SUSTAINABILITY PROGRAM
2014-2015 BIENNIAL REPORT

January, 2017

Prepared by the FasTracks Sustainability Committee

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TABLE OF CONTENTS

Figure 1. LEED-Gold Certification for DUS Bus Concourse presented on November 18, 2014

LIST OF FIGURES

Figure 2. Denver Union Station Bus Transfer Facility showing Day-lit Concourse

1. EXECUTIVE SUMMARY

The RTD FasTracks Sustainability Committee continued to measure sustainability metrics during 2014 and 2015. The agency follows its mission by increasing economic vitality, enhancing the social community and safeguarding environmental resources.

The RTD Sustainability Program uses the economic, social and environmental triple-bottom line (TBL) framework as shown in Figure 3, which fulfills the RTD mission of "providing safe, clean, reliable, courteous, accessible and cost-effective service." The TBL focuses on strengthening the economy, improving the social quality of life, and protecting the natural and built environment for present needs without sacrificing the needs of future generations. The Regional Transportation District (RTD) has a service area of approximately 2,342 square miles, serves a population of approximately 2.87 million, and carries an average of 355,000 passengers daily.

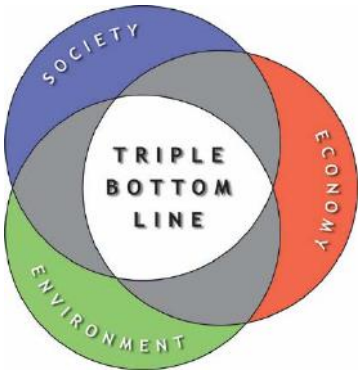

Figure 3 Triple Bottom Line

RTD and Sustainability

In 2006, the RTD Board of Directors adopted a Sustainability Policy and accompanying Guidelines. The Policy Goal Statement is as follows:

> *"Every effort should be made to incorporate sustainability in the implementation and operation of the FasTracks Program within its authorized schedule and budget and in all other RTD activities as well. With this goal in mind, a series of recommendations has been incorporated in the attached RTD Sustainability Guidelines to encourage and foster sustainability in all aspects of the FasTracks program, from planning through design and construction of FasTracks facilities and systems and beyond the FasTracks program to all capital projects District wide. This will include developing and adopting Best Practices for sustainable planning, design, construction, operations and maintenance activities. The ultimate goal is to instill a culture of sustainability throughout the RTD organization."*

During 2014 and 2015, daily passenger ridership increased and fossil fuel consumption was reduced. Additionally, RTD increased its renewable energy portion of total energy use from 2012-2013.

This 2014-2015 Biennial Sustainability Report documents changes within the system. The most significant changes occurred with the start of the Free Metro Ride, the opening of the Denver Union Station Bus Transfer Facility and the Commuter Rail Maintenance Facility in 2014, and more energy-efficient bus service from a bus fleet acquisition which protected the environmental resources and provided additional economic benefits and additional social amenities.

Community services increased, while the environmental footprint impact decreased. Unlinked passenger trips increased 3.3 percent and passenger miles increased 7.3 percent from 2012-2013 to 2014-2015 as reported to National Transit Database (NTD) by RTD. Greenhouse Gas Emissions were calculated 1 percent higher than the average of 2012-2013.

RTD currently has many programs that provide economic, social and environmental sustainability benefits to the community. The Workforce Initiative Now (WIN) program was recognized nationally in 2014.

2014-2015 RTD Sustainability highlights include the following:

Denver Union Station Transit Facility (DUS)

- By achieving more than 20% of locally-acquired materials, the Bus Transfer facility was able to earn LEED-Gold instead of LEED-Silver Certification.
- 22 gate Bus Transfer Facility opened May 9, 2014. Historic Station building opened July 26, 2014.
- Project stockpiled uncontaminated excavated material on site to be used for fill during construction.

West Rail Line

- Eight commissioned pieces of artwork installed along the West Line in 2014 enhanced visual impact and overall commute experience for passengers (Social Sustainability).
- ”Art-wraps” (designs on plastic wrap covering) were installed in 2014 on 34 relay houses, which was part of the Art-n-Transit program. Art wraps dissuades graffiti and maintenance removal costs.
- Included the use of self-weathering steel, which eliminates the need for painting.
- Utilized 32 biodiesel capable vehicles and 21 highly efficient (SUVs) construction vehicles on the project, which met or exceeded State of Colorado Air Quality Emission Standards.
- Parking structures at the Sheridan and Wadsworth Stations include provisions for future PV Solar arrays and Electric Vehicle Charging Stations.

EAGLE (East and Gold Rail Lines)

- Included language in the P3 contract to require sustainable Best Management Practices in the design, construction, operations and maintenance in the corridors.
- Of the DBE eligible construction value, 24% was awarded to DBEs, and of the SBE eligible construction value, 28% was awarded to SBEs, providing a local availability labor pool.
- The CRMF was furnished with used high-quality office furniture and equipment procured from the Colorado Supreme Court, none of which went to landfills.
- Commuter Rail Maintenance Facility earned LEED-Gold Certification by a) using ballast to reduce Heat Island effect, b) reducing Water use by 35% or more, and c) incorporating an employee train stop to reduce on-site parking.
- In 2015, 34,745,550 gallons of previously contaminated water was remediated and returned to the water shed or used for dust suppression, reducing the need for potable water. This brings to project total to 147,697,608 gallons of such remediated and reused water.
- To date, there has been 240,321 cubic yards of previously contaminated materials or soils remediated by the Eagle P3 Project. Construction of the Eagle P3 Project has resolved historic contamination which would not have otherwise been addressed.

- The project exceeded an early-established goal of 40% by diverting around 48% of construction debris from landfills to date. For 2015 specifically, almost 86% of all waste was diverted from landfills (alternative uses).
- Purchase of materials and products from local and regional companies returns project funding to the community that the project serves. The project purchased 52% of its materials from local and regional businesses with 22% of the materials having recycled content.
- The CRMF in 2015 purchased green power to supply 35% of its power for the first two years of the O&M phase.

Northwest Rail Line/US36 BRT

- Joint managed with CDOT design, Widening of US 36 to include new toll lanes and shoulders begun in 2014.
- Construction of the Westminster Station and the first segment of the Northwest (B-Line) commuter rail was well underway by Spring, 2015.
- The first portion of the US 36 Bikeway from Westminster to Louisville/Superior opened June 24, 2015 providing a direct commuter route for bicyclists.
- Incorporated natural daylighting into Driver Relief Stations at Park-n-Ride Facilities.
- Reduced pollution and congestion by constructing direct access bus ramps and pullouts that allow buses to move to/from US 36 without experiencing the delay of adjacent intersections.
- US 36 “Bus-then-Bike” Bicycle Storage facility for 140 bicycles opened January 28, 2014 at the Boulder Transit Center.

North Metro Rail Line

- 24% DBE on Design and 22% DBE on construction representation in 2014
- North Metro Rail Line broke ground in March 2015; design of the project reached 60 percent completion in September; and North Metro received rail delivery and completed tie-in work at Union Station in November, 2014.
- Implemented Aconex paperless Document Control System in 2014.
- Encouraged multi-mode transportation nodes at stations.
- Use of full-cutoff LED light fixtures at Park-n-Rides and plaza/platform areas.
- Use of recycled ballast and track rail for safety guard rails, and reuse of concrete, asphalt and soil.
- Driver Relief Stations will use Low-flow toilets with infrared sensors to minimize water use.

I-225 Line

- Trackwork and track bed construction begun in April, 2014. CDOT's widening of I-225 in conjunction with RTD's LRT extension will reduce overall construction environmental impact.
- Redesign of Mississippi Avenue flyover will save 80% material and construction costs.
- Redesign of the power distribution system resulted in eliminating one Traction Power Substation, saving money and generation costs.
- Parking and platform area lighting will use energy-efficient LED fixtures.
- Appointed a LEED-Accredited deputy project manager. Required consultant team to include a LEED-Accredited member.

Southeast Rail Extension (SERE)

- RTD revised Lighting criteria will optimize illumination levels and reduce energy consumption and maintenance needs.
- RidgeGate parking structure lighting will be LED luminaires, reducing energy and maintenance costs.
- Each of the stations allows for potential TOD parcels which will encourage pedestrian walkability and bicycle access.
- Included requirements for Sustainability considerations in planning and environmental work.

Rail Operations

- During 2014 and 2015 the Light Rail Vehicle fleet of SD-100's went through a mid-life refurbishment which, after completion, will extend the vehicle's life by 30-40 years.
- Acquired 52 Commuter Rail cars (26 married pairs) in 2015.
- The trains incorporate regenerative braking to capture and reuse kinetic energy, and energy-efficient HVAC systems, along with passenger-activated doors to preserve air conditioning and heating.
- RTD implemented the new Automatic Train Stop (ATS) system and the Supervisory Control and Data Acquisition (SCADA) fiber-optic system to assure on-time connection as new rail service is added.
- Refurbished space in one of the buildings to consolidate SCADA, LRV Maintenance Training and Transit Security adjacent to Security Command Center.
- Rio Court, a recycled empty warehouse, was opened in late 2014 to house RTD Maintenance-of-Way Infrastructure employees.

Bus Operations

- Replaced half of bus fleet with more efficient and better fuel economy buses, which reduce particulate matter exhaust emissions by 90%, with a 4% to 13% improved fuel economy (depending on the sub fleet) from the older buses.

- New all-electric Mall Shuttle buses were ordered in 2015, to be deployed starting in the 3rd quarter of 2016. These new battery-electric buses are estimated to improve the energy consumption rate eight-fold, transferring mobile source emissions to lesser emitting point sources.
- Implemented a "smart transmission" feature on the new buses which maximizes gear-shifting efficiency, resulting in a fuel consumption reduction of approximately 5%.
- Implemented the supercapacitor starting feature on the new buses. A supercapacitor is an electrical storage device that can be recharged quickly and can provide a burst of high energy to start a bus. With the supercapacitor, bus idling is greatly reduced, saving energy and reducing vehicle exhaust emission.
- Bus tires are being replaced with low-rolling resistance tires. Studies have shown that low rolling resistant tires improves fuel economy 1-2%.
- Free Metro Ride began high-frequency peak-hour service between Union Station and Civic Center on May 12, 2014. Free Metro Ride relieves the crowded 16th Street Mall shuttle, improving travel time and transit experience across downtown.

Capital Programs

- Replaced three highblock ramps along California and Stout Streets in 2015, ensuring a safer, more positive and cleaner transit experience (social sustainability).
- Bus shelters were recycled and repurposed for West Arts Colfax upgrade in 2014.
- Continued review of performance and energy saving metrics of LED lighting retrofit project at Westminster Center Park-n-Ride (approximately 100 lights and controllers) estimated between 28-30% savings from original luminaires.

Finance & Administration

- Developed and implemented new Payroll Money Card, creating a paperless payment process.
- Implemented the Smart Card pilot program in 2015 providing passengers with greater convenience, facilitating cashless operation at rail and bus stations, eliminating paper tickets, the cost of station service equipment, and improving security.

Safety, Security and Asset Management

- (Environmental) As of 2015, document control of expansive environmental reports are limited to one hard copy and all other reports, manifests and laboratory results are relegated to electronic/CD format.
- (Safety) Project Safety and Security Certification programs have dramatically reduced paper copies of backup documentation associated with the certification programs. Certifiable items now use titles and reference numbers to the backup documentation stored electronically with the project's document control system.
- (Asset Management) RTD received a 2014 grant from the Regional Air Quality Council (RAQC) to purchase electric vehicles and install chargers at select facilities within the District.

Communications

- Communications Department has met paper reduction goals for the past 6 years.
- Information Technology began saving $90,000 annually from a procurement of more energy efficient network servers.
- Eliminated paper use in payroll and scans.

General Counsel

- Manager of General Counsel issued comprehensive review of document production, and issued order to reduce paper usage in the Department.

Planning

- Transit Oriented Communities Pilot projects at Olde Town Arvada and Alameda.
- In 2014-2015 RTD's Bike-n-Ride Program improved multi-modal access and reduced dependency on Single Occupancy Vehicle (SOV) travel to transit facilities by:
  - Supporting the programming of eight (8) Bike-n-Ride Shelters on US 36, A and R Lines
  - Providing capacity for 1,298 bicycles at RTD stations.
  - Integration of four (4) bike racks per train car on each new RTD Commuter Rail Line (A, B, and G lines)

Figure 4: Bike-n-Ride Shelter with protected Bicycle Storage (8th and Coffman in Longmont)

- RTD monitors all FasTracks projects during construction to ensure compliance with environmental mitigation measures agreed upon during the environmental documentation phase. Measures range from those used to mitigate temporary construction impacts, such as using best management practices, to those necessary to mitigate for direct, permanent impacts, such as purchase of wetland mitigation bank credits. For the reporting period (2014-2015), the Eagle Project, I-225 Rail Line, North Metro Rail Line, and Denver Union Station were monitored for compliance. During this time, 282 mitigation measures were completed.

2. RTD SUSTAINABILITY PROGRAM

Sustainability is the capacity to give support. For humans, sustainability is the long-term maintenance of well-being, which has environmental, economic and social dimensions, commonly referred to as the "triple bottom line". As shown in Figure 4 below, the RTD Sustainability Program seeks to balance the delivery of effective public services (external activities) with the implementation of efficient business activities (internal management practices). This results in an increased quality of life, a smaller environmental footprint and cost-effective management of resources and materials. With the endorsement of the United Nations this became the dominant approach to public sector full cost accounting. In the private sector, this is known as "corporate social responsibility"

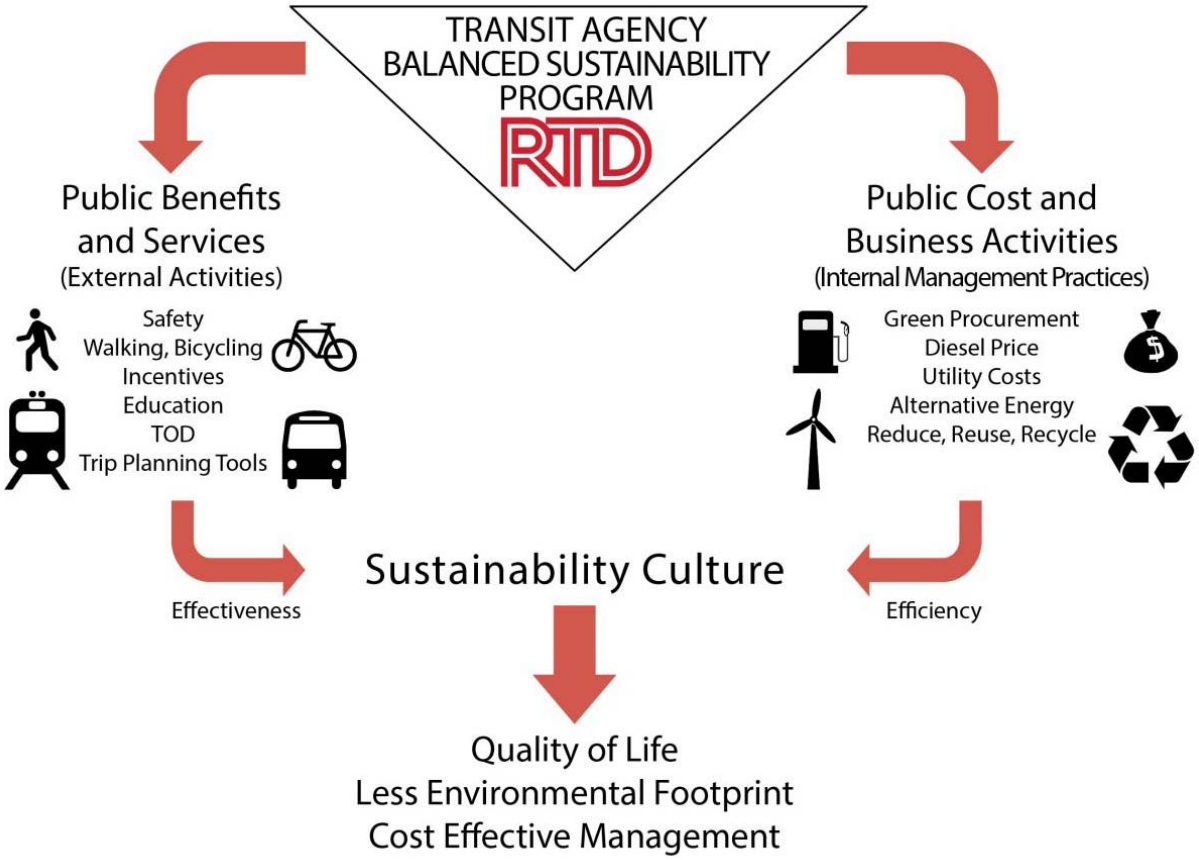

Figure 5 RTD Sustainability Program Concept Chart

3. RTD SUSTAINABILITY CULTURE

RTD's sustainability program is well imbedded within the daily tasks of the agency. The chart below highlights the fundamental factors which comprise RTD sustainability culture; objectives and indicators. An indicator is a sign or group of statistical values that helps one understand the condition of a given feature, in this case the ability to give support to the long-term maintenance of well-being, in its environmental, economic, and social dimensions. RTD's sustainability indicators provide useful metrics to identify problems before they become critical, and to spotlight the areas where the links between the environment, economy and society are weak. The indicators below fall into the three objectives of sustainability outlined by RTD policy.

RTD SUSTAINABILITY CULTURE	OBJECTIVES	INDICATORS
QUALITY OF LIFE	GREATER TRAVEL CHOICES/ACCESSIBILITY	Optimized Transit Service Balanced Transit Access Public Involvement Multi-modal Transit
	LIVABLE COMMUNITIES	Improve Air Quality Reduce Congestion Transit Oriented Development Walkable Communities WIN Program DBE\SBE\MBE Participation on Projects Commuinity Participation Transit Watch program
ENVIRONMENTAL FOOTPRINT MANAGEMENT	ENVIRONMENTAL SUSTAINABILITY	Reduce System Environmental Footprint Reduce Total Fuel Reduce Green House Gas Emissions Reduce Water Use Minimize Hazardous Wastes Reduce Infrastructure Maintenance Costs Reduce Harmful Air Emissions Reduce, Reuse, Recycle Materials

Figure 6 RTD Sustainability Culture chart

While this report focuses on the Quality of Life and Environmental Footprint aspects of sustainability it does not intend to address the Fiscal Sustainability of the agency.

3.1. QUALITY OF LIFE

Quality of Life is used to evaluate the general well-being of individuals and societies. Quality of life should not be confused with the concept of standard of living, which is based primarily on income. Instead, standard indicators of the quality of life include not only wealth and employment, but also the built environment, physical and mental health, education, recreation, social belonging and leisure time.

3.1.1. GREATER TRAVEL CHOICES/ACCESSIBILITY

Optimized Transit Service refers to growth and improvements to the transit network, including new rail and bus routes and the facilities that support those services. Service effectiveness is higher when it carries more passenger trips per vehicle revenue mile.

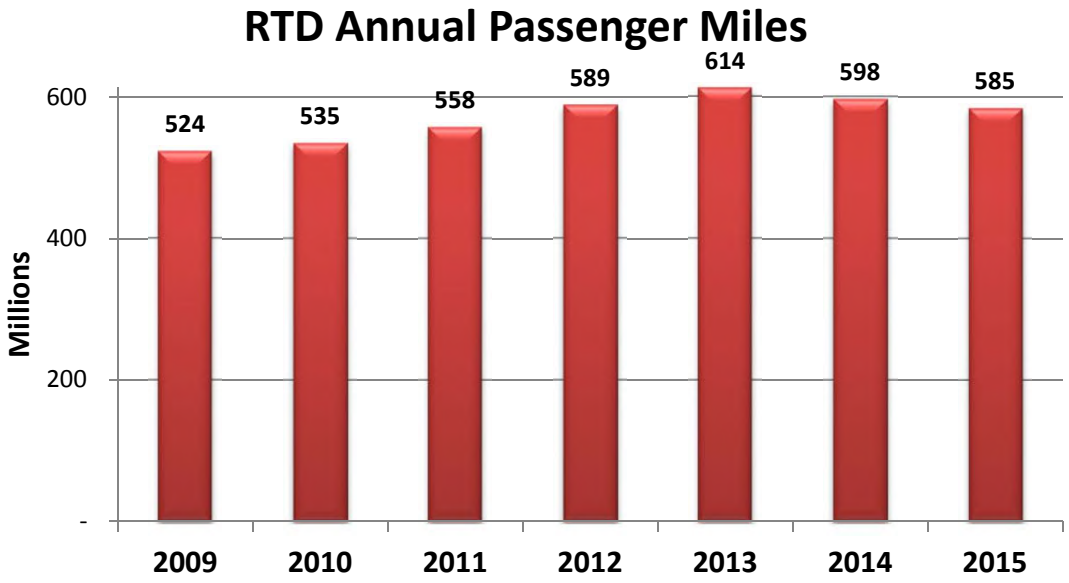

Figure 7 Passenger Miles by Year

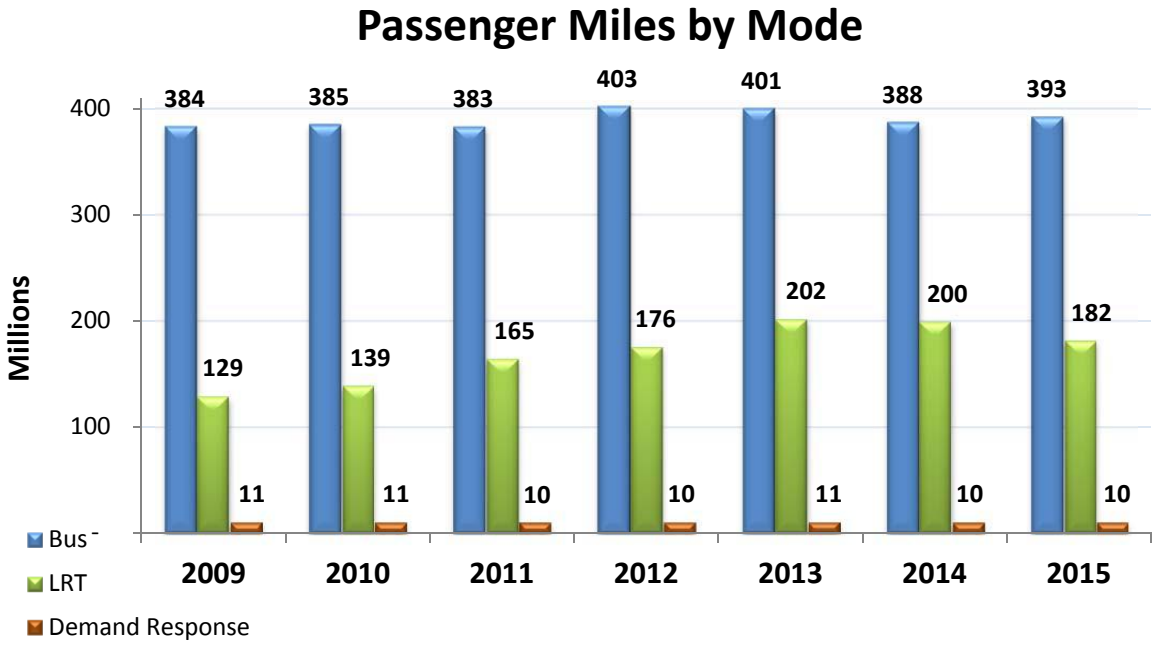

Figure 8 Passenger Miles by Mode

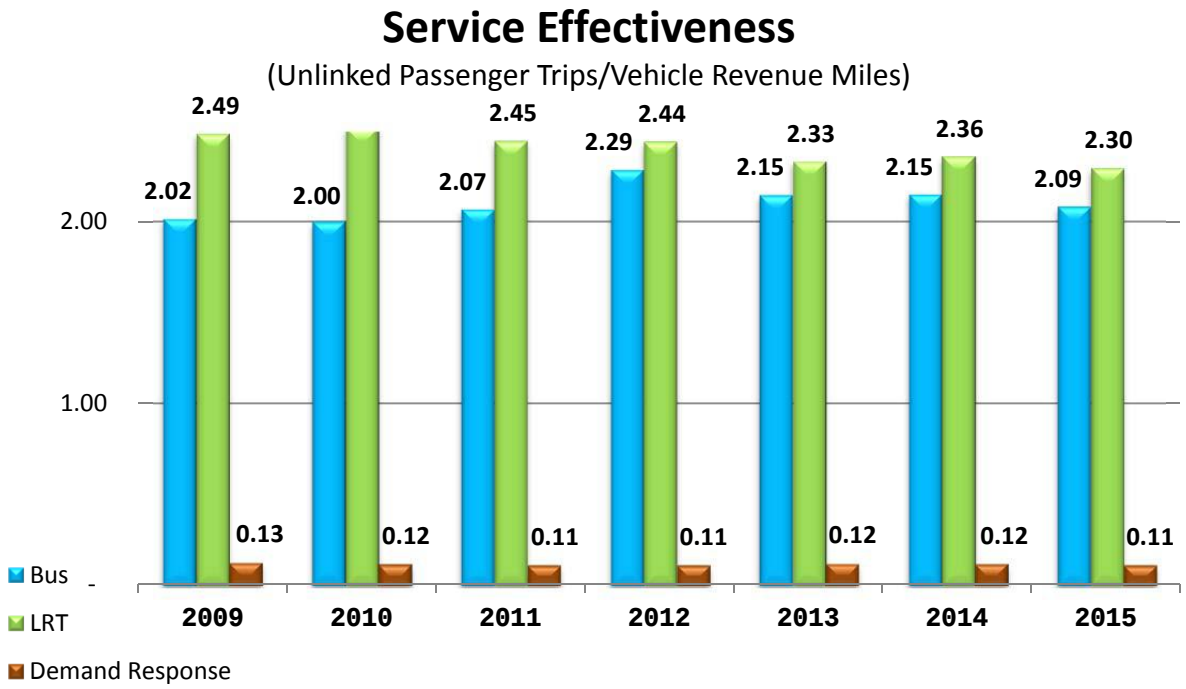

Figure 9 Service Effectiveness

Annual Passenger Miles declined between 2013 and 2015, partially due to service cuts in 2014, bringing the overall Service Effectiveness (the ratio of passenger miles to vehicle revenue miles) of the RTD system to 2009 levels. The relative low service effectiveness of the Demand Response mode raises the question whether there are other modes to be considered for enhanced sustainability.

Near term goals for the FasTracks Program include approximately 93 miles of commuter rail, 28 miles of light rail, 18 miles of BRT, park-n-Ride improvements and/or relocations at existing park-n-Ride lots along US 36.

Balanced Transit Access is the ability for people to approach transit in a convenient way, such as being within walking distance to origin and destination, or efficient transfers from one mode of transportation to another. This refers also to the capacity for people with special needs to get access to special transportation.

Public Involvement engages the community in planning and project development in order to increase the pool of common knowledge and build trust. Public involvement is based on giving people the opportunities to debate issues, frame alternative solutions, and affect final decisions in ways that respect the roles of decision-makers.

Multimodal Opportunities refers to linking the interaction of various modes of transportation (walking, cycling, automobile, public transit, etc.) with planning and development, and the connections among such modes so each can fill its optimal role in the overall transport system.

3.1.2. LIVABLE COMMUNITIES

Air Quality: Air quality has improved significantly since the passage of the Clean Air Act in 1970. There are still many areas of the country where the public is exposed to unhealthy levels of air pollutants and sensitive ecosystems are damaged by air pollution. RTD's role in improving air quality includes curbing greenhouse gas emissions, particulate matter and ozone producing pollutants, this report tracks greenhouse gas emissions as seen in Figure 10 in section 3.2 Environmental Sustainability. The Denver Regional Council of Governments (DRCOG) tracks carbon monoxide and particulate matter for conformity with the Regional Transportation Plan and the Transportation Improvement Program.

Water Quality: Water quality is measured by standards set by the EPA relative to health of ecosystems, safety of human contact and drinking water. RTD complies with all water quality law and in addition implements measures that help prevent the waste of water and the reuse of water for irrigation purposes.

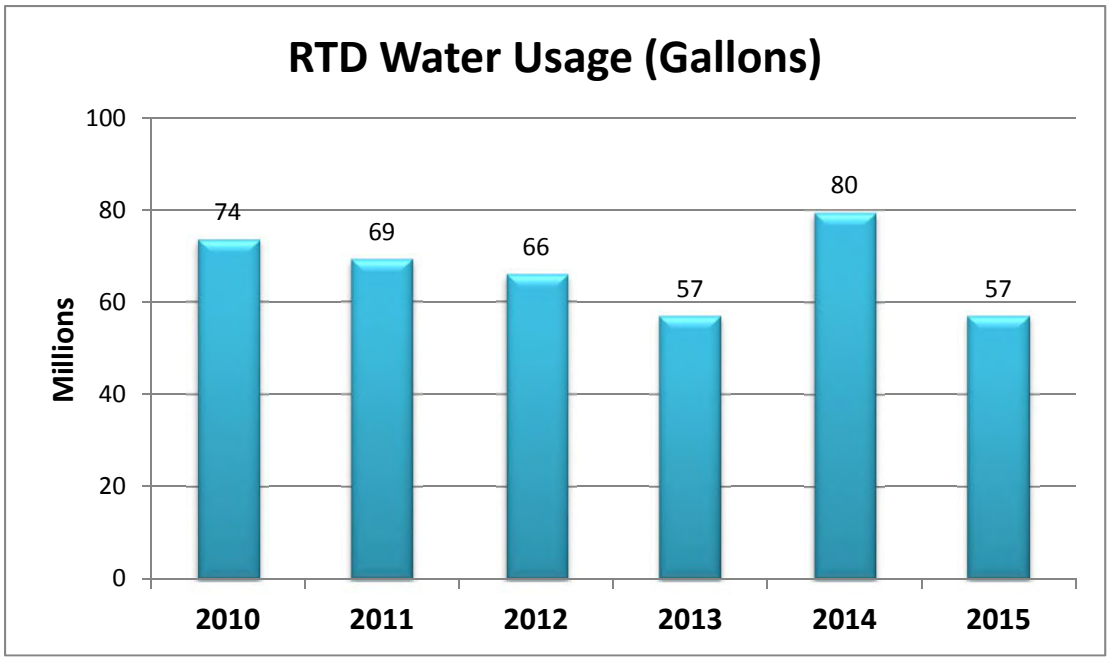

Figure 10 Water Usage from 2010-2015

This report tracks water usage; to minimize the consumption of water RTD uses rain sensors and uses, where available, reclaimed gray water. RTD had observed a continued improvement in water efficiency at about four or five percent annually from 2010 to 2013. See Figure 10. Water usage increased in 2014 due to establishment of vegetation at Denver Union Station and water leaks at several Park-n-Rides. Once the vegetation was established and water leaks repaired, water usage returned to 2013 levels.

Reduce Congestion: Although rail and bus service are not expected to eliminate congestion in the region, it expected instead that they slow the increase of congestion and daily Vehicle Miles Travelled (VMT) growth. If congestion in the region increases, transit modes, in particular rail, may see also an increase. Since 2010 RTD has observed an annual increase of four to five percent in passenger miles, see Figure 4.

Transit-Oriented Development (TOD): RTD's TOD pilot program has started to show fundamental changes in land use in the region, in 2013 key project got under way, including the Alameda Station Village where for the first time RTD gave up parking in favor of residential uses within walking distance to the station. Other pilot projects include Olde Town Arvada and the Federal Center, where higher residential and mixed-use densities around transit are sought.

Walkability: More people access transit by walking than by any other means. Because walking promotes health and social connections along walking paths, walkability is an indicator of sustainability. Transit supports walkable communities at both ends of the trip, at the origin by promoting residential densities that support pedestrian-scale neighborhoods and at the destination by promoting easy access to employment, services and recreation. RTD has a street improvements program that is budgeted annually to use discretionary funds to enhance pedestrian connections among other capital improvements to RTD holdings.

WIN: The regional Workforce Initiative Now (WIN) is a collaborative partnership between RTD, Community College of Denver, Denver Transit Partners (DTP) and the Urban League of Metropolitan Denver. WIN helps job seekers, companies, and local communities through the creation of career opportunities in the transportation and construction industries. At the end of 2015, 227 new participants were enrolled in WIN, which is 64 percent over the 2013 figure.

DBE/SBE Participation on Projects: FTA recipients receiving planning, capital and/or operating assistance who will award prime contracts exceeding $250,000 in FTA funds in a Federal fiscal year are required to have a Disadvantaged Business Enterprise (DBE) Program that complies with the requirements of federal regulations codified at 49 CFR Part 26. As an applicable recipient, RTD is continuing to implement a DBE Program consistent with federal requirements. Recently, RTD not only reorganized its Small Business Department (re-naming it the Civil Rights Department) but revised its DBE Plan and implementing Program to continue to comply with the federal DBE Program requirements. RTD has consistently established DBE participation goals, continued to notify members of the both the DBE and non-DBE firms of the program requirements, has a comprehensive compliance monitoring and oversight program, provides technical assistance and supportive services to DBEs. From the beginning of the program to the end of 2015, RTD processed 774 SBE/DBE certifications.

Transit Watch refers to passengers being alert and aware; passengers are encouraged to report suspicious activity. The CERT program is a safety and security partnership between RTD and its passengers in which RTD asks its users to receive orientation to and make a commitment to be an alert, informed, prepared and involved passenger.

3.2. ENVIRONMENTAL SUSTAINABILITY

Environmental Footprint: The environmental footprint is a measure of human demand on the Earth's ecosystems. It is a standardized measure of demand for natural capital that may be contrasted with the planet's ecological capacity to regenerate.

Reduce Energy Use: After little overall change in energy usage between 2011 and 2013 (decrease of less than 1%), there was an increase of 1.7% from 2013 to 2014, then a decrease of 3.6% from 2014 to 2015. The increase in 2014 is likely due to the commissioning of the Denver Union Station bus concourse. The subsequent decrease in 2015 appears to be due to a reduction in natural gas usage at East Metro and Platte divisions, and a 3.6% reduction in diesel fuel usage.

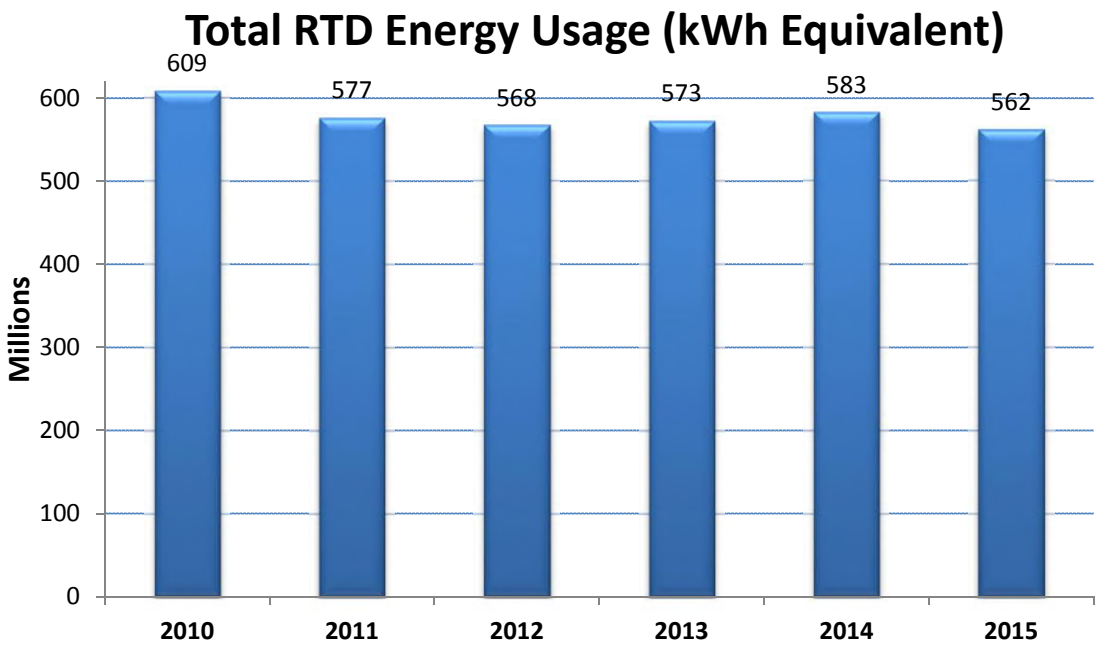

Figure 11 Total RTD Energy Usage from 2010-2015

For this calculation all energy units used by RTD in transportation and facilities were converted to kilowatt-hour assuming that one kilowatt-hour is equal to 3,413 BTU.

The energy consumption pattern has not changed significantly since RTD started reporting in 2010. Not surprisingly, diesel fuel is the greatest user of energy in kWh equivalence, followed by electricity. See Figure 12.

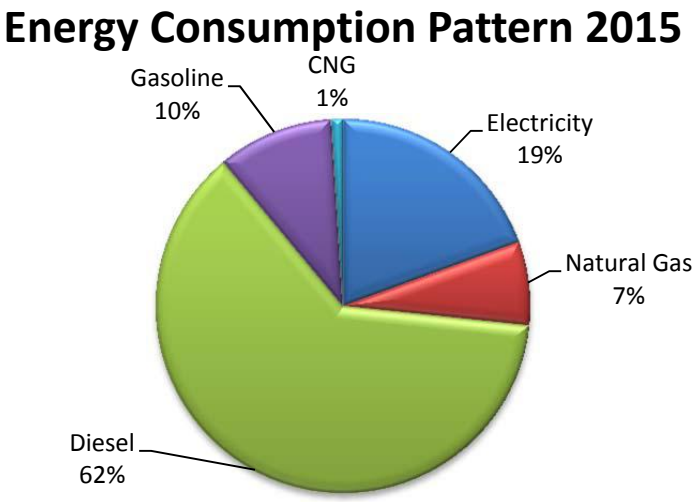

Figure 12 Energy Consumption Pattern in 2015

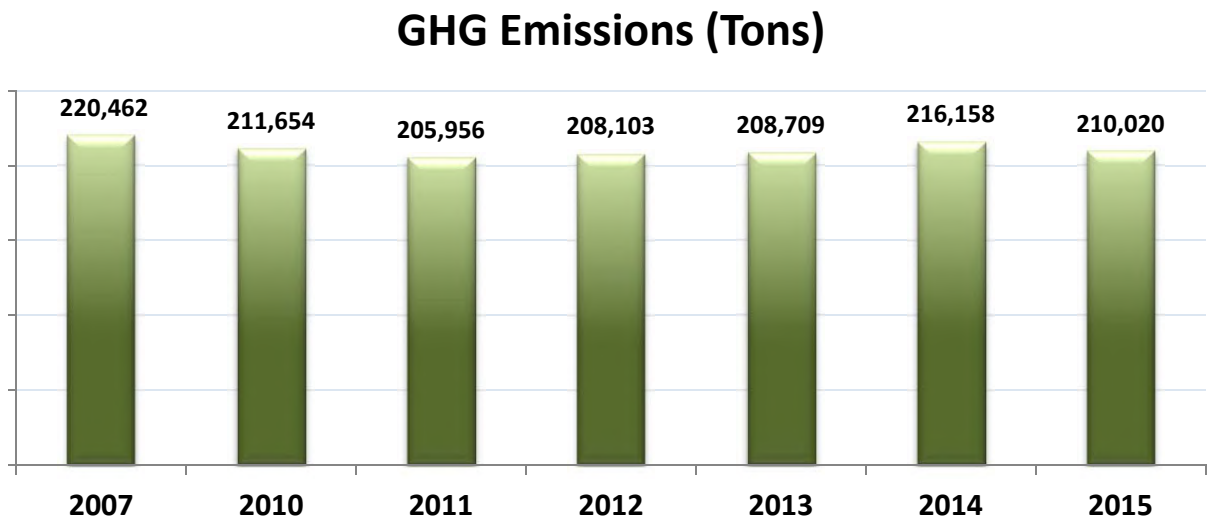

Figure 13 GHG Emissions (tons)

Reduce Greenhouse Gas Emissions: Greenhouse Gas Emissions are affected by the quantity and types of fuels used by the RTD system. There has been a net decrease of 4.7 percent in greenhouse gas emissions from 2007 to 2015. In the same period, passenger miles have increased by about 48 percent from 394 million annual passenger miles to 585 million.

In RTD's methodology, greenhouse gas emissions are calculated only for carbon dioxide, which is, albeit the most pronounced, only one of many greenhouse gases along with carbon monoxide, nitric oxide, sulfur oxide and methane. To compare carbon dioxide from all sources of energy, RTD has adopted conversion factor methods by the EPA and equivalencies among fossil fuels.

Of the 210 thousand tons of carbon dioxide emitted by RTD's vehicles and facilities, nearly half originated from diesel fuel engines. The electricity portion of this chart includes both electricity used by RTD facilities as well as Traction Power Substations for LRT locomotion. The GHG contributed by Steam is considered negligible to this study. See Figure 14.

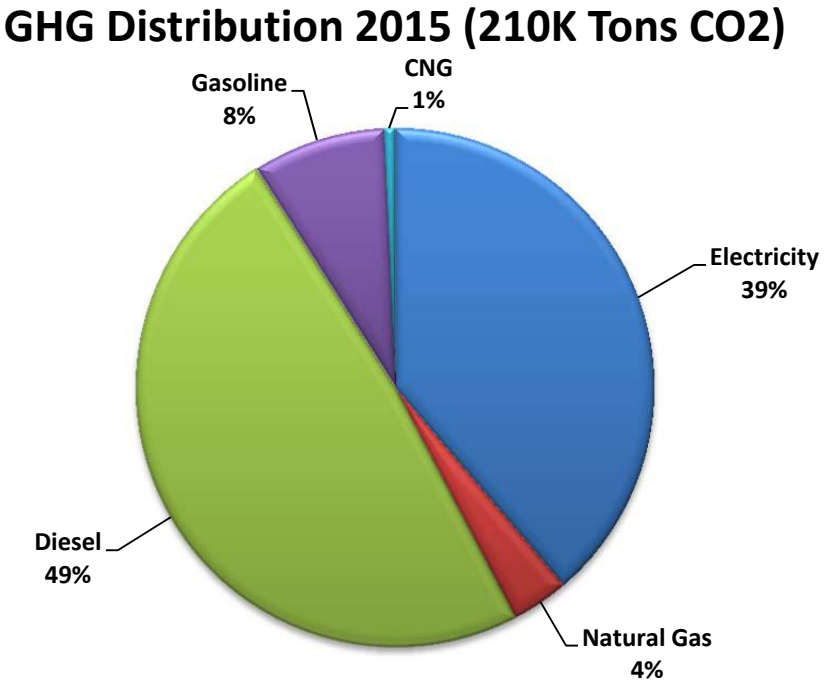

Figure 14 Sources of GHG Emissions

3.3. CLIMATE OBSERVATION

Starting with this biannual report, RTD is incorporating climate readings with the purpose to observe whether regional weather facts such as temperature and precipitation have any effect on the system's usage of energy and water resources, and whether RTD is responding appropriately to climate change and preparing for regional resilience to extreme weather events. Figure 13, below, shows a comparative climate readings chart for the years 2010-2015. For example, 2013 and 2015 precipitation lowered the cooling degree-day loads.

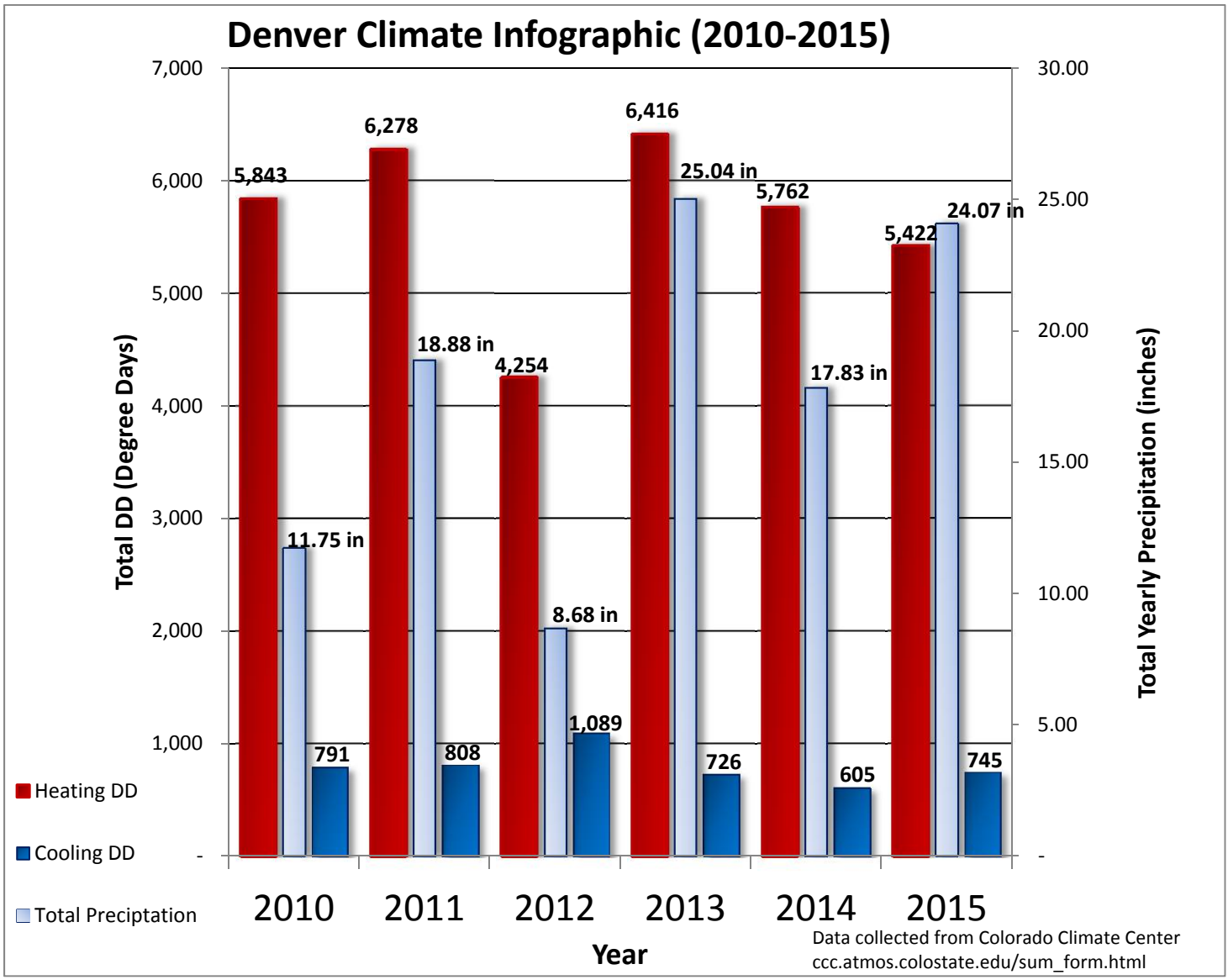

Figure 15 Denver Region Climate Readings

Resilience: The Colorado Climate Center Boulder Weather Station recorded 16.4 inches of precipitation between September 10 and 15 of 2013, triggering massive floods in Boulder County's piedmont. As a result, communities in Lyons and Longmont suffered devastation activating the evacuation of certain areas. RTD, in coordination with county and municipal

authorities, provided the buses necessary to evacuate people from the areas during the floods. Because some roads had been washed out after the floods, RTD rerouted buses to continue providing service on roads that had not been affected. Two months after the floods RTD noted an increase in ridership of 20% in the affected areas.

3.4. LOOKING FORWARD

There are a number of items that need to be considered to continue moving forward with the Sustainability Program as follows.

RTD Sustainability Policy and Guidelines Update: the current policy was drafted in 2006 and needs an update to reflect some of the conditions that characterize the District today and state-of-the-art sustainability measures.

RTD Interdepartmental Sustainability Committee: to comply with the mandate of the 2006 policy, it is recommended that the interdepartmental sustainability committee be reconvened.

RTD FasTracks Sustainability Committee will continue to be a study group, which will keep pace with the prevailing trends in the field. The RTD FasTracks Sustainability Committee created a web page on the HUB in 2014, to be used to solicit ideas across the entire Agency. The Committee will gather ideas, evaluate their merit and advocate for their implementation.

Fiscal Sustainability: The Sustainability Program shall continue to coordinate with the Long Range Fiscal Sustainability Task Force who is looking at the opportunities for operating efficiencies and revenue enhancements to promote RTD fiscal sustainability in the long term. The committee will continue to review sustainability metrics to evaluate this sustainability program.

Advancing RTD sustainable policy: Update current standards and create new RTD Standards improving the state-of-the art to include

- Transit Effectiveness
- Landscape (Xeriscaping)
- Solar Photovoltaic Systems
- Lighting (LED fixtures)
- Mechanical
- Recycling

Advancement of Green Procurement Policy: RTD staff should take into account long term maintenance considerations while specifying products. RTD may want to study various approaches to Life Cycle costing methodologies for the bigger purchase categories to start with. RTD does need to maintain all its infrastructure and vehicles in good working condition, while operating within a framework of many regulations that govern procurement. Questions to address include:

1. What constitutes a green product or service?
2. How do we verify we will get the green attributes of products and services we desire?
3. How much of a premium are we willing to pay for desirable environmental attributes?
4. How much of a premium are we willing to pay for lower maintenance costs?
5. How do we incorporate the above considerations into our designs, specifications, and procurement documents?

Collaboration with other agencies: Increase the collaboration with other transit and local agencies and programs including the Colorado Environmental Leadership Program.

- In June 2014, Walk Denver issued a report on the poor walkability connections from West Colfax to the West Line Stations. It was suggested that RTD continue working with local agencies and Walk Denver to provide better pedestrian connections per the Colfax study.
- RTD partners have asked the District to look at efficiencies in ridership on days where the measured or predicted ozone levels are higher than a pre-determined level.

4. GLOSSARY OF TERMS

Average Mean Temperature: The average between the high and low temperature readings for a specified period of time (day, month, etc.).

Biomass: as a renewable energy source, biomass is biological material from living, or recently living organisms. As an energy source, biomass can either be used directly, or converted into other energy products such as biofuel.

Carbon dioxide (CO_2): is a colorless, odorless, non-toxic greenhouse gas also associated with ocean acidification, emitted from sources such as combustion, cement production, and respiration. It is otherwise recycled in the atmosphere in the carbon cycle.

Carbon monoxide: is a colorless, odorless, non-irritating but very poisonous gas. It is a byproduct of incomplete fuel combustion such as natural gas, coal or wood. Vehicular exhaust is a major source of carbon monoxide.

CERT: Community Emergency Response Team

CO_2 Equivalent: is a measure used to compare the emissions from various greenhouse gases based upon their global warming potential, using the functionally **equivalent** amount or concentration of **carbon dioxide** (**CO_2**) as the reference.

Cooling Degree Day (CDD): A unit of measurement equal to a difference of one degree between the mean outdoor temperature on a certain day and a reference temperature (~74 degrees) as an indicator of energy consumption for air conditioning.

Corporate Social Responsibility: is a form of corporate self-regulation integrated into a business model and it is commonly seen as a synonym to the Triple-Bottom Line of sustainability.

CRMF: Commute Rail Maintenance Facility

DBE: Disadvantage Business Enterprise

DTP: Denver Transit Partners, primary design/construction consortium for the EAGLE P3 project.

DUS: Denver Union Station

Ecological Footprint: is a measure of human demand on the Earth's ecosystems, at RTD it is measured in term of water usage, energy usage and greenhouse gas emissions.

ECO Pass: Employee Commuter Options program is an RTD membership based transit pass for businesses and communities.

Emissions: are pollutants in the air that can cause harm to humans and the environment. Emissions can be in the form of solid, liquid, or gases.

Energy Efficiency: is the goal to reduce the amount of energy required to provide products and services.

Energy Equivalence: is the method of quantifying the amounts of energy from diverse sources into one common measure, this report uses kilowatt-hour as a measure of equivalence.

Energy Performance Contracting: is an alternative financing mechanism used to accelerate investment in cost effective energy conservation measures; it is commonly used in Federal buildings.

EPA: Environment Protection Agency

Green Procurement: is a spending and investment process that enables the acquisition of goods, services, utilities and works not solely based on a cost-benefit analysis, but in combination with a return on investment in the long term and external benefits.

Greenhouse Gases (GHG): are gases in the earth's atmosphere that absorb and emit radiation within the thermal infrared range. The primary greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

Heating Degree Day (HDD): A unit of measurement equal to a difference of one degree between the mean outdoor temperature on a certain day and a reference temperature (~65 degrees), as an indicator of energy consumption for space heating.

LEED: Leadership in Energy and Environmental Design

LRT: Light Rail Transit or light rail is a form of urban rail public transportation that generally has a lower capacity and lower speed than heavy rail and metro systems, but higher capacity and higher speed than traditional street-running streetcar systems.

LRV: Light Rail Vehicle

Nitrogen oxides (NO_x): especially nitrogen dioxide, these gases are emitted from high temperature combustion and can be seen as the brown haze dome above or plume downwind of cities. Nitrogen dioxide is the chemical compound with the formula NO_2. It is one of the several nitrogen oxides. This reddish-brown toxic gas has a characteristic sharp, biting odor. NO_2 is one of the most prominent air pollutants.

NTD: National Transit Database

Resilience: the ability for a community to prepare for, survive, adapt and recover after a natural disaster.

Renewable Energy: is energy which comes from natural resources such as sunlight, wind, rain, tides, and geothermal heat, which are naturally replenished.

PMT: Passenger Miles Traveled

SBE: Small Business Enterprise

SCADA: Supervisory Control and Data Acquisition

Service Effectiveness: is the ratio of Unlinked Passenger Trips over Vehicle Revenue Miles. It is to say, the number of boardings per every revenue mile a vehicle travels.

Sulfur oxides (SO_x): especially sulfur dioxide, a chemical compound with the formula SO_2. SO_2 is produced by volcanoes and in various industrial processes. Since coal and petroleum often contain sulfur compounds, their combustion generates sulfur dioxide. Further oxidation of SO_2, usually in the presence of a catalyst such as NO_2, forms H_2SO_4, and thus acid rain. This is one of the causes for concern over the environmental impact of the use of these fuels as power sources.

Sustainability: is the capacity to give support. For humans, sustainability is the long-term maintenance of well-being, which has environmental, economic, and social dimensions; this triad is commonly referred as the "triple-bottom line" and it captures an expanded spectrum of values and criteria for stewardship and the responsible management of the environment.

TOC: See TOD.

TOD: Transit-Oriented Development is a mixed-use residential or commercial area designed to maximize access to public transport, and often incorporates features to encourage transit ridership.

Total Precipitation: The entire quantity of precipitation measured over a specified period of time (hour, day, month or year).

TBL: Triple Bottom line, addressing the three facets of sustainability (Social, Environmental, Economic).

WIN: Workforce Initiative Now, a collaborative partnership that helps job seekers, businesses and communities by developing career opportunities in transportation and construction.

APPENDIX A. RTD SUSTAINABILITY METRICS

This appendix contains supporting data referenced in the body of the report.

1. Service Footprint

RTD Service Footprint by Mode							
Annual Passenger Miles	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Bus	383,948,305	385,410,133	383,245,030	402,936,810	400,915,017	387,701,787	392,843,152
LRT	129,248,691	139,416,653	164,540,706	175,736,810	201,995,324	199,703,188	181,980,600
Demand Response	10,534,775	10,594,663	10,304,084	10,475,949	10,660,785	10,371,735	10,377,078
CRT	0	0	0	0	0	0	0
	523,731,771	**535,421,449**	**558,089,820**	**589,149,569**	**613,571,126**	**597,776,710**	**585,200,830**

2. Vehicle Fleet Fuel, Mileage and Greenhouse Gas Emissions

GHG Impact by Energy Source (CO2 Tons)						
	2010	**2011**	**2012**	**2013**	**2014**	**2015**
Electricity	69,705	71,144	76,928	76,298	83,454	82,741
Natural Gas	14,165	10,016	8,380	9,197	9,191	7,592
Diesel	112,645	110,499	105,298	103,943	106,278	102,420
Gasoline	13,595	13,121	15,968	17,731	15,689	15,866
CNG	1,544	1,176	1,530	1,540	1,545	1,401
TOTAL	**211,654**	**205,956**	**208,103**	**208,709**	**216,158**	**210,020**

3. RTD Water Use Data.

RTD Water Use						
	2010	**2011**	**2012**	**2013**	**2014**	**2015**
	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons
park-n-Rides	27,607,294	24,619,583	12,360,859	7,363,081	21,372,850	10,736,617
Facilities	29,820,783	29,866,486	36,281,291	34,870,803	37,702,264	30,741,551
LRT Water	5,916,009	6,319,313	7,840,588	8,844,939	11,273,517	7,917,000
LRT Irrigation	10,285,005	8,549,000	9,615,134	5,997,057	9,182,000	7,679,013
TOTAL	**73,629,091**	**69,354,382**	**66,097,872**	**57,075,880**	**79,530,631**	**57,074,181**

4. RTD Energy Usage

RTD System Fuel and Energy Sources (in MWh)												
	2010		2011		2012		2013		2014		2015	
	MWH	% of Total MWH	MWH	% of Total MWH	MWH	% of Total MWH	MWH	% of Total MWH	MWH	% of Total MWH	MWH	% of Total MWH
Steam	4,373	1%	2,875	0%	1,200	0%	1,064	0%	1,243	0%	2,622	0%
Electricity	91,705	15%	93,611	16%	101,214	18%	100,385	18%	109,800	19%	108,863	19%
Natural Gas	75,302	12%	53,260	9%	44,553	8%	48,893	9%	48,865	8%	40,361	7%
Diesel	383,570	63%	376,264	65%	358,552	63%	353,941	62%	361,889	62%	348,754	62%
Gasoline	48,046	8%	46,372	8%	56,433	10%	62,663	11%	55,449	10%	56,073	10%
CNG, Diesel Equi.	6,209	1%	4,727	1%	6,150	1%	6,193	1%	6,213	1%	5,634	1%
TOTAL	609,205	100%	577,109	100%	568,103	100%	573,139	100%	583,461	100%	562,306	100%

5. Transit Efficiency

Service Effectiveness (Unlinked Passenger Trips/Vehicle Revenue Miles)							
	2009	2010	2011	2012	2013	2014	2015
Bus	2.02	2.00	2.07	2.29	2.15	2.15	2.09
Light Rail	2.49	2.52	2.45	2.44	2.33	2.36	2.30
Demand Response	0.13	0.12	0.11	0.11	0.12	0.12	0.11
Commuter Rail	-	-	-	-	-	-	-
	1.76	**1.74**	**1.77**	**1.89**	**1.82**	**1.81**	**1.76**

6. Climate Data Denver Region (Stapleton Weather Station)

	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Yr. 2010
Ave Mean T	30.9	27.9	39.9	47.9	53.6	68.6	72.9	73.3	66.1	54.4	38.8	34.9	50.8
Heating DD	1,048	1,030	770	505	368	40	9	-	39	325	782	927	5,843
Cooling DD	-	-	-	-	22	156	262	266	80	5	-	-	791
Total Prec	0.09	0.65	1.28	2.62	1.23	1.78	1.68	1.07	0.07	0.56	0.52	0.20	11.75

Source: Colorado Climate Center

	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Yr. 2011
Ave Mean T	29.4	27.8	42.4	48.1	51.5	67.2	75.1	75.1	62.1	51.6	39.9	26.0	49.7
Heating DD	1,098	1,035	695	500	414	34	-	-	137	418	747	1,200	6,278
Cooling DD	-	-	-	-	5	107	310	323	55	8	-	-	808
Total Prec	0.45	0.53	0.26	1.09	3.67	1.36	6.94	0.07	1.62	1.52	0.39	0.98	18.88

Source: Colorado Climate Center

	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Yr. 2012
Ave Mean T	35.8	28.3	48.2	52.8	60.1	73.7	77.8	73.8	65.5	48.8	46.0	32.4	53.6
Heating DD	899	1,057	512	358	176	8	-	-	72	497	559	116	4,254
Cooling DD	-	-	-	2	34	276	403	280	93	1	-	-	1,089
Total Prec	0.24	0.95	-	1.00	1.16	0.04	2.00	0.20	2.26	0.28	0.28	0.27	8.68

Source: Colorado Climate Center

	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Yr. 2013
Ave Mean T	29.7	30.4	37.0	41.9	57.4	70.3	73.5	73.1	66.4	47.3	40.5	28.8	49.7
Heating DD	1,087	962	864	687	256	100	-	-	79	539	726	1,116	6,416
Cooling DD	-	-	-	-	38	43	261	256	128	-	-	-	726
Total Prec	0.24	0.67	1.43	1.10	1.24	0.41	3.49	1.58	13.79	0.62	0.20	0.27	25.04

Source: Colorado Climate Center

	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Yr. 2014
Ave Mean T	31.5	28.5	41.0	49.8	57.8	66.1	73.1	69.8	64.4	55.3	35.9	31.6	50.4
Heating DD	1,030	1,013	735	449	208	39	6	6	84	297	866	1,029	5,762
Cooling DD	-	-	-	-	16	81	264	164	74	6	-	-	605
Total Prec	0.64	0.26	0.81	1.87	3.47	1.65	3.37	1.01	2.15	1.16	0.93	0.51	17.83

Source: Colorado Climate Center

	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Yr. 2015
Ave Mean T	33.6	33.8	43.5	48.4	52.1	68.8	71.7	72.5	68.3	56.7	39.9	30.8	51.7
Heating DD	903	867	658	492	391	12	8	11	15	264	746	1,055	5,422
Cooling DD	-	-	-	-	-	134	226	252	118	15	-	-	745
Total Prec	0.34	2.06	0.57	2.34	5.02	7.37	1.20	0.58	0.19	1.83	1.74	0.83	24.07

Source: Colorado Climate Center

RTD