Depot District Clean Fuels Technology Center Benefit Cost analysis

July 2018

Abstract

The current UTA Central Bus Garage was developed in the 1970’s to service a maximum fleet size of 90 buses. Currently, 93 buses are housed, maintained, and deployed from the site. As identified in the regionally approved Long Range Transportation Plan, the Vision is to develop a new bus garage that could support an expanded bus fleet as well as support alternative fuel technologies. Development of the Depot District Technology Center will serve as a catalytic investment to help redevelop an economically underperforming area while also meeting the capacity and technological needs not available at the Central Bus Garage. It is projected that the development of the Depot District will have a $1.62 to $1 return on investment to the community.

## DEPOT DISTRICT CLEAN FUELS TECH CENTER BENEFIT-COST ANALYSIS

## Summary of Benefit-Cost Analysis (BCA)

The construction of a Depot District Clean Fuels Tech Center (Depot District) will have significant economic, environmental and safety benefits for the State of Utah. The new facility will be a LEED-certified building, thereby reducing annual utility and maintenance costs. It will allow for the expansion of the Utah Transit Authority’s (UTA) existing bus fleet from 93 vehicles to 150 vehicles and the conversion from 46 diesel buses to 75 CNG and 75 electric buses. Operating efficiencies will be increased, VMTs will be reduced, fewer pollutants will be emitted in the air and safety will be increased. Each of these factors is discussed in more detail in the following sections.

***Background and Need for Facility***

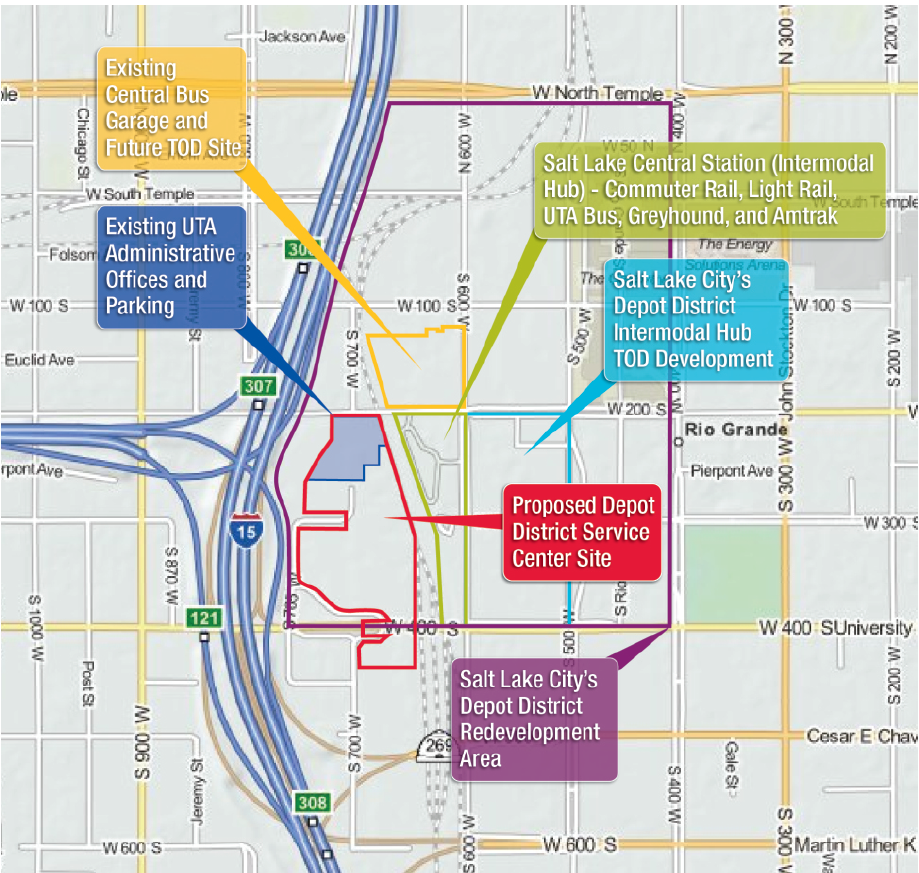
Utah is one of the most rapidly-growing states in the nation. As such, we recognize the imperative need to plan for rapid growth. Our population is expected to continue to grow by more than half a million people between 2010 and 2020, and most of this growth will take place along the Wasatch Front.

**Table 1: State of Utah Population Growth Projections**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Population | Absolute Growth | AAGR\* |
| 2015 Population – Utah | 2,997,404 | NA | NA |
| 2020 Population – Utah | 3,325,425 | 328,021 | 2.1% |
| 2030 Population – Utah | 3,889,310 | 563,885 | 1.6% |
| Source: University of Utah Kem Gardner Policy Institute, Utah’s Long-Term Demographic and Economic Projections, July 2, 2017  \*AAGR – average annual growth rate | | | |

Based on U.S. Census data, between 2000 and 2010 Utah ranked third among states in population growth.[[1]](#footnote-1) This growth has placed significant pressure on transportation infrastructure, including UTA’s operations and maintenance facilities.

Buses utilizing the current Central Garage provides service to Southern Davis County and Northern Salt Lake County. Additionally, Salt Lake City’s Transit Master Plan identifies the need to expand bus service. Because of this rapidly-increasing demand, the existing Central Bus Garage is currently at capacity and cannot operate or service any additional vehicles. Further, without costly upgrades estimated at approximately $3 million, it cannot efficiently service or acquire future CNG or electric buses that are part of UTA’s desired fleet upgrade. Therefore, bus ridership in this area will be impacted unless operations and maintenance capacity and capabilities are expanded. Due to lack of space in an antiquated facility that cannot service any additional buses beyond the current 93, a new facility is needed. The Depot District will be built to service 150 buses with the ability to expand to 250 buses in the future. UTA is well prepared with 18.69 acres of land located near the Salt Lake Central intermodal hub (and just a few blocks west of downtown) that will be used for the Depot District (116,378 square feet); this site is less than a block away from the existing Central Garage (35,000 square feet on 7.3 acres). Further, UTA will eliminate current maintenance inefficiencies with this move.



***Summary of Benefit-Cost Ratio***

The total investment in the Depot District Clean Fuels Technology Center is projected to be $70 million. The new facility could be fully operational by 2021, assuming funding is obtained by early 2019. This benefit-cost analysis (BCA) shows that **for every dollar spent on project development, $1.62 will be created in terms of direct and indirect benefits realized by the community.** This ratio is calculated by dividing the net present value of future benefits ($95,894,280) by the net present value of future costs ($59,140,781).

Benefits of the project are summarized as follows and discussed in more detail in the BCA. All benefits are analyzed in terms of incremental benefits when compared with the baseline situation which is that the existing facility remains, with all of its inefficiencies, and future bus capacity is limited to 93 vehicles.

A 40-year timeframe has been used for the analysis. While the Depot District will likely have a useful life of 75 years,[[2]](#footnote-2) many of the other savings associated with the facility, such as changing over the bus fleet to CNG and electric buses, are better accommodated in the 40-year timeframe. A detailed spreadsheet is included in the Appendix.

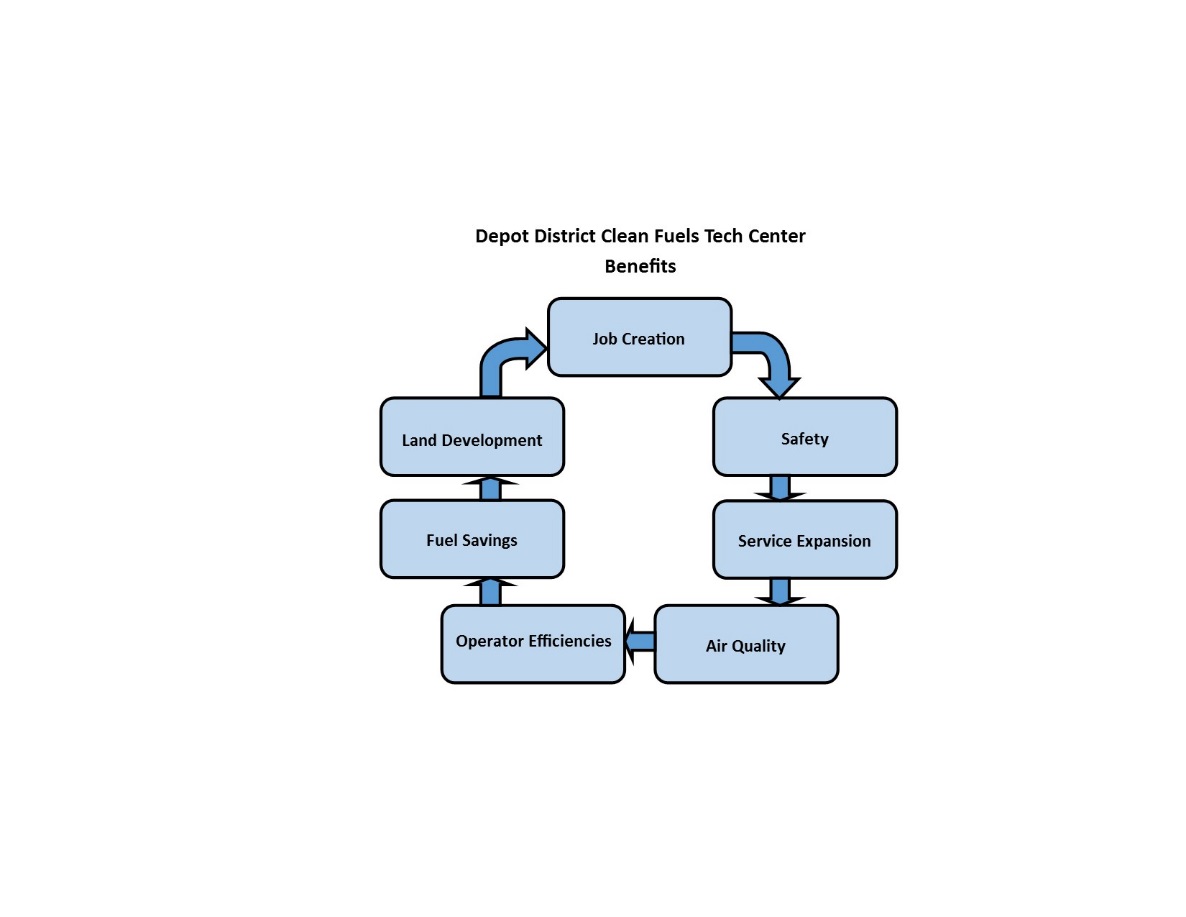
**Table 2: Summary of Economic Benefits - 40 Year Analysis**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Economic Competitiveness | Environmental Protection | Safety | Total |
| Total |  | $330,130,191 | $136,397,106 | $127,309,657 | $593,836,953 |
| NPV |  | $58,646,810 | $19,638,327 | $17,609,143 | $95,894,280 |

***Overview of Benefits***

Benefits of constructing the Depot District include the ability to add 28 CNG buses (47 are existing; this brings the total to 75) and 75 electric buses to UTA’s fleet; lower operating costs for natural gas and electric fuels; lower maintenance costs (labor and time savings) associated with fueling, fare box collection and bus servicing; reduced utility costs at the new LEED sustainable building; and increased ridership through the ability to increase the number of buses and routes. In addition, air quality will be improved through the addition of CNG and electric buses and the existing Central Garage site will be available for redevelopment as a transit-oriented site adjacent to UTA’s Intermodal Hub and Salt Lake City’s Depot District Development Project.

**Figure 1:**



***Benefits to Environmental Protection - Addition of CNG and Electric Buses to Improve Air Quality***

The addition of CNG and electric vehicles is deemed to be a priority by UTA in order to improve air quality in the State, as well as reduce operating costs and improve efficiencies. The Salt Lake Metropolitan Area is surrounded by beautiful mountains that create “soup bowl” inversions, trapping pollution in the valley for days at a time, and resulting in the metro area having one of the highest rates of childhood asthma in the country, and some of the worst wintertime and mid-summer air quality ratings.

UTA is currently using 47 CNG buses but the existing Central Garage can only marginally support the maintenance of these existing CNG vehicles. UTA has no other facilities in the Salt Lake Valley that can service and maintain CNG or electric buses. This lack of sufficient maintenance for CNG and electric buses therefore effectively limits any future growth in CNG and electric buses unless the Depot District, designed for CNG and electric bus maintenance and operation, is constructed.

The addition of CNG and electric buses results in reduced pollutants for CO2, NO, SO2, Particulates and VOCs. This improves air quality in an area of the country that struggles, because of its geographic formations, with maintaining good air quality.

***Benefits to Economic Competitiveness – Addition of CNG and Electric Buses to Reduce Fuel and Maintenance Costs***

By converting its bus fleet to CNG and electric buses, UTA will see sizeable reductions in annual fuel costs, as well as maintenance costs for electric buses.

***Benefits to Economic Competitiveness*** *–* ***Increased Ridership and Reduced VMTs***

Expansion of the bus fleet in downtown Salt Lake City will promote increased ridership, thereby reducing VMTs and the accompanying fuel and vehicle operating costs for consumers.

***Benefits to Economic Competitiveness– Improved Operating Efficiencies in Servicing Buses***

The existing Central Garage is an outdated and inefficient facility that includes limited property (7.3 acres) and a configuration that does not allow all buses to be parked at the site. Parked more than a block away (750 West 300 South), a mechanic must walk over and drive buses to and from the garage to service – a time-consuming activity each day. The existing Central Garage is also inadequate due to limited rooftop access to coaches. Because scaffolding is used to access bus rooftops, there is less than six inches on each side to squeeze buses in for their weekly brake testing. Limited space also forces maintenance employees to back up and pull forward multiple times to line up the coaches with antiquated 12-foot wide maintenance doors and minimal circulation and maneuvering corridors. It is hard to imagine any bus facility in operation that can effectively and efficiently accommodate 93 buses on 7.3 acres of land. That represents 13 buses per acre whereas efficient bus facilities are designed at a maximum of 10 buses per acre. Additionally, UTA is incurring extra cost to maintain CNG buses because the current facility is not designed to accommodate CNG. Specifically, UTA has to limit the type of work that can occur while CNG buses are present in the garage as no grinding or welding is allowed in close proximity to CNG buses. The issues with the existing site and its inefficiencies are apparent and UTA needs to update to the new Depot District Clean Fuels Technology Center.

***Benefits to Economic Competitiveness – Decreased Fueling and Farebox Collection Times***

Construction of the Depot District on a larger site (18.69 acres) will allow ten buses to be moved immediately from Meadowbrook to the new facility, saving 15 deadhead miles and 0.76 deadhead hours per bus per service day. The new facility will also provide increased efficiencies through decreased fueling times and farebox time savings.

***Benefits to Economic Competitiveness– Job Creation in Underperforming Part of City***

The Depot District will be located in an underperforming part of Salt Lake City – in a census tract (1025) that qualifies as economically distressed due its low per capita incomes. Per capita income in the area is $23,323 – only 59 percent of the national average per capita income of $39,648.[[3]](#footnote-3) More than one-third of the population in this census tract lives below the poverty level and the area has a significantly higher ratio of minorities than Salt Lake County overall. The existing Central Garage is located in an officially “blighted” redevelopment area by the Redevelopment Agency of Salt Lake City. By building a larger facility in the same neighborhood, jobs will be created in an area that is economically disadvantaged and underperforming.

***Benefits to Economic Competitiveness – Public Land Developed as TOD and Returned to Tax Rolls***

The existing Central Garage property would also be available for transit-oriented development by UTA, and possibly the Salt Lake City Redevelopment Agency, at a location that has been identified as one of six future TOD “catalytic” sites in the HUD $5 million Sustainable Communities Planning Grant awarded to the Wasatch Front in 2010. Based on a recent review of property in the same area, if returned to private use, the land value of the 7.3 acres would be approximately $29 per square foot, or an estimated $9.2 million for the existing site.

***Benefits – Increased Safety***

Due to the increased ridership projected (and therefore the reduced VMTs of private travel), there would be a reduction in traffic incidents, and therefore safety savings.

***Summary of Benefits.*** In summary, construction of a new 116,378 square foot maintenance and operations facility just a few blocks west of Salt Lake City’s downtown, and in an economically distressed and blighted area, will benefit the region through improved air quality, increased maintenance and operations efficiencies, reduced fuel costs by changing the fleet to CNG and electric buses, reduced air pollution emissions, increased ridership and the potential for transforming the existing 7.3 acres to higher-density transit-oriented development. These benefits are discussed in more detail in the following sections.

# Economic Competitiveness

The new Depot District Clean Fuels Technology Center will provide increased economic competitiveness from four major components:

1. Increased efficiencies for existing buses and operations
   1. Reduced times for park, wash, fuel and brake
   2. Reduced deadhead miles for buses transferred from Meadowbrook
   3. Fueler headcount savings
   4. Reduced wait times for fueling and farebox collection
2. Increased efficiencies for the new buses made possible through the Depot District
   1. Fuel savings from use of CNG and electric buses rather than diesel buses
   2. Operating cost savings from CNG and electric buses rather than diesel buses
3. LEED-certified new building and redevelopment of current garage property in the heart of the City
   1. Utility cost savings for LEED certified building
   2. Redevelopment potential of current garage site
4. Cost savings from the increased ridership due to the new facility
   1. Reduced fuel costs from reduced VMTs
   2. Reduced vehicle operating costs

## Increased Efficiencies for Existing Buses and Operations

***Reduced Times for Park, Wash, Fuel and Brake***

Increased operating efficiencies will result from the additional fueling stations that will decrease the wait time for buses (thereby decreasing both labor and gas costs from bus idling). This analysis assumes that with 3-4 fueling stations at the new Depot District, similar to what is currently in place at Meadowbrook Garage, the following efficiencies could be achieved at a level similar to those at the Meadowbrook facility.

**Table 3: Maintenance Time Savings per Bus**

|  |  |  |
| --- | --- | --- |
| Description | Fuel, Clean, Wash & Park | Fuel, Clean, Wash, Brakes & Park |
| Central | 9:38 | 20:16 |
| Meadowbrook | 6:39 | 11:45 |
| Difference | 2:59 | 8:31 |
| Efficiency Difference (Converted to Decimal) | **2.98** | **8.52** |

These reduced waiting times are then converted to time savings per year, based on the average number of buses in service on weekdays, weekends, and at peak periods. The savings for fuel, clean, wash and park occur only one day per week, while the other savings occur the other four days that a bus is in use.

**Table 4: Average Bus Usage**

| Description | Average Buses | Average Days per Year |
| --- | --- | --- |
| Buses (Weekday Peak) | 76 | 252\* |
| \*Calculated on each bus receiving Fuel, Clean, Wash and Park four days a week and receiving Fuel, Clean, Wash, Brakes and Park one day a week, for a total of five days a week. | | |

Time savings are calculated by multiplying the average buses per day, by the time savings per day, by the number of days per year for which the time savings occur. Therefore, the time savings for “Fuel, Clean, Wash & Park” are calculated by multiplying the time savings of 2.98 minutes per bus, by 76 buses per day (weekday), by 252 days per year. The time savings for “Fuel, Clean, Wash & Park” are calculated by multiplying the time savings of 8.52 minutes by 76 buses by 52 days per year.

**Table 5: Annual Maintenance Time Savings**

|  |  |  |  |
| --- | --- | --- | --- |
| Description | Fuel, Clean, Wash & Park | Fuel, Clean, Wash, Brakes & Park | Total Time Saved |
| Time Savings per Year (minutes) | 60,084 | 33,658 | 93,742 |

The total labor time savings is 93,742 minutes, or 1,562 hours. The related labor cost savings are then calculated by multiplying average employee wages, plus benefits, by the total number of hours saved. The annual labor savings is $52,849.60.

**Table 6: Maintenance Employee Cost Savings**

| Description | Amount |
| --- | --- |
| Average Hourly Wage for Maintenance Employee | $22.98 |
| Fringe Rate | 0.472 |
| Total Hours Saved | 1,562.37 |
| Total Annual Labor Savings | $52,849.60 |

The annual labor savings are projected to increase annually based on the historical consumer price index (CPI).

There are further savings for reduced idling times for buses. UTA has estimated that the average amount of fuel consumed per hour of wait time is 0.75 gallons of fuel. Cost savings vary by CNG buses and diesel buses. At the present time, UTA has 47 CNG buses and 46 diesel buses at the Central Garage.

**Table 6: Operating Fuel Cost Savings**

| Description | Diesel Buses | CNG Buses | Total |
| --- | --- | --- | --- |
| Number of Buses | 46 | 47 | 93 |
| Percent of Total Buses | 49.46% | 50.54% | 100.00% |
| Gallons/equivalent of Fuel Saved per Hour of Wait Time | 0.75 | 0.75 |  |
| Cost per Gallon of Fuel | $2.56 | $1.04 |  |
| Yearly Hours Saved | 772.79 | 789.58 | 1,562.37 |
| Yearly Cost Savings | $1,483.75 | $615.88 | $2,099.62 |

A summary of the annual cost savings for improved efficiencies, as shown in reduced labor and fuel cost savings is as follows:

**Table 7: Summary of Reduced Maintenance and Operating Costs**

| Category | Annual Cost Savings |
| --- | --- |
| Total Annual Labor Savings | $52,849.60 |
| Total Annual Fuel Savings | $2,099.62 |
| Total | $54,949.23 |

Forecasts for annual labor savings and annual fuel savings have been projected using the same increase seen in the CPI over the past 30 years (2.6%).

***Reduced Operating Costs of New Facility - Reduced Deadhead Miles***

The current facility cannot house any expanded operations because it is currently at capacity. Anticipated savings per future bus expansion are based on the reduction of 7.5 deadhead miles (one-way) and 0.38 deadhead hours (one-day). It is anticipated that ten buses could be immediately transferred from Meadowbrook, resulting in deadhead mile savings.

**Table 8: Reduced Deadhead Miles and Hours with Garage and With Future Bus Expansion**

| Description | One-Way | Round-Trip |
| --- | --- | --- |
| Deadhead Miles | 7.5 | 15 |
| Deadhead Hours | 0.38 | 0.76 |

The cost savings for the transfer of ten buses to the new facility is as follows:

**Table 9: Cost Savings from Bus Expansion Based on Reduced Deadhead Miles and Deadhead Hours**

| Category | Amount |
| --- | --- |
| Roundtrip Deadhead Mile Savings | 15 |
| Roundtrip Deadhead Hours Savings | 0.76 |
| Expanded Buses | 10 |
| Service Days | 252 |
| Average Cost Per Mile | $1.17 |
| Average Cost Per Hour | $39.06 |
| Annual Deadhead Mile Savings | $44,226 |
| Annual Deadhead Hours Savings | $74,808 |
| Total Annual Savings | $119,034 |

These savings have been projected for 40 years, converting each year to real dollars using the CPI.

***Reduced Operating Costs of New Facility – Greater Efficiencies of Existing CNG Bus Refuelings***

UTA does not currently have a CNG fueling station at its Central Garage, but a CNG fueling station is instead located on the site where the Depot District will be constructed. By maintaining and servicing the CNG buses at the new facility, UTA will save 0.55 deadhead miles, on average, for each CNG refueling and 0.75 employee hours for each refueling.

**Table 10: Cost Savings by Maintaining and Servicing CNG Buses at the New Facility**

| Description | Amount |
| --- | --- |
| CNG Bus Refuelings per Year | 11,844 |
| Deadhead Miles per Refueling | 0.55 |
| Cost per Mile | $1.17 |
| Deadhead Mile Savings | $7,622 |
| Employee Hour Savings per Refueling | 0.75 |
| Employee Cost per Hour | $18.64 |
| Employee Cost Savings | $165,579 |
| Total Cost Savings | $173,201 |
| \*Calculated by multiplying 47 CNG buses by 252 days per year | |

***Reduced Operating Costs of New Facility – Farebox***

Time savings are anticipated for the approximately 19 buses that have to await fueling and farebox collection each day. Because of the streamlining that will take place at the new facility, wait times will decrease from four minutes to approximately one-minute wait time.

**Table 11: Farebox Time Savings**

| Description | Amount |
| --- | --- |
| Number of Buses Backed Up | 19 |
| Time Backed Up (min) | 4 |
| Estimated New Time (min) | 1 |
| Time Savings (min) | 3 |
| Service Days (Weekday) | 252 |
| Farebox Time Savings (min) | 14,364 |
| Farebox Time Savings (hr) | 239.4 |

The reduced bus queueing times to have fareboxes pulled are an estimated 239.4 hours annually.

**Table 12: Annual Farebox Savings**

| Description | Amount |
| --- | --- |
| Farebox Time Savings (hr) | 239.4 |
| Average Hourly Wage for Farebox Employee | $22.98 |
| Fringe Rate | 0.472 |
| Average Amount of Fuel Consumed during Waiting | 1 |
| Fuel Price Per Gallon | $2.56 |
| Total Annual Labor Savings | $8,098.08 |
| Total Annual Fuel Savings | $612.86 |
| Total Annual Farebox Savings | $8,710.94 |
| \*The fuel price per Gallon of $1.65 represents a weighted average of $1.04 per gallon for CNG and $2.27 per gallon for diesel. | |

## 2. Improved Efficiencies Due to New CNG and Electric Bus Capability and Capacity

***CNG and Electric Bus Savings for Fuel***

UTA currently operates 47 CNG buses, with the potential for this number to increase to 75 CNG buses with the new facility. Capacity will also be added for 75 electric buses. While CNG buses do not get quite as many miles per gallon (4.34) when compared to diesel buses (4.66), the price of CNG ($1.04) is less than then diesel price per gallon of $2.56. Therefore, the diesel gallon equivalent price (assuming same mileage) of CNG is $1.12.

The CNG fuel savings reflect the savings for only the additional CNG buses that could be accommodated at the current Central Garage. The analysis assumes 75 CNG vehicles by 2024 (47 current plus 28 new) and 75 electric buses by 2029.

**Table 13: CNG Bus Fuel Cost Savings by Year**

| CNG Bus Schedule | Total | CNG DGE\* per Year | CNG Cost per Year | Diesel Gal per Year | Diesel Cost per Year | Fuel Cost Savings |
| --- | --- | --- | --- | --- | --- | --- |
| 2018 | 47 | 389,862 | $405,456 | 363,090 | $929,511 | $524,055 |
| 2019 | 47 | 389,862 | $405,456 | 363,090 | $929,511 | $524,055 |
| 2020 | 47 | 389,862 | $405,456 | 363,090 | $929,511 | $524,055 |
| 2021 | 50 | 414,747 | $431,336 | 386,266 | $988,841 | $557,505 |
| 2022 | 60 | 497,696 | $517,604 | 463,519 | $1,186,609 | $669,006 |
| 2023 | 65 | 539,171 | $560,737 | 502,146 | $1,285,494 | $724,756 |
| 2024 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2025 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2026 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2027 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2028 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2029 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2030 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2031 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2032 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2033 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2034 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2035 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2036 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2037 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2038 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2039 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2040 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2041 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2042 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2043 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2044 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2045 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2046 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2047 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2048 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2049 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2050 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2051 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2052 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2053 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2054 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2055 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2056 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| 2057 | 75 | 622,120 | $647,005 | 579,399 | $1,483,262 | $836,257 |
| TOTAL | 75 | **23,773,272** | **$24,724,203** | **22,140,773** | **$56,680,378** | **$31,956,175** |
| **\*DGE = diesel gallon equivalent** | | | | | | |

However, these fuel savings are partially offset by the increased costs of purchasing CNG buses. CNG buses cost approximately $40,000 more per bus than do diesel buses. These costs have been included in the analysis and are used to offset a portion of the cost savings associated with the reduced fuel costs.

**Table 14: Electric Bus Fuel Cost Savings by Year**

| Electric Bus Schedule | Total | Electric DGE\* per Year | Electric Cost per Year | Diesel Gal per Year | Diesel Cost per Year | Fuel Cost Savings |
| --- | --- | --- | --- | --- | --- | --- |
| 2018 | 2 | 4,492 | $15,002 | 15,451 | $39,554 | $24,552 |
| 2019 | 2 | 4,492 | $15,002 | 15,451 | $39,554 | $24,552 |
| 2020 | 5 | 11,229 | $37,505 | 38,627 | $98,884 | $61,379 |
| 2021 | 10 | 22,458 | $75,009 | 77,253 | $197,768 | $122,759 |
| 2022 | 15 | 33,687 | $112,514 | 115,880 | $296,652 | $184,138 |
| 2023 | 20 | 44,916 | $150,019 | 154,506 | $395,536 | $245,518 |
| 2024 | 25 | 56,145 | $187,523 | 193,133 | $494,421 | $306,897 |
| 2025 | 30 | 67,374 | $225,028 | 231,760 | $593,305 | $368,277 |
| 2026 | 40 | 89,832 | $300,037 | 309,013 | $791,073 | $491,036 |
| 2027 | 50 | 112,289 | $375,047 | 386,266 | $988,841 | $613,794 |
| 2028 | 60 | 134,747 | $450,056 | 463,519 | $1,186,609 | $736,553 |
| 2029 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2030 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2031 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2032 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2033 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2034 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2035 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2036 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2037 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2038 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2039 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2040 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2041 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2042 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2043 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2044 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2045 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2046 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2047 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2048 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2049 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2050 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2051 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2052 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2053 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2054 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2055 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2056 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| 2057 | 75 | 168,434 | $562,570 | 579,399 | $1,483,262 | $920,692 |
| **TOTAL** | **75** | **5,466,251** | **$18,257,278** | **18,803,433** | **$48,136,790** | **$29,879,512** |
| **\*DGE = diesel gallon equivalent** | | | | | | |

These savings are partially offset by the increased cost of the CNG buses and electric buses. CNG buses are assumed to cost $540,000 - $40,000 more than diesel buses. Electric buses are assumed to cost $550,000 - $50,000 more than a diesel bus. Plus, this analysis includes a $35,000 annual battery lease cost per electric bus.[[4]](#footnote-4)

***Electric Bus Savings for Operating Costs***

Based on information provided by Proterra, annual bus maintenance costs for electric vehicles are $0.30 per mile (assuming battery lease) compared to diesel and CNG buses at $1.00 per mile. This represents an annual savings of $.70 per mile per bus.

## 3. LEED-Certified New Technology Center and Redevelopment of Existing Garage Site

***Utility Cost Savings***

The proposed new 116,378 square foot Depot District Clean Fuels Technology Center will have lower utility costs than the existing 35,000 square foot Central Garage. This is due to the energy efficiencies associated with a LEED-certified building. Based on the analysis of existing costs, as well as anticipated costs for the new building, utility costs should be reduced by $125,000 per year.

***Redevelopment of Existing Garage Site***

*Land Value Benefits.* The existing Central Garage is located on a key site in the Salt Lake City Redevelopment Agency’s Depot District, an officially blighted area slated for redevelopment. The existing property would be available for transit-oriented development by UTA, and possibly the Salt Lake City Redevelopment Agency, at a location that has been identified as one of six future TOD “catalytic” sites in the HUD $5 million Sustainable Communities Planning Grant awarded to the Wasatch Front in 2010. Based on a recent review of property in the same area, if returned to private use, the land value of the 7.3 acres would be approximately $29 per square foot, or an estimated $9,221,652. While this number has not been included in the cost-benefit calculations, it still represents the value of development in this central part of the City.

***Residual Value of Depot District Clean Fuels Technology Center***

The Depot District is assumed to have a useful life of 75 years, based on a study conducted by the University of Utah. With a cost of $70 million, this leaves a residual value of $32.7 million after 40 years.

**Table 15: Residual Value of the Depot District Clean Fuels Technology Center**

|  |  |
| --- | --- |
| Description | Amount |
| Useful life of facility in years | 75 |
| Years in analysis | 40 |
| Useful life remaining | 35 |
| Project Cost | $70,000,000 |
| Residual Value | $32,666,667 |

## 4. Savings from Increased Ridership and Reduced VMTs

***Fuel Savings from Increased Ridership***

Fuel savings will also occur from increased ridership. The increased ridership will result in reduced vehicle miles traveled (VMTs), with the accompanying reduced fuel usage and costs. Ridership is anticipated to increase with construction of the new garage because, with the added maintenance space, additional buses and bus routes can be added. This results in increased ridership of nearly 5,300 riders daily by 2058.

Vehicle miles traveled are reduced by an average of seven miles per day per rider. This is the average bus trip length for the typical UTA rider. Savings are calculated by dividing the reduced vehicle miles by the average miles per gallon in order to calculate the gallons of gas saved. Without specific information available as to the mix of vehicles represented in the VMTs saved, an average of 17.5 miles per gallon was used.[[5]](#footnote-5) The average gallons saved were then multiplied by the *rate* of per gallon cost increases in the NHTSA’s forecast[[6]](#footnote-6) to estimate total cost savings. However, the starting point for 2018 is the $3.17[[7]](#footnote-7) per gallon currently paid for regular gas by motorists in Utah as of June 2018. In addition, there are vehicle operating costs of approximately $0.50 per mile that include insurance, license, depreciation, maintenance, repair and tires.

**Table 16: Estimated Operating Savings from Increased Ridership by Year**

| Description | Amount |
| --- | --- |
| Average cost per mile for maintenance, repair and tires | $0.0794 |
| Insurance, license and depreciation per year | $5,625.00 |
| Average vehicle miles pe ryear | 13,474 |
| Average cost per mile for insurance, license and depreciation | $0.42 |
| **Total Operating and Repair Costs per Vehicle Mile** | $0.50 |

**Table 17: Estimated Fuel Savings and Operating Cost Savings from Increased Ridership by Year**

| Year | Total VMT Reduction | Gallons of Gas Saved | Estimated Fuel Costs per Gallon | Estimated Fuel Savings | Estimated Operating Cost Savings |
| --- | --- | --- | --- | --- | --- |
| 2018 |  |  | $3.17 |  | $0 |
| 2019 |  |  | $3.25 |  | $0 |
| 2020 |  |  | $3.34 |  | $0 |
| 2021 |  |  | $3.42 |  | $0 |
| 2022 | 89,445 | 5,111 | $3.51 | $17,934 | $49,191 |
| 2023 | 254,306 | 14,532 | $3.60 | $52,298 | $143,453 |
| 2024 | 412,557 | 23,575 | $3.69 | $87,023 | $238,703 |
| 2025 | 564,125 | 32,236 | $3.79 | $122,053 | $334,789 |
| 2026 | 708,938 | 40,511 | $3.88 | $157,327 | $431,545 |
| 2027 | 916,924 | 52,396 | $3.98 | $208,713 | $572,496 |
| 2028 | 1,118,009 | 63,886 | $4.09 | $261,026 | $715,988 |
| 2029 | 1,312,121 | 74,978 | $4.19 | $314,220 | $861,899 |
| 2030 | 1,499,186 | 85,668 | $4.30 | $368,246 | $1,010,089 |
| 2031 | 1,679,133 | 95,950 | $4.41 | $423,047 | $1,160,409 |
| 2032 | 1,921,887 | 109,822 | $4.52 | $496,653 | $1,362,309 |
| 2033 | 2,157,377 | 123,279 | $4.64 | $571,838 | $1,568,540 |
| 2034 | 2,385,530 | 136,316 | $4.76 | $648,566 | $1,779,000 |
| 2035 | 2,606,273 | 148,930 | $4.88 | $726,793 | $1,993,576 |
| 2036 | 2,889,534 | 165,116 | $5.01 | $826,495 | $2,267,057 |
| 2037 | 3,165,242 | 180,871 | $5.13 | $928,627 | $2,547,201 |
| 2038 | 3,433,324 | 196,190 | $5.27 | $1,033,167 | $2,833,954 |
| 2039 | 3,693,708 | 211,069 | $5.40 | $1,140,093 | $3,127,249 |
| 2040 | 4,016,325 | 229,504 | $5.54 | $1,271,535 | $3,487,790 |
| 2041 | 4,331,103 | 247,492 | $5.68 | $1,406,435 | $3,857,818 |
| 2042 | 4,637,971 | 265,027 | $5.83 | $1,544,795 | $4,237,338 |
| 2043 | 4,936,862 | 282,106 | $5.98 | $1,686,613 | $4,626,342 |
| 2044 | 5,297,704 | 302,726 | $6.13 | $1,856,411 | $5,092,091 |
| 2045 | 5,650,430 | 322,882 | $6.29 | $2,030,905 | $5,570,725 |
| 2046 | 5,994,972 | 342,570 | $6.45 | $2,210,126 | $6,062,324 |
| 2047 | 6,401,263 | 365,786 | $6.62 | $2,420,568 | $6,639,561 |
| 2048 | 6,799,236 | 388,528 | $6.79 | $2,637,141 | $7,233,618 |
| 2049 | 7,188,827 | 410,790 | $6.96 | $2,859,914 | $7,844,679 |
| 2050 | 7,569,970 | 432,570 | $7.14 | $3,088,950 | $8,472,919 |
| 2051 | 8,012,601 | 457,863 | $7.32 | $3,353,606 | $9,198,863 |
| 2052 | 8,446,659 | 482,666 | $7.51 | $3,626,145 | $9,946,433 |
| 2053 | 8,872,083 | 506,976 | $7.71 | $3,906,677 | $10,715,925 |
| 2054 | 9,358,811 | 534,789 | $7.90 | $4,226,923 | $11,594,353 |
| 2055 | 9,836,785 | 562,102 | $8.11 | $4,556,995 | $12,499,733 |
| 2056 | 10,375,947 | 592,911 | $8.32 | $4,930,318 | $13,523,748 |
| 2057 | 10,601,402 | 605,794 | $8.53 | $5,166,925 | $14,172,757 |
| **TOTAL** |  |  |  | **$61,165,102** | **$167,774,465** |

These savings are partially offset by the cost of bus fares for the increased ridership. Based on UTA’s database, the average fare per rider is $1.11. This offsetting cost has been included in the analysis.

# Environmental Sustainability

Construction of the Depot District will result in reduced pollutants from: 1) emissions from the CNG and electric buses in comparison to diesel buses; and 2) reduced pollutants from emissions due to the increased ridership (and therefore reduced automobile VMTs).

*Reduced Pollutant Emissions from CNG and Electric Buses.* Basic assumptions used for the calculation of emissions impacts from the use of CNG buses are that the average bus travels 36,000 miles in a year and averages 4.66 miles per gallon for a diesel bus, 4.34 miles per gallon for a CNG bus and 16.03 miles per gallon for an electric bus. Using these assumptions, as well as a total of 150 buses in operation by 2029 (75 CNG and 75 electric) will result in reduced CO2 emission costs of over $7.0 million over a 40-year period.

Reduced pollutants from emissions with the use of CNG and electric buses are also projected for NOx, PMs, VOCs and SO2. These cost savings have been calculated based on the assumptions for each pollutant as shown in the table below.

**Table 18: Cost per Short Ton for Various Emission Types**

| Emission Type | Cost per Short Ton |
| --- | --- |
| Nitrogen oxide | $7,877 |
| Particulate matter | $360,383 |
| VOC | $1,999 |
| Sulfur dioxide | $46,561 |
| *Source: BCA Resource Guide 2018 provides costs in $2016. Costs have been increased by UTA to $2018.* | |

**Table 19: Emission Assumptions by Pollutant**

| (CAP- Criteria Air Pollutants) | | CNG | Diesel (manuf.<2010) | Electric | EPA Clean Diesel |
| --- | --- | --- | --- | --- | --- |
| NOx | grams/mile= | 5.13 | 20.35 | 2.42 | 3.06 |
| PM | grams/mile= | 0.129 | 0.704 | 0.133 | 0.072 |
| VOC | grams/mile= | 0.048 | 0.562 | 0.014 | 0.047 |
| SO2 | grams/mile= | 0.012 | 0.099 | 0.981 | 0.02 |

The estimated total cost savings from these pollutants over 40 years is projected at over $68 million.

*Reduced Pollutant Emissions from Reduced VMTs from Increased Ridership*

The reduced pollutant emissions from the reduced VMTs due to increased bus ridership include CO2, NOx, PMs, VOCs, and SO2. Reduced VMTs were calculated based on the increased ridership discussed previously in this BCA, assuming that each rider has an average bus trip length of seven miles.

**Table 19: Emission Cost Savings from Reduced VMTs - CO2**

| Year | Reduced VMTs | CO2 Saved (lbs) | CO2 Saved (metric tons) | CO2 Cost/Ton | Total CO2 Cost Savings |
| --- | --- | --- | --- | --- | --- |
| 2018 | - | - | 0.00 | $43.00 | $0.00 |
| 2019 | - | - | 0.00 | $44.00 | $0.00 |
| 2020 | - | - | 0.00 | $45.00 | $0.00 |
| 2021 | - | - | 0.00 | $46.00 | $0.00 |
| 2022 | 89,445 | 72,763 | 33.00 | $47.00 | $1,550.96 |
| 2023 | 254,306 | 206,876 | 93.82 | $49.00 | $4,597.24 |
| 2024 | 412,557 | 335,612 | 152.20 | $51.00 | $7,762.44 |
| 2025 | 564,125 | 458,911 | 208.12 | $52.00 | $10,822.40 |
| 2026 | 708,938 | 576,716 | 261.55 | $52.00 | $13,600.55 |
| 2027 | 916,924 | 745,910 | 338.28 | $54.00 | $18,267.19 |
| 2028 | 1,118,009 | 909,491 | 412.47 | $55.00 | $22,685.73 |
| 2029 | 1,312,121 | 1,067,400 | 484.08 | $56.00 | $27,108.57 |
| 2030 | 1,499,186 | 1,219,576 | 553.10 | $57.00 | $31,526.46 |
| 2031 | 1,679,133 | 1,365,961 | 619.48 | $58.00 | $35,930.04 |
| 2032 | 1,921,887 | 1,563,440 | 709.04 | $60.00 | $42,542.59 |
| 2033 | 2,157,377 | 1,755,009 | 795.92 | $61.00 | $48,551.28 |
| 2034 | 2,385,530 | 1,940,610 | 880.10 | $62.00 | $54,565.90 |
| 2035 | 2,606,273 | 2,120,183 | 961.53 | $63.00 | $60,576.64 |
| 2036 | 2,889,534 | 2,350,613 | 1066.04 | $63.00 | $67,160.38 |
| 2037 | 3,165,242 | 2,574,899 | 1167.75 | $65.00 | $75,904.05 |
| 2038 | 3,433,324 | 2,792,981 | 1266.66 | $66.00 | $83,599.45 |
| 2039 | 3,693,708 | 3,004,802 | 1362.72 | $67.00 | $91,302.38 |
| 2040 | 4,016,325 | 3,267,248 | 1481.75 | $68.00 | $100,758.68 |
| 2041 | 4,331,103 | 3,523,318 | 1597.88 | $69.00 | $110,253.48 |
| 2042 | 4,637,971 | 3,772,953 | 1711.09 | $71.00 | $121,487.38 |
| 2043 | 4,936,862 | 4,016,098 | 1821.36 | $72.00 | $131,137.89 |
| 2044 | 5,297,704 | 4,309,640 | 1954.49 | $73.00 | $142,677.43 |
| 2045 | 5,650,430 | 4,596,580 | 2084.62 | $74.00 | $154,261.65 |
| 2046 | 5,994,972 | 4,876,862 | 2211.73 | $76.00 | $168,091.40 |
| 2047 | 6,401,263 | 5,207,377 | 2361.62 | $77.00 | $181,844.90 |
| 2048 | 6,799,236 | 5,531,125 | 2508.45 | $78.00 | $195,658.84 |
| 2049 | 7,188,827 | 5,848,054 | 2652.18 | $79.00 | $209,522.10 |
| 2050 | 7,569,970 | 6,158,110 | 2792.79 | $80.00 | $223,423.50 |
| 2051 | 8,012,601 | 6,518,188 | 2956.09 | $82.00 | $242,399.72 |
| 2052 | 8,446,659 | 6,871,290 | 3116.23 | $83.00 | $258,647.21 |
| 2053 | 8,872,083 | 7,217,369 | 3273.18 | $84.00 | $274,947.38 |
| 2054 | 9,358,811 | 7,613,318 | 3452.75 | $85.00 | $293,483.92 |
| 2055 | 9,836,785 | 8,002,146 | 3629.09 | $86.00 | $312,101.85 |
| 2056 | 10,375,947 | 8,440,751 | 3828.00 | $87.00 | $333,036.42 |
| 2057 | 10,601,402 | 8,624,156 | 3911.18 | $88.00 | $344,184.02 |
| **TOTAL** |  |  |  |  | **$4,495,972.01** |

Using the same assumptions for decreased VMTs as shown in the following table, reduced emission costs for NOx, VOCs, PMs and SO2 are calculated below.

**Table 20: Emission Assumptions for Cost Calculations**

|  | Cost per Long Ton | Emissions and Fuel Consumption Rates per Mile Driven (grams) |
| --- | --- | --- |
| VOC | $1,999 | 1.26 |
| Nitrogen oxide | $7,877 | 0.95 |
| Particulate matter | $360,383 | 0.0052 |
| Sulfur dioxide | $46,561 | 0.02 |

**Table 21: Emission Cost Savings from Reduced VMTs - NOx, VOCs, PMs and SO2**

| Year | NO saved (long tons) | Total NOx Cost Savings | Particulates Saved (long tons) | Total Particulate Cost Savings | SO2 Saved (long tons) | Total SO2 Cost Savings | VOCs Saved (long tons) | Total VOC Cost Savings |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2018 | - | $0.00 | - | $0.00 | - | $0.00 | - | $0.00 |
| 2019 | - | $0.00 | - | $0.00 | - | $0.00 | - | $0.00 |
| 2020 | - | $0.00 | - | $0.00 | - | $0.00 | - | $0.00 |
| 2021 | - | $0.00 | - | $0.00 | - | $0.00 | - | $0.00 |
| 2022 | 0.08 | $658.75 | 0.00 | $164.97 | 0.00 | $69.96 | 0.11 | $221.51 |
| 2023 | 0.24 | $1,872.92 | 0.00 | $469.03 | 0.00 | $198.91 | 0.32 | $629.79 |
| 2024 | 0.39 | $3,038.41 | 0.00 | $760.90 | 0.01 | $322.69 | 0.51 | $1,021.70 |
| 2025 | 0.53 | $4,154.69 | 0.00 | $1,040.45 | 0.01 | $441.24 | 0.70 | $1,397.06 |
| 2026 | 0.66 | $5,221.22 | 0.00 | $1,307.54 | 0.01 | $554.51 | 0.88 | $1,755.69 |
| 2027 | 0.86 | $6,753.00 | 0.00 | $1,691.14 | 0.02 | $717.19 | 1.14 | $2,270.76 |
| 2028 | 1.05 | $8,233.96 | 0.01 | $2,062.02 | 0.02 | $874.47 | 1.39 | $2,768.75 |
| 2029 | 1.23 | $9,663.56 | 0.01 | $2,420.03 | 0.02 | $1,026.30 | 1.63 | $3,249.47 |
| 2030 | 1.40 | $11,041.27 | 0.01 | $2,765.04 | 0.03 | $1,172.62 | 1.86 | $3,712.73 |
| 2031 | 1.57 | $12,366.55 | 0.01 | $3,096.93 | 0.03 | $1,313.37 | 2.08 | $4,158.37 |
| 2032 | 1.80 | $14,154.39 | 0.01 | $3,544.66 | 0.03 | $1,503.24 | 2.38 | $4,759.55 |
| 2033 | 2.02 | $15,888.74 | 0.01 | $3,978.99 | 0.04 | $1,687.43 | 2.67 | $5,342.74 |
| 2034 | 2.23 | $17,569.05 | 0.01 | $4,399.79 | 0.04 | $1,865.89 | 2.96 | $5,907.76 |
| 2035 | 2.44 | $19,194.79 | 0.01 | $4,806.92 | 0.04 | $2,038.55 | 3.23 | $6,454.43 |
| 2036 | 2.70 | $21,280.96 | 0.01 | $5,329.35 | 0.05 | $2,260.11 | 3.58 | $7,155.93 |
| 2037 | 2.96 | $23,311.50 | 0.02 | $5,837.86 | 0.05 | $2,475.76 | 3.92 | $7,838.72 |
| 2038 | 3.21 | $25,285.88 | 0.02 | $6,332.30 | 0.06 | $2,685.44 | 4.25 | $8,502.62 |
| 2039 | 3.45 | $27,203.57 | 0.02 | $6,812.54 | 0.06 | $2,889.11 | 4.58 | $9,147.47 |
| 2040 | 3.76 | $29,579.59 | 0.02 | $7,407.56 | 0.07 | $3,141.45 | 4.98 | $9,946.43 |
| 2041 | 4.05 | $31,897.88 | 0.02 | $7,988.13 | 0.07 | $3,387.66 | 5.37 | $10,725.97 |
| 2042 | 4.34 | $34,157.92 | 0.02 | $8,554.11 | 0.08 | $3,627.68 | 5.75 | $11,485.93 |
| 2043 | 4.62 | $36,359.20 | 0.03 | $9,105.37 | 0.08 | $3,861.46 | 6.12 | $12,226.13 |
| 2044 | 4.95 | $39,016.75 | 0.03 | $9,770.89 | 0.09 | $4,143.70 | 6.56 | $13,119.76 |
| 2045 | 5.28 | $41,614.52 | 0.03 | $10,421.45 | 0.09 | $4,419.59 | 7.00 | $13,993.29 |
| 2046 | 5.61 | $44,152.02 | 0.03 | $11,056.91 | 0.10 | $4,689.08 | 7.43 | $14,846.54 |
| 2047 | 5.99 | $47,144.29 | 0.03 | $11,806.26 | 0.11 | $5,006.87 | 7.93 | $15,852.72 |
| 2048 | 6.36 | $50,075.30 | 0.03 | $12,540.27 | 0.11 | $5,318.15 | 8.42 | $16,838.30 |
| 2049 | 6.72 | $52,944.57 | 0.04 | $13,258.81 | 0.12 | $5,622.88 | 8.91 | $17,803.12 |
| 2050 | 7.08 | $55,751.62 | 0.04 | $13,961.78 | 0.13 | $5,921.00 | 9.38 | $18,747.02 |
| 2051 | 7.49 | $59,011.54 | 0.04 | $14,778.15 | 0.13 | $6,267.21 | 9.93 | $19,843.20 |
| 2052 | 7.90 | $62,208.31 | 0.04 | $15,578.71 | 0.14 | $6,606.72 | 10.46 | $20,918.15 |
| 2053 | 8.30 | $65,341.48 | 0.05 | $16,363.35 | 0.15 | $6,939.47 | 10.99 | $21,971.71 |
| 2054 | 8.75 | $68,926.15 | 0.05 | $17,261.05 | 0.16 | $7,320.17 | 11.59 | $23,177.09 |
| 2055 | 9.20 | $72,446.36 | 0.05 | $18,142.61 | 0.17 | $7,694.03 | 12.19 | $24,360.79 |
| 2056 | 9.70 | $76,417.20 | 0.05 | $19,137.02 | 0.17 | $8,115.75 | 12.85 | $25,696.03 |
| 2057 | 9.91 | $78,077.64 | 0.05 | $19,552.84 | 0.18 | $8,292.09 | 13.13 | $26,254.36 |
| **TOTAL** |  | **$1,172,015.57** |  | **$293,505.72** |  | **$124,471.75** |  | **$394,101.60** |

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# Safety

Reduction in VMTs equates to a lower incidence of traffic accidents. Costs per incident were obtained from the United States Department of Transportation, Office of the Secretary of Transportation. These costs were then applied to the total number of Utah traffic incidents, as well as vehicle miles traveled, to calculate a safety cost per VMT.[[8]](#footnote-8)

**Table 22: Cost per Accident by Severity**

| Accident Classification | Utah Incidents | Per Incident Cost | Total Cost | Cost/VMT |
| --- | --- | --- | --- | --- |
| AIS 0 |  | **-** | **-** | **-** |
| AIS 1 | 11,823 | $28,800 | $340,490,056 | $0.0111 |
| AIS 2 | 5,881 | $451,200 | $2,653,568,928 | $0.0862 |
| AIS 3 | - | $1,008,000 | $0 | $0.0000 |
| AIS 4 | - | $2,553,600 | $0 | $0.0000 |
| AIS 5 | 1,043 | $5,692,800 | $5,939,251,527 | $0.1930 |
| AIS 6 | 259 | $9,600,000 | $2,486,400,000 | $0.0808 |
| Property Damage | 43,465 | $4,252 | $184,813,180 | $0.0060 |
| **Total** | **62,471** |  | **$11,604,523,692** | **$0.3770** |

The cost per VMT was then applied to the estimated reduction in VMTs traveled due to the increased ridership associated with the new facility.

**Table 23: Safety Cost Reductions**

| Year | Annual VMT Reduction | Cost Savings per VMT | Crash Reduction Savings |
| --- | --- | --- | --- |
| 2017 | 0 | $0.3770 | $0 |
| 2018 | 0 | $0.3867 | $0 |
| 2019 | 0 | $0.3967 | $0 |
| 2020 | 0 | $0.4069 | $0 |
| 2021 | 89,445 | $0.4173 | $37,327 |
| 2022 | 254,306 | $0.4280 | $108,854 |
| 2023 | 412,557 | $0.4390 | $181,131 |
| 2024 | 564,125 | $0.4503 | $254,042 |
| 2025 | 708,938 | $0.4619 | $327,462 |
| 2026 | 916,924 | $0.4738 | $434,418 |
| 2027 | 1,118,009 | $0.4860 | $543,302 |
| 2028 | 1,312,121 | $0.4984 | $654,021 |
| 2029 | 1,499,186 | $0.5113 | $766,470 |
| 2030 | 1,679,133 | $0.5244 | $880,535 |
| 2031 | 1,921,887 | $0.5379 | $1,033,739 |
| 2032 | 2,157,377 | $0.5517 | $1,190,230 |
| 2033 | 2,385,530 | $0.5659 | $1,349,931 |
| 2034 | 2,606,273 | $0.5804 | $1,512,754 |
| 2035 | 2,889,534 | $0.5953 | $1,720,275 |
| 2036 | 3,165,242 | $0.6106 | $1,932,853 |
| 2037 | 3,433,324 | $0.6263 | $2,150,445 |
| 2038 | 3,693,708 | $0.6424 | $2,373,001 |
| 2039 | 4,016,325 | $0.6590 | $2,646,585 |
| 2040 | 4,331,103 | $0.6759 | $2,927,367 |
| 2041 | 4,637,971 | $0.6933 | $3,215,352 |
| 2042 | 4,936,862 | $0.7111 | $3,510,534 |
| 2043 | 5,297,704 | $0.7294 | $3,863,952 |
| 2044 | 5,650,430 | $0.7481 | $4,227,146 |
| 2045 | 5,994,972 | $0.7673 | $4,600,178 |
| 2046 | 6,401,263 | $0.7871 | $5,038,194 |
| 2047 | 6,799,236 | $0.8073 | $5,488,973 |
| 2048 | 7,188,827 | $0.8280 | $5,952,654 |
| 2049 | 7,569,970 | $0.8493 | $6,429,371 |
| 2050 | 8,012,601 | $0.8712 | $6,980,229 |
| 2051 | 8,446,659 | $0.8935 | $7,547,495 |
| 2052 | 8,872,083 | $0.9165 | $8,131,397 |
| 2053 | 9,358,811 | $0.9401 | $8,797,960 |
| 2054 | 9,836,785 | $0.9642 | $9,484,976 |
| 2055 | 10,375,947 | $0.9890 | $10,262,013 |
| 2056 | 10,601,402 | $1.0144 | $10,754,490 |
| **TOTAL** |  |  | **$127,309,657** |

## Conclusion

The development of the Depot District Clean Fuels Technology Center is a key investment for the State of Utah which will have many direct and indirect benefits. Implementation of this new facility has been identified in the regionally approved Long Range Transportation plan. It is critical to implement based on transit service expansion needs that have been identified by both Wasatch Front Regional Council and Salt Lake City. Benefits include job creation, land development and returning property to the tax rolls, increased safety, operation efficiencies, fuel cost savings, air quality benefits and the ability to expand bus service. Development of the Depot District has a benefit-cost ratio of 1.62 to 1.

1. http://www.governor.utah.gov/dea/econsummaries/EconomicSummary.pdf [↑](#footnote-ref-1)
2. Research by Chris Nelson, former professor at the University of Utah, suggests that the useful life of buildings in the downtown area of Salt Lake City is 75 years. [↑](#footnote-ref-2)
3. http://bber.unm.edu/econ/us-pci.htm [↑](#footnote-ref-3)
4. An alternative payment program for electric buses is an upfront, one-time cost of $750,000, with no annual battery lease. This analysis chooses the lower initial cost of $550,000, plus annual battery lease amounts of $35,000 per bus, based on average use of 36,000 miles per year per bus. [↑](#footnote-ref-4)
5. http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national\_transportation\_statistics/index.html#chapter\_4 [↑](#footnote-ref-5)
6. https://www.fhwa.dot.gov/policyinformation/tables/vmt/vmt\_forecast\_sum.cfm [↑](#footnote-ref-6)
7. https://gasprices.aaa.com/state-gas-price-averages/ [↑](#footnote-ref-7)
8. State of Utah, Department of Public Safety, Utah Crash Summary 2016 [↑](#footnote-ref-8)