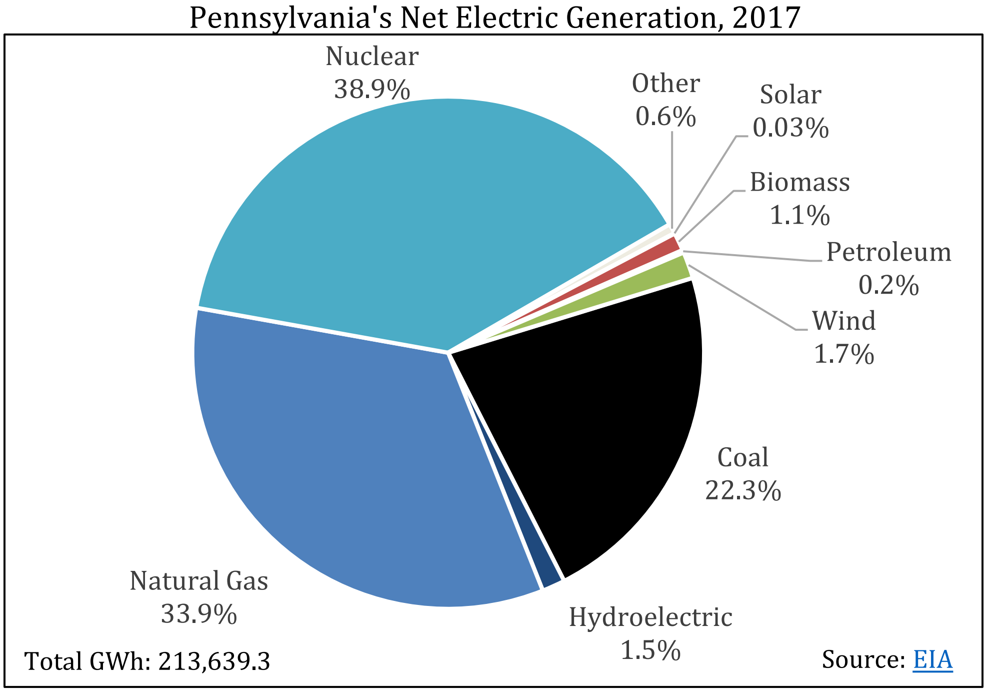
State Brief: Pennsylvania

BACKGROUND



Pennsylvania ranks second in the country (behind Texas) for total energy production, second in natural gas production (behind Texas), and third in coal production (behind Wyoming and West Virginia).

Pennsylvania generates the largest percentage of its electric power (approximately 40%) from nuclear power, followed closely by natural gas (33%). For economic reasons, the 819 megawatt (MW) Three Mile Island nuclear facility is scheduled for closure in September 2019. First Energy has announced it will close the Beaver Valley reactors in 2021. In an effort to avoid the closures, legislation (SB 510) was introduced this year to add a third tier to the state's alternative energy standard and allow a capacity payment for nuclear power.

The Keystone State's greenhouse gas (GHG) emissions from coal fired electric generation decreased 45% between 2005 and 2015, reducing annual coal emissions by 50 million metric tons of carbon dioxide equivalent ($MMTCO_2e$). However, during the same time, emissions from natural gas electricity generation increased 546%, increasing annual greenhouse gas emissions from natural gas generation by 20 MMT CO_2e.

A 2019 report by the National Association of State Energy Officials and the Energy Futures Initiative found that Pennsylvania has 113,168 traditional energy workers (1.9% of state employment) and an additional 68,820 workers employed in energy efficiency. According to the most recent verified U.S. Energy Information Administration (EIA) data available, installed wind capacity nearly doubled between 2010 and 2013, however, since that time, wind generation has remained mostly flat, increasing only 7% between 2013 and 2017.

In 2004, Act 213 established an "Alternative Energy Standard" of 18% by 2021. Within the standard, there is a requirement of 8% from "tier I" resources (such as solar, wind, biomass, and low impact hydropower) by 2021 and "tier II" resources of 10% by 2021, which includes a variety of resources including: gasification of coal, large hydropower, energy efficiency, combined heat and power, and distributed energy less than 5 MW in capacity. The standard also includes a .5% solar carve-out.

The Pennsylvania Public Utility Commission (PUC) regulates 11 electric distribution companies and 25 gas utilities in the state. The bipartisan PUC has five appointed commissioners. Currently, there are two Republicans and three Democrats on the commission; Gladys Brown Dutrieuille is Chair. Republican majorities control both chambers of the General Assembly, and Democratic Governor Tom Wolf was elected in 2014.

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.

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

The transition to a digital economy requires affordable, sustainable, and reliable electricity and presents challenges and opportunities to the grid. Emerging physical and cyber security threats, along with increased demand for faster outage response times, require, at minimum, real-time incident tracking and response capabilities. Increased grid penetration of renewable energy coupled with the adoption of advanced metering, energy storage, microgrids, electric vehicles, and other technologies to modernize our electric system will provide economic benefits, increase security, and ensure more reliable, resilient, and clean electricity. These innovations will require substantial planning and investment in grid technologies.

Grid modernization will require a suite of state and federal policy changes to support advancements in grid technologies, grid management, and utility regulation. Grid modernization strategies, while recognizing regional and inter-state diversity and avoiding one-size-fits-all plans, should take a holistic view of the electric system.

Although the GridWise Alliance's latest Grid Modernization Index ranks Pennsylvania at seventeenth in the country for grid modernization efforts, the state is ranked much lower for customer engagement due to a lack of policy direction customer energy usage data (legislation introduced in 2019 – HB 310 – attempts to address the access component of this issue).

There are policies that Pennsylvania's policymakers could adopt to support in-state modernization efforts.

1. Develop a grid modernization strategy through a stakeholder process. Alternatively, states might decide to require that utilities develop and propose a ten-year grid modernization plan to the public utilities commission within a specified timeframe. Utilities would then be required to implement that plan within another specified timeframe. Strategies and/or plans should outline a clear set of grid modernization goals and describe methods to measure, report, verify, and enforce progress towards those goals.

2. States might also provide incentives or cost recovery mechanisms for utilities that meet grid modernization goals. Policymakers could consider directing the PRC to evaluate alternative ratemaking mechanisms, performance-based regulation, and/or new utility business models that support grid modernization.

3. Require that utilities' integrated resource plans (IRPs) include plans to enhance cybersecurity, integrate distributed energy resources (including electric vehicles and energy storage), increase smart meter deployment

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[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.

and demand response and/or demand-side management (DSM) programs, and measure and report on the results of grid modernization efforts.

4. Pennsylvania does not have clear state policies governing energy data ownership, customer data access and privacy protections. To address this, policymakers should develop legislation or rules that, at minimum, do the following: clarify who owns the energy data associated with consumer 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 possible. Standards for sharing of data are articulated in a report by the Pennsylvania Web Portal Working Group. The state could establish customer access to energy data through a program like Green Button.

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.

The flexibility of battery storage, combined with advanced metering infrastructure, allows customers to control, for instance, 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.

Two major trends have enabled increased deployment of energy storage: declining costs and technological advances. State policy can help maximize these benefits through a combination of establishing a framework for easy integration of energy storage into the grid and establishing a marketplace that monetizes the benefits of energy storage for cost-effective investment.

In addition to evaluating energy storage's benefits to the grid, there are several additional 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. This can be accelerated through "Distribution System Planning."

3. Require that utilities' IRPs include 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 utilities to 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 creating 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 limit the amount of utility owned storage to be procured; require that a certain amount of storage be targeted to low-income customers; and create carve-outs for specific amounts of storage to be procured at the transmission, distribution, and customer levels. Procurement targets can jump-start market creation, spur fast learning, and guide the development of a regulatory framework.

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 and/or as the cost of storage decreases. 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 could help reduce their demand charges. Policymakers might want to start first with a policy that provides grants to pilot projects. Policy might also target solar system owners. Financial incentives should be designed to ensure that the state will meet other goals including emissions and peak demand reductions, and equitable access to clean energy.

6. Clear data access policies that allow third parties to provide energy management services based on signals from the utility can greatly increase the value of efforts to monetize the value stream offered by energy storage. (See discussion above, under Grid Modernization.)

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 2019 Bloomberg New Energy Finance report predicts that renewable resources will generate at least 60% of total global electricity and 43% of U.S. electricity 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 interest of policymakers to ensure that their states are well positioned to benefit from the transition to clean energy resources.

To reduce barriers to customer and utility participation in the renewable energy market, policymakers in Pennsylvania might consider several 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, Pennsylvania's policymakers could consider adopting IREC's model interconnection procedures, removing net metering system size limitations and allow for an ongoing carry-forward of net metering credits beyond an annual true-up payment (which is considered taxable income). 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 Philadelphia 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 where they live or work. Allowing shared, or community, renewable energy projects addresses these barriers. These projects have multiple owners or subscribers who pay for a portion of the project or the generation provided by the system. Introduced this year, HB 531 would create a community solar program.

   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 ensured 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 LMI customers. States that have a shared renewable program may want to coordinate this program with implementation of the federal Weatherization Assistance Program or the Low Income Home Energy Assistance Program to provide recipients of assistance with participation in a shared renewable system.

There are several additional policy options that Pennsylvania 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. Over the last five years, over 16 gigawatts (GW) of renewable contracts have been announced by corporate entities. This is leading policymakers to provide additional avenues for businesses to procure renewable energy. In light of the fact that the state's alternative energy standard is about to expire and is not significantly pushing additional renewable development, the state could look at establishing a process at the PUC for incorporating corporate renewable procurement targets into the state's IRP process. It is prudent to incorporate corporate renewable purchase commitments into the IRPs that utilities submit to regulators to plan for resource needs over multiple decades. By integrating these renewable purchase commitments into the IRP process, regulators can avoid over-building resources and stranding generation assets.

Utility-Oriented Policies

Some states have created programs that aim to reduce greenhouse gas (GHG) emissions and increase investments in clean energy resources. Pennsylvania's Alternative Energy Portfolio standard applies to two tiers of resources – Tier 1, which includes utility scale solar, wind, biomass and hydropower resources is required to make up 8% of utility sales by 2021. This standard has largely been met. Pennsylvania has seen lagging wind development and utility scale solar development relative to other areas of the country. Simultaneously, the state's utilities have announced the closure of two large nuclear plants and a coal plant due to uncompetitive economic conditions – meaning a large amount of generation will be required to replace retiring generation. This creates the opportunity for a new standard to replace the old one. Some concepts that could be included in the new standard are:

- A carve-out within the larger standard to advance solar resources. This could be crafted to include a specific portion for utility scale, distributed scale, and customer-sited systems.
- Requirements that utilities evaluate NWAs, which could include distributed energy resources such as storage, customer-sited solar, demand response programs, and other technologies that could serve as an alternative to large, centralized generation and transmission resources.

Pennsylvania's policymakers might also consider the following:

1. Emission standards are designed to drive emission reductions through either 1) a carbon portfolio standard or 2) a market-based approach. Both types of approaches can take a technology neutral stance that drives emissions down with a combination of renewables, traditional fuels, efficiency, and technological advances. These policies can also address other concerns such as pollution, asthma risk, environmental justice, and water use.

   A portfolio emissions standard sets emissions reduction targets to be achieved over time. This can be implemented through the utility planning process or by establishing a maximum allowable rate of emissions per unit.

   Market-based approaches can take the form of an emissions trading regime or a tax. Under a market-based approach, a state or a group of states might set a certain emissions reduction target, for example, 40% below 1990 levels by 2030. This reduction is achieved by the distribution of annual emission allowances that decrease over time until the goal is met. Allowances can be bought and sold on a market that allows utilities and other emitting firms flexibility in reaching total emissions goals. Revenue generated by these markets can be used to support the development of renewable energy, energy storage, and energy efficiency programs. There are emissions trading markets in operation today that states can join. The other pathway to reaching emissions targets is through a tax on fossil fuel use that can be used to generate revenue to fund emissions reductions policies and technologies and to incentivize the reduction of emissions over time. One of the advantages of a market-based program is that these are designed to reduce emissions in the most economically efficient manner possible.

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 requirements that focus on peak demand; a moratorium on the construction of new peaking units or a phase out of existing units; incentives 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

Bloomberg New Energy Finance estimates that 57% of all new passenger vehicle sales will be electric by 2040 and that price parity with conventional vehicles will be met for most segments in the mid-2020s. Designing infrastructure that will facilitate easy connection of EVs to the grid is a key part of building a modernized grid. The relationship between the increased adoption of EVs and the availability of EV charging stations is complicated. On the one hand, consumer range anxiety creates a barrier to increased adoption. On the other hand, while greater availability of charging stations would ease this anxiety, the relatively low numbers of vehicles on the road provides little incentive to install and make these stations available to the public. The good news is that both supportive policies for developing charging infrastructure and advancements in technology have eased range anxiety.

A few incentives for alternatively fueled vehicles are currently available in Pennsylvania. Vehicle incentives are based upon battery size with a maximum qualifying vehicle price of $60,000. The qualifying vehicle price could be reduced (many vehicles are now on the market for lower prices) and that could help to finance larger incentive levels particularly for all EVs. Low-income purchasers are allotted an additional $500 in rebate value – that value could be extended to used vehicles (most low-income vehicle buyers are not purchasing new) and the qualifying requirements could be amended to cover to a larger number of purchasers. The state might consider a program targeting low-income customers for trade-in EVs. With increasing battery capacities and falling prices, there are many EVs with few miles on them that are relatively new and are being traded in. While low-income customers may not qualify for a loan directly, a program through the state could facilitate sales to low-income purchasers (for example, loan loss reserve programs, interest buy down programs, and expanding the Keystone HELP and Keystone Advantage Programs).

In February of 2019, the Pennsylvania Department of Environmental Protection released a report entitled "Pennsylvania Electric Vehicle Roadmap". The report identified a number of key next steps including: establishing an electrification directive for utilities and the PUC, expanding charging infrastructure, increasing incentives for vehicle purchase, and establishing EV ready building codes. There are several policy opportunities to further encourage and prepare for increased market penetration of EVs in the state, including:

1. Establishing an Electrification Directive – The PUC receives its authority from the legislature; however, it is unclear what the priorities are for the regulatory body in achieving specific vehicle electrification goals. The Legislature could clearly articulate the objectives of the PUC to achieve specific statewide electrification goals and the responsibilities of the utilities to invest in that expansion. It would be helpful for the legislature to identify the responsibilities of the retail utilities versus the regional transmission authority in preparing for an electrified transportation future as well as the allowable returns to those entities for making necessary investments. Finally, the legislature could instruct the PUC to open a proceeding to receive proposals from the utilities on how to best achieve electrification objectives within their service areas.

2. EV and EV Supply Equipment (EVSE) Financing and Financial Incentives – Providing 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 the credit is not applied at the time of purchase.[3] For vehicles, income tax credits should be made transferrable so they can be assigned to the dealership to apply the savings at the time of purchase. 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.

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

3. State 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 attempt to pair the appropriate level of charging with a reasonable amount of time a person will be at that location. Legislation could direct a state agency to develop an infrastructure plan through a stakeholder process.

4. Regulatory approaches – Pennsylvania's building energy codes can be modified to require 220 wiring to garages, which will make the installation of charging infrastructure in a garage much less expensive in the future. For home charging units, the cost of wiring can be more than the charging units themselves. A less prescriptive approach could require the option of including wiring to the garage when a homebuyer is choosing a design package. 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. Some states like Hawaii have included a requirement for parking areas based on the number of parking spaces – for example for every 100 parking spaces, there must be one EV parking space with at least a level 2 charger.

5. Pennsylvania could investigate adopting California's zero emission Vehicle (ZEV) standards. As a member of the U.S. Climate Alliance, Pennsylvania has signed the Nation's Clean Car Promise to support the creation of a national clean car standard. The state is also a member of the transportation climate initiative (TCI), which is exploring regional policy options to reduce emissions from the transportation sector.

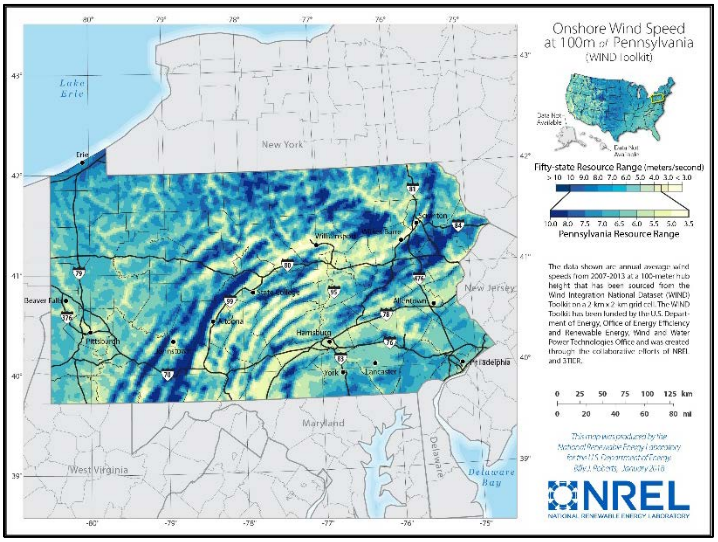
NEWS

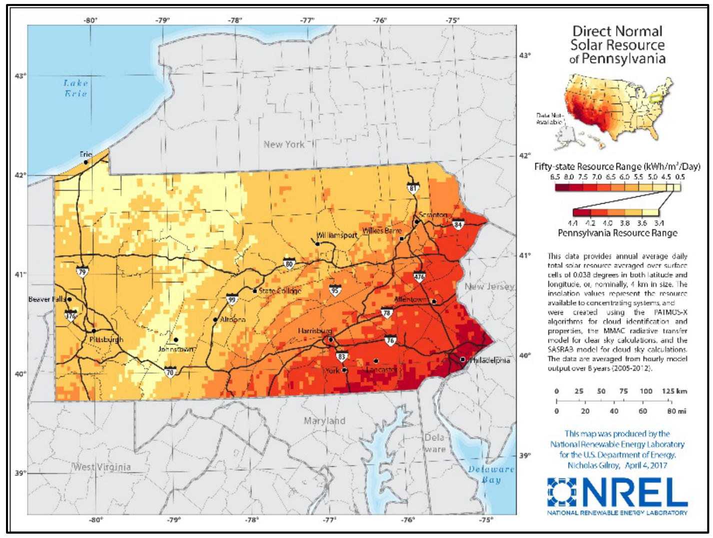
- August 15, 2019: City Rebates Brighten Solar Appeal to Reach Energy Mix Goal
- August 13, 2019: First Energy Solutions Accelerates Closure of Pennsylvania's Largest Coal Plant
- August 7, 2019: Pennsylvania Promotes Playbook for Redeveloping Former Coal Plant Sites
- August 4, 2019: PA Governor Wolf Announces $8.5M from Volkswagen Settlement to Reduce Transportation Pollution
- August 2, 2019: Rep. Synder Encourages Small Businesses, Farmers to Apply for Green Technology, Energy Efficiency Grants
- July 25, 2019: Cities, Attorneys General Call for New Leader of PJM Interconnection to Focus on Clean Energy
- July 17, 2019: Pennsylvania had More Solar Projects Installed this Year, but Still Lags far Behind Nearby States
- June 17, 2019: Study Finds 10% Solar Energy Generation Could Save Pennsylvania $619 Million Yearly
- May 8, 2019: Three Mile Island Nuclear Power Plant is Shutting Down
- May 7, 2018: 'What Does the Science Say?': Bipartisan Group of Legislators Reintroduces Bills to Get Pennsylvania 100% Powered by Renewable Energy

OTHER RESOURCES

- The American Council for an Energy-Efficient Economy State and Local Policy Database, Pennsylvania: https://database.aceee.org/state/pennsylvania
- The Database of State Incentives for Renewables and Efficiency, Pennsylvania: http://programs.dsireusa.org/system/program?fromSir=0&state=PA
- U.S. Energy Information Administration, Pennsylvania: https://www.eia.gov/state/?sid=PA
- American Wind Energy Association (AWEA): https://www.awea.org/resources/fact-sheets/state-facts-sheets
- National Renewable Energy Laboratory Biomass Maps: https://www.nrel.gov/gis/biomass.html
- U.S. Department of Energy's Alternative Fuels Data Center, Pennsylvania: https://www.afdc.energy.gov/states/pa
- SPOT for Clean Energy, Pennsylvania: https://spotforcleanenergy.org/state/pennsylvania/
- The Rocky Mountain Institute: From Gas to Grid – Building Charging Infrastructure to Power Electric Vehicle Demand
- The GridWise Alliance: EVs - Driving Adoption, Capturing Benefits
- The Regulatory Assistance Project: Performance-Based Regulation
- The Energy Storage Association: Advanced Energy Storage in Integrated Resource Planning.

PENNSYLVANIA'S WIND AND SOLAR RESOURCES
WIND https://windexchange.energy.gov/states/pa
SOLAR https://www.nrel.gov/gis/solar.html





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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