

Regulatory Analysis Form (Completed by Promulgating Agency)		INDEPENDENT REGULATORY REVIEW COMMISSION
(All Comments submitted on this regulation will appear on IRRC's website)		
(1) Agency Environmental Protection		IRRC Number:
(2) Agency Number: 7 Identification Number: 559		
(3) PA Code Cite: 25 Pa. Code Chapter 145, Subchapter E		
(4) Short Title: CO ₂ Budget Trading Program		
(5) Agency Contacts (List Telephone Number and Email Address): Primary Contact: Laura Griffin, 783-8727, laurgriffi@pa.gov Secondary Contact: Jessica Shirley, 783-8727, jessshirley@pa.gov		
(6) Type of Rulemaking (check applicable box): <input checked="" type="checkbox"/> Proposed Regulation <input type="checkbox"/> Final Regulation <input type="checkbox"/> Final Omitted Regulation		<input type="checkbox"/> Emergency Certification Regulation; <input type="checkbox"/> Certification by the Governor <input type="checkbox"/> Certification by the Attorney General
(7) Briefly explain the regulation in clear and nontechnical language. (100 words or less) The Environmental Quality Board (Board) proposes to amend Chapter 145 (relating to interstate pollution transport reduction) to read as set forth in Annex A. This proposed rulemaking would add Subchapter E (relating to CO ₂ budget trading program) to establish a program to limit the emissions of carbon dioxide (CO ₂) from fossil fuel-fired electric generating units (EGUs), with a nameplate capacity equal to or greater than 25 megawatts (MWe). This proposed rulemaking includes a declining annual CO ₂ emissions budget, which starts at 78,000,000 tons in 2022 and ends at 58,085,040 tons in 2030. This is anticipated to reduce CO ₂ emissions in this Commonwealth by 31% compared to 2019. This proposed rulemaking would result in CO ₂ emission reductions in this Commonwealth of 188 million tons by 2030, improving the health and welfare and the environment of this Commonwealth, including communities most impacted by marginal air quality. This proposed rulemaking would also establish the Commonwealth's participation in the Regional Greenhouse Gas Initiative (RGGI), a regional CO ₂ Budget Trading Program.		
(8) State the statutory authority for the regulation. Include <u>specific</u> statutory citation. This proposed rulemaking is authorized under section 5(a)(1) of the Air Pollution Control Act (APCA) (35 P.S. § 4005(a)(1)), which grants the Board the authority to adopt rules and regulations for the prevention, control, reduction and abatement of air pollution in this Commonwealth. Section 6.3(a) of the APCA (35 P.S. § 4006.3(a)) also authorizes the Board by regulation to establish fees to support the air pollution control program authorized by this act and not covered by fees required by section 502(b) of the Clean Air Act (CAA).		

(9) Is the regulation mandated by any federal or state law or court order, or federal regulation? Are there any relevant state or federal court decisions? If yes, cite the specific law, case or regulation as well as, any deadlines for action.

While this proposed rulemaking is not mandated by any federal or state law or court order, CO₂ is a regulated air pollutant under the APCA and the Federal CAA. This Commonwealth's courts have found that the regulation of air pollution has long been a valid public interest. *See e.g., Bortz Coal Co., v. Commonwealth*, 279 A.2d 388, 391 (Pa. Cmwlth. 1971); *DER v. Pennsylvania Power Co.*, 384 A.2d 273, 284 (Pa. Cmwlth. 1978); *Commonwealth v. Bethlehem Steel Corporation*, 367 A.2d 222, 225 (Pa. 1976). Moreover, the Commonwealth Court has endorsed the Department's position that the General Assembly, through the APCA, gave the agency the authority to reduce greenhouse gas (GHG) emissions, including CO₂. *Wolf v. Funk*, 144 A.3d 228, 250 (Pa. Cmwlth. 2016). In *Massachusetts v. EPA*, 549 U.S. 497 (2007) the U.S. Supreme Court recognized that similarly broad language in the CAA authorized EPA to regulate CO₂ emissions under the CAA.

On October 3, 2019, Governor Wolf signed Executive Order 2019-07, *Commonwealth Leadership in Addressing Climate Change through Electric Sector Emissions Reductions*,¹ which directed the Department to use its existing authority under the APCA to develop a proposed rulemaking to abate, control, or limit CO₂ emissions from fossil fuel-fired electric power generators. This proposed rulemaking establishes a CO₂ budget consistent in stringency to that established by the states participating in RGGI ("participating states"), provides for the auction of CO₂ emissions allowances through a market-based mechanism, and is sufficiently consistent with the RGGI Model Rule such that allowances may be traded with holders of allowances from other states.

While the Department developed this proposed rulemaking under the direction of Executive Order 2019-07, the Board has the authority to promulgate this proposed rulemaking under the APCA. Through the APCA, the Legislature granted the Department and the Board the authority to protect the air resources of this Commonwealth, which is inclusive of controlling CO₂ pollution. CO₂ falls under the definition of "air pollution" in section 3 of the APCA (35 P.S. § 4003). The Board has the authority under section 5(a)(1) of the APCA to adopt rules and regulations for the prevention, control, reduction and abatement of air pollution in this Commonwealth. As mentioned in the response to question 10, numerous sources, including the EPA, the Penn State University, the U.S. Global Change Research Program (USGCRP) and the International Panel on Climate Change (IPCC), have confirmed that CO₂ emissions cause harmful air pollution that is inimical to the public health, safety and welfare, as well as human, plant and animal life. CO₂ is also a GHG and the largest contributor to climate change. Thus, regulating sources of CO₂ emissions is necessary to protect the public health and welfare from harmful air pollution and address climate change.

(10) State why the regulation is needed. Explain the compelling public interest that justifies the regulation. Describe who will benefit from the regulation. Quantify the benefits as completely as possible and approximate the number of people who will benefit.

According to data from the United States Energy Information Administration (EIA), this Commonwealth generates the 4th most CO₂ emissions from EGUs in the country.² Since CO₂ emissions are a major contributor to regional climate change impacts, the Department developed this proposed rulemaking to

¹ Executive Order 2019-07, *Commonwealth Leadership in Addressing Climate Change through Electric Sector Emissions Reductions*, October 3, 2019, <https://www.oa.pa.gov/Policies/eo/Documents/2019-07.pdf>.

² EIA, *Energy-Related Carbon Dioxide Emissions by State, 2005-2016*, February 27, 2019, <https://www.eia.gov/environment/emissions/state/analysis/>.

establish this Commonwealth's participation in a regional approach that significantly reduces CO₂ emissions and this Commonwealth's contribution to regional climate change.

The purpose of this proposed rulemaking is to reduce anthropogenic emissions of CO₂, a GHG, and major contributor to climate change impacts, in a manner that is protective of public health, welfare and the environment. This proposed rulemaking would establish the Commonwealth's participation in RGGI, a regional CO₂ Budget Trading Program aimed at reducing CO₂ emissions from the power sector. This proposed rulemaking would establish a CO₂ Budget Trading Program for this Commonwealth which is capable of linking with similar regulations in the participating states. The totality of these individual state CO₂ Budget Trading Program regulations together make up the regional CO₂ Budget Trading Program or "RGGI."

This proposed rulemaking would effectuate least cost CO₂ emission reductions for the years 2022 through 2030. The declining CO₂ Emissions Budget in this proposed rulemaking directly results in CO₂ emission reductions of around 20 million short tons in this Commonwealth as well as emission reductions across the broader PJM regional electric grid. However, the Department projects that 188 million short tons of CO₂ that would have been emitted over the next decade are avoided by this Commonwealth's participation in RGGI.

If this Commonwealth participates in RGGI in 2022, combined with the other participating states and based on gross domestic product (GDP), RGGI would be equal to the third largest economy in the world. When viewed from this collective impact, the CO₂ emission reductions achieved by the participating states are even more significant. Reductions in CO₂ emissions will help decrease the adverse impacts of climate change on human health, the environment and the economy. Specifically, CO₂ emission reductions may decrease costs from extreme weather events and climate-related ailments that also result in increased health care costs, as well as missed school and work days due to illness.

The CO₂ emission reductions accomplished through implementation of this proposed rulemaking would benefit the health and welfare of the approximately 12.8 million residents and the numerous animals, crops, vegetation and natural areas of this Commonwealth by reducing the amount of climate change causing air pollution resulting from the regulated sources.

Climate Change Impacts and the Greenhouse Effect

Like every state in the country, this Commonwealth has already begun to experience adverse impacts from climate change, such as higher temperatures, changes in precipitation, and frequent extreme weather events, including large storms, flooding, heat waves, heavier snowfalls, and periods of drought. These impacts could alter the many fundamental assumptions about climate that are intrinsic to this Commonwealth's infrastructure, governments, businesses and the stewardship of its natural resources and environment. If not properly accounted for, changes in climate could result in more frequent road washouts, higher likelihood of power outages, and shifts in economic activity, among other significant impacts. Climate change can also affect vital determinants of health such as clean air, safe drinking water, sufficient food and secure shelter. These vital determinants are particularly affected by the increased extreme weather events, in addition to decreased air quality and an increase in illnesses transmitted by food, water, and disease carriers such as mosquitos. If these impacts are to be avoided, GHG emissions must be reduced expeditiously.

The impacts of climate change are vast and what was predicted ten years ago is being confirmed today. Climate change is being caused by the emission and atmospheric concentration of GHGs, namely CO₂.

Scientists have confirmed that increased CO₂ emissions from human activity are causing changes to global climate. Of all the actively publishing climate scientists, 97% agree that climate warming trends over the past century are extremely likely due to human activities. Major scientific institutions including the U.S. National Academy of Sciences, the USGCRP, the American Medical Association, the American Association for the Advancement of Science, and many others endorse this position. In the Fifth Assessment Report of the IPCC released in 2014, the IPCC concluded that, “human influence on the climate system is clear, and recent anthropogenic emissions of GHGs are the highest in history.”³

While CO₂ is a necessary element of life on Earth and acts as a fundamental aspect of nearly every critical system on the planet, CO₂ in high concentrations in the atmosphere leads to the greenhouse effect. The greenhouse effect occurs when CO₂ (and other GHG) molecules absorb solar energy and re-emit infrared energy back to the Earth’s surface. This absorption and re-emitting of infrared energy is what makes certain gases trap heat in the lower atmosphere, not allowing it to go back out to space. The greenhouse effect disrupts the normal process whereby solar energy is absorbed at the Earth’s surface and is radiated back through the atmosphere and back to space. Maintaining the surface temperature of the Earth depends on this balance of incoming and outgoing solar radiation.⁴

Global temperatures are increasing due to the greenhouse effect. Significantly changing the global temperature has impacts to every other weather and climate cycle occurring across the world. For instance, global average sea level, which has risen by about 7–8 inches since 1900 (with about 3 inches of that increase occurring since 1993), is expected to rise at least several inches in the next 15 years and by 1–4 feet by 2100.⁵ The impacts of increased GHGs in the atmosphere, including extreme weather and catastrophic natural disasters, have become more frequent and more intense. Extreme weather events also contribute to deaths from extreme heat or cold exposure and lost work hours due to illness. The World Health Organization expects climate change to cause around 250,000 additional deaths globally per year between 2030-2050, with additional direct damage costs to health estimated to be around \$2-4 billion per year by 2030.⁶ Based on the overwhelming scientific evidence, these harms are likely to increase in number and severity unless aggressive steps are taken to reduce GHG emissions.

Climate Change Impacts Assessments

In 2009, the Department released its first Climate Change Impacts Assessment⁷ and Climate Change Action Plan, as required under the Pennsylvania Climate Change Act (71 P.S. § 1361.1—13.61.8). The 2009 Climate Change Impacts Assessment showed that this Commonwealth was already experiencing some of the harmful effects of climate change. That same year, under CAA section 202(a)(1), 42 U.S.C.A. § 7521(a)(1), the EPA issued an “Endangerment Finding,” that six GHGs — CO₂, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride — endanger both the public health and the public welfare of current and future generations by causing or contributing to climate

³ IPCC, Climate Change 2014: Synthesis Report, Contribution of Working Groups I, II and III to the *Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, 2014, www.ipcc.ch/site/assets/uploads/2018/05/SYR_AR5_FINAL_full_wcover.pdf.

⁴ National Aeronautics and Space Administration, “The Causes of Climate Change,” <https://climate.nasa.gov/causes/>.

⁵ Sea Level Rise. *U.S. Climate Resilience Toolkit*, September 19, 2019, <https://toolkit.climate.gov/topics/coastal/sea-level-rise>.

⁶ World Health Organization, *Climate change and health*, February 1, 2018, <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>.

⁷ Environment and Natural Resources Institute of The Pennsylvania State University, 2019 Pennsylvania Climate Impacts Assessment Update, June 29, 2019, <http://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OETDPortalFiles/Climate%20Change%20Advisory%20Committee/7000-BK-DEP4252%5B1%5D.pdf>.

change. See 74 FR 66496 (December 15, 2009). The 2009 Endangerment Finding is further reinforced by the findings of the USGCRP's Fourth National Climate Assessment (NCA4) which is consistent with the Commonwealth's 2015 and 2020 Climate Impacts Assessment Updates.

In 2015, the Environment and Natural Resources Institute at Penn State University released an updated Climate Impacts Assessment for the Department. The 2015 Climate Impacts Assessment found that this Commonwealth has undergone a long-term warming of more than 1.8°F over the prior 110 years, and that due to increased GHG emissions current warming trends are expected to increase at an accelerated rate with average temperatures projected to increase an additional 5.4 degrees by 2050.⁸ This warming will have potential adverse impacts related to Pennsylvania agriculture, forests, aquatic ecosystems, water resources, wildlife and public health. In this Commonwealth, average annual precipitation has increased by approximately 10% over the past 100 years and, by 2050, is expected to increase by an additional 8%, with a 14% increase during the winter season.⁹

In particular, climate change will worsen air quality relative to what it would otherwise be, causing increased respiratory and cardiac illness. Air quality impacts from climate change are due to the combination of pollutants emitted from anthropogenic sources and weather conditions. Climate change can potentially also worsen water quality, affecting health through consumption of diminished quality drinking water and through contact with surface waters during outdoor recreation. The risk of injury and death from extreme weather events could also increase as a consequence of climate change. Additionally, climate change could affect the prevalence and virulence of air-borne infectious diseases such as influenza. In April 2020, the Environment and Natural Resources Institute at Penn State University released an updated Climate Change Impacts Assessment for the Department,¹⁰ which states that the expected disruptions to this Commonwealth's climate and impacts on this Commonwealth's climate sensitive sectors remain as dire as presented in the 2015 Climate Impacts Assessment.

On November 23, 2018, the USGCRP released the NCA4,¹¹ a scientific assessment of the national and regional impacts of natural and human-induced climate change. The NCA4 represents the work of over 300 government and non-government experts, led by experts within the U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy and eleven other federal agencies. The NCA4 shows how the impacts of climate change are already occurring across the country and emphasizes that future risks from climate change will depend on the decisions made today. It is worth noting that the NCA4 mentions that the Northeast region is a model for other states, as it has traditionally been a leader in GHG mitigation action.

By 2035, the NCA4 projects that the Northeast will see the largest temperature increase in the country of more than 3.6°F on average higher than the preindustrial era.¹² This would occur as much as two decades before global average temperatures reach a similar milestone. The changing climate of the Northeast

⁸ Environment and Natural Resources Institute of The Pennsylvania State University, 2015 Pennsylvania Climate Impacts Assessment Update, May 2015,

<http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=5002&DocName=2015%20PENNSYLVANIA%20CLIMATE%20IMPACTS%20ASSESSMENT%20UPDATE.PDF%20>

⁹ *Id* at 7.

¹⁰ Environment and Natural Resources Institute of The Pennsylvania State University, 2020 Pennsylvania Climate Change Impacts Assessment Update, April 2020,

<http://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OETDPortalFiles/ClimateChange/2020ClimateChangeImpactsAssessmentUpdate.pdf>.

¹¹ USGCRP, Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II, 2018, <https://nca2018.globalchange.gov/>.

¹² *Id.* at Chapter 18: Northeast.

threatens the health and public welfare of its residents and will lead to health-related impacts and costs, including additional deaths, emergency room visits and hospitalizations, higher risk of infectious diseases, lower quality of life and increased costs associated with healthcare utilization. Mosquitoes, fleas and ticks and the diseases they carry have been a particular concern in the Northeast in recent years. Scientists have linked these diseases, specifically tick-related Lyme disease, to climate change.

Climate change also threatens to reverse the advances in air quality that the states in the Northeast, including this Commonwealth, have worked so hard to achieve over the past couple of decades. In particular, climate change will increase levels of ground-level ozone pollution in the Northeast through changes in weather and increased ozone precursor emissions. Ozone is an irritant and repeated exposure to ozone pollution for both healthy people and those with existing conditions may cause a variety of adverse health effects, including difficulty in breathing, chest pains, coughing, nausea, throat irritation and congestion. In addition, people with bronchitis, heart disease, emphysema, asthma and reduced lung capacity may have their symptoms exacerbated by ozone pollution. Asthma, in particular, is a significant and growing threat to children and adults in this Commonwealth. The NCA4 refers to this as a “climate penalty” and projects it could cause hundreds more ozone pollution-related deaths per year.

Over the past several decades, the Department has made substantial progress in decreasing ground-level ozone pollution in this Commonwealth, including limiting precursor emissions. However, Bucks, Chester, Delaware, Montgomery and Philadelphia counties are designated as marginal nonattainment areas for the 2015 ozone national ambient air quality standards (NAAQS). See 83 FR 25776 (June 4, 2018). There is still more work that needs to be done to reduce emissions in these nonattainment areas and to avoid backsliding on the improvements to air quality across this Commonwealth. An increase in ground-level ozone levels due to climate change would interfere with continued attainment of the ozone NAAQS, hinder progress in marginal nonattainment areas and put public health and welfare at risk.

Along with these overall impacts, multiple sectors in this Commonwealth can expect to see specific negative impacts from climate change.

Health

Climate change will impact human health in a number of ways. It will likely increase ground-level ozone, small airborne particulates, and pollen and mold concentrations. Ozone is an irritant that causes respiratory issues, aggravates asthma, causes respiratory infections, and increases mortality. Higher plant growth, more pollen produced by each plant, increased allergenicity of the pollen grains, and a longer pollen season can also be expected. In this Commonwealth, mosquito and tick-borne diseases are spreading to new communities and regions and impacting people’s lives.¹³ According to a recent Penn State University study,¹⁴ since 2000, this Commonwealth has had the highest number of total Lyme disease cases nationwide. Increased deer tick prevalence throughout this Commonwealth is related to climate change and shifts in land use because winters are no longer cold enough to kill off tick populations.

¹³ Environment and Natural Resources Institute of The Pennsylvania State University, 2015 Pennsylvania Climate Impacts Assessment Update, May 2015, <http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=5002&DocName=2015%20PENNSYLVANIA%20CLIMATE%20IMPACTS%20ASSESSMENT%20UPDATE.PDF%20>

¹⁴ Pennsylvania State University, More than 100 years of data show Pennsylvania tick population shift, May 3, 2019, <https://phys.org/news/2019-05-years-pennsylvania-population-shift.html>.

Vulnerable populations across this Commonwealth will be at a higher risk for heat related death. People with heart failure, the elderly, and those without access to air conditioning will all be increasingly exposed to more frequent and intense heat waves. One study found that if temperatures increase another 3 degrees, cities like Philadelphia will see hundreds more deaths per year than if warming is limited to 1 degree.¹⁵

Repeated exposure to ozone pollution for both healthy people and those with existing conditions may cause a variety of adverse health effects including difficulty breathing, chest pains, coughing, nausea, throat irritation, and congestion. In addition, people with bronchitis, heart disease, emphysema, asthma, and reduced lung capacity may have their symptoms exacerbated by ozone pollution. Asthma is a significant and growing threat to children and adults in this Commonwealth. Reduced ambient concentrations of ground-level ozone would reduce the incidences of hospital admissions for respiratory ailments including asthma and improve the quality of life for residents of this Commonwealth.¹⁶

According to the NCA4, climate-driven changes in weather, human activity and natural emissions are all expected to impact future air quality across the United States. Many emission sources of GHGs also emit air pollutants that harm human health. Controlling these common emission sources would both mitigate climate change and have immediate benefits for air quality and human health. The energy sector, which includes energy production, conversion, and use, accounts for 84% of GHG emissions as well as 80% of emissions of oxides of nitrogen (NO_x) and 96% of sulfur dioxide (SO₂). Specifically, mitigating GHGs can lower emissions of particulate matter (PM), ozone and PM precursors, and other hazardous pollutants, reducing the risks to human health from air pollution.

Agriculture

In addition to causing adverse human and animal health effects, high levels of ground-level ozone affect vegetation and ecosystems, leading to reductions in agricultural crop and commercial forest yields by destroying chlorophyll; reducing growth and survivability of tree seedlings; and increasing plant susceptibility to disease, pests, and other environmental stresses, including harsh weather. In long-lived species, these effects may become evident only after several years or even decades and have the potential for long-term adverse impacts on forest ecosystems.¹⁷

Similar to various public health pressures, the agricultural, food, and water systems this Commonwealth depends on for survival are also under threat by climate change. The increase in precipitation and its variability could lead to higher plant disease, increased risk of flooding, difficulty in the timing of planting, and increased demand for irrigation. Extreme temperatures will stress grain crops and fruit crops that flower in the summer months (such as grapes). To adapt, this Commonwealth's wineries may choose to plant European varieties of grapes, which tend to do better in warmer climates, but this would also lead to increases in the cost of wine.¹⁸

¹⁵ University of Bristol, Adjusting carbon emissions to the Paris climate commitments would prevent thousands of heat-related deaths, June 5, 2019, <http://www.bristol.ac.uk/news/2019/june/heat-related-deaths-.html>.

¹⁶ EPA, Health Effects of Ground-Level Ozone, <http://web.archive.org/web/20160220023128/http://www3.epa.gov/airquality/ozonepollution/health.html>.

¹⁷ Environment and Natural Resources Institute of The Pennsylvania State University, 2013 Pennsylvania Climate Impacts Assessment Update, May 2015, <http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=6806&DocName=PA%20DEP%20CLIMATE%20IMPACT%20ASSESSMENT%20UPDATE.PDF%20%20%3Cspan%20style%3D%22color%3Agreen%3B%22%3E%3C%2Fspan%3E%20%3Cspan%20style%3D%22color%3Ablue%3B%22%3E%3C%2Fspan%3E>.

¹⁸ *Id.*

This Commonwealth's dairy production will also experience challenges from reduced milk yields, a result of heat stress on cows. Farmers may see additional capital expenditures necessary for cooling systems to reduce the heat stress on cows. The same is true for poultry and egg production. Investments in insulation, ventilation, fans, and air conditioning will be necessary to prevent heat stress to the birds. Currently, a large portion of poultry and hog production takes place in warmer, southern states like North Carolina and Georgia, showing that these production processes can still be viable with the increased costs of cooling. However, there may be a northward movement of these animals, bringing with them an increase in nutrient production and further stressing our obligations for water quality improvements.¹⁹

High levels of ground-level ozone also affect animals including pets, livestock, and wildlife, in ways similar to humans. Reduced ambient concentrations of ground-level ozone would improve the quality of life of animals, preserve this Commonwealth's biodiversity, and reduce veterinary costs to farmers and citizens with pets.

Forests & Recreation

Climate change is already having an impact on forests around the world and this Commonwealth's diverse and productive forests will likely also see impacts. Tree species are expected to shift to higher latitudes and elevations for suitable habitat. Mortality rates are expected to increase, and regeneration is expected to decline. Rising temperatures increase insect reproductive rates, making pest outbreaks more destructive and harder to control. Additionally, pests that impact the forests of southern states could make their way into this Commonwealth's forests.

Outdoor recreation in this Commonwealth will also be impacted by climate change. Stream flows in the summer could be reduced and negatively affect sport fishing. Swimming in lakes and rivers could be limited by poor water quality, the result of higher temperatures, low summer flows, and nutrient and pathogen loadings. These combinations of circumstances can lead to harmful algal blooms.

Warmer winter temperatures and reduced snowfall will negatively impact snow-based recreation. This Commonwealth's ski resorts will experience shorter seasons, higher snow making costs, and lower profits as a consequence of climate change. Research also suggests that dispersed winter recreation, such as cross-country skiing and snowmobiling, will decline because of less snowfall and fewer extended periods of cold weather.²⁰

Infrastructure

Extreme weather events can affect the reliability of energy delivery. Hurricanes, polar vortexes, and ice storms can damage infrastructure. Increased cooling demands can also stress energy delivery systems during times of high demand and could lead to electrical blackouts. Planning for distributed generation to provide electricity in the event of natural disaster related outages becomes necessary.

¹⁹ Environment and Natural Resources Institute of The Pennsylvania State University, 2019 Pennsylvania Climate Impacts Assessment Update, June 29, 2019, <http://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OETDPortalFiles/Climate%20Change%20Advisory%20Committee/7000-BK-DEP4252%5B1%5D.pdf>.

²⁰ Environment and Natural Resources Institute of The Pennsylvania State University, 2015 Pennsylvania Climate Impacts Assessment Update, May 2015, <http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=5002&DocName=2015%20PENNSYLVANIA%20CLIMATE%20IMPACTS%20ASSESSMENT%20UPDATE.PDF%20>.

The Commonwealth's infrastructure system has recently experienced major impacts from increased precipitation and the resultant landslides, as 2018 was the wettest year on record.²¹ In just one year, PennDOT saw over \$125 million in emergency expenses to replace damaged infrastructure and cash-strapped local municipalities are dealing with the same budget-busting issues. Adding to that financial stress, many flooding events are so localized that they do not qualify for Federal assistance, so homeowners, business owners, and local and state agencies must bear the brunt of repair costs.

Water Resources

The Department predicts higher flood potential due to more precipitation and intensified risks to water resources that are already stressed. Other potential impacts are decreased water quality, urban flooding, decreased water supplies for urban areas, and irrigation. Warmer temperatures may mean less winter thermal stress on fish, but higher summer temperatures could have an impact on salmon spawning. More severe storm events and dry periods will change flow patterns, resulting in major changes to the channel morphology and aquatic habitat. The largest negative impact may be in lost biodiversity as fish and other species' populations shift northward.

Additionally, the Department predicts that water temperatures in the summer could increase 2.7 to 3.5 degrees. This warming will cause a decrease in the solubility of oxygen and an increase in respiration rates, resulting in decline of the dissolved oxygen concentration. By mid-century, the sea level will increase by 0.4 meters. Coupled with the projected summer stream flow decrease of 19%, a modest increase of salinity is expected to occur.²² Salinity is an important defining characteristic of the Delaware estuary, regulating floral and faunal distributions and affecting human use of the estuary. While salinity is a threat, the predicted sea-level rise has the potential to drown the already-stressed wetlands if their growth rates are less than the rates of the rise.²³

Immediate Action is Needed to Address this Commonwealth's Contribution to Climate Change

Given the urgency of the climate crisis, including the significant impacts on this Commonwealth, the Board determined that concrete, economically sound and immediate steps to reduce GHG emissions are needed. As one of the top GHG emitting states in the country, the Board has a compelling interest to reduce GHG emissions to address climate change and protect public health, welfare and the environment. Based on the most recent data from the EPA's State Inventory Tool, in 2017, this Commonwealth generated net GHG emissions equal to 233.20 million metric tons CO₂ equivalent (MMTCO₂e) Statewide, the vast majority of which are CO₂ emissions. In the context of the world, this Commonwealth's electricity generation sector alone emits more CO₂ than many entire countries including Greece, Colombia, Sweden, Israel, Singapore, Austria, Peru and Portugal.²⁴

Historically, the electricity generation sector has been the leading source of CO₂ emissions in this Commonwealth. Based upon data contained in the Department's 2020 GHG Inventory, 29% of this

²¹ National Weather Service: National Oceanic and Atmospheric Administration, 2018 in Context: Record Precipitation across Pennsylvania, <https://www.weather.gov/ctp/RecordPrecip2018>.

²² Environment and Natural Resources Institute of The Pennsylvania State University, 2015 Pennsylvania Climate Impacts Assessment Update, May 2015, <http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=5002&DocName=2015%20PENNSYLVANIA%20CLIMATE%20IMPACTS%20ASSESSMENT%20UPDATE.PDF%20>.

²³ *Id.*

²⁴ Joint Research Centre, European Commission, "JRC Science For Policy Report: Fossil CO₂ emissions of all world countries," 2018, <https://ec.europa.eu/jrc/en/publication/fossil-co2-emissions-all-world-countries-2018-report>.

Commonwealth's total GHG emissions are produced by the electricity generation sector.²⁵ In recent years, this Commonwealth has seen a shift in the electricity generation portfolio mix, resulting from market forces and the establishment of alternative energy goals, and energy efficiency targets. Since 2005, this Commonwealth's electricity generation has shifted from higher carbon-emitting electricity generation sources, such as coal, to lower and zero emission generation sources, such as natural gas, wind and solar. At the same time, overall energy use in the residential, commercial, transportation, and electric power sectors has reduced.

However, looking forward, the Department projects CO₂ emissions from the electricity generating sector will increase due to reduced switching from coal to natural gas, the potential closure of zero carbon emitting nuclear power plants, and the addition of new natural gas-fired units in this Commonwealth. The Three Mile Island nuclear power plant already closed on September 20, 2019, amounting to a loss of 818 MW of carbon free generation. However, the modeling conducted for this proposed rulemaking predicts no further nuclear power plants retirements through 2030 with implementation of this proposed rulemaking. Without this proposed rulemaking, this Commonwealth's nuclear fleet may remain at-risk of closure. In fact, the Beaver Valley nuclear power plant, responsible for 1,845 MW of carbon free generation, recently withdrew its closure announcement, specifically citing this Commonwealth's intended participation in RGGI as a key determinant in continuing operations.

Further, the Department's Climate Action Plan predicts that total and net GHG emissions (including emissions sinks) will increase by 4% and 5%, respectively, from 2015 to 2050.²⁶ Additionally, the most recent GHG Inventory indicates that in 2017 GHG emissions in this Commonwealth increased, widening the gap between current emissions and reductions necessary to avoid the worst impacts of climate change.²⁷

This proposed rulemaking is necessary to ensure CO₂ emissions continue to decrease and at a rate that shields this Commonwealth from the worst impacts of climate change. RGGI plays an important role in providing a platform whereby this Commonwealth can reduce CO₂ emissions using a market-based approach. As the electricity generation sector remains one of the leading sources of CO₂ in this Commonwealth, it is imperative that emissions continue to decrease from that sector.

The Commonwealth's GHG Emission Reduction Goals

It is for these reasons that on January 8, 2019, Governor Wolf signed Executive Order 2019-01, *Commonwealth Leadership in Addressing Climate Change and Promoting Energy Conservation and Sustainable Governance*.²⁸ This Executive Order set the first ever climate change goal for this Commonwealth to reduce net GHG emissions from 2005 levels by 26% by 2025 and 80% by 2050. These

²⁵ Environment and Natural Resources Institute of The Pennsylvania State University, 2020 Pennsylvania Climate Change Impacts Assessment Update, April 2020, <http://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OETDPortalFiles/ClimateChange/2020ClimateChangeImpactsAssessmentUpdate.pdf>.

²⁶ Pennsylvania Department of Environmental Protection, 2018 Pennsylvania Climate Action Plan: Strategies and actions to reduce and adapt to climate change, April 29, 2019, <http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=1454161&DocName=2018%20PA%20CLIMATE%20ACTION%20PLAN.PDF%20%20%20%3cspan%20style%3D%22color:blue%3b%22%3e%28NEW%29%3c/span%3e>.

²⁷ Pennsylvania Department of Environmental Protection, 2019 Pennsylvania Greenhouse Gas Inventory Report, December 2019, 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.

²⁸ Executive Order 2019-01, *Commonwealth Leadership in Addressing Climate Change and Promoting Energy Conservation and Sustainable Governance*, January 8, 2019, <https://www.governor.pa.gov/newsroom/executive-order-2019-01-commonwealth-leadership-in-addressing-climate-change-and-promoting-energy-conservation-and-sustainable-governance/>.

climate change goals align this Commonwealth with the reduction targets under the Paris Agreement aimed at keeping global temperature rise below the 2-degree Celsius threshold. According to climate experts, the 2-degree Celsius threshold is the level beyond which dire global consequences would occur, including sea level rise, superstorms and crippling heat waves.

On April 29, 2019, the Department issued a Pennsylvania Climate Action Plan that identified GHG emission trends and baselines in this Commonwealth and recommended cost-effective strategies for reducing or offsetting GHG emissions. The Climate Action Plan determined that reducing the overall carbon intensity of the electricity generated in this Commonwealth is one of the most critical strategies for reducing GHG emissions. The Climate Action Plan also identified many different strategies and actions that all Pennsylvanians can take to combat climate change. According to the Climate Action Plan, one of the most cost-effective emissions reduction strategies is to limit CO₂ emissions through an electricity sector cap and trade program. This Commonwealth participating in a cap and trade program is expected to result in the largest near-term reduction in emissions and was deemed cost-effective relative to the social cost of carbon. The Climate Action Plan modeled a cap and trade program that requires a carbon cap equal to a 30% reduction from 2020 CO₂ emissions levels by 2030, which is equivalent to RGGI stringency.

On October 3, 2019, Governor Wolf signed Executive Order 2019-07, *Commonwealth Leadership in Addressing Climate Change through Electric Sector Emissions Reductions*,²⁹ which directed the Department to use its existing authority under the APCA to develop this proposed rulemaking to abate, control or limit CO₂ emissions from fossil fuel-fired electric power generators. The Executive Order also directed the Department to present this proposed rulemaking to the Board by July 31, 2020. On June 22, 2020, Governor Wolf amended the Executive Order to extend the deadline to September 15, 2020. As directed by the Executive Order, this proposed rulemaking establishes a CO₂ budget consistent in stringency to that established by the participating states, provides for the annual or more frequent auction of CO₂ emissions allowances through a market-based mechanism, and is sufficiently consistent with the RGGI Model Rule such that allowances may be traded with holders of allowances from other states.

Considering that this Commonwealth has the fourth leading CO₂ emitting electricity generation sector in the country, this proposed rulemaking is a significant component in achieving the Commonwealth's goals to reduce GHG emissions. Although this proposed rulemaking will not solve global climate change, it will aid this Commonwealth in addressing its share of the impact, joining other states and countries that are addressing their own impacts. The statutory authority for this proposed rulemaking, the APCA, is built on a precautionary principle to protect the air resources of this Commonwealth for the protection of public health and welfare and the environment, including plant and animal life and recreational resources, as well as development, attraction and expansion of industry, commerce and agriculture. In order to be proactive, this proposed rulemaking is needed to address this Commonwealth's contributions to climate change, particularly CO₂ emissions. The Board determined to address CO₂ emissions through a regional initiative because regional cap and trade programs have proven to be beneficial and cost-effective at reducing air pollutant emissions. In fact, this Commonwealth has and continues to participate in successful regional cap and trade programs.

History and Success of this Commonwealth's Participation in Cap and Trade Programs

In the 1990 CAA Amendments, the United States Congress determined that the use of market-based principles, such as emissions banking and trading are effective ways of achieving emission reductions.

²⁹ Executive Order 2019-07, *Commonwealth Leadership in Addressing Climate Change through Electric Sector Emissions Reductions*, October 3, 2019, <https://www.oa.pa.gov/Policies/eo/Documents/2019-07.pdf>.

According to the EPA, emissions trading programs are best implemented when the environment and public health concerns occur over a relatively large geographic area and effectively designed emissions trading programs provide flexibility for individual emissions sources to tailor their compliance path to their needs. The EPA has also determined that reducing emissions using a market-based system provides regulated sources with the flexibility to select the most cost-effective approach to reduce emissions and has proven to be a highly effective way to achieve emission reductions, meet environmental goals, and improve human health. In contrast to traditional command and control regulatory methods that establish specific emissions limitations and technology use with limited or no flexibility, cap and trade programs harness the economic incentives of the market to reduce pollution. The Board has a decades-long history of promulgating regulations that have established this Commonwealth's participation in successful cap and trade programs.

Beginning in 1995, this Commonwealth participated in the first national cap and trade program in the United States, the Acid Rain Program, which was established under Title IV of the 1990 CAA Amendments and required, in part, major emission reductions of SO₂ through a permanent cap on the total amount emitted by EGUs. For the first time, the Acid Rain Program introduced a system of allowance trading that used market-based incentives to reduce pollution. The Acid Rain Program reduced SO₂ emissions by 14.5 million tons (92%) from 1990 levels and 16.0 million tons (93%) from 1980 levels.³⁰ The undisputed success of achieving significant emission reductions in a cost-effective manner led to the application of the market-based cap and trade tool for other regional environmental problems.

From 1999 to 2002, this Commonwealth participated in the Ozone Transport Commission's (OTC) NO_x Budget Program, an allowance trading program designed to reduce summertime NO_x emissions from EGUs to reduce ground-level ozone, which included all of the current states participating in RGGI. According to the OTC's NO_x Budget Program 1999-2002 Progress Report,³¹ NO_x Budget Program units successfully reduced ozone season NO_x emissions in 2002 by nearly 280,000 tons, or about 60%, from 1990 baseline levels, achieving greater reductions than required each year of the program. Based on the success of the OTC's NO_x Budget Program and the Acid Rain Program, in 2003 the EPA implemented a regional NO_x cap and trade program under the NO_x SIP Call, which closely resembled the OTC NO_x Budget Program. The EPA again noted the cost savings of achieving emissions reductions through trading.

Beginning in 2009, the EPA's NO_x Budget Trading Program was replaced by the Clean Air Interstate Rule (CAIR) trading program, covering 28 eastern states, which required further summertime NO_x reductions from the power sector as well as SO₂ reductions. Finally, in 2015 CAIR was replaced by the Cross-State Air Pollution Rule trading program.

Regional Greenhouse Gas Initiative (RGGI)

RGGI is a cooperative regional market-based cap-and-trade program designed to reduce CO₂ emissions from fossil fuel-fired EGUs. RGGI is currently composed of ten northeastern states, including

³⁰ EPA, 2018 Power Sector Programs Progress Report, 2018, https://www3.epa.gov/airmarkets/progress/reports/pdfs/2018_full_report.pdf.

³¹ OTC, NO_x Budget Program 1999-2002 Progress Report, <https://nepis.epa.gov/Exe/ZyNET.exe/P1002LY4.TXT?ZyActionD=ZyDocument&Client=EPA&Index=2000+Thru+2005&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C00thru05%5CTxt%5C00000017%5CP1002LY4.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL>

Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont. Since its inception on January 1, 2009, RGGI has utilized a market-based mechanism to cap and cost-effectively reduce CO₂ emissions that cause climate change. Because CO₂ from large fossil fuel-fired EGUs is a major contributor to regional climate change, the participating states developed a regional approach to address CO₂ emissions. This regional approach resulted in a Model Rule applicable to fossil fuel-fired EGUs with a nameplate capacity equal to or greater than 25 MWe. RGGI is implemented in the participating states through each state's independent CO₂ Budget Trading Program regulations, based on the Model Rule, which link together.

RGGI is a “cap and trade” program that sets a regulatory limit on CO₂ emissions from fossil fuel-fired EGUs and permits trading of CO₂ allowances to effect cost efficient compliance with the regulatory limit. RGGI is also referred to as a “cap and invest” program, because unlike traditional cap and trade programs, RGGI provides a “two-prong” approach to reducing CO₂ emissions from fossil fuel-fired EGUs. The first prong involves a declining CO₂ emissions budget and the second prong is investment of the proceeds resulting from the auction of CO₂ allowances to further reduce CO₂ emissions.

Benefits of RGGI Participation

Cap and trade programs have an established track record as economically efficient, market-driven mechanisms for reducing pollution in a variety of contexts. Other countries and states have found that cap and trade programs are effective methods to achieve significant GHG emission reductions. RGGI is one of the most successful cap and trade programs and it is well-established with an active carbon trading market for the northeastern United States. This successful market-based program has significantly reduced and continues to reduce emissions. The participating states have collectively reduced power sector CO₂ pollution by over 45% since 2009, while experiencing per capita Gross Domestic Product growth and reduced energy costs.³² The program design of RGGI would enable the Board to regulate CO₂ emissions from the power sector in a way that is least-cost and economically efficient thereby driving long-term investments in cleaner sources of energy.

Part of what makes RGGI economically efficient is that it is a regional program, which allows EGUs to achieve least-cost compliance by buying and selling allowances in a regional auction or in regional secondary markets. RGGI CO₂ allowances are fungible across the participating states, meaning that though this Commonwealth has an established allowance budget for each year, this Commonwealth's allowances are available to meet the compliance obligations in any other RGGI state and vice versa. Therefore, CO₂ emissions from this Commonwealth's power sector are not limited to strictly the amount of this Commonwealth's CO₂ allowances. This cooperation allows EGUs more flexibility in terms of compliance and allows the market to continue to signal entrance and exit of generation. Though each state has its own annual allocation, compliance occurs at the regional level rather than on a state-by-state basis. In this respect the market assists in achieving least cost compliance for all participating states.

Another benefit of participating in multistate auctions run by RGGI, Inc. is that RGGI, Inc. has retained the services of an independent market monitor to monitor the auction, CO₂ allowance holdings, and CO₂ allowance transactions, among other activities. The market monitor provides independent expert monitoring of the competitive performance and efficiency of the RGGI allowance market. This includes identifying attempts to exercise market power, collude, or otherwise manipulate prices in the auction and/or the secondary market, making recommendations regarding proposed market rule changes to

³² Analysis Group, The Economic Impacts of The Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States: Review of RGGI's Third Three-Year Compliance Period (2015-2017), April 17, 2018, https://www.analysisgroup.com/globalassets/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_april_2018.pdf

improve the efficiency of the market for RGGI Allowances, and assessing whether the auctions are administered in accordance with the noticed auction rules and procedures. The market monitor will monitor bidder behavior in each auction and report to the participating states any activities that may have a material impact on the efficiency and performance of the auction. The participating states, through RGGI, Inc., release a Market Monitor Report shortly after each CO₂ allowance auction. The report includes aggregate information about the auction including the dispersion of projected demand, the dispersion of bids, and a summary of bid prices, showing the minimum, maximum, average and clearing price and the allowances awarded.

RGGI has helped the participating states create jobs, save money for consumers, and improve public health, while reducing power sector emissions and transitioning to a cleaner electric grid. In an independent and nonpartisan evaluation of the first three control periods in RGGI, the Analysis group, one of the largest economic consulting firms globally, found that the participating states experienced economic benefits in all three control periods, while reducing CO₂ emissions. The participating states added between \$1.3 billion and \$1.6 billion in net economic value during each of the three control periods. The participating states also showed growth in economic output, increased jobs and reduced long-run wholesale electricity costs.³³

A recent report from the Acadia Center, a nonprofit organization committed to advancing the clean energy future, entitled “The Regional Greenhouse Gas Initiative: Ten Years in Review,” shows that CO₂ emissions from covered sources in the participating states have decreased 47%, which is 90% faster than in the rest of country. The participating states were able to achieve that significant reduction while the gross domestic product grew by 47%, outpacing the rest of the country by 31%. RGGI has also driven substantial reductions in harmful co-pollutants, making the region’s air cleaner and its people healthier. Additionally, proceeds from RGGI auctions generated nearly \$3.3 billion in state investments from 2009 to 2019.³⁴

For comparison, according to the Department’s 2019 GHG Inventory Report from 2005 to 2016, this Commonwealth reduced its net emissions by 33.5% while the participating states reduced covered sources CO₂ pollution over 45% over the same period. Additionally, this was achieved while the region’s per-capita GDP has continued to grow- highlighting the synergies between environmental protection and economic development.

Emissions Reductions

The design of the CO₂ Budget Trading Program within this proposed rulemaking ensures emissions from the electricity generation sector are decreased over time. Between 2022 and 2030, the program’s CO₂ emissions budget will decrease 19,914,960 tons, equal to a reduction of 25.532%, as shown in Table 1. However, to capture the full extent of the benefits of this proposed rulemaking it is critical to compare this Commonwealth’s annual emissions with this proposed rulemaking and without it from 2022 to 2030.

³³ *Id.*

³⁴ Acadia Center, “The Regional Greenhouse Gas Initiative 10 Years in Review,” 2019, https://acadiacenter.org/wp-content/uploads/2019/09/Acadia-Center_RGGI_10-Years-in-Review_2019-09-17.pdf.

Table 1. Pennsylvania CO₂ Emissions Budget Through 2030.

Year	Budget	Decline (Tonnage)	Annual Decline (Percentage)
2022	78,000,000	2,489,370	-3.19%
2023	75,510,630	2,489,370	-3.30%
2024	73,021,260	2,489,370	-3.41%
2025	70,531,890	2,489,370	-3.53%
2026	68,042,520	2,489,370	-3.66%
2027	65,553,150	2,489,370	-3.80%
2028	63,063,780	2,489,370	-3.95%
2029	60,574,410	2,489,370	-3.11%
2030	58,085,040	2,489,370	-4.11%
2022-2030 Total Reduction		19,914,960	-25.532%
-25.532% reduction from 2022		58,085,040	
Total tonnage reduction		19,914,960	
Annual tonnage reduction		2,489,370	

In order to analyze the full extent of CO₂ emission reductions due to this proposed rulemaking, the Department utilized the Integrated Planning Model (IPM) to compare this Commonwealth’s CO₂ emissions, among other attributes, with implementation of this proposed rulemaking and without implementation of this proposed rulemaking. IPM is a dynamic model of the United States power sector that can determine least-cost solutions of meeting energy and peak demand requirements. The model considers a number of key operating or regulatory constraints, such as emission limits, transmission capabilities and constraints, renewable generation requirements, fuel market constraints, etc. IPM can perform integrated analysis and can project wholesale power prices, CO₂ allowance prices, and CO₂ emissions in an optimal and internally consistent manner. It is also particularly suited to evaluating the impacts of environmental regulations and policies.

IPM is well-suited to consider complex treatment of emission regulations involving trading, banking and traditional command-and-control emission policies. Because of the model’s endogenous treatment of natural gas, coal and biomass fuel markets, it is fully capable of analyzing policies that directly affect these markets. A detailed unit-level database of every grid-connected EGU in the United States is the fundamental input to IPM. The model represents power markets through model regions that are geographical entities with distinct characteristics. Wholesale power prices, fuel prices, emission allowance prices, and renewable energy credits are all estimated endogenously in an integrated fashion.

The IPM analysis produced two results for this proposed rulemaking. The first is a “Reference Case” based on this proposed rulemaking not being implemented in this Commonwealth or business as usual. The second is a “Policy Case” based on this proposed rulemaking being implemented in this Commonwealth and the auction proceeds being invested in efforts to further reduce air pollution. Comparing these two cases, the Department estimates that this Commonwealth will experience CO₂ emission reductions of 188 million tons over the decade as a direct result of participation in RGGI. This results in CO₂ reductions in this Commonwealth and a net benefit to the entire PJM region. The Department’s modeling shows that this Commonwealth makes these significant emission reductions while maintaining historic electric generation levels, enhancing this Commonwealth’s status as a leading net energy exporter, creating economic opportunities and reducing long-term wholesale energy prices.

Health Benefits of this Proposed Rulemaking

This proposed rulemaking would provide public health benefits due to the expected reductions in emissions of CO₂ and the ancillary emission reductions or co-benefits of SO₂ and NO_x reductions. The Department's modeling projects cumulative emission reductions of 112,000 tons of NO_x and around 67,000 tons of SO₂ over the decade. Further reducing NO_x and SO₂ emissions is beneficial to public health, because NO_x and SO₂ contribute to several health problems.

Short-term exposure to SO₂ emissions can be harmful to public health because it impacts the ability to breathe especially in children and those with asthma.³⁵ NO_x can also cause irritation in the respiratory system. In particular, long-term exposure to elevated NO_x levels may contribute to asthma, and potentially increase susceptibility to respiratory infections and lead to increased hospital admissions.³⁶

NO_x and SO₂ emissions are also major contributors to PM pollution, which is a mixture of microscopic solid and liquid droplets that are suspended in the air. The smaller the size of the particle, the more damaging it is to human health. PM_{2.5}, which is particulate matter that is particularly damaging as the particles are small enough to get deep into the lungs, and perhaps even enter the bloodstream. Children are at increased risk of health impacts from PM as their lungs are still developing, and PM can exacerbate asthma or acute respiratory disease. Elevated levels of PM will also aggravate adults with COPD, asthma, coronary artery disease, or congestive heart failure. When particle levels in the air are high, older adults are more likely to be hospitalized, and death from aggravated heart or lung disease may occur.³⁷

NO_x emissions also contribute to the formation of ground-level ozone. When ozone occurs at ground level it presents a serious air quality problem in many parts of the United States, including this Commonwealth. Ground level ozone is formed when pollutants emitted from a variety of sources, including power plants, react with sunlight. Ozone negatively affects human health as it irritates the respiratory system, reduces lung function, aggravates asthma, and inflames and damages the lining of the lungs.³⁸ Those especially at risk from ground-level ozone exposure are children, adults who are active outdoors, and those with underlying respiratory issues such as asthma.

A 2017 independent study by Abt Associates, a global research firm focused on health and environmental policy, on the "Analysis of the Public Health Impacts of the Regional Greenhouse Gas Initiative, 2009-2014" showed that participating states gained significant health benefits in the first six years of RGGI implementation alone. From 2009-2014, the participating states avoided around 24% of CO₂ emissions that would have otherwise been emitted during that period, resulting in around \$5 billion in avoided health related costs.³⁹ Since this proposed rulemaking would lead to a 31% reduction of projected CO₂ emissions, or avoided emissions, over the next decade, this Commonwealth is likely to see similar gains in health benefits.

A recent study led by researchers from the Columbia Center for Children's Environmental Health at Columbia University Mailman School of Public Health ("Columbia study"), published on July 29, 2020,

³⁵ EPA, Sulfur Dioxide (SO₂) Pollution, [www.epa.gov/so2-pollution/sulfur-dioxide-basics#what is so2](http://www.epa.gov/so2-pollution/sulfur-dioxide-basics#what%20is%20so2).

³⁶ EPA, Particulate Pollution and Your Health, September 2003, <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1001EX6.txt>.

³⁷ *Id.*

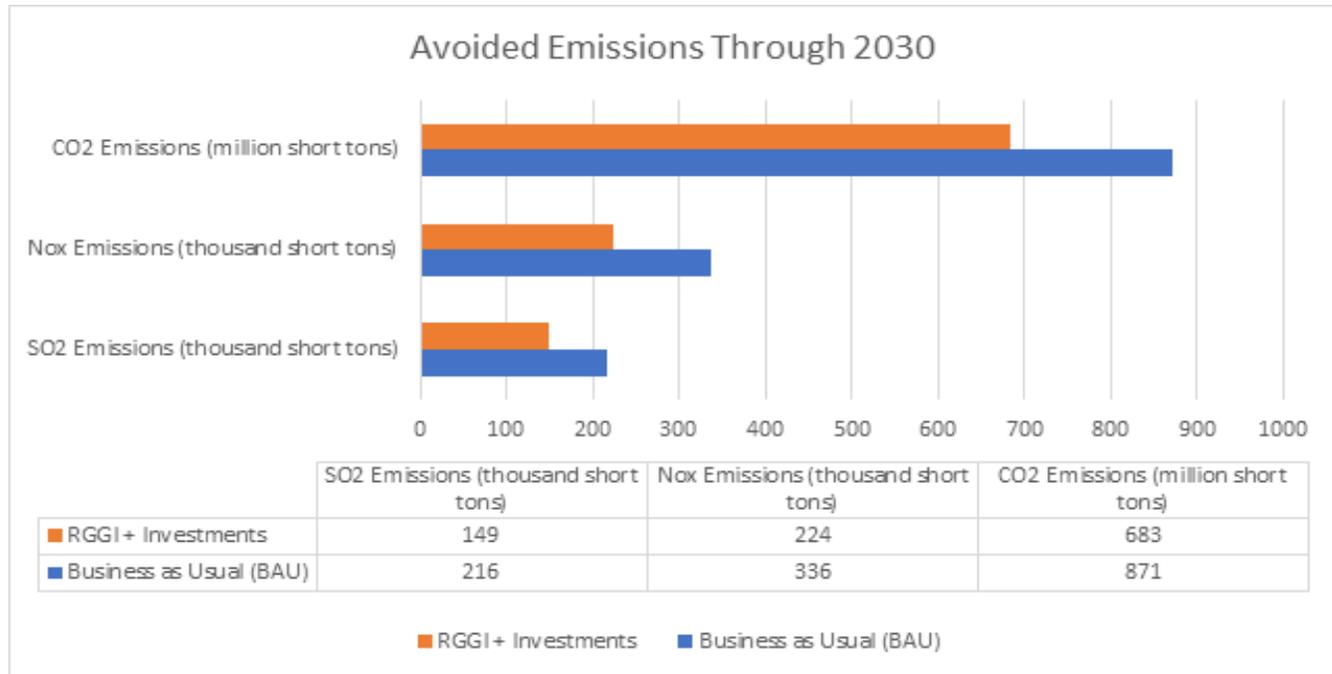
³⁸ EPA, Health Effects of Ground-Level Ozone, <http://web.archive.org/web/20160220023128/http://www3.epa.gov/airquality/ozonepollution/health.html>.

³⁹ Abt Associates, "Analysis of the Public Health Impacts of the Regional Greenhouse Gas Initiative, 2009-2014," January 2017, <https://www.abtassociates.com/sites/default/files/files/Projects/executive%20summary%20RGGI.pdf>.

on the “Co-Benefits to Children’s Health of the U.S. Regional Greenhouse Gas Initiative” indicates that the health benefits from RGGI are even more significant than estimated in 2017 by Abt Associates. The Columbia study concluded that the co-pollutant reductions resulting from RGGI have provided considerable child health benefits to participating and neighboring states. In particular, between 2009-2014, RGGI resulted in an estimated 537 avoided cases of childhood asthma, 112 avoided preterm births, 98 avoided cases of autism spectrum disorder, and 56 avoided cases of term low birthweight. Those child health benefits also have significant economic value, estimated at \$199.6–358.2 million between 2009 and 2014 alone. However, the researchers note that the actual health benefits are even greater than estimated because the analysis does not capture the future health benefits related to reductions in childhood PM2.5 exposure and mitigating climate change, such as fewer heat-related illnesses or cases of vector-borne disease to which children are especially vulnerable.⁴⁰

⁴⁰ Frederica Perera, David Cooley, Alique Berberian, David Mills, and Patrick Kinney, “Co-Benefits to Children’s Health of the U.S. Regional Greenhouse Gas Initiative,” *Environmental Health Perspectives*, Vol. 128, No. 7, July 2020, <https://ehp.niehs.nih.gov/doi/10.1289/EHP6706>.

Figure 1. CO₂, NO_x and SO₂ Emission Reductions Comparison.



Benefit-per-Ton (BPT) Methodology

To calculate the public health benefits of avoided emissions, the Department used the EPA’s Regional Benefit-per-Ton (BPT) methodology.⁴¹ This approach applies an average benefit per ton derived from modeling of benefits of specific air quality scenarios. The EPA’s benefit-per-ton approach “relies on estimates of human health responses to exposure to PM and ozone obtained from the peer-reviewed scientific literature.”⁴² These estimates are then used in conjunction with emissions reductions or avoided emissions to conduct health impact and economic benefit assessments.

Specifically, to calculate benefits of avoided emissions, the Department multiplied the benefit-per-ton estimates (using the 3% discount rate) by the corresponding emission reductions that were generated from the power sector modeling for this proposed rulemaking. This methodology relies on two U sets of coefficient for calculations, from two cohort studies. The Krewski calculation serves as the lower bound and the Lepeule calculation as the upper bound of projected impacts. As this proposed rulemaking spans the timeframe of 2022 to 2030, so does the analysis of the health benefits due to avoided emissions. However, the emission reductions from this proposed rulemaking will provide benefits that extend well beyond 2030. Based on these calculations, the public health benefits to this Commonwealth of avoided SO₂ and NO_x emissions range between \$2.79 billion to \$6.3 billion by 2030, averaging between \$232 million to \$525 million per year.

⁴¹ EPA, Regulatory Impact Analysis for the Clean Power Plan Final Rule, October 2015, https://www3.epa.gov/tneacas1/docs/ria/utilities_ria_final-clean-power-plan-existing-units_2015-08.pdf.

⁴² *Id.*

Table 2. Public Health Benefits of Emissions Reductions.

Avoided Emissions	Krewski (low-end)	Lepeule (high-end)
Benefits of Avoided SO ₂ Emissions	\$2,415,130,517	\$5,458,234,159
Benefits of Avoided NO _x Emissions	\$372,171,575	\$840,749,945
TOTAL	\$2,787,302,092	\$6,298,984,104

Incidence-per-Ton (BPT) Methodology

The Department used the EPA’s Regional Incidence-per-Ton (IPT) methodology which calculates total avoided incidences of major health issues and avoided lost work and school days due to reduced emissions. Again, to calculate reduced incidences of avoided emissions, we multiplied the incidence-per-ton estimates (using the 3% discount rate) by the corresponding emission reductions that were generated from the power sector modeling for this proposed rulemaking. Again, using the Krewski and Lepeule incidence co-efficients as the lower and upper bound respectively.⁴³

Through 2030, it is estimated that between 282 and 639 premature deaths will be avoided in this Commonwealth due to emission reductions directly resulting from this proposed rulemaking.

Table 3. Avoided Premature Deaths by 2030 from emissions reductions from this regulation.

	Avoided Deaths by 2030
Krewski	282
Lepeule	639

Children and adults alike will suffer less from respiratory illnesses. The methodology projects 31,000 fewer incidences of upper and lower respiratory symptoms which will lead to reduced emergency department visits and avoided hospital admissions. Healthier children will be able to play more, as incidences of minor restricted-activity days decline on the order of almost 500,000 days between now and 2030. Adults would be healthier as well. The methodology projects over 83,000 avoided lost workdays due to health impacts.

⁴³ EPA, Co-efficients for the Eastern Region for both the IPT and BPT Methodologies can be found in the Regulatory Impact Analysis for the Clean Power Plan Final Rule, October 2015, https://www3.epa.gov/ttnecas1/docs/ria/utilities_ria_final-clean-power-plan-existing-units_2015-08.pdf.

Table 4. Avoided Health Impacts by 2030 from emission reductions from this regulation.⁴⁴

Incidences per Ton (IPT)	Avoided Incidences Through 2030
Emergency department visits for asthma	335
Acute bronchitis (age 8–12)	1,011
Lower respiratory symptoms	12,898
Upper respiratory symptoms	18,458
Minor restricted-activity days	495,487
Lost workdays (age 18–65)	83,639
Asthma exacerbation (age 6–18)	45,299
Hospital Admissions, Respiratory	211
Hospital Admissions, Cardiovascular	258

Investment of Auction Proceeds Benefits Consumers and the Economy

The proceeds generated from this proposed rulemaking would be invested into programs that would reduce air pollution and create positive economic impacts in this Commonwealth. The Department plans to develop a draft plan for public comment outlining reinvestment options separate from this proposed rulemaking. However, the Department conducted modeling to estimate the economic impacts of this proposed rulemaking. The Department analyzed the net economic benefits of the program investments using the Regional Economic Model, Inc. (REMI) model. The extensive economic modeling will help the Department determine the best ways to invest the auction proceeds in this Commonwealth to maximize emission reductions and economic benefits. The modeling anticipates that in the first year of participation in RGGI, approximately \$300 million in auction proceeds will be generated for the use in the elimination of air pollution in this Commonwealth. The auction proceeds would be spent on programs related to the regulatory goal, and the Department modeled a scenario in which the proceeds are invested in energy efficiency, renewable energy and GHG abatement.

The proceeds will aid this Commonwealth in the transition toward a clean energy economy. In 2015, the EPA noted that the energy market was moving toward cleaner sources of energy and states needed to make plans for and invest in the next generation of power production, particularly considering that current assets and infrastructure were aging. By strategically investing the proceeds, this Commonwealth can help ensure that, as new investments are being made, they are integrated with the need to address GHG pollution from the electric generation sector. See 80 FR 64661, 64678 (October 23, 2015). There are energy transitions occurring both in this Commonwealth and nationally.

Nationally, the last ten years have seen coal's position steadily erode due to a combination of low electricity demand, mounting concern over climate, and increased competition from natural gas and renewables. The same is true for coal generation in this Commonwealth. Since 2005, electricity generation in this Commonwealth has shifted from higher carbon-emitting electricity generation sources, such as coal, to lower and zero emissions generation sources, such as natural gas, and renewable energy. Between now and 2030, coal generation is expected to decline dramatically. In 2010, coal generation represented 47% of this Commonwealth's generation portfolio and is expected to decline to roughly 1% of this Commonwealth's generation portfolio in 2030.⁴⁵ This shift away from coal-fired generation occurs irrespective of this Commonwealth's participation in RGGI. Anticipating the need for transition,

⁴⁴ *Id.*

⁴⁵ EIA, State Electricity Profiles 2010, January 2012, www.eia.gov/electricity/state/archive/sep2010.pdf.

for these communities and employees, auction proceeds can be used to mitigate these impacts and assist communities and families through the energy transition. This could include repowering of the existing coal-fired power plants to natural gas, investments in worker training or other community-based support programs.

The Department would invest a portion of the proceeds in energy efficiency initiatives because energy efficiency is a low-cost resource for achieving CO₂ emission reductions while reducing peak demand and ultimately reducing electricity costs. Lower energy costs create numerous benefits across the economy, allowing families to invest in other priorities and businesses to expand. Energy efficiency savings can be achieved cost-effectively by upgrading appliances and lighting, weatherizing and insulating buildings, upgrading HVAC and improving industrial processes. Additionally, all consumers benefit from energy efficiency programs, not just direct program participants because focused investment in energy efficiency can lower peak electricity demand and can decrease overall electricity costs which results in savings for all energy consumers. Additionally, energy efficiency projects are labor-intensive which creates local jobs and boosts local economy. For instance, projects involving home retrofits directly spur employment gains in the housing and construction industries.

Investing a portion of the auction proceeds into energy efficiency initiatives is also crucial to addressing the impacts of climate change on consumers. According to the NCA4, rising temperatures are projected to reduce the efficiency of power generation while increasing energy demands, resulting in higher electricity costs. Energy efficiency will help lessen those impacts by putting downward pressure on both demand and electricity costs.

Historically, the participating states have invested a significant portion of their auction proceeds in energy efficiency programs. According to RGGI's 2017 Investment Report,⁴⁶ over the lifetime of the installed measures, the investments made in energy efficiency in 2017 alone are projected to save participants over \$879 million on energy bills, providing benefits to more than 291,000 participating households and 2,600 participating businesses. The investments are also projected to further avoid the release of 6.6 million short tons of CO₂ pollution.

The Department would also invest a portion of the proceeds in clean and renewable electricity generation, such as energy derived from clean or zero emissions sources including geothermal, hydropower, solar and wind. Clean and renewable energy systems reduce reliance on fossil fuels and provide climate resilience benefits, including reduced reliance on centralized power. They also offer the opportunity to save money on electricity costs by installing on-site renewable energy and also reduce power lost through transmission and distribution. Investing in clean and renewable projects will help this Commonwealth meet its climate goals, drive in-state investments and job creation, and lessen the pressure on the CO₂ allowance budget by generating more electricity without additional emissions.

The participating states invested 14% of their 2017 auction proceeds in clean and renewable energy projects. Over the lifetime of the projects installed in 2017, these investments are projected to offset \$329.6 million in energy expenses for nearly 500 households and businesses. The investments are also projected to avoid the release of 1.2 million short tons of CO₂ emissions.⁴⁷

⁴⁶ Analysis Group, The Economic Impacts of The Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States: Review of RGGI's Third Three-Year Compliance Period (2015-2017), April 17, 2018, https://www.analysisgroup.com/globalassets/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_april_2018.pdf

⁴⁷ RGGI, The Investment of RGGI Proceeds in 2017, October 2019, https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2017.pdf.

The Department would also invest a portion of the proceeds in GHG abatement initiatives. GHG abatement includes a broad category of projects encompassing other ways of reducing GHGs, apart from energy efficiency and clean and renewable energy. Examples of potential programs in this Commonwealth include abandoned oil and gas well plugging, electric vehicle infrastructure, carbon capture, utilization and storage, combined heat and power, energy storage, repowering projects and vocational trainings, among others.

For reference, in 2017, an estimated 14% of RGGI investments were made in GHG abatement programs and projects. For the duration of the project lifetime, those investments are expected to avoid over 431,000 short tons of CO₂ emissions across the region.⁴⁸

The Department modeled an investment scenario with 31% of annual proceeds for energy efficiency, 32% for renewable energy and 31% for GHG abatement, and 6% for any programmatic costs related to the oversight of the CO₂ Budget Trading Program (5% for the Department and 1% for RGGI, Inc). These programmatic costs are in line with the historical amounts reserved by the participating states.

The results of the modeling show that this proposed rulemaking will not only combat climate change and improve air quality for residents, but also be of positive economic value to this Commonwealth. The modeling estimates that from 2022 to 2030, this proposed rulemaking would lead to an increase in Gross State Product of \$1.9 billion and a net increase of 27,752 jobs in this Commonwealth. The Department's modeling also indicates that investments from this proposed rulemaking would spur an addition of 9.4 gigawatts (GW) of renewable energy and result in a load reduction of 29 terawatt hours of electricity from energy efficiency projects.

(11) Are there any provisions that are more stringent than federal standards? If yes, identify the specific provisions and the compelling Pennsylvania interest that demands stronger regulations.

There is not a corresponding federal regulation that reduces CO₂ emissions from fossil fuel-fired EGUs through a CO₂ budget trading program. Therefore, this proposed rulemaking will be more stringent than federal requirements.

On July 8, 2019, the EPA promulgated the "Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units," commonly known as the "Affordable Clean Energy Rule or ACE rule" under section 111(d) of the CAA. 84 FR 32520 (July 8, 2019). The Department has incorporated the Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources, promulgated under section 111 of the CAA (42 U.S.C.A. § 7411) by reference in Chapter 122 (relating to national standards of performance for new stationary sources).

Under the ACE Rule, the Department is required to establish unit-specific standards of performance that reflect the GHG, specifically CO₂, emission limitation achievable through application of the appropriate best system of emission reduction technologies at existing coal-fired EGUs. The EPA determined that CO₂ emissions trading is not a permissible measure for states to implement in establishing the standards of performance for existing coal-fired EGUs under the ACE Rule. 84 FR 32520, 32556. To satisfy compliance with the ACE Rule, the Department is modifying the Title V permits of applicable facilities to incorporate these unit-specific standards of performance. Thus, this proposed rulemaking is not being developed to implement the ACE Rule requirements.

⁴⁸ *Id.*

Based on the EPA's Regulatory Impact Analysis for the ACE Rule, the resulting CO₂ emission reductions amount to less than 1% of the CO₂ emissions from the total electric sector. Given the urgency of the climate crisis, including the significant impacts to this Commonwealth, the Board determined that this proposed rulemaking is necessary to help achieve the significant reductions in CO₂ emissions necessary to avoid the worst impacts of climate change. As one of the top GHG emitting states in the country, the Board has a compelling interest to reduce GHG emissions to address climate change and protect public health, welfare and the environment.

(12) How does this regulation compare with those of the other states? How will this affect Pennsylvania's ability to compete with other states?

There are ten states currently participating in RGGI, including Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont. The Commonwealth of Virginia is expected to begin participating in 2021. Since all of the participating states' regulations are based on the RGGI Model Rule, this proposed rulemaking is very similar to the regulations in the participating states, with modifications made to accommodate the unique aspects of this Commonwealth's power sector.

Comparison with RGGI Participating States

As mentioned previously, the participating states developed a Model Rule to use as the framework for each state's independent CO₂ Budget Trading Program regulation. The development of the RGGI Model Rule was supported by an extensive regional stakeholder process that engaged the regulated community, environmental non-profits and other organizations with technical expertise in the design of cap and trade programs. The structure of the RGGI Model Rule, because it was drafted based on the language in the EPA's NO_x Budget Trading Program rule in 40 CFR Part 96 (relating to NO_x budget trading program and CAIR NO_x and SO₂ trading programs for state implementation plans), which the Board used as a model for Chapter 145, Subchapter A.

States that participate in RGGI develop regulations that are compatible with the RGGI Model Rule to ensure consistency among the individual programs. Key areas of compatibility include alignment of the main program elements, stringency of the CO₂ allowance budgets and consistency of regulatory language. This consistency is necessary to ensure the fungibility of CO₂ allowances across the participating states, which supports the regional trading of CO₂ allowances and the use of a CO₂ allowance issued in one participating state for compliance by a regulated source in another participating state.

This proposed rulemaking therefore adopts the main program elements of the RGGI Model Rule, including the definitions, applicability, standard regulatory requirements, monitoring and reporting requirements, the CO₂ Allowance Tracking System (COATS), the emissions containment reserve (ECR), the cost containment reserve (CCR) and the CO₂ emissions offset project provisions. The CO₂ allowance budgets in this proposed rulemaking are sufficiently stringent to align with RGGI's goal of reducing CO₂ emissions by 30% from 2020 to 2030. This proposed rulemaking also contains regulatory language consistent with the RGGI, Inc. auction platform, the online platform used to sell CO₂ allowances. RGGI, Inc. is a nonprofit corporation created to provide technical and administrative support services to the participating states in the development and implementation of their CO₂ Budget Trading Programs. Each participating state is also allotted two positions on the Board of Directors of RGGI, Inc. Under this proposed rulemaking, RGGI, Inc. may act as the agent for the Department.

Each participating state's regulation provides for the distribution of CO₂ allowances from its CO₂ allowance budget. The majority of CO₂ allowances are distributed at auction and each CO₂ allowance sold at auction returns proceeds from the sale to that state to invest in energy efficiency, renewable energy, and GHG abatement programs. but some states have elected to designate a limited amount of CO₂ allowances to be "set-aside" in a designated account and distributed to advance individual state policy goals and objectives. Since this proposed rulemaking is consistent with the RGGI Model Rule, the Commonwealth's CO₂ allowances will have equal value to CO₂ allowances held in the other participating states, meaning they may be freely acquired and traded across the region.

Although CO₂ allocation provisions may vary from state to state, to be consistent with the RGGI Model Rule each participating state allocates a minimum of 25% of its CO₂ allowance budget to a general account from which CO₂ allowances will be sold or distributed in order to provide funds for energy efficiency measures, renewable or noncarbon-emitting energy technologies, and CO₂ emissions abatement technologies, as well as programmatic costs. Consistent with the RGGI Model Rule, this proposed rulemaking establishes a general account from which CO₂ allowances will be sold or distributed, which is labeled as the Department's air pollution reduction account. Each year, the Department will allocate CO₂ allowances representing 100% of the tons of CO₂ emitted from the Commonwealth's CO₂ allowance budget to the air pollution reduction account, except for the CO₂ allowances that the Department has set aside for a designated purpose as discussed in the following section. CO₂ allowances in the air pollution reduction account will be sold or distributed in order to provide funds for use in the elimination of air pollution and programmatic costs.

While this proposed rulemaking is sufficiently consistent with the Model Rule and corresponding regulations in the participating states, the Board also accounts for the unique environmental, energy and economic intricacies of this Commonwealth. This provides the Board the flexibility to limit CO₂ emissions from fossil fuel-fired EGUs in a way that aligns with the other participating states, while tailoring this proposed rulemaking to this Commonwealth's energy markets. There are five main areas in which this proposed rulemaking differs from the Model Rule.

First, under § 145.342(i) (relating to CO₂ allowance allocations) of this proposed rulemaking, the Department will set aside 9,300,000 CO₂ allowances at the beginning of each year for waste coal-fired units located in this Commonwealth. The Board is establishing this waste coal set-aside in this proposed rulemaking because waste coal-fired units provide an environmental benefit of reducing the amount of waste coal piles in this Commonwealth. Coal piles are a significant environmental issue in this Commonwealth, because waste coal piles cause air and water pollution, as well as safety concerns. Waste coal-fired units burn waste coal to generate electricity thereby reducing the size, number and impacts of these piles otherwise abandoned and allowed to mobilize and negatively impact air and water quality in this Commonwealth. In recent years, waste coal-fired units have struggled to compete in the energy market, due in part to low natural gas prices, and several units have shut down or announced anticipated closure dates. Given the environmental benefit provided, the Board determined that it is necessary to assist owners or operators of waste coal-fired units with meeting their compliance obligation under this proposed rulemaking. This legacy environmental issue from this Commonwealth's long history of coal mining further underscores why it is vital to not leave additional environmental issues, like climate change, for future generations to solve.

By providing a set aside, as opposed to an exemption, the CO₂ emissions from waste coal-fired units are included in this Commonwealth's CO₂ emissions budget and owners or operators of waste coal-fired units are still required to satisfy compliance of all the regulatory requirements in this proposed rulemaking.

After reviewing the last 5 years of CO₂ emission data from waste coal-fired units, the Department determined that the CO₂ allowance set aside should be equal to the total of each waste coal-fired unit's highest year of CO₂ emissions from that 5-year period. That total is 9,300,000 tons of CO₂ emissions. Thus, the Department will set aside 9,300,000 CO₂ allowances annually. Each year, Department will allocate the CO₂ allowances directly to the compliance accounts of the waste coal-fired units equal to the unit's actual emissions. However, if the waste coal-fired units emit over 9,300,000 tons of CO₂ emissions sector-wide in any year, then the units must acquire the remaining CO₂ allowances needed to satisfy their compliance obligation.

While this Commonwealth's participation in RGGI will have tangible health, environmental and economic benefits, the inclusion of the waste coal set-aside has the additional benefit of avoiding unintended impacts to this generation sector, so that the environmental benefits of continuing to remediate this Commonwealth's legacy waste coal piles may continue. For context, since 1988 a total of 160.7 million tons of waste coal has been removed and burned to generate electricity, with an additional 200 million tons of coal ash beneficially used at mine sites. Of this Commonwealth's over 13,000 acres of waste coal piles cataloged by the Department, 3,700 acres have been reclaimed with roughly 9,000 acres remaining. Additionally, of the piles that remain, approximately 40 of them have ignited, and continually burn which significantly impacts local air quality.

Second, this proposed rulemaking also includes the establishment of a strategic use set-aside allocation under § 145.342(j). By April 1 of each calendar year, the Department will allocate any undistributed CO₂ allowances from the waste coal set-aside to the strategic use set-aside account. Since generation from waste coal-fired units has been declining in this Commonwealth, waste coal fired-units may emit less than 9,300,000 tons each year and the Department will be left with undistributed CO₂ allowances. Under the strategic use set-aside, the Department will allocate these undistributed CO₂ allowances directly to eligible projects that eliminate air pollution. The Board is establishing the strategic use set-aside particularly to encourage and foster promotion of energy efficiency measures, promote renewable or noncarbon-emitting energy technologies, and stimulate or reward investment in the development of innovative carbon emissions abatement technologies.

Third, this proposed rulemaking includes a set-aside provision under § 145.342(k) for cogeneration units, including combined heat and power (CHP) systems. The Board is establishing this set-aside because cogeneration units concurrently produce electricity and useful thermal energy, making them energy efficient and environmentally beneficial. Under the cogeneration set-aside, the Department will adjust the compliance obligation of a cogeneration unit by reducing the total CO₂ emissions by an amount equal to the CO₂ that is emitted as a result of providing useful thermal energy or electricity, or both, supplied directly to a co-located facility during the allocation year. The Department will only provide CO₂ allowances in this set-aside equal to the compliance adjustment. The cogeneration unit will be responsible for obtaining the remaining CO₂ allowances needed to satisfy the unit's compliance obligation. Unlike the waste coal set-aside, the Department would not distribute CO₂ allowances directly to the unit, but rather retire CO₂ allowances on behalf of the unit in order to reduce its compliance obligation. Also, cogeneration units must fill out an application and provide information to the Department to receive a compliance adjustment.

CHP systems use energy efficiently by simultaneously producing electricity and useful thermal energy from the same fuel source. CHP captures the wasted heat energy that is typically lost through power generation, using it to provide cost-effective heating and cooling to factories, businesses, universities and hospitals. CHP systems are able to use less fuel compared to other fossil fuel-fired EGUs to produce a given energy output. Less fuel being burned results in fewer air pollutant emissions, including CO₂ and

other GHGs. In addition to reducing emissions, CHP benefits the economy and businesses by improving manufacturing competitiveness through increased energy efficiency and providing a way for businesses to reduce energy costs while enhancing energy reliability.

Fourth, under § 145.305 (relating to limited exemption for CO₂ budget units with electrical output to the electric grid restricted by permit conditions) of this proposed rulemaking, the Board provides additional flexibility in the form of a limited exemption for cogeneration units that are interconnected and supply power to a manufacturing facility. A cogeneration unit that supplies less than 15% of its annual total useful energy to the electric grid, not including energy sent to the interconnected manufacturing facility, does not have a compliance obligation under this proposed rulemaking. The owner or operator of the cogeneration unit claiming this limited exemption must have a permit issued by the Department containing a condition restricting the supply to the electric grid. This limited exemption is in addition to the exemption in the RGGI Model Rule for fossil fuel-fired EGUs with a capacity of 25 MWe or greater that supply less than 10% of annual gross generation to the electric grid. The Board is including this additional exemption for cogeneration units that primarily send energy to an interconnected manufacturing facility because these cogeneration units provide a CO₂ emission reduction benefit. These units provide useful thermal energy, a byproduct of electricity generation, to the manufacturing facility which helps prevent the need for the facility to run additional boilers onsite to generate electricity which in turn avoids additional CO₂ emissions.

Lastly, this proposed rulemaking adds regulatory language on the procedure for auctioning CO₂ allowances, which is not contained in the RGGI Model Rule. Several participating states have also added auction procedure language to their CO₂ Budget Trading Program regulations or developed completely separate auction regulations. By including the auction procedure in this proposed rulemaking, the Board seeks to ensure that auction participants fully understand the auction process and the associated requirements.

In the auction procedure section of this proposed rulemaking, § 145.401 (relating to auction of CO₂ allowances), the Board states that the Department will participate in multistate CO₂ allowance auctions in coordination with other participating states based on specific conditions. First, a multistate auction capability and process must be in place for the participating states. A multistate auction must also provide benefits to this Commonwealth that meet or exceed the benefits conferred on this Commonwealth through a Pennsylvania-run auction process. Additionally, the multistate auction process must be consistent with the process described in this proposed rulemaking and include monitoring of each CO₂ allowance auction by an independent market monitor. Since the multistate auctions conducted by RGGI, Inc. satisfy all four of the conditions, the Department will participate in the multistate auctions. However, the Board also states that if the Department finds these four conditions are no longer met, the Department may determine to conduct a Pennsylvania-run auction. By including the ability to conduct a Pennsylvania-run action in this proposed rulemaking, the Board provides for flexibility in case the benefits of the multistate auctions diminish in the future.

Competition in Interstate Electricity Market

This Commonwealth generates more electricity than it consumes, exporting the remaining electricity to other states within PJM. States within PJM compete with one another in interstate electricity markets. State level policies can impact that market unevenly as generators may have varying costs depending on their location.

Not all states within PJM participate in RGGI, so generators in non-participating states may have different costs associated with electricity generation. The Department conducted an analysis evaluating possible impacts on this Commonwealth's ability to compete in the interstate electricity generation market if this proposed rulemaking is implemented.

The Department found that this Commonwealth will continue to export electricity to other states and this Commonwealth's total generation is not eroded as a result of RGGI participation. In fact, if the auction proceeds are invested in the energy sector, the modeling estimates that total electricity exports from this Commonwealth will be higher by 2030 with this proposed rulemaking than without it. Further, any price differential resulting from the addition of the CO₂ allowance price is not significant enough to cause EGUs to close and reopen in surrounding states. EGUs in this Commonwealth have historically maintained a competitive advantage regarding natural gas prices due to the proximity to the Marcellus shale formation. Even with the price adder of the CO₂ allowance price, the modeling shows that natural gas generation in this Commonwealth continues to be extremely competitive.⁴⁹ As shown in Table 5 below, this Commonwealth's nominal power prices (capacity and energy) remain competitive in the region when compared to the current and future power prices of the participating states.

Table 5. Firm Power Prices (Nominal \$/MWh).

	2020	2022	2025	2028	2030
MA	\$ 54.0	\$ 46.8	\$ 46.2	\$ 52.5	\$ 56.0
CT	\$ 49.0	\$ 42.4	\$ 43.4	\$ 46.4	\$ 47.1
ME	\$ 48.8	\$ 41.4	\$ 43.6	\$ 47.7	\$ 47.5
NH	\$ 49.4	\$ 41.7	\$ 42.3	\$ 47.5	\$ 47.6
RI	\$ 54.1	\$ 47.3	\$ 48.4	\$ 55.1	\$ 57.4
VT	\$ 53.3	\$ 45.0	\$ 47.6	\$ 52.6	\$ 53.5
NY	\$ 43.7	\$ 44.3	\$ 45.4	\$ 46.1	\$ 47.2
DE	\$ 42.7	\$ 35.6	\$ 39.4	\$ 42.7	\$ 40.2
MD	\$ 35.7	\$ 34.4	\$ 38.8	\$ 42.1	\$ 39.8
9-state RGGI	\$ 45.9	\$ 40.2	\$ 41.4	\$ 44.2	\$ 44.2
VA	\$ 33.9	\$ 34.1	\$ 38.6	\$ 41.1	\$ 39.2
NJ	\$ 42.0	\$ 37.1	\$ 40.6	\$ 41.9	\$ 38.9
PA	\$ 32.0	\$ 31.6	\$ 36.6	\$ 39.7	\$ 37.5

(13) Will the regulation affect any other regulations of the promulgating agency or other state agencies? If yes, explain and provide specific citations.

No other regulations are affected by this proposed rulemaking.

(14) Describe the communications with and solicitation of input from the public, any advisory council/group, small businesses and groups representing small businesses in the development and drafting of the regulation. List the specific persons and/or groups who were involved. (“Small business” is defined in Section 3 of the Regulatory Review Act, Act 76 of 2012.)

⁴⁹ ICF, Energy Assessment Report for the Commonwealth of Pennsylvania, April 2019, <http://www.depgreenport.state.pa.us/eLibrary/GetDocument?docId=1451239&DocName=ENERGY%20ASSESSMENT%20REPORT%20FOR%20THE%20COMMONWEALTH%20OF%20PENNSYLVANIA.PDF%20%20%20%3cspan%20style%3D%22color:blue%3b%22%3e%28NEW%29%3c/span%3e.>

As required under the Regulatory Review Act and further emphasized by Executive Order 2019-07, the Department conducted a robust public outreach effort including the business community, energy producers, energy suppliers, organized labor, environmental groups, low-income and environmental justice advocates and others to ensure that the development and implementation of this program results in reduced emissions, economic gains and consumer savings.

Additionally, the Department, working with the Public Utility Commission, engaged with PJM Interconnection to promote the integration of this program in a manner that preserves orderly and competitive economic dispatch within PJM and minimizes emissions leakage. The Department has also been an active participant in PJM's Carbon Pricing Senior Task Force (CPSTF)⁵⁰ which was established to discuss potential process or rule changes necessary to integrate a regional or sub-regional carbon pricing mechanism into PJM's wholesale electricity markets.

The Department consulted with the Air Quality Technical Advisory Committee (AQTAC) and the Citizens Advisory Council (CAC) in the development of this proposed rulemaking. On December 12, 2019, the Department presented concepts to AQTAC on a potential rulemaking to participate in RGGI. The Department returned to AQTAC on February 13, 2020 to discuss the preliminary draft Annex A. At the April 16, 2020 AQTAC meeting, the Department provided a brief update on the development of this proposed rulemaking. In response to requests from committee members for more opportunities to learn about the CO₂ Budget Trading Program, on April 23, 2020, the Department presented on and provided the modeling results associated with this proposed rulemaking in a Special Joint Informational Meeting of AQTAC and CAC. The meeting was held via a webinar and over 225 members of the public were able to listen to the modeling results. Anyone interested in hearing the modeling results can also watch the meeting at any time through a link on the Department's website.⁵¹

AQTAC was established under section 7.6 of the APCA (35 P.S. § 4007.6) to provide technical advice at the request of the Department on policies, guidance and regulations. On May 7, 2020, this proposed rulemaking was presented to AQTAC for review and technical advice before the Department moved this proposed rulemaking forward to the Board for consideration. The meeting was held via a webinar and over 200 members of the public had the opportunity to listen to the discussion and to request to provide comments. The AQTAC members were divided on whether to submit a formal letter of concurrence and ultimately declined to do so without a majority decision. The Department will continue to seek technical advice from AQTAC and address member questions and concerns throughout the rulemaking process.

The opportunity to provide public comment on this proposed rulemaking to AQTAC members was provided on three occasions, at the February 13, 2020, April 16, 2020, and May 7, 2020 AQTAC meetings.

Under section 7.6 of the APCA, the Department is required to consult with CAC in the development of the Department's regulations and State implementation plans. On November 19, 2019, the Department presented concepts to CAC on a potential rulemaking to participate in RGGI. The Department returned to CAC on February 18, 2020 for an informational presentation on a preliminary draft Annex A. The Department also conferred with CAC's Policy and Regulatory Oversight Committee concerning this proposed rulemaking on May 8, 2020. At the May 19, 2020 CAC meeting, this proposed rulemaking was presented to CAC for review before the Department moved this proposed rulemaking forward to the Board

⁵⁰ PJM Interconnection, Issue Charge of the Carbon Pricing Senior Task Force, 2019, www.pjm.com/-/media/committees-groups/task-forces/cpstf/postings/issue-charge.ashx?la=en.

⁵¹ Pennsylvania Department of Environmental Protection, Special Joint Informational Meeting- Carbon Dioxide Budget Trading Program, April 23, 2020, www.dep.pa.gov/rggi.

for consideration. The CAC members ultimately declined to submit a formal letter of concurrence with the Department's recommendation to move this proposed rulemaking forward to the Board for consideration. The Department will continue to consult with CAC and address member questions and concerns throughout the rulemaking process.

The opportunity to provide public comment on this proposed rulemaking to CAC members was provided on three occasions, at the November 19, 2019, February 18, 2020, and May 19, 2020 CAC meetings.

Under section 7.8 of the APCA (35 P.S. § 4007.8), the Small Business Compliance Advisory Committee (SBCAC) is required to review and advise the Department on rulemakings which affect small business stationary sources. The Department provided informational presentations on this proposed rulemaking to SBCAC on January 22, 2020 and April 22, 2020. On July 22, 2020, the Department presented this proposed rulemaking to SBCAC for review and advice on the potential small business stationary source impact of this proposed rulemaking. During the presentation, the Department mentioned that it has estimated that ten small business stationary sources, as defined under section 3 of the APCA (35 P.S. § 4003), may need to comply with this proposed rulemaking. Of those ten sources, seven are estimated to be waste coal-fired power plants. The Department also mentioned that it has included in this proposed rulemaking a CO₂ allowance set-aside provision to assist all waste coal-fired power plants located in this Commonwealth with their compliance obligation. The SBCAC ultimately voted not to concur with the Department's recommendation to move this proposed rulemaking forward to the Board, with 4 opposed and 3 in support. The Department will continue to seek advice from SBCAC on the small business stationary source impact of this proposed rulemaking and address member questions and concerns throughout the rulemaking process.

Additionally, the Department provided an informational presentation to the Environmental Justice Advisory Board on May 21, 2020 and had further engagement with Environmental Justice stakeholder groups such as the Chester Environmental Partnership and EJ Stakeholders Group. The Department also provided informational presentations on this proposed rulemaking to the Climate Change Advisory Committee on February 25, 2020 and the Oil and Gas Technical Advisory Board on May 20, 2020.

The Department has also met with various stakeholders to receive additional input on this proposed rulemaking on numerous occasions throughout the development process. In particular, the Department met with environmental groups, residents, businesses, legislators, owners and operators of affected sources, industry groups and environmental justice stakeholders during the development of this proposed rulemaking.

The Board will also provide for a comment period for a minimum of 60 days and hold public hearings in impacted areas of this Commonwealth, as required under the APCA.

(15) Identify the types and number of persons, businesses, small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012) and organizations which will be affected by the regulation. How are they affected?

Under § 145.304 (relating to applicability) of this proposed rulemaking, the owner or operator of a fossil-fuel-fired EGU with a nameplate capacity equal to or greater than 25 MWe that sends more than 10% of its annual gross generation to the electric grid would have a compliance obligation. These regulated EGUs are referred to as "CO₂ budget units" and a facility that includes one or more CO₂ budget units is a "CO₂ budget source." Under § 145.306 (relating to standard requirements) of this proposed rulemaking, the owner or operator of each CO₂ budget source will be required to have a permit under Chapter 127 (relating to construction, modification, reactivation and operation of sources) which incorporates the requirements

of the CO₂ Budget Trading Program. The owner or operator will be required to operate the CO₂ budget source and each CO₂ budget unit at the source in compliance with the permit.

Based on the most recent data from the EPA's Clean Air Market Division, the U.S. Energy Information Administration (EIA) and the Department's emission inventory, the Department estimates that as of the end of 2019, 57 CO₂ budget sources (facilities) with 140 CO₂ budget units (EGUs) would have a compliance obligation under this proposed rulemaking. However, due to the dynamic nature of the electricity generation sector, the number of covered facilities will likely change by the implementation date, January 1, 2022, of this proposed rulemaking. The Department projects based on announced closures and future firm capacity builds that on January 1, 2022 there will be 62 CO₂ budget sources with 150 CO₂ budget units with a compliance obligation under this proposed rulemaking. The Department conducted an analysis of power sector emissions and the facilities that meet the applicability criteria in this proposed rulemaking and determined that around 99% of this Commonwealth's power sector CO₂ emissions would be covered under this proposed rulemaking.

The Department used the North American Industry Classification System (NAICS) codes for the subject industry sectors to develop lists of potentially affected entities. The NAICS identifies the industry as Electric Bulk Power Transmission and Control (NAICS code 221112 and 221121), Other Electric Power Generation (NAICS code 221118), Electric Power Distribution (NAICS code 221122), and Paper (except Newsprint) Mills facility (NAICS code 322121). The Department provided these NAICS codes to the Pennsylvania Small Business Development Center's Environmental Management Assistance Program (EMAP) with a request for a list of entities in each classification. EMAP provided the Department with a list of 57 facility owners or operators identified by NAICS code 221112, two facility owners or operators identified by NAICS code 221121, one facility owner or operator identified by NAICS code 221118, one facility owner or operator identified by NAICS code 221122, and one facility owner or operator identified by NAICS code 322121, for a total of 62 potentially affected entities. Under the U.S. Small Business Administration (SBA) Small Business Size Regulations under 13 CFR Chapter 1, Part 121, the small business-size standard in number of employees for each of these NAICS classifications is 750 employees. The Department determined that ten of these potentially affected entities may be small businesses by that definition. Of these ten entities, seven are waste coal facilities, for which a set-aside provision has been established to assist these facilities with most if not all of their compliance obligation under this proposed rulemaking.

Within the participating states and under this proposed rulemaking, the owner or operator of a CO₂ budget unit must obtain one CO₂ allowance for each ton of CO₂ emitted from the CO₂ budget unit each year. The owner or operator may use a CO₂ allowance issued by any participating state to demonstrate compliance with any state's regulation, including this proposed rulemaking. RGGI operates on three-year control periods for compliance, meaning full compliance is evaluated at the end of each three-year control period. As described under § 145.306(c), at the end of a control period, the owner or operator is required as a permit condition to hold enough CO₂ allowances in their compliance account to cover the CO₂ budget source's CO₂ emissions during the period. The owner or operator must also show interim control period compliance during each of the first two calendar years of a control period. During each interim control period, the owner or operator must hold CO₂ allowances equal to 50% of CO₂ emissions in the compliance account for the CO₂ budget source. As outlined under § 145.355 (relating to compliance), at the end of the control period or interim control period, CO₂ allowances will be deducted from each CO₂ budget source's compliance account to cover each of the CO₂ budget unit's CO₂ emissions at the source for the control period or interim control period.

All owners or operators of CO₂ budget sources are required to open a compliance account in COATS in order to transfer and hold CO₂ allowances for compliance purposes. The Department will use COATS to determine compliance with this proposed rulemaking by comparing the covered emissions of a CO₂ budget source with the CO₂ allowances held in its compliance account. COATS is a publicly accessible platform that records and tracks data for each state's CO₂ Budget Trading Program, including the transfer of CO₂ allowances that are offered for sale by the participating states and purchased in the quarterly auctions. On the COATS website, the public can view and download reports of RGGI program data and CO₂ allowance market activity. COATS is used to allocate, award and transfer CO₂ allowances, to certify and provide CO₂ allowances for compliance-related tasks, and to register and submit applications and reports for offset projects.

Under § 145.352 (establishment of accounts) of this proposed rulemaking, any person may apply to open a general account for the purpose of holding and transferring CO₂ allowances by submitting a complete application for a general account to the Department or its agent. A general account can be used for the receipt, transfer, and banking of CO₂ allowances in COATS, but unlike a compliance account, it does not provide for the CO₂ allowance compliance deduction process outlined in this proposed rulemaking. A compliance account is associated with an electric generation facility regulated under a state CO₂ Budget Trading Program, a CO₂ budget source. These accounts are used for compliance with the requirements of each state's CO₂ Budget Trading Program. Only one compliance account will be assigned to each CO₂ budget source. An applicant must have either a general or compliance account to participate in CO₂ allowance auctions. CO₂ allowances can be "banked" meaning they may be held for future compliance as they have no expiration date.

CO₂ allowances may be acquired through purchases in quarterly multistate auctions, through secondary markets, or by obtaining CO₂ offset allowances. Once a CO₂ allowance is purchased in an auction, it can then be resold in the secondary market. The secondary market assists with compliance by allowing CO₂ allowances to be traded in between quarterly auctions. As previously mentioned, every auction is overseen by an independent market monitor. Trading in the secondary market is also monitored by an independent market monitor in order to identify anticompetitive conduct. The quarterly multistate auction process continues each consecutive year of the CO₂ Budget Trading Program with fewer CO₂ allowances distributed into the auctions by the participating states each year.

RGGI Provides Regulatory Certainty

Although RGGI is a market-based approach, there are also price fluctuation protections that are built into the auction platform to help ensure that CO₂ allowance prices are predictable. Specifically, there are auction mechanisms that identify a precipitous increase or decrease in price, and trigger what are referred to as the CCR and ECR. The CCR process triggers additional CO₂ allowances to be offered for sale in the case of higher than projected emissions reduction costs. Similarly, states implementing the ECR, including this Commonwealth, will withhold CO₂ allowances from the auction to secure additional emissions reductions if prices fall below the established trigger price, so that the ECR will only trigger if emission reduction costs are lower than projected. This provides predictability in terms of both the cost of compliance for covered entities, and a relatively predictable stream of revenue for each participating state. CO₂ allowances may also be purchased through the secondary market when costs are low and held for future compliance years.

Offsets

As an additional compliance option under this proposed rulemaking, owners or operators of CO₂ budget

sources may complete an offset project to reduce or avoid atmospheric loading of CO₂ or CO₂ equivalent (CO₂e) emissions. CO₂e refers to the quantity of a given GHG, other than CO₂, multiplied by its global warming potential. By completing an offset project, the owner or operator will generate CO₂ offset allowances which can be used to offset a portion of the CO₂ budget source's emissions. A CO₂ offset allowance is equivalent to a CO₂ allowance, however a CO₂ offset allowance represents a project-based GHG emission reduction outside of the electric generation sector. This project must be in addition to not in place of an existing legal requirement. Under § 145.355(a)(3) of this proposed rulemaking, consistent with the RGGI Model Rule and the regulations in the participating states, the number of CO₂ offset allowances available to be deducted for compliance purposes may not exceed 3.3% of the CO₂ budget source's CO₂ emissions for a control period or interim control period.

As described under § 145.395 (relating to CO₂ emissions offset project standards), the three eligible offset categories include landfill methane capture and destruction projects, projects that sequester carbon due to reforestation, improved forest management or avoided conversion, and projects that avoid methane emissions from agricultural manure management operations. Each of the three offsets categories are designed to further reduce or sequester emissions of CO₂ or methane within the northeast region. In the RGGI Model Rule, the participating states cooperatively developed prescriptive regulatory requirements for each of the offset categories that have been incorporated into this proposed rulemaking. These requirements ensure that awarded CO₂ offset allowances represent CO₂e emission reductions or carbon sequestration that are real, additional, verifiable, enforceable and permanent.

Under § 145.393 (relating to general requirements) of this proposed rulemaking, offset projects must be located in this Commonwealth or partly in this Commonwealth and partly within one or more of the participating states, provided that the majority of the CO₂e emission reductions or carbon sequestration occur in this Commonwealth. Massachusetts, New Hampshire and Rhode Island have determined not to award CO₂ offset allowances, but CO₂ budget sources located within those states may use CO₂ offset allowances awarded by a participating state, including this Commonwealth. By recognizing CO₂e emission reductions and carbon sequestration outside the electric generation sector and this Commonwealth's CO₂ emissions budget offset projects provide compliance flexibility and create opportunities for low-cost emission reductions and other co-benefits across various sectors. Thus, including offset projects in this proposed rulemaking provides two crucial benefits, an additional compliance option for owners or operators and the potential for this Commonwealth to further reduce GHG emissions.

Compliance Assistance Plan

The Department will continue to educate and assist the public and the regulated community in understanding the proposed requirements and how to comply with them throughout the rulemaking process. The Department will continue to work with the Department's provider of Small Business Stationary Source Technical and Environmental Compliance Assistance. These services are currently provided by EMAP of the Pennsylvania Small Business Development Centers. The Department has partnered with EMAP to fulfill the Department's obligation to provide confidential technical and compliance assistance to small businesses as required by the APCA, Section 507 of the CAA (42 U.S.C.A. § 7661f) and authorized by the Pennsylvania Small Business and Household Pollution Prevention Program Act (35 P.S. §§ 6029.201—6029.209).

In addition to providing one-on-one consulting assistance and on-site assessments, EMAP also operates a toll-free phone line to field questions from this Commonwealth's small businesses, as well as businesses wishing to start up in, or relocate to, this Commonwealth. EMAP operates and maintains a resource-rich

environmental assistance website and distributes an electronic newsletter to educate and inform small businesses about a variety of environmental compliance issues.

(16) List the persons, groups or entities, including small businesses, that will be required to comply with the regulation. Approximate the number that will be required to comply.

The owner or operator of a fossil-fuel-fired EGU with a nameplate capacity equal to or greater than 25 MWe that sends more than 10% of its annual gross generation to the electric grid would have a compliance obligation under this proposed rulemaking.

Based on the most recent data from the EPA’s Clean Air Market Division, the EIA and the Department’s emission inventory, the Department estimates that as of the end of 2019, 57 CO₂ budget sources (facilities) with 140 CO₂ budget units (EGUs) would have a compliance obligation under this proposed rulemaking. However, due to the dynamic nature of the electricity generation sector, the number of covered facilities will likely change by the implementation date, January 1, 2022, of this proposed rulemaking. The Department projects based on announced closures and future firm capacity builds that on January 1, 2022 there will be 62 CO₂ budget sources with 150 CO₂ budget units with a compliance obligation under this proposed rulemaking.

About ten of these potentially affected facilities may meet the definition of small business as defined in Section 3 of the Regulatory Review Act (71 P.S. § 745.3). Of these ten potential facilities, seven of them are classified as waste coal facilities. This proposed rulemaking includes a waste-coal set aside provision to assist these facilities with compliance by providing up to 9.3 million CO₂ allowances each year.

The Department conducted an analysis of power sector emissions and the facilities that meet the applicability criteria in this proposed rulemaking and determined that around 99% of this Commonwealth’s power sector CO₂ emissions would be covered under this proposed rulemaking. The number and type of facilities that will be affected by this proposed rulemaking are listed below in Table 6.

Table 6. Affected Facilities and EGUs By Fuel Type.

Category	Facilities (2019)	EGUs (2019)	Facilities (2022)	EGUs (2022)
Coal	6	13	6	13
Waste Coal	9	13	9	13
Natural Gas Combined Cycle	21	55	25	62
Natural Gas Single Cycle	15	44	15	44
Oil/Gas Boiler	4	11	4	11
Combined Heat & Power	2	4	3	7
Total	57	140	62	150

(17) Identify the financial, economic and social impact of the regulation on individuals, small businesses, businesses and labor communities and other public and private organizations. Evaluate the benefits expected as a result of the regulation.

Owners or operators of fossil fuel-fired EGUs with a nameplate capacity equal to or greater than 25 MWe that send more than 10% of annual gross generation to the electric grid would have a compliance

obligation under this proposed rulemaking. While those with a compliance obligation are limited, the benefits of this proposed rulemaking will accrue to all residents of this Commonwealth.

Regional Environmental and Health Benefits

The CO₂ emission reductions resulting from this proposed rulemaking are substantial and are the catalyst needed to meet the climate goals for this Commonwealth, as outlined in Executive Order 2019-01, to reduce net GHG emissions Statewide by 26% by 2025 from 2005 levels and by 80% by 2050 from 2005 levels. A predicted reduction of 13.6 million metric tons of CO₂ by 2025 due to this Commonwealth's potential participation in RGGI provides significant assurance that along with prudent investments of auction proceeds and other GHG abatement activities, this Commonwealth will remain on track to reach the 2025 net GHG reduction goal.

While efforts to model impacts of this proposed rulemaking focused on this Commonwealth, the impacts on the participating states in the PJM region, which consists of all or parts of 13 states and the District of Columbia, were also considered. Historically, the RGGI program has experienced some emissions leakage. Emissions leakage is the shifting of emissions from states with carbon pricing to states without carbon pricing. The Department's modeling indicates that there may be some future emissions leakage in terms of additional fossil fuel emissions outside of this Commonwealth's borders. Despite the leakage, this Commonwealth's participation in RGGI would result in a net emissions reduction of 86.9 million tons of CO₂ across PJM for the period between 2020 and 2030. Additionally, the Department has been an active participant in PJM's CPSTF which is conducting additional modeling in an effort to better understand and control leakage across the entire PJM region.

The participating states together, including this Commonwealth, will achieve regional CO₂ emissions reductions of 30% by 2030. According to data from the World Bank, by 2022 based on GDP, the participating states would comprise the third largest economy in the world.⁵² These CO₂ emission reductions are even more significant when viewed from this collective impact. Reductions in CO₂ emissions will help decrease the adverse impacts of climate change on human health, the environment and the economy. Specifically, CO₂ emission reductions may decrease costs from extreme weather events and climate-related ailments that also result in increased health care costs.

While this proposed rulemaking requires CO₂ emission reductions, co-pollutants will also be reduced, because multiple pollutants are emitted from fossil fuel-fired EGUs. While the benefits of the cumulative CO₂ emission reductions will be tremendous, the Department also estimates that this proposed rulemaking will lead to a reduction of co-pollutants as well. This proposed rulemaking would provide public health benefits due to the expected reductions in emissions of CO₂ and the ancillary emission reductions or co-benefits of SO₂ and NO_x reductions. The Department's modeling projects cumulative emission reductions of 112,000 tons of NO_x and around 67,000 tons of SO₂ over the decade. The public health benefits to this Commonwealth of these avoided SO₂ and NO_x emissions range between \$2.79 billion to \$6.3 billion by 2030, averaging between \$232 million to \$525 million per year.

Investment of Auction Proceeds

The amount of proceeds generated from the multistate auctions is a function of the CO₂ allowance price and this Commonwealth's "effective budget," which is the amount of CO₂ allowances that the Department will have remaining in its budget after deducting allowances for the set aside allocations and the ECR.

⁵² The World Bank, Calculation based on GDP (current US\$), <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD>.

The Department estimates that this proposed rulemaking will generate around \$339 million in 2022 and around \$190 million in 2030 from the sale of CO₂ allowances in multistate auctions as seen in Table 7.

These auction proceeds are then available to the Department to be invested in programs and projects that would further eliminate air pollution in this Commonwealth. For the purposes of modeling the impacts of investing the proceeds, assumptions were made that the proceeds would be distributed so that 31% are invested in energy efficiency, 32% in renewable energy and 31% in GHG abatement with 6% remaining to cover any programmatic costs related to management of the CO₂ Budget Trading Program, 5% for the Department and 1% for RGGI, Inc.

Additionally, modeling indicates that these investments not only spur economic benefits but also result in the addition of 9.4 GW of renewable energy and load reduction of 29 TWh of electricity from energy efficiency projects. This addition of carbon free generation and reduction in electricity demand would further bolster the benefits of this proposed rulemaking. This increases the amount of electricity exported from this Commonwealth, further drives down emissions and compliance costs for facilities, and results in a reduction of electricity prices in 2029 below what they would have been without this proposed rulemaking. This is consistent with the prices in the participating states, which since the beginning of the RGGI program have not seen an increase in electricity costs.

By using program proceeds to invest in energy efficiency and renewable energy programs, this will help offset any potential increased costs to electricity prices by decreasing peak demand and offering low cost electricity to the grid. In fact, the Acadia Center conducted an analysis of electricity costs for all states that participated in RGGI compared to states in the rest of the country and found that electricity prices in RGGI states have fallen by 5.7% while prices have increased in the rest of the country by 8.6%.⁵³

Table 7. Pennsylvania Auction Proceeds through 2030.

Year	PA Effective Budget	CO ₂ Allowance Price (\$)	Total Auction Proceeds
2022	60,900,000	5.42	\$330,253,216
2023	58,659,567	5.59	\$327,858,077
2024	56,419,134	5.76	\$324,717,819
2025	54,178,701	5.92	\$320,832,440
2026	51,938,268	5.27	\$273,949,084
2027	49,697,835	4.63	\$229,965,884
2028	47,457,402	3.98	\$188,882,843
2029	45,216,969	3.98	\$180,081,660
2030	42,976,536	3.99	\$171,268,997

Financial and Economic Impact

The results of the modeling show that this proposed rulemaking will not only combat climate change and improve air quality, but also provide positive economic value to this Commonwealth. These results align with the numerous published studies highlighting the corresponding positive financial and economic impacts of RGGI participation.

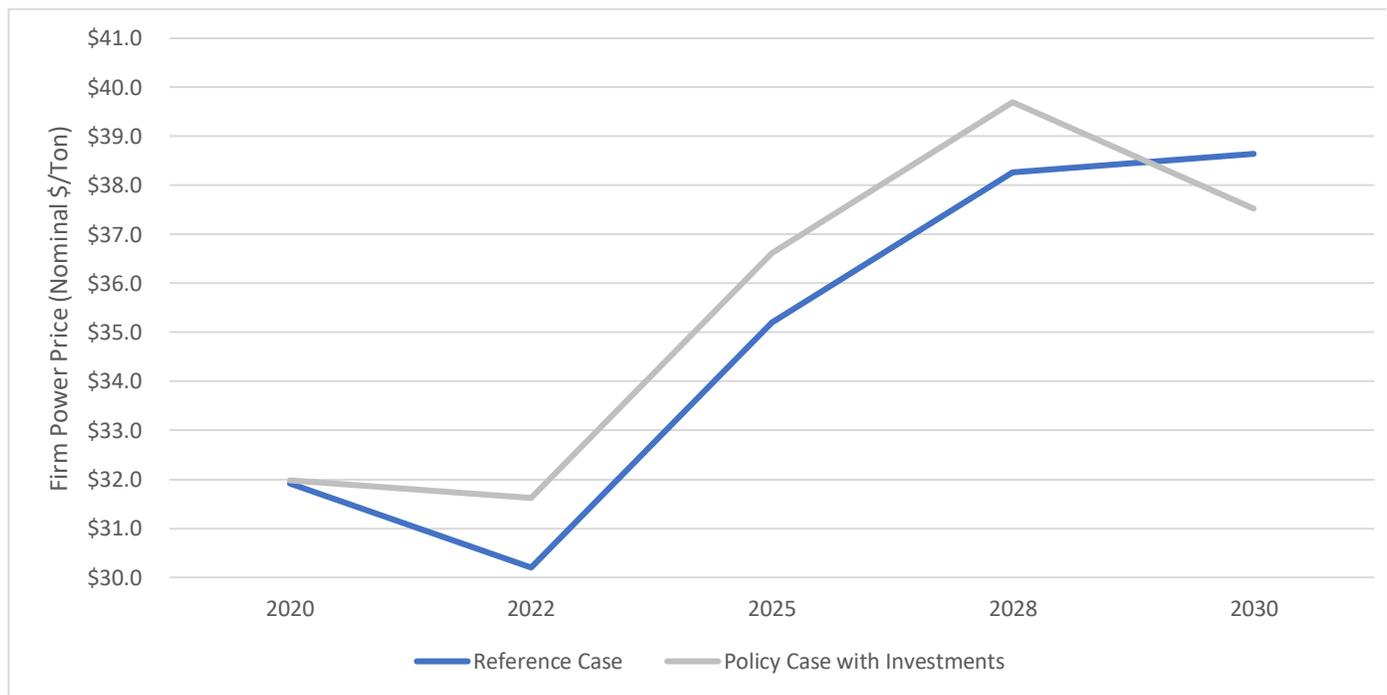
⁵³Acadia Center, “The Regional Greenhouse Gas Initiative 10 Years in Review,” 2019, https://acadiacenter.org/wp-content/uploads/2019/09/Acadia-Center_RGGI_10-Years-in-Review_2019-09-17.pdf.

The modeling estimates that from 2022 to 2030, this proposed rulemaking would lead to an increase in Gross State Product of \$1.9 billion and a net increase of 27,752 jobs in this Commonwealth. The results also show that overall citizens of this Commonwealth could see a cumulative increase in Disposable Personal Income of \$6.9 billion by 2050.

Electric Consumer Impact

According to the Department’s modeling, this Commonwealth’s projected firm power prices after implementation of this proposed rulemaking are expected to be lower than prices would be without this proposed rulemaking, as seen in Figure 2.

Figure 2. Comparison of Firm Power Prices Through 2030.



Historically, this Commonwealth has exported a third of its electricity generation, and that will continue into the future. In fact, if this Commonwealth participates in RGGI, electricity exports will increase even more than business-as-usual. Therefore, it can be expected that at least a third of the cost of compliance would be borne by out-of-state electric consumers. In 2022, this Commonwealth’s net electricity exports are estimated at 68,000 gigawatt hours (GWh), representing 31% of this Commonwealth’s 2022 electricity generation of 217,476 GWh.⁵⁴ As a result, without factoring in the strategic investment of auction proceeds, the remaining 69% of the costs or \$219 million would be borne by this Commonwealth. This percentage is also dependent on the CO₂ emissions intensity of the exported generation. However, this does not mean that electric consumers in this Commonwealth will therefore pay \$219 million. There are several other factors involved in determining the impact on consumer electric bills.

According to the EIA’s Annual Energy Outlook from January 2020, the major components of the United States average price of electricity in 2019 were 58% generation, 29% distribution and 13% transmission

⁵⁴ Pennsylvania Public Utility Commission, Electric Power Outlook for Pennsylvania 2017-2022, August 2018, www.puc.state.pa.us/General/publications_reports/pdf/EPO_2018.pdf.

costs.⁵⁵ This proposed rulemaking would only impact the generation portion of a consumer electric bill, which is a little more than half of the bill. The Department's modeling estimates that over the next decade wholesale energy prices will stay in between a range of an increase of 3% in 2022 and ultimately a decrease of 3% by 2030 as a result of this proposed rulemaking. That amounts to a roughly 1.5% increase or decrease in the average retail electricity rate, which is less than the swing in prices traditionally seen as a result of seasonal fluctuations in the energy market.

The average residential electric consumer in this Commonwealth spends from \$97.04 to \$136.60 per month depending on whether they heat their homes with electricity or another fuel source.⁵⁶ Although electricity rates vary in this Commonwealth by Electric Distribution Company service territories, these bill amounts represent the average electricity rates across this Commonwealth.

If this proposed rulemaking is implemented and this Commonwealth begins participating in RGGI in 2022, residential electric consumer bills will increase by an estimated 1.5% in the short-term. This amounts to an additional \$1.46 to \$2.05 per month depending on the home heating source. However, the Department's modeling shows that this minor increase is temporary. As a result of the revenue reinvestments from the auction proceeds, by 2030, energy prices will fall below business-as-usual prices resulting in future consumer electricity cost savings. This means electric consumers will see greater electric bill savings in the future than if this proposed rulemaking were not implemented.

This Commonwealth's electricity generation mix has changed significantly over time. In 2010, coal accounted for approximately 47% of this Commonwealth's generation and natural gas accounted for approximately 15%. By 2019, coal accounted for approximately 17% of this Commonwealth's generation and natural gas accounted for approximately 43%, mainly due to the relatively low price of natural gas as a fuel source.⁵⁷ The notable shifts in the generation mix from 2010 to 2019 highlight that the electricity generation sector is dynamic and can change over time without impacts to the overall economic health of the industry and this Commonwealth.

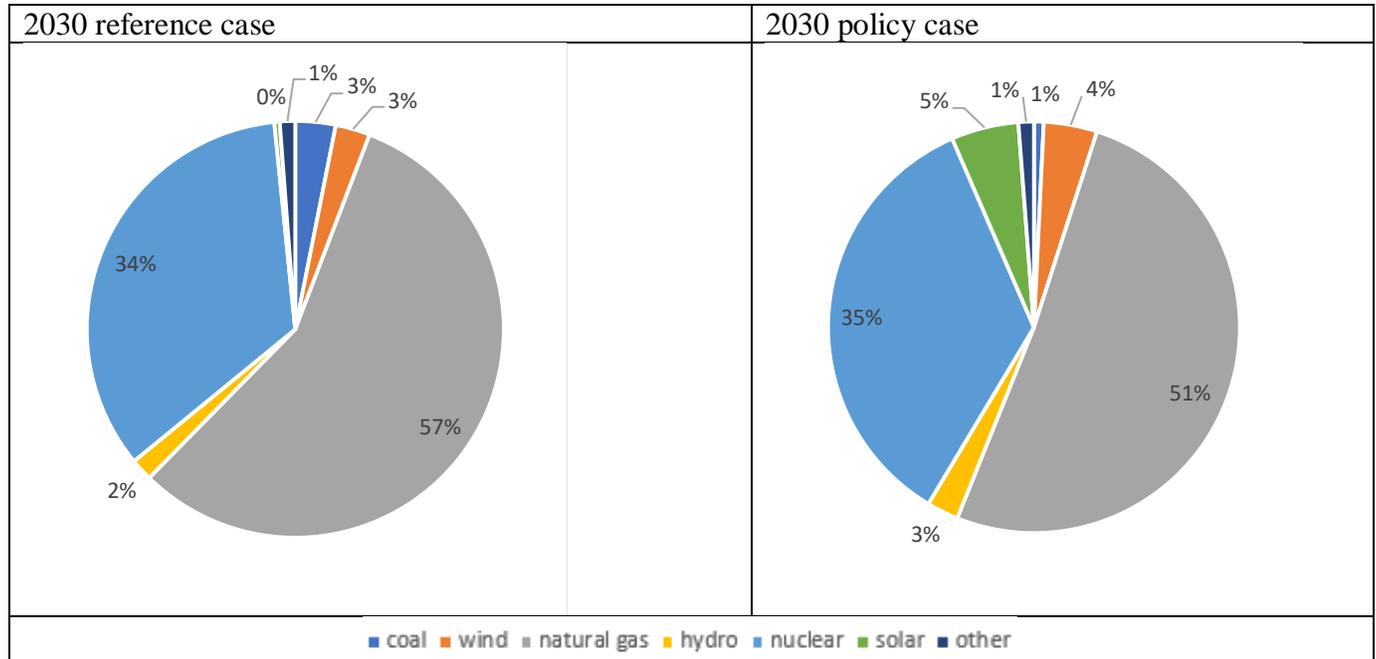
The modeling results show that even without accounting for the proceed investments, the electricity generation sector will not be harmed by this proposed rulemaking. The Department projects that the differences of this Commonwealth's electricity generation mix between the Policy Case and Reference Case by 2030 is minimal, as seen in Figure 3. Even without this proposed rulemaking, the amount of coal generation will experience a precipitous decline to 2030. Although the trajectories vary, by 2030 there will be marginal differences in the amount of coal generation in this Commonwealth with or without this proposed rulemaking. As this coal-fired generation retires, new generation from natural gas and renewables will more than make-up for the lost coal generation.

⁵⁵ EIA, Annual Energy Outlook 2020, January 29, 2020, www.eia.gov/todayinenergy/detail.php?id=42635.

⁵⁶ Pennsylvania Public Utility Commission, 2018 Collections Data for the Major Electric and Gas Companies- Chapter 14 Biennial Report, January 15, 2020, http://www.puc.pa.gov/General/publications_reports/pdf/Chapter14-Biennial_2018RCD.pdf.

⁵⁷ EIA, State Profile and Energy Estimates: Pennsylvania, 2019, <https://www.eia.gov/state/analysis.php?sid=PA>.

Figure 3. Comparison of Pennsylvania Energy Generation.



With changes to the power generation, so too are there impacts in terms of employment in these sectors. Within the energy sector, there have been employment shifts and trends occurring over time across this Commonwealth showing the most growth in clean energy employment and slower, or negative, growth in fossil fuel energy sectors.

Energy Sector Employment⁵⁸

The energy sector is a large employer of workers in this Commonwealth and one of the fastest growing employment sectors. From 2017 to 2019, this Commonwealth had a total of 269,031 traditional energy jobs, defined as jobs in electric power generation, transmission, distribution, and storage, as well as fuels, energy efficiency, and motor vehicles. These jobs accounted for 4.5% of the overall Statewide workforce. Energy and energy-related employment has continued to grow over the last two years. Since 2017, traditional energy jobs have grown by 7.6%, or 8,306 new workers. Between 2018 and 2019 alone, traditional energy employment grew by 5.2%, or 5,757 jobs. In fact, energy jobs are growing faster than the overall labor market. Total jobs in this Commonwealth have grown by only 0.8% between 2018 and 2019 compared to 5.2% in the energy sector as a whole.

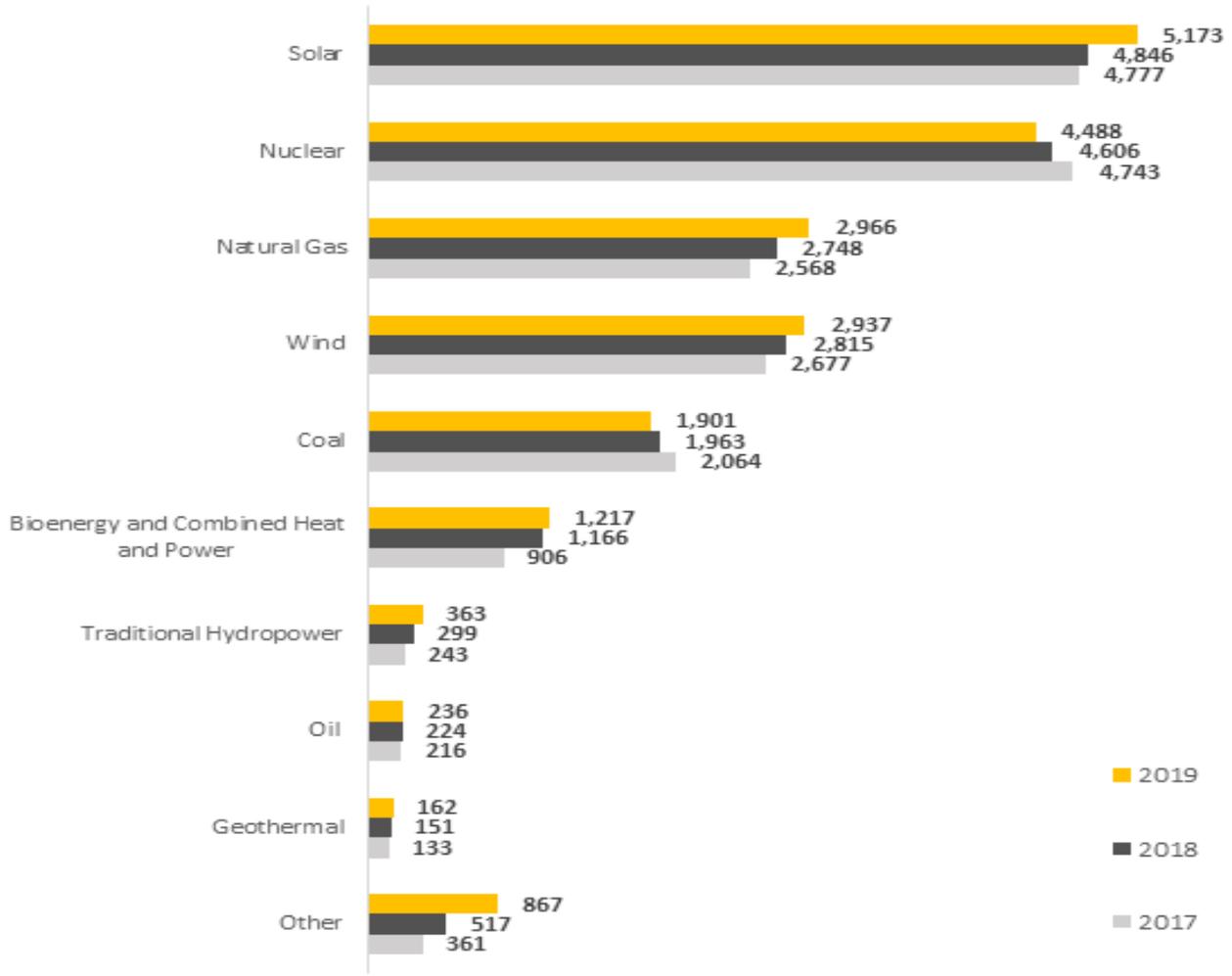
Looking more specifically at employment within the energy sector, natural gas electric power generation jobs have grown since 2017 as the state increases its natural gas electricity generation capacity. Since 2010, the state’s share of electricity generation from natural gas has more than doubled, while the share of coal has declined by more than half. In general, natural gas is becoming an increasingly larger share of the energy production mix in the United States. Between 2014 and 2018, natural gas production in America grew by 18.6%, and over the last two decades, natural gas production has grown by 61.2% across the country.

⁵⁸ BW Research Partnership. 2020 Pennsylvania Energy Employment Report and 2020 Pennsylvania Clean Energy Employment Report, [https://www.dep.pa.gov/Business/Energy/OfficeofPollutionPrevention/EnergyEfficiency Environment and EconomicsInitiative/Pages/Workforce-Development.aspx](https://www.dep.pa.gov/Business/Energy/OfficeofPollutionPrevention/EnergyEfficiency%20Environment%20and%20EconomicsInitiative/Pages/Workforce-Development.aspx)

Coal jobs have declined by 3.3% since 2017 due to the decrease in coal generation, a nationwide phenomenon as the country moves away from coal-fueled electric power generation to cleaner burning sources. In general, coal generation jobs across the United States have decreased by 14.1%, shedding 13,132 jobs. At the same time, coal production across America has declined by 24.3% since 2014. Coal production in this Commonwealth between December 2018 and December 2019 alone declined by 21%. In a comparison of technologies across the energy sector, employment in coal accounted for less than wind, natural gas, nuclear and solar- with 1,901 jobs remaining across this Commonwealth at the end of 2019.

This Commonwealth is also home to a significant nuclear generation workforce; this sector employs 4,488 workers, but has declined by 5.7% since 2017, shedding 256 jobs. Job losses in nuclear generation are likely attributable to the closing of Three Mile Island in September 2019. Since nuclear facilities are zero-carbon emitters, their position is bolstered through this proposed rulemaking because it factors in the price of emitting CO₂ into electricity prices, which may provide a competitive advantage. In fact, Energy Harbor, owner of the Beaver Valley Nuclear Plant, in early 2020 specifically cited this proposed rulemaking as a primary reason for withdrawing their deactivation notice and keeping the plant operating and securing the jobs of their employees.

Figure 4. Pennsylvania Electric Power Generation Employment by Sub-Technology, 2017-2019.



Clean energy, defined as energy efficiency, clean energy generation, alternative transportation, clean grid and storage, and clean fuels, employs over 97,000 workers, and represents 36% of employment in this Commonwealth’s energy sector. Clean energy jobs have grown by 7,800 jobs since 2017, an increase of 8.7%, slightly outpacing traditional energy jobs, which have grown 7.6%. By comparison, overall job growth in this Commonwealth was 0.8% between 2018 and 2019.

Table 8. Change in Pennsylvania Jobs by Fuel Type 2017 vs 2019.⁵⁹

	Clean Energy	Natural Gas	Petroleum	Coal
Number of Jobs in PA	97,186	23,738	23,690	10,350
Job growth since 2017	+8.7%	-7.4%	+14.9%	-3.3%

Energy efficiency represents the majority of all clean energy jobs in this Commonwealth; these businesses employ 71,443 workers and employment has grown by 9.4% since 2017. Following energy efficiency,

⁵⁹ *Id.*

clean energy generation firms comprise 15% of total clean energy jobs. Clean energy generation firms grew by 6.5%, creating 893 jobs since 2017 for a total of 14,594 workers.

The overall proportion of clean energy jobs compared to total Statewide employment in this Commonwealth is 1.6%, comparable to New York's clean energy economy, where 1.7% of total jobs are clean energy workers. However, clean energy employment concentration in this Commonwealth is lower compared to other states like Massachusetts (3.5%) or Rhode Island (3.4%), signifying the potential employment growth opportunities in this Commonwealth.

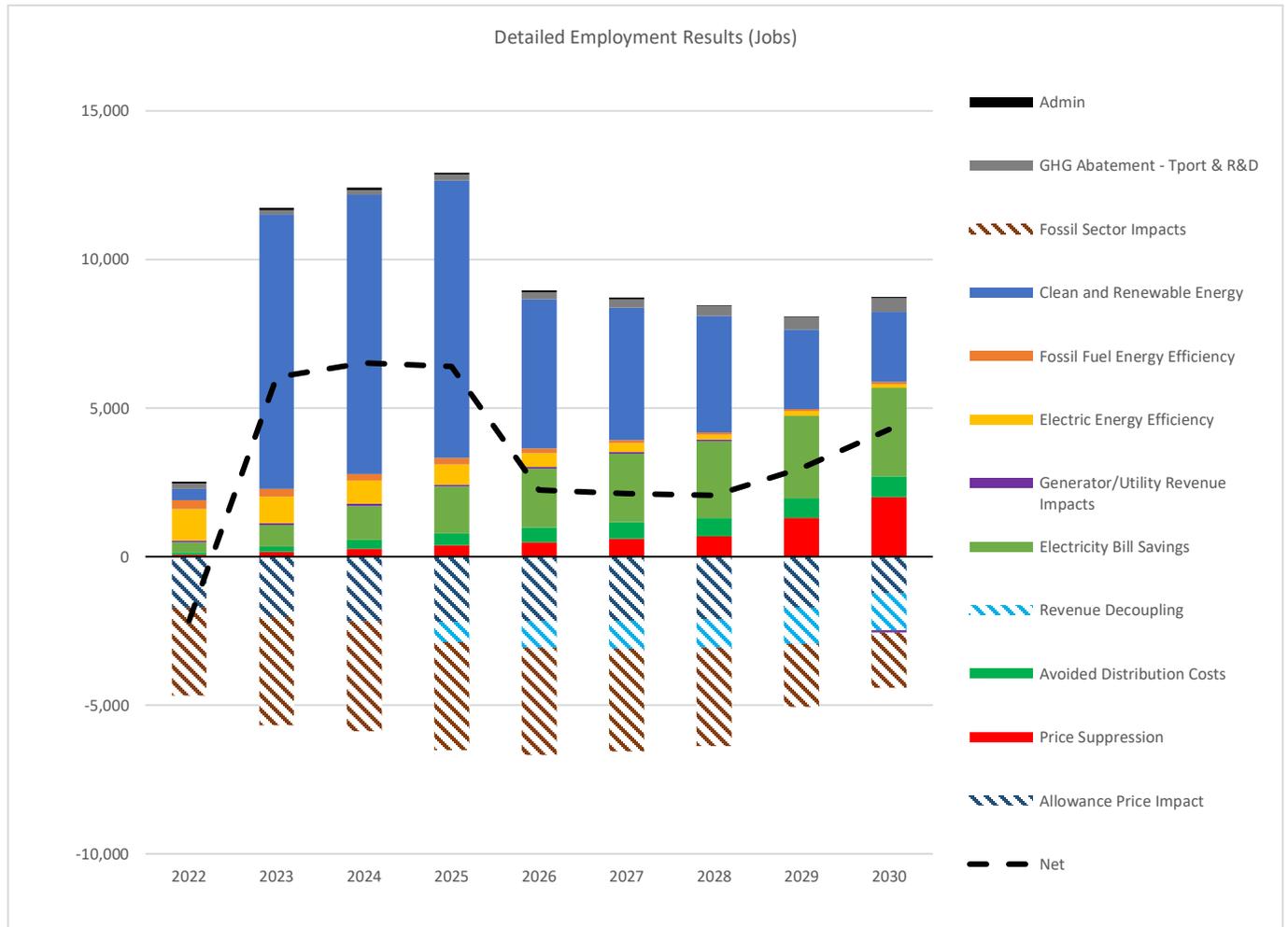
Solar workers account for the largest proportion of energy generation workers in this Commonwealth and the largest share of clean energy generation workers, 35.4% of the clean energy generation labor force or 5,173 jobs. Unlike the rest of the nation, solar jobs have been growing in this Commonwealth since 2017. Between 2017 and 2019, solar employment grew by 8.3% across the state from 4,777 workers to 5,173 workers at the end of 2019. By contrast, nationwide solar jobs declined by 1.2% over the same time period. The continued growth in solar jobs for this Commonwealth is likely the result of an increase in annual installations between 2018 and 2019. In 2018, this Commonwealth installed just under 60 MW of residential, non-residential, and utility-scale solar capacity. In 2019, annual installed capacity reached about 70 MW.

Wind energy firms continue to grow employment in this Commonwealth. The state's 2,937 wind energy generation workers account for 2.6% of all wind energy jobs across the United States. These businesses grew by 9.7% since 2017, creating 259 new clean energy jobs across this Commonwealth. Wind energy generation job growth comes alongside increasing wind capacity in this Commonwealth. Since 2013, wind energy has become the largest renewable source of electricity generation, accounting for 36% of this Commonwealth's renewable electricity capacity in 2018. With significant resources along the Appalachian Mountain crests and the shoreline of Lake Erie, this Commonwealth currently boasts 726 installed wind turbines with over 1,400 MW of generating capacity. Furthermore, the state is home to 29 manufacturing facilities that produce wind turbines, blades, towers, and other components related to wind energy technologies.

Bioenergy and CHP, traditional hydropower, low-impact hydropower, and geothermal generation technologies account for 13.7% of this Commonwealth's clean energy generation workforce and have collectively resulted in 494 new jobs since 2017, the majority of which can be attributed to the bioenergy and CHP industry. In fact, this Commonwealth is among one of the top 12 states in the nation for the amount of electricity generated from biomass resources.

The Department's modeling shows that reinvestment of auction proceeds into the energy sector will result in a net benefit to this Commonwealth. Employment contractions occurring in the coal industry, are more than countered by immense growth in clean and renewable energy, and energy efficiency sectors. The modeling estimates that from 2022 to 2030, this proposed rulemaking would lead to an increase in Gross State Product of \$1.9 billion and a net increase of 27,752 jobs in this Commonwealth as seen in Figure 5.

Figure 5. Pennsylvania Net Jobs by Sector Through 2030.



This proposed rulemaking provides an opportunity to assist residents of this Commonwealth impacted by changes in the energy sector, as Pennsylvania and the rest of the country transition to a new energy future. Without this proposed rulemaking, many jobs, specifically at coal-fired power plants will be lost without any opportunities for assistance to ensure there is an equitable transition for workers in all energy sectors.

(18) Explain how the benefits of the regulation outweigh any cost and adverse effects.

The two-prong approach of this proposed rulemaking, both a declining CO₂ emissions budget and investment of the proceeds resulting from the auction of CO₂ allowances to further reduce CO₂ emissions, will lead to positive net benefits for this Commonwealth. The combination of reduced CO₂, SO₂, and NO_x emissions, along with investments in energy efficiency, renewable energy and GHG abatement will ensure this Commonwealth gains environmental benefits while mitigating environmental impacts and growing the economy.

The results of the modeling show that overall, this proposed rulemaking will be an economic benefit to this Commonwealth. The modeling estimates that from 2022 to 2030, this proposed rulemaking would lead to an increase in Gross State Product of \$1.9 billion and a net increase of 27,752 jobs. The results also show that overall Pennsylvanians could see an increase in Disposable Personal Income of approximately \$6.9 billion by 2050.

(19) Provide a specific estimate of the costs and/or savings to the regulated community associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived.

This proposed rulemaking applies to owners or operators of fossil fuel-fired EGUs, with a nameplate capacity equal to or greater than 25 MWe. This proposed rulemaking is designed to effectuate least cost CO₂ emission reductions for the years 2022 through 2030. In addition to purchasing CO₂ allowances and completing offset projects to generate CO₂ offset allowances, CO₂ budget units may reduce their compliance obligations by reducing CO₂ emissions through other alternatives such as heat rate improvements, fuel switching and co-firing of biofuels.

To comply with this proposed rulemaking, each CO₂ budget unit will need to acquire CO₂ allowances equal to its CO₂ emissions. If CO₂ allowances are purchased through the regional auctions, the owner or operator of a CO₂ budget unit will pay the auction allowance price, currently around \$5 per ton, for each ton of CO₂ the unit emits. As mentioned previously, reserved CO₂ CCR allowances can be released into the auction if allowance prices exceed predefined price levels, meaning emission reduction costs are higher than projected. The total cost of purchasing allowances will therefore vary per unit based on how much CO₂ the unit emits and the allowance price. The owner or operator may also purchase CO₂ allowances on the secondary market where they could potentially purchase CO₂ allowances at a price lower than the RGGI allowance price. CO₂ allowances also have no expiration date and can be acquired and banked to defray future compliance costs.

Since the Department will allocate CO₂ allowances to waste coal-fired units each year up to 9,300,000 allowances sector-wide, waste coal-fired units will incur minimal compliance costs. Owners or operators of waste coal-fired units will only need to purchase CO₂ allowances if the set-aside amount is exceeded. However, waste coal-fired units still must comply with the other components of the regulation, including incorporating the CO₂ budget trading program requirements into their permits.

The requirements established by this proposed rulemaking will require the owner or operator to submit a complete application for a new, renewed or modified permit and pay the associated fee. The application must be submitted by the later of 6 months after the effective date of this rulemaking or 12 months before the date on which the CO₂ budget source, or a new unit at the source, commences operation.

The Department estimates that the costs related to monitoring, recordkeeping and reporting will be minimal as this proposed rulemaking utilizes current methods and, in most instances, will require no additional emissions reporting. For instance, the continuous emission monitoring required under this proposed rulemaking is already in existence at the regulated source and the necessary emissions data is currently reported to the EPA. There may be minimal programmatic costs related to the submittal of compliance certification reports and auction, account, and offset project related forms.

Compliance costs will vary by CO₂ budget unit as the amount of CO₂ emitted is the primary driver of compliance costs. Overall CO₂ emissions are impacted by operational decisions such as run time, and by emissions intensity which varies by fuel type, and abatement technology employed. Additionally, certain sources may be eligible for set-aside allowances at no cost.

In 2022, this Commonwealth's CO₂ emissions from CO₂ budget sources are estimated to be 57 million short tons. Given the 3-year compliance schedule, all 57 million CO₂ allowances will not need to be purchased in the first year. The total amount of allowance available will decline as the amount of CO₂ emissions in this Commonwealth decline.

As CO₂ budget sources would need one allowance for each ton of CO₂ emitted, the owners or operators would need to acquire 57 million CO₂ allowances at the estimated 2022 allowance price of \$5.58 (2017\$/Ton). If these CO₂ allowances were all purchased at quarterly multistate auctions in 2022, the total purchase cost would be \$318 million. The CO₂ budget sources would then most likely incorporate this compliance cost into their offer price for electricity. The price of electricity is then passed onto electric consumers. However, that does not mean that \$318 million will be passed onto this Commonwealth's electric consumers.

As detailed in Question 17, the average residential electric consumer in this Commonwealth spends from \$97.04 to \$136.60 per month depending on whether they heat their homes with electricity or another fuel source.⁶⁰ Residential bills will increase by an estimated 1.5% in the short-term. This amounts to an additional \$1.46 to \$2.05 per month. However, the Department's modeling shows that this minor increase is temporary. As a result of the revenue reinvestments from the auction proceeds, by 2030, energy prices will fall below business-as-usual prices resulting in future consumer electricity costs savings. This means electric consumers will see greater electric bill savings in the future than if this proposed rulemaking were not implemented.

(20) Provide a specific estimate of the costs and/or savings to the local governments associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived.

It is not anticipated that local governments will incur any costs as a result of this proposed rulemaking.

(21) Provide a specific estimate of the costs and/or savings to the state government associated with the implementation of the regulation, including any legal, accounting, or consulting procedures which may be required. Explain how the dollar estimates were derived.

State government costs would include permit engineer review time for permit applications as a result of any new or modified permits needed to comply with this proposed rulemaking. It is anticipated that any cost to the Commonwealth will be offset by the 5% of auction proceeds available to the Department for programmatic costs. State government does not have any CO₂ budget sources covered under this proposed rulemaking.

(22) For each of the groups and entities identified in items (19)-(21) above, submit a statement of legal, accounting or consulting procedures and additional reporting, recordkeeping or other paperwork, including copies of forms or reports, which will be required for implementation of the regulation and an explanation of measures which have been taken to minimize these requirements.

No new legal, accounting or consulting procedures are contained in this proposed rulemaking. The recordkeeping and reporting requirements for owners and operators of applicable sources under this proposed rulemaking are minimal because the records required are in line with the records already required to be kept for emission inventory purposes and for other federal and state requirements. To minimize the burden of these requirements, the Department allows electronic submission of most planning, reporting and recordkeeping forms required by this proposed rulemaking.

⁶⁰ Pennsylvania Public Utility Commission, 2018 Collections Data for the Major Electric and Gas Companies- Chapter 14 Biennial Report, January 15, 2020, http://www.puc.pa.gov/General/publications_reports/pdf/Chapter14-Biennial_2018RCD.pdf.

COATS is an electronic platform, developed, implemented and maintained by RGGI, Inc. on behalf of the participating states, that records and tracks CO₂ emission data for each state's CO₂ Budget Trading Program. The emissions data that owners or operators report to the EPA's Clean Air Markets Division system flows through to COATS. COATS is also the platform used for each state's compliance process, meaning it is used by the participating states, including this Commonwealth, to record allocations, deductions and transfers of CO₂ allowances. Additionally, COATS allows offset project sponsors to register offset projects and submit offset project Consistency Applications and Monitoring and Verification Reports to the participating states.

(22a) Are forms required for implementation of the regulation?

Yes

(22b) If forms are required for implementation of the regulation, **attach copies of the forms here**. If your agency uses electronic forms, provide links to each form or a detailed description of the information required to be reported. **Failure to attach forms, provide links, or provide a detailed description of the information to be reported will constitute a faulty delivery of the regulation.**

The draft forms are attached to this Regulatory Analysis Form, including the CO₂ Budget Unit Application Form, Cogeneration Set-aside Application Form, Compliance Certification Form and the Quarterly Report Form.

(23) In the table below, provide an estimate of the fiscal savings and costs associated with implementation and compliance for the regulated community, local government, and state government for the current year and five subsequent years.

	Current FY (20/21)	FY +1 (21/22)	FY +2 (22/23)	FY +3 (23/24)	FY +4 (24/25)	FY +5 (25/26)
SAVINGS:	\$	\$	\$	\$	\$	\$
Regulated Community	0.00	0.00	0.00	0.00	0.00	0.00
Local Government	0.00	0.00	0.00	0.00	0.00	0.00
State Government	0.00	0.00	0.00	0.00	0.00	0.00
Total Savings	0.00	0.00	0.00	0.00	0.00	0.00
COSTS:						
Regulated Community	0.00	129,222,902	258,445,803	263,212,399	267,978,995	267,978,995
Local Government	0.00	0.00	0.00	0.00	0.00	0.00
State Government	0.00	0.00	0.00	0.00	0.00	0.00
Total Costs	0.00	129,222,902	258,445,803	263,212,399	267,978,995	267,978,995
REVENUE LOSSES:						

Regulated Community	0.00	0.00	0.00	0.00	0.00	0.00
Local Government	0.00	0.00	0.00	0.00	0.00	0.00
State Government	0.00	0.00	0.00	0.00	0.00	0.00
Total Revenue Losses	0.00	0.00	0.00	0.00	0.00	0.00

(23a) Provide the past three-year expenditure history for programs affected by the regulation.

Program	FY -3 (16/17)	FY -2 (17/18)	FY -1 (18/19)	Current FY (19/20)
Environmental Program Management (161-10382)	\$26,885,000	\$29,413,000	\$30,932,000	\$28,420,000
Clean Air Fund Major Emission Facilities (215-20077)	\$16,931,000	\$17,480,000	\$16,067,000	\$17,878,000
Clean Air Fund Mobile and Area Facilities (233-20084)	\$8,228,000	\$8,727,000	\$7,205,000	\$9,369,000

(24) For any regulation that may have an adverse impact on small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012), provide an economic impact statement that includes the following:

- (a) An identification and estimate of the number of small businesses subject to the regulation.

As described in the response to Question 15, EMAP provided the Department with a list of entities in this Commonwealth identified as Electric Bulk Power Transmission and Control (NAICS code 221112 and 221121), Other Electric Power Generation (NAICS code 221118), Electric Power Distribution (NAICS code 221122), and Paper (except Newsprint) Mills facility (NAICS code 322121). The Department provided these NAICS codes to the Pennsylvania Small Business Development Center's EMAP with a request for a list of entities in each classification. EMAP provided the Department with a list of 57 facility owners and operators identified by NAICS code 221112, two facility owners or operators identified by NAICS code 221121, one facility owner or operator identified by NAICS code 221118, one facility owner or operator identified by NAICS code 221122, and one facility owner or operator identified by NAICS code 322121, for a total of 62 potentially affected entities. Under the U.S. SBA Small Business Size Regulations under 13 CFR Chapter 1, Part 121, the small business-size standard in number of employees for each of these NAICS classifications is 750 employees. The Department determined that ten of these potentially subject entities may be small businesses by that definition.

This proposed rulemaking may also apply to owners or operators of other facilities that have not yet been identified.

- (b) The projected reporting, recordkeeping and other administrative costs required for compliance with the proposed regulation, including the type of professional skills necessary for preparation of the report or record.

The recordkeeping and reporting requirements for owners or operators of affected facilities are minimal because most of the records required are in line with the records already required to be kept for emission inventory purposes and for other federal and state requirements. The owners and operators of affected facilities are familiar with the existing requirements for reporting and recordkeeping for their industry and have the professional and technical skills needed for compliance with these proposed requirements. No special skills are required, and the Department only anticipates minimal programmatic costs.

The Department plans to educate and assist the public and the regulated community in understanding the proposed requirements and how to comply with them.

- (c) A statement of probable effect on impacted small businesses.

The Department expects that the impact on small businesses will be minimal. Of the ten potential small businesses identified, the majority are waste coal fired facilities. This proposed rulemaking would establish a waste-coal set aside account to assist these facilities with compliance by providing up to 9.3 million CO₂ allowances each year.

Small businesses would not be unduly burdened by this proposed rulemaking. Overall, small businesses would likely be impacted positively as a result of this proposed rulemaking, due to the benefits provided by the RGGI proceed investments. The potential funding programs could allow for more access to energy efficiency and renewable energy projects and investments in clean transportation options. For instance, if the Commonwealth decides to fund an orphan and abandoned well plugging program with RGGI proceeds, the conventional oil and gas industry would benefit from the additional work being offered. Additionally, many renewable energy firms are considered small businesses, which could benefit from a rooftop solar program.

The Department plans to educate and assist the public and the regulated community in understanding the proposed requirements and how to comply with them. The Department will continue to work with the Department's provider of Small Business Stationary Source Technical and Environmental Compliance Assistance. These services are currently provided by EMAP of the Pennsylvania Small Business Development Centers. The Department has partnered with EMAP to fulfill the Department's obligation to provide confidential technical and compliance assistance to small businesses as required by the APCA, Section 507 of the CAA (42 U.S.C.A. § 7661f) and authorized by the Pennsylvania Small Business and Household Pollution Prevention Program Act (35 P.S. §§ 6029.201—6029.209). In addition to providing one-on-one consulting assistance and on-site assessments, EMAP also operates a toll-free phone line to field questions from this Commonwealth's small businesses, as well as businesses wishing to start up in, or relocate to, Pennsylvania. EMAP operates and maintains a resource-rich environmental assistance website and distributes an electronic newsletter to educate and inform small businesses about a variety of environmental compliance issues.

- (d) A description of any less intrusive or less costly alternative methods of achieving the purpose of the proposed regulation.

There are no less intrusive or less costly alternative regulatory provisions available.

(25) List any special provisions which have been developed to meet the particular needs of affected groups or persons including, but not limited to, minorities, the elderly, small businesses, and farmers.

Provisions for Covered Facilities

The Board developed a special provision to meet the particular needs of waste coal-fired electric generators in this Commonwealth, many of which may meet the definition of small business (as defined in Section 3 of the Regulatory Review Act (71 P.S. §745.3)). As discussed in the response to question 12, the Department will set aside 9,300,000 CO₂ allowances at the beginning of each year for waste coal-fired units located in this Commonwealth. The Board is establishing this waste coal set-aside in this proposed rulemaking because in addition to electricity generation, waste coal-fired units provide an environmental benefit of reducing air and water pollution caused by the remaining waste coal piles in this Commonwealth. This compliance assistance is important to continuing the remediation of these waste coal piles, as these facilities are facing increased competition in part from low natural gas prices. Several facilities have closed, and others have announced anticipated closure dates.

The Board also developed a special provision to meet the particular needs of cogeneration facilities interconnected with manufacturing facilities. The general applicability of the rulemaking is for those facilities that have a nameplate capacity of 25MWe or greater and send more than 10% of the electricity to the grid. For cogeneration facilities interconnected to manufacturing facilities, the requirement for the portion of electricity required to trigger a compliance obligation increases to 15% of useful thermal energy. This provides manufacturing facilities, with on-site generation to support on-site production, an opportunity for an exemption from the regulation.

For those cogeneration facilities that do trigger a compliance requirement under this proposed rulemaking, the Board is establishing a co-generation set-aside to assist with compliance obligations. Qualifying facilities would be able to apply for CO₂ allowances from this set-aside to offset their compliance obligation associated with emissions related to the generation used on-site. If approved, these facilities would only be responsible for the compliance obligation for CO₂ emissions associated with electricity generation sold to the grid.

Consideration of Vulnerable Communities

The Department will ensure that measures taken through this proposed rulemaking do not disproportionately impact the most vulnerable residents in this Commonwealth. The Department is focused on developing a strategy for the reinvestment of proceeds resulting from the auction of this Commonwealth's CO₂ allowances that ensures an equitable distribution of beneficial projects across this Commonwealth, with a focus on benefits for low-income consumers, environmental justice communities and communities impacted by this Commonwealth's transition to a new energy future. Opportunities for these expenditures to assist transitioning communities include targeted weatherization and energy efficiency services to reduce energy use and costs for households and businesses, training opportunities related to energy efficiency and renewable energy careers, and the retention of jobs through repowering of coal-fired facilities to natural gas, among others.

Since around 20% of fossil fuel-fired EGUs in this Commonwealth are in Environmental Justice areas, residents in these communities will directly benefit from the localized emission reductions from plants located in their communities. These include reductions in CO₂, SO₂ and NO_x emissions and reduced formation of ground level ozone. Additional consideration for reinvestment opportunities will be given to

Bucks, Chester, Delaware, Montgomery and Philadelphia counties as they are designated as marginal nonattainment areas for the 2015 ozone NAAQS, a standard that will become more difficult to attain with future climate change impacts.

As previously mentioned, vulnerable populations across this Commonwealth, including children, the elderly, those with pre-existing health conditions especially respiratory and communities of color are those most affected by diminished air quality. These groups are also those who have the most to gain from avoiding the worst impacts of climate change while improving the air and water quality in this Commonwealth.

Consideration of Farming & Agricultural Operations

Similar to various public health pressures, the agricultural, food, and water systems the citizens of this Commonwealth depend on for survival are also under threat by climate change. The increase in precipitation and its variability could lead to higher plant disease, increased risk of flooding, difficulty in the timing of planting, and increased demand for irrigation. This Commonwealth's dairy production will also experience challenges from reduced milk yields, a result of heat stress on cows. High levels of ground-level ozone also affect animals including pets, livestock, and wildlife, in ways similar to humans. Reduced ambient concentrations of ground-level ozone as a result of this proposed rulemaking would improve the quality of life of animals, preserve this Commonwealth's biodiversity, and reduce veterinary costs.

(26) Include a description of any alternative regulatory provisions which have been considered and rejected and a statement that the least burdensome acceptable alternative has been selected.

The Department has not considered alternative regulatory provisions for this proposed rulemaking, as Executive Order 2019-07 directed the Department to develop a regulation to reduce CO₂ emissions from fossil fuel-fired EGUs through a cap and trade program. Alternatively, the Department could have proposed a traditional command and control regulation to reduce CO₂ emissions from fossil fuel-fired EGUs. However, that would not be the most advantageous or economically beneficial method to control CO₂ emissions in this Commonwealth.

As noted by the EPA in its Guide to Designing and Operating a Cap and Trade Program for Pollution Control, cap and trade programs provide several benefits and advantages over more traditional approaches to environmental regulation. By establishing an emissions budget, cap and trade programs can provide a greater level of environmental certainty than other environmental policy options. The regulated sources, across the region, must procure allowances to cover emissions or risk being penalized for lack of compliance. Traditional command and control regulations, on the other hand, tend to rely on variable emission rates and often only regulate existing or new sources. However, under cap and trade programs, new and existing sources must comply with the emissions budget. A cap and trade program may also encourage sources to achieve emission reductions in anticipation of future compliance, resulting in the earlier achievement of environmental and human health benefits. In fact, the Department's modeling shows that this is occurring as this Commonwealth prepares to participate in RGGI in 2022.

The EPA also noted that banking of allowances, which this proposed rulemaking allows, provides an additional incentive to reduce emissions earlier than required. Banking provides flexibility by allowing sources to save unused allowances for use in a later compliance period when the emissions budget is lower and the costs to reduce emissions may be higher. With command-and control, the regulating authority specifies sector-wide technology and performance standards that each of the affected sources must meet,

whereas cap and trade provides sources with the flexibility to choose the technologies that minimize their costs while achieving the emissions target. Cap and trade programs also provide more accountability than a command and control program. Under this proposed rulemaking and other cap and trade programs, sources must account for every ton of emissions they emit by acquiring allowances. Command and control programs tend to rely on periodic inspections and assumptions that control technology is functioning properly to show compliance.⁶¹

This proposed rulemaking employs an efficient and market-based solution to achieve a reduction in CO₂ emissions from the electricity generation sector in this Commonwealth. This is further bolstered by the 2019 update to the Pennsylvania Climate Action Plan which determined that one of the most cost-effective emissions reduction strategies is to limit CO₂ emissions through an electricity sector cap and trade program. Although RGGI is a market-based approach, there are also price fluctuation protections that are built into the auction platform to help ensure that CO₂ allowance prices and compliance costs are feasible. Specifically, there are auction mechanisms that identify a precipitous increase or decrease in price, and trigger what are referred to as the CCR and ECR. The CCR process triggers additional CO₂ allowances to be offered for sale in the case of higher than projected CO₂ allowance costs. Similarly, states implementing the ECR, including this Commonwealth, would withhold CO₂ allowances from the auction to secure additional emissions reductions if prices fall below the established trigger price. This provides predictability in terms of both the cost of compliance for covered entities, and a relatively predictable stream of revenue for each participating state. CO₂ allowances may also be purchased through the secondary market and may be held for future compliance years as they have no expiration.

(27) In conducting a regulatory flexibility analysis, explain whether regulatory methods were considered that will minimize any adverse impact on small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012), including:

- a) The establishment of less stringent compliance or reporting requirements for small businesses.

Less stringent compliance and reporting requirements are not established under this proposed rulemaking. However, this proposed rulemaking includes a waste-coal set aside provision to assist waste coal-fired facilities with compliance by providing up to 9.3 million CO₂ allowances. The Department has estimated that 7 waste coal-fired facilities are small businesses. The Department has also established a small business assistance program that is available to provide confidential assistance to small businesses.

- b) The establishment of less stringent schedules or deadlines for compliance or reporting requirements for small businesses.

Establishment of a less stringent compliance schedule or deadline for small businesses is not possible. The compliance schedules and deadlines in this proposed rulemaking align with the regulations in the participating states and follow a 3-year control period for compliance. The Department has established a small business assistance program that is available to provide confidential assistance to the small businesses.

- c) The consolidation or simplification of compliance or reporting requirements for small businesses.

⁶¹ EPA, Tools of the Trade: A Guide to Designing and Operating a Cap and Trade Program for Pollution Control, EPA430-B-03-002, June 2003, www.epa.gov/sites/production/files/2016-03/documents/tools.pdf.

Compliance and reporting requirements are the same for all affected facilities. The Department has established a small business assistance program that is available to provide confidential assistance to the small businesses.

- d) The establishment of performance standards for small businesses to replace design or operational standards required in the regulation.

This proposed rulemaking does not include performance standards for any affected facilities.

- e) The exemption of small businesses from all or any part of the requirements contained in the regulation.

This proposed rulemaking does not exempt owners or operators of small businesses.

(28) If data is the basis for this regulation, please provide a description of the data, explain in detail how the data was obtained, and how it meets the acceptability standard for empirical, replicable and testable data that is supported by documentation, statistics, reports, studies or research. Please submit data or supporting materials with the regulatory package. If the material exceeds 50 pages, please provide it in a searchable electronic format or provide a list of citations and internet links that, where possible, can be accessed in a searchable format in lieu of the actual material. If other data was considered but not used, please explain why that data was determined not to be acceptable.

The data supporting the Department’s IPM and REMI analysis can be found on the Department’s website at <https://www.dep.pa.gov/Citizens/climate/Pages/RGGI.aspx>. A presentation entitled “Modeling Results Presentation” located on that webpage provides supplemental information about the modeling. Additionally, relevant data files are located on that webpage, labeled as “Reference Case Results” and “Policy Case Results.”

The data supporting this Commonwealth’s GHG emissions can be found on the Department’s website at <https://www.dep.pa.gov/Citizens/climate/Pages/GHG-Inventory.aspx>.

Data supporting comparisons amongst states in CO₂ emissions can be found at <https://www.eia.gov/>. Data supporting GHG equivalencies can be found using <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>.

(29) Include a schedule for review of the regulation including:

- | | |
|---|------------------------|
| A. The length of the public comment period: | <u>60+ days</u> |
| B. The date or dates on which any public meetings or hearings will be held: | <u>Quarter 4, 2020</u> |
| C. The expected date of delivery of the final-form regulation: | <u>Quarter 3, 2021</u> |
| D. The expected effective date of the final-form regulation: | <u>Quarter 4, 2021</u> |
| E. The expected date by which compliance with the final-form | |

regulation will be required:

January 1, 2022

F. The expected date by which required permits, licenses or other approvals must be obtained:

1 year after the effective date

(30) Describe the plan developed for evaluating the continuing effectiveness of the regulations after its implementation.

The Board is not establishing a sunset date for this proposed rulemaking, since it is needed for the Department to carry out its statutory authority. The Department will closely monitor this proposed rulemaking after promulgation as a final-form rulemaking in the *Pennsylvania Bulletin* for its effectiveness and recommend updates to the Board as necessary.

Through RGGI, Inc., the Department will utilize the expertise of an independent market monitor to monitor the multistate auction, CO₂ allowance holdings and CO₂ allowance transactions, among other activities in order to ensure this proposed rulemaking is maintaining its effectiveness. The market monitor provides independent expert monitoring of the competitive performance and efficiency of the RGGI allowance market. This includes identifying attempts to exercise market power, collude, or otherwise manipulate prices in the auction and the secondary market, making recommendations regarding proposed market rule changes to improve the efficiency of the market for CO₂ allowances, and assessing whether the auctions are administered in accordance with the noticed auction rules and procedures. The market monitor will monitor bidder behavior in each auction and report to the participating states any activities that may have a material impact on the efficiency and performance of the auction. The participating states, through RGGI, Inc., release a Market Monitor Report shortly after each multistate auction. The report includes aggregate information about the auction including the dispersion of projected demand, the dispersion of bids, and a summary of bid prices, showing the minimum, maximum, average and clearing price and the CO₂ allowances awarded.

Further, the participating states conduct comprehensive, periodic “program reviews” to consider program successes, impacts and design elements. In particular, during program review, participating states may revise the RGGI Model Rule, adjust the multistate auction process and develop new goals for the CO₂ Budget Trading Program. The program review also includes an extensive regional stakeholder process that engages the regulated community, environmental groups, consumer and industry advocates and other interested stakeholders.

The participating states have completed 3 program reviews since program implementation in 2009, and the next program review is currently scheduled for 2021. The program review in 2021 will evaluate energy trends, performance of the amendments, and other program design elements. Upon implementation of this proposed rulemaking, this Commonwealth would participate in the periodic program reviews to ensure this proposed rulemaking is implemented effectively.