

<h1>Regulatory Analysis Form</h1> <p>(Completed by Promulgating Agency)</p> <p>(All Comments submitted on this regulation will appear on IRRC's website)</p>		<p><b>INDEPENDENT REGULATORY REVIEW COMMISSION</b></p>	
<p><b>(1) Agency</b> Environmental Protection</p>			
<p><b>(2) Agency Number:</b> 7 Identification Number: 546</p>		<p><b>IRRC Number:</b> 3238</p>	
<p><b>(3) PA Code Cite:</b> 25 Pa. Code § 123.22</p>			
<p><b>(4) Short Title:</b> Revision of the Maximum Allowable Sulfur Content Limit for No. 2 and Lighter Commercial Fuel Oil</p>			
<p><b>(5) Agency Contacts (List Telephone Number and Email Address):</b>          Primary Contact: Laura Edinger, 783-8727, ledinger@pa.gov          Secondary Contact: Jessica Shirley, 783-8727, jessshirley@pa.gov</p>			
<p><b>(6) Type of Rulemaking (check applicable box):</b></p> <p><input type="checkbox"/> Proposed Regulation  <input checked="" type="checkbox"/> Final Regulation  <input type="checkbox"/> Final Omitted Regulation</p>		<p><input type="checkbox"/> Emergency Certification Regulation  <input type="checkbox"/> Certification by the Governor  <input type="checkbox"/> Certification by the Attorney General</p>	
<p><b>(7) Briefly explain the regulation in clear and nontechnical language. (100 words or less)</b></p> <p>This final-form rulemaking amends § 123.22 (relating to combustion units) to reduce the maximum allowable sulfur content limit for No. 2 and lighter commercial fuel oil from 500 parts per million (ppm) of sulfur to 15 ppm to address regional haze and visibility impairment. The compliance date is September 1, 2020. This final-form rulemaking will be submitted to the United States Environmental Protection Agency (EPA) for approval as a revision to the Commonwealth's State Implementation Plan (SIP) following promulgation of the final-form regulation in the <i>Pennsylvania Bulletin</i>.</p>			
<p><b>(8) State the statutory authority for the regulation. Include <u>specific</u> statutory citation.</b></p> <p>This final-form rulemaking is authorized under section 5(a)(1) of the Air Pollution Control Act (APCA) (35 P.S. § 4005(a)(1)), which grants the Environmental Quality Board (Board) the authority to adopt rules and regulations for the prevention, control, reduction and abatement of air pollution in this Commonwealth. Section 5(a)(8) of the APCA (35 P.S. § 4005(a)(8)) also grants the Board the authority to adopt rules and regulations designed to implement the provisions of the Clean Air Act (CAA) (42 U.S.C.A. § 7401—7671q).</p>			
<p><b>(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.</b></p> <p>There are no Federal or State laws, court orders or Federal regulations for the maximum allowable sulfur content of No. 2 and lighter commercial fuel oil, generally sold for and used in residential and commercial furnaces and oil heat burners for home or space heating, water heating, or both. However, this rulemaking</p>			

is being finalized under provisions of the CAA and its implementing regulations specified below that require states to protect against regional haze and visibility impairment.

*Obligations under the CAA:* The CAA and its implementing regulations in 40 CFR Part 51, Subpart P (relating to protection of visibility) mandate actions to protect visibility, especially in Federal Class I areas. Section 169A(a)(1) of the CAA (42 U.S.C.A. § 7491(a)(1)), regarding visibility protection for Federal Class I areas (which include National parks, forests, and wilderness areas) sets a National goal for the “prevention of any future, and the remedying of any existing, impairment of visibility in mandatory class I Federal areas which impairment results from manmade air pollution.” The Federal visibility regulations require restoration of natural levels of visibility in the mandatory Federal Class I areas by 2064. See 40 CFR 51.308(d)(1). The Federal regulations require that states revise their SIPs approved by the EPA to implement the emission reduction measures for regional haze identified by Class I states as being necessary to make reasonable progress in any Class I area. See 40 CFR 51.308(d)(3). This final-form rulemaking fulfills that obligation.

*Mid-Atlantic/Northeast Visibility Union:* Section 169B(c)(1) of the CAA (42 U.S.C.A. § 7492(c)(1)), regarding visibility, authorizes the Administrator of the EPA to establish a transport region for visibility impairment when there is reason to believe that pollutants from one or more states contribute to visibility impairment in Federal Class I areas. In 1999, the EPA and the affected states and tribes agreed to create five Regional Planning Organizations (RPO) to facilitate interstate coordination with regional haze SIPs. The Commonwealth is a member of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) RPO established in 2001 to assist the Mid-Atlantic and Northeast states in planning and developing their regional haze SIP revisions. The other MANE-VU states are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. The District of Columbia, Native American tribes in the region, the EPA, the U.S. Fish and Wildlife Service, and the U.S. Forest Service are also members of MANE-VU. There are 156 mandatory Federal Class I areas established under the CAA, including seven in the MANE-VU states. Although this Commonwealth does not have any mandatory Federal Class I areas, emissions from within the Commonwealth are considered to impact several Federal Class I areas in MANE-VU states as well as the Dolly Sods Wilderness Area in West Virginia and Shenandoah National Park in Virginia.

*Course of Action:* This final-form rulemaking is consistent with the course of action set forth in the *Statement of the Mid-Atlantic and Northeast Visibility Union (MANE-VU)* adopted on June 20, 2007 (2007 MANE-VU “Ask”), and in MANE-VU’s August 25, 2017, *Statement of the MANE-VU States Concerning a Course of Action Within MANE-VU Toward Assuring Reasonable Progress For the Second Regional Haze Implementation Period (2018-2028)* (2017 MANE-VU “Ask”). To address the impact of regional haze on mandatory Federal Class I areas within the MANE-VU region, the 2007 MANE-VU “Ask” established that the member states would pursue a coordinated course of action, including pursuing the adoption and implementation of the following strategy to reduce the sulfur content of distillate oil (a general classification for one of the petroleum fractions produced in conventional distillation operations) in the “inner zone” MANE-VU states (New Jersey, New York, Delaware, and Pennsylvania, or portions thereof), as follows: to 500 ppm (0.05% sulfur by weight) by 2012 and to 15 ppm (0.0015% by weight) by 2016. The 2017 MANE-VU “Ask” specifies that member states are to expeditiously pursue adoption of the low-sulfur content maximum allowable limit of 15 ppm for No. 2 and lighter commercial fuel oil if they have not done so. The final-form rulemaking is designed to meet this aspect of the 2017 MANE-VU “Ask.”

***Implementation Plans and Reasonable Progress Goals:*** In December 2010, the Department submitted the Commonwealth's first regional haze implementation plan to the EPA as a revision to the Commonwealth's SIP. To track visibility improvement, the Commonwealth must submit its second regional haze SIP revision to the EPA by July 31, 2021. The third regional haze SIP revision is due July 31, 2028, and then additional SIP revisions every 10 years thereafter.

The control measure in this final-form rulemaking is an important part of the Commonwealth's efforts to meet the 2028 reasonable progress goals for reducing regional haze established by the Commonwealth in consultation with the member states of MANE-VU. In addition, the decreased emissions of sulfur dioxide (SO<sub>2</sub>) will contribute to the attainment and maintenance, or both, of the SO<sub>2</sub>, fine particulate matter (PM<sub>2.5</sub>), and ground-level ozone National Ambient Air Quality Standards (NAAQS) in this Commonwealth and the MANE-VU region. Upon publication as a final-form rulemaking in the *Pennsylvania Bulletin*, the Department will submit this rulemaking to the EPA for approval as a SIP revision.

***Attainment and Maintenance of the National Ambient Air Quality Standards:*** In addition to improving public health and the environment, decreased emissions of SO<sub>2</sub> will also contribute to the attainment or maintenance, or both, of the 2012 annual PM<sub>2.5</sub> NAAQS within this Commonwealth. On April 7, 2015, the EPA designated the Allegheny, Delaware, and Lebanon County areas as nonattainment with the 2012 annual PM<sub>2.5</sub> NAAQS. See 80 FR 18535, 18549. The EPA subsequently determined that the Delaware and Lebanon County areas attained that NAAQS. See 81 FR 89868 (December 13, 2016) and 83 FR 9435 (March 6, 2018), respectively. The maintenance plans for these areas have identified lowering the commercial fuel oil standard to 15 ppm as a contingency measure to ensure that these areas will continue to be classified as attainment for the 2012 annual PM<sub>2.5</sub> NAAQS.

**(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.**

This final-form rulemaking is designed to lower the maximum allowable sulfur content limit of No. 2 and lighter commercial fuel oil, generally used in residential and commercial furnaces and oil heat burners, to meet the Commonwealth's obligations under the CAA and the MANE-VU "Asks" described in the response to Question 9. It will also make the maximum allowable sulfur content limit for No. 2 and lighter commercial fuel oil consistent Statewide at 15 ppm.

***Formation of regional haze, fine particulate matter, and ground-level ozone:***

Haze is one of the most basic forms of air pollution. It degrades visibility in many American cities and scenic areas. Haze is caused when sunlight encounters tiny pollution particles in the air, which reduce the clarity and color of what we see, especially during humid conditions. Most haze is not naturally occurring. It is air pollution carried by the wind, often many hundreds of miles from where it originated.

Regional haze is visibility impairment produced by a multitude of combustion sources and activities that emit SO<sub>2</sub>, nitrogen oxides (NO<sub>x</sub>), PM<sub>2.5</sub>, and PM<sub>2.5</sub> precursors. The combustion sources and activities are located across a broad geographic area. Visibility impairment is humanly perceptible change in visibility (such as light extinction, visual range, contrast, and coloration) from the visibility that would have existed under natural conditions.

SO<sub>2</sub> emissions released by the combustion of sulfur-containing No. 2 or lighter commercial fuel oil contribute to the formation of regional haze and PM<sub>2.5</sub>, both of which are serious public health and welfare threats and affect visibility.

*Environmental and public health and welfare benefits:* The Department estimates that implementation of this control measure reduces SO<sub>2</sub> emissions by as much as 4,000 tons per year (tpy). These SO<sub>2</sub> emission reductions benefit public health and welfare, as well as the environment, by decreasing regional haze and visibility impairment in Federal Class I areas and within the Commonwealth. Decreased emissions of SO<sub>2</sub> contribute to the attainment or maintenance, or both, of the SO<sub>2</sub>, PM<sub>2.5</sub>, and ground-level ozone NAAQS in this Commonwealth and the MANE-VU region.

Emissions of SO<sub>2</sub> also contribute to the formation of acid rain, which can cause lakes, rivers, and streams to be unsuitable for fish and other aquatic life, as well as erode stone buildings, historical monuments, and paint on cars. Acid rain and PM<sub>2.5</sub> contribute to agricultural crop and vegetation damage, and degradation of the Chesapeake Bay. Thus, by reducing the maximum allowable sulfur content limit of No. 2 and lighter commercial fuel oil, this final-form rulemaking decreases these adverse public health and welfare and environmental impacts.

This final-form rulemaking may also lead to the reduction of NO<sub>x</sub> and carbon dioxide emissions. The use of lower sulfur content No. 2 and lighter commercial fuel oil with a maximum allowable sulfur content of 15 ppm will improve furnace and oil heat burner combustion efficiency which should decrease emissions. NO<sub>x</sub> emissions contribute to public health and environmental problems, particularly in the Northeastern United States, including the formation of PM<sub>2.5</sub> and ground-level ozone.

The adverse human health effects associated with exposure to PM<sub>2.5</sub> are significant. Epidemiological studies have shown a significant correlation between elevated PM<sub>2.5</sub> levels and premature mortality. Other notable adverse health effects include aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions, emergency room visits, absences from school or work and restricted activity days), lung disease, decreased lung function, asthma attacks, and certain cardiovascular problems. Individuals particularly sensitive to PM<sub>2.5</sub> exposure include older adults, people with heart and lung disease, and children. Ground-level ozone is also a serious human and animal health and welfare threat, causing or contributing to respiratory illnesses and decreased lung function, agricultural crop loss, visible foliar injury to sensitive plant species, and damage to forests, ecosystems, and infrastructure. Adopting a maximum allowable sulfur content limit of 15 ppm for No. 2 and lighter commercial fuel oil contributes to reducing these public health and welfare and environmental impacts.

*Statewide consistency:* On February 9, 2013, the Board amended § 123.22 to reduce SO<sub>2</sub> emissions from home heating and commercial fuel oils beginning July 1, 2016. See 43 Pa.B. 806 (February 9, 2013). Due to concerns at the time regarding the available supply of low-sulfur content distillate oil in various regions of the Commonwealth, the Board reduced the maximum allowable sulfur content limit for No. 2 and lighter commercial fuel oil to 500 ppm rather than to 15 ppm, as recommended by the 2007 MANE-VU “Ask.” On July 10, 2014, the EPA approved a SIP revision incorporating the amended low-sulfur content commercial fuel oil provisions into the Commonwealth’s SIP. See 79 FR 39330 (July 10, 2014). The City of Philadelphia, Department of Public Health, Philadelphia Air Management Services (AMS) adopted a low-sulfur content commercial fuel oil requirement, enacted into law by the City of Philadelphia on July 15, 2014, as an amendment to Philadelphia Code, Title 3- Air Management Code, Chapter 3-200, § 3-207 (relating to sale of fuel oil) and to Philadelphia Air Management Regulation III (relating to the control of emissions of oxides and sulfur compounds), Section I. Since there was not a low-sulfur fuel supply concern

within the Philadelphia region, the amendments reduced the maximum allowable sulfur content limit for No. 2 and lighter commercial fuel oil to 15 ppm in the City of Philadelphia, effective July 1, 2015. The Department, on behalf of AMS, submitted these amendments to the EPA as a revision to the Commonwealth's SIP on June 27, 2018. Thus, the City of Philadelphia currently has a lower standard than the rest of the Commonwealth.

The Department is reducing the maximum allowable sulfur content limit for No. 2 and lighter commercial fuel oil to 15 ppm, because the availability of distillate oil with 15 ppm of sulfur or less in various regions of this Commonwealth and Nationwide is no longer a concern. The supply of No. 2 and lighter commercial fuel oil with a maximum sulfur content of 15 ppm has increased over the last several years and fuel with a sulfur content between 15 ppm and 500 ppm has decreased to less than 1% of the overall supply of distillate oil distributed on the east coast.

*Anticipated emission reductions:* MANE-VU evaluated the burning of sulfur-containing distillate oil in residential and commercial furnaces and oil heat burners to assess its contribution to the MANE-VU SO<sub>2</sub> emission inventory. The Northeast States for Coordinated Air Use Management (NESCAUM) performed this evaluation for MANE-VU in 2005 using 2002 data, the most current information available at the time. The 2005 NESCAUM evaluation found that MANE-VU regional residential and commercial furnaces and oil heat burners, combined, contributed about 7% of the SO<sub>2</sub> emissions in the MANE-VU SO<sub>2</sub> emission inventory. Commercial fuel oil combustion in residential and commercial furnaces and oil heat burners, in the Commonwealth alone, contributed between 2% and 3% of the SO<sub>2</sub> emissions in the MANE-VU region, depending on the season. The 2005 NESCAUM evaluation indicated that the Commonwealth would likely reduce SO<sub>2</sub> emissions by approximately 25,000 tpy when the maximum allowable sulfur content limit of 15 ppm for No. 2 and lighter commercial fuel oil is fully implemented.

Implementation of the maximum allowable sulfur content limit of 500 ppm for No. 2 and lighter commercial fuel oil beginning July 1, 2016, was expected to achieve reductions of SO<sub>2</sub> emissions of at least 21,000 tpy in this Commonwealth. See 43 Pa.B. 811. The Department expects to realize an additional 4,000 tpy of SO<sub>2</sub> emission reductions from implementation of this final-form rulemaking, achieving the full 25,000 tpy of SO<sub>2</sub> emission reductions anticipated in the 2007 MANE-VU "Ask." See 43 Pa.B. 807 and 811. While many of these anticipated emission reductions have already been achieved as a result of the marketplace and nearby state and local limits already in place, this final-form rulemaking, upon promulgation as a final-form regulation and approval by the EPA as a revision to the Commonwealth's SIP, will ensure that the full amount of emission reductions is realized.

*Economic benefits to commercial fuel oil users and consumers:* Nearly one in five households in this Commonwealth, or approximately 18% of households, uses No. 2 and lighter commercial fuel oil for space heating.<sup>1</sup> Lowering the maximum allowable sulfur content limit for No. 2 and lighter commercial fuel oil from 500 ppm to 15 ppm has the potential to improve furnace and oil heat burner efficiency by reducing fouling rates of furnace and oil heat burner heat exchangers and other components. Reduced furnace and oil heat burner fouling rates translate directly into lower vacuum-cleaning costs for fuel oil companies and homeowners by extending the service intervals. According to the NESCAUM report "Low Sulfur Heating Oil in the Northeast States: An Overview of Benefits, Costs and Implementation Issues," December 2005 (2005 NESCAUM Report), the added cost for the 15 ppm sulfur content commercial fuel oil is expected to be less than the savings produced by the cleaner operation of furnaces and oil heat burners.<sup>2</sup> While there may be an increase in fuel purchase costs for commercial fuel oil users and consumers who are not already using No. 2 and lighter commercial fuel oil with a sulfur content of 15 ppm or less, this increase would likely be offset by increased efficiency and lower maintenance costs incurred for residential and commercial

furnaces and oil heat burners, or through competitive pricing that heating oil vendors would experience with other fuels. The 2005 NESCAUM Report listed an example whereby using a median hourly service cost of \$72.50 per hour for vacuum-cleaning a furnace and reducing the maximum allowable No. 2 commercial fuel oil sulfur content from 2500 ppm to 500 ppm would be expected to save \$29,000 a year per 1,000 homes, or \$29.00 per home annually in the United States.<sup>3</sup> These savings have been and continue to be realized with the Commonwealth's 500 ppm standard. It is expected that implementing a maximum allowable sulfur content of 15 ppm will allow the users and consumers of commercial fuel oil to further extend their furnace-cleaning service intervals, thereby saving additional money. Further, the availability of 15 ppm or lower sulfur content No. 2 and lighter commercial fuel oil enables the introduction of highly-efficient advanced technology condensing furnaces.

*Economic benefits to commercial fuel oil industry:* A requirement for 15 ppm or lower sulfur content No. 2 and lighter commercial fuel oil benefits distributors of commercial fuel oil by increasing their space heating market competitiveness.

Another economic benefit is that the maximum allowable sulfur content limit of 15 ppm for No. 2 and lighter commercial fuel oil is consistent with the maximum allowable sulfur content limit of 15 ppm that is required in highway diesel fuel and nonroad, locomotive, and marine (NRLM) transportation diesel fuel. This consistency will help refinery owners and operators, owners and operators of commercial fuel oil and transportation diesel fuel terminals, and distributors and carriers of commercial fuel oil minimize the number of storage tanks and trucks needed for segregating the different sulfur-content fuel and heating oils. No. 2 and lighter commercial fuel oil could be combined with highway diesel fuel and NRLM transportation diesel fuel in the same storage tanks and delivery trucks.

Additionally, since the maximum allowable sulfur content limit of 15 ppm for No. 2 and lighter commercial fuel oil will now be implemented Statewide, compliance and recordkeeping will be simplified for the petroleum refining and distribution companies.

Please also see the response to Question 9.

**(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.**

This final-form rulemaking is more stringent than Federal standards because the Federal government does not regulate the sulfur content of No. 2 and lighter commercial fuel oil. The Commonwealth is, however, required to make progress toward achieving natural background visibility conditions at Federal Class I areas under section 169A of the CAA and corresponding EPA regulations. Reduction of the maximum allowable sulfur content of No. 2 and lighter commercial fuel oil has been identified as a reasonable and cost-effective strategy by MANE-VU. The Department reviewed the 2005 NESCAUM evaluation and associated MANE-VU recommendations and determined that the recommended maximum allowable sulfur content limit for No. 2 and lighter commercial fuel oil is an appropriate measure to be pursued in this Commonwealth as part of the regional strategy to improve visibility. The Department indicated in its 2010 regional haze SIP revision that the Commonwealth would pursue adoption of reduced sulfur content in commercial fuel oil and other emission management strategies, as appropriate and necessary, as part of its long-term strategy to meet the reasonable progress goals contained in the SIPs of states with Federal Class I areas that may be affected by emissions from within the Commonwealth. MANE-VU modeling identified SO<sub>2</sub> emissions as the primary source of visibility impairment in the region. MANE-VU performed a cost-benefit analysis for

lowered sulfur limits and determined that the benefits exceed the costs. In addition, reducing SO<sub>2</sub> emission levels would assist the Commonwealth in meeting current and anticipated NAAQS for PM<sub>2.5</sub> and SO<sub>2</sub>.

Please also see the response to Question 9.

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

MANE-VU includes Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, the District of Columbia, Native American tribes in the Northeastern United States, the EPA, the United States Fish and Wildlife Service, and the United States Forest Service. All MANE-VU member states, except the Commonwealth, have adopted the same maximum allowable sulfur content limit of 15 ppm for No. 2 and lighter commercial fuel oil. Thus, industry and commercial businesses in the Commonwealth will not be put at a disadvantage by the final-form amendments.

Owners and operators of refineries and retail outlets of commercial fuel oil could still manufacture and sell No. 2 fuel oil with a sulfur content above 15 ppm, if the ultimate consumer is located outside of this Commonwealth and the MANE-VU region and in a state that does not have a sulfur content limit of 15 ppm (e.g. Ohio, West Virginia, Virginia).

**(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 final-form 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.)**

In November 2017, the Department met with representatives from the Pennsylvania Petroleum Association (the Association) and member companies, including Shipley Energy, Walton, Inc., and Tevis Energy, and they indicated that the Association would like the maximum allowable sulfur content of No. 2 and lighter commercial fuel oil to be reduced to 15 ppm as soon as possible.

The Department presented the draft proposed Annex A to the Small Business Compliance Advisory Committee (SBCAC) on January 24, 2018, and the Air Quality Technical Advisory Committee (AQTAC) on February 8, 2018. During the AQTAC meeting, one member asked if the Department could set a compliance date sooner than July 1, 2019. The Department explained that the compliance date is dictated by the time needed to proceed through the rulemaking process. The Department had revised the proposed compliance date from July 1, 2019, to 60 days after publication of this rulemaking in its final-form, as the rulemaking would not be promulgated by July 1, 2019. Another AQTAC member noted a concern that the sulfur content in the heavier fuel oils remains unchanged. The Department could not address this concern because it was beyond the intended purpose of the rulemaking. Both committees voted unanimously to concur with the Department's recommendation to present the rulemaking to the EQB for consideration as a proposed rulemaking.

The Department presented the draft proposed Annex A to the Citizens Advisory Council's (CAC) Policy and Regulatory Oversight (PRO) Committee on February 9, 2018. On the recommendation of the PRO

Committee the CAC concurred on February 20, 2018, to present the proposed rulemaking to the Board for consideration.

In the Department's discussions with refiners operating in this Commonwealth, United Refining and Monroe Energy, LLC (Monroe) indicated that they could meet the 15 ppm low-sulfur content limit for the No. 2 and lighter commercial fuel oil produced at each of their facilities. In addition, American Refining Group, Inc. (ARG) indicated that it was already producing No. 2 and lighter commercial fuel oil for sale in New York which meets a maximum allowable sulfur content limit of 15 ppm. Currently, ARG supplies No. 2 and lighter commercial fuel oil with a sulfur content of less than 500 ppm to northern counties in this Commonwealth. PES also could produce No. 2 and lighter commercial fuel oil with a maximum sulfur content of 15 ppm and at the time of publication of the proposed rulemaking, produced most of the No. 2 and lighter commercial fuel oil distributed along the east coast.

The proposed rulemaking was adopted by the Board at its meeting on April 16, 2019, and published in the *Pennsylvania Bulletin* on July 6, 2019, with a 66-day public comment period. See 49 Pa.B. 3482. Three public hearings were held on August 6, 7, and 8, 2019, in Pittsburgh, Norristown, and Harrisburg, respectively. The public comment period closed on September 9, 2019. The Department received 23 public comments, including a comment from a member of the Pennsylvania Senate Environmental Resources and Energy Committee, Senator Scott Hutchinson. Senator Hutchinson indicated that there is a small transmix refinery in his district with 44 employees that the proposed rulemaking would place an onerous financial burden on. He further indicated that requiring an immediate reduction in sulfur content from 500 ppm to 15 ppm would be overly burdensome for a small refinery that lacks resources to invest in plant upgrades to meet the new standards. The other 22 commenters supported the proposed rulemaking. Two commenters suggested adding a biodiesel requirement, which is outside the scope of this rulemaking; however, biodiesel may still be used, but is not mandated. One trade association noted that upstream suppliers indicated that the 60-day transition period might not be enough time to cycle through the existing 500 ppm product, but the association ultimately supported the 60-day period. Another commenter requested a fixed compliance date (i.e. July 1, 2020, or September 1, 2020) rather than a "date 60 days after the effective date of adoption" as stated in the proposed rulemaking, as well as a longer time between the effective and compliance dates.

On October 9, 2019, the Independent Regulatory Review Commission (IRRC) submitted comments on the proposed rulemaking. IRRC asked if the Department considered a fixed implementation date to allow the regulated community to plan for the transition to the lower sulfur content limit. IRRC also asked whether the Department considered a less costly or less intrusive alternative method of achieving the goal of the regulation for small businesses in the fuel oil supply chain impacted by this regulation. All comments were addressed.

The Department presented the draft final-form Annex A to the Air Quality Technical Advisory Committee (AQTAC) on October 17, 2019, and to the Small Business Compliance Advisory Committee (SBCAC) on October 23, 2019, and briefed the committees on the comments received on the proposed rulemaking. Both committees voted unanimously to concur with the Department's recommendation to present this final-form rulemaking to the Board for consideration. The Department presented the draft final-form Annex A to the Citizens Advisory Council's (CAC) Policy and Regulatory Oversight Committee on October 28, 2019. On the recommendation of the Policy and Regulatory Oversight Committee, on November 19, 2019, the CAC concurred with the Department's recommendation to present this final-form rulemaking to the Board for consideration. Advisory committee meetings are advertised and open to the public.

**(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?**

*Types of persons, businesses, small businesses, and organizations that would be affected.* This final-form rulemaking applies to the owner and operator of a refinery, terminal, distributor, carrier, or retail outlet fuel storage facility that produces, conveys, stores, or sells No. 2 and lighter commercial fuel oil, as well as the ultimate consumer that uses No. 2 and lighter commercial fuel oil in this Commonwealth.

*Numbers of persons, businesses, small businesses, and organizations that would be affected.* The Department estimates that this final-form rulemaking may affect as many as 812 entities and as many as 892,800 households, who will be buying and using compliant fuel.

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 separates the industry into two classifications: Petroleum Bulk Stations and Terminals (NAICS code 424710) and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals) (NAICS code 424720).

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 70 facility owners and operators identified by NAICS code 424710 and a list of 441 facility owners and operators identified by NAICS code 424720, for a total of 511 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 200 employees. The Department determined that of these 511 potentially subject entities, the owners and operators of 424 facilities (83%) are small businesses by that definition. For the remaining entities, the owners and operators of eight facilities were determined not to be small businesses and the small business status of 79 facility owners and operators could not be determined.

The owners and operators of many of these small business-sized facilities may in fact not offer for sale, deliver for use, exchange in trade, or permit the use of No. 2 and lighter commercial fuel oil and therefore are not be subject to this final-form rulemaking. For this reason, the projected number of 424 potentially subject small business-sized facility owners and operators is likely higher than the number of small business-sized entities that are actually subject to this final-form rulemaking.

The Department also used these NAICS codes to review the Department databases (Discoverer, Environmental Facility Application Compliance Tracking System (eFACTS), and Air Information Management System (AIMS)) to gather information about potentially affected facility owners and operators. The review of the Department databases indicated that there are 128 fuel oil terminal operation owners and operators and 684 distributors of petroleum products for a total of 812 potentially affected entities; not all of these businesses handle No. 2 and lighter commercial fuel oil.

The difference between the EMAP's number of 511 and the Department's database number of 812 is likely because the Department's databases are for the owners and operators of previously and currently permitted (or inspected) facilities based on regulatory criteria for requiring a permit (or being inspected), while the EMAP list is based on a self-reported classification of a facility by the facility owner or operator.

This final-form rulemaking applies to owners and operators of other facilities that have not yet been identified, because NAICS codes are self-reported and facility owners and operators may not have identified themselves under the appropriate NAICS code. For purposes of this final-form rulemaking, the Department assumed that all identified businesses involved in the production, conveyance, or sale of No. 2 and lighter commercial fuel oil are affected by this final-form rulemaking.

*How are they affected?* Refineries, terminals, distributors, carriers, and retail outlet fuel storage facilities will be prohibited from producing, conveying, storing, or selling No. 2 and lighter commercial fuel oil intended for use in this Commonwealth that exceeds the maximum allowable sulfur content limit of 15 ppm. Commercial fuel oil that was stored in this Commonwealth by the ultimate consumer prior to the September 1, 2020, compliance date of this rulemaking, which met the applicable maximum allowable sulfur content for commercial fuel oil through August 31, 2020, at the time it was stored, may be used by the ultimate consumer in this Commonwealth on and after September 1, 2020.

According to the 2005 NESCAUM Report, the added cost for producing the No. 2 and lighter commercial fuel oil with a maximum allowable sulfur content of 15 ppm is expected to be less than the savings produced by the cleaner operation of residential and commercial furnaces and oil heat burners.<sup>4</sup> While there may be a price increase for the users of No. 2 and lighter commercial fuel oil with a maximum allowable sulfur content of 15 ppm, this increase will likely be partially offset by increased combustion efficiency and lower maintenance costs incurred for residential and commercial furnaces and oil heat burners, or through competitive pricing that heating oil vendors experience with other fuels, natural gas in particular.

By June 1, 2010, nonroad transportation diesel fuel was required to meet a maximum allowable sulfur content limit of 15 ppm. NRLM transportation diesel fuel is the same as No. 2 commercial fuel oil and is often used as home heating oil. Market forces and regulations for transportation-related diesel fuels in the United States and internationally will be the major forces affecting this industry, because the use of No. 2 and lighter commercial fuel oil for residential heating is a very small portion of diesel fuel consumption. If this final-form rulemaking is promulgated, No. 2 and lighter commercial fuel oil consumed in this Commonwealth will have the same maximum allowable sulfur content limit of 15 ppm as NRLM transportation diesel fuel.

This final-form rulemaking retains the provision for the Department to temporarily suspend or increase the applicable maximum allowable sulfur content limit for a commercial fuel oil, if supply in an air basin (or air basins) or a particular geographic area (for nonair basins) is reasonably unavailable. This provides flexibility for the regulated community in this specific situation.

There are four refineries in this Commonwealth, owned by four different companies. The ARG refinery in Bradford, Pennsylvania, currently uses a hydrotreating desulfurization process for producing its No. 2 and lighter commercial fuel oil with a maximum sulfur content of 15 ppm that is shipped to New York. To produce No. 2 and lighter commercial fuel oil with a sulfur content that is 15 ppm or less, the ARG refinery processes fuel oil with a sulfur content of 500 ppm through an additional hydrotreating step to go from 500 ppm to 15 ppm. This final-form rulemaking will cause the ARG refinery hydrotreating desulfurization process to increase production, as No. 2 and lighter commercial fuel oil with a maximum allowable sulfur content of 15 ppm for marketing in the Commonwealth will need to be processed through its hydrotreater. This potentially creates a need for additional maintenance of the hydrotreater and thereby increased maintenance costs for ARG. However, switching to a maximum allowable sulfur content limit of 15 ppm for No. 2 and lighter commercial fuel oil Statewide will allow ARG to dedicate all of its fuel oil storage

tanks to 15 ppm and lower sulfur content fuel oil rather than dedicating separate tanks for differing sulfur content fuels, which could reduce ARG's storage and distribution costs.

Prior to a fire in June 2019, Philadelphia Energy Solutions (PES) produced most of the No. 2 and lighter commercial fuel oil distributed along the east coast with a sulfur content of 15 ppm or less. A discussion with Philadelphia Air Management Services on September 26, 2019, indicated that PES is currently operating the boilers and wastewater sources, but no refining sources. The facility permit is active and a renewal application is on hold. PES is currently in bankruptcy and is trying to find a buyer. Since PES has an operating permit, the refining sources can resume operating or someone could buy the PES facility and operate those sources. The United Refining and Monroe Energy, LLC refineries are currently producing No. 2 and lighter commercial fuel oil with a sulfur content of 15 ppm or less for marketing in this Commonwealth. The final-form rulemaking control measure likely has no impact on these refineries.

Please also see the response to Question 16.

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

*Refineries.* There are four refineries in the Commonwealth, owned by four different companies, namely PES, United Refining, ARG, and Monroe. As discussed in the response to Question 15, PES currently is not operating its refining sources. The United Refining, ARG, and Monroe Energy, LLC refineries currently produce No. 2 and lighter commercial fuel oil with a sulfur content of 15 ppm or less. Owners and operators of refineries outside the Commonwealth would be indirectly affected if they supply distributors that sell No. 2 and lighter commercial fuel oil in this Commonwealth. However, maximum allowable sulfur content limits have been established in motor fuels for 30 years, so the industry has the technical capacity to implement the new requirements.

*Terminal owners, distributors and carriers, and retail outlet fuel storage facility owners and operators.* A total of 812 potentially affected entities were documented from a review of the Department's databases. There are 128 fuel oil terminal owners and operators and 684 distributors and carriers and retail outlet fuel storage facility owners and operators of petroleum products in this Commonwealth; not all of these entities handle No. 2 and lighter commercial fuel oil. The terminal operators include those with familiar names from the petroleum industry, such as Sunoco and Gulf Oil. Several major distributors also operate terminals, including Buckeye Energy. While the size of distributor, carrier, and retail outlet storage facility operations varies, members of the petroleum distribution industry, as a whole, have been regulated for many years. Existing systems to track the quantity and composition of fuel are longstanding for purposes of compliance with environmental and tax regulations.

As explained in the response to Question 15, 424 facility owners and operators of the potentially subject 511 entities identified by EMAP were identified as small businesses under the SBA Small Business Size Regulations under 13 CFR Chapter 1, Part 121. Data was not available for 79 entities to determine whether they may be considered to be small businesses, and eight entities were not considered to be small businesses because the number of employees exceeded the size standard.

*End-users and consumers.* No. 2 and lighter commercial fuel oil is generally sold for and used in residential and commercial oil heat burners and furnaces. The Department reviewed data maintained by the U.S. Census Bureau and the U.S. Energy Information Administration (EIA) to determine how many households may be impacted by the reduction in maximum allowable sulfur content limit from 500 ppm to 15 ppm for home heating oil. A review of U.S. Census Bureau 2016 data indicates that there are an estimated 4.96

million households in this Commonwealth. A review of the EIA State Energy Profile for the Commonwealth estimates that 18% of those homes use No. 2 and lighter commercial fuel oil for space heat. Multiplying 4.96 million households times 18% of households indicates that there are approximately 892,800 households that may use this fuel (4.96 million households x 18% of households). However, the burden of compliance with the final-form rulemaking is not on households – it is on those that offer for sale, deliver for use, exchange in trade, or permit the use of commercial fuel oil in this Commonwealth. These are the suppliers, distributors, and vendors selling to ultimate consumers. No recordkeeping or reporting is required of ultimate consumers at private residences or apartment complexes and condominiums; all they need to do is buy and use compliant fuel.

(U.S. Census Bureau American FactFinder Household and Families, 2012-2016 American Community Survey 5-Year Estimates, Estimated PA Total Households in 2016.

([https://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS\\_16\\_5YR\\_S1101&prodType=table](https://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S1101&prodType=table).) (EIA State Energy Profiles (<https://www.eia.gov/state/?sid=PA>)).

Please also see the response to Question 15.

**(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.**

The financial impact of this final-form rulemaking is comparable for individuals, small businesses, businesses and labor communities, and other public and private organizations. Costs or savings are directly related to the volume of No. 2 and lighter commercial fuel oil with a maximum allowable sulfur content limit of 15 ppm produced or consumed by each of these entities. This final-form rulemaking is unlikely to negatively impact employment because the current employees involved with the production and transfer of No. 2 and lighter commercial fuel oil will likely still be needed to work regardless of the sulfur content of the fuel oil; the volume of fuel oil demand will likely not change significantly, just the maximum allowable sulfur content limit for the fuel oil supplied.

Furnace and oil heat burner maintenance costs for consumers will likely be lower for those that do not already use No. 2 and lighter commercial fuel oil with a sulfur content of 15 ppm or less, due to less fouling of their heat exchangers. According to the 2008 National Oilheat Research Alliance (NORA) “Northeast Heating Oil Assessment” (2008 NORA Assessment), although compliant No. 2 and lighter commercial fuel oil may cost the ultimate consumer a few cents per gallon more, savings on maintenance costs are orders of magnitude higher, depending on hourly rates for maintenance, and will help defray the impact of potentially increased fuel oil purchase costs. Decreased fouling improves the efficiency of the unit, which results in less fuel usage.<sup>5</sup> The 2005 NESCAUM Report noted a median annual savings of \$29.00 per household on furnace vacuuming by using 500 ppm sulfur content commercial fuel oil instead of 2500 ppm. However, beginning July 1, 2016, the Commonwealth began regulating No. 2 and lighter commercial fuel oil to a sulfur content of no more than 500 ppm. Therefore, the savings noted in the 2005 NESCAUM Report were realized beginning July 1, 2016. It is expected that, in limited circumstances of around 1%, where the reduction of the maximum allowable sulfur content from 500 ppm to 15 ppm has not yet occurred, implementation of the maximum allowable sulfur content limit of 15 ppm will allow the end-users of No. 2 and lighter commercial fuel oil to further extend their service intervals and have a net savings. As previously discussed, the PES, United Refining, ARG, and Monroe refineries are capable of producing or already produce No. 2 and lighter commercial fuel oil with a maximum sulfur content of 15 ppm and therefore, the financial impact on most consumers is likely to be cost neutral.

From a social perspective, the Commonwealth is the only MANE-VU state that has not lowered its maximum allowable sulfur content limit for No. 2 and lighter commercial fuel oil from 500 ppm to 15 ppm. The Department's research shows that the market can now provide an adequate supply of compliant fuel to the Commonwealth, as No. 2 and lighter commercial fuel oil with a maximum sulfur content of 15 ppm is already widely produced and distributed in the MANE-VU region, which includes the Commonwealth.

Implementation of this final-form rulemaking puts the Commonwealth in the same position as all other MANE-VU States. Therefore, any retail cost variations are due solely to local, regional, and National market forces, as well as State and local taxes and other applicable requirements. A cost analysis is provided in the response to Question 19.

Please also see the response to Question 18.

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

Lowering the maximum allowable sulfur content limit for No. 2 and lighter commercial fuel oil from 500 ppm of sulfur to 15 ppm will benefit the approximately 12.8 million residents and the numerous animals, crops, vegetation, and natural areas of this Commonwealth, as well as the residents and environments of downwind states, through reduced levels of regional haze and reduced SO<sub>2</sub>, PM<sub>2.5</sub>, and ground-level ozone pollution.

Costs to the industry to comply with this final-form rulemaking will be outweighed by the public health and welfare benefits and economic benefits of this final-form rulemaking. Emissions of SO<sub>2</sub> into the atmosphere and subsequent formation of regional haze, PM<sub>2.5</sub>, and ground-level ozone will be reduced by using No. 2 and lighter commercial fuel oil with a sulfur content of 15 ppm or less. Implementation of the maximum allowable sulfur content limit of 15 ppm for No. 2 and lighter commercial fuel oil is expected to realize an additional 4,000 tpy of SO<sub>2</sub> emission reductions, achieving the full 25,000 tpy of SO<sub>2</sub> emission reductions anticipated in the 2007 MANE-VU "Ask." These emission reductions will support the Commonwealth's efforts to reduce regional haze as well as to attain and maintain the health-based and welfare-based ambient air quality standards for SO<sub>2</sub>, ozone, and fine particulate matter. This final-form rulemaking, if published in the *Pennsylvania Bulletin* and approved by the EPA as a revision to the Commonwealth's SIP, will ensure that any SO<sub>2</sub> emissions reductions that have not been previously attained are realized and the Commonwealth will be able to take credit for these additional reductions.

Further, less commercial fuel oil will be burned because of the improved combustion efficiency of No. 2 and lighter commercial fuel oil with a sulfur content of 15 ppm or less. This will result in less use of fossil fuel resources and in reduced costs for end-users to maintain combustion equipment, because there will be less fouling of heat exchangers, and to heat homes and buildings. Improved combustion efficiency will also contribute to reduced emissions of NO<sub>x</sub>, which will reduce the formation of PM<sub>2.5</sub> and ground-level ozone pollution.

At elevated levels, ground level ozone and PM<sub>2.5</sub> can adversely affect the environment and human health. Adverse health effects include premature death in people with heart or lung disease, nonfatal heart attacks, aggravated asthma, and increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing. According to the PA Department of Health *2015 Asthma Prevalence in Pennsylvania Fact Sheet*, 9.6% of the adult population (or 955,374 adults) and 10.2% of children (or 269,423 children) currently suffer from asthma. This is significantly higher than the National average of 8.3% for both

children and adults. All Commonwealth residents, particularly asthma sufferers, will therefore benefit from the indirect emission reductions resulting from this final-form rulemaking.

Statewide and regional consistency of No. 2 and lighter commercial fuel oil sulfur content limits and consistency of No. 2 and lighter commercial fuel oil sulfur content limits with transportation diesel sulfur limits helps refinery owners and operators and owners and operators of fuel oil and transportation diesel fuel terminals, distributors and carriers, and retail outlet fuel storage facility owners and operators by easing storage tank constraints and recordkeeping requirements. No. 2 and lighter commercial fuel oil could be combined with NRLM transportation diesel fuel in the same storage tanks and trucks.<sup>6</sup>

Regional implementation of No. 2 and lighter commercial fuel oil with a maximum sulfur content limit of 15 ppm will help industry comply with the Commonwealth's regulations and other states' regulations by providing a broad Mid-Atlantic and Northeast market for low-sulfur content product. In addition, compliance and recordkeeping is simplified for the petroleum refining and distribution companies in this Commonwealth because the maximum allowable sulfur content limit for No. 2 and lighter commercial fuel oil will be uniform across the state. Reducing costs to producers through regional consistency will likely reduce fuel costs to consumers in the Commonwealth.

**(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.**

The 2008 NORA Assessment estimated that there would be a 6.3-to-6.8 cent-per-gallon (cpg) incremental production cost for refining 500 ppm versus 2500 ppm sulfur content home heating oil (No. 2 and lighter commercial fuel oil), including capital costs. Incremental production costs were estimated to be as much as 8.9 cpg for refining 15 ppm sulfur content versus 2500 ppm. Data showing the incremental production cost difference for refining 15 ppm versus 500 ppm sulfur content home heating oil was not found. However, by taking the difference between the incremental costs to produce 500 ppm and 15 ppm sulfur content home heating oil versus 2500 ppm sulfur content home heating oil, the incremental production cost to produce home heating oil with a sulfur content of 15 ppm or less versus home heating oil with a sulfur content of 500 ppm or less would likely be no more than 2.6 cpg ( $8.9 \text{ cpg} - 6.3 \text{ cpg} = 2.6 \text{ cpg}$ ). These are estimated costs for refiners without desulfurization capabilities. For refiners that have desulfurization capabilities, the incremental cost of producing 15 ppm versus 2500 ppm sulfur content home heating oil was estimated to be 4.6 cpg. Note that these are costs to the producers; prices to the ultimate consumer would be influenced by factors additional to the cost of reducing the sulfur content in the No. 2 and lighter commercial fuel oil.

The EIA data for Adjusted Sales of Distillate Fuel Oil by End Use indicates that residential customers in this Commonwealth purchased 411 million gallons of distillate fuel oil in 2015. As explained in the response to Question 16, the Department estimates that there may be as many as 892,800 households in this Commonwealth that use distillate fuel oil for home or space heating, water heating, or both. Therefore, on average, each household used 460 gallons of distillate fuel oil in 2015 ( $411,000,000 \text{ gallons} / 892,800 \text{ households}$  in this Commonwealth). The average price of home heating oil in 2015 was \$2.60 per gallon (per gal) (excluding taxes), also according to the EIA. By multiplying the average price per gallon by the average number of gallons used, it is estimated that each household spent \$1,196 on distillate fuel oil in 2015, excluding taxes ( $\$2.60 \times 460 \text{ gal} = \$1,196$ ). If the additional cost of producing 15 ppm sulfur content home heating oil versus 500 ppm is 2.6 cpg ( $\$0.026 \text{ per gal}$ ), as explained above, the estimated annual increased cost to the residential customer will be no more than \$12.00 ( $\$2.60 \text{ per gal cost} + \$0.026 \text{ per gal}$

increase = \$2.626 per gal; \$2.626 per gal x 460 gal per year = \$1,208; \$1,208 - \$1,196 = \$12.00 additional cost per year).

Refinery owners and operators will no longer need to dedicate capacity to manufacturing and distributing several different products because the No. 2 and lighter commercial fuel oil maximum allowable sulfur content limit of 15 ppm is consistent with the maximum allowable sulfur content limit already imposed Nationwide for most transportation diesel fuels. No. 2 and lighter commercial fuel oil is similar to nonroad transportation diesel fuel. By 2014, most transportation diesel fuel was limited to a maximum allowable sulfur content of 15 ppm. Harmonizing the maximum allowable sulfur content limit for the No. 2 and lighter commercial fuel oil and nonroad transportation diesel fuels in the MANE-VU region avoids the need for supplying another fuel product, with separate storage tanks, trucks, and administrative costs.

In addition, this final-form rulemaking eliminates regional differences in maximum allowable sulfur content limits for No. 2 and lighter commercial fuel oil in this Commonwealth, simplifying compliance for and by the regulated industry.

New legal, accounting or consulting procedures will not be required.

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

Local governments will be affected by this regulation primarily in their purchase of No. 2 and lighter commercial fuel oil for space heating, water heating, or both. The Department assumed that local government use of No. 2 and lighter commercial fuel oil for these purposes is proportionate to the general population's use of No. 2 and lighter commercial fuel oil. About 18% of households in this Commonwealth rely on No. 2 and lighter commercial fuel oil for home or space heating, water heating, or both. This usage is concentrated more in the eastern part of the Commonwealth than in other parts. (EIA State Energy Profiles (<https://www.eia.gov/state/?sid=PA>))

Costs for the production of compliant No. 2 and lighter commercial fuel oil by refineries are discussed in the response to Question 19. The wholesale and retail price differential for compliant No. 2 and lighter commercial fuel oil that affects local governments will be influenced by many factors additional to the cost of reducing the sulfur content of the fuel oil, including the demand and supply in the international markets for petroleum, diesel fuel, and fuel oil. Therefore, costs, savings, or both, to local governments cannot be precisely projected. In recent years, the annual average spot market price (wholesale price at the New York Harbor) differential between No. 2 diesel fuel with 15 ppm or lower sulfur content and No. 2 home heating oil (No. 2 commercial fuel oil) with 15 ppm or lower sulfur content has been between 7-11 cpg.<sup>7</sup>

Local governments will also likely realize savings due to lower furnace and oil heat burner maintenance costs due to less fouling of their heat exchangers. Although compliant No. 2 and lighter commercial fuel oil may cost a few cents per gallon more, savings on maintenance costs will help to defray that impact. Decreased fouling typically improves efficiency of the combustion unit, which means less fuel oil usage and thereby reduced fuel oil purchase costs. As explained in the response to Question 10, most of these cost savings have likely already been realized as the majority of No. 2 and lighter commercial fuel oil produced and distributed in this Commonwealth has a sulfur content of 15 ppm or less.

**(21) Provide a specific estimate of the costs and/or savings to 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 will be affected by this regulation primarily in its purchase of No. 2 and lighter commercial fuel oil for space heating, water heating, or both, at Commonwealth facilities. The Pennsylvania Department of General Services (DGS) purchased at least 2,091,720 gallons of No. 2 and lighter commercial fuel oil between July 2016 and June 2017.<sup>8</sup>

Costs to produce compliant No. 2 and lighter commercial fuel oil by the owners and operators of refineries are discussed in the response to Question 19. The wholesale and retail price differential for compliant fuel that affects State government will be influenced by factors in addition to the cost of improving the sulfur content of the No. 2 and lighter commercial fuel oil, including demand and supply in the international markets for petroleum, diesel fuel, and fuel oil. Therefore, costs, savings, or both, to State government cannot be precisely projected. In recent years, the annual average spot market price (wholesale price at the New York Harbor) differential between No. 2 diesel fuel with 15 ppm or lower sulfur content and No. 2 home heating oil (No. 2 commercial fuel oil) with 15 ppm or lower sulfur content has been between 7-11 cpg.<sup>9</sup>

State government will also likely realize savings due to lower furnace and oil heat burner maintenance costs due to less fouling of heat exchangers. Although compliant No. 2 and lighter commercial fuel oil may cost a few cents per gallon more, savings on maintenance costs will help to defray that impact. Decreased fouling typically improves efficiency of the combustion unit, which means less fuel oil usage and thereby lower fuel oil purchase costs. As explained in the response to Question 10, most of these cost savings have likely already been realized as the majority of No. 2 and lighter commercial fuel oil produced and distributed in this Commonwealth has a sulfur content of 15 ppm or less.

**(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 additional legal, accounting, or consulting procedures are expected for the groups identified in items (19)-(21) above. No additional reporting, recordkeeping, or other paperwork will be required.

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

There are no forms required for implementation of the regulation.

**(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.**

Not applicable.

**(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.**

This table represents the Department's best estimates of fiscal savings and costs, given the huge number of uncertainties involved, primarily in predicting the price of the affected fuel oil, but also in the investments that may be needed by refineries to supply end-users with compliant No.2 and lighter commercial fuel oil. The cost of those investments has not been included in the total costs below because fuel supplies could come from other suppliers and because noncompliant fuel could be exported and sold by the refiners to other markets.

Only the rows for the regulated community (residential sector) are completed because the best data available to the Department, namely, the Pennsylvania sales data from the EIA, does not break out local and State government costs or savings. The values in the table were derived using the following assumptions:

**A. Total costs:**

1. The production cost increase is \$0.026 per gal to reduce sulfur content from 500 ppm to 15 ppm No. 2 and lighter commercial fuel oil. Please see the response to Question 19.
2. 1,081,489,000 gallons of distillate fuel oil were purchased in the Commonwealth in 2015. (EIA data: Adjusted Sales of Distillate Fuel Oil by End User information totaling the Residential, Commercial, Industrial, Oil Company, Farm and Electric Power sectors.)
3. The increase in price is similar to the increase in cost to manufacture compliant fuel oil.
4. Little change in demand or other variables will affect the actual price of No. 2 and lighter commercial fuel oil.
5. 1,081,489,000 gallons x \$0.026 per gal equals \$28,118,714.
6. The Commonwealth's fiscal year is July-June, therefore, since the final-form compliance date is September 1, 2020, the total costs for the first fiscal year (FY+1) accrue from September 1, 2020, to June 30, 2021. To determine the total costs for FY+1, divide the annual costs of \$28,118,714 by 12 months (\$28,118,714/12) to get \$2,343,226. Multiply \$2,343,226 per month by the 10 applicable months (\$2,343,226 x 10), which equals \$23,432,261.

**B. Cost increase for residential sector:**

1. The production cost increase is \$0.026 per gal to reduce the sulfur content from 500 ppm to 15 ppm No. 2 and lighter commercial fuel oil. Please see the response to Question 19.
2. 411,000,000 gallons of distillate fuel oil were purchased by residential customers in the Commonwealth in 2015. (EIA data: Adjusted Sales of Distillate Fuel Oil by End Use.)
3. The increase in price is similar to the increase in cost to manufacture compliant fuel oil.
4. Little change in demand or other variables will affect the actual price of No. 2 and lighter commercial fuel oil.

5. 411,000,000 gallons x \$0.026 per gal equals \$10,686,000. This results in an approximate annual increase of \$12 per household using No. 2 and lighter commercial fuel oil, which is assumed to be already realized. The offset from furnace and oil heat burner efficiencies is not factored in. Please also see the response to Question 19 and the “Total savings, residential sector only,” in this response to Question 23.

6. The Commonwealth’s fiscal year is July-June, therefore, since the final-form compliance date is September 1, 2020, the cost increase for the residential sector for the first fiscal year (FY+1) accrues from September 1, 2020, to June 30, 2021. To determine the cost increase for FY+1, divide the annual cost increase of \$10,686,000 by 12 months ( $\$10,686,000/12$ ) to get \$890,500. Multiply \$890,500 per month by the 10 applicable months ( $\$890,500 \times 10$ ), which equals \$8,905,000.

C. Cost increase for nonresidential sector (this includes State and local governments, commercial entities, industrial entities, oil companies, farms and electric power producers):

1. Total costs – residential costs = nonresidential costs:  $\$28,118,714 - \$10,686,000 = \$17,432,714$ .

2. The Commonwealth’s fiscal year is July-June, therefore, since the final-form compliance date is September 1, 2020, the cost increase for the nonresidential sector for the first fiscal year (FY+1) accrues from September 1, 2020, to June 30, 2021. To determine the cost increase for FY+1, divide the annual cost increase of \$17,432,714 by 12 months ( $\$17,432,714/12$ ) to get \$1,452,726. Multiply \$1,452,726 per month by the 10 applicable months ( $\$1,452,726 \times 10$ ), which equals \$14,527,600.

D. Total savings, residential sector only:

1. The 2005 NESCAUM Report estimates a median annual savings of \$29.00 per household on furnace vacuuming by using 500 ppm sulfur content commercial fuel oil instead of 2500 ppm sulfur content commercial fuel oil. This savings was realized beginning July 1, 2016. While the intervals between furnace vacuuming may be longer for furnaces burning 15 ppm sulfur content fuel oil versus furnaces burning 500 ppm sulfur content fuel oil, no documentation could be found. Therefore, any further savings are assumed to be realized beginning July 1, 2016. Residential savings of \$29.00 per year for furnace vacuum-cleaning (response to Question 10) x 892,800 households in this Commonwealth that use No. 2 and lighter commercial fuel oil (response to Question 16) = \$25,891,200 per year.

2. The Commonwealth’s fiscal year is July-June, therefore, since the final-form compliance date is September 1, 2020, the total savings for the residential sector for the first fiscal year (FY+1) accrue from September 1, 2020, to June 30, 2021. To determine the total savings for FY+1, divide the annual total savings of \$25,891,200 by 12 months ( $\$25,891,200/12$ ) to get \$2,157,600. Multiply \$2,157,600 per month by the 10 applicable months ( $\$2,157,600 \times 10$ ), which equals \$21,576,000.

	<b>Current FY Year 19/20</b>	<b>FY+1 Year 20/21</b>	<b>FY+2 Year 21/22</b>	<b>FY+3 Year 22/23</b>	<b>FY+4 Year 23/24</b>	<b>FY+5 Year 24/25</b>
<b>SAVINGS:</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
<b>Regulated Community (residential sector)</b>	Not quantifiable	\$21,576,000	\$25,891,200	\$25,891,200	\$25,891,200	\$25,891,200
<b>Local Government</b>	”	Not quantifiable				
<b>State Government</b>	”	”	”	”	”	”
<b>Total Savings</b>	“	\$21,576,000	\$25,891,200	\$25,891,200	\$25,891,200	\$25,891,200
<b>COSTS:</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
<b>Regulated Community (residential sector)</b>	Not quantifiable	\$8,905,000	\$10,686,000	\$10,686,000	\$10,686,000	\$10,686,000
<b>Regulated Community (nonresidential including local/State government)</b>	”	\$14,527,262	\$17,432,714	\$17,432,714	\$17,432,714	\$17,432,714
<b>Total Costs</b>	”	\$23,432,261	\$28,118,714	\$28,118,714	\$28,118,714	\$28,118,714
<b>REVENUE LOSSES:</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
<b>Regulated Community (refineries)</b>	Not quantifiable	Not quantifiable	\$0	\$0	\$0	\$0
<b>Local Government</b>	”	”	Not quantifiable	Not quantifiable	Not quantifiable	Not quantifiable
<b>State Government</b>	”	”	”	”	”	”
<b>Total Revenue Losses</b>	”	”	”	”	”	”

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

<b>Program</b>	<b>FY-3 (16/17)</b>	<b>FY-2 (17/18)</b>	<b>FY-1 (18/19)</b>	<b>Current FY (19/20)</b>
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.**

The Department estimates that as many as 424 small businesses will potentially be subject to this final-form rulemaking.

This final-form rulemaking applies to anyone, including a small business, who offers for sale, delivers for use, exchanges in trade, or permits the use of No. 2 and lighter commercial fuel oil in this Commonwealth. The owner and operator of a refinery, pipeline, terminal, distributor, carrier, or retail outlet fuel storage facility that produces, conveys, stores, or sells No. 2 and lighter commercial fuel oil, as well as the ultimate consumer that uses No. 2 and lighter commercial fuel oil in this Commonwealth, will likely be affected.

As described in the response to Question 15, EMAP provided the Department with a list of entities in this Commonwealth identified as Petroleum Bulk Stations and Terminals (NAICS code 424710) and Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals) (NAICS code 424720); the list identified 70 and 441 entities, respectively, for a total of 511 entities. Under the SBA Small Business Size Regulations under 13 CFR Chapter 1, Part 121, the size standard in number of employees for these two NAICS codes is 200 employees. The Department determined that of these 511 entities, 424 are small businesses that will potentially be subject to this final-form rulemaking, eight were not small businesses, and the small business status of 79 of them was not able to be determined. These entities include the owners and operators of terminals, distributorships, carriers, and retail outlet fuel storage facilities. It should be noted that the owners and operators of many of these small business-sized facilities assumed to be subject to this final-form rulemaking may in fact not offer for sale, deliver for use, exchange in trade, or permit the use of No. 2 and lighter commercial fuel oil and, therefore, will not be subject to this final-form rulemaking. Consequently, the projected number of 424 potentially subject small business-sized facilities is likely higher than the actual number of small business-sized facilities that will be subject to this final-form rulemaking.

This final-form rulemaking may also apply to owners and operators of other facilities that have not yet been identified. If this final-form rulemaking applies to other facility owners and operators, they will likely also be small businesses.

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

The recordkeeping and reporting requirements for owners and operators of affected small businesses will not change from what is already required other than the identification of the sulfur content of the shipment being at or below 15 ppm, whereas previously it was at or below 500 ppm. There are no further legal, accounting or consulting procedures established in this final-form rulemaking.

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

Minimal adverse impact is expected for the owners and operators of small business-sized facilities because compliant No. 2 and lighter commercial fuel oil with a sulfur content of 15 ppm or less is readily available.

These entities include the owners and operators of terminals, distributorships, carriers, and retail outlet fuel storage facilities. For a more detailed explanation, please see the response to Question 15.

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

There are no less intrusive or less costly alternative regulatory provisions available. No. 2 and lighter commercial fuel oil is readily available throughout the Commonwealth. The final-form rulemaking will help the Commonwealth make further progress toward its Clean Air Act obligation to reduce regional haze and visibility impairment impacting Federal Class I areas. This control measure is a regional initiative for the MANE-VU states to assist in reducing regional haze in Federal Class I areas, as well as to assist in reducing the formation of ground-level ozone and PM<sub>2.5</sub> and PM<sub>2.5</sub> precursors throughout the region.

**(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.**

No special provisions were developed as no special provisions were necessary.

**(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 proposed rulemaking included a compliance date of 60 days after publication of this rulemaking in its final-form for No. 2 and lighter commercial fuel oil to meet the maximum allowable sulfur content limit of 15 ppm. Two industry commenters requested during the public comment period that the compliance date be a specified “fixed” date rather than the “moving target” of 60 days after publication of the final-form rulemaking. The commenters indicated that a specified “fixed” compliance date is desired for market purposes and to avoid affecting the winter heating season. One alternative “fixed” compliance date considered and rejected by the Department during development of the final-form rulemaking was to use a compliance date of July 1, 2020. Although July 1, 2020, may be preferred by some of the regulated industry, the Department could not be certain that the final-form rulemaking would be published as final in the *Pennsylvania Bulletin* by May 1, 2020, or earlier, to give the industry at least 60 days lead time after publication of the final-form rulemaking to have compliant fuel oil in place by July 1, 2020. In setting a compliance date of September 1, 2020, as specified in the final-form rulemaking, the Department anticipates at least 60 days lead time after publication of the final-form rulemaking for industry to have compliant fuel oil in place by September 1, 2020. This was done to be the least burdensome compliance date to the regulated community, while providing the regulated community with certainty and enough lead time prior to the start of the 2020—2021 winter heating season for compliant fuel oil to be in place.

In addition, a request to require the use of a certain percentage of biodiesel as a component of the No. 2 and lighter commercial fuel oil was considered and rejected. No. 2 and lighter commercial fuel oil may already contain biodiesel and the request to require a certain percentage is outside the scope of this final-form rulemaking.

**(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 appropriate or necessary for small businesses under this final-form rulemaking. The recordkeeping requirements for owners and operators of affected facilities, including small businesses, do not change from what is already required other than the identification of the sulfur content of the shipment as being at or below 15 ppm, whereas previously the sulfur content of the shipment was identified as being at or below 500 ppm. Reporting is only necessary upon Department request. Further, since the maximum allowable sulfur content limit of 15 ppm for No. 2 and lighter commercial fuel oil will be implemented Statewide and will be consistent with the maximum allowable sulfur content limits for highway diesel fuel and NRLM transportation diesel fuel, compliance and recordkeeping will be simplified for the petroleum refining and distribution companies. This consistency between the maximum allowable sulfur content limits will allow refinery owners and operators, owners and operators of commercial fuel oil and transportation diesel fuel terminals, and distributors and carriers of commercial fuel oil to minimize the number of storage tanks and delivery trucks needed to segregate different sulfur-content fuel and heating oils. No. 2 and lighter commercial fuel oil with a maximum allowable sulfur content of 15 ppm can be combined with highway diesel fuel and NRLM transportation diesel fuel in the same storage tanks and delivery trucks.

**(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 appropriate or necessary because required recordkeeping is minimal and reporting is only necessary upon Department request. The recordkeeping requirements for owners and operators of affected facilities, including small businesses, do not change from what is already required other than the identification of the sulfur content of the shipment as being at or below 15 ppm, whereas previously the sulfur content of the shipment was identified as being at or below 500 ppm.

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

As discussed in the response to Question 27(a), this final-form rulemaking consolidates and simplifies the compliance requirements by establishing one Statewide maximum allowable sulfur content limit for No. 2 and lighter commercial fuel oil, which benefits the owners and operators of all subject facilities, including small business-sized facilities. Further consolidation or simplification of compliance or reporting requirements for small businesses is not appropriate or necessary because existing recordkeeping requirements are minimal and reporting is only necessary upon Department request. The recordkeeping requirements for owners and operators of affected facilities, including small businesses, do not change from what is already required other than the identification of the sulfur content of the shipment as being at or below 15 ppm, whereas previously the sulfur content of the shipment was identified as being at or below 500 ppm.

**(d) The establishment of performing standards for small businesses to replace design or operational standards required in the regulation.**

This final-form rulemaking does not include performance standards for anyone because the rulemaking does not include design or operational standards that could be replaced by a performance standard.

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

This final-form rulemaking does not exempt owners and operators of small businesses from any requirements because this is a MANE-VU initiative which applies to all subject entities. In addition, it is not necessary to exempt the owners and operators of small businesses from this final-form rulemaking given that compliant No. 2 and lighter commercial fuel oil is readily available within the MANE-VU region, which includes this Commonwealth.

**(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.**

*Assessment of Reasonable Progress for Regional Haze In MANE-VU Class I Areas*, July 9, 2007, located at: [http://www.marama.org/visibility/RPG/FinalReport/RPGFinalReport\\_070907.pdf](http://www.marama.org/visibility/RPG/FinalReport/RPGFinalReport_070907.pdf)

Contribution of Home Heating Oil to SO<sub>2</sub> Emission Inventory by State, PowerPoint Slide, Arthur Marin, NESCAUM, 2005. Copy attached.

Low Sulfur Heating Oil in the Northeast States: An Overview of Benefits, Costs and Implementation Issues, NESCAUM, December 2005, located at: <https://www.nescaum.org/activities/major-reports>.

MARAMA Workshop on Energy and Air Quality Issues, PowerPoint Presentation, September 23, 2008, Arthur Marin, NESCAUM. Copy attached.

NESCAUM Evaluation for MANE-VU (2005 NESCAUM evaluation). Copy attached.

2008 Northeast Heating Oil Assessment, National Oilheat Research Alliance (NORA) (2008 NORA Assessment), Hart Energy Consulting. Copy attached.

Pennsylvania Department of General Services fuel report by email November 21, 2017. Copy attached.

Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) Concerning a Course of Action within MANE-VU Toward Assuring Reasonable Progress, June 20, 2007, David Littell, Chair, MANE-VU, and Commissioner, Maine Department of Environmental Protection, located at: [https://otcair.org/MANEVU/Upload/Publication/Formal%20Actions/Statement%20on%20Controls%20in%20MV\\_072007.pdf](https://otcair.org/MANEVU/Upload/Publication/Formal%20Actions/Statement%20on%20Controls%20in%20MV_072007.pdf)

Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) States Concerning a Course of Action within MANE-VU Toward Assuring Reasonable Progress for the Second Regional Haze

Implementation Period (2018-2028), August 25, 2017, David Foerter, Executive Director, MANE-VU/OTC, located at: <https://otcair.org/MANEVU/Upload/Publication/Formal%20Actions/MANE-VU%20Intra-Regional%20Ask%20Final%208-25-2017.pdf>

U.S. Energy Information Administration State Energy Profiles (<https://www.eia.gov/state/?sid=PA>)

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

- |   |                                 |
|---|---------------------------------|
| A. The length of the public comment period:   | <u>66 days</u>                  |
| B. The date or dates on which any public meetings or hearings were held:                      | <u>August 6, 7, and 8, 2019</u> |
| C. The expected date of delivery of the final-form regulation:                                | <u>Quarter 1, 2020</u>          |
| D. The expected effective date of the final-form regulation:                                  | <u>Quarter 2, 2020</u>          |
| E. The expected date by which compliance with the final-form regulation will be required:     | <u>September 1, 2020</u>        |
| F. The expected date by which required permits, licenses or other approvals must be obtained: | <u>N/A</u>                      |

**(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 final-form regulation, since it is needed for the Department to carry out its statutory authority. The Department will closely monitor this final-form rulemaking after promulgation as a final-form regulation for its effectiveness and recommend updates to the Board as necessary.

<sup>1</sup>U.S. Energy Information Administration, State Energy Profiles

<sup>2</sup>NESCAUM report: “Low Sulfur Heating Oil in the Northeast States: An Overview of Benefits, Costs and Implementation Issues,” December 2005, page 3-1.

<sup>3</sup>NESCAUM report: “Low Sulfur Heating Oil in the Northeast States: An Overview of Benefits, Costs and Implementation Issues,” December 2005, pages 3-2 and 3-3.

<sup>4</sup>NESCAUM report: “Low Sulfur Heating Oil in the Northeast States: An Overview of Benefits, Costs and Implementation Issues,” December 2005, page 3-1.

<sup>5</sup>“Northeast Heating Oil Assessment” by Hart Energy Consulting for National Oilheat Research Alliance, March 2008, page 36.

<sup>6</sup> U.S. Energy Information Administration, “Heating Oil Explained,” at [https://www.eia.gov/energyexplained/index.cfm?page=heating\\_oil\\_home](https://www.eia.gov/energyexplained/index.cfm?page=heating_oil_home).

<sup>7</sup>U.S. Energy Information Administration, New York Harbor Low Sulfur No. 2 Diesel Spot Price and No. 2 Heating Oil Spot Price, (annual), obtainable from EIA Petroleum Navigator at <https://www.eia.gov/petroleum/data.php#prices>.

<sup>8</sup>Pennsylvania Department of General Services fuel report by email, November 21, 2017.

<sup>9</sup>U.S. Energy Information Administration, New York Harbor Low Sulfur No. 2 Diesel Spot Price and No. 2 Heating Oil Spot Price, (annual), obtainable from EIA Petroleum Navigator at <https://www.eia.gov/petroleum/data.php#prices>.