20. Energy

20.1. Chapter Overview

20.1.1. Introduction

This chapter discusses the changes to the potential for impacts to energy associated with modification of the Preferred Alternative. The following revisions specifically apply to the energy analysis:

- <u>Change in project terminus</u>: the revised Preferred Alternative ends in Englewood instead of Tenafly; consequently, the length of the operating service would be reduced.
- <u>Change in service plan</u>: the change in the service plan affects the project's operating mileage, thus affecting energy use.
- <u>Change in project ridership and station use</u>: changes to the ridership and the station destinations affects the reduction in vehicle miles traveled (VMT), which are used to calculate changes to regional energy use.

There were no public comments on the DEIS regarding energy. This reassessment therefore addresses only the changes to the VMT and the operating lengths of the SDEIS Preferred Alternative.

20.1.2. Summary of Findings of the DEIS and SDEIS

Currently, the existing Northern Branch rail right-of-way is not electrified and serves only diesel-powered freight trains. The operation of light rail vehicles under the Preferred Alternative would require the right-of-way to be electrified via the installation of overhead electric catenary along the alignment. As a result, the Preferred Alternative would require electrical power supplied from the existing power grid. The existing power grid has a sufficient energy supply to support the Preferred Alternative.

The direct annual energy reduction associated with the Preferred Alternative would be 164.3 billion British Thermal Unit (BTU). The one-time indirect energy expenditure is estimated to be 271.9 billion BTU. This would yield a payback potential, which is a measure of the number of years it would take for the energy savings of a transit project to zero-out the energy costs associated with construction, of 1.7 years. Accordingly, energy expenditures associated with the Preferred Alternative are not anticipated to result in energy consumption impacts or the disruption of energy services within the Northern Branch study area.

20.2. Methodology

The methodology for this analysis is the same as that described in the DEIS.

20.3. Environmental Review

For the purpose of the Preferred Alternative energy estimates it was assumed that because freight rail service would continue to operate within the Northern Branch study area rights-of way, freight VMT is assumed to remain constant. Similarly, bus VMT has been assumed to remain constant under the Preferred Alternative. Thus, the energy analysis area was assessed as it relates to a change in energy usage, over existing conditions.

20.3.1. Existing Conditions

There are no changes to the existing conditions as compared to those analyzed in the DEIS.

20.3.2. Potential Impacts and Mitigation

20.3.2.1. No Build Alternative

The No Build Alternative assumes that there would be no reduction in auto VMT nor an increase in rail VMT. Additionally, no energy would be consumed to operate stations or the vehicle base facility (VBF). Therefore, there would be no change in BTU usage for the No Build Alternative.

20.3.2.2. Preferred Alternative

Due to the reduction of 9,440 auto trips per day, the Preferred Alternative would cause a reduction of 34 million auto VMT annually, resulting in a reduction of 212.0 billion BTU. This light rail system would operate 1.3 million rail VMT annually (using 37.8 billion BTU); seven stations (using 1.2 billion BTU); and one VBF (using 8.7 billion BTU); totaling approximately 47.7 billion BTU per year. When combined with the energy savings of the reduction in auto VMT, the Preferred Alternative would save approximately 164.3 billion BTU per year.

Construction of the Preferred Alternative would require approximately 19.4 miles of at-grade track (using 238.6 billion BTU) and 0.6 miles of structured track (using 33.3 billion BTU), resulting in the consumption of 271.9 billion BTU. The projected indirect energy expenditures are marginal when compared with overall statewide figures. The one-time indirect construction expenditure represents approximately 0.001 percent of annual statewide industrial energy consumption. Additionally, the indirect energy costs would be paid back due to the reduction in direct energy costs in less than two years.

The Preferred Alternative would require traction power substations along the Northern Branch right-of-way to maintain the current necessary to power the light rail vehicles. As described in Chapter 3: Alternatives Considered, voltage drop occurs when electricity is passed over a long distance and occurs in all electrical applications. The requirement for substations is not an indicator that there is insufficient electrical power supply in the area.

Mitigation

Due to the small relative sizes of the projected one-time energy expenditure in comparison with overall statewide figures, the projected indirect expenditures are not considered significant. In addition, the energy savings anticipated to result from an annual reduction in the direct energy expenditure would payback the indirect energy expenditure in less than two years. The existing power grid also contains enough supply to power the project. Therefore, no significant energy impacts are foreseen, and no mitigation is warranted.

20.4. Summary of Potential Environmental Effects

A comparison of energy expenditures for the Preferred Alternative is provided below in Table 20-1. In terms of energy savings, the Preferred Alternative is more efficient than the No Build Alternative, with a payback potential of less than two years. Energy consumption associated with the proposed project is not anticipated to result in a significant impact to the provision of energy services within the Northern Branch corridor as the existing power grid contains sufficient supply to accommodate the Preferred Alternative. As such, no energy impacts are anticipated under the Preferred Alternative.

Table 20-1: Comparison of Alternatives (BTU in billions)

Mode	No Build	Preferred Alternative
Direct Energy Expenditure		
Auto	0	-212.0
Rail	0	37.7
Stations	0	1.2
Yard	0	8.7
Total Direct Energy Expenditure	***0***	***-164.3***
Indirect Energy Expenditure		
Track Miles – At-Grade	0	238.6
Track Miles – Structure	0	33.3
Total Indirect Energy Expenditure	***0***	***271.9***
Payback Potential	***n/a***	***1.7 years***

Notes: Direct energy expenditure (BTU): Auto 6,233, Light Rail 28,442/VMT, Station 175 million, and Yard 8.7 billion. Energy Expenditure for Construction 12.3 BTU/Mile for At-Grade track; 55.5 BTU/Mile for track on structure (At-grade miles includes yard trackage.)

Source: Transportation Energy Data Book, Edition 16, Oak Ridge National Laboratory, June, 2003; Urban Transportation and Energy: The Potential Savings of Different Modes, Congressional Budget Office, September, 1977; NJ TRANSIT, 2015; Jacobs, 2015.

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