Chapter 13: Energy and Climate Change

13-1 INTRODUCTION

The effect of the Tappan Zee Hudson River Crossing Project's operation on greenhouse gas emissions and energy use and potential adverse effects of global climate change on project operations are assessed in this chapter. The project's operation would not substantially affect energy use and greenhouse gas emissions, and no quantified analysis is required. Energy use and greenhouse gas emissions associated with construction are analyzed in Chapter 18, "Construction Impacts," which also includes a description of the regulatory context and analysis methodology.

Subsequent to publication of the Draft Environmental Impact Statement, the New York State Thruway Authority (NYSTA) identified a modified tolling scheme for Tappan Zee Bridge users to assist in the funding of the Replacement Bridge Alternative. An analysis of the potential vehicle diversions that may result from the toll increases was prepared and is discussed in both Chapter 4, "Transportation," and Chapter 11, "Air Quality." Since this potential change would result in a net reduction in emissions, it is mentioned qualitatively in Section 13-2-2 of this chapter.

13-2 ENVIRONMENTAL EFFECTS

13-2-1 POTENTIAL IMPACTS OF GLOBAL CLIMATE CHANGE

13-2-1-1 PROJECTED SEA LEVEL RISE

The analysis of adverse effects of global climate change on the project focuses on potential changes in sea level in the context of flooding and air draft limitation (the distance from the bottom of the bridge to mean high water). Existing scientific studies and information available from New York City and State sources were reviewed, and relevant information is presented. Due to the uncertain nature of predictions for future climate change effects, a range is presented. While future changes in other climate parameters, such as temperature, storm frequency, and precipitation, may have some effect on bridge maintenance, the projections for these parameters are much less certain at this time and are therefore not addressed.

The New York State Sea Level Rise Task Force has adopted projected sea level rise estimates based on the best available science.[1] In the lower Hudson Valley, sea levels are likely to increase by 12 to 23 inches by the end of the century, with possible increase up to 55 inches in the event of rapid ice melt. In general, the probability of sea levels increasing is characterized as "extremely likely," but there is high uncertainty regarding the probability of a rapid ice melt scenario. Intense hurricanes are

1 New York State Sea Level Rise Task Force, Report to the Legislature, December 31, 2010.

characterized as "more likely than not" to increase in intensity and/or frequency, and the likelihood of changes in other large storms ("Nor'easters") is characterized as "unknown." Therefore, the projections for future 1-in-100 probability coastal storm surge levels for the area include only sea level rise at this time, and do not account for changes in storm frequency.

13-2-1-2 FLOODING EVENTS

Based on the above data, it is reasonable to assume that sea level and floodplains would rise by up to 2.0 feet by the end of the century, with a smaller chance of increases up to 4.5 feet. The elevation of the current 1-in-100 probability flooding event is 6.6 feet (NAVD88), and therefore, the 1-in-100 probability coastal flooding level by the end of the century is likely to be in the range of 8.6 to 11.1 feet. The lowest point along the bridge access is approximately 30 feet above this level (this occurs along the Rockland approach), and the bridge and its approaches would not be expected to flood in future coastal flooding events within a 1-in-100 probability per year (this is similar to the No Build Alternative).

Note that the 1-in-500 probability floodplain on the Rockland side in the area of the bridge approach (**Figure 15-5**) extends further upland on the steep slopes west of the Thruway (not parallel to the Hudson); flooding in that area is associated with sheet flow caused by heavy downpours,[1] not coastal flooding. Although it is likely that the frequency of heavy downpours events (very short events where precipitation would exceed 4 inches per day, currently once every three years on average) may be increased by climate change, there is currently no information to indicate if climate change would impact the most extreme events, occurring with a probability of less than 1-in-100.[2] Such infrequent flooding events would have a similar flooding effect in the Rockland bridge approach area as in the current condition, and are currently expected to occur with a probability ranging from 1-in-100 to 1-in-500 in any given year.

13-2-1-3 MARINE TRAFFIC

Sea level rise would reduce the air draft (the distance between the bottom of the bridge and the water) for ships traversing under the bridge by 2.0 feet by the end of the century, with a smaller chance of 4.5 feet. The current design would result in an air draft of 139 feet at mean high water when constructed (same as the existing bridge), which would likely be reduced due to sea level rise by 2.0 to 4.5 feet by the end of the century.

The design of the replacement bridge with an air draft of 139 feet (present day) was made in coordination with the United States Coast Guard (USCG) as part of the bridge permit application.

13-2-2 ENERGY AND GREENHOUSE GAS EMISSIONS

13-2-2-1 NO BUILD ALTERNATIVE

The No Build Alternative would not change energy use or greenhouse gas emissions. Vehicles using the facility would continue to do so, with emissions per vehicle declining

[1] FEMA, Flood Insurance Study, Village of South Nyack, New York Rockland County, 1981.

[2] New York City Panel on Climate Change, Climate Risk Information, 2009.

in future years (due to federal regulation of emissions and fuel economy for new vehicles) and total vehicle miles increasing (due to growth), potentially outpacing the emission reductions. Bridge maintenance would continue to require materials and energy use resulting in greenhouse gas emissions. NYSTA estimates that it would spend $1.3 billion to maintain and repair the bridge over the next decade. Major work activities would include seismic upgrades to portions of the bridge, navigational safety improvements, steel and concrete repairs, and other miscellaneous work to continue to keep the bridge safe for the traveling public. Furthermore, heavy congestion occurring due to vehicle accidents and breakdowns on the bridge, where no shoulder is available to clear the roadway, would persist, resulting in avoidable fuel consumption and greenhouse gas emissions.

13-2-2-2 REPLACEMENT BRIDGE ALTERNATIVE

As compared to the No Build Alternative, the Replacement Bridge Alternative would not increase traffic volumes or reduce vehicle speeds (see Chapter 4, “Transportation”). Therefore, fuel consumption and greenhouse gas emissions would be largely unaffected by the Replacement Bridge Alternative. However, a few features of the Replacement Bridge Alternative would result in some energy and greenhouse gas benefit as compared to the No Build Alternative:

- There are frequent accidents on the existing bridge, which can result in substantial vehicle delays, as described in Chapter 1, “Purpose and Need.” The existing bridge has lanes that range in width from 11 feet, 2 inches to 12 feet. All of the traffic lanes on the Replacement Bridge would be 12 feet wide, improving safety on the bridge. The bridge would also include wide shoulders for vehicles involved in accidents and breakdown incidents and for emergency vehicle access, improving the traffic flow and reducing the substantial delays that these incidents cause. Overall, the improvement in lane widths and the addition of shoulders would substantially improve incident management and reduce the propensity for substantial vehicle delays.
- The introduction of three highway-speed E-ZPass lanes allowing vehicles to proceed at 55 mph through the lanes (replacing the two existing 35 mph lanes) would reduce fuel consumption associated with congestion and idling vehicles at the toll plaza.
- The bridge would have four lanes in each direction, eliminating the need to move the median barriers twice daily (currently accomplished using a specialized diesel engine, which takes approximately half an hour for each switch) and improving traffic flow during those times.
- In the event that a modified tolling scheme for Tappan Zee Bridge users is adopted, and the future toll rates at the Tappan Zee are set equivalent to the tolls at the Port Authority of New York and New Jersey and the New York Metropolitan Transportation Authority facilities, some users would prefer a shorter route (where previously users may have opted for longer, but cheaper, routes.) As a result, there would be a reduction in vehicle use on the order of 121,000 vehicle-miles traveled daily (see Chapter 4, “Transportation,” for details) and an ensuing reduction in greenhouse gas (GHG) emissions.

13-3 MEASURES TO REDUCE GREENHOUSE GAS EMISSIONS

The operation of the Replacement Bridge Alternative would result in some local reduction in traffic congestion on the bridge. The net GHG emissions associated with the Replacement Bridge Alternative would include construction emissions presented in Chapter 18, "Construction", which would not be offset by these operational benefits. However, consistent with New York State policies aimed at increasing energy efficiency and the use of renewable energy, designed to reduce statewide GHG emissions to 80 percent lower than 1990 levels by 2050, the following energy efficiency and renewable energy components would be included in the project design where practicable:

- ***Heat Exchange Pumps*****:** Concrete can be an efficient platform for heat exchange. Systems embedded in concrete in the bridge and landing area on the Westchester County side could supply renewable heating and cooling for facilities in the toll plaza area. The construction contract bid documents will require proposals to include options for efficient and renewable energy design for the toll plaza facilities, and will include them where found to be practicable.
- ***Efficient Lighting*****:** As with most new facilities, the bridge will incorporate efficient lights. To increase lighting efficiency, daylight sensor switching systems could be incorporated throughout the bridge. Using independent switching throughout the bridge would not only reduce energy consumption by operating lights only at times when they are needed, but would also reduce the need for considerable wiring to connect lights throughout the bridge with centralized switching and timer systems. This would further reduce both direct energy consumption and indirect emissions associated with production of electrical wiring and systems.

In addition, NYSTA and the New York State Department of Transportation (NYSDOT), through the Design-Build Contract Documents, have requested that proposers include options for incorporating renewable energy production in the replacement bridge. As design progresses, the feasibility of these measures would be explored and incorporated where practicable.

Overall, given the efforts to reduce GHG emissions throughout the lifetime of the replacement bridge (during both construction and operation of the project), the project would be consistent with all state policies aimed at reducing energy use and GHG emissions.

13-4 MITIGATION

Since the operation of the Replacement Bridge Alternative would have no adverse impact on energy use and greenhouse gas emissions, mitigation would not be required.