

28. Greenhouse House Gas Emissions and Climate Change

28.1. Chapter Overview

28.1.1. Introduction

This chapter discusses greenhouse gas (GHG) emissions and the effect of climate change. GHG are gases that trap heat in the atmosphere. In 2009, the Environmental Protection Agency (EPA) issued a finding that the changes in our climate caused by elevated concentrations of greenhouse gases in the atmosphere are reasonably anticipated to endanger the public health and public welfare of current and future generations.

GHG emissions and climate change have been addressed through various efforts at the federal and state level. Executive Order 13693, *Planning for Federal Sustainability in the Next Decade*, signed on March 19, 2015, sets a goal of 40 percent reduction in GHG emissions by implementing more efficient federal agency operations. It focuses on reducing GHGs internally in federal agency missions, programs, and operations. On August 1, 2016 the Council on Environmental Quality (CEQ) issued their *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*, (final CEQ Guidance). The final CEQ Guidance requires Federal agencies, such as the Federal Transit Administration (FTA), to include in their National Environmental Policy Act (NEPA) reviews for proposed actions the consideration of greenhouse gas emissions from the proposed action, and the effect of climate changes on the proposed action. The New Jersey Global Warming Response Act (GWRA), enacted in 2007, mandates the reduction of GHG emissions to 1990 levels by 2020, and to 80 percent below 2006 levels by 2050. The Global Warming Response Act Recommendation Report (December 2009), provides an outline of actions to be taken toward achieving these goals.

28.1.2. Summary of Findings of the SDEIS

To address the final CEQ Guidance requiring Federal agencies to include in their NEPA reviews the consideration of greenhouse gas emissions and climate changes, in this SDEIS, the FTA has added this new chapter to analyze GHG emissions and climate change, which were not evaluated in the DEIS, which predated the August 1, 2016 final CEQ Guidance.

The Preferred Alternative will result in an overall benefit to GHG emissions and climate change. The Preferred Alternative is consistent with federal, state, and regional policies aimed at reducing GHG emissions and addressing climate change. The operation of the Preferred Alternative will result in a net decrease in GHG emissions of 11,811.46 metric tons of CO₂ annually due to decreased automobile VMT resulting from the introduction of light rail service. Construction of the Preferred Alternative will result in an increase in GHG emissions of 10,279 metric tons of CO₂e annually during the construction period. These GHG emissions increases during construction will be short-term and temporary, and will be significantly offset in the future by the annual decreases in GHG emissions once light rail service is in operation. The potential for impacts on the Preferred Alternative from climate change resulting from greater sea-level rise and increased flooding will be addressed through the performance of a criticality assessment during preliminary engineering and the application of NJ TRANSIT's Flood Elevation Design Criteria where necessary.

28.2. Methodology

In accordance with the final CEQ Guidance, this chapter will consider:

- 1) The potential effects of the proposed action on climate change as indicated by an assessment of GHG emissions; and,
- 2) The effects of climate change on the proposed action and its environmental impacts.

The main GHGs that are emitted into the atmosphere as a result of human activity include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and fluorinated gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). Of these GHGs, carbon dioxide is the most prevalently emitted from human activities such as internal combustion and the burning of other fuel materials.

Given the global scope of the impacts of GHG emissions, and the incremental contribution of each single action to global concentrations, CEQ recommends that Federal agencies use the projected GHG emissions associated with the proposed action as a proxy for assessing the proposed actions' potential effects on climate change in the NEPA analysis. The CEQ final Guidance does not establish any particular quantity of GHG emissions as "significantly" affecting the quality of the human environment. Rather, the CEQ final guidance indicates that Federal agencies should in their NEPA documents disclose the GHG emissions and potential for climate change impacts for consideration by decision-makers along with the other reasonably foreseeable environmental effects of their proposed actions.

To estimate the anticipated GHG emissions from the operations of the Preferred Alternative, the change in vehicle miles traveled (VMT) as a result of the Preferred Alternative were estimated. The change in VMT includes a reduction for autos and an increase for light rail. The Preferred Alternative GHG emissions were calculated by multiplying the VMT of each type of vehicle by the GHG emission factors from the *Federal Transit Administration Capital Investment Grant Program Final Interim Policy Guidance* (June 2016). In addition, any potential considerations/impacts on the Preferred Alternative from climate change are described.

To estimate the anticipated GHG emissions from the construction of the Preferred Alternative, anticipated sources of construction GHG emissions are described. Anticipated GHG emissions as a result of the construction of the Preferred Alternative are estimated using the FHWA *Infrastructure Carbon Estimator (ICE)* model.

28.3. Environmental Review

28.3.1. No Build Alternative

The No Build Alternative includes projects in the regional transportation plan. The No Build Alternative assumes that there would be no reduction in auto VMT or an increase in rail VMT. Therefore, there would be no change in GHG emissions for the No Build Alternative. The Preferred Alternative would not exist; therefore, there would be no additional climate change considerations.

28.3.2. Preferred Alternative

28.3.2.1. Operations

The operation of the Preferred Alternative in 2030 will result in a net GHG emissions reduction in the region which will be beneficial to GHG and climate change impacts. GHG emissions were estimated using the GHG emission factors from the *Final Interim Policy Guidance Federal Transit Administration Capital Investment Grant Program* (FTA, June 2016) (Table 28-1). A summary of the GHG emissions from the regional vehicles (automobiles, light rail) is shown in Table 28-1.

Table 28-1: Preferred Alternative Annual Greenhouse Gas Emissions during Operations (metric tons CO₂e)

| Mode | VMT Decrease (Increase) | Conversion Factor: Emissions (ton)/ VMT | Emissions Decrease (Increase) tons |
|--------------|-------------------------|---|------------------------------------|
| Automobile | 33,880,000 | 0.000532 | 18,024.16 |
| Light Rail | (1,300,000) | 0.004779 | (6,212.70) |
| Total Change | 32,580,000 | -- | 11,811.46 |

Source: FTA Final Interim Policy Guidance Federal Transit Administration Capital Investment Grant Program (June 2016); NJ TRANSIT 2015; Jacobs 2016.

Note: The factor is CO₂ equivalents (CO₂e). This means that other greenhouse gas emissions (other than CO₂) that have different rates of affecting global warming are converted into CO₂ terms because that is the most prevalent greenhouse gas emission.

The Preferred Alternative would reduce regional automobile VMT by approximately 9,440 trips per day, or a reduction of approximately 34 million automobile VMT annually, resulting in a decrease in GHG emissions of 18,024.16 tons annually. The Preferred Alternative would increase regional light rail VMT by approximately 1.3 million annually, resulting in an increase in GHG emissions of 6,212.70 tons annually. The GHG emissions generated from the operation of the light rail service are offset by the GHG savings from the decrease in automobile emissions, resulting in an overall decrease in GHG emissions of 11,811.46 tons annually.

28.3.2.2. Construction

Construction of the Preferred Alternative is estimated to be four years. Construction of the Preferred Alternative will result in the emissions of GHG from both direct on-site construction and indirect upstream construction materials. Direct on-site construction emissions sources include on-site non-road construction engines and on-road engines from worker trips and trucks delivering and removing materials from the construction site. Indirect upstream construction emissions sources include emissions from the production and disposal of the materials used for construction; examples include the production of concrete and the manufacture of light rail vehicles. The emissions will be short-term and temporary during the construction period.

Construction GHG emissions were estimated using the FHWA Infrastructure Carbon Estimator (ICE) model. The ICE model estimates the lifecycle GHG emissions from the construction and maintenance of transportation facilities. The ICE model estimates construction emissions from both direct on-site construction and indirect upstream construction materials. Construction of the Preferred Alternative would include seven new stations and 20 miles of track, 19.4 miles of track at-grade and 0.6 miles of track on structure.

10,279 metric tons (MT) of carbon dioxide equivalent (CO₂e) emissions per year are estimated for the construction of the Preferred Alternative (Table 28-2). Increases in GHG emissions due to direct emissions from construction of the Preferred Alternative would be minimal. The majority of the GHG emissions would be from the indirect upstream emissions of raw material energy consumption for construction materials for the Preferred Alternative, such as extraction, production, and transportation.

Table 28-2: Preferred Alternative Annual Greenhouse Gas Emissions during Construction (metric tons CO₂e per year over four years)

| Construction Type | Bridges | Rail | Total |
|---|----------------|--------------|---------------|
| Upstream Emissions Materials | 680 | 8,482 | 9,162 |
| Direct Emissions Construction Equipment Routine Maintenance | 150 | 849 | 999 |
| Total | 830 | 9,331 | 10,279 |

Source: Jacobs 2016, FHWA Infrastructure Carbon Estimator (ICE) model.

28.3.2.3. Mitigation

Operation of the Preferred Alternative will result in annual decreases in GHG emissions; therefore, there will be no negative impacts that will require mitigation.

Construction of the Preferred Alternative will result in short-term and temporary GHG emissions from construction equipment and vehicles during the construction period. Use of Best Management Practices (BMPs) can reduce GHG emissions from construction activities. Potential BMPs include energy efficient construction vehicles and limiting vehicle and equipment idling time during construction.

28.4. Summary of Potential Environmental Effects

The operation of the Preferred Alternative will result in a net decrease in GHG emissions of 11,811 metric tons of CO₂ annually due to decrease automobile VMT resulting from the introduction of light rail service. Construction of the Preferred Alternative will result in an increase in GHG emissions of 10,279 metric tons of CO₂e annually during the construction period. These GHG emissions increases during construction will be short-term and temporary, and will be significantly offset in the future by the annual decreases in GHG emissions once light rail service is in operation. The Preferred Alternative will result in an overall benefit to GHG emissions and climate change. The Preferred Alternative is consistent with federal, state, and regional policies aimed at reducing GHG emissions and addressing climate change.

The analysis in this chapter was completed prior to the issuance of FTA's Programmatic Assessment of Greenhouse Gas Emissions from Transit Projects (FTA Report Number 0097), which FTA published on January 18, 2017. The findings of the analysis presented in this chapter are consistent with the Programmatic Assessment that light rail projects result in a net decrease in GHG emissions, and FTA and NJ TRANSIT hereby incorporate into this SDEIS the Programmatic Assessment by reference.