7.13 Air Quality

7.13 AIR QUALITY

7.13.1 Introduction

This chapter assesses the effects on air quality from implementation of the Preferred Alternative as described in this Tier 1 Final Environmental Impact Statement (Tier 1 Final EIS). Human activity affects ambient air quality via production of air pollutants, including emissions by mobile and stationary sources. Mobile-source emissions refer to emissions from transportation sources. Stationary source emissions refer to emissions from fixed facilities. The No Action Alternative and Preferred Alternative could affect air emissions and greenhouse gas (GHG) emissions—and thus air quality—via operational changes in the following:

- Vehicle-miles traveled (VMT) – regional traffic (potential mode shift from autos to rail)
- Train-miles traveled (potential changes in power and fuel requirements)
- Local traffic (potential shifts in traffic, particularly near station locations)
- Bus and air travel (potential mode shift from buses and planes to rail)

The summation of these changes will reflect the overall impact of the Preferred Alternative on the following:

- Criteria air quality pollutants
- Mobile-source air toxics
- GHG emissions

The FRA used MOVES2010b[1] to ensure consistent modeling between the analysis for the Tier 1 Draft EIS Action Alternatives (Volume 2) and the subsequent analysis for the Tier 1 Final EIS Preferred Alternative (Volume 1). MOVES2014 (or the most current model) will be used for subsequent Tier 2 project analyses.

Volume 2, Chapter 7.14 and Appendix E.14, provide background and more detailed information on terms related to air quality, attainment status, monitoring data, and the effects-assessment methodology used.

7.13.2 Resource Overview

Analysis indicates that implementation of the Preferred Alternative would result in net benefits to air quality within the Study Area. The FRA's modeling predicts a decrease in regional pollutant burdens from roadways caused by the expected decrease in roadway VMT (autos) and an increase in regional pollutant burdens from power sources (diesel fuel and electric) due to increased train service under the Preferred Alternative. The combined (net) effect of these elements is a predicted decrease in all criteria pollutant burdens, with the exception of SO_2. The predicted reduction in roadway VMT associated with the Preferred Alternative also results in an overall beneficial effect on mobile-source air toxics (MSAT). Overall, the net total GHG would decrease under the Preferred Alternative.

[1] The FRA calculated vehicle emission factors using the EPA's MOVES2010b mobile-source emissions modeling program, which estimates emissions and GHGs for mobile sources.

7.13.3 Criteria Pollutants

7.13.3.1 Affected Environment

As required by the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA) publishes a list of all geographic areas in compliance and not attaining the National Ambient Air Quality Standards (NAAQS) (nonattainment areas) for each criteria pollutant. Table 7.13-1 summarizes these standards. Areas that have insufficient data to make a determination are deemed unclassified, and are treated as being attainment areas until proven otherwise. Maintenance areas were previously designated as nonattainment for a particular pollutant but have since demonstrated compliance with the NAAQS for that pollutant. An area's designation is based on the data collected by the state monitoring network on a pollutant-by-pollutant basis. Table 7.13-2 lists all counties within the Affected Environment and identifies those that are nonattainment or maintenance for at least one pollutant. Table 7.13-3 lists the major sources of these pollutants. Volume 2, Appendix E.13, contains detailed ambient air quality monitoring data for the Study Area and attainment status information as well as current and future energy profiles.

Preferred Alternative

Almost every county within the Affected Environment of the Preferred Alternative is nonattainment or maintenance for at least one pollutant. However, all counties in Rhode Island are attainment for all criteria pollutants.

Below is information about the attainment status of counties through which new or upgraded segments (off of the Existing NEC) of the Preferred Alternative run:

- **Elements South of New York City**
  - **Maryland/Delaware – Bayview to Newport (new segment) –** Baltimore City, Baltimore, Harford, and Cecil Counties, MD, and New Castle County, DE, are all designated as nonattainment for at least one criteria pollutant.
  - **Delaware – Wilmington Segment (bypasses Wilmington Station) –** New Castle County is designated as nonattainment for at least one criteria pollutant.
  - **Pennsylvania – Philadelphia Segments (new segments) –** Philadelphia County is designated as nonattainment for at least one criteria pollutant.
  - **New Jersey – New Brunswick to Secaucus (new segment) –** Middlesex County and Hudson County are both designated as nonattainment for at least one criteria pollutant.
  - **New Jersey – Secaucus/Bergen loop (new segment) –** Hudson County is designated as nonattainment for at least one criteria pollutant.

Table 7.13-1: National Ambient Air Quality Standards

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide		Primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hours	35 ppm	
Lead		Primary and Secondary	Rolling 3-month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide		Primary	1 hour	100 ppb	98th percentile, averaged over 3 years
		Primary and Secondary	Annual	53 ppb (2)	Annual Mean
Ozone		Primary and Secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution	$PM_{2.5}$	Primary	Annual	12 µg/m^3	Annual mean, averaged over 3 years
		Secondary	Annual	15 µg/m^3	Annual mean, averaged over 3 years
		Primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide		Primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

Source: U.S. Environmental Protection Agency Office of Air and Radiation. (2015). *NAAQS Table.* Accessed April 2016 at *https://www.epa.gov/criteria-air-pollutants/naaqs-table*

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m3 as a calendar quarter average) also remain in effect.

(2) The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

(4) The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the require NAAQS.

ppm = parts per million

ppb = parts per billion

Table 7.13-2: Affected Environment: Air Quality Attainment Status (2016)

Geography	County	Attainment Status: *Nonattainment or Maintenance for at least one criteria pollutant?*	
		Existing NEC + Hartford/Springfield Line	**Preferred Alternative**
D.C.		Yes	Yes
MD	Prince George's	Yes	Yes
	Anne Arundel		
	Baltimore City		
	Baltimore County		
	Harford		
	Cecil		
DE	New Castle	Yes	Yes
PA	Delaware	Yes	Yes
	Philadelphia		
	Bucks		
NJ	Mercer	Yes	Yes
	Middlesex		
	Union		
	Essex		
	Hudson		
NY	New York	Yes	Yes
	Queens		
	Kings	—	Yes
	Bronx	Yes	Yes
	Putnam	—	—
	Westchester	Yes	Yes
CT	Fairfield	Yes	Yes
	New Haven		
	Middlesex		
	New London		
	Hartford	—	Yes
RI	Washington	**No**	**No**
	Kent		
	Providence		
MA	Bristol	**No**	—
	Hampden	—	Yes
	Norfolk	Yes	Yes
	Suffolk		

Source: U.S. Environmental Protection Agency. (2016April). *Green Book Nonattainment Areas for Criteria Pollutants*. Accessed June 2016 at *https://www3.epa.gov/airquality/greenbook/index.html*
National Archives and Records Administration. (2016, June). *Federal Registry.* Accessed June 2016 at https://www.federalregister.gov/
— = County is not in the Affected Environment for the alternative.

Table 7.13-3: Affected Environment: Primary Source of Air Pollutants (2011)

Geography	County	CO	VOC	NO_x	PM10	PM2.5	SO_2
D.C.		Mobile	Solvent	Mobile	Dust	Fuel combustion	Fuel combustion
MD	Prince George's	Mobile	Biogenics	Mobile	Dust	Fuel combustion	Fuel combustion
	Anne Arundel						
	Baltimore City		Solvent				
	Baltimore County		Mobile				
	Harford		Biogenics			Mobile	
	Cecil						
DE	New Castle	Mobile	Mobile	Mobile	Dust	Fuel combustion	Fuel combustion
PA	Delaware	Mobile	Mobile	Mobile	Dust	Fuel combustion	Fuel combustion
	Philadelphia		Solvent				
	Bucks		Mobile				
NJ	Mercer	Mobile	Biogenics	Mobile	Dust	Fuel combustion	Fuel combustion
	Middlesex		Mobile				
	Union						Mobile
	Essex		Solvent				Fuel combustion
	Hudson				Fuel combustion		
NY	New York	Mobile	Solvent	Mobile	Fuel combustion	Fuel combustion	Fuel combustion
	Queens						
	Kings				Dust	Mobile	
	Nassau		Mobile			Fuel combustion	
	Suffolk						
	Bronx		Solvent			Mobile	
	Putnam		Biogenics			Dust	
	Westchester		Mobile			Fuel combustion	
CT	Fairfield	Mobile	Mobile	Mobile	Dust	Fuel combustion	Fuel combustion
	New Haven						
	Middlesex		Biogenics				
	New London						
	Hartford		Mobile				
	Tolland		Biogenics				
	Windham						
RI	Washington	Mobile	Biogenics	Mobile	Dust	Fuel combustion	Fuel combustion
	Kent						
	Providence						
MA	Bristol	Mobile	Biogenics	Mobile	Dust	Dust	Fuel combustion
	Hampden		NA			NA	
	Norfolk		Mobile			Fuel combustion	
	Suffolk		Solvent				

Source: U.S. Environmental Protection Agency. (2011). *Air Emission Sources*. Accessed April 2016 at *https://www3.epa.gov/air/emissions/index.htm*
NA = information not available

- **Elements North of New York City**
  - **New York/Connecticut – New Rochelle to Greens Farm (new segment) –** Westchester County, NY, and Fairfield County, CT, are both designated as nonattainment for at least one criteria pollutant.
  - **Connecticut/Rhode Island – Old Saybrook Kenyon (new segment) –** Middlesex and New London Counties, CT, and Washington County, RI, are designated as nonattainment for at least one criteria pollutant.
  - **Connecticut/Massachusetts – Hartford/Springfield Line (upgraded track/electrification) –** New Haven and Hartford Counties, CT, and Hampden County, MA, are designated as nonattainment for at least one criteria pollutant.

7.13.3.2 Environmental Consequences

The FRA's modeling predicts a decrease in regional pollutant burdens from roadways caused by the expected decrease in roadway VMT (autos) and an increase in regional pollutant burdens from power sources (diesel fuel and electric) due to increased train service under the Preferred Alternative. As shown in Table 7.13-4, the combined (net) effect of these elements is a predicted decrease in all criteria pollutant burdens, with the exception of SO_2.

The primary reason for the increase in SO_2 is the increased electrical power requirements resulting from additional trains under the Preferred Alternative. The predicted increase in SO_2 would account for less than 0.1 percent of SO_2 emission burdens currently generated in the Study Area. This relatively small change is expected to have little impact on overall ambient pollutant concentrations. In addition the vast majority of the Study Area is classified as attainment for SO_2. However, these estimates for emission burdens generated by future power use are conservative since they are based on current emission profile information obtained from the EPA's eGRID and national emission inventory databases; in actuality, a cleaner energy profile will likely exist in the future due to the adoption or increase of renewable portfolio standards by the states within the Study Area. As shown in Table 7.13-5, all states within the Study Area have adopted renewable energy goals. For all states, achievement of these renewable energy targets are expected by 2040.

Refer to Volume 2, Appendix E.13, for a detailed methodology on the following future energy profile analysis.

The results presented in Table 7.13-6 reflect the impacts of the Preferred Alternative based upon this future emission profile for electrical generation. As shown in this table, the Preferred Alternative would have smaller absolute air quality impacts under a predicted future energy profile, as compared to the impacts expected if the energy profile were to remain the same as that that exists today. The reduced air quality impacts would result in an overall reduction in all criteria pollutant burdens, with the exception of SO_2. The predicted increase in SO_2 would account for less than 0.1 percent of SO_2 emission burdens currently generated in the Study Area.

Table 7.13-4: 2040 Changes in Criteria Pollutant Burdens (tons/year) – Existing Energy Profile

Pollutant	Project Element	Preferred Alternative
CO	Roadways	-6,085
	Diesel Trains	5
	Electric Trains	40
	TOTAL	**-6,040**
VOC	Roadways	-80
	Diesel Trains	1
	Electric Trains	4
	TOTAL	**-75**
NO_x	Roadways	-405
	Diesel Trains	5
	Electric Trains	170
	TOTAL	**-225**
PM_{10}	Roadways	-95
	Diesel Trains	1
	Electric Trains	20
	TOTAL	**-75**
$PM_{2.5}$	Roadways	-40
	Diesel Trains	1
	Electric Trains	20
	TOTAL	**-25**
SO_2	Roadways	-15
	Diesel Trains	1
	Electric Trains	385
	TOTAL	**370**

Source: NEC FUTURE team, 2016

Table 7.13-5: Renewable Energy Targets by Geography

Geography	Current Percentage of Renewable Energy	Percentage Renewable Energy Target	Percentage Increase Applied to Current Profile
D.C.	0%	20%	20%
MD	5%	20%	15%
DE	1%	25%	24%
PA	3%	18%	15%
NJ	1%	25%	24%
NY	20%	50%	30%
CT	1%	27%	26%
RI	0%	16%	16%
MA	4%	20%	16%

Sources: U.S. Energy Information Administration. Accessed April 2016 at *http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_sum/html/sum_btu_eu.html&sid=MD*; National Conference of State Legislatures, *State Renewable Portfolio Standards and Goals*. Accessed April 2016 at *http://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx*

Table 7.13-6: Changes in Criteria Pollutant Burdens – Preferred Alternative – Future Energy Profile (2040)

Pollutant	Project Element	Tons/Year
CO	Roadways	-6,085
	Diesel Trains	5
	Electric Trains	35
	TOTAL	**-6,045**
VOC	Roadways	-80
	Diesel Trains	1
	Electric Trains	3
	TOTAL	**-75**
NO_x	Roadways	-405
	Diesel Trains	5
	Electric Trains	140
	TOTAL	**-260**
PM_{10}	Roadways	-95
	Diesel Trains	1
	Electric Trains	15
	TOTAL	**-75**
$PM_{2.5}$	Roadways	-40
	Diesel Trains	1
	Electric Trains	15
	TOTAL	**-25**
SO_2	Roadways	-15
	Diesel Trains	1
	Electric Trains	310
	TOTAL	**295**

Source: NEC FUTURE team, 2016

Several other items suggest that future energy profiles will continue to improve and result in fewer emissions:

- The EPA's Clean Power Plan[2] will reduce pollutants that contribute to soot and smog by over 20 percent in 2030, including SO_2 and NO_2.[3]
- The use of regenerative braking would reduce the energy use, and resulting power plant emissions, from the electric trains. Regenerative braking is the process during which the train's electric traction motors are utilized as generators during a brake application. This regenerated electricity can be used to power other trains drawing power within the network. The regenerated power can also be returned to the electrical utility grid using bi-directional traction power substations. Trains with high brake duty cycles can recover upwards of 15 percent of the total consumed electricity. High-speed trains can recover approximately 5–10 percent of the total electricity consumed, a value that is reduced by the longer distances between stations and fewer station stops.
- Today, Amtrak directly receives a portion of their electrical requirements from the hydroelectric generators operating at the Safe Harbor Dam in Pennsylvania. The Safe Harbor Dam has two 28 megawatt turbines that are dedicated to generating power for Amtrak's use. Due to the nature of the power grid and the Preferred Alternative, it is not possible to reliably determine what percentage of the Preferred Alternative's power requirements would come from the Safe Harbor Dam system. As such, emission estimates from electrical usage are conservative because they are based on statewide values, which assume only a percentage of renewable power generation rather than a direct portion of electrical usage coming from a renewable source.
- As discussed in Chapter 5, Transportation, implementation of the Preferred Alternative would create a shift in demand from aircraft and bus trips servicing the corridor to rail trips, as compared to the No Action Alternative. As such, the shift in travel mode choice is likely to result in a decrease in criteria pollutant emissions from aircraft and buses under the Preferred Alternative; however, it is not within the scope of this analysis to make quantitative predictions regarding the level of decrease in emissions.

The FRA did not conduct a quantitative analysis of the impacts to air quality from construction of the Preferred Alternative, since a detailed construction schedule, along with estimates of construction equipment and activities, are not developed as part of NEC FUTURE. However, construction of the Preferred Alternative would result in temporary emissions of criteria pollutants associated with construction equipment and activities. Local levels of criteria pollutants could also increase near station locations and parking facilities caused by vehicles queuing at these locations.

[2] *Federal Register*, Vol. 80, No. 205 (October 2015). Accessed at *https://www.gpo.gov/fdsys/pkg/FR-2015-10-23/pdf/2015-22842.pdf*

[3] The FRA recognizes that the Supreme Court stayed implementation of the Clean Power Plan in February 2016, pending judicial review of legal challenges to the rule. This analysis assumes that states will continue to voluntarily comply with the Clean Power Plan during the stay and that the Clean Power Plan will be upheld.

7.13.4 Mobile-Source Air Toxics

7.13.4.1 Affected Environment

In addition to the criteria pollutants for which there are NAAQS, the EPA also regulates air toxics. Toxic air pollutants are those pollutants known or suspected to cause cancer or other serious health effects. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

Refer to Volume 2, Chapter 7.13, for a detailed discussion on MSATs.

7.13.4.2 Environmental Consequences

Reduction in roadway VMT results in an overall beneficial effect on MSAT. Although the No Action Alternative will not affect VMT in the Affected Environment, MSAT emissions will likely be lower than present levels in the design year; this reduction will be due to the EPA's national control programs, which are projected to reduce annual MSAT emissions by over 80 percent from 2010 to 2050.[4] In addition to those reductions in annual MSAT emissions, the Preferred Alternative would reduce roadway VMT; therefore, a further reduction in MSAT would occur within the Affected Environment.

Construction of the Preferred Alternative could result in temporary, localized emissions of MSAT associated with construction equipment and activities. Local levels of MSAT could also increase near station locations and parking facilities.

7.13.5 Greenhouse Gas Emissions

7.13.5.1 Affected Environment

To date, no national standards have been established regarding GHGs, nor has the EPA established criteria or thresholds for ambient GHG emissions pursuant to its authority to establish motor-vehicle emission standards for CO_2 under the CAA. However, there is a considerable body of scientific literature addressing the sources of GHG emissions and their adverse effects on climate, including reports from the Intergovernmental Panel on Climate Change, the U.S. Global Change Research Program, the U.S. National Academy of Sciences, and the EPA as well as other federal agencies.

On February 18, 2010, the White House Council on Environmental Quality (CEQ) released draft guidance regarding the consideration of GHG in National Environmental Policy Act (NEPA) documents for federal actions; updated draft guidance was subsequently released in December 2014 (CEQ 2014). The 2014 draft guidance:

- Encourages agencies to draw from their experience and expertise to determine the appropriate level (broad, programmatic or project- or site-specific) and type (quantitative or qualitative) of GHG impact analysis required to comply with NEPA.

[4] Federal Highway Administration. (2013, February 2). *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA - Appendix B*. Retrieved from Air Quality: Transportation and Toxic Air Pollutants: *http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/aqintguidapb.cfm*

- Focuses analysis on the projects and actions with the greatest impacts by providing a reference point of 25,000 metric tons of CO_2-equivalent emissions on an annual basis below which a project's NEPA analysis is not recommended to include quantitative analysis of GHG emissions unless it is easily accomplished.
- Counsels agencies to use the information developed during the NEPA review to consider alternatives that are more resilient to the effects of a changing climate.
- Advises agencies to use existing information and science when assessing proposed actions, and highlights tools and methodologies that are available to them for conducting their analyses.

Furthermore, on August 1, 2016, the Council on Environmental Quality issued final guidance on consideration of GHG emissions and the effects of climate change in National Environmental Policy Act documents.[5] This guidance states that "when addressing climate change agencies should consider: (1) The potential effects of a proposed action on climate change as indicated by assessing GHG emissions (e.g., to include, where applicable, carbon sequestration); and, (2) The effects of climate change on a proposed action and its environmental impacts." GHG emissions and the vulnerability of rail assets are considered in Chapter 7.15, Climate Change.

GHGs are different from other air pollutants evaluated in federal environmental reviews because their impacts are not localized or regional due to their rapid dispersion into the global atmosphere, which is characteristic of these gases. GHG emissions affect the entire planet. Table 7.13-7 highlights the total existing ambient GHG emissions from the commercial, electric power, residential, industrial and transportation sectors within the Study Area.

Table 7.13-7: Greenhouse Gas Emissions by Geography (2013)

Geography	Greenhouse Gas Emissions (million metric tons $C0_2$)
D.C.	3
MD	58
DE	13
PA	244
NJ	105
NY	160
CT	34
RI	10
MA	65

Source: U.S. Energy Information Administration. Accessed April 2016 at *http://www.eia.gov/environment/emissions/state/analysis/*

Refer to Volume 2, Chapter 7.13, for a detailed explanation of GHGs.

[5] Council on Environmental Quality, "Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews," 81 Fed. Reg. 51866 (August 5, 2016). Access at *http://energy.gov/sites/prod/files/2016/08/f33/nepa_final_ghg_guidance_FR.pdf*

7.13.5.2 Environmental Consequences

Table 7.13-8 presents the changes in GHGs in the Study Area due to the implementation of the Preferred Alternative, in terms of CO_2e, in the year 2040. The changes in CO_2e are presented for roadways, diesel trains, and electric trains.

Table 7.13-8: 2040 Changes in CO_2e – Preferred Alternative – Existing Energy Profile

Project Element	Tons/Year*
Roadways	-979,110
Diesel Trains	2,335
Electric Trains	262,935
TOTAL	**-713,840**

Source: NEC FUTURE team, 2016
*Presents changes due to the Preferred Alternative, and does not consider ambient GHG emissions.

As shown in Table 7.13-8, CO_2e from roadways would decrease under the Preferred Alternative, whereas the CO_2e from electric trains would increase. Overall, the net total GHGs would decrease under the Preferred Alternative. For the No Action Alternative, changes in CO_2e will reflect future regulations and VMT growth. As shown in Table 7.13-9, the CO_2e reductions would be even greater assuming the future energy profile, due to the implementation of the Preferred Alternative.

Table 7.13-9: 2040 Changes in CO_2e – Preferred Alternative – Future Energy Profile

Project Element	Tons/Year*
Roadways	-979,110
Diesel Trains	2,335
Electric Trains	210,505
TOTAL	**-766,270**

Source: NEC FUTURE team, 2016
*Presents changes due to the Preferred Alternative, and does not consider ambient GHG emissions.

Additionally, the EPA's Clean Power Plan,[6] if implemented as finalized in October 2015, would reduce carbon pollution by 32 percent by 2030. The Supreme Court stayed implementation of the final rule in February 2016, pending judicial review of legal challenges. Despite the stay, some states are moving forward with compliance with the final rule, and the EPA is encouraging voluntary state action in compliance with the rule. States, including those in the Study Area, that have already invested in energy efficiency programs will be able to build on these programs to help make progress toward meeting their targets.

The use of regenerative braking, as described in Section 7.13.3.2, would reduce the energy use, and resulting power plant CO_2e emissions, from the electric trains.

As discussed in Chapter 5, Transportation, investment in the NEC FUTURE passenger rail infrastructure would create a shift in demand from aircraft and bus trips servicing the corridor to rail

[6] *Federal Register*, Vol. 80, No. 205 (October 2015). Accessed at *https://www.gpo.gov/fdsys/pkg/FR-2015-10-23/pdf/2015-22842.pdf*

trips, when comparing the No Action Alternative to the Preferred Alternative. This mode shift from aircraft and bus trips to rail trips would remove some aircraft and buses from the NEC. As such, CO_2e from aircraft and buses would decrease under the Preferred Alternative.

The FRA did not conduct a quantitative analysis of the impacts to air quality of construction of the Preferred Alternative, as a detailed construction schedule, along with estimates of construction equipment and activities, are unknown at the Tier 1 level. However, construction of the Preferred Alternative would result in temporary CO_2e emissions associated with construction equipment and activities.

7.13.6 Comparison to the Action Alternatives

Overall, the reductions in criteria pollutants under the Preferred Alternative would be greater than the reductions under the Action Alternatives. The only exception is SO_2, with Alternatives 1 and 2 performing better than the Preferred Alternative. The reductions in CO_2e under the Preferred Alternative would also be greater than the reductions under the Action Alternatives.

7.13.7 Potential Mitigation Strategies

Examples of programmatic mitigation measures for air quality include the incorporation of Environmental Performance Measures in Tier 2 alternatives, including solar panels on stations and other buildings, as well as the use of renewable energy. With regards to construction activities, potential mitigation could involve voluntary emission reduction agreements, as well as the use of electric, energy efficient or low-emissions equipment. Specific mitigation concerning air quality impacts during construction, such as fugitive dust from earth moving and pollutants from construction equipment, would also be investigated. The following are examples of potential mitigation measures:

- **Site Preparation**
  - Minimize land disturbance.
  - Water site a minimum of three times per day.
  - Cover trucks when hauling dirt.
  - Stabilize the surface of dirt piles if they are not removed immediately.
  - Use windbreaks to prevent accidental dust pollution.
  - Limit vehicular paths and stabilize temporary roads.
  - Pave all unpaved construction roads and parking areas to road grade for a length of no less than 50 feet from where such roads and parking areas exit the construction site to prevent dirt from washing onto paved roadways.
- **Construction**
  - Equip applicable construction equipment with emission control devices such as diesel particulate filters, idle reduction, and exhaust retrofit technology.
  - Cover trucks when transferring materials.
  - Use dust suppressants on unpaved traveled paths.

- Minimize unnecessary vehicular and machinery activities.
- Minimize dirt track-out by washing or cleaning trucks before leaving the construction site. An alternative to this strategy is to pave a few hundred feet of the exit road just before entering the public road.
- Use ultra-low sulfur diesel fuel for all diesel equipment.
- Use cleanest available (Tier 4) equipment.

- **Post-Construction**
  - Re-vegetate any disturbed land not used.
  - Remove unused material.
  - Remove dirt piles.
  - Re-vegetate all vehicular paths created during construction to avoid future off-road vehicular activities.

7.13.8 Subsequent Tier 2 Analysis

Project-level Tier 2 analyses will include more-detailed evaluation of site-specific air quality impacts, where appropriate, as well as updated and refined regional and GHG analyses, as appropriate. Subsequent Tier 2 analyses will determine the benefits at the individual project level. The EPA has requested that subsequent Tier 2 project analyses also examine the effects of idling freight trains to the extent practicable. Part of the Tier 2 analyses will include the following:

- **Regional Analysis** – A refined regional air quality analysis will be conducted to demonstrate the proposed project's impact on regional air quality levels. The analysis will be conducted for the No Action Alternative and Preferred Alternative and will be based on daily VMT and associated average network speeds. Emission factors will be calculated using the EPA's most current approved emission factor program (assumed to be MOVES2014) with the appropriate local area parameters. If the project is predicted to affect plane traffic or power generation, the air quality impact of these elements will also be quantitatively evaluated.
- **SIP Conformity** – Energy requirements of the fleet will be refined along with future emission factors from electrical generation. It will be determined if the project conforms with the applicable SIPs.
- **MSAT Analysis** – An MSAT analysis will be conducted according to the Federal Highway Administration's (FHWA) most current MSAT guidance at the time of the analysis. This will most likely include a regional MSAT analysis.
- **Greenhouse Gas Analysis** – The changes the proposed project has on GHG emissions will be refined using the recommended FHWA and/or EPA guidance at the time of analysis. The analysis will be conducted for the No Action Alternative and Preferred Alternative and will be based on daily VMT and associated average network speeds. Emission factors will be calculated using the EPA's most current approved emission factor program (assumed to be MOVES2014) with the appropriate local area parameters. If the project is predicted to affect plane traffic or power generation, the GHG impact of these elements will also be quantitatively evaluated.
- **Local Analysis** – Based on the area's attainment status and the project's proposed traffic impacts, particularly near station locations and at grade crossings, a CO and $PM_{2.5}$/PM_{10} hot-spot analysis

will be conducted following the latest local, state, and federal guidance. For particulate matter, the latest EPA guidance is the *Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas.*[7] For CO, the latest guidance is *Using MOVES in Project-Level Carbon Monoxide Analyses.*[8] Microscale CO and $PM_{2.5}$/PM_{10} will be compared to the applicable NAAQS to determine if the project causes or exacerbates a violation of the applicable NAAQS.

- **Construction Analysis** – Based on the location of construction sites, staging areas, sensitive receptors, and the construction schedule, an analysis of local construction-related air quality impacts will be conducted. Emission burdens from construction equipment and activities will be generated using project-specific operating parameters and emission rates derived from the EPA's NONROAD Model[9] and AP-42.[10] Local air quality concentrations will be predicted at appropriate sensitive receptors using the EPA's AERMOD[11] program along with location and project-specific parameters.
- **Conformity** – Required transportation or general conformity analyses and any necessary determinations will be completed for the project. In November 1993, the EPA promulgated two sets of regulations to implement Section 176(c) of the Clean Air Act. First, on November 24, the EPA promulgated the Transportation Conformity Regulations, which apply to highways and mass transit. Transportation conformity is required by the Clean Air Act section 176(c) (42 U.S.C. 7506(c)) to ensure that federal funding and approval are given to highway and transit projects that are consistent with ("conform to") the air quality goals established by a state air quality implementation plan (SIP). Conformity, to the purpose of the SIP, means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the national ambient air quality standards.

  On November 30, the EPA promulgated a second set of regulations, known as the General Conformity Regulations, which apply to all other federal actions. These regulations ensured that other federal actions also conformed to the SIPs (*58 FR 63214*). The purpose of the General Conformity Rule is to:

  – Ensure that federal activities do not cause or contribute to new violation of NAAQS.
  – Ensure that actions do not cause adpditional or worsen existing violations of or contribute to new violations the NAAQS.
  – Ensure that attainment of the NAAQSs is not delayed.

[7] U.S. Environmental Protection Agency. (2013). *Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas.* Retrieved from *http://www.epa.gov/otaq/stateresources/transconf/policy/420b13053-sec.pdf*

[8] U.S. Environmental Protection Agency. (2010). *Using MOVES in Project-Level Carbon Monoxide Analyses.* Retrieved from *http://www.epa.gov/otaq/stateresources/transconf/policy/420b10041.pdf*

[9] U.S. Environmental Protection Agency. NONROAD Model. Retrieved from *http://www.epa.gov/oms/nonrdmdl.htm*

[10] U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors. Retrieved from *http://www.epa.gov/oms/ap42.htm*

[11] U.S. Environmental Protection Agency. Preferred/Recommended Models. Retrieved from *http://www.epa.gov/scram001/dispersion_prefrec.htm*