

Pennsylvania Environmental Council

Climate and Energy Policy Recommendations 2021



pec

Introduction

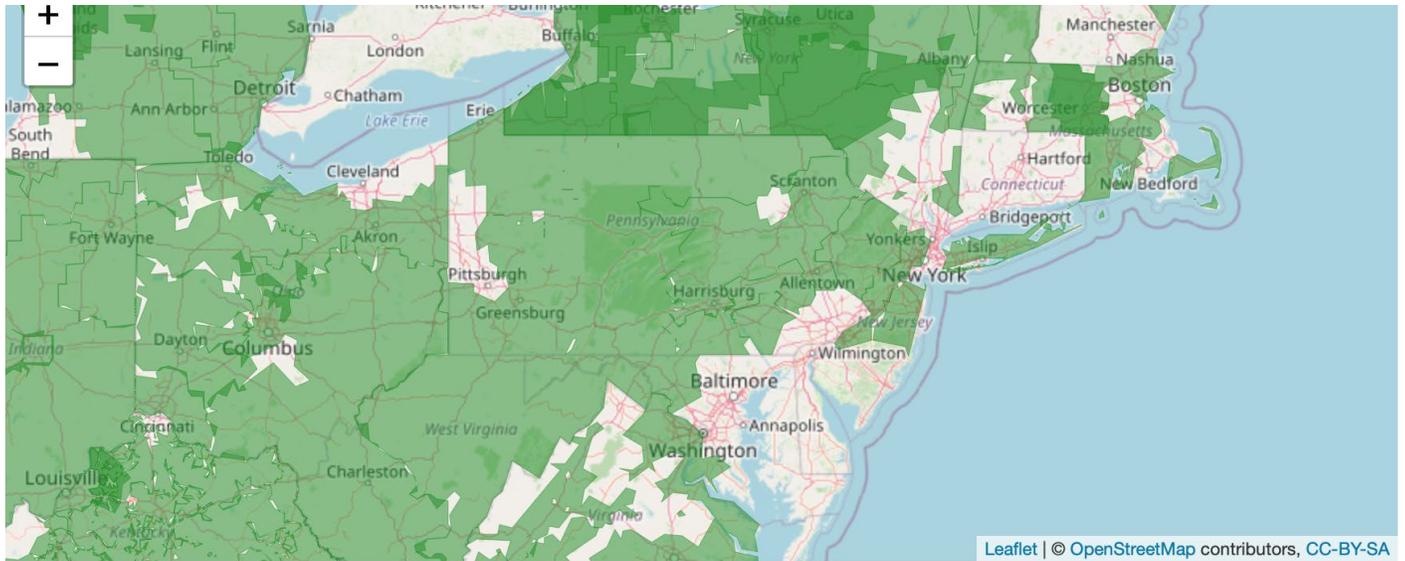
In January 2019, the Pennsylvania Environmental Council (PEC) issued its *Energy and Climate: A Policy Pathway Forward for Pennsylvania* report, outlining recommendations for how the Commonwealth should accelerate the shift toward a ‘net zero’ greenhouse gas emissions profile. These recommendations were developed pursuant to stakeholder discussions, as well as examination of policies in other states.

Over the past two years, there has been one notable step forward: Governor Wolf’s October 2019 Executive Order¹ directing the Department of Environmental Protection (DEP) to develop a rulemaking to reduce carbon dioxide emissions from the electric power generation sector by linking to the Regional Greenhouse Gas Initiative (RGGI). Participation in RGGI was the foremost recommendation in our 2019 Report; that rulemaking process is now proceeding toward hopeful completion by the end of 2021.

Beyond this singular (though significant) step, however, the Commonwealth has remained at a standstill with respect to meaningful policy evolution on climate action and energy transitioning. While Pennsylvania remains an energy exporter, shifts in the economic and energy sectors signal the need for Pennsylvania to better capitalize on clean energy technology and job growth. Other states, as well as businesses, energy producers, and utilities, are all making net zero energy commitments. If our Commonwealth fails to adapt and develop a suite of policies that incent technology and investment, we ensure that we will be left behind -- particularly at a time when federal stimulus discussions turn an eye toward leveraging clean energy opportunities. With the state’s outmoded Alternative Energy Portfolio Standards reaching their ceiling in 2021, this urgency is all the greater.

With this in mind, PEC has revisited its Pathways Report to provide an updated decarbonization roadmap – predicated on an “all in” approach – for policy action during the 2021-2022 state legislative session. This roadmap includes:

- Continuing the process to link with other states in the Mid-Atlantic and Northeast in the Regional Greenhouse Gas Initiative;
- Reforming the Alternative Energy Portfolio Standards into a Clean Energy Standard;
- Creating or enhancing tax credits, grants, loans, or other financial incentives for energy efficiency and energy use reduction, as well as strengthening and expanding existing Act 129 energy efficiency programs and weatherization programs;
- Adopting measures to promote community solar and grid modernization;
- Adopting policies and incentives to support installation of distributed energy resources, including renewables and energy storage;
- Advancing measures to facilitate clean energy development, including with regard to contracting and siting; and



The Utility Carbon Reduction Tracker above displays publicly announced utility commitments to emission reduction. Credits: Electric utility territories were produced by Oak Ridge National Laboratory (ORNL) Geographic Information Science and Technology (GIST) Group.

Source: [Smart Electric Power Alliance](#)

- Considering new or enhanced financial incentives and otherwise leveraging state resources to help bring other zero-carbon technologies to commercial readiness in Pennsylvania.

In addition, measures are needed to decarbonize Pennsylvania’s transportation sector. Decarbonization roadmap actions for transportation include:

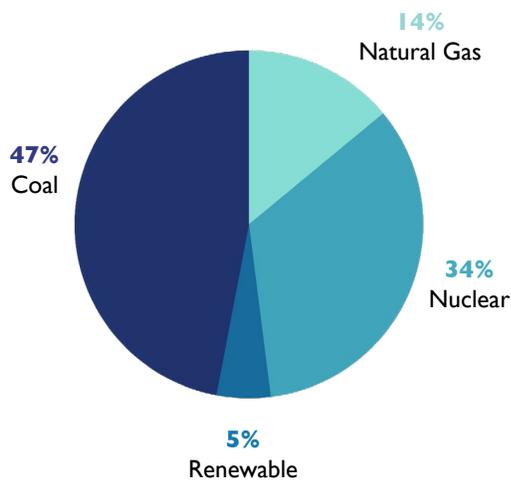
- Continuing to collaborate with neighboring states to ensure that the Transportation and Climate Initiative results in a robust policy proposal that is then implemented by the Commonwealth; and
- Promoting electric vehicles, electric vehicle charging infrastructure, and other low-carbon fuels.

Background: Pennsylvania's Electricity Portfolio

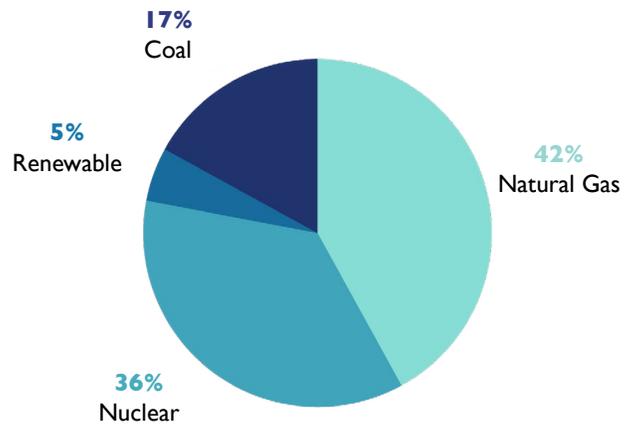
In 2018, Pennsylvania's total electricity usage was more than 148,000 gigawatt-hours, an increase of almost 4% from the prior year. Total usage was expected to decline at an average annual rate of 0.18% through 2023 – and that was a pre-COVID estimate.²

As of 2019, Pennsylvania's generation mix was roughly 42% natural gas, 36% nuclear, 17% coal, 2% hydro, 1% wind, and 1% other – a marked decrease in use of coal and increase in natural gas since 2010, when they were at roughly 47% and 14% respectively (as shown in the figure below).³

2010 PA Total Generation - 233,100 GWh



2019 PA Total Generation - 231,245 GWh



Source: DEP (2020)

According to the state greenhouse gas inventory (which is based on 2016 data), electricity production was the second-largest contributor to Pennsylvania greenhouse gas emissions, just barely behind the industrial sector. Of those electricity sector emissions, about 65% were due to coal combustion, with almost all the rest due to natural gas combustion.⁴ The U.S. Energy Information Administration, on the other hand, suggests (based on 2017 data) that the electricity sector was by far the largest source of energy-related carbon dioxide (CO₂) emissions in Pennsylvania, accounting for more than 35% of emissions (compared to about 29% for transportation and more than 21% for industrial).⁵ Either way, electricity is a key sector if Pennsylvania is going to address its contributions to climate change. This becomes all the more important with increasing electrification of the transportation and building sectors.



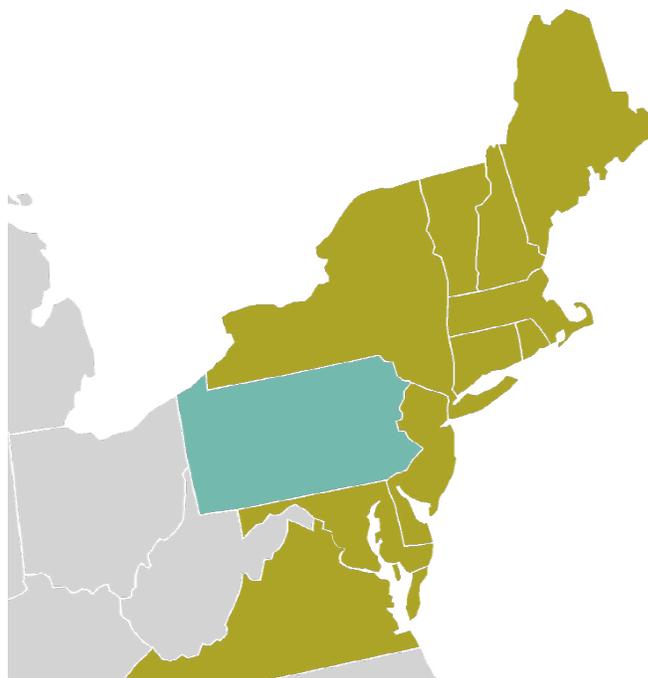
A Policy Agenda for Decarbonizing Pennsylvania's Electricity

While addressing climate change in the Commonwealth will require a range of policy actions for years to come, PEC believes the following opportunities should be considered and acted on in the 2021-2022 legislative session.

Pennsylvania should:

Continue the process to link with other states in the Mid-Atlantic and Northeast in the **Regional Greenhouse Gas Initiative (RGGI)**, to begin providing a price signal and generating revenues that can reduce emissions in the electric power sector, while boosting the local economy, helping consumers, and creating jobs.

- » Placing a price on carbon emissions is widely seen as the most cost-effective lever to reduce emissions.⁶
- » RGGI is a multi-state, market-driven platform to reduce carbon emissions in the electric power sector. It is a cooperative effort among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Virginia to cap and reduce CO₂ emissions in the sector. There is a Pennsylvania-shaped hole in the RGGI map (below).
- » In combination with low natural gas and renewable energy prices, RGGI has helped spur emission reductions and provided significant economic revenues for participating states. Since RGGI's launch in 2009, almost all of the nearly \$3 billion in proceeds from allowance auctions has gone back into state coffers to be used for energy efficiency programs, renewable energy projects, consumer bill assistance, job training, and more – with net benefits for the states' economies and consumers.⁷
- » DEP modeling indicates that joining RGGI will lead to a cumulative reduction of 180 million tons of emissions in Pennsylvania and 87 million tons within PJM by 2030.⁸ To help address emissions leakage, Pennsylvania should examine creation of a carbon border adjustment, or push for a regional policy throughout PJM. PJM has already formed a carbon pricing task force to examine this issue.



- » The Commonwealth should prudently utilize revenues derived from participation in RGGI to help address any consumer impacts, job transitioning, and expanded investment in renewables deployment, grid modernization, efficiency measures, and other beneficial programs. To fully realize these benefits, the General Assembly should augment the scope of programs available for use of RGGI proceeds. One potential new opportunity is the Keystone Green Bank announced by the Department of Treasury in 2020.⁹
- » Concurrent with this investment, Pennsylvania should adapt the approach taken by other coal states (such as Colorado)¹⁰ by developing programs to help communities and workers impacted by plant closures. The need to ensure a just transition will be a reality regardless of whether Pennsylvania joins RGGI or not.

Reform the Alternative Energy Portfolio Standards (AEPS) into a **Clean Energy Standard (CES) to further drive zero-carbon electricity generation.**

- » While RGGI will help promote measured reductions in the electricity sector, deeper and more precisely targeted policy action is also needed to ensure that Pennsylvania achieves a net-zero generation profile by 2050.
- » A CES can help ensure that our state’s generation portfolio does not become monolithic with over-reliance on natural gas, while still preserving reliable dispatch and preventing curtailment. If natural gas displaces existing nuclear or crowds out renewable generation, Pennsylvania’s carbon dioxide and methane emissions will markedly increase.
- » Unlike the current AEPS in Pennsylvania, a CES would be focused on achieving zero-carbon energy, albeit in a more technology-inclusive way than most states’ Renewable Portfolio Standards (RPSs). In addition to renewables, a CES could include technologies such as existing and new nuclear plants, emerging technologies such as hydrogen and geothermal, as well as fossil-fuel-fired plants with carbon capture, utilization, and storage (CCUS). A CES can help propel public and private investment in these technologies.
- » A CES framework also allows utilities to implement a range of options – including efficiency – to help drive utility- and distributed-scale programs for clean energy deployment.
- » Other states have begun to expand their RPSs into CESs (often retaining an RPS element within the broader CES), including states in the region (e.g., Massachusetts, New York, Virginia). In addition, a CES matches the increasing movement of utilities and companies to commit to net-zero profiles.
- » Pennsylvania’s CES should be centered on a target to achieve a 100% zero-carbon electricity supply by, or preferably before, 2050. Over time, the CES can agnostically guide the state’s generation toward zero-emission sources.
- » Given that the state recently enacted tax credits to directly assist the waste coal industry, waste coal should be phased out of a CES unless it is coupled with carbon capture.
- » As part of, or in parallel to, the CES, Pennsylvania should fully account for lifecycle greenhouse gas emissions from all sources and should develop policies to reduce and eventually eliminate or offset those emissions. At present, chief among these emissions is methane from natural gas production and transport.

Build on existing financial incentives for energy efficiency and energy use reduction, as well as strengthen and expand existing Act 129 energy efficiency programs and weatherization programs.

- » Achieving CES and RGGI targets will be easier, and more advantageous for consumers, with enhanced programs targeting energy efficiency and energy conservation. Energy efficiency and conservation reduce energy use and therefore greenhouse gases (and other pollution), while also reducing the amount of zero-carbon energy that has to be brought online to meet demand. Energy efficiency and conservation initiatives also can reduce consumer bills and create local jobs.
- » In the 2020 ranking of states by the American Council for an Energy-Efficient Economy (ACEEE), Pennsylvania came in 19th and received only 4 out of 20 possible points regarding utility efficiency.¹¹ The Commonwealth can do better. Pennsylvania needs to ramp up its efficiency programs and spending and should set more ambitious energy savings targets.
 - » Many states have incremental energy savings targets in the 1% to 1.5% range, with some states (including Maryland and New Jersey) raising their targets to 2% or higher.¹² Pennsylvania has varying targets for its utilities, but ACEEE estimates they equate to a statewide level around 0.6%.
- » Pennsylvania should continue updating its building energy and construction codes to require implementation of energy efficiency measures in buildings.
- » If Pennsylvania enacts a tax credit program, it should be structured so as to make the credits attractive to a wide range of target audiences, including those with limited tax liability.
- » Pennsylvania should also be careful to structure its efficiency policies so as to drive decarbonization and avoid penalizing people and facilities for taking steps to reduce emissions that end up increasing their electricity consumption (e.g., purchasing an electric vehicle). Instead, the Public Utility Commission (PUC) should work with the power sector to advance overall carbon efficiency, preparing for and facilitating electrification of other sectors.

Adopt measures to promote community solar and grid modernization, both of which can boost resilience and consumer choice while enabling emission reductions.

- » Many states have adopted policies promoting community solar – local solar facilities shared by several subscribers who receive credit on their electricity bills – as a way to create access to solar for more people (e.g., renters, those without suitable roof space).¹³ Bipartisan legislation was introduced in the General Assembly in the prior session and should be reintroduced and promptly enacted in 2021.
- » Several states, including Ohio, New York, and Rhode Island, are also pursuing initiatives to modernize their grids and utility regulations in light of new technologies and consumer demands.¹⁴ Pennsylvania should do so as well.

Create tax or other financial incentives and policies to support installation of distributed energy resources (DERs), including renewables and energy storage, in Pennsylvania.

- » Zero- or low-carbon DERs, including distributed solar, battery storage, and demand response, can reduce

greenhouse gas emissions while also increasing grid flexibility and resilience.

- » Other states are spurring adoption of energy storage. Maryland, for instance, in 2018 became the first state to launch an energy storage tax credit.¹⁵
- » Net metering limits could be raised to allow for bigger distributed installations. Pennsylvania could also adopt a Value of Distributed Energy Resources (VDER) approach, as New York has done, to provide further forward revenue certainty to distributed clean energy project developers.
- » When considering financial incentives and subsidies that affect the competitive electricity market, FERC's Minimum Offer Price Rule, which unduly affects state energy policies, has to be kept in mind.
- » As noted above, any tax credit program should be structured so as to make the credits attractive to a wide range of target audiences, including those with limited tax liability.
- » The state should promote micro-hydro opportunities through retrofit of existing impoundments. There is renewed partnership between the environmental and hydropower industry on guiding principles for such development.¹⁶ Legislation was introduced in the General Assembly last session and should be reintroduced and promptly passed in 2021.

Advance other measures to facilitate clean energy development, including with regard to **contracting and siting.**

- » Increasing developers' ability to secure quantifiable, long-term off-take commitments could boost in-state clean energy deployment. Developers with guaranteed long-term backing will have investment-grade secured revenue that de-risks the business case, enables them to get financing for building projects, and allows them to offer lower prices to buyers. The long-term contracting barrier has been overcome in some states (e.g., New York, Connecticut, Illinois), but Pennsylvania has nothing similar that provides developers with the long-term certainty they need to secure financing. Utilities do have authority to enter into long-term contracts under §2807(e) of Act 129, but that authority has rarely been exercised. One solution could be to amend Act 129 to make clearer that a portion of utility energy should be sourced through long-term contracts of at least a certain length (e.g., 15-20 years). Alternatively, the locus of action for change in long-term contracting could lie at the PUC, through proceedings related to default service.¹⁷
- » Pennsylvania could try to guide clean energy development to where it is most desirable, such as brownfields or retired coal plants. Incentives to reuse old mine lands or other previously developed sites could be an economic development approach that also requires less civil engineering (and thus less cost) for clean energy developers, and some sites, such as retired coal plants, already have transmission infrastructure in place. Massachusetts, for instance, incentivizes development in brownfields to focus development in spaces not otherwise being used; the state actually penalizes greenfield development.¹⁸ Relatedly, some states have created economic development zones through public policy that streamline the renewables siting process and/or come with real estate tax abatement.

» Siting measures could include creating designated, pre-approved areas for development, testing, and

operation of prototypes and pilots for zero-carbon technologies that are currently in relatively early stages, such as advanced nuclear.¹⁹

- » The state should seek to promote more low-impact hydro generation at existing facilities throughout the state. This can be accomplished by offering funding or tax credits for projects, as well as by developing uniform permitting guidance. As mentioned earlier, legislation was introduced in the prior session of the General Assembly; this should be given renewed consideration in 2021.

Consider adopting tax credits (again, structured to be attractive to a wide range of target audiences, such as through “direct pay” options) or other financial incentive programs to help bring zero-carbon technologies to commercial readiness, including facilitating research and infrastructure assessments in Pennsylvania related to carbon capture and storage, hydrogen, enhanced geothermal, advanced nuclear, advanced renewables, and other technologies.

- » While Pennsylvania should unquestionably accelerate deployment of traditional renewable generation technologies such as wind and solar to achieve zero-carbon targets, the Commonwealth does not have particularly robust wind and solar resource potential. To maximize in-state economic development opportunities, Pennsylvania should support efforts to bring other zero-carbon technologies to commercialization – recognizing that the state’s role in advancing some technologies may inherently be somewhat limited, particularly given constraints on the state’s budget.
- » Piggybacking on the recent suite of energy research, development, and demonstration (RD&D) programs authorized by Congress in the December 2020 omnibus, the Commonwealth should fund an investment program in RD&D for advanced renewables (e.g., enhanced or super-hot-rock geothermal), advanced nuclear, hydrogen, carbon capture, carbon utilization, and/or other zero-carbon technologies that could support businesses and job creation in Pennsylvania.
 - » Maryland, for instance, enacted in 2017 a law creating the Maryland Energy Innovation Institute (at the University of Maryland) designed to promote innovation and commercialization of clean energy technologies as part of the state’s economic development strategy.²⁰
 - » The Commonwealth does not necessarily need to create a standalone energy RD&D agency, but the Governor’s office should at least convene a working group to make recommendations for how best to formulate and direct a state-sponsored zero-carbon RD&D program that complements federal initiatives, perhaps with targeted grants to Pennsylvania university research centers.
- » The federal 45Q tax credit for carbon capture, utilization, and storage was extended and expanded by Congress in February 2018 and then extended again in December 2020.²¹ Pennsylvania should enact complementary programs and incentives to attract greater private investment in carbon capture and other emission-reducing projects in the state.
 - » Pennsylvania could also seek to address other barriers to CCUS in the state (e.g., establishing regulations on issues concerning liability and ownership of pore space rights),²² as well as risks across all phases of geologic sequestration. As part of this, the state could consider creating a fund to support CO₂ infrastructure (e.g., pipelines, storage site assessment), as a CO₂ transport system could attract new industrial projects to the state. Pennsylvania’s participation in a multistate

memorandum of understanding (MOU) committing to establish a regional CO₂ transport infrastructure is a promising step, but it is important that the MOU collaboration lead to action.²³

- » **Pennsylvania is especially well-situated to serve as an innovation and commercial hub for the use of gas with CCUS to produce low-carbon electricity and zero-carbon fuels (e.g., hydrogen) for transportation and industry, considering the state's substantial natural gas endowment. The Commonwealth should support efforts to become such a hub, including developing a plan to assess the potential infrastructure needs – including repurposing of existing natural gas infrastructure to enable transport of hydrogen and captured CO₂ from sources to locations where it can be utilized or stored.**
 - » Hawaii created a Hydrogen Investment Capital Special Fund to provide seed capital and venture capital investments in renewable hydrogen research, development, and demonstration projects.²⁴ Utah has an oil and gas severance tax credit for production of hydrogen fuel from natural gas for zero-emission vehicles.²⁵ Pennsylvania could do something similar for hydrogen produced from natural gas with carbon capture and storage, with a focus that includes not only hydrogen as a fuel but also hydrogen as a form of energy storage. (Pennsylvania already has a range of grant and rebate programs related to hydrogen fuel cell vehicles and fueling infrastructure.)
 - » Pennsylvania should also continue to take steps to ensure that methane and CO₂ emissions from natural gas extraction, processing, and transport are substantially reduced or eliminated, so that gas with CCUS or hydrogen produced from natural gas (with CCUS) is actually low- or zero-carbon.
- » **Pennsylvania could make nascent zero-carbon technologies eligible for state loan programs. Such loan programs could be tailored to have rates and terms appropriate for when a technology is expected to start producing energy and revenues.**
 - » Wisconsin, for instance, adopted Act 344 in 2016 adding advanced nuclear reactors to the state's energy policy priorities list (e.g., when awarding loans and grants), behind energy efficiency and renewables.²⁶



Additional Measures to Decarbonize Pennsylvania's Transportation

While Pennsylvania's emissions from the electric power sector must be the primary initial target in order to achieve decarbonization, addressing climate change in the Commonwealth will require a range of policy actions in the transportation sector as well. As one of the largest sources of greenhouse gas emissions in the Commonwealth (and the largest source in the country), it is imperative to have a robust policy to tackle emissions from the state's automotive, truck, and bus fleets.

Pennsylvania should:

Continue to collaborate with neighboring states to ensure that the **Transportation and Climate Initiative (TCI) results in a robust policy proposal – that is then implemented by the Commonwealth – to significantly reduce emissions from the transportation sector.**

- » Pennsylvania is a member of the Transportation and Climate Initiative, a regional collaboration of Northeast and Mid-Atlantic states and the District of Columbia that seeks to improve transportation, develop the clean energy economy, and reduce carbon emissions from the transportation sector. The TCI Program aims to cap and reduce carbon emissions from the combustion of transportation fuels and invest proceeds from the program into low-carbon and more resilient transportation infrastructure.
- » In December 2020, the governors of Massachusetts, Connecticut, and Rhode Island and the mayor of the District of Columbia announced that they would be the first to launch the TCI Program in their jurisdictions, while Pennsylvania and seven other states said they would continue working to develop the details of the regional program while pursuing state-specific initiatives.²⁷ The Pennsylvania Department of Transportation and DEP must continue to work to ensure that the TCI model rule is capable of achieving significant emission reductions, and the Commonwealth should then expeditiously initiate and complete the process of adopting and implementing the agreed-upon mechanism.

Promote **electric vehicles, electric vehicle charging infrastructure, and other low-carbon fuels to achieve emission reductions in the transportation sector.**

- » Pennsylvania is already pursuing a range of incentives and programs to advance clean transportation, including through the Drive PA Forward initiative funded largely by the Volkswagen mitigation plan.²⁸ More is needed, however, to plan and facilitate the buildout of supportive infrastructure for all classes of zero-emission vehicles. The Commonwealth should develop a comprehensive long-range plan to accelerate the deployment of zero-emission vehicle charging and refueling infrastructure; this should include requiring electric utilities to regularly file transportation electrification infrastructure development plans. Legislation toward these goals was introduced in the General Assembly's prior session and should be reintroduced and promptly passed in 2021.

- ¹ Executive Order 2019-07. <https://www.governor.pa.gov/newsroom/executive-order-2019-07-commonwealth-leadership-in-addressing-climate-change-through-electric-sector-emissions-reductions/>
- ² PAPUC, *Electric Power Outlook for Pennsylvania 2018-2023*, Aug. 2019, p.iii, http://www.puc.state.pa.us/General/publications_reports/pdf/EPO_2019.pdf
- ³ PADEP, *IPM Modeling Results Discussion Reference Case and RGGI Policy Scenario*, Apr. 23, 2020, pp.13-14, <http://files.dep.state.pa.us/Air/AirQuality/AQPortalFiles/Advisory%20Committees/Air%20Quality%20Technical%20Advisory%20Committee/2020/4-23-20/RGGI%20IPM%20Modeling%20Webinar.pdf>
- ⁴ PADEP, *2019 Pennsylvania Greenhouse Gas Inventory Report*, Dec. 2019, pp.7-8, 16, http://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OETDPortalFiles/Climate%20Change%20Advisory%20Committee/2019/12-20-19/FINAL%20Inventory%20-%202019_2019-12-20.pdf
- ⁵ US EIA, *Energy-Related CO2 Emission Data Tables*, Table 4, 2017 State energy-related carbon dioxide emissions by sector, Release date May 20, 2020, <https://www.eia.gov/environment/emissions/state/excel/table4.xlsx>
- ⁶ See, e.g., Climate Leadership Council, *Economists' Statement on Carbon Dividends*, 2019, <https://clccouncil.org/economists-statement/>
- ⁷ RGGI, *The Investment of RGGI Proceeds in 2018*, July 2020, pp.12-14, https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2018.pdf
- ⁸ PADEP, *IPM Modeling Results Discussion Reference Case and RGGI Policy Scenario*, Apr. 23, 2020, <http://files.dep.state.pa.us/Air/AirQuality/AQPortalFiles/Advisory%20Committees/Air%20Quality%20Technical%20Advisory%20Committee/2020/4-23-20/RGGI%20IPM%20Modeling%20Webinar.pdf> (and data tables at Reference Case Results and Policy Case Results)
- ⁹ Pennsylvania Treasury, *Treasurer Torsella To Establish Keystone Green Bank*, News Release, Oct. 9, 2020, <https://www.patresury.gov/newsroom/archive/2020/10-09-Keystone-Green-Bank.html>
- ¹⁰ Colorado HB19-1314, <https://leg.colorado.gov/bills/hb19-1314>
- ¹¹ American Council for an Energy-Efficient Economy, *2020 State Energy Efficiency Scorecard: Pennsylvania*, 2020, https://www.aceee.org/sites/default/files/pdfs/ACEEE_ScrSht20_Pennsylvania.pdf
- ¹² NGA Center for Best Practices, *State Energy Toolkit*, Dec. 2019, p.4, https://www.nga.org/wp-content/uploads/2019/11/NGA_CleanEnergy_Toolkit_Full_all-sections.pdf
- ¹³ National Conference of State Legislatures, *State Policies for Shared Renewable Energy*, Nov. 21, 2017, <http://www.ncsl.org/research/energy/state-policies-for-shared-renewable-energy.aspx>
- ¹⁴ GridWise Alliance, *Grid Modernization Index 4*, Nov. 2017, <https://cleandedge.com/reports/4th-Grid-Modernization-Index>
- ¹⁵ Robert Walton, *Maryland is first state to launch energy storage tax credit*, Utility Dive, Feb. 13, 2018, <https://www.utilitydive.com/news/maryland-is-first-state-to-launch-energy-storage-tax-credit/517011/>
- ¹⁶ *Joint Statement of Collaboration: U.S. Hydropower: Climate Solution and Conservation Challenge*, Oct. 13, 2020, https://www.eenews.net/assets/2020/10/14/document_ew_02.pdf
- ¹⁷ See, e.g., Pennsylvania Public Utility Commission Docket M-2019-3007101, <https://www.puc.pa.gov/docket/M-2019-3007101>
- ¹⁸ Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs, Department of Energy Resources, *Solar Massachusetts Renewable Target Program (225 CMR 20.00), Guideline, SMART Land Use and Siting Guideline*, effective Apr. 26, 2018, <https://www.mass.gov/doc/smart-land-use-and-siting-guidelinefinal/download> and *Guideline Regarding the Definition of "Brownfield"*, <https://www.mass.gov/doc/smartbrownfields-guideline-final/download>
- ¹⁹ See, e.g., Maryland Power Plant Research Program, Maryland Department of Natural Resources, *Nuclear Power in Maryland: Status and Prospects*, Jan. 2020, pp.119-20, https://dnr.maryland.gov/pprp/Documents/NuclearPowerinMaryland_Status-and-Prospects.pdf
- ²⁰ Maryland Energy Innovation Institute, SB 313, <https://energy.umd.edu/sb-313>
[26 USC 45Q](http://uscode.house.gov/view.xhtml?req=%28title:26%20section:45Q%20edition:prelim%29), <http://uscode.house.gov/view.xhtml?req=%28title:26%20section:45Q%20edition:prelim%29>

²¹ Clinton Climate Initiative, *Viability of a Large-Scale Carbon Capture & Sequestration Network In Pennsylvania*, Nov. 2009, p.37, http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_20033317.pdf; see also Patrick Falwell, C2ES and North America 2050, *State Policy Actions to Overcome Barriers to Carbon Capture and Sequestration and Enhanced Oil Recovery*, Sept. 2013, https://www.c2es.org/site/assets/uploads/2013/08/CCS_EOR_Whitepaper.pdf; *Road Map to a US Hydrogen Economy*, March 2020, p.65, <http://www.ushydrogenstudy.org/>

²² Governor Tom Wolf, *Pennsylvania Joins 6 States in Commitment to Plan for CO2 Transport Infrastructure*, Press Release, Oct. 1, 2020, <https://www.governor.pa.gov/newsroom/pennsylvania-joins-6-states-in-commitment-to-plan-for-co2-transport-infrastructure/>

²³ HI Rev Stat § 211F-5.7 (2015), <https://law.justia.com/codes/hawaii/2015/title-13/chapter-211f/section-211f-5.7/>

²⁴ Utah Code 59-5-102(8), <https://le.utah.gov/xcode/Title59/Chapter5/59-5-S102.html>

²⁵ Wisconsin Act 344 (2015), <https://docs.legis.wisconsin.gov/2015/related/acts/344>; Wisconsin statutes 1.12(4), <https://docs.legis.wisconsin.gov/statutes/statutes/1/12>

²⁶ Transportation and Climate Initiative, *Massachusetts, Connecticut, Rhode Island, D.C. are First to Launch Groundbreaking Program to Cut Transportation Pollution, Invest in Communities*, Dec. 21, 2020, <https://www.transportationandclimate.org/final-mou-122020>

²⁷ Drive PA Forward, <http://www.depgis.state.pa.us/DrivingPAForward/>

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Pennsylvania Environmental Council

Acknowledgement

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www.consultgreenlight.com

The Pennsylvania Environmental Council (PEC) protects and restores the natural and built environments through innovation, collaboration, education and advocacy. PEC believes in the value of partnerships with the private sector, government, communities and individuals to improve the quality of life for all Pennsylvanians.

Learn more about PEC's energy and climate work at www.pecpa.org/climate

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