

Pennsylvania  
Energy Programs Office

# CLEAN ENERGY PROGRAM PLAN

*Priorities in Renewable Energy  
and Energy Efficiency, Security,  
and Workforce Development*

2023-2025





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# Foreword

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The Energy Programs Office (EPO) is the U.S. Department of Energy-recognized Pennsylvania State Energy Office and has operated within the Pennsylvania Department of Environmental Protection (DEP) since 1995.

EPO has increased its leadership role in response to changes in the energy marketplace and an ever-greater focus on the relationship between energy acquisition, energy use, infrastructure modernization, jobs, resiliency, health, and the climate. In 2019, over 90% of Pennsylvania’s greenhouse gas (GHG) emissions came from energy production and use. Clean and diverse energy supply resources and energy efficiency are key to reducing these emissions, thus mitigating climate change and its impacts while assuring the availability and reliability of critical energy services and systems.

EPO is leading efforts in climate planning, energy assurance and resiliency planning, solar future planning, transportation electrification, and the continuous prioritization of energy conservation and efficiency throughout all sectors of Pennsylvania’s economy. In tandem, EPO increasingly has integrated equity, access, and inclusion to address the needs of and effects on vulnerable communities in the commonwealth in our program planning. By regularly assessing our progress, updating plans, improving implementation efforts, and examining the efficacy of our actions taken, EPO aims to continue to lead energy innovation and accomplish its mission.

We continue to innovate and expand our collaborations with federal, state, and local officials, including business, community, and academic leaders, to implement programs that benefit all Pennsylvanians. We hope this updated plan will inform our current partners and those who may seek to work with us to achieve Pennsylvania’s long-term clean energy and climate goals. We invite you to read this plan and consider how we may work together to successfully deploy more clean energy programs in Pennsylvania.

David A. Althoff, Jr.  
Director  
Energy Programs Office

# Executive Summary

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The 2022 Clean Energy Program (CEP) Plan builds on the 2020 CEP Plan, documenting progress made, refining ongoing priorities, and presenting additional new priorities for the Pennsylvania Energy Programs Office (EPO) for program years 2023-25.

## Progress on 2020 Priorities

EPO has made significant strides in implementing programming and planning to achieve the goals established in the 2020 CEP Plan.

- Launched the fourth year of the Local Climate Action Plan with participants representing 54 municipalities, five counties, and five regional planning offices. EPO positioned the program to be taken over and expanded by the Penn State Sustainability Institute.
- Developed and launched an online resource hub and series of outreach events to provide solar energy guidance to local government and community leaders.
- Recruited a cohort of nine wastewater treatment plants to receive an energy assessment and participate in an accelerator program designed to improve energy efficiency and integrate resiliency through training, developing an energy management plan, and continuing to track and report their energy usage.

These successes represent just a small subset of the progress EPO and its partners have made on the priorities and goals outlined in the 2020 CEP Plan.

## Incorporation of New Opportunities

Since 2020, EPO has also welcomed several new opportunities such as the Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA) to inform the priorities within this plan. EPO will be receiving approximately \$60 million in formula awards from IIJA to address energy security, energy assessments, and clean energy financing and over \$200 million in IRA funding to provide residential energy efficiency and electrification rebates.

## Priorities: 2023-25

This plan serves as the blueprint for EPO’s role in supporting the commonwealth’s long-term clean energy goals while fulfilling EPO’s obligations to support energy conservation and efficiency, advance diverse clean energy technologies, and ensure energy security and resilience. The actions in this CEP Plan (see Figure 1) will help give all Pennsylvanians cleaner, healthier, and more affordable and reliable energy choices.

Figure 1. EPO's Program Priorities 2023-25

**Program Priorities 2023-25**

- ONGOING
- UPCOMING (Launching 2023-25)

**Renewable Energy & Efficiency**

- Clean energy financing initiatives
- Alternative Energy Portfolio Standard, solar energy siting, outreach and training
- Biomethane, food waste utilization
- Renewable energy/energy efficiency revolving loan funds
- Residential efficiency and electrification rebate programs
- Renewable energy/energy efficiency grants and financing for municipalities and non-profits

**Energy Security & Resilience**

- State energy security planning and continuity of operations planning
- Critical facilities energy security analysis and planning
- Clean and resilient microgrid deployments (Building Resilient Infrastructure and Communities Program)
- Electric grid reliability, smart grid, rural and urban energy resilience planning

**Climate & Energy**

- Act 70 climate program
- Pennsylvania GreenGov Council sustainability initiatives (state and municipal)
- Industrial decarbonization (hydrogen and carbon capture utilization and storage)
- Building decarbonization and electrification
- Community climate and decarbonization planning

**Energy Workforce**

- Clean energy workforce analysis, training and development
- Shared energy manager for local governments
- Building energy codes training
- Industrial and municipal energy audits (training and deployment)

**Transportation**

- Alternative fuel vehicle and infrastructure incentive programs
- Residential, municipal and dealership education and outreach programs
- Electric vehicles and infrastructure incentive programs

**Adapting for the Future**

Along with pursuing its 2023-25 priorities, EPO will continue to actively identify and track energy trends and technologies to anticipate and utilize emerging technologies. These include opportunities with hydrogen, small modular nuclear reactors, virtual power plants, and advanced energy storage. Activities regarding future technologies are already underway. EPO has been coordinating an Energy Storage Consortium since September 2021 to identify ways to further deploy advanced storage. EPO has also been participating in the Energy Horizons Cross-Sector Collaborative (Collaborative), which focuses on opportunities to develop hydrogen production resources in Pennsylvania. Led by Team Pennsylvania, a non-partisan nonprofit established to connect private and public sector leaders to achieve and sustain progress for Pennsylvania, the Collaborative's mission is to create a regional ecosystem to achieve decarbonization, transition to clean hydrogen, and pursue federal investments to support these endeavors.

# Introduction to the 2023-25 Clean Energy Program Plan

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A review and update of the 2020 Pennsylvania Clean Energy Program (CEP) Plan is necessary to ensure progress on critical efforts to further a cleaner, more efficient, and secure energy future.

This updated version is not a wholly new plan, but rather a timely update that describes how the Energy Programs Office (EPO) continues to build on previous priorities while focusing on the next two years of program planning. The updated 2022 CEP Plan helps to fulfill EPO’s continuing state energy planning obligation as the U.S. Department of Energy-recognized State Energy Office and defines EPO’s current priority actions. It also discusses recent changes to the energy and policy landscape that affect EPO’s priorities.

The 2022 CEP Plan builds on recent successes driven by recommendations for program development included in the first CEP plan, captures new and recently introduced initiatives and programs, and outlines EPO’s priorities for 2023-25.

The new and evolving programs described in this CEP Plan—along with the accompanying guiding principles, best practices, strategies, and measurement and evaluation tools—will shape EPO’s design and deployment of clean energy programs over the next two program planning years and beyond.

This document provides a comprehensive accounting of opportunities that integrates EPO’s current energy-related initiatives and goals with new and upcoming opportunities and priorities. This CEP Plan achieves this by:

- Describing EPO’s roles and responsibilities for current policy implementation and programs.
- Identifying new opportunities and realized successes since the 2020 CEP Plan.
- Identifying actions that EPO intends to undertake in the next two program planning years to build, enhance, and expand on past and current programs, consistent with long-term goals and state policies.
- Discussing how to anticipate potential future events and mitigate disruptions that may impact the implementation of this CEP Plan.

By presenting an overview of all EPO’s work, the CEP Plan enables government officials and other leaders, as well as analysts, other technical experts and businesses and citizens, to quickly understand and access information on Pennsylvania’s energy plans and programs. The plan provides a one-stop summary of information and access to the program resources that EPO is and will be developing to achieve its mission and objectives.



Lastly, this CEP Plan serves as a guide on how EPO intends to fulfill its obligations to support energy conservation and efficiency, advance diverse clean energy technologies, and provide energy security and resilience while improving the environment and health of Pennsylvanians through education, outreach, funding, and technical support. Through this CEP Plan EPO is continuing to further the Commonwealth of Pennsylvania’s role as an energy leader by outlining near-term actions to achieve its ambitious long-term clean energy and climate goals. The actions in this plan will provide all Pennsylvanians with cleaner, healthier, and more affordable and resilient energy choices.

## Overview of the Energy Programs Office

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### Mission

EPO was first established by the Governor’s Energy Council under Executive Order 1979-7. EPO was initially tasked with developing a comprehensive energy plan for the commonwealth by distributing federal and private energy funds, collecting and distributing energy information for the public, and helping to assess, track, and regulate energy sources. Further executive orders and acts since then have refined and supported EPO’s current functions as the commonwealth’s lead agency for energy policy development (see Appendix A).

As the primary entity implementing energy programs in the Commonwealth of Pennsylvania under the leadership of the Department of Environmental Protection (DEP), EPO’s mission is as follows:

*To maintain the statutory responsibilities of the Pennsylvania Energy Office, to support the development of clean and indigenous energy resources, to advance conservation and efficient use of diverse energy resources to provide for a healthier environment, to achieve greater energy security for future generations, and achieve the mission of DEP to protect Pennsylvania’s air, land, and water from pollution and provide for the health and safety of its citizens through a cleaner environment.*

EPO carries out its mission through work that accomplishes the following five activities:

1. Promoting and encouraging energy conservation and efficiency.
2. Deploying advanced energy technologies.
3. Ensuring energy security and resilience.
4. Reducing GHG emissions and adapting to climate change impacts.
5. Performing energy education and outreach.

Through this work, EPO helps Pennsylvanians make smarter energy choices that reduce pollution and energy use and expand the use of renewable and other clean energy solutions.

A central focus of EPO’s work is helping government leaders and stakeholders understand the current and potential future landscape of energy programs and initiatives, as well as the social equity, health, and economic benefits of these programs for Pennsylvania’s residents.

Key factors such as socioeconomic status, race and ethnicity, sex, gender, age, English language proficiency, and disability play major roles in Pennsylvanians' vulnerability to energy disruptions, disasters, and climate change. EPO considers and addresses these issues in the development of its long-term energy goals and plans. Within this longer-term context, EPO implements near-term actions that progress toward achieving its goals.

## How EPO Ensures Success

EPO continuously deploys several techniques to ensure that programs operate as effectively as possible, including:

- Identifying the potential for technology to both solve problems and disrupt normal business practices in the energy marketplace.
- Using available tools to anticipate needs and modify programs.
- Tracking and securing federal and other funding to support existing and new programs that further EPO's mission.
- Dedicating deliberate staff time and efforts to planning and building relationships with a broad set of stakeholders with diverse perspectives.
- Creating flexible programs to adapt to evolving new technologies, energy market shifts, resilience considerations, and the needs of Pennsylvania residents and businesses.
- Maintaining streamlined third-party support for technical assistance to quickly understand energy system changes and adjust programs accordingly.
- Seeking regular input from stakeholders to keep program implementers informed of relevant changes to the energy landscape in the commonwealth.

Additionally, EPO's work is guided by best practices and principles, including:

- Collaborating with other agencies and organizations.
- Conducting program impact assessments.
- Considering potential and actual program effects on equity, access, and inclusion to better serve vulnerable communities.
- Including diverse stakeholders in program design and evaluation intentionally and early.
- Measuring and evaluating program results and tracking progress.
- Marketing programs and results.
- Integrating energy assurance and resilience in planning efforts.

By applying these principles and practices, EPO is better able to plan and implement programs to achieve its goals.

## How to Contact EPO

The Energy Programs Office headquarters is located in the Rachel Carson State Office Building, 400 Market Street, Harrisburg, PA. Staff can be contacted via phone or email at 717-783-8411 or [RA-epenergy@pa.gov](mailto:RA-epenergy@pa.gov)

The Energy Programs Office website can be found using the DEP website: [www.dep.pa.gov](http://www.dep.pa.gov) and selecting "Business" then "Energy" then "Energy Programs Office".

## Successes Driven by the 2020 Clean Energy Program Plan

The 2020 Clean Energy Program (CEP) Plan was developed to provide a clear, comprehensive plan to describe EPO’s priorities to enable leaders, analysts, and experts to quickly understand and access information on Pennsylvania’s energy plans and programs. The plan described Pennsylvania’s position as an energy leader and outlined actionable near-term priorities to achieve Pennsylvania’s long-term clean energy goals. Recent successes in local climate action planning, developing solar guidance, working with local governments, and providing outreach to wastewater treatment plant operators all illustrate the progress driven by our 2020 CEP Plan. Additional successes are highlighted throughout this document and in Appendix B.

### Conducting Climate Action and Energy Work with 64 Local Government Partners

DEP’s Local Climate Action Program (LCAP) began its fourth year in 2022, enrolling 64 new local government partners, including 54 municipalities, 5 counties, and 5 regional planning organizations. More than 440 municipalities, including 46 environmental justice communities, have participated in LCAP since it launched in 2019.

*“My administration has prioritized sustainability by identifying initiatives that demonstrate environmental, social, and financial benefits that will positively impact our residents’ quality of life. The city’s staff has also done an outstanding job utilizing the training, technical support, and available resources to shape and improve our future. I thank DEP for supporting the City of Reading in its transition to become more climate-resilient and a regional leader in renewable energy and sustainability.”*

—City of Reading Mayor Eddie Moran, LCAP 2021-2022

At least 19 local governments have officially adopted their climate action plans, and another 17 have completed draft plans. Additionally, 51 greenhouse gas (GHG) inventories have been completed by local governments. For the 2022-23 fiscal year the program is expanding, and the Penn State Sustainability Institute has taken over the management and instruction of the program.

As a companion program, DEP’s Shared Energy Manager program assists LCAP participants with implementing their climate action plans. To date, 10 communities have participated. The Shared Energy Manager program provides support for conducting building energy assessments, developing energy management plans and studies on adopting renewable energy, and electrifying fleets.

## **Providing New Solar Energy Guidance Resources to Assist Local Governments, Businesses, Residents, and Developers**

To accelerate the use of solar energy across the commonwealth, EPO led the development of solar guidance to provide local governments and communities with a wealth of information, tools, and instructions. This guidance, along with the delivery of new and up-to-date resources, is benefitting local officials, installers and providers, and residents by providing recommendations and information for permitting, planning, zoning, and utility interconnection. The resources are living documents that will be updated and maintained as an online resource for users.

In addition, since May 2021, EPO has contracted with Penn State Extension to provide additional guidance for local governments. This includes the following components:

- Direct outreach to local governments in areas with high concentrations of proposed projects.
- Recurring forums for local governments and residents to discuss solar development topics.
- Solar ordinance research to examine best practices and demonstrate how they can optimize project design.
- A solar development guide of research-based information to provide information on the physical, environmental, land use, and economic impacts of solar development.

## **Conducting Outreach to Wastewater Treatment Plant Operators and Increasing Energy Efficiency Awareness and Measures at Nine Plants**

In 2021, EPO partnered with the U.S. Department of Energy's (DOE) Better Buildings Sustainable Wastewater Infrastructure of the Future (SWIFt), an accelerator program designed to assist wastewater utilities with improving energy efficiency and integrating resiliency. EPO recruited nine wastewater plants across Pennsylvania from a list of over 150 that would most benefit from the program and were interested in receiving energy management assistance.

The selected plants committed to participating in the training, developing an energy management plan, and continuing to track and report their energy usage and any implemented energy conservation measures through the fiscal year 2022-23. During the program, the plants received five SWIFt trainings, and EPO benchmarked their energy use using ENERGY STAR Portfolio Manager and used State Energy Program (SEP) dollars to perform an American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Level 2-equivalent energy assessment of their plant operations. An assessment report was provided to each plant with energy conservation and efficiency measures and cost savings.

## Current Activities and New Opportunities

### EPO’s Responsibilities and Efforts as the State Energy Program

The goal of the Pennsylvania State Energy Program (SEP) is to expand the use of renewable energy, improve energy efficiency, enhance energy and grid security, and advance innovative clean energy technologies in the commonwealth. This is achieved through outreach programs, training opportunities, grants, and technical assistance. The Pennsylvania SEP is funded by the U.S. Department of Energy (DOE) through an annual formula grant, and DEP submits an annual plan to U.S. DOE detailing upcoming projects.<sup>1</sup> The SEP provides a substantial portion of EPO’s annual financial resources and supports EPO staff positions that conduct many of the programs described in this plan.

Pennsylvania’s 2022 SEP Plan includes programs and initiatives to address renewables, energy efficiency, energy security, clean transportation, energy workforce development and climate change. The plan also includes opportunities to provide and receive technical assistance related to federal grant or loan programs, including applying for energy funding and developing procedures to ensure compliance with federal regulations. By encouraging reduced energy use and renewable energy development, the expected outcomes of the SEP initiatives are to reduce air pollution, provide opportunities for technology development and job growth, improve quality of life, and increase energy security.<sup>2</sup>

The current 2022-23 Pennsylvania SEP program implemented by EPO is supporting the following programmatic actions and efforts:

- **Renewable Energy and Energy Efficiency**
  - **Solar Assistance for Local Governments:** Supporting local governments considering the siting of grid-scale solar projects in their communities.
  - **Solar on Mine Lands Assessment:** Developing strategies to support the deployment of grid-scale solar on environmentally impacted lands.
  - **Commercial Kitchen Modernization Program:** Developing an education and rebate program to install energy efficient electric kitchen equipment at K-12 school districts, higher education institutions, and nonprofits whose missions focus on health care or community services.
  - **Agriculture Energy Efficiency Rebate Program:** Continuing to fund an incentive program to support the agriculture sector through rebates for energy efficient LED lighting, efficient ventilation systems, and efficient milk pumping, cooling, and refrigeration equipment.

<sup>1</sup> Pennsylvania DEP. 2022. *State Energy Program Narrative Information Worksheet*. DOE F 540.1, U.S. Department of Energy.

<sup>2</sup> Ibid.

- **Energy Security and Resilience**
  - **Microgrid and Energy Storage at Critical Facilities:** Continuing a microgrid education and outreach program to local governments while conducting initial feasibility studies at critical facilities.
  - **Energy Storage Consortium:** Continuing to facilitate the Energy Storage Consortium to share information and develop energy storage opportunities to maximize the benefits and viability of renewable energy generation and energy resiliency in Pennsylvania.
- **Climate and Energy**
  - **Local Climate Action Planning:** Supporting Penn State's Sustainability Institute to train college student and local government teams on the development of greenhouse gas inventories and local climate action plans.
  - **Climate Network:** Continuing to develop Pennsylvania's network of climate professionals and a curriculum for new training opportunities, lead climate change trainings, as well as plan and deliver a statewide climate change conference.
  - **Pennsylvania Climate Action to Benefit Disadvantaged Communities:** Creating a plan for community engagement to solicit and coordinate input from leaders in disadvantaged communities and experts on Diversity, Equity, and Inclusion (DEI). This effort will result in a guide that addresses how to implement climate strategies for maximum benefit to disadvantaged communities and work toward eliminating barriers to climate resilience. (See the box to the right for more information.)

**Incorporating Environmental Justice and Equity Is Integral to EPO's Programming**

Environmental justice embodies the principle that communities and populations should not be disproportionately exposed to adverse environmental impacts. Historically, non-white and low-income Pennsylvanians have experienced disproportionate adverse environmental impacts and often face greater obstacles in accessing state funding and resources to improve environmental outcomes. EPO recognizes that the intentional, proactive inclusion of voices that have historically been inequitably represented in environmental decision-making is essential to ensuring that its programs maximize the equitable distribution of benefits to all Pennsylvania residents, businesses, and communities.

Many DEP programs already include special considerations for low-income and otherwise disadvantaged populations, but EPO continues to seek new opportunities to further improve equitable outcomes. For example, EPO is currently developing the Climate Action for Disadvantaged Communities program as an opportunity to engage with Pennsylvanians from historically disenfranchised groups to better understand what resilience challenges are most critical to these communities, where gaps in services and support exist, how EPO can design and modify its work to better meet these needs, and how DEP can better include and represent disadvantaged communities to ensure future success.



- **Energy Workforce**
  - **Energy Code Trainings:** Providing residential and commercial energy code and inspection training programs with a focus on code officials and third-party agencies contracted to municipalities, including design professionals, contractors, builders, and developers.
  - **Clean Energy Workforce Report:** Updating Pennsylvania's Energy Employment Report and Clean Energy Employment Report for 2022 using data collected, in part, from the 2022 U.S. Energy Employment Report, as well as data on unionized workers in the field of clean energy.
- **Transportation**
  - **Hydrogen Heavy Duty Transportation Roadmap:** Creating a Pennsylvania Heavy-Duty Hydrogen Vehicle Roadmap (PA HDH Vehicle Roadmap) to augment the existing *Pennsylvania Electric Vehicle Roadmap*.
  - **Municipal Electric Vehicle (EV) Guide:** Conducting municipal EV education and feedback sessions, providing EV and charging infrastructure technical assistance to diverse Pennsylvania municipalities, and creating EV planning resources for Pennsylvania municipalities including an EV Guidebook.
  - **EV Dealership Outreach and Education:** Providing an onsite training resource for car dealerships and salespersons to educate themselves and then the public on EV operation, charging, and incentives during the car shopping experience.

## EPO's Implementation of Act 70 of 2008, the Pennsylvania Climate Change Act

Act 70 of 2008, also known as the Pennsylvania Climate Change Act, requires DEP to annually compile an inventory of Pennsylvania's greenhouse gas (GHG) emissions, develop a voluntary registry of GHG emissions, conduct a Pennsylvania Climate Impacts Assessment (PCIA), develop a Climate Action Plan (CAP), and administer a Climate Change Advisory Committee (CCAC).

These mandates are tied to EPO's mission and therefore directly affect its programming efforts. EPO prepares the update to the Commonwealth's CAP and PCIA, which assess the impacts of climate change in Pennsylvania, ways to address those impacts, and Pennsylvania's GHG emissions goals and reductions strategies. EPO crafts its program planning while considering the strategies outlined in the plan to assist in achieving emissions reduction targets.

The CCAC advises DEP on the implementation of Act 70's provisions. Membership includes appointed individuals from the science, business and industry, transportation, labor, and other affiliated communities. The CCAC provides input and guidance for the development of and updates to climate change-related reports such as the CAP and PCIA. EPO oversees the operation of the CCAC.<sup>3</sup>

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<sup>3</sup> Pennsylvania DEP. 2022. *Climate Change Advisory Committee*. Accessed October 20, 2022. <https://www.dep.pa.gov/Citizens/climate/Pages/CCAC.aspx>

In addition to directives from Act 70, several executive orders have guided EPO’s programming and planning efforts by setting long-term goals and establishing near-term directives. Executive Order 2019-01, *Commonwealth Leadership in Addressing Climate Change and Promoting Energy Conservation and Sustainable Governance*, included a Lead by Example provision for state government that commits the commonwealth to addressing climate change and established the GreenGov Council.<sup>4</sup> Moreover, this executive order established a goal to achieve a 26% reduction of net GHG emissions statewide by 2025 from 2005 levels, and an 80% reduction of net GHG emissions by 2050 from 2005 levels.

**2021 Pennsylvania Climate Action Plan and Impacts Assessment Update**

The latest CAP update was completed in 2021, along with an updated PCIA. The 2021 CAP outlines a potential path toward achieving the commonwealth’s GHG reduction goals and includes approaches to adapt to a changing climate. The PCIA evaluated the likelihood and consequences of six climate hazards deemed to pose the greatest threat to Pennsylvania based on previous assessments. The 2021 CAP and PCIA both have an increased focus on environmental justice and equity. The 2021 PCIA took a new risk assessment approach to analyzing the impacts of climate change for Pennsylvania, which allowed for the identification of priority areas for adaptation actions in the CAP. Within the 2021 CAP, flexible adaptation pathways were designed to address the impacts that pose the greatest risk to the commonwealth.

To achieve Pennsylvania’s long-term goals, the 2021 CAP outlines 18 strategies—in the electricity generation, transportation, agriculture, fuel supply, and residential and commercial buildings sectors—that form a pathway to meet the commonwealth’s GHG reduction goals. Each of these strategies was modeled to estimate its GHG reduction potential and its economic costs and benefits. The 2021 CAP found that implementing the identified strategies would significantly reduce GHG emissions and allow Pennsylvania to reach a 26% decrease in annual GHG emissions by 2025 compared with 2005 levels and an 80% decrease by 2050.

**New Opportunities for EPO**

Since the 2020 CEP Plan, several new and significant opportunities have emerged that are considered in this plan. Three significant new federal funding and technical assistance sources and one new state initiative are available:

- Federal: Infrastructure Investment and Jobs Act (IIJA);
- Federal: Inflation Reduction Act (IRA); and
- Federal: U.S. Federal Emergency Management Administration’s (FEMA) Building Resilient Infrastructure and Communities (BRIC) program.
- State: Pennsylvania’s Whole Home Repairs Program

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<sup>4</sup> Pennsylvania DEP. 2022. *GreenGov Council*. Accessed October 20, 2022.  
<https://www.dgs.pa.gov/greengov/Pages/default.aspx>



## Infrastructure Investment and Jobs Act

EPO's program priorities significantly align with the funding and programs available through the Infrastructure Investment and Jobs Act (IIJA). IIJA provides \$1.2 trillion for transportation and infrastructure spending, with \$550 billion of that allocated for “new” investments and programs that aim to produce sustainable, resilient, and just economic growth. \$62 billion of the total funding is to be spent on federal funds for clean energy, managed by the U.S. DOE. Of this clean-energy specific funding, EPO anticipates receiving approximately \$60 million from IIJA formula funding, which is non-competitive. These funds will be used for existing or new decarbonization or resilience programs managed by EPO, block grants for local government or nonprofit energy efficiency programs, and energy efficiency revolving loan programs. EPO is also applying for two competitive funding programs.<sup>5</sup>

**Formula Grant Funds**—EPO will apply for and receive funding for these opportunities:

- State Energy Program (Section 40109): EPO is expected to receive \$14 million to help implement programs that include policy, planning, and education initiatives to address energy efficiency, renewable energy, energy security, and resiliency planning to help the industry, buildings, transportation, and electric power sectors with added focus on delivering support and benefits to underserved populations.
- Energy Efficiency and Conservation Block Grant Program (EECBG) (Section 40552): EPO is expected to receive \$3.0 million to support small local governments that don't qualify for EECBG formula grants for energy efficiency, renewable energy, and zero-emission transportation. Local governments are expected to receive approximately \$9.8 million directly.
- Energy Efficiency Revolving Loan Fund (Section 40502): EPO is expected to receive \$3.3 million in new funding to capitalize or support a revolving loan fund for energy efficiency loans and audits.
- Preventing Outages and Enhancing the Resilience of the Electric Grid (Section 40101): EPO is expected to receive \$8 million per year for 5 years to help in improving the all-hazards resilience of the electric grid and to prevent outages through the hardening of assets, real time control and coordination of system assets, and provision of tools for support modeling and analysis efforts.

**Competitive Funds**—EPO plans to apply for these opportunities:

- Energy Auditors Training Program (Section 40503): EPO can apply for a maximum of \$2 million to provide energy auditor training assistance.
- Building Codes Assistance/Training (Section 40511): \$225 million will be available nationally over the next five years to be used for energy code workforce training, codes updates, implementation and compliance. EPO can apply in partnership with other agencies and non-government organizations to support energy code training and workforce development.

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<sup>5</sup> DEP. 2022. *Infrastructure Investment and Jobs Act Funding for Energy*  
[https://www.dep.pa.gov/Business/Energy/OfficeofPollutionPrevention/Pages/Infrastructure-Investment-and-Jobs-Act-\(IIJA\).aspx](https://www.dep.pa.gov/Business/Energy/OfficeofPollutionPrevention/Pages/Infrastructure-Investment-and-Jobs-Act-(IIJA).aspx)

**Other Significant Funding Programs**—not administered by EPO but programs in which EPO will play a critical role in supporting successful projects that will contribute to achieving a clean energy economy in Pennsylvania. These include:

- National Electric Vehicle Infrastructure (NEVI) Formula Program (Section 11401);
- Regional Clean Hydrogen Hubs (Section 40311);
- Preventing Outages and Enhancing the Resilience of the Electric Grid (Section 40101) (additional funding besides the Formula Grant);
- Building a Better Grid, Energy Improvement in Rural and Remote Areas (Section 40103);
- Building a Better Grid, Program Upgrading Our Electric Grid and Ensuring Reliability and Resilience (Section 40103);
- Grants for Energy Efficiency Improvements and Renewable Energy Improvements at Public School Facilities (Section 40541);
- Replacement of Existing School Buses with Clean and Zero Emission School Buses (Section 71101); and
- Weatherization Assistance Program (Section 40551).

**Inflation Reduction Act**

The Inflation Reduction Act (IRA) is the largest federal investment in clean energy and climate to date. While the IRA will not singlehandedly accomplish current U.S. climate commitments, the act is projected to cut GHG emissions by 32-40% below 2005 levels by 2030.<sup>6</sup> IRA includes \$369 billion for climate and energy investment and tax credits.<sup>7</sup> The IRA provides two key mechanisms for funding to accelerate clean energy and climate action—tax credits that are available directly to individual and business taxpayers and grant funding or rebate programs. There is a wide variety of opportunities for EPO and the commonwealth in IRA. Key opportunities EPO will facilitate include:<sup>8,9</sup>

- **Home Energy Performance-Based, Whole House Rebates (HOMES) (Section 50121):** Provides \$4.3 billion for state rebate programs for home energy-saving retrofits—this funding will be provided to state energy offices, such as EPO, to develop and administer programs to provide rebates for home energy savings retrofits. Pennsylvania is expected to receive over \$129 million for this program.<sup>10</sup> With those funds, EPO can provide homeowners between \$2,000 and \$8,000 in rebates, with multi-family buildings eligible to receive significantly more (up to \$400,000). The maximum rebates can double within this program for low- and moderate-income homes.

<sup>6</sup> Congressional Research Service. 2022. *Inflation Reduction Act of 2022 (IRA): Provisions Related to Climate Change*. Accessed October 20, 2022. <https://crsreports.congress.gov/product/pdf/R/R47262>.

<sup>7</sup> The Bipartisan Policy Center, “Inflation Reduction Act (IRA) Summary Energy and Climate Provisions.” August 4, 2022, <https://bipartisanpolicy.org/blog/inflation-reduction-act-summary-energy-climate-provisions>.

<sup>8</sup> Congressional Research Service. 2022. *Inflation Reduction Act of 2022 (IRA): Provisions Related to Climate Change*. Accessed October 20, 2022. <https://crsreports.congress.gov/product/pdf/R/R47262>

<sup>9</sup> H.R. 5376. The Inflation Reduction Act of 2022.

<sup>10</sup> U.S. DOE, “Biden Harris Administration Announces State and Tribe Allocations for Home Energy Rebate Program.” November 2, 2022. Accessed December 7, 2022. [Biden-Harris Administration Announces State And Tribe Allocations For Home Energy Rebate Program | Department of Energy](#)

- **High-Efficiency Electric Home Rebate Program (Section 50122):** Provides \$4.5 billion for state and tribal rebate programs for low- and moderate-income households to achieve high-efficiency, electrified homes. Pennsylvania is also expected to receive over \$129 million for this program.<sup>11</sup> Rebate values vary by appliance or equipment type and cover heating, electric upgrades, appliances, and insulation and air sealing measures.
- **Climate Pollution Reduction Grants, to include GHG Air Pollution Planning Grants and GHG Air Pollution Implementation Grants (Section 60114):** Through the U.S. Environmental Protection Agency (EPA), these grants will provide \$250 million to at least one entity (e.g., states, state agencies, municipalities, tribes) in each state to develop a plan for GHG emission reduction. For entities that receive planning grants, an additional \$4.75 billion is then available to implement GHG reduction plans.
- **Greenhouse Gas Reduction Fund (Section 60103):** The GHG Reduction Fund is a flexible grant opportunity via the U.S. EPA for state, local and tribal governments and non-profit entities to mobilize financing and leverage private capital for clean energy and climate projects. The fund provides \$7 billion for projects intended to help low-income and disadvantaged communities deploy or benefit from zero-emission technology or other GHG reduction activities, \$8 billion to support these communities by funding direct or indirect investments in renewable energy projects that would otherwise lack access to financing, and almost \$12 billion that can be used broadly to support eligible direct and indirect investments in renewable energy projects nationwide.
- **Assistance for Latest and Zero Building Energy Code Adoption (Section 50131):** This \$1 billion grant program is available to grants to state and local governments to adopt the latest residential or commercial building energy codes and implement a plan to achieve full compliance with codes (\$330 million) as well as to adopt residential or commercial building energy codes that meet or exceed the zero energy provisions of the 2021 International Energy Conservation Code or equivalent stretch code and implement a plan to achieve full compliance with codes (\$670 million).
- **State-based Home Energy Efficiency Contractor Training Grants (Section 50123):** Provides \$200 million to states from U.S. DOE to establish and provide training and education to contractors who install home energy efficiency and electrification improvements.
- **Low Emissions Electricity Program (Section 60107):** Allows for technical assistance from or partnerships with U.S. EPA to facilitate domestic low emissions electricity generation and use. Within the program, \$17 million is provided to U.S. EPA for each outreach and technical assistance with state and local governments, consumer-related education and partnerships, education, technical assistance, and partnerships within low-income and disadvantaged communities, and industry-related outreach and technical assistance. EPO can work with U.S. EPA for this program and help facilitate leveraging the program across the commonwealth.

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<sup>11</sup> Ibid.

Like its role in the use of IIJA funding, EPO will play a critical role in supporting successful programs and projects resulting from IRA that will help to achieve a clean energy economy in Pennsylvania. EPO is also tracking other IRA programs and opportunities, such as the Clean Heavy-Duty Vehicles Program (Section 60101) and the Competitive Grants for Non-Federal Forest Landowners (Section 23002), which is a grant program that supports underserved landowners with climate mitigation or forest resilience.

Available tax credits for businesses and individuals cover:

- Clean energy, including wind and solar, energy storage, and nuclear;
- Residential rooftop solar and energy efficiency;
- Energy efficiency for commercial buildings and new homes;
- Electric vehicles;
- Sustainable aviation fuels;
- Clean energy manufacturing;
- Clean hydrogen and carbon capture utilization and storage (CCUS); and
- Clean energy workforce.

As program information and guidance become available, EPO will continue to evaluate opportunities to support the clean energy and climate transition within Pennsylvania.

### **Building Resilient Infrastructure in Communities**

The Federal Emergency Management Agency’s (FEMA) Building Resilient Infrastructure in Communities (BRIC) grant program provides investments to reduce overall risk to the population and infrastructure from future hazard events, while also reducing reliance on federal funding in future disasters. BRIC funding supports states, local communities, tribes, and territories as they undertake hazard mitigation projects to reduce the risks they face from disasters and natural hazards, including those amplified by the impacts of climate change (e.g., flooding).

In Fiscal Year (FY) 2021, FEMA expanded its grant funding for BRIC projects to \$1 billion in addition to \$160 million for Flood Mitigation Assistance.<sup>12</sup> FEMA also emphasized its commitment to the federal Justice40 initiative, which promotes funding opportunities aimed at addressing environmental justice and equity issues, and to removing barriers that prevent low-income communities and communities of color from accessing FEMA aid. These communities are often disproportionately exposed to and least able to recover from disasters that are becoming more frequent and severe due to climate change. Additionally, FEMA increased the funding available to non-coastal states and native tribes, and approximately \$2.5 billion will be available in 2023.

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<sup>12</sup> FEMA, “Building Resilient Infrastructure and Communities FY 2021 Subapplication and Selection Status,” August 1, 2022, <https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities/after-apply/fy-2021-subapplication-status#subapplications>.

Almost \$30 million in Pennsylvania project funding is currently under review or approved from FY 2021 applications, including five scoping projects and one mitigation implementation project to assess, reduce, and prevent flooding disasters.<sup>13</sup> For example, the Cohocksink Flood Mitigation Project aims to mitigate flooding in three neighborhoods that are historically vulnerable to floods by increasing sewer capacity. This is the type of Justice40 project that will benefit environmental justice communities in Philadelphia. As a continued source of funding, there are additional opportunities for the commonwealth to apply for support that will increase its resilience to natural disasters and hazards that could affect Pennsylvania’s energy security.

**Pennsylvania’s Whole Home Repairs Program**

Using Federal funding for the COVID-19 Federal American Rescue Plan (ARP), the commonwealth appropriated funding in 2022 to create a state initiative to improve home safety, accessibility, and energy efficiency.<sup>14</sup> Pennsylvania’s Whole-Home Repairs program, through the state’s Department of Community and Economic Development (DCED), will award grants to county implementors to provide repair services to residents and small landlords of affordable units. The program was initially capitalized with \$125 million, with \$5 million allocated for training and \$120 million for county implementation. County implementors will establish grant and loan programs for constituents, providing individual grants up to \$50,000 each. Although DCED is administering the program, EPO will continue to track the work and provide guidance on training programs and implementation as opportunities arise.

<sup>13</sup> FEMA, “Building Resilient Infrastructure and Communities FY 2021 Subapplication and Selection Status,” August 1, 2022, <https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities/after-apply/fy-2021-subapplication-status#subapplications>.

<sup>14</sup> Pennsylvania Department of Community and Economic Development. 2022 *Whole-Home Repairs Program Guidelines* <https://dced.pa.gov/download/whole-home-repairs-program-guidelines/?wpdmdl=117114>

## Priorities: 2023-25

With this 2022 CEP Plan, EPO reiterates its initial five priority areas with a renewed emphasis on energy security, clean energy, equity, and resilience. These priorities include expanding or evolving existing programs as well as implementing new programming to further transform Pennsylvania’s energy system. EPO leadership selected the actions summarized in Figure 2 and described below as priority actions to implement in the next two program planning years.

Figure 2. EPO’s Program Priorities 2023-25

### Program Priorities 2023-25

- ONGOING
- UPCOMING (Launching 2023-25)

#### Renewable Energy & Efficiency

- Clean energy financing initiatives
- Alternative Energy Portfolio Standard, solar energy siting, outreach and training
- Biomethane, food waste utilization
- Renewable energy/energy efficiency revolving loan funds
- Residential efficiency and electrification rebate programs
- Renewable energy/energy efficiency grants and financing for municipalities and non-profits

#### Energy Security & Resilience

- State energy security planning and continuity of operations planning
- Critical facilities energy security analysis and planning
- Clean and resilient microgrid deployments (Building Resilient Infrastructure and Communities Program)
- Electric grid reliability, smart grid, rural and urban energy resilience planning

#### Climate & Energy

- Act 70 climate program
- Pennsylvania GreenGov Council sustainability initiatives (state and municipal)
- Industrial decarbonization (hydrogen and carbon capture utilization and storage)
- Building decarbonization and electrification
- Community climate and decarbonization planning

#### Energy Workforce

- Clean energy workforce analysis, training and development
- Shared energy manager for local governments
- Building energy codes training
- Industrial and municipal energy audits (training and deployment)

#### Transportation

- Alternative fuel vehicle and infrastructure incentive programs
- Residential, municipal and dealership education and outreach programs
- Electric vehicles and infrastructure incentive programs



## Renewable Energy and Energy Efficiency

### Ongoing Actions

#### Clean Energy Financing Initiatives

Clean energy financing through the Commonwealth’s Green Energy Loan Fund (GELF) and the Pennsylvania Energy Development Authority (PEDA) helps to deploy low-carbon solutions throughout Pennsylvania. EPO supports both the GELF and PEDA by guiding the programs, establishing pathways for new products and revenues, and measuring results. These programs provide support for the introduction of new financing/lending products and expansion of geographic diversity. EPO is both continuing and expanding these programs in the coming years.

*Key Partners:* Industry, government, commercial and institutional building/property owners.

*Recent Activity:* The PEDA Board is preparing to launch additional clean energy financing products supported by a combination of public and private funds. In 2022, PEDA issued a solicitation seeking a third-party administrator that can develop, launch, and manage a program offering affordable loans for clean energy projects to residents and business owners. In addition to already dedicated funds, PEDA is pursuing funding from the Greenhouse Gas Reduction Fund outlined in the IRA for this effort. This funding opportunity provides financial and technical assistance to enable low-income and disadvantaged communities to deploy or benefit from zero-emission technologies. PEDA hopes to secure funding from this source to potentially provide technical assistance grants, which will help to prioritize and plan for potential clean energy projects and develop a project pipeline. The program is expected to launch in 2023.

*Ongoing Activities:*

- Continue to support and revolve GELF.
- Measure results, market available funds, and expand geographic diversity.
- Keep PEDA active through new program development by:
  - Measuring results and duplicating the success of the COVID-19 Restart Grants.
  - Establishing the Green Bank Facility and deploying the first product offering.
  - Developing and establishing more pathways for PEDA to receive revenue and accomplish projects to achieve the mission of PEDA’s Energy Development Plan.

#### Alternative Energy Portfolio Standard, Solar Energy Siting, Outreach, and Training

Expansion of renewable energy is crucial to meeting the commonwealth’s climate goals. EPO provides a variety of technical support, guidance, and education to local governments, landowners, developers, and communities to expand knowledge on local siting issues. EPO also monitors renewable energy and alternative energy project development and siting and tracks legislative changes to the Alternative Energy Portfolio Standard (AEPS).

*Key Partners:* Local governments officials, landowners, and renewable energy developers.

*Recent Activity:* EPO has been hosting information sessions for local government practitioners to ask questions regarding solar renewable energy projects in development and what steps they need to take to ensure responsible and sustainable development, while balancing the concerns of landowners, neighboring property owners, and developers.

*Ongoing Activities:*

- Continue to provide support to the Pennsylvania Public Utility Commission (PA PUC) in implementation of the AEPS program.
- Continue to monitor renewable and alternative energy project development and siting within Pennsylvania.
- Continue to provide technical support, guidance, and education to local governments, landowners, developers, and communities on alternative energy deployments.
- Provide fact-based resources and brand-neutral expertise to support local siting decisions.

**Biomethane, Food Waste Utilization**

Organic materials from Pennsylvania farms, natural lands, and communities have significant alternative energy potential, which can help reduce emissions and the importing of fuels. Locally deployed food waste projects can also help food insecurity issues and/or improve soil health. EPO supports communities to develop new opportunities to access and deploy systems that create a biocycle of organics within their communities.

*Key Partners:* Local government officials, farmers, and landowners.

*Recent Activity:* As a part of DEP’s recent waste composition study, EPO partnered with DEP’s Bureau of Waste Management to assess the potential use and best practices strategies to employ. This assessment may result in food waste from industrial, commercial, and institutional sources becoming a renewable energy feedstock in Pennsylvania.

*Ongoing Activities:*

- Continue to develop new opportunities and resources to access and deploy systems resulting in greater use of organic materials.
- Define best use of waste products for local purposes including fighting food insecurity in underserved areas, improving soil health, and energy generation.
- Create a biocycle of organics within communities to reduce emissions and reduce importing of fuels.

**Upcoming Actions**

**Renewable Energy/Energy Efficiency Revolving Loans Funds**

The IIJA provides Pennsylvania with significant resources to support renewable energy and energy efficiency in the commonwealth. Approximately \$3.7 million is allocated to support a revolving loan fund (RLF) and \$4.7 million is provided in a more flexible form of the Energy Efficiency Conservation Block Grant (EECBG). EPO will work to identify further use of federal funding from private capital and through the IIJA to supplement existing RLFs and green banks or to develop new products with a preference toward assisting underserved entities and communities. EPO will target EECBG funding toward Pennsylvania’s smaller local governments and businesses that were not able to directly benefit from federal funding. The IRA GHG Reduction Fund could also be used to support a variety of financing options, including revolving loan funds.

*Key Partners:* Local government officials, green banks, community development financial institutions, and businesses.



*Upcoming Activities:*

- Develop an application package and solicit for partnership opportunities and assistance in deploying the Efficiency RLF.<sup>15</sup>
- Identify further use of federal funding for supplementing existing RLFs, green banks, or development of a new product to preference utilization by underserved entities and communities.
- Develop an application package and solicit partnership opportunities and assistance in deploying the EECBG.<sup>16</sup>
  - Deploy Energy Efficiency funds to the greatest benefit of small non-direct recipients of Federal EECBG funds.

**Residential Efficiency and Electrification Rebate Programs**

The IRA provides federal incentives for residential energy efficiency programs, with a focus on low- and moderate-income households, for Pennsylvania residences through its HOMES program and its High-Efficiency Electric Home Rebate Program. Additionally, Pennsylvania's Whole Home Repairs program provides funding to address habitability and safety concerns, improve energy and water efficiency, and expand housing accessibility for individuals with disabilities, lower-income homeowners, and landlords renting affordable units. Together, these programs will provide over \$259 million in federal funding to improve efficiency in homes and for specific home appliances as well as \$120 million in state funding for home repairs and energy and water efficiency. Through its various partnerships, EPO will work to deploy these incentives in Pennsylvania.

*Key Partners:* Homeowners, property owners, local government officials, green banks, contractors, and utilities.

*Upcoming Activities:*

- Develop an application package and solicit partnership opportunities and assistance in deploying Pennsylvania's formula grant portion for two residential energy efficiency programs:
  - Home Energy Performance-Based Whole-House Rebates (HOMES Program),<sup>17</sup> and
  - High-Efficiency Electric Home Rebate Program (Electric Appliance Program).<sup>18</sup>
- Convene meetings to coordinate and leverage existing resources with the Pennsylvania Public Utility Commission, Sustainable Energy Funds, and supporting programs.

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<sup>15</sup> IRA Section 40502 Energy Efficiency Revolving Loan Fund Capitalization Grant Program. This will be used to establish a program to capitalize revolving loan funds implemented by the states.

<sup>16</sup> IIJA Section 40552 Energy Efficiency and Conservation Block Grant Program. The goals of the program are to help reduce energy use and carbon emissions at the local and regional level. Funds can be used for strategic planning, consultant services, and energy audits.

<sup>17</sup> IRA Section 50121 Home Energy Performance-Based, Whole-House Rebates. Provides funding to DOE for state energy offices (\$4.3 billion) to develop and implement a rebate program to homeowners and aggregators for whole-house energy saving retrofits.

<sup>18</sup> IRA Section 50122 High-Efficiency Electric Home Rebate Program. Provides funding to DOE for state energy offices (\$4.275 billion) and Indian tribes (\$225 million) to develop and operate high efficiency electric home rebate programs for appliance and non-appliance upgrades.

**Renewable Energy/Energy Efficiency Grants and Financing for Municipalities and Non-Profits**

Pennsylvania has several funding sources to provide grants and financing for renewable energy and energy efficiency projects. The IRA provides funding through the GHG Reduction Fund to enable low-income and disadvantaged communities to deploy or benefit from zero-emission technologies, including distributed generation technologies on residential rooftops.

*Key Partners:* Homeowners, business owners, local government officials, green banks, contractors, and utilities.

*Upcoming Activities:*

- Develop an application package and solicit partnership opportunities and assistance in deploying IRA funding including the GHG Reduction Fund.<sup>19</sup>
  - Enable low-income and disadvantaged communities to deploy or benefit from zero-emission technologies, including distributed generation technologies on residential rooftops.

**Energy Security and Resilience**

**Ongoing Actions**

**State Energy Security Planning and Continuity of Operations Planning**

EPO develops and maintains Pennsylvania’s State Energy Security Plan (SESP), an energy emergency planning program for energy supply disruptions, with an all-hazards approach to identifying risks to critical infrastructure and prioritizing investments in resiliency. Additionally, EPO will continue to update and refine its Continuity of Operations Plan (COOP).

*Key Partners:* State agencies, federal partners, state emergency management officials, local and public safety officials, and energy infrastructure owners.

*Recent Activity:* In September 2022, EPO updated and submitted its SESP, which contains all the required contents as specified under Section 40108 of the IIJA, to U.S. DOE.<sup>20</sup>

*Ongoing Activities:*

- Continue to develop and update the SESP annually to include an all-hazards approach and to identify risks to critical infrastructure to prioritize investments in resiliency.
- Continue to update and refine the COOP as workplaces and environments shift due to continuing telework and mobile work platforms.

<sup>19</sup> IRA Section 60103 GHG Reduction Fund. Provides funding to EPA for a new GHG Reduction Fund with \$7 billion to make competitive grants to states, municipalities, tribal governments, and eligible recipients to provide financing and technical assistance to enable low-income and disadvantaged communities to deploy or benefit from zero-emission technologies, including distributed technologies on residential rooftops, and to carry out other GHG emission reduction activities; \$11.97 billion for general assistance; \$8 billion for low-income and disadvantaged communities; and \$30 million for EPA administrative costs.

<sup>20</sup> IIJA Section 40108 State Energy Security Plans. Provides financial and technical assistance to states for state energy security planning. These plans are to assess the existing circumstances in the state. The State Energy Security Plan is to propose methods to strengthen the ability of the state (in consultation with owners and operators of energy infrastructure) to secure the energy infrastructure against all physical and cybersecurity threats; mitigate the risk of energy supply disruptions; and to ensure that the state has reliable, secure, and resilient energy infrastructure.

Energy Security Analysis and Planning at Critical Facilities

Facilities such as hospitals, public safety centers, and other critical energy infrastructure locations benefit from energy security analysis and planning that help to ensure operability during interruptions or emergencies. EPO supports statewide organizations by providing training and planning documents to critical facilities, allowing them to improve their energy resiliency. Additionally, EPO helps to review and assess facilities that can serve as resilience hubs.

*Key Partners:* Local government officials, hospital officials, public safety officials, and energy infrastructure owners.

*Recent Activity:* EPO completed five initial feasibility studies at critical facilities within local governments to identify and develop projects to increase resiliency and provide critical services to the community. EPO also worked with a consortium of states through the U.S. DOE’s Technology Action Group and the National Energy Technology Lab using the ReOPT tool to identify resiliency hubs in Pennsylvania.

*Ongoing Activities:*

- Continue to review and assess critical facilities including five more feasibility studies in FY 22-23 and further evaluate areas in Pennsylvania that can serve as resiliency hubs.
- Continue to further identify and provide technical resources to key sectors and critical energy lifeline facilities in communities that would then consider energy resiliency improvements as a near term critical infrastructure upgrade.

Clean and Resilient Microgrid Deployments (BRIC)

Small energy systems and infrastructure are necessary to meet many of the most critical demands during emergencies and can benefit from microgrids, which maintain energy through integrated distributed energy resources. EPO helps to identify suitable candidates to compete for FEMA BRIC and other pre-disaster mitigation funding with an eye toward increasing the number of secure, clean energy microgrids that support critical community functions.

*Key Partners:* Local governments officials, hospital officials, Pennsylvania Emergency Management Agency (PEMA) and public safety officials, and energy infrastructure owners.

*Recent Activity:* EPO is seeking out good candidates who meet the prerequisite building and energy codes requirements to apply for and receive BRIC funding to develop microgrids. Approximately \$2.5 billion will be available in 2023.

*Ongoing Activities:*

- Provide technical and administrative assistance to suitable candidates to compete nationally for FEMA BRIC and other pre-disaster mitigation funding, focusing on assisting disadvantaged and vulnerable communities where feasible.
- Deploy assistance to commercial, industrial, and institutional entities to increase the number of secure, clean energy microgrids that support critical community and economic functions.

## Upcoming Actions

### Electric Grid Reliability, Smart Grid, Rural and Urban Energy Resilience Planning

Electric grid reliability is critical to all areas of Pennsylvania, including both urban and rural communities. Various upcoming state and federal funding including Section 40101(d) of the IIJA<sup>21</sup> will help to increase reliability of the grid, make it smarter, prevent outages, and decrease the restoration time relative to energy supply disruptions.

*Key Partners:* Local government officials, electric utilities, and energy infrastructure owners.

*Upcoming Activities:*

- Develop new programs to identify opportunities, find partners, and craft project proposals that will seek to utilize federal and state funding sources to:
  - Increase reliability of the electric grid in urban and rural portions of Pennsylvania.
  - Prevent outages and decrease the restoration time relative to energy supply disruptions, especially in vulnerable communities.

## Climate and Energy

### Ongoing Actions

#### Act 70 Climate Program

Act 70 of 2008, the Pennsylvania Climate Change Act, sets certain requirements for DEP to deliver annual greenhouse gas (GHG) inventories and triennial Climate Action Plans (CAPs) and Climate Impact Assessments (PCIA). EPO has led DEP's work to meet these obligations and will continue to seek diverse opinions and advisement through the Climate Change Advisory Committee (CCAC), develop new and repeatable tools to model cost-effective GHG emission reductions, and secure in-state voluntary resources to assist in updates to the CAP and PCIA. Different federal funding sources can be leveraged for the CAP and PCIA and implementation through the IRA GHG Reduction Fund and Climate Pollution Protection Planning and Implementation Grants.<sup>22</sup>

*Key Partners:* Pennsylvania's CCAC, local and state government officials, academia, and residents of the commonwealth.

*Recent Activity:* The CAP and PCIA updates were completed in 2021. The CAP outlines a potential pathway to achieving GHG reduction goals and an approach to adapt to a changing climate and includes an increased focus on environmental justice and equity, exploring impacts and the benefits of targeted action. The PCIA provided an evaluation of the likelihood and consequences of six climate hazards deemed to pose the greatest threat to Pennsylvania.

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<sup>21</sup> IIJA Section 40101 Preventing Outages and Enhancing the Resilience of the Electric Grid. Requires the Secretary of Energy to establish a program to make grants to eligible electric industry entities, states, and Indian tribes to supplement hardening activities to reduce the likelihood and consequences of disruptive events, including natural disasters, to the electric grid.

<sup>22</sup> IRA Section 60144 Climate Pollution Reduction Grants. \$250 million in grants for at least one entity (e.g., states, state agencies, municipalities, Indian tribes) in each state to develop a plan for GHG emission reduction. For entities that receive planning grants, additional funds of \$4.75 billion are then available to implement GHG reduction plans.

*Ongoing Activities:*

- Continue to work with partners and the CCAC to fulfill the Act 70 requirements of delivering annual GHG inventory and triennial CAPs and CIAs.
  - Continue to seek diverse opinions from partners and advisement from the CCAC.
  - Develop new and repeatable tools to model GHG emissions for PA.
  - Secure in-state financial resources as well as additional input from communities, including disadvantaged and vulnerable communities, to assist in developing the CAP.

**Pennsylvania GreenGov Council Sustainability Initiatives (State and Municipal)**

State and local government leadership is crucial to leading by example and demonstrating sustainability. Pennsylvania’s GreenGov Council was chartered to promote best practices, continuous improvement, and success in achieving the energy efficiency and performance goals. The EPO supports the GreenGov Council by providing technical support for projects and access to third party experts.

*Key Partners:* Pennsylvania’s GreenGov Council, Pennsylvania state agencies, and local governments.

*Recent Activities:* The GreenGov Council worked with EPO to develop a program that resulted in a benchmarking protocol for leased buildings and a report identifying energy saving opportunities and for the lessor to implement. EPO also assisted in the coordination and delivery of the first-ever Pennsylvania Sustainability Summit for state agencies and external stakeholders throughout the commonwealth, which highlighted initiatives on electric vehicles, solar, high-performance buildings, climate change, and energy efficiency financing.

*Ongoing Activities:*

- Develop training modules focused on sustainable buildings, integrative design, and green leasing to educate state agencies, as well as the design and construction community.
- Develop sustainability guidelines for commonwealth-owned new construction and major renovation projects.
- Develop and maintain a climate network to continue professional development opportunities on climate change and support peer-to-peer networking and information exchange between professionals in the commonwealth and climate experts.

**Upcoming Actions**

**Industrial Decarbonization (Hydrogen and CCUS)**

Carbon Capture Utilization and Storage (CCUS) technology captures carbon dioxide (CO<sub>2</sub>) emissions from fossil fuel combustion and prevents CO<sub>2</sub> from entering the atmosphere. Captured CO<sub>2</sub> can be transported underground via pipeline to be stored in geologic rock formations or reused in industrial processes and products. CO<sub>2</sub> can also be captured and stored through natural processes in soils and biomass. Moving from high-carbon sources of energy, such as natural gas, to a fuel supply with lower carbon content or that is carbon neutral will further reduce GHG emissions. Hydrogen fuel emits zero emissions when consumed and can be produced from a variety of resources, including natural gas, biomass, or electrolysis via electricity generation. The use of a zero-carbon electricity source, such as renewable or nuclear energy, will thus create zero-carbon hydrogen fuel. Industrial facilities in Pennsylvania are large

consumers of thermal energy sources and, through the IIJA and IRA, have significant new incentives and technical resources to pursue projects with CCUS and hydrogen.

*Key Partners:* Department of Community and Economic Development, industry and non-profit groups and organizations, industrial facilities, renewable energy developers, and energy infrastructure owners.

*Upcoming Activities:*

- Support the development of a regional hydrogen hub and the ancillary carbon capture technologies necessary to ensure a net positive emissions outcome.
- Provide support through planning and incentives to industries or sectors that would serve as off-take resources to utilize hydrogen and decarbonize their operations in Pennsylvania.
- Provide support for implementing a Hydrogen Strategy, focusing on the use of hydrogen produced with the least amount of environmental impact, in combination with combined heat and power technologies, which result in significant industrial electrification.

**Building Decarbonization and Electrification**

Through changes to materials, energy efficiency, and electrification, buildings can decarbonize. The EPO will provide support through planning and deployment incentives for buildings with a specific focus on identifying and deploying buildings that could serve as distributed energy resources (DERs) via co-located energy generation and storage technologies or vehicle-to-grid technologies. Additionally, EPO will support the use and acquisition of lower embodied carbon materials.

*Key Partners:* Homeowners, business owners, local government officials, green banks, contractors, and utilities.

*Upcoming Activities:*

- Plan for and deploy IRA funding including the IRA HOMES and electrification rebate programs and the GHG Reduction Fund<sup>23</sup> to provide incentives and financing options for buildings.
- Focus on identifying and deploying buildings that could serve as DERs via co-located energy generation and storage technologies or vehicle to grid technologies.
- Identify a program to incentivize reduction of embodied carbon in materials acquisition and use such as the support of mass timber projects in Pennsylvania.

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<sup>23</sup> IRA Section 60103 Provides funding to EPA for a new GHG Reduction Fund with \$7 billion to make competitive grants to states, municipalities, tribal governments, and eligible recipients to provide financing and technical assistance to enable low-income and disadvantaged communities to deploy or benefit from zero-emission technologies, including distributed technologies on residential rooftops, and to carry out other GHG emission reduction activities; \$11.97 billion for general assistance; \$8 billion for low-income and disadvantaged communities; and \$30 million for EPA administrative costs.

Community Climate and Decarbonization Planning

Climate action and decarbonization planning helps local governments and communities focus on which programs, policies, and projects contribute most toward their goals. The IRA GHG Reduction Fund and Climate Pollution Reduction Planning and Implementation Grants can be leveraged to support these planning efforts.<sup>24</sup>

*Key Partners:* Homeowners, business owners, local government officials, and utilities.

*Upcoming Activities:*

- Provide funding and technical support to help local jurisdictions coordinate with businesses and industry as they identify opportunities to decarbonize sectors that are deemed critical to the health and resilience of their communities.
- Conduct additional research and develop a report through EPO’s SEP-funded Climate Action for Disadvantaged Communities program to determine what further coordination and programming should be undertaken at the state level to meet community energy and resilience needs, particularly for vulnerable populations.

Energy Workforce

Ongoing Actions

Clean Energy Workforce Analysis, Training, and Development

Pennsylvania’s clean energy workforce requires further training and professional development to continue to ensure the commonwealth’s energy security. EPO contributes to energy, labor, and industry reports to identify workforce opportunities and support the development of training programs for Pennsylvania’s workforce. Programs such as the IRA’s State-based Home Energy Efficiency Contractor Training Grants program can be accessed to support clean energy workforce development.<sup>25</sup>

*Key Partners:* Renewable energy developers, other clean energy companies, energy infrastructure owners, and state and local workforce development agencies.

*Recent Activities:*

- EPO, together with BW Research and the U.S. DOE, has developed the 2020 and 2021 Energy and Clean Energy Workforce reports, which include ancillary studies on the role of union workforce and apprenticeship programs.
- EPO has assisted the Pennsylvania Department of Labor and Industry (L&I) with implementing a training incentive program to develop new clean energy workers.

<sup>24</sup> IRA Section 60144 Climate Pollution Reduction Grants. \$250 million in grants for at least one entity (e.g., states, state agencies, municipalities, Indian tribes) in each state to develop a plan for GHG emission reduction. For entities that receive planning grants, additional funds of \$4.75 billion are then available to implement GHG reduction plans.

<sup>25</sup> IRA Section 50123 State-based Home Energy Efficiency Contractor Training Grants. Provides funding to states from U.S. DOE in a total amount of \$200 million to establish and provide training and education to contractors who install home energy efficiency and electrification improvements.



*Ongoing Activities:*

- Develop, distribute, and use the 2022 and 2023 Pennsylvania Energy and Clean Energy Reports to identify future clean energy workforce opportunity sectors that will provide new and well-paying jobs.
- Provide financial and technical support to L&I, workforce board partners, and academia to identify and deploy new and additional clean energy workforce training and development programs and projects, specifically targeting environmental justice and disadvantaged communities wherever feasible.

**Shared Energy Manager for Local Governments**

Strong energy management in local governments helps to reduce costs, increase energy efficiency, and reduce emissions. EPO will continue to provide and expand a network of state and local technical and academic resources to local governments to help them implement clean energy projects in response to existing plans to deploy resiliency and lower emissions within their communities.

*Key Partners:* Local government officials, academia, and private engineering firms.

*Recent Activities:* The latest cohort of local governments participated in the Shared Energy Manager program to develop opportunities to implement actions and strategies identified in their CAPs. The energy manager provided engineering and financial analysis to be used for quoting projects and creating information for funding assistance requests that the local governments do not have the time or expertise to complete.

*Ongoing Activities:*

- Continue to provide and expand a network of state and local technical and academic resources to local governments to help implement clean energy projects in response to their existing plans to deploy resiliency and lower emissions within their communities and conduct proactive outreach to ensure resource needs are met.



## Upcoming Actions

### Building Energy Codes Training

Code officials from local governments help to ensure that energy codes are being followed for construction and renovations projects in homes and businesses. EPO has been supporting building energy codes trainings for over 10 years. Additional funding from the IRA will provide the necessary tools to communities to upgrade and implement modern energy codes. EPO will support communities as they look to implement the new 2021 code or new net-zero codes.<sup>26</sup>

*Key Partners:* Local government officials, building owners, building tradesmen, and academia

*Upcoming Activities:*

- Access additional funding from the IRA, including IRA Section 50131, which provides assistance for energy codes adoption across the country, and the State-based Home Energy Efficiency Contractor Training Grants program to provide the necessary tools and workforce to communities to upgrade and implement modern energy codes.<sup>27,28</sup>
- Distribute and promote existing information to help communities implement the most up-to-date code or net-zero codes, particularly in disadvantaged areas where new codes can serve as both resilience and cost saving measures.

### Industrial and Municipal Energy Audits (Training and Deployment)

Facility energy audits provide foundational information that enables organizations to increase energy efficiency. Through IJA funding, EPO will look to train students and graduates to utilize energy management systems and create a workforce within the industrial and municipal sectors. This will help develop a new workforce to complete initial scoping audits to prepare industry, government, and residents to best utilize new and upcoming funding to deploy clean energy projects. It will also support job growth while lessening climate impacts per square foot of facility or unit of production.

*Key Partners:* Homeowners, business owners, local government officials, industrial facilities, and utilities.

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<sup>26</sup> Net-zero codes are energy codes which require buildings to meet the minimum code requirements for building energy performance plus have access to enough on-site or offsite renewable energy to compensate for all the energy anticipated to be consumed by the building.

<sup>27</sup> IRA 50123- State-based Home Energy Efficiency Contractor Training Grants. Provides funding to DOE for states to establish programs providing training and education to contractors who install home energy efficiency and electrification improvements.

<sup>28</sup> IRA Section 50123 State-based Home Energy Efficiency Contractor Training Grants. Provides funding to states from U.S. DOE in a total amount of \$200 million to establish and provide training and education to contractors who install home energy efficiency and electrification improvements.

*Upcoming Activities:*

- Utilize additional funding from the IIJA<sup>29</sup> to train students and graduates to employ energy management systems and create a workforce within the industrial and municipal sectors.
- Train a new workforce to complete initial scoping audits to prepare industry, government, and residents to best utilize new and upcoming funding to deploy clean energy projects.
- Support job growth while lessening climate impacts per square foot of facility or unit of production, economic activity, etc., particularly focusing on collaboration with facilities in environmental justice areas.

**Transportation**

**Ongoing Actions**

**Alternative Fuel Vehicle and Infrastructure Incentive Programs**

Pennsylvania’s Driving PA Forward program and Alternative Fuel Vehicle and Infrastructure Grants (AFIG) have already significantly impacted the state’s electric vehicle (EV) readiness. This work is enabled by the EV and Electric Vehicle Supply Equipment (EVSE) provisions of the Volkswagen (VW) Mitigation Trust Fund as well as the Pennsylvania Alternative Fuels Incentive Act. EPO will continue to deploy and modernize the AFIG program through competitive grants and a residential Alternative Fuel Vehicle Rebate program. Future development could include new programs to support development of hydrogen use in the medium- and heavy-duty use transportation sector.

*Key Partners:* Homeowners, business owners, and utilities.

*Recent Activities:*

- Deployment of the Level 2 Rebate and DC Fast Charge/Hydrogen Refueling Grant Programs utilizing the VW Mitigation Trust funds.
- Alteration of the Alternative Fuel Vehicles Rebate program to benefit low-to-moderate income Pennsylvania residents.
- Update of the AFIG Program to further prioritize support projects that serve seniors, low-income individuals and families, and individuals with disabilities; supporting projects in EJ communities; and prioritizing applicants that are minority, veteran, or women-owned businesses.
- EPO is managing \$6 million of grant contracts for 42 projects currently underway as well as executing grant agreements for 18 projects totaling an additional \$2.8 million.

*Ongoing Activities:*

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<sup>29</sup> IIJA 40503, 40512 and 40513. Section 40503 (Energy auditor training grant program) which establishes a grant program within the SEP for states to train individuals to conduct energy audits or surveys of commercial and residential buildings. Section 40512. (Building, training, and assessment centers) which creates grants to colleges and universities including tribal colleges and universities to establish building training and assessment centers, to promote building energy efficiency and environmental performance, and to coordinate with industrial research and assessment centers. Section 40513 (Career skills training) which awards grants to eligible entities to pay the federal share of career skills training programs (50%) to train and certify students to install energy efficient building technologies.

- Continue to deploy and modernize the AFIG program through competitive grants and the residential Alternative Fuel Vehicle Rebate program and adapting the program as needed to meet the needs of Pennsylvania residents and businesses.
- Continue to deploy the EV and EVSE provisions of the VW Mitigation Trust Fund—Driving PA Forward Program.
- Further develop new and existing programs to support development of hydrogen use in the medium- and heavy-duty use transportation sector.

**Residential, Municipal, and Dealership Education and Outreach Programs**

Education and outreach are crucial to continued deployment of EVs in Pennsylvania. EPO plans to continue to support this through multiple activities.

*Key Partners:* Homeowners, local government officials, business owners, dealerships, and utilities.

*Recent Activities:*

- Provide webinars and speaking engagements discussing the use of and opportunities to deploy alternative fuel vehicles as well as status of state and federal incentives to support alternative vehicle purchases and fueling stations.

*Ongoing Activities:*

- Create programs to work with dealerships and further their role in educating the public.
- Create programs to help modernize government fleets through education to promote the acceptance of alternative fuel vehicles.
- Create programs to support the acquisition, implementation, and utilization of new alternative fuel vehicles and fueling infrastructure.
- Implement strategies outlined in the Pennsylvania Electric Vehicle Roadmap.

**Upcoming Actions**

**Electric Vehicle and Infrastructure Incentive Programs**

New funding from the IIJA provides both formula and competitive grants for EV infrastructure. EPO will assist communities and state agencies to identify and apply to funding opportunities for EVs and EV infrastructure to help reduce air pollution.

*Key Partners:* Homeowners, local government officials, business owners, and utilities.

*Upcoming Activities:*

- Assist Pennsylvania Department of Transportation with deploying IIJA<sup>30</sup> NEVI Formula grant funds and state and local competitive electric vehicle infrastructure projects. Assist rural, urban, and disadvantaged communities to identify opportunities to decarbonize the transportation sector using IRA funding that reduces local air pollution.

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<sup>30</sup> IIJA 11401 Grants for Charging and Fueling Infrastructure. A grant program within the US Department of Transportation for the strategic deployment of publicly accessible alternative fuel infrastructure.

# Adapting for the Future and Ensuring Success

The future is inherently unpredictable. Unforeseen events and advancing technologies and policies that divert resources or require changes are likely to affect even the most comprehensive and thoughtful plans. Innovations in energy systems are constant, and EPO can best serve Pennsylvania’s residents, businesses, and governments by evolving its programming to align with these advancements. Tracking changes in energy technologies and systems allows EPO’s programs to be more agile and adaptable. While much of the content in the CEP Plan focuses on 2023-25, this section looks beyond that time horizon to factors and technologies that EPO should consider, ensuring all options remain available to achieve a clean energy transition.

To anticipate and capitalize on potential future changes and ensure its programs deliver the greatest benefits to Pennsylvania residents and businesses, EPO will need to monitor trends in energy system technology, services, and policy. Innovation in the information technology sector has significantly changed how Pennsylvanians live, work, and play. The same will occur in energy and climate technology as more funding for innovation and research solidifies. Some energy systems technology innovations have already accelerated, with new clean energy products and services being made available, such as grid-enabled building technologies and energy storage and additional investment in hydrogen and carbon capture and storage (CCUS). Each new technology and service has the potential to change EPO’s program thrust areas by altering program effectiveness or uptake.

## Enabling Technologies

A common thread across EPO programs is the role they can play in advancing new technologies. Some of today’s programs are designed to enable what were once yesterday’s emerging technologies. EPO programs provide broad technical support, funding for pilot projects, and incentives for projects that help reduce energy use and associated pollution. As new clean energy options emerge and develop, EPO will need to continue to work with organizations and partners like the National Association of State Energy Officials (NASEO), U.S. DOE National Labs, and the many Pennsylvania energy-focused research institutions. With these partners the EPO will continue to lead the commonwealth forward by evaluating emerging technologies, providing supporting programs, and leveraging partner programs that enable a mix of demonstration, pilot projects, and scalable implementation models.

In this section, EPO outlines several key technology and service model categories that could affect current and future programs. The identified technologies provide potential opportunities to advance short- and long-term goals for EPO and, in some cases, can work synergistically to produce more impactful results.

## Hydrogen

Hydrogen fuel emits zero emissions upon combustion and can be produced from a variety of resources. Several different types of low- or no-carbon hydrogen are being developed for use as a substitute for natural gas and thermal energy including:

- *Green Hydrogen:* hydrogen generated from the electrolysis of water using electricity from renewable resources such as wind and solar.

- *Blue Hydrogen*: hydrogen generated from fossil fuels, but where the fossil-generated CO<sub>2</sub> is captured in the process for sequestration and storage. A variety of different sequestration methods are possible including storage in geological formations.
- *Pink Hydrogen*: hydrogen generated from the electrolysis of water using electricity from nuclear energy.

Hydrogen can be utilized for a variety of different end uses including as a supplement to gas for the fueling of heavy- and medium-duty vehicles and by some heavy industries that require high heating temperatures.

**Why it matters for Pennsylvania:**

Pennsylvania's electricity generators, fossil fuel producers and processors, and high-emitting or hard to electrify industries could incorporate hydrogen along with CCUS as a solution for achieving statewide GHG emission reduction goals while preserving a viable fossil fuel-based energy industry and economy.

Pennsylvania's long history of energy development and significant industry (large users of thermal energy) uniquely position the commonwealth to pursue new hydrogen production facilities. The IIJA provides significant funding for 6 to 10 national hydrogen hubs. Pennsylvania is well positioned for a blue hydrogen hub, given the commonwealth and surrounding region's significant hydrocarbon resources and geological opportunities for carbon sequestration. Furthermore, Pennsylvania's workforce is well versed in many of the skills needed to support blue hydrogen production.

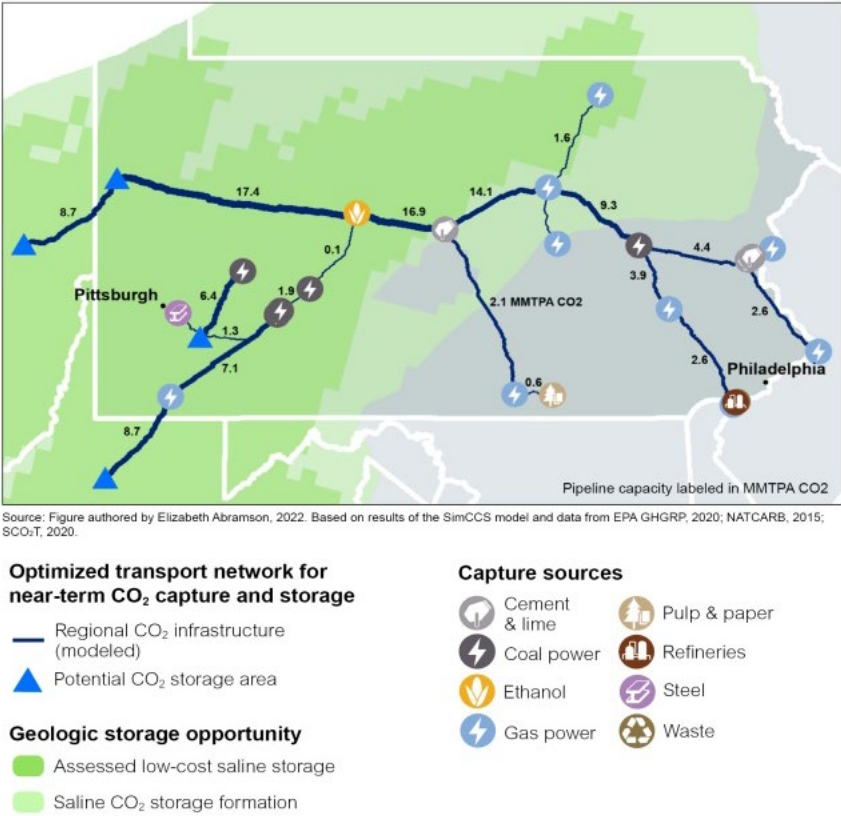


Figure 3. Infrastructure map of potential near-term carbon capture opportunities for Pennsylvania as identified in Team Pennsylvania's Carbon and Hydrogen Roadmap

Pennsylvania stakeholders have created a roadmap (Team Pennsylvania’s Carbon and Hydrogen Roadmap),<sup>31</sup> emphasizing blue hydrogen that outlines the commonwealth’s hydrogen needs and the various carbon sequestration opportunities available given Pennsylvania’s geology.

The roadmap highlights various technical, policy, and regulatory needs the commonwealth must address for Pennsylvania to better compete for the hydrogen hub opportunities in the IIJA and national hydrogen business.

Through the IRA, significant new incentives and technical resources for hydrogen projects are available, including a new tax credit supporting clean hydrogen production and the extension and modification of a tax credit for CCUS. The potential to create, store, and distribute hydrogen in Pennsylvania using excess electricity generated from nuclear, in-state solar, and planned offshore wind projects could be a unique and important opportunity.

### Small Modular Reactors

Small modular reactors (SMR) are advanced nuclear reactors that have lower power capacity and provide carbon-free electricity. They differ from existing nuclear generation projects for several reasons:

- A smaller overall size and smaller generation capacity.
- Reduced construction risk due to modularization and factory assembly.
- Enhanced safety risk from replicated design.
- Greater agility on the grid to better enable integration with renewables.
- Expected lower overall costs (once final designs are complete).

SMR’s size and ability to be factory assembled and transported as a single unit can potentially disrupt the energy market space. Their small footprints will allow them to be produced more affordably and sited in locations not suitable for larger nuclear power plants. SMR technologies can also be used to generate carbon-free hydrogen (pink hydrogen) through electrolysis.

**Why it matters for Pennsylvania:** New construction of SMR technologies is eligible for clean energy tax credits under the IRA, which can help advance or accelerate their development and deployment. Pennsylvania has a long history with nuclear power, and future SMR projects may play a role in the commonwealth’s evolving and future energy mix. SMR technology can also serve to repower older or inactive electric generation plants, which already have access to transmission and/or potential interconnection into the electrical grid.

### Virtual Power Plants

Virtual Power Plants (VPPs) aggregate energy resources across a range of connected energy devices and can act collectively to support the larger electricity grid. They typically consist of distributed energy resources (DERs), which include customer-owned generation and storage as well as other connected digital technologies, including building automation systems, smart thermostats, grid-interactive appliances, and other equipment that can vary energy use in response to grid operational needs.

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<sup>31</sup> Team Pennsylvania. 2022. Successful deployment of Carbon Management and Hydrogen Economies in the Commonwealth of Pennsylvania. September 2022. <https://teampa.com/wp-content/uploads/2022/09/Pennsylvania-Carbon-and-Hydrogen-Roadmap-2022.pdf>.



Because DERs typically constitute small-scale, customer-owner technologies that operate on a localized level and are often on the customer side of the meter, they are typically designed to meet the needs of a specific utility customer or set of customers. However, they can also be aggregated through VPP technologies to support the grid, help achieve Alternative Energy Performance Standards (AEPS) targets, or otherwise balance grid operational needs. DERs include many forms of technologies for both power generation and energy use, such as solar, gas, electric water heaters, or micro combined heat and power (CHP) systems.

DERs, together with digital technologies enabled through the Internet of Things (IoT) and high-speed networks such as 5G, have significant potential to disrupt traditional business models and standard industry processes. IoT allows grid-interactive customer devices to connect to the internet and transmit data (e.g., smart thermostats). Widespread application of the IoT can work with Wi-Fi systems or newer high-speed 5G networks to exchange data, implement updates, and track performance. A range of entities can invest in these technologies, aggregate them as a VPP, and use them to drive revenues or cost savings. The cost barriers to implementation and impacts of VPPs vary based on the scale and scope of application; however, they will undoubtedly reshape the energy sector over the next decade. The energy sector has historically been an early adopter of digital solutions and has already seen digital technologies penetrate and disrupt energy system supply and demand, from smart metering to distributed grid optimization.

**Why it matters for Pennsylvania:** Pennsylvania has significant potential for VPPs throughout its buildings and industries. VPPs have the potential to significantly enhance Pennsylvania’s energy sector by improving efficiency and optimization. The commonwealth already has several microgrids and district energy systems, some of which are powered by CHP systems.

**Potential components of a virtual power plant**

Virtual power plants consist of a range of DER technologies including:

**Microgrids** are groups of interconnected electricity loads and distributed energy resources that work together to provide and use energy services.

**CHP systems** produce electricity and thermal energy (i.e., heating and cooling) from a single energy source and are located near consumption points.

**District energy systems** provide heating and cooling needs from a centralized plant to a connected network of geographically grouped buildings.

**Battery energy storage systems** connect renewable energy sources with battery storage to allow for greater predictability and continuity of service across the grid and in times of shortages.

**Solar energy generation** has drastically declined in cost, thus accelerating widespread adoption. Entities have demonstrated a strong interest in integrating solar into their systems due to these reduced costs, maturing technologies, and innovative financing models.

**Grid-interactive devices** in customer facilities such as electric water heaters or HVAC systems.

Tax credits for renewable energy and battery storage systems will be accelerated through mechanisms like those in the IRA and supported broadly by various aspects of the federal legislation. Together, these incentives will help lower investment costs in the equipment needed to create VPPs. Integrating VPPs into power grids can potentially reduce operation costs, enable integration of variable renewable power sources, lessen negative environmental impacts, and reduce GHG emissions. Energy demand patterns from VPPs will also change, and the commonwealth must improve its capability to respond and adapt to the changing energy landscape.

**Advanced Large-Scale Energy Storage**

Energy storage deployment is a growing opportunity that can address challenges the grid may face due to a higher penetration of renewables or intermittent generation technologies. The ability to integrate more intermittent resources like renewables can reduce the impacts of electricity production during peak demand periods. Energy storage can improve the resiliency of the grid and ensure reliable service, especially for critical facilities and in areas that are congested or constrained by a lack of new distribution or transmission system upgrades.

**Why it matters for Pennsylvania:** Pennsylvania is already home to several traditional energy storage projects in the form of hydropower and other innovative energy storage projects such as flywheel technologies. Pennsylvania’s ability to identify advanced grid connected storage technologies within PJM will help stabilize the grid and bring benefits (e.g., jobs) to the commonwealth when they are sited, built, and operated in Pennsylvania.

**Potential Example, Mine Pool Pumped Storage:** Pennsylvania has a long history of mining. Many abandoned mines, including some near energy transmission infrastructure, could be evaluated for viability of pumped storage systems. When underground mining operations are completed, the cavern provides an opportunity for an energy storage system and thermal energy sink using the water present in reservoir sections of the mines. Pumped water energy storage systems are configured with two water reservoirs located at different elevations. The system generates power as water moves from the higher reservoir to the lower one, while passing through a turbine. The system recharges by pumping water back into the upper reservoir.<sup>32</sup> Pumped storage can be discharged and recharged rapidly, allowing for the system to act as a battery.

While advanced mine pool pumped storage systems are not currently deployed in Pennsylvania, identifying and evaluating potential mine sites could help EPO and more broadly the commonwealth understand the potential of advanced mine pool pumped storage.

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<sup>32</sup> Department of Energy. Pumped Storage Hydropower <https://www.energy.gov/eere/water/pumped-storage-hydropower>



# Conclusion

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EPO has played and will continue to play a key role in maintaining the commonwealth’s energy economy, while advancing indigenous clean and renewable energy sources.

EPO, working with its partners, will focus on the priority actions within this 2022 CEP Plan in 2023-25 to achieve its mission and fulfill its obligations for supporting energy conservation and efficiency, advancing clean energy technologies, and providing energy security and resilience. Through these actions, EPO will continue to improve the environment and health of Pennsylvania residents through education, outreach, and technical support. EPO will also fill existing gaps in its programming activities, giving additional focus to historically underserved communities and environmental justice areas, and addressing current and future energy priorities to better fulfill its mission and achieve Pennsylvania’s climate and energy goals.

EPO understands that successful programs require tracking for effectiveness to ensure that each program is achieving its desired outcomes. Continued and robust tracking efforts that gather service provider feedback or participant information will help EPO understand technical successes and financial breakthroughs. EPO has developed a program tracker which is being used for nearly real-time activity monitoring and can be used to create periodic reports. Over the last two years, EPO has developed an internal quarterly reporting as part of the development of the tracker. Looking forward, EPO strives to provide a summary report via the EPO website to allow others quick access to the results of its most noteworthy program activities. Ultimately, these tools allow EPO’s managers to track progress and adjust programs to better meet its mission as well as Pennsylvania’s energy and climate goals.

In addition to these actions, EPO will continue to incorporate the six guiding principles and best practices identified in this report into all future programming and planning efforts:

- Collaborate with other agencies and organizations.
- Consider equity, access, and inclusion and the needs of and effects on vulnerable communities.
- Ensure effective marketing of programs and results.
- Conduct program impact assessments.
- Create and use a program tracker.
- Integrate energy assurance and resilience in planning efforts.

Integrating these practices and principles in future programs will help EPO more effectively plan and execute and better achieve its goals.

Finally, to ensure that EPO’s programs are more resilient and able to adapt to future needs, EPO will continue tracking developments in energy systems and technologies. This will provide a future-focus to EPO’s programming efforts, keeping it informed and poised to capitalize on emerging technologies and strategies as they mature.

Altogether, these priority and upcoming programs and plans, guiding principles, and future-focused efforts will shape EPO’s clean energy programs over the next two years. EPO’s sincere intent is that this actionable Clean Energy Program Plan will further the Commonwealth of Pennsylvania’s role as an energy leader, help achieve its long-term clean energy goals, and ensure resilient and reliable energy resources for all Pennsylvania residents.

# Appendix A. History and Function of the Energy Programs Office

The Pennsylvania State Energy Office (SEO), now known as EPO, was first established as the Governor’s Energy Council under Executive Order 1979-7. SEO was responsible for developing a comprehensive energy plan for the commonwealth, distributing federal and private energy funds, collecting and distributing information for the public related to energy conservation and sources, and helping to assess, track, and regulate energy resources.

Since then, several other relevant executive orders related to the SEO’s operations have informed EPO’s functions.<sup>33</sup>

- **Executive Order 1983-6** required the Department of Commerce to provide staff services to the then-recently created Pennsylvania Energy Development Authority (PEDA), which provided financing for energy projects.
- **Executive Order 1984-2** designated the SEO as the agency responsible for monitoring supplies of petroleum and for implementing measures to allocate petroleum in the case of an emergency.
- **Executive Order 1987-15** designated the SEO as the lead commonwealth agency for energy policy development.
- **Act 18 of 1995** transferred the SEO and its responsibilities to be within DEP, including the duties under the Building Energy Conservation Act, the Energy Conservation and Assistance Act, and related to alternative fuels.
- **Executive Order 2004-5** designated DEP as the agency primarily responsible for providing staffing services to PEDA. As the chair of PEDA, the Secretary of DEP leads a 19-member board that oversees the authority.

## EPO and DEP Organizational Charts

Today, EPO works within the DEP to implement energy programs, with a focus on energy efficiency, energy conservation, resilience, and the promotion of indigenous, clean, and diverse energy resources.<sup>34</sup> Development of clean energy resources falls within DEP’s overarching mission to protect Pennsylvania’s air, land, and water from pollution and to provide for the health and safety of its citizens through a cleaner environment. DEP partners with individuals, organizations, governments, and businesses to prevent pollution and protect the commonwealth’s natural resources. EPO works to assist, educate, and encourage Pennsylvanians to conserve and efficiently use energy, to provide for a healthier environment, and to achieve greater energy security for future generations. The EPO organizational structure includes 27 full-time staff as depicted in Figure A-1 below.

<sup>33</sup> Pennsylvania Department of Environmental Protection. 2019. *PA DEP Energy Programs Office*. May.

<sup>34</sup> Ibid.

The EPO is a stand-alone office that reports directly to the Executive Deputy Secretary for Programs, who reports directly to the Secretary of DEP. This reporting relationship is depicted in Figure A-2. The EPO’s team is diverse and includes the following positions:

- Director.
- Environmental Program Manager.
- PEDAs Executive Director - Energy Incentive Programs.
  - Energy Program Specialist – PEDAs, Green Bank, CPACE.
  - Energy Program Specialist – EECBG, Revolving Loan Fund, GELF.
- Energy Workgroup Manager (Regions).
  - Energy Program Specialist Southeast – Energy Codes, WWTP.
  - Energy Program Specialist Southwest – Community Resilience, Energy Storage.
  - Energy Program Specialist Northcentral – Agriculture, Energy Efficiency.
  - Energy Program Specialist Southcentral – DEPA, Electric Vehicles, Climate.
  - Energy Program Specialist Northeast – Municipal Solar, Anerobic Digestion.
- Energy Workgroup Manager\* (Harrisburg).
  - Energy Program Specialist – Act 129, State Energy Program.
  - Energy Program Specialist – AFIG, PEDAs.
  - Sr. Civil Engineer – Technical Reviewer, Energy Systems.
- Energy Workgroup Manager.
  - Energy Program Specialist – ESF 12, Energy Assurance/COOP Planning.
  - Climate Program Specialist – Act 70, Climate Change, Green Gov T/A.
  - Energy Program Specialist – AEPS, Solar.
- Energy Workgroup Manager.
  - Energy Program Specialist – State Energy Security Planning – All hazards.
  - Energy Program Specialist – Electric Grid Resiliency.
  - Energy Program Specialist – Justice 40, Community Planning.
- Administrative Officer.
  - Administrative Assistant.
  - Clerical Assistant - SEP.
  - Clerical Assistant– Energy Security/Resilience – PEDAs.

\* Please note that the Energy Workgroup Manager positions are listed as Environmental Group Managers in Figure A-1.

Figure A-1. Energy Programs Office Organizational Chart

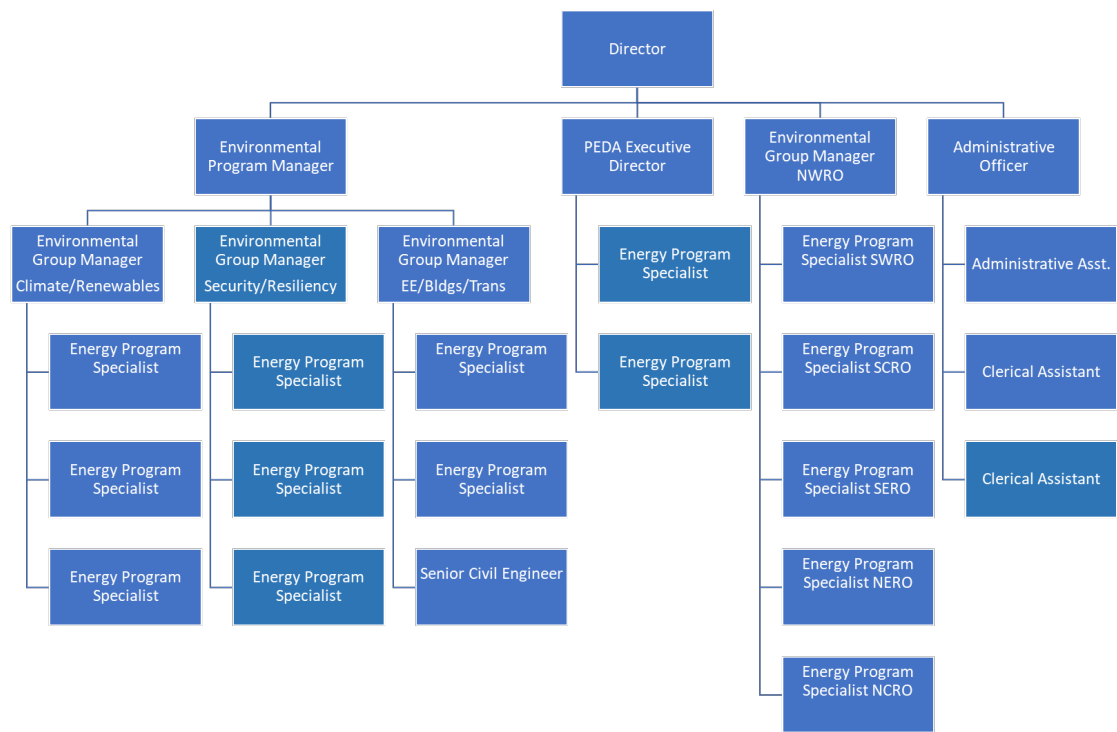
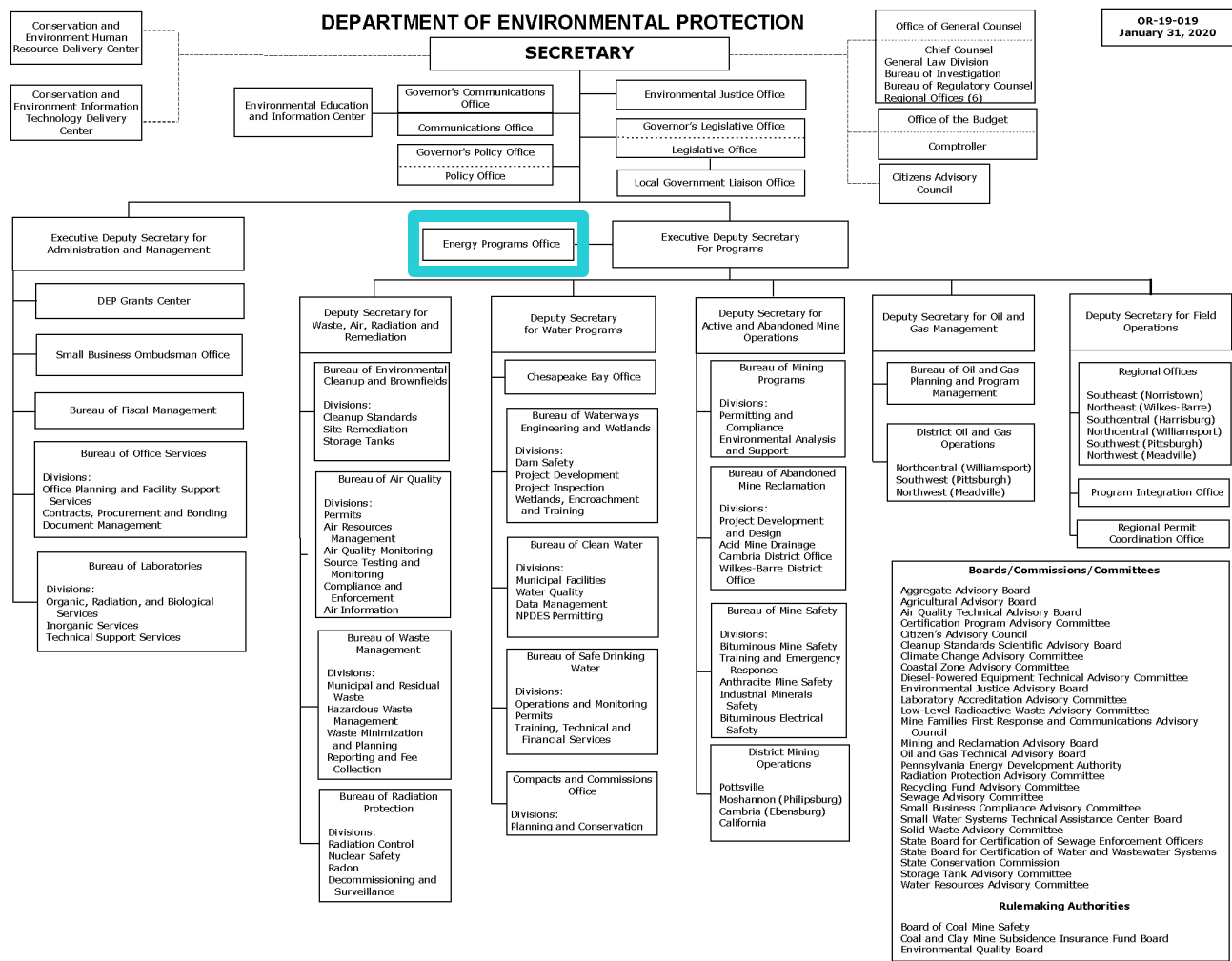


Figure A-2. DEP Organizational Structure



# Appendix B. Recent Significant Products and Successes

## EPO’s Clean Energy Leadership

The Commonwealth of Pennsylvania is a leader in developing clean energy sources. This position builds on the deep energy history of the commonwealth, which presents both opportunities and challenges. As a leading energy-producing state rich with natural resources, Pennsylvania has led the transition to lower-carbon fuels such as natural gas and alternative transportation fuels for decades. Pennsylvania is continuing to lead the transition to clean energy by developing renewable energy and other alternative energy resources; investing in energy efficiency, clean transportation systems, and energy resilience strategies; and preparing Pennsylvania’s clean energy workforce. Clean energy development and use have continued to increase in the commonwealth due to advances in technology and policies promoting development. This is being driven in part because of the efforts of EPO and its partners. EPO has played, and will continue to play, a key role in maintaining the commonwealth’s energy economy while advancing indigenous clean and renewable energy sources. EPO works with its partners to implement, coordinate, and facilitate clean energy programs which are intended to meet both state energy and climate goals including social equity, health, and economic benefits for Pennsylvania’s residents.

EPO has developed several significant plans and reports to inform a wide range of stakeholders including government leaders, industry participants, and Pennsylvania residents on the status, accomplishments, and opportunities of clean energy programs and policies. These plans and reports, which in some cases are subject-specific, have created a foundation of information and strategies that together comprise comprehensive energy program planning. They set a pathway for the commonwealth and provide residents, businesses, local governments, and other stakeholders with an interest in Pennsylvania’s energy future.

### 2021 Pennsylvania Climate Impacts Assessment<sup>35</sup> and Climate Action Plan<sup>36</sup>

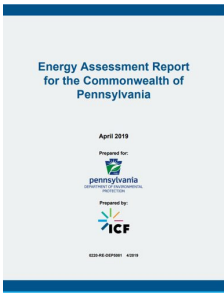


- Present updated climate projections based on the latest available climate models and identify priority climate change-related risks for adaptation planning.
- Lay out a pathway to meet the Governor’s 2025 and 2050 emissions reduction goals. Link adaptation pathways directly to the 2021 Impacts Assessment.
- Quantify economic costs and benefits associated with each GHG mitigation strategy and provide considerations for human health and equity.

<sup>35</sup> Pennsylvania Department of Environmental Protection. 2021. "[Pennsylvania Climate Impacts Assessment 2021](#)." Government Report.

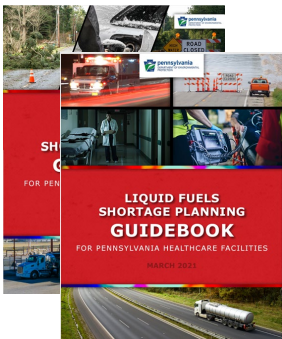
<sup>36</sup> Pennsylvania Department of Environmental Protection. 2021. "[Pennsylvania Climate Action Plan 2021](#)." Government Report.

2019 Pennsylvania Comprehensive Energy Assessment Report<sup>37</sup>



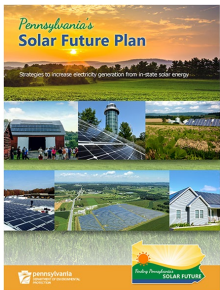
- Characterizes the technical and economic potential of Pennsylvania's available energy resources from 2016 through 2050
- Informs the development of the Pennsylvania 2018 Climate Action Plan.

2020 Liquid Fuel Shortage Planning Guidebook for Pennsylvania Local Government and Healthcare Facilities<sup>38</sup>



- Provides tools and resources to support local governments with energy assurance planning, providing foundational guidance for advancing Pennsylvania's energy security and sustainability. EPO provided tools and resources to support healthcare facilities with energy assurance planning.

Pennsylvania's Solar Future Plan<sup>40</sup>



- Based on an EPO-led 30-month "Finding Pennsylvania's Solar Future" project that convened hundreds of community, industry, government, and other stakeholders to collaboratively identify and plan pathways toward the goal of 10% of in-state electricity sales generated by in-state solar energy sources by 2030.

<sup>37</sup> Pennsylvania Department of Environmental Protection. 2019. "[Energy Assessment Report for the Commonwealth of Pennsylvania](#)." Government Report.

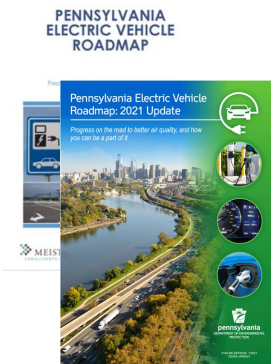
<sup>38</sup> Pennsylvania Department of Environmental Protection. 2020. "[Liquid Fuels Shortage Planning Guidebook for Pennsylvania Local Governments](#)." Government Report.

<sup>39</sup> Pennsylvania Department of Environmental Protection. 2020. "[Liquid Fuels Shortage Planning Guidebook for Pennsylvania Healthcare Facilities](#)." Government Report.

<sup>40</sup> Pennsylvania Department of Environmental Protection. 2018. "[Pennsylvania's Solar Future Plan](#)." Government Report.



2019 Pennsylvania Electric Vehicle Roadmap<sup>41</sup> and 2021 Update<sup>42</sup>



- Prepared by the Drive Electric PA Coalition in 2017 to advise on electric vehicle (EV) policies and planning.
- A stakeholder-driven planning effort to identify strategies to increase the adoption of electric vehicles.
- Identifies near-, mid-, and long-term strategies to incentivize and remove barriers to EV adoption.
- The 2019 Pennsylvania Electric Vehicle Roadmap was updated in 2021 to include new data on EV use in Pennsylvania, suggestions for policy, planning, and programming based on recent changes in the EV landscape; and progress reports on previously initiated goals and programming.

The Pennsylvania Energy Storage Assessment: Status, Barriers, and Opportunities<sup>43</sup>



- Issued in April 2021, it underscores the importance of efficient energy storage to create a sustainable, affordable, and resilient energy grid.
- Provides recommendations for capitalizing on energy storage benefits, including the creation of The Energy Storage Consortium, The Food Waste to Energy Report, and The Energy Workforce and Gap Analysis Reports.

2021 Pennsylvania Food Waste to Renewable Energy Assessment<sup>44</sup>



- EPO initiated this report to collect and analyze data on the generation and processing of industrial, commercial, and institutional (ICI) food waste to identify key challenges and best practices for ICI food waste management. The assessment also provides analysis of the potential to convert GHG emissions from ICI food waste into renewable energy.

<sup>41</sup> Pennsylvania Department of Environmental Protection. 2019. "[Pennsylvania Electric Vehicle Roadmap](#)." Government Report.

<sup>42</sup> Pennsylvania Department of Environmental Protection. 2021. "[Pennsylvania Electric Vehicle Roadmap: 2021 Update](#)." Government Report.

<sup>43</sup> Pennsylvania Department of Environmental Protection. 2019. "[Pennsylvania Energy Storage Assessment: Status Barriers, and Opportunities](#)." Government Report.

<sup>44</sup> Pennsylvania Department of Environmental Protection. 2018. "[Pennsylvania Food Waste to Renewable Energy Assessment](#)." Government Report.

## EPO Successes Since 2020

EPO has led and continues to support many clean energy programs related to renewable energy and energy efficiency, the energy workforce, climate and energy, energy security and resilience, and transportation. EPO has made notable progress and reached key milestones in these program areas since the publication of the 2020 CEP Plan.

### Examples of EPO’s Success Since 2020

- 8** direct sessions with local governments to support solar development.
- 2,500+** municipal ordinances reviewed.
- 465** Leaders trained through the Pennsylvania Climate Leadership Academy.
- Over 600** Individuals educated on energy assurance planning and implementation.
- 710,000** square feet of buildings operating more efficiently due to Green Energy Loans Fund projects.

## Solar Guidance for Local Governments

### Grid-Scale Solar Outreach to Local Government Officials

EPO has been working with the Pennsylvania State University Extension (including the PSU Marcellus Center for Outreach and Education, the PSU Center for Agricultural and Shale Law, and Penn State Dickinson Law) to deliver training and technical assistance services to local government officials around the topic of grid-scale solar development since May 2021. With over 500 projects and 16 gigawatts of proposed grid-scale solar energy proposals in various stages of the PJM New Services Queue, grid-scale solar is expected to expand across the commonwealth over the next decade, with most of the development occurring in rural areas with limited administrative capacity to develop and enact the regulatory framework at the local level (ordinances and zoning) to govern the design, construction, and operations of these facilities.

EPO partnered with Penn State Extension to deliver training and technical assistance in four distinct formats to provide relevant information to the targeted audience of local government officials (county planning directors, township supervisors, zoning officers, and solicitors), with an emphasis on outreach to rural communities where most of the development is expected to occur. These formats included:

1. **Direct Outreach to County and Municipal Officials in Pennsylvania:** Since June 2021, eight (8) sessions have been conducted across the commonwealth (Franklin County, Centre County, Mercer County, Adams/Franklin Counties, Lehigh/Northampton Counties, Bradford/Susquehanna Counties, Crawford/Venango Counties, and Erie County). These sessions provided an opportunity for local government practitioners to ask questions about how grid-scale solar projects are being developed and what steps they need to take to ensure development occurs in a responsible and sustainable fashion, balancing the concerns of landowners, neighboring property owners, and developers. Topics addressed included considerations for ordinances to govern land use and zoning, site engineering and development, and decommissioning requirements. Each of the eight sessions were attended by between 20 and 35 local officials per event. Additionally, follow-up meetings were held with Mercer, Lehigh, and Centre Counties to provide more in-depth technical assistance based on issues identified during the outreach sessions.
2. **Grid-Scale Solar Development Issues Forums for Pennsylvania Public Officials:** Eleven (11) virtual sessions were conducted monthly on the third Tuesday of each month that were open to local government officials from across the commonwealth. The format for these sessions included a brief presentation (10-15 minutes) on a specific topic such as ordinance development or integrating agrivoltaics into project proposals, followed by an open forum for participants to ask questions and share lessons learned based on grid-scale solar development activities occurring in their communities. Each of the eleven sessions were attended by between 15 and 30 local officials per event.
3. **Solar Ordinance Assessment Research:** Assistance was provided to continue research being conducted by a team at Penn State Dickinson Law School to review and categorize land use ordinances governing solar development in Pennsylvania. The team reviewed over 2,500 individual municipal ordinances and found less than 5% of current ordinances have rules in place to govern grid-scale solar development. This research provides a baseline for future ordinance development across Pennsylvania and identified best practices that were shared during the technical assistance sessions listed above.
4. **Municipal Officials' Guide to Grid-Scale Solar Development in Pennsylvania:** This guide was developed and published to inform municipal and county officials about grid-scale solar development so they can potentially add clear, regionally consistent language addressing the specific issues around solar energy development to their zoning ordinances and other regulations. The guide includes sections about the physical, environmental, land use, and economic impacts of grid-scale solar development, and provides brief overviews about each topic and provides links to resources with more in-depth information. This guide can be accessed at: [Penn State's Solar Energy website](https://marcellus.psu.edu/solar-energy/).<sup>45</sup>

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<sup>45</sup> Penn State. 2022. "Solar Energy." Available at: <https://marcellus.psu.edu/solar-energy/>.

## Green Energy Loan Fund

The Green Energy Loan Fund (GELF) provides loans for energy conservation and efficiency improvements in commercial, nonprofit, government, residential, and industrial buildings and facilities. Initial funding for this program came from the U.S. DOE SEP during the American Recovery and Reinvestment Act of 2009. Projects must demonstrate an energy reduction of either 25% over the current systems or 10% over current code to be eligible. Reinvestment Fund, a federally certified community development financial institution (CDFI), manages GELF in coordination with DEP.<sup>46</sup>



In 2022, EPO announced that the fund had financed \$30 million in energy saving improvements that resulted in improvements to 2.3 million square feet of building space across the commonwealth. Approximately \$350 million in private capital was leveraged into energy efficiency projects in part due to the Loan Fund. As a recent success, The Leon H. Sullivan Charitable Trust sought \$1.3 million in financing to improve sustainability for its 43-year-old Human Services Center in Philadelphia. The improvements included a new HVAC system, including boilers and chillers and an upgraded emergency backup generator. Energy improvements are anticipated to cut energy use from heating and cooling by more than 25%. The benefits of this project are magnified even further by the fact that all of this is happening in Environmental Justice areas. EPO works to ensure that all Pennsylvanians, especially those that have typically been disenfranchised, benefit from programs like GELF. Since the program began, over half of GELF funded projects have been located in low-income census tracts.<sup>47</sup> Projects funded by GELF can be viewed in an online, interactive map that includes information on expected or observed energy reduction and cost savings.

<sup>46</sup> Commonwealth of Pennsylvania. The Green Energy Loan Fund (GELF). Available at: <https://www.dep.pa.gov/Business/Energy/OfficeofPollutionPrevention/FinancialOptions/Pages/Green-Energy-Loan-Fund-.aspx>

<sup>47</sup> Low-income census tracts (census tracts that qualify for low-income housing tax credits) are defined by over 50 percent of households with incomes below 60 percent of the Area Median Gross Income (AMGI) or 25 percent or greater poverty rate.

GELF can finance on-site renewable energy and CHP systems only when they are part of a larger building energy efficiency project. Eligible applicants include building owners, developers, and commercial tenants, but not single-family homeowners.<sup>48</sup> Additional SEP funds in later years supplemented this program.

**PEDA COVID-19 Restart Grants**

In December 2020, the Pennsylvania Energy Development Authority (PEDA) sought to restart supply chains, put clean energy workers back to work and support clean energy deployment in Pennsylvania. To accomplish this, PEDA awarded \$1.7 million in COVID-19 Restart Grants to 11 energy efficiency, solar energy, high-performance building, and electric vehicle charging projects halted by the pandemic. Five businesses, two municipalities, two school districts, and two nonprofit organizations received grants for a variety of building and transportation projects that had broken ground or were in advanced planning stages before being disrupted by the pandemic. Grants supported immediately re-hiring workers or hiring additional workers to complete the projects quickly, making immediate equipment payments to restart the supply chain, and, most importantly, restarting a project that otherwise likely would not have been completed due to the disruption caused by the pandemic. The funded projects were in urban and rural areas in eight counties, and seven were in or served environmental justice communities. The projects included innovative high-performance buildings, the first solar array to be owned by the City of Erie, energy efficiency lighting installations at businesses, and municipal electric vehicle chargers. Several projects incorporated student and public education on clean energy. All project awards successfully restarted projects and resulted in clean energy project deployments.<sup>49</sup>

**Outreach to Wastewater Treatment Plant Operators on Energy Efficient Operations**

Based on the recommendations from our Clean Energy Plan, in 2021 DEP’s EPO became a partner with U.S. DOE’s Better Buildings Sustainable Wastewater Infrastructure of the Future (SWIFt), an accelerator program designed to assist wastewater utilities to improve their energy efficiency and integrate resource recovery. As a partner, EPO recruited nine wastewater plants across the commonwealth to participate in a cohort. The plants ranged in permitted size from 1.5 million gallons per day (MGD) to 20.5 MGD plants and utilize various treatment processes. This cohort received five US DOE SWIFt trainings, EPO staff assistance in benchmarking their energy use using the free EPA tool Energy Star Portfolio Manager, and through State Energy Program dollars, EPO hired a contractor to provide an ASHRAE Level 2-equivalent energy assessment of their plant operations. Cohort members committed to participating in the training, developing an energy management plan, and continuing to track and report their energy usage and any implemented energy conservation measures through the fiscal year 2022-23.

<sup>48</sup> Reinvestment Fund. n.d. *Pennsylvania Green Energy Loan Fund*. Accessed March 11, 2020. Available at: <https://www.reinvestment.com/GELF/PAGELF.html>.

<sup>49</sup> DEP. 2020. “Pennsylvania Energy Development Authority Provides \$1.7 Million in COVID-19 Restart Grants to 11 Clean Energy and Energy Efficiency Projects Statewide.” Available at: <https://www.ahs.dep.pa.gov/NewsRoomPublic/articleviewer.aspx?id=21891&typeid=1>.



The assessment report provided each plant with energy conservation measures, potential energy and cost savings for each, and basic information on renewable opportunities and incorporation of energy resiliency in their operations. The nine plants annually spend between \$71,000 and \$573,000 on their energy utilities. Due to long paybacks for equipment upgrades and after review of operations in relation to water quality output, the plants should expect about a 5-10% improvement in their energy usage with measures they can implement through operational changes or new equipment with reasonable payback periods. Most of these plants already operate at a high level of energy efficiency for their process type, using variable frequency drives on motors and blowers and fine or medium bubble in their aeration systems, typically the largest energy conservation measures available for wastewater facilities. Energy use intensity was also analyzed, and the plants in the cohort with the newest technology and stricter permit limits tended to be the most energy intensive facilities. Moving into the future, a contractor could provide additional energy audits to interested plants through EPO's Shared Energy Manager program. In addition, EPO could work with the DEP's Bureau of Clean Water to identify plants that do not use variable frequency drives, have not upgraded their aeration systems, or that are undergoing expansions where examination of energy use could be a priority. Through Clean Water, EPO could reach out to plants where incorporation of renewables, distributed generation, and/or electric energy storage would be a next best step for their operations.

## Climate Action and Energy Work with Local Governments

### LCAP

For the past three years, EPO has managed a Local Climate Action Program (LCAP) where ICLEI (Local Governments for Sustainability) was contracted to train college student and local government teams on development of greenhouse gas inventories and local climate action plans to further local GHG reduction efforts. The program runs on the same timeline as the academic calendar year and trains student teams which are paired with local government participants in the program to analyze community-wide utility use data, vehicle miles traveled, and other relevant information on ICLEI's ClearPath platform to produce GHG inventories for the local government by the end of the fall semester. This information is then used to inform a stakeholder engagement process to set target goals and recommend specific actions to reduce GHG emissions from that inventory in a local climate action plan.

EPO has worked exclusively with ICLEI for the first three years of the program and is currently entering into its 4<sup>th</sup> year of the program. For the 2022-23 cohort, the Penn State Sustainability Institute will take over the management and instruction of this program. EPO will continue to fund the purchase of ICLEI subscriptions for the local governments that participate, providing access to their ClearPath tool to assist in completing their GHG inventories. This program has achieved many successes enrolling a total of 64 local government participants including 54 municipalities, 5 counties, and 5 regional planning organizations. At least 19 participants have officially adopted their climate action plans, and another 17 have completed draft plans through the LCAP program. Additionally, local governments have completed at least 51 GHG inventories through the LCAP program. EPO has continued to support its LCAP participants with programs to assist them with implementing their climate action plans that are produced through LCAP with our Shared Energy Manager and CAPstone programs.

**Shared Energy Manager**

EPO is currently completing its second year of working with Wilson Engineering Services on the Shared Energy Manager Program (SEM). The SEM program further assisted local governments which participated in our Local Climate Action Program (LCAP), designed to help municipalities and counties in Pennsylvania complete GHG inventories and their own climate action plans based on those emissions inventories. Five participants of LCAP were selected each year for our contracted SEM, Wilson Engineering Services, to identify aspects of their completed climate action plans to conduct feasibility studies on or begin implementation to increase the energy efficiency of their facilities and operations as well as save taxpayer dollars on energy costs. The goal of the SEM program is to provide remote support in the form of technical expertise and implementation guidance to these local governments to lower their energy consumption and improve their energy management practices. The SEM work includes various site visits and energy use analyses, feasibility studies for converting existing facilities to new renewable power sources or alternative technologies, and scoping of available programing resources, grants, or other funding mechanisms to achieve those transitions.

The SEM provided numerous reports for the five local governments by the end of the program each year. For example, the 2021-2022 cohort included: 7 building energy assessments, 1 county-level light-duty fleet electrification analysis, 5 local government wide energy inventories/benchmarking analyses or energy management plans (including ENERGY STAR® verification reports), 1 county-level solar photovoltaic feasibility assessment, and 1 renewable natural gas feasibility analysis for a wastewater treatment plant. EPO intends on repeating and expanding this program for several years going forward (depending on funding availability through the IIJA), enrolling up to 10 communities per year (doubling the previous size) including local governments with climate plans that were not produced directly from our internal LCAP program, and expanding the scope to potentially include plans for improving energy efficiency and cost savings of residential and commercial facilities. There is consideration for expanding the program to allow school districts and other entities beyond strictly local governments to apply as well. There will also be a focus on developing climate action and energy efficiency programs through SEM that will center on environmental justice communities.

**Pooled Local Government Procurement of Energy Services**



EPO has worked with local governments to identify and establish pooled procurement programs for energy services such as renewable energy Power Purchase Agreements (PPAs), LED streetlighting, or energy efficiency services. By pooling their collective resources, local governments can achieve more together than they could do alone, and recent activities in this space have proven that joint programs can foster regional collaboration to provide greater consistency and coverage of energy services.



The Delaware Valley Regional Planning Commission (DVRPC) Regional Streetlight Procurement Program (RSLPP) which was supported by EPO exemplified the efficacy of pooling procurement programs as it reduces energy use and operating costs while improving public safety. The program helped participating municipalities gain access to necessary resources for LED street and exterior lighting projects by pooling resources and decision-making power to improve cost-effectiveness. Since DVRPC launched RSLPP in 2015, the program has produced the following benefits across the 61 participating municipalities:

- About 40,000 converted LED streetlights.
- \$26.6 million net savings over 20 years.
- 8,430 metric tons of CO<sub>2</sub> emissions saved annually.
- 18.7 million kilowatt hours saved annually.<sup>50</sup>

### Energy Storage Consortium

Following a recommendation presented in the ***Pennsylvania Energy Storage Assessment: Status, Barriers, and Opportunities***, EPO launched the Pennsylvania Energy Storage Consortium (Consortium) in September 2021. The consortium meets quarterly and is comprised of membership from stakeholder groups working in the energy storage sector such as battery manufacturers, renewable energy project developers, utilities, state and local government, trade associations, PJM Interconnect and the Pennsylvania Public Utility Commission. Planning for Consortium sessions is guided by a steering committee comprised of membership from these stakeholder groups. The consortium has over 200 registered participants, with each meeting averaging approximately 100 attendees.

The purpose of the Consortium is to serve as an opportunity for key stakeholders to engage on a wide range of topics that address policy and market barriers that can lead to the advancement of energy storage to support a modern, resilient, low carbon grid for all Pennsylvanians. During the initial Consortium meeting, participants agreed upon a mission: *To engage stakeholders on policy and market topics that identify the opportunities to deploy energy storage for a modern, resilient cleaner, low-carbon grid for all Pennsylvanians.* Through the first year, Consortium meetings have featured presentations and panel discussions on topics including:

- Case Studies on Energy Storage Deployment in Pennsylvania by Utilities.
- State Policy Levers for Energy Storage Deployment.
- Developer Perspectives on Optimizing Storage Policies and Programs.
- Energy Storage for Peaker Plant Replacement.
- Equity Considerations for Pennsylvania Energy Storage Policy.

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<sup>50</sup> Delaware Valley Regional Planning Commission, “Regional Streetlight Procurement Program,” <https://www.dvrpc.org/rslpp>

## Transportation Programs

### AFIG Program

The Alternative Fuels Incentive Grants (AFIG) Program promotes the use of alternative fuels in the Commonwealth of Pennsylvania under the Alternative Fuels Incentive Act of 2004. The AFIG Program houses two specific incentive programs: the Alternative Fuel Vehicle Rebate Program and the AFIG Grant Program.

Together these programs encourage a statewide shift to alternative fuel use to improve local air quality, reduce CO<sub>2</sub> emissions, and spur development of Pennsylvania's indigenous fuels market.

In the 2021-2022 program year, the AFV Rebate Program issued 1,312 rebates to Pennsylvania residents totaling \$885,500 to support the purchase or lease of alternative fuel vehicles.

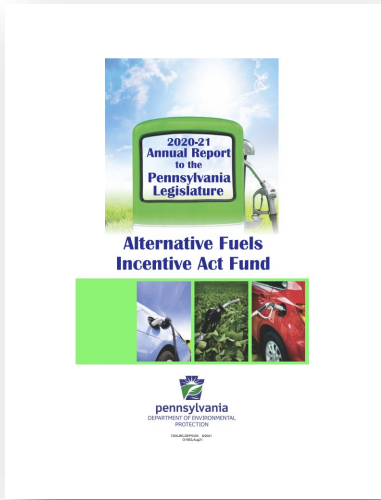
Since 2011, the program has provided a total of \$15 million in rebate funds to over 10,000 Pennsylvania residents for the purpose of purchasing alternative fuel vehicles.

In the 2021-2022 program year, the AFIG program successfully oversaw the completion of 21 projects which included the deployment of 225 alternative fuel vehicles and two completed alternative fuel refueling stations estimated to displace 1,152,851 gasoline gallon equivalents per year.

Since 2013, AFIG program grantees have been reimbursed for more than \$18.5 million in AFIG funding for alternative fuel projects including incremental costs for alternative vehicle purchases, equipment and installation costs for alternative fuel refueling infrastructure, and for projects developing innovative alternative fuel technologies. AFIG grantees have purchased or converted more than 1,700 alternative fuel vehicles and saved an estimated 7.5 million gasoline gallon equivalents annually.<sup>51</sup>

### Driving PA Forward

The Driving PA Forward initiative includes a suite of grant and rebate programs aimed at improving air quality in Pennsylvania by spurring the transition from older, polluting diesel engines to clean engine technologies powered by electricity, compressed natural gas, propane, or clean diesel.<sup>52</sup>



<sup>51</sup> Pennsylvania Department of Environmental Protection. 2018. "2017-2018 Annual Report to the Pennsylvania Legislature: Alternative Fuels Incentive Act Fund (Report No. 0220-RE-DEP4466)."  
<https://www.dep.pa.gov/Citizens/GrantsLoansRebates/Alternative-Fuels-Incentive-Grant/Pages/default.aspx>.

<sup>52</sup> Pennsylvania DEP. 2018. *Driving PA Forward*. Accessed January 2020.  
<https://www.dep.pa.gov/Business/Air/Volkswagen/Pages/default.aspx>.

Since 2018, the EPO led Driving PA forward program has progressed through 4 versions of the Level 2 rebate program driving down the incentive levels and providing for additional incentives to deploy vehicle chargers across the commonwealth with a goal of providing equitable access. As of October 2022, the program has deployed over 1,600 plugs with over 700 more plugs applied for and being installed. The program will remain active until all funds are deployed, approximately, \$1.7 million remains.

Since 2018, the DC Fast Charge Program has provided approximately \$8.5 million in incentive funds to 34 projects across the commonwealth. Eight projects are currently completed, and ten projects are significantly under way. Sixteen projects were recently awarded in 2022 and are anticipated to be operational within two years.

**Energy Security and Resiliency**

**Performance Excellence in Electricity Renewal Cohort**

Beginning in 2019, EPO partnered with Green Business Certification Inc. (GBCI) to advance energy security and resiliency in Pennsylvania via the Performance Excellence in Electricity Renewal (PEER) certification program. GBCI developed and manages PEER, which is a global rating system that measures and improves power system performance and electricity infrastructure. The rating system evaluates and verifies a power system across four performance categories: reliability and resiliency; energy efficiency and environment; operations, management, and safety; and grid services.

Following a public webinar and in-person workshop on PEER, four Pennsylvania entities were selected to participate in a technical training cohort with GBCI representatives, including Penn State Hershey Medical Center, Lafayette College, PEMA, and Chatham University’s Eden Hall Campus.

Via the technical training cohort, project teams from these institutions utilized the comprehensive PEER framework to learn, document, and advance the electric infrastructure on their campuses. After compiling and submitting documentation to GBCI on their campus power systems, three of the four cohort participants earned PEER certification in 2021. Lafayette College and Chatham University Eden Hall Campus both earned silver certification, and Penn State Hershey Medical Center achieved the highest level, platinum. Chatham University’s project was the first student-led PEER certification effort in the world, as five graduate students participated in the training and assessment process for course credit. These three certifications serve as a testament to the leadership of these institutions and demonstrate their concern for the responsible use of energy resources and safeguarding infrastructure.



EPO Staff, GBCI Staff, and Penn State leadership and dignitaries pose with the PEER Platinum Certification plaque presented to the Penn State Hershey Medical Center in 2022.

**State Energy Security Plan 2022 Update**

The Infrastructure Investment Jobs Act (IIJA) required the State Energy Offices to update State Energy Security Plans to receive additional IIJA funding. The State Energy Security Plan (SESP) analyzes Pennsylvania’s current energy infrastructure, risks and hazards to that infrastructure, responses to energy emergencies, and coordination with a variety of stakeholders. Pennsylvania’s SESP was updated in September 2022 to include materials from the Pennsylvania Public Utility Commission (PUC) related to natural gas and electricity hazards and responses. By incorporating these additional sources, the SESP now contains more robust information to be utilized when responding to all types of energy emergencies within the commonwealth.

The requirement elements and content now included in the plan are as follows:

1. Addresses all energy sources and regulated and unregulated energy providers.
2. Provides a state energy profile including an assessment of energy production, transmission, distribution, and end use.
3. Addresses potential hazards to each energy sector or system including physical threats and vulnerabilities, and cybersecurity threats and vulnerabilities.
4. Provides a risk assessment of energy infrastructure and cross-sector interdependencies.
5. Provides a risk mitigation approach to enhance reliability and end-use resilience.
6. Addresses multi-state and regional coordination, planning, and response; coordinates with tribal entities; and encourages mutual assistance in cyber and physical response plans.

**Operation Winter Break Exercise**

The Pennsylvania Department of Environmental Protection (DEP), in conjunction with the Pennsylvania Emergency Management Agency (PEMA), conducted a discussion-based tabletop exercise on November 9, 2021, for private fuel industry partners and select county, state, and federal government agencies and organizations. This exercise was the first of its kind in Pennsylvania.

Operation Winter Break was developed to address selected areas for improvement identified in the Colonial Pipeline Temporary Shutdown After Action Report and build upon monthly conference calls with the private fuel industry. By combining similar real events from the previous three years, the exercise scenario was designed as a long-term regional disruption for both petroleum and propane products as a result of a pipeline break, strike action of railway workers, and a prolonged period of below-average cold weather. These events placed added pressure on a market where product shipping was already strained.

Seventy-one stakeholders, including representatives from Pennsylvania state government, the private fuel industry, and federal and national organizations, participated in the hybrid event. Twenty-three participated at the in-person event in Harrisburg, Pennsylvania, while 48 participated online via WebEx.

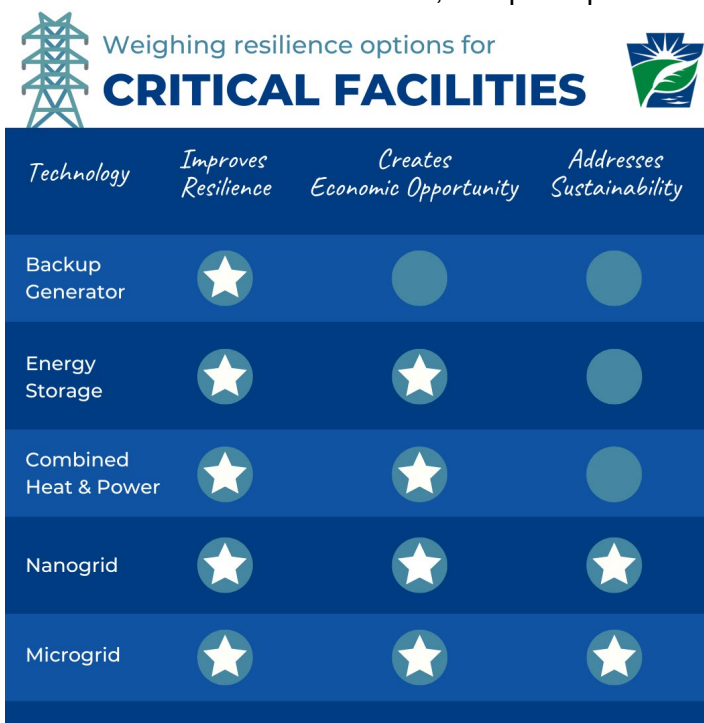
According to participant feedback, Operation Winter Break was successful, and participant feedback collectively indicated overall satisfaction with this first exercise and a desire to plan for more on an annual basis.

**Onsite Energy Generation and Storage for Critical Facilities**

In 2019, EPO initiated the first phase of an energy storage analysis by creating a comprehensive, statewide energy storage assessment report. One of the 15 recommendations included in the report was to develop a strategic plan to accelerate microgrid deployment, including energy storage, at critical facilities across the commonwealth.

To develop this strategic plan, EPO hired an expert contractor, ProtoGen, in 2021 to develop and present a virtual educational webinar and provide technical assistance to owners and operators of critical facilities with a focus on the use of onsite clean electric generation combined with electric energy storage resulting in microgrids as a resilience strategy. The target audience for the webinar included local governments, emergency management staff, and other public and private critical facilities. Funding opportunities highlighted included the FEMA Building Resilient Infrastructure and Communities (BRIC) Program and other FEMA, U.S. DOE, and state programs.

ProtoGen then provided technical assistance to a subset of five of the webinar participants selected in concert with EPO to assist the participants in initial feasibility studies for microgrid deployment at critical facilities. The five participants were selected based on criteria involving environmental justice, social vulnerability, risk and population. ProtoGen conducted physical site visits to investigate electrical infrastructure and assets to determine if energy storage technology would fit the facility and solar potential of site. Five final reports were delivered to the participants in the summer of 2022.





## Appendix C. Pennsylvania's Current Energy Profile

The Commonwealth of Pennsylvania is a leader in developing clean energy sources. This position builds on the deep energy history of the commonwealth, which presents both opportunities and challenges. As a leading energy-producing state rooted in its rich natural resources, Pennsylvania has led the transition to lower-carbon fuels such as natural gas and alternative transportation fuels and is continuing to lead the transition to clean energy by developing renewable and other alternative energy resources. The commonwealth's investments in planning and programing for climate adaptation demonstrate continued efforts to lead this transition to develop a resilient, sustainable energy sector.

### Pennsylvania's Energy Profile

Pennsylvania's Climate Action Plan (CAP), published in 2021, characterizes the trends in Pennsylvania's energy production and consumption under a business-as-usual (BAU) scenario and provides recommendations to accommodate projected energy needs with sustainable, resilient energy solutions.<sup>53</sup>

Key energy trends identified in the CAP under the BAU scenario include the following:

- Overall energy consumption would increase slightly through 2050, with an increase in all fuel types except direct-use fossil fuels.
- Energy used to generate electricity is projected to increase, while overall end-use electricity consumption is projected to slightly decrease.
- Natural gas consumption is projected to increase almost two-fold from 2005 to 2050, bringing both economic impacts (i.e., jobs and growth) and environmental and climate risks associated with production, transport, and combustion.
- Similarly, natural gas production is projected to increasingly be the commonwealth's largest energy source through 2050 in a BAU scenario.
- Use of renewable and alternative fuels (nuclear excluded) is projected to keep increasing slowly.
- Electricity generation is projected to increase overall, with the largest increases coming from natural gas and renewable energy sources, including wind, hydroelectric, and wood/biogenic waste. However, renewable energy sources are projected to never exceed 10% of total electricity generated by 2050.

**Pennsylvania Energy by the Numbers**

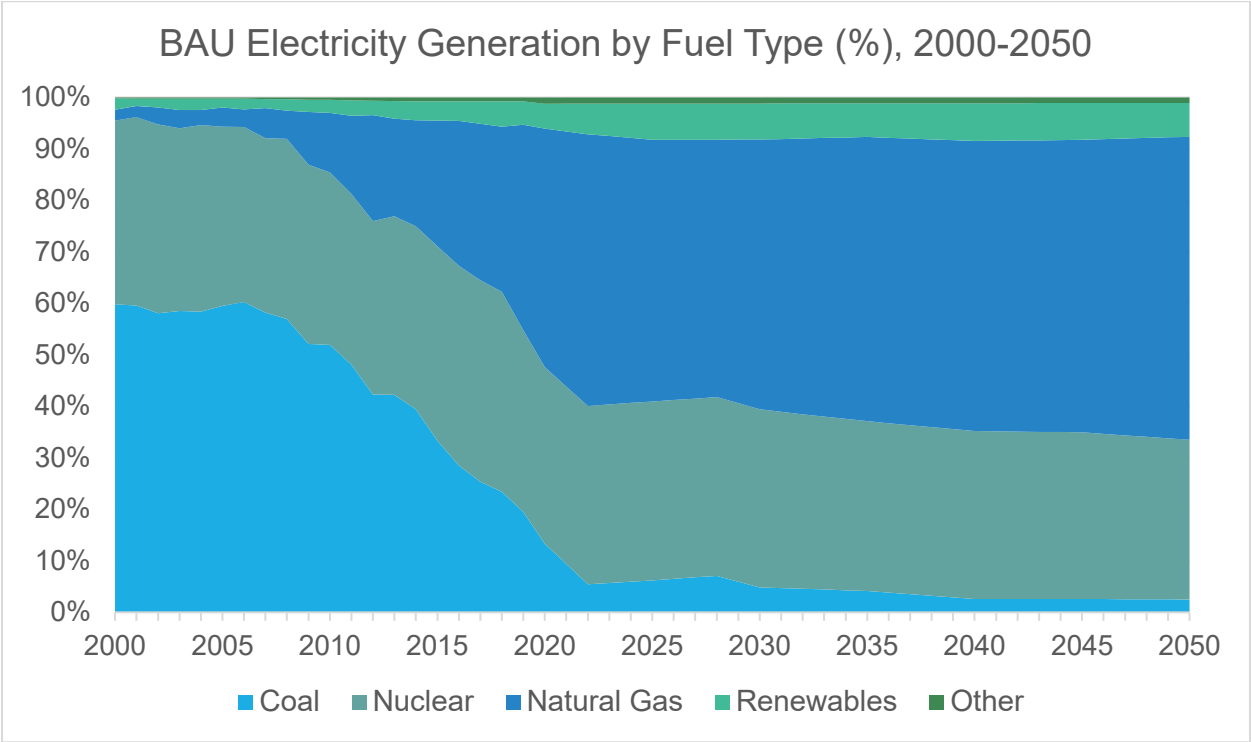
- **9,492 trillion Btu** – Total annual energy produced in 2020.
- **3,413 trillion Btu** – Total annual energy consumption in 2020.
- **32%** – Share of state's electricity generated by nuclear power (down from 39% in 2017).
- **53%** – Share of state's electricity generated by natural gas in 2018.
- **51.1%** – Share of households using natural gas for home heating in 2018.

*Source: Energy Information Administration.*

<sup>53</sup> Pennsylvania Department of Environmental Protection. 2019. Energy Assessment Report for the Commonwealth of Pennsylvania (Report No. 0220-RE-DEP5081). Prepared by ICF; Pennsylvania Department of Environmental Protection. 2021. Pennsylvania Climate Action Plan (Report No. 7200-RE-DEP5418). Prepared by ICF.

The CAP concludes that increasing the amount of electricity generated from renewables and other alternative fuels will improve the share of Pennsylvania’s energy consumption that comes from clean sources; however, fossil fuels still play an important role in the BAU scenario.

**Figure C-1. Total Pennsylvania Electricity Generation by Fossil Fuels, Nuclear, and Renewables: Business As Usual Scenario**



Energy production plays an important role in the strength of Pennsylvania’s economy. The power sector has the potential for substantial transformation as the projected reductions in coal and nuclear generation make way for increased use of natural gas, renewables, and combined heat and power (CHP) resources, all of which will play a more significant role in the grid mix by 2050 under the BAU scenario.<sup>54</sup> The potential for growing demand through electrification may provide Pennsylvania the chance to decarbonize the electricity grid while increasing generation capacity from clean energy sources, creating opportunities for additional renewable or alternative sources of energy.

<sup>54</sup> Pennsylvania Department of Environmental Protection. 2019. Energy Assessment Report for the Commonwealth of Pennsylvania (Report No. 0220-RE-DEP5081). Prepared by ICF; Pennsylvania Department of Environmental Protection. 2021. Pennsylvania Climate Action Plan (Report No. 7200-RE-DEP5418). Prepared by ICF.

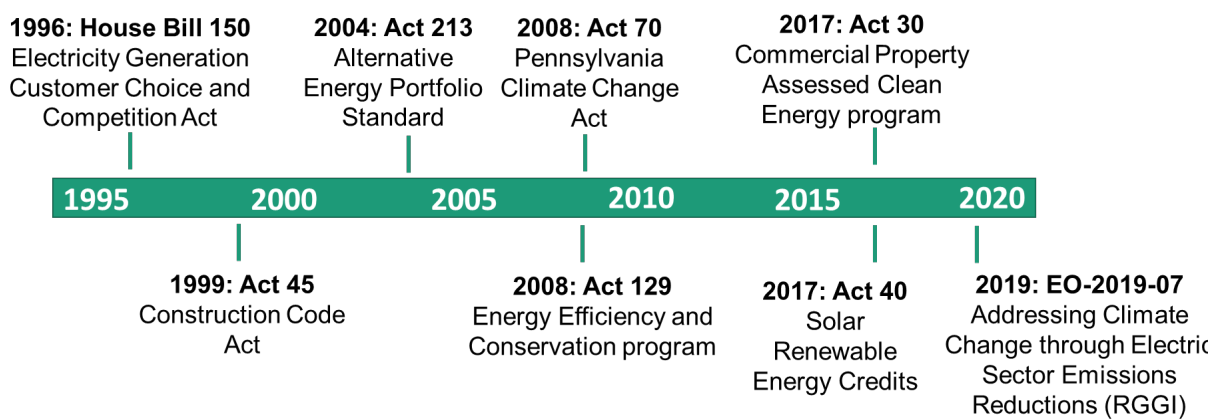


# Appendix D. Pennsylvania's Key Clean Energy Policies to Date

Pennsylvania has implemented several key energy policies and programs over the past three decades. EPO plays major and supporting roles or takes on responsibilities as a result of the policies and programs described in this section. Many of these policies were factored into the BAU projections discussed in the previous section.

Hallmark energy policies implemented in Pennsylvania over the past three decades are shown in D-1 and summarized below.

Figure D-1. Timeline of Pennsylvania's Recent Hallmark Energy Policies



## Electricity Generation Customer Choice and Competition Act of 1996: Making Pennsylvania a National Pioneer in Offering Choice of Supplier

Pennsylvania is one of the states that pioneered the deregulation of retail electricity markets in the 1990s. In the commonwealth's deregulated retail electricity market, electric generation suppliers can market electricity supply and other services directly to utility customers at competitive prices. Pennsylvania's traditional electric utilities continue to serve as electric distribution companies (EDCs), with generation suppliers competing for the generation portion of the customer's electric bill. In December 1996, Governor Ridge enacted the Electricity Generation Customer Choice and Competition Act, which outlined the transition from a regulated to deregulated retail electricity markets. In 1997, the commonwealth launched the country's largest electric-choice pilot program at that time, and by 2000 all of Pennsylvania's electric customers had access to choose an electric generation supplier. As of April 2020, nearly 1.5 million residential customers, over 300,000 commercial customers, and over 10,000 industrial customers receive service from an alternative generation supplier.<sup>55</sup>

<sup>55</sup> Pennsylvania Office of Consumer Advocate. (2020). "Pennsylvania Electric Shopping Statistics As of April 1, 2020." [http://www.oca.state.pa.us/Industry/Electric/elecstats/ElecStats\\_April2020.pdf](http://www.oca.state.pa.us/Industry/Electric/elecstats/ElecStats_April2020.pdf).

## Construction Code Act of 1999: Setting Energy Efficiency Standards

The Pennsylvania Construction Code Act (Act 45 of 1999), also known as Pennsylvania's Uniform Construction Code (UCC), establishes codes and standards for work requiring a construction permit. Across the commonwealth, 100% of the 2,560 municipalities locally administer and enforce the residential portions of UCC, either using their own employees or via certified third-party private code enforcement entities. For the commercial portions of the code, only 90% is locally enforced with the Department of Labor and Industry (L&I) providing commercial code enforcement in the less than 10% of municipalities that have opted out of the UCC (i.e., have chosen not to enforce the UCC locally) and also has sole jurisdiction over all elevators and all state-owned buildings regardless of where they are located.

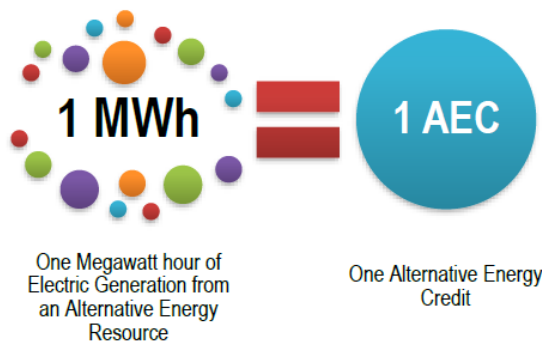
The UCC Administration and Enforcement regulation has been amended several times, including the creation of a Review and Advisory Council (RAC) that is required to review triennial code revisions published by the International Code Council (ICC) and recommend any changes, and L&I subsequently promulgates regulations from the recommendations. In February of 2022, the RAC recommendations including Pennsylvania specific amendments were updated by L&I to the relevant 2018 ICC. This includes the 2018 commercial and residential energy codes (IECC). These codes set a minimum baseline for building construction in relation to energy usage and conservation, including areas such as building envelope tightness, insulation and ventilation standards and controls for lighting, heating, and cooling. Municipalities cannot easily require higher standards under the current law, but builders and building owners can go above code requirements for building construction.

## Alternative Energy Portfolio Standards of 2004: Requiring Renewable and Cleaner Sources of Electricity

Enacted in 2004, the Alternative Energy Portfolio Standards (AEPS) Act, also known as Act 213, requires that 18% of Pennsylvania's retail electricity must be generated from alternative energy resources by 2021.<sup>56</sup> Energy resources that are eligible for consideration in this program are classified into two groups:

- Tier I: renewable energy sources.
- Tier II: alternative energy sources.

Tier I sources include solar energy, wind power, low-impact hydropower, geothermal energy, biologically derived methane gas fuel cells, biomass energy, and coal mine methane. Eight percent of all sales must come from Tier I sources by 2021. Current AEPS will remain the same unless legislative action changes the AEPS Act.



<sup>56</sup> Alternative Energy Portfolio Standards Act, P.L. 1672, No. 213 (2004), <https://www.legis.state.pa.us/cfdocs/legis/li/uconsCheck.cfm?yr=2004&sessInd=0&act=213>.

The remaining 10% of the AEPS sales requirement must be met through Tier II sources, which include waste coal, distributed generation systems, demand-side management, large-scale hydropower, municipal solid waste, generation from wood byproducts, and integrated gasification combined cycle technology.

For the 2021 reporting year, all EDCs and all but two electric generation suppliers met their requirements for acquiring and retiring sufficient alternative energy credits (AECs).<sup>57</sup>

**Energy Efficiency and Conservation Program of 2008:  
Requiring Electricity Distribution Companies to Save Energy**

The Act 129 Energy Efficiency and Conservation program, enacted in 2008, established energy efficiency and demand response obligations for the seven largest Pennsylvania EDCs and is overseen by the Pennsylvania Public Utility Commission (PUC).

On June 18, 2020, the Commission adopted the Act 129 Phase IV Implementation Order prescribing additional incremental reductions in electric consumption and peak demand over a five-year period. Phase IV began on June 1, 2021, and will end on May 31, 2026. The EDCs were directed to develop Energy Efficiency and Conservation (EE&C) Plans that are designed to achieve at least 15% of their consumption reduction target amount in each program year. The electric consumption and peak demand reduction targets for each EDC are outlined in the Phase IV Implementation Order as determined by the Statewide Evaluator (SWE). The SWE concluded in their Energy Efficiency and Peak Demand Reduction Potential Study that the EDCs can achieve an estimated 4,512,829 MWh of incremental annual savings over a five-year timeframe with net benefits of approximately \$1.2 billion over the lifetime of measures installed during Phase IV.

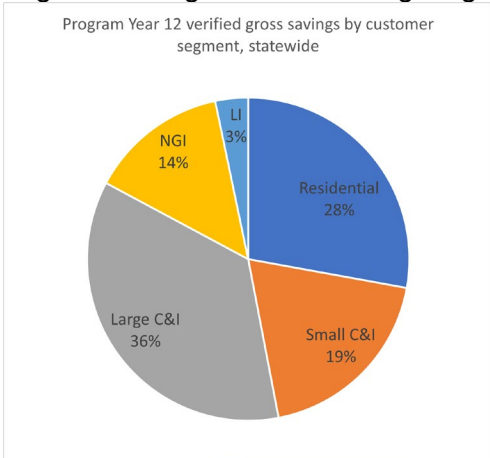
For Phase IV, as in all prior phases of Act 129, each EDC EE&C Plan shall include specific energy efficiency measures for households at or below 150% of the Federal Income Poverty Guideline, in proportion to that sector's share of the total energy usage in the EDC's service territory and, the EDCs provide a proportionate number of measures equivalent to the low-income sector's share of usage as previously required in Phases II and III of the program. Phase III of Act 129 began in June 2016 and ended June 2021. According to the Statewide Evaluator Program Year 12 report, over this five-year period, the EDCs have collectively met their savings target resulting in 6.6M MWh saved, enough to power 630,000 homes for a year. All the EDCs met and some exceeded their demand response targets ranging from 39 MW to 167 MW. The overall net benefits were worth \$750.5 M to Pennsylvanians, for every \$1 spent, a \$1.40 benefit. In addition, each EDC must obtain at least 5.5% of its consumption reduction requirements from programs solely directed at low-income customers or low-income-verified participants in multifamily housing programs. Each EDC must also obtain at least 3.5% of all consumption reduction requirements from government, nonprofit, and institutional entities.<sup>58</sup>

<sup>57</sup> Pennsylvania Department of Environmental Protection. 2019. *Alternative Energy Portfolio Standards Act: Compliance for Reporting Year 2018*. Harrisburg, PA: Pennsylvania Public Utility Commission.

<sup>58</sup> Ibid.

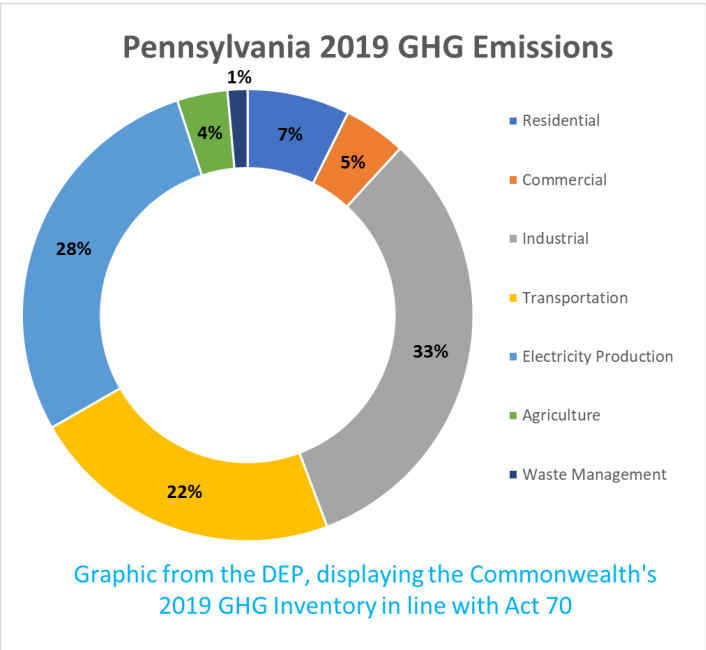
In response, the seven EDCs implemented a wide range of strategies to save energy including residential, commercial, and industrial lighting programs; home energy reports; and demand response efforts that save energy while reducing peak load. In Program Year 12, there were a total of 1,222,779 megawatts per year (MWh/yr). of verified gross savings. Residential lighting, home energy reports, non-residential lighting programs, and CHP were responsible for 78% of gross energy savings. Overall, lighting measures accounted for half (50%) of statewide verified gross savings in program year 12.<sup>59</sup>

Program year 12 efforts saved residents of the Commonwealth of Pennsylvania an estimated \$230.3 million (benefits minus costs). As of May 2019, the seven EDCs saved 1,222,779 MWh/yr of verified gross energy savings in program year 12 (approximately 21% of the statewide Phase III target) and 6,663,502 MWh/yr of verified gross energy savings for Phase III to date (117% of the statewide Phase III target). Progress toward the 5.5% low-income target ranged from 95% (by Duquesne Light) to 140% (by Penn Power) of the verified gross savings goal in program year 12. These programs have avoided nearly 4 million first-year CO<sub>2</sub> short tons and over 36 million lifetime CO<sub>2</sub> short tons, respectively.<sup>60</sup>



**Pennsylvania Climate Change Act of 2008: Mandating DEP to Generate Greenhouse Gas Emissions Data, Project Climate Change Impacts, and Recommend Actions**

Act 70 of 2008, also known as the Pennsylvania Climate Change Act, requires DEP to annually compile an inventory of greenhouse gas (GHG) emissions, create a voluntary GHG registry, establish a Climate Change Advisory Committee (CCAC), develop a Climate Change Action Plan, and conduct a Climate Change Impacts Assessment.



<sup>59</sup> Ibid; Pennsylvania Department of Environmental Protection. 2022. SWE Annual Report Act 129 Phase III and Program Year 12, Harrisburg, PA: Pennsylvania Public Utilities Commission.  
<sup>60</sup> Ibid.

Act 70 resulted in the development of Pennsylvania’s first Climate Change Action Plan, published in 2009. The plan was a science-based report that examined potential threats to Pennsylvania from climate change and recommended actions to curb future impacts. The act requires that the plan be updated once every three years with the most recent version being released in September of 2021.<sup>61</sup>

The CCAC provides advice to DEP regarding implementation of the provisions of Act 70. The committee comprises appointed members from the science, business and industry, transportation, labor, and other affiliated communities, and oversees the development of climate change-related reports such as the Climate Change Action Plan and Climate Change Impacts Assessment.<sup>61</sup> The voluntary GHG registry established as a result of Act 70 is now part of The Climate Registry, a nationwide organization that operates GHG reporting programs for states, cities, and businesses. This registry helps governments and other institutions with GHG measurement, reporting, and verification efforts.<sup>62</sup>

## Commercial Property Assessed Clean Energy Program Act of 2017: Enabling Local Governments to Offer Businesses Low Interest Financing for Energy Improvements

In 2017, the General Assembly authorized Act 30, which established the Commercial Property Assessed Clean Energy program, or C-PACE. C-PACE enables local jurisdictions to provide accessible, long-term, low-interest financing for agricultural, commercial, and industrial properties to implement energy efficiency, clean energy, and water conservation projects.

C-PACE financing can provide up to 100% of the total project costs including equipment, labor, and soft costs. The loan payment is then added to the property tax bill and collected as an added assessment by the county or municipality.<sup>63</sup> If property ownership changes, the loan obligation is passed on to the new property owner and continues to be repaid through the property tax bill. Projects eligible for financing range from whole-building insulation to CHP to smart building systems and beyond. C-PACE has been adopted in cities and counties across the commonwealth since the program launched in 2018.<sup>64</sup>



Graphic from the Office of Energy Efficiency & Renewable Energy on Commercial Property Assessed Clean Energy (C-PACE) Programs.

<sup>61</sup> Pennsylvania DEP. 2020. *Climate Change Advisory Committee*. Accessed March 11, 2020. <https://www.dep.pa.gov/Citizens/climate/Pages/CCAC.aspx>.

<sup>62</sup> The Climate Registry. n.d. *Abouts Us*. Accessed March 11, 2020. <https://www.theclimateregistry.org/who-we-are/about-us/>.

<sup>63</sup> Pennsylvania C-PACE. 2020. *Pennsylvania C-PACE Case Studies*. <https://pennsylvaniacpace.org/case-studies/>.

<sup>64</sup> Pennsylvania Department of Environmental Protection. 2019. "Draft - Pennsylvania Energy Development Authority Annual Report 2019." <http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=3493255&DocName=2019%20PA%20ENERGY%20DEVELOPMENT%20AUTHORITY%20ANNUAL%20REPORT.PDF%20%20%3Cspan%20style%3D%22color:green%3B%22%3E%3Cspan%3E%20%3Cspan%20style%3D%22color:blue%3B%22%3E%28NEW%29%3Cspan%3E>



On June 29, 2022, Senate Bill 23 was passed to expand C-PACE. It went into effect within 60 days of Governor Wolf signing the bill in July 2022. This legislation will allow for C-PACE financing on multi-family commercial buildings, indoor air quality improvements (e.g., COVID-19 mitigation), and resiliency improvements in new and existing commercial construction projects. These resiliency efforts may include flood mitigation, wind resistance, and various forms of energy grid development (e.g., energy storage, microgrids, and backup power generation.)

Before the House vote, the City of Philadelphia passed expansion language contingent on the passage of state legislation, so once signed by Governor Wolf, their program can begin financing these new projects. Over that past several years Philadelphia C-PACE and the Sustainable Energy Fund, who administers the programs outside of Philadelphia, have been administering projects throughout the state and deploying energy efficiency through C-PACE.

Currently, twenty counties—Allegheny, Bedford, Berks, Bucks, Cambria, Centre, Chester, Dauphin, Delaware, Erie, Lebanon, Lehigh, Luzerne, Montgomery, Northampton, Philadelphia, Union, Westmoreland, Washington and Wayne Counties—have adopted and established a C-PACE program and Lawrence and Warren counties have passed a resolution to establish a program. Most programs are similar to one another due to efforts undertaken soon after the 2018 legislation passed by the Sustainable Energy Fund (SEF), Keystone Energy Efficiency Alliance, Philadelphia Energy Authority, and the City of Pittsburgh using input from stakeholders.<sup>65</sup> In 2021 an update to the legislation passed adding indoor air quality and resiliency projects plus projects at multifamily properties to the eligible funding categories. The counties will need to pass updated resolutions to enable these changes; many began that process soon after the legislation became effective.

Property owners, private lenders, and surrounding communities all benefit from building improvements implemented with C-PACE financing. These benefits include increased building resilience, lower electric and water utility costs for property owners, increased property values, improved cash flows and reduced credit risks for private lenders, and cleaner air and water.<sup>66</sup>

## Act 40 of 2017: Solar Renewable Energy Credits

Signed into law in 2017, Act 40 requires that electricity distribution companies obtain their AEPS solar PV carve-out—requiring that 0.5% of their 8% Tier I target be met with solar PV — from facilities producing solar power within Pennsylvania to ensure the economic and environmental benefits remain within Pennsylvania.<sup>67</sup> Previously, alternative energy credits (AECs) could be sold into the Pennsylvania AEC market from other states based on Pennsylvania prices.

This change was intended to ensure the AEPS solar carve-out credit projects under the state AEPS are built in Pennsylvania for as long as the 0.5% mandate is in effect, except for certified out-of-state facilities, which are permitted to retain their certifications under AEPS until their contract expires through a grandfathering mechanism.<sup>68</sup>

<sup>65</sup> Pennsylvania C-PACE. 2020. *Pennsylvania C-PACE Case Studies*. <https://pennsylvaniacpace.org/case-studies/>.

<sup>66</sup> Pennsylvania DEP. 2020. *PA.Gov*.

<https://www.dep.pa.gov/Business/Energy/OfficeofPollutionPrevention/FinancialOptions/Pages/C-PACE.aspx>.

<sup>67</sup> Pennsylvania Public Utility Commission. 2022. Alternative Energy Portfolio Standards Acts of 2004 Compliance for Reporting Year 2021. [https://www.puc.pa.gov/media/1843/aeps\\_march-2022.pdf](https://www.puc.pa.gov/media/1843/aeps_march-2022.pdf)

<sup>68</sup> Pennsylvania General Assembly. 2017. "2017 Act 40." October.

## **Act 114 of 2020: Eligibility of Tier II Alternative Energy Credits**

Signed into law in 2020, Act 114 requires that electricity distribution companies obtain their Tier II alternative energy credits, requiring that 10% target be met with a variety of sources, from facilities located within Pennsylvania to ensure economic benefits remain within Pennsylvania. Previously, Tier II Alternative Energy Credits could be obtained from facilities outside of the Commonwealth.

## **Carbon Dioxide Budget Trading Program Regulation: Participation in the Regional Greenhouse Gas Initiative**

The Regional Greenhouse Gas Initiative (RGGI) is an electricity sector cap and invest program composed of participating Northeastern and Mid-Atlantic states. Together, the participating states reduce their carbon dioxide (CO<sub>2</sub>) emissions by setting a regional cap or limit on CO<sub>2</sub> emissions from fossil fuel-fired power plants located in these states. That cap decreases year over year to reduce overall CO<sub>2</sub> emissions. Under RGGI, each regulated power plant is required to obtain one CO<sub>2</sub> allowance per ton of CO<sub>2</sub> emitted. These CO<sub>2</sub> allowances may be purchased through multistate auctions or on a secondary market. On October 3, 2019, Governor Tom Wolf issued Executive Order 2019-07 which directed the DEP to develop a rulemaking that would allow Pennsylvania to participate in RGGI, with the goal of reducing CO<sub>2</sub> emissions from the electricity sector, as recommended in the 2018 Pennsylvania Climate Action Plan. On April 23, 2022, the DEP's CO<sub>2</sub> Budget Trading Program regulation (25 Pa. Code Chapter 145, Subchapter E) became final and effective. If Pennsylvania participates in RGGI, the commonwealth is projected to reduce CO<sub>2</sub> emissions by between 97 and 225 million tons by 2030 (compared to 2005 levels).

The CO<sub>2</sub> allowances that are purchased through multistate auctions result in proceeds for reinvestment in various energy efficiency, clean energy and other pollution reduction measures in the RGGI states, which may include strategic energy and consumer programs. In the participating states, programs funded with RGGI investments have benefited local businesses, low-income communities, industrial facilities, and households throughout the region.

Note: DEP is currently enjoined from implementing and enforcing the CO<sub>2</sub> Budget Trading Program regulation due to ongoing litigation. Pennsylvania will not be able to participate in RGGI unless that litigation is resolved in DEP's favor.



# Appendix E. Partnerships with Other Agencies and Programs

EPO’s past and future successes are closely tied to the support and interactions from other agencies and programs. EPO’s partnerships and relationships with other agencies and federal, state, and local programs are essential to the office’s success as energy and climate touch almost every aspect of operations and day-to-day life in the commonwealth.

## Federal Agencies and Programs

EPO partners with the U.S. DOE and, as the designated Pennsylvania Energy Office, receives funding from its State Energy Program (SEP). SEP provides funds and technical assistance to state energy offices to enhance energy security, advance state-led energy programs, and minimize energy waste. The SEP Annual Formula Grant Award from the U.S. DOE’s Weatherization and Intergovernmental Programs Office provides annual funding for EPO staff and programs and drives programming. Since 2010, Pennsylvania has received \$19.2 million from SEP.<sup>69</sup> EPO will also receive a one-time disbursement of \$14 million of IIJA funding via the SEP in 2023.

### Partner Agencies and Supported Programs State Agencies:

- Department of Conservation and Natural Resources.
- Department of Community and Economic Development.
- Public Utility Commission.
- Department of General Services.
- Department of Agriculture.
- Department of Transportation.
- Pennsylvania Emergency Management Agency.
- Department of Labor and Industry.
- Governor’s Office of Homeland Security.
- Department of Revenue.
- Department of Health.

### Programs:

- Commonwealth Finance Authority.
- Green Government Council.
- Pennsylvania Energy Development Authority.
- Alternative Energy Portfolio Standard.
- Energy Efficiency and Conservation Program (Act 129).
- Weatherization Assistance Program
- Other DEP Programs.

<sup>69</sup> Office of Energy Efficiency and Renewable Energy, DOE. 2020. *Weatherization and Intergovernmental Programs Office Project Map – Pennsylvania*. Accessed April 21, 2020. <https://www.energy.gov/eere/wipo/downloads/weatherization-and-intergovernmental-programs-office-project-map-pennsylvania>.

## Pennsylvania Agencies and Programs

EPO partners and coordinates with many Pennsylvania agencies and programs. For example, EPO coordinates with the PUC to enforce the AEPS, together monitoring and tracking compliance. Executive Order 2019-1 directs DEP, the Department of General Services, and the Department of Conservation and Natural Resources to chair the Green Government Council and requires DEP to provide technical support to develop strategies to meet state climate change, sustainable governance, and energy conservation goals. DEP delivers this support through resources provided by EPO. A more comprehensive list of partner state agencies and programs EPO supports is provided in the box on page E-1.

## Pennsylvania DEP Programs

As a non-regulatory office, EPO coordinates policy and program design and delivery of energy-related initiatives with the DEP Policy and Legislative Offices. EPO collaborates with the Bureau of Air Quality (BAQ) on climate policy and programming, including modeling the costs and benefits of implementing energy-focused carbon cap and trade programs, and assists BAQ with design and management of Driving PA Forward. EPO conducted outreach to other DEP programs to provide input on the 2021 Climate Impacts Assessment and Climate Action Plan including BAQ, Bureau of Waste Management, Office of Oil and Gas Management, and Water Programs on climate planning efforts, and is coordinating with these programs where their efforts intersect with climate actions. EPO is working with the DEP mining program on strategies to result in more instances of siting of renewable energy on previously impacted lands within the commonwealth. EPO is collaborating with the Office of Environmental Justice to engage with communities and organizations and address climate change and resilience for vulnerable communities, as well as helping to advance energy equity, create economic opportunity, and offer financial support for clean energy and energy efficiency in the commonwealth. It has coordinated with the Small Business Ombudsman (SBO) on programming and evaluation of the Small Business Advantage Grant program. Additionally, EPO coordinates with industrial energy efficiency assessment contractors to work with the SBO in assisting customers applying to the grant program to implement energy conservation measures.

## Participation in Networks

EPO participates actively in the U.S. Climate Alliance and the National Association of State Energy Officials (NASEO). EPO also partners with the North East Energy Partnership (NEEP) but is not a paid member.

The EPO director currently serves on the board of directors for NASEO as a regional representative for the Mid-Atlantic Region. NASEO is a national nonprofit association for the governor-designated energy officials from each of the 56 states and territories. Formed by the states in 1986, NASEO facilitates peer learning among state energy officials, serves as a resource for and about state energy offices, and advocates the interests of the state energy offices to Congress and federal agencies.<sup>70</sup>

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<sup>70</sup> Ibid.

# Appendix F. Further Clean Energy Program Opportunities

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In the 2020 Clean Energy Program Plan, EPO evaluated many potential program actions and ideas prior to identifying a final set of recommended actions to include in the plan. EPO re-reviewed the list included in the 2020 plan and brainstormed additional and future opportunities that could be integrated into the priority actions and activities of EPO as technologies, policies, and stakeholder needs continue to evolve. The list below represents a summary of additional and viable opportunities for program development.

## Equity, Access, and Inclusion

- **Additional Support for WAP:** Partner to a greater extent with Pennsylvania's Weatherization Assistance Program to help achieve the mission of increasing energy efficiency in low-income homes by reducing energy costs and increasing comfort while safeguarding health and safety.
- **Multifamily/Single-Family Rentals Gap Analysis:** Identify gaps in existing programs and look for opportunities to provide energy assistance services for residents who do not own the properties in which they live.
- **Innovative financing for EVs:** Develop innovative financing mechanisms for Electric Vehicle (EV)/Electric Vehicle Service Equipment (EVSE) deployment with priority focused on residential, fleet vehicles EVSE, and supporting low-income households' ability to afford EV technologies.
- **Low-Income incentives:** Identify mechanisms to increase energy incentives for transportation companies and organizations and services that serve low-income individuals to increase uptake of projects

## Renewable Energy

- **Campus Challenge:** Encourage and recognize Pennsylvania institutions of higher education that are taking clean energy ideas from the classroom and putting them to work—both on campus and in their communities.
- **Critical Value Solar:** Promote all ownership options for solar generation where market-driven deployment may be insufficient to achieve public goals such as resilience, reliability, and environmental justice.
- **Developer and Investor Center and comprehensive website for renewable energy permitting:** Create and staff a renewable energy development office and comprehensive website with the goal of supporting renewable energy developers and investors while simplifying permitting processes.
- **Innovation Challenges:** Create or support incentive programs that result in demonstration projects that show how new products and services can capture latent value on the grid, and how new business models can monetize and distribute that value among customers, third parties, and utilities.
- **Renewable Energy Permitting:** Support building permit fee waivers for Tier I renewable energy projects under 5kW, as well as support/encourage local jurisdictions to use SolarAPP+ to expedite the permitting process for residential photovoltaic systems.

- **Renewable Energy Transition:** Support a transition of the state to 100% renewable energy. Support a variety of committees and councils to implement this transition such as the Clean Energy Transition Task Force, Just Transition Community Advisory Committee, Clean Energy Center of Excellence, Council for Clean Energy Workforce Development, and a Clean Energy Workforce Development Fund.
- **Solarize Schools:** Provide tools, technical expertise (including free solar feasibility assessments), and access to financing to help K-12 schools cost-effectively install solar.
- **Solarize Toolkit for industries and for residents:** Develop a toolkit to help industries and residents implement solar energy. A comprehensive document could cover a range of subjects from photovoltaics basics to case studies on how specific industries could and have used solar.
- **Utility- and Building-Scale Renewable Energy Support Program:** Develop a program aimed at providing funding, technical assistance, or both to a broad set of renewable energy technologies. Program would focus on supporting community solar and other near-term advancements, including solar on grayfields and brownfields, but would also aim to further technologies such as renewable natural gas, reusing food/waste-water treatment plant waste, energy storage, etc.
- **Regional energy planning:** Support regional planning organizations as they develop regional clean energy plans that may include renewable power purchase agreements and energy efficiency standards and practices.

## Energy Efficiency

- **Agricultural Energy Audits or Circuit Rider Programs:** Support energy audits that would evaluate all energy-using equipment on the farm, educate farmers about the availability of incentives, and support their application process.
- **Building Assessments:** Increase emphasis on existing building assessments via walkthroughs of facilities and workshops for local governments and schools.
- **Energy Efficiency in Energy Transmission and Distribution:** Promote and educate energy utilities to determine how to solve transmission energy loss prevention through innovation and new technology.
- **High-Performance Building Program/Performance Standards:** Provide technical and financial assistance to individuals or small businesses to underwrite the cost premiums associated with the design and construction or major renovation of high-performance buildings to support local governments in developing and managing building performance standards.
- **Modular Building Technology:** Support expansion of both manufacturing and use of modular building construction technologies to reduce embodied carbon through waste reduction, improving energy code compliance with factory quality control, and increasing year-round workforce opportunities.
- **Homeowner Energy Efficiency Loans (HEEL):** Provide outreach and marketing support for the Pennsylvania Housing Finance Agency's (PHFA) HEEL loans.
- **Roundtable Collaboration.** Develop a comprehensive roundtable program to partner with regional or local organizations (manufacturing and utilities) to identify specific energy system best practices that can be replicated through education and outreach provided through coordinated learning sessions.

- **State Appliance Efficiency Standards:** Support new state appliance efficiency standards for equipment and appliances not covered by federal efficiency standards.
- **Sustainable Energy Funds (SEFs) Recapitalization:** Consider using incentive funding to support the recapitalization of various regional SEFs to ensure regional programing and lending continues.

## Energy Security and Resilience

- **Microgrid Feasibility Assessment:** Complement microgrid outreach and assistance with a statewide assessment of the best locations to support critical facility resilience with clean energy and storage.
- **Community Microgrid Competition:** Explore a competition to engage communities in advancing plans for local power and resilience. The competition will offer awards in three stages: feasibility studies, audit-grade design, and project build. It will challenge local communities, businesses, entrepreneurs, and electric utilities to design and implement community-based microgrids.
- **Energy Resilience Bank:** Explore an Energy Resilience Bank that provides funding to support energy infrastructure projects that will address energy vulnerabilities and maximize energy resilience by supporting projects such as fuel cells, combined heat and power (CHP), solar with storage, and dynamic microgrids.

## Transportation

- **EV-Ready:** Support amending the state's building code to ensure EV readiness in new construction (such as pre-wiring for charging stations) is promoted through the building codes.
- **Fleet Education, Cooperative Purchase, and Technical Assistance Program:** Explore a program to include a variety of programs to support public and private fleet investment in EVs and infrastructure, including outreach to fleet managers, such as ride and drive events for fleet operators; Development of specialized tools, procurement guides, procurement templates, sample request for proposal language, and other materials to support fleet EV and EVSE procurement.
- **Incentivize More Opportunities for EV Purchases:** Provide rebates to Pennsylvania residents through partnerships with car manufacturers and dealers for the purchase of new and pre-owned electric, natural gas, propane, and hydrogen fuel cell vehicles.
- **Tailpipe Emissions Standard:** Support a rule requiring automakers to phase in lower-emitting cars and trucks, with new standards for model years 2017-25. Support an updated zero-emission vehicle program that requires increasing production of plug-in and fuel cell vehicles.
- **Transportation Electrification Strategy:** Support an action to enable and encourage utilities to invest in transportation electrification including EVSE investment, EV rates, and marketing and outreach.

## Energy Workforce

- **Energy Workforce:** Encourage or support the development of energy manager training programs through the state system of higher education and community colleges and other venues. Support apprenticeships, internships, and career and technical education in K-12 schools.

- **Solar/EV workforce training for re-entry population:** Explore the potential for development of programs that prepare incarcerated individuals for employment in the clean energy industry upon release.
- **Workforce Education Building Operations:** Develop a long-term agreement with Pennsylvania College of Technology's Clean Energy Center to provide Building Operator Certification Level 1 trainings to Pennsylvania facility managers and HVAC mechanics/technicians from K-12 schools, higher education, and government agencies.

## Climate and Energy

- **Beneficial Electrification Evaluation:** Evaluate an incentive program to switch to all electric heating/cooling.
- **Broad Statewide Energy Education Messaging:** Expand influence beyond existing stakeholders, should develop a broad, statewide messaging effort to educate new groups. Need partners to amplify message. Not fact sheets and guides.
- **Develop Industrial Decarbonization Strategy:** Meet with industrial stakeholders and develop a deep energy efficiency strategy, a targeted green hydrogen use strategy focusing on CHP, and an industrial electrification strategy
- **Carbon Capture Use and Sequestration (CCUS) Opportunities and Technology Project:** Investigate developing information regarding the state of CCUS technologies with an aim to understand specific opportunities and applicability of the technology in Pennsylvania, Information would be used to develop programs or opportunities to support energy generation.
- **Clean Grid:** Support a diverse and clean electricity grid that is critical to reducing GHG emissions, accomplish through support of an increase in AEPS Tier 1 targets and further increase in-state generation and use of renewables. Implement policy to maintain nuclear generation at current levels.
- **Consider an EPO role within the EPA Smart Sector Program:** EPA's Smart Sectors is a partnership program that provides a platform to collaborate with regulated sectors and develop sensible approaches that better protect the environment and public health.
- **Energy Incentives Tracker:** Develop an online resource that catalogs all state and federal grant opportunities with filters for groups, sectors, etc.
- **Establish Local Energy Authorities:** Work with local governments to identify and set up local or Pennsylvania regional municipal energy authorities that can work to facilitate local energy projects and programs.
- **Green Schools:** Support the PA Green & Healthy Schools Partnership plans to organize and implement several workshops focusing on Eco-Schools USA, a framework for engaging students in school environmental initiatives, including energy.
- **Innovation and Research and Development:** Explore investments in energy innovation to deliver market-ready solutions that can produce meaningful reductions in GHG emissions and provide for greater energy affordability, system resilience, and consumer choice. These investments facilitate the development, commercialization, and market entry of new clean energy technologies, and aim specifically to grow the clean energy market sector in Pennsylvania.
- **Local Waste to Energy:** Investigate potential to reduce waste and GHGs using agriculture byproducts, wastewater, and biomass from MSW for energy generation.

- **PJM Advocacy via Consumer Advocate and CAPS:** Expand DEP's relationship with PJM with a focus on growing clean energy in Pennsylvania. Work will include collaborating with PA's Office of Consumer Advocate and the PJM Consumer Advocates of PJM States program to advocate for clean energy friendly rulemaking by PJM.