A. INTRODUCTION

This chapter compares the direct energy expenditures associated with the TSM and Build Alternatives with that of the No Action Alternative. Direct energy expenditure is the total fuel consumption by vehicles operating on roadways in the Long Island Transportation Corridor and the energy required to operate the trains, both diesel and electric, under each scenario. Energy consumed to construct the Preferred Alternative is discussed in Chapter 17, "Construction and Construction Impacts."

B. EXISTING CONDITIONS

Gross energy consumption in the United States in 1996 has been estimated at an equivalent of 93.81 quadrillion British Thermal Units, or BTUs.* Of that total energy consumption, the transportation sector uses 24.43 quadrillion BTUs, or approximately 26 percent (source: National Transportation Statistics, U.S. Department of Transportation). This number includes coal, natural gas, electricity, and electrical system energy losses. Electrical energy within the transportation sector is predominantly used by railroads and is a very small portion of the overall energy demand in the United States. The direct electrical energy required by railroads is generated by coal, oil, natural gas, hydroelectric, and nuclear fuel sources.

The most recent estimate available for electric power consumption by facilities operated by the Long Island Rail Road (LIRR) was approximately 426 million kilowatt hours (kwh), consumed in 1995. This is equivalent to 1.45 trillion BTUs (one kwh is equal to 3,413 BTUs). Fuel consumed by the diesel fleet totaled 6.2 million gallons, which is equivalent to 812 billion BTUs. Electric power for LIRR is provided by the New York Power Authority (NYPA). Gas and oil plants generated most of this power, and the remainder was generated by hydroelectric and nuclear sources.

C. PROBABLE IMPACTS OF THE PROJECT ALTERNATIVES

TSM ALTERNATIVE

The TSM Alternative would decrease energy usage over that of the No Action Alternative. This alternative would reduce the number of automobile vehicle miles traveled (VMT) over the No Action Alternative, by attracting new riders to its improved service. However, the TSM Alternative would not increase the number of trains traveling to Manhattan in the peak period, so these

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* 1 quadrillion = 1 x 10^{15}. British Thermal Units, or BTUs, are a measure of energy used to compare consumption of energy from different sources, such as gasoline, electricity, etc., taking into consideration how efficiently those sources are converted to energy. One BTU is the quantity of heat required to raise the temperature of one pound of water by one Fahrenheit degree.

new riders would experience significant crowding and inconvenience. In contrast, the Preferred Alternative would substantially increase LIRR service during the peak hour, while still decreasing the amount of energy consumed.

PREFERRED ALTERNATIVE

OVERALL ENERGY CONSUMPTION

The Preferred Alternative would increase peak hour trains from 42 (in the No Action condition) to 61, increasing energy consumption from electric train VMT. However, the Preferred Alternative would, at the same time, reduce energy consumption from automobile VMT. This would result in overall decreases in energy consumption compared with the No Action Alternative. This decreased energy consumption as a result of the Preferred Alternative would represent a small fraction of the approximately 874 trillion BTUs[1] of energy used for ground transportation in New York State each year.* The energy consumed by each alternative compared with the No Action Alternative is shown in Table 12-1.

Table 12-1

Net Annual Energy Consumption for Project Alternatives vs. No Action Alternative

Alternative/Component	Net New Annual Vehicle Miles	Total Annual Energy Consumption[1] (Billion BTUs)
TSM vs. No Action Alternative		
Auto	-33,650,000	-210
Electric Trains	-160,000	-16
Diesel Trains	490,000	49
Total	-33,320,000	-177
Preferred vs. No Action Alternative		
Auto	-105,510,000	-658
Electric Trains	5,324,000	532
Diesel Trains	-248,000	-25
Total	-100,434,000	-151

Note:
[1] BTUs per vehicle mile are based on data in FTA's *Technical Guidance on Section 5309 New Starts Criteria*, July 1999, as follows:
Auto = 6,233 BTU/vehicle miles; and
Rail = 100,000 BTU/vehicle miles.

It should be noted that the energy consumption values from the Federal Transit Administration (FTA) guidance represent the total operational energy consumption required per vehicle mile of travel. These average values are based on data from rail systems throughout the country. As an

* State energy figures from "Patterns and Trends, New York State Energy Profiles: 1994-1998," New York State Energy Research and Development Authourity.

average, they include not only the energy required for traction power, but also other ancillary systems that are part of a given system. This would include the energy for communications, signals, stations, and in some cases, tunnel lighting and ventilation. While averaged nationally over a wide range of systems, these factors provide a good indicator of the relative differences in energy consumption between various modes of transportation.

Overall, no adverse energy impacts would occur under either the TSM or Preferred Alternative. Compared with the No Action Alternative, both the TSM and the Preferred Alternatives would decrease overall energy consumption.

SUNNYSIDE STATION

The design and construction of Sunnyside Station provides an opportunity to employ environmentally responsible design ("Green Design"). As the project progresses, standards would be adopted to lessen the environmental impact of the new station. Recognized opportunities to do so would include: environmentally responsible technology; energy efficient climate control; resource conservation; and responsible construction, operations, and maintenance procedures. While there is no uniformly accepted "blueprint" for environmentally responsible design, the construction of Sunnyside station would carefully consider available procedures for minimizing the environmental impact of the station.

D. MITIGATION MEASURES

Neither the TSM nor the Preferred Alternative would cause significant adverse energy impacts and both would decrease the amount of non-transit-related energy consumption. Therefore, no mitigation measures are required. ❖