3.21 ENERGY

3.21.1 Introduction

What's in Section 3.21?

This section evaluates and compares energy consumption and greenhouse gas emissions of the No-Action Alternative and each of the build packages, as measured in British thermal units (BTUs). The regional transportation system currently consists of passenger automobiles, trucks, and buses. Both build packages include these modes of transportation. Package A also includes commuter rail. Energy calculations were based on regional travel demand model projections, combining data from Denver Regional Council of Government (DRCOG) and North Front Range Metropolitan Planning Organization (NFRMPO).

Greenhouse gas emissions from transportation sources are directly related to energy consumption and primarily result from the combustion of fossil fuels in vehicles. These emissions are normally presented as the total carbon dioxide (CO_2) equivalent released, and they take into account the global warming potential of each chemical species emitted from a source. For example, combustion sources emit small amounts of nitrous oxide (N_2O), which has a global warming potential 310 times that of CO_2. Each ton of N_2O emitted is equivalent to 310 tons of CO_2. All greenhouse gas emissions presented in this section are presented as a CO_2 equivalent.

Energy sources for transportation are most commonly petroleum-based fossil fuels for automobiles, trucks, trains, and buses. Neither of the build packages under consideration in this Draft EIS would use vehicles that run on electric power.

3.21.2 Environmental Consequences

Energy would be consumed for both the construction and operation of transportation improvements associated with both build packages. This section evaluates and compares energy consumption and greenhouse gas emissions of the No-Action Alternative and each of the build packages (Package A and B), using the following methodology:

- The forecast year used was 2030.
- Daily Vehicle Miles Traveled (VMT) data were estimated using the North I-25 Regional Travel Demand Model (see **Table 3.21-1**).
- The regional study area was defined as the regional transportation network, which was modeled for air quality and travel demand purposes.
- Regional energy consumption in BTUs was based on estimated changes in vehicle miles traveled, in accordance with the FTA's document, *Reporting Instructions for the Section 5309 New Starts Criteria* (FTA, 2006).
- Greenhouse gas emissions were calculated from BTU estimates developed from the energy consumption estimate multiplied by standard tons of CO_2/ million BTU conversion templates, provided in the FTA's *Reporting Instructions for the Section 5309 New Starts Criteria* (FTA, 2006).

Table 3.21-1 Daily VMT in the North I-25 Regional Study Area

Alternative	Total Daily VMT (Auto, Truck, Bus, and Rail)
No-Action Alternative	48,684,000
Package A*	49,147,000
Package B	49,124,000

Source: North I-25 Regional Travel Demand Model.
Notes: *Package A includes annual rail miles traveled in addition to auto, truck and bus miles; Package B includes only auto, truck, and bus miles traveled.

Daily energy consumption and carbon dioxide production were used to evaluate greenhouse gas emissions in this project. Greenhouse gas emissions were estimated by multiplying the daily energy use (tons of CO_2 per million BTU) by CO_2 conversion factors taken from the New Starts Criteria (FTA, 2006). Passenger miles were assumed to be 92 percent automobiles, 4 percent heavy trucks, and 4 percent buses of the total regional annual VMT. For Package A, rail miles traveled accounted for less than 1 percent of total VMT.

3.21.2.1 Direct Impacts

Table 3.21-2 summarizes estimated daily energy consumption as a result of operation of the No-Action Alternative and the two build packages.

Table 3.21-2 Energy Consumption by Alternative (Daily BTUs)

Alternative	BTUs Consumed (millions)	Difference from No-Action (millions)	Percent Difference
No-Action Alternative	403,220	N/A	N/A
Package A	407,055	+3,835	+1.0
Package B	406,865	+3,645	+0.9

Source: FTA, 2006 and North I 25 Regional Travel Demand Model.

Table 3.21-3 summarizes estimated daily CO_2 production as a result of operation of the No-Action Alternative and the two build packages.

Table 3.21-3 Daily CO_2 Production by Alternative

Alternative	CO_2 Produced (Tons)*	Difference from No-Action (Tons)	Percent Difference
No-Action Alternative	31,132	N/A	N/A
Package A	31,428	+296	+1.0
Package B	31,414	+282	+0.09

*CO_2 Produced: All greenhouse gas emissions in the study area are presented as CO_2 equivalents.
Source: FTA 2006.

The No-Action Alternative would utilize less energy than either of the build alternatives. As shown in **Table 3.21-2**, Package A and Package B would use approximately 1.0 percent and 0.9 percent more energy respectively than the No-Action Alternative. The rationale is that the added capacity provided by the build packages would attract VMT from other areas. This, in turn, would create an increase in daily VMT within the regional study area and a corresponding decrease from surrounding areas as more trips would be diverted.

These same trends were found for CO_2 production. Both build packages would produce more CO_2 (greenhouse gas emissions) than the No-Action Alternative. As shown in **Table 3.21-3**, Package A and Package B would increase CO_2 production by approximately 1.1 percent and 1.0 percent respectively over the No-Action Alternative.

Over time (after 2030) it would be expected that the rail components of Package A would provide more options for lower energy consumption because more trains could easily be added. The tolled express lanes (TEL) in Package B would eventually fill up (with bus riders and carpoolers) especially in the segments of the corridor with only one TEL in each direction. The transit stations associated with both packages would, over time, serve as a stimulus to transit oriented development. This would be more noticeable with Package A. This transit oriented development would potentially reduce energy consumption due to mixed use and higher density development, which would reduce trips.

In addition to energy consumed during operation, energy would be consumed for construction of Packages A and B. This is described in **Section 3.23.3.2**, Construction Impacts.

3.21.2.2 Indirect Impacts

Under the No-Action Alternative and both build packages, population in the regional study area is anticipated to increase 79 percent by the year 2030. This increase would result in substantial additional demands for energy for construction of new homes, in gasoline for automobiles, and in natural gas and electricity for utilities. It is anticipated that the additional energy demand would be directly proportionate to the increase in population as land development occurs.

3.21.3 Mitigation Measures

Mitigation of energy consumption during operations will focus on a reduction in daily VMT. This reduction can be achieved through successful transit oriented development, congestion management, and effective improvements to the roadways. These measures all work to reduce overall traffic time by increasing travel efficiency.

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