Los Angeles County
Metropolitan Transportation Authority

Moving Towards Sustainablity:
2011 Metro Sustainability Report

Metro®

Acknowledgement

This document was prepared by ICF International under contract through Los Angeles County Metropolitan Transportation Authority (Metro) Sustainability Program administered by Metro's Environmental Compliance and Services Department. Technical input was provided by staff in the following Metro departments:

Contract Services, New Business Development, Systems Engineering, Rail MOW Engineering, Resource Management, Environmental Compliance and Services Department, ECSD, Maintenance Administration, Facilities and Property Maintenance, Governmental Accounts, Quality Assurance, Long Range Planning, Operations Systems Integration, Purchasing, Vehicle Technology and Support, Building Services, and General Services Administration.

Table of Contents

List of Figures

Executive Summary

Indicator Analysis

Appendix

Abbreviations and Key Terms

APTA	American Public Transportation Association
AQMD	Air Quality Management District
Boarding	A passenger boarding a Metro revenue vehicle
BRT	Bus Rapid Transit
Criteria (air) pollutants	Six pollutants designated by the Environmental Protection Agency as indicators of air quality
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CNG	Compressed natural gas
EBOM	Existing Buildings, Operation and Maintenance
EMS	Environmental Management System
ECMP	Energy Conservation and Management Plan
GGE	Gasoline Gallon Equivalents
GHG	Greenhouse gas
GHGe	Greenhouse gas emissions
GRI	Global Reporting Initiative
GWP	Global warming potential
HC	Hydrocarbons
HFC	Hydrofluorocarbons
kWh	Kilowatt hours
LA	Los Angeles
LADWP	Los Angeles Department of Water and Power
LEED	Leadership in Energy and Environmental Design
MSIP	Metro Sustainability Implementation Plan
MSSC	Metro Support Service Center
MTCO2e	Metric Ton Carbon Dioxide Equivalent
NTD	National Transit Database
NO_X	Nitrogen oxides
PFC	Perfluorocarbons
PM	Particulate matter
Purchased transportation	Metro transit service provided through contract service
ROG	Reactive organic gas
SCE	Southern California Edison
VMT	Vehicle miles traveled
WESS	Wayside Energy Storage System

Los Angeles County
Metropolitan Transportation Authority

One Gateway Plaza
Los Angeles, CA 90012-2952

213.922.2000 Tel
metro.net

Metro

2011 Sustainability Report
Message from the Chairman

Sustainability has long been a key component of Metro's mission to be "responsible for the continuous improvement of an efficient and effective transportation system for Los Angeles County." As an organization, we are committed to reducing the impacts of climate change in all of our planning, construction, operations, and procurement activities, while simultaneously increasing our ability to control costs, expanding our system, and efficiently managing resources.

On a daily basis, Metro operates buses and trains to support the region's transportation needs. Our transit operation, along with our sister agencies in LA County, improves the region's mobility by removing vehicles from roadways, reducing congestion, and creating conditions for transit oriented developments, which brings jobs, services, and housing together.

Our transit operations also help reduce the impacts of congestion on air quality. To this end, Metro now operates a 100% CNG bus fleet and is aggressively pursuing new projects and expanding transportation choices for commuters. These options (such as vanpools, bikes, ridesharing, etc.), and other initiatives, such as transit demand management and congestion pricing, increase the capacity of the region's transportation system, while reducing the impacts of climate change.

The buses and trains that we operate require extensive maintenance, servicing, and a well-honed dispatch system to keep the region moving. All of these activities take place at Metro's bus and rail divisions, which have been in service for many decades. To improve the use of limited resources at the facility level, Metro has: 1) completed energy efficiency audits; 2) reduced utility use and introduced other cost saving measures; 3) installed and continued to explore renewable energy opportunities, such as solar panels, where feasible; 4) implemented Environmental Management System (EMS) principles in our environmental operations, and 5) incorporated Leadership in Energy and Environmental Design (LEED) elements in the construction and retrofit of new and existing facilities.

These efforts have collectively achieved significant reductions in resource usage, saved money, reduced our agency-wide carbon footprint and most importantly, put us onto a path for a better and more sustainable Los Angeles County. I commend our staff for their dedication and on-going efforts to reduce our operations costs, while simultaneously enhancing and expanding our system, making us a national leader in environmental protection and sustainability.

Sincerely,

Don Knabe

Don Knabe
Chairman, Board of Directors

Los Angeles County
Metropolitan Transportation Authority

One Gateway Plaza
Los Angeles, CA 90012-2952

213.922.2000 Tel
metro.net

Metro

2011 Sustainability Report
Message from the CEO

Los Angeles Metro is committed to building a world-class transportation system; one that is safe, clean, reliable, on-time, and courteous. While doing this, we are also working to ensure that every step forward is as environmentally aware and sustainable as possible.

When we talk about sustainability at Metro, our core concern is managing environmental effects. Air quality, water management, energy usage, emissions, recycling and waste management are some elements that characterize Metro's sustainability efforts.

Metro's commitment to sustainability can be seen in recent successes:

- Metro has one of the largest renewable energy portfolio out of any transit property in America with generation of two megawatts of clean renewable energy.
- Metro has the largest fleet of clean fuel buses in the nation, a fleet built through efforts as early as 1980.
- Our Metro headquarters recently joined a host of other Metro facility buildings in receiving Leadership in Energy and Environmental Design (LEED) and EnergyStar recognition from the U.S. Green Building Council and the U.S. Environmental Protection Agency.
- In February 2011, Metro's Division 20 (Red Line Yard) was the first major rail maintenance facility in the nation to earn an ISO 14001 certification for its environmental management system (EMS); the EMS program will grow to operate agency-wide.
- Many types of waste like paper and tires are funneled through recycling programs and Metro facilities are outfitted with a variety of utilities for conservation of water and energy.

Metro is on the forefront of transportation innovation in all of our planning, construction, operations, and procurement; exploring the best ways to maintain a high level of service while reducing environmental impacts. Metro's sustainability efforts have increased environmental safety, jobs, cleanliness, efficiency, and cost-savings agency-wide.

Metro serves as a national example for this region and the nation. With targeted management of our environmental impacts, we make the most of the resources we have; enabling us to keep fares and passenger loads low.

I congratulate our staff and our partners in leading the way towards a more sustainable Los Angeles.

Sincerely,

Arthur T. Leahy

Arthur T. Leahy
Chief Executive Officer, Los Angeles County Metropolitan Transportation Authority

Company Profile

Los Angeles County Metropolitan Transportation Authority's (Metro) mission is to be responsible for the continuous improvement of an efficient and effective transportation system in Los Angeles County and Metro's role is unique among the nation's transportation agencies. Metro serves as transportation planner and coordinator, designer, builder and operator for one of the country's largest, most populous counties. More than 9.6 million people - nearly one-third of California's residents—live, work, and play within Metro's 1,433-square-mile service area.

In the last 25 years, Metro has developed an extensive mass rapid transit system consisting of almost 80 miles of urban rail, a very successful Bus Rapid Transit (BRT) route, and the nation's largest fleet of very low emissions buses (2,500+ buses; Metro's last diesel bus was retired in February 2011). Metro operates 180 bus routes, servicing almost 16,000 bus stops to accommodate over 1.1 million average weekday boardings; for a total of 365.9 million annual boardings.

Metro also operates the region's fixed guideway system, which includes the subway (Red Line) and three light rail lines (Blue, Gold and Green Lines). The first segment of the Metro Red Line was opened in 1993 and the final segment to North Hollywood was opened in 2000. The Red Line is 17 miles in length, includes 16 stations, and averages 143,000 weekday boardings for a FY2010 total of 47.9 million boardings. Combined, the three light rail lines (Metro Blue Line – 1990; Metro Gold Line – 2003; and Metro Green Line – 1995) are 61.7 miles long, include 57 stations, and averages 155,000 weekday boardings for a FY2010 total of 46.4 million boardings.

As the region's transportation planner, Metro's Long Range Transportation Plan calls for investments to expand the region's rail system by another 105 miles and build 170 more miles of carpool lanes. The Gold Line Eastside Extension started revenue service in 2009; the Expo Line will start revenue service in 2012; the Orange Line Extension is under construction; and planning work continues on several corridors to develop light rail transit. In addition, projected benefits from Measure R Projects include the creation of 160,000 new jobs and annual reductions in vehicle miles traveled (208 million miles) and gallons of gasoline used (10.3 million gallons), and increases in transit boardings (77 million boardings). These investments, in combination with a statewide mandate to better coordinate land-use planning with the transportation system, will transform LA's urban landscape over the next 30 years, reduce demand for single-occupancy travel, reduce per capita greenhouse gas emissions and improve air quality.

To further enhance the benefits of transit, Metro encourages transit oriented developments (TOD) on Metro controlled property near transit facilities. Currently, over 40 TOD projects have been completed, are under construction, are in negotiations, or are under consideration. Through Metro's TOD program, over 2,000 housing units have been developed and better walking and bicycle improvements have been created in tandem with these projects.

Planning, developing, and operating the region's transportation system is an energy intensive endeavor. To reduce the consumption of natural resource and the associated emission of pollutants and greenhouse gases, Metro has implemented several initiatives and policies to operate more efficiently and to be better stewards of the environment. Specifically, Metro has recently committed to:

1. Constructing all new facilities to Leadership in Energy and Environmental Design (LEED) Silver standards; three buildings have received a LEED Gold rating, one building is under construction and on track to receive a Gold rating, and one facility is being designed to achieve a Gold rating;

2. Assessing its existing facilities to determine the feasibility of achieving a LEED – Existing Building Operations and Maintenance (EBOM) certification; Metro's Gateway Headquarters Building has received a LEED-EBOM Gold rating and 17 facilities are currently being assessed;

3. Incorporating energy efficiency and renewable energy into its facilities; energy efficiency principles have been incorporated in all new and projects are underway in existing facilities. In addition, solar panels have been installed at four Metro facilities for a combined two megawatts of energy. Renewable energy options, not only solar, are being planned for new facilities;

4. Reducing emissions from construction activities by requiring the use of clean, green construction equipment on all Metro construction projects.

These policies and activities tie back to Metro's mission—responsibility for an efficient and effective transportation system—and its effort to do so in a sustainable manner, with minimal impacts on the environment.

Executive Summary

This sustainability report analyzes Los Angeles County Metropolitan Transportation Authority's (Metro) 2010 environmental performance and the economic cost of public transportation and facility operations and presents historical data for the identification of significant trends and issues. The purpose of this report is to provide an update to the previous year's report by presenting data for calendar year 2010. The report compares trends, focusing on the previous year's report data (2009) and this year's report data (2010), to monitor and analyze the increases or decreases in environmental impacts and assess Metro's ongoing progress toward sustainability. This trend analysis can then be used to identify causes, direct resources, and improve Metro's future performance and sustainability in a cost-effective way.

The Metro Board adopted the Metro Sustainability Implementation Plan (MWIP) in June 2008. The MSIP contains short-term projects and general guidelines that serve as the basis for specific long-term sustainability project development. An ongoing task is the reporting of Metro's environmental sustainability performance. This report focuses on our activities for calendar year 2010, and meets the requirements by comparing and analyzing trends over the course of previous years in environmental performance across five key areas: ridership, energy, emissions, water use, and waste. From these five key areas, 12 indicators were selected to be used on an annual basis to evaluate Metro's sustainability progress. The indicators used in this report were derived using the

Global Reporting Initiative (GRI) sustainability reporting framework. Indicators were chosen that are common to most organizations in relation to energy, water, materials, emissions, effluents, and waste, as well as impacts to biodiversity.

Beyond the direct impact of its service operations, Metro plays a significant role our region's advancement towards a more livable and sustainable Los Angeles through system-wide transportation planning and programming decisions that influence the travel choices of the nearly 10 million people living in Los Angeles County. These activities include:

- The implementation of the Long Range Transportation Plan through measure R over the next 30 years will reduce the growth of daily vehicle miles traveled by three million miles, which is substantial considering the 33 % growth in population and employment anticipated within the region over the life of the plan.
- The amount of funding dedicated to bicycle infrastructure doubled - from 7% to 15% - in Metro's "2011 Call for Projects", a competitive solicitation for regional capital transportation projects and programs. Sustainability was a criterion in the review and selection of projects funded across all categories.
- Metro's guidelines for Measure R Local Return Funds encourage local agencies to implement projects that reduce greenhouse gas emissions.
- Metro is partnering with the Southern California Association of Governments on the development of a 2012 Regional Transportation Plan that will reduce per capita greenhouse gas emissions 8 % by 2020 and 13% by 2035, relative to 2005.
- The agency is a partner in the development of a Countywide Climate Action & Adaptation Plan, led by a coalition of public, private and non-profit organizations, which includes a comprehensive inventory of greenhouse gas emissions across sectors, simulations and analysis to assess risks and vulnerabilities, and integrated strategies for mitigating and preparing for climate change within the county.

Additional efforts will provide a framework for monitoring, managing and communicating progress as well as provide an avenue to foster the partnerships necessary to achieve the goal of a more sustainable Los Angeles.

Indicator Area Summary Table

The following table compares key indicator area data from 2008 to 2010.

Indicator	Unit of Measurement	2008 Data	2009 Data	2010 Data
1. Ridership	Boardings	474,000,000	464,000,000	460,000,000
2. Fuel Use	Gallons of Gas Equivalents	48,000,000	47,000,000	44,000,000
3. Rail Propulsion Power	Kilowatt Hours	175,000,000	184,000,000	163,000,000
4. Facility Electricity Use/ Combined Electricity Use	Kilowatt Hours	69,000,000/ 244,000,000	62,000,000/ 246,000,000	81,000,000/ 244,000,000
5. Water Use	Gallons of Water	253,000,000	227,000,000	250,000,000
6. Greenhouse Gas Emissions	Metric Tons of CO_2e	478,000	483,000	456,000
7. Air Quality	Tons of Criteria Pollutants	2,149	2,042	1,783
8. Solid Waste and Recycling	Tons of Solid Waste/ Recycling Percentage	12,488/ 45%	11,463/ 44%	11,000/ 44%
9. Used Oil Waste	Gallons of Waste Oil	183,000	173,000	177,000
10. Hazardous Liquid Waste	Gallons of Hazardous Waste	771,000	728,000	715,000
11. Non-Hazardous Liquid Waste	Gallons of Non-Haz. Waste	500,000	585,000	611,000
12. Anti-Freeze Waste	Gallons of Anti-Freeze	93,000	87,000	86,000

Some significant changes between 2008 and 2010 data from the table above include the following:

- **Electricity used for rail propulsion power decreased while facility electricity use increased.** During the preparation of Metro's 2011 Energy Conservation and Management Plan (ECMP) report, a rail propulsion consultant analyzed all Metro electricity accounts to determine which accounts were rail propulsion and which were facility electricity use. The analysis was performed taking into account electrical demand, consumption, and rate schedule characteristics. Based on this analysis, the number of rail propulsion accounts was significantly less than that used in the previous year's report and now represents the best determination of what meters specifically measure propulsion power. All accounts not considered rail propulsion were then considered facility electricity use. This analysis led to the reapportionment of propulsion versus facility electricity accounting for the increase in facility electricity use from 2009 to 2010.

- **Increase in water use.** Overall water use increased faster than ridership growth. A significant increase was noted at the MSSC division; the average daily water consumption increase was approximately 46% from 2009 to 2010. In 2010, Metro's MSSC division began pressure washing 6,000 new solar panels on an as-needed basis. This process is likely to account for the majority of the water use increase at the MSSC.

- **Decrease in Greenhouse Gas Emissions.** As of early 2011, 100% of Metro's bus fleet runs on CNG. Buses fueled by CNG function more efficiently as well as contribute less GHG emissions. Continuing efforts in Ridership, Fuel Use, and Facility Electricity Use have also contributed to this decrease.
- **Air Quality Improvement.** There was a significant decrease in criteria pollutants emitted by Metro from 2009 to 2010. Criteria pollutants measured include reactive organic hydrocarbon emissions (ROG), carbon monoxide (CO), oxides of nitrogen (NOx), and exhaust particulate matter (PM). The retirement of all diesel engine buses has contributed to the 30% reduction (from 2009 to 2010) of diesel particulate matter specifically. This is a significant achievement seeing as emissions of fine particulate matter in vehicle exhaust are known to have serious health effect consequences.
- **Steady increase of non-hazardous liquid waste.** Non-hazardous liquid waste saw a 4% increase from 2009 to 2010. Non-hazardous waste production has seen a steady increase since 2004. The increase in non-hazardous liquid waste continues to be attributed to the increase in number of bus washers and facilities throughout Metro.

Further data trend discussions are included in the Indicator Analysis section of this report.

This report has two goals: 1) to provide information that can be used to improve Metro's sustainability going forward, and 2) to inform the public of Metro's sustainability performance. This report not only demonstrates Metro's proactive approach to meeting sustainability goals of this region, but, more important, demonstrates Metro's commitment to meet social, financial, and environmental goals.

The three essential components of a sustainability program are:

- Performance Goals.
- Program Implementation.
- Performance Monitoring.

This report strengthens Metro's sustainability program in all three areas. By providing annual information, it 1) enables our Board to adopt informed performance targets, 2) provides information necessary to implement plans to meet those targets, and 3) creates a structure that can be used to regularly monitor progress. A brief summary of performance in each of the 12 indicator areas is presented in the following section.

Metro's sustainability projects offer an opportunity to demonstrate environmental leadership, improve economic efficiency, and, most important, create a safe and healthy environment for all employees, clients, and customers. In order to be effective, these efforts should be strategic and based on strong comprehensive information. Data, analyses, and corresponding recommendations are documented in this report.

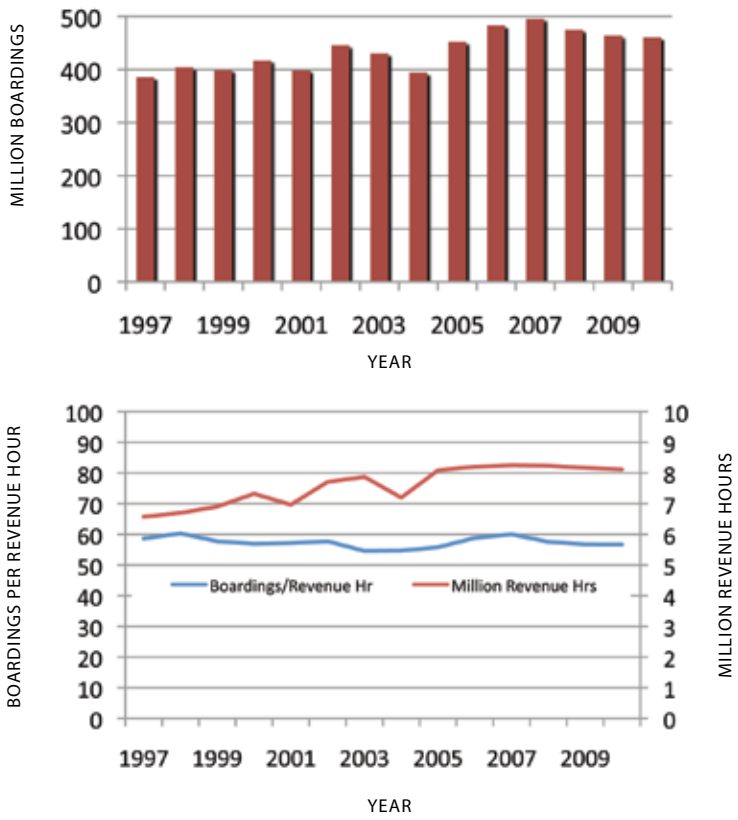
Ridership

1 This indicator area analyzes transit ridership as a means to improve the environmental performance of our operations. Transit service is measured using ridership boardings and revenue hours. Revenue hours are defined as the sum total of hours that each bus/train carries passengers.

In 2010, bus boardings remained the majority of Metro boardings; however, its slow growth has gradually become overshadowed by the more rapid growth in rail boardings over the past few years. While the larger bus service area continued to facilitate more than three and a half times as many trips by bus in 2010 than by rail, rail has seen the fastest ridership growth, more than doubling to 20% of Metro's total mode share from 1997. In addition to increased rail service, this increase in rail mode share is also attributable to the slow growth of bus boardings from year to year. Bus ridership has only increased by 4% between 1997 and 2010, remaining at about 360 million boardings per year. The combination of increasing rail ridership and slow growth of bus ridership has resulted in a decrease in bus mode share from 91% in 1997 to 80% in 2010. Despite the changes in mode share, overall transit ridership increased 19% since 1997, though evidence shows ridership has slightly decreased since a peak in 2007.

Increasing transit ridership can reduce regional vehicle miles traveled (VMT) and the associated greenhouse gas emissions (GHGe). Although this may increase Metro's transit GHGe, these emissions will be offset by an overall regional reduction of greenhouse gas (GHG) attributed to Metro's transit service.

FIGURE 1 **Changes in Ridership (1997-2010)**

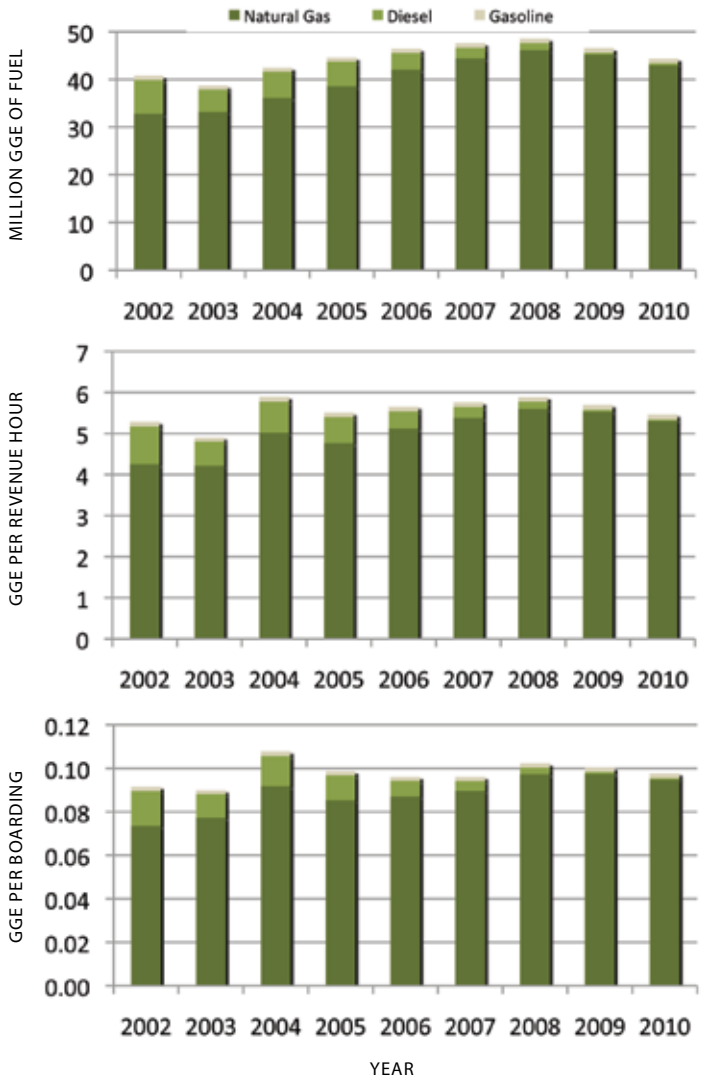


Fuel Use

2 In 2010, Metro used three types of fuel to power its vehicles: compressed natural gas (CNG), diesel, and gasoline. Total fuel use, measured in gasoline gallon equivalents (GGE), rose an average of 1% annually since 2002. Beginning in 2011, diesel fuel will no longer be used in the Metro fleet. The last of the diesel buses was officially retired in March 2011, completing Metro's goal of achieving a 100% alternatively fueled fleet consisting of 2,221 CNG buses, one electric bus, and six gasoline-electric hybrid buses.

The fuel intensity of Metro's service, as measured in GGE per boarding, increased by nearly 10% from 2002 to 2008 and then has a slight trend downward. This trend is due to revenue hours rising faster than ridership during that period. After rising consistently from 2002 to 2008, prices of all fuels dropped sharply in 2009 and rose modestly in 2010. Nevertheless, after adjusting for inflation, diesel prices are 130% higher than in 2002. Gasoline prices and CNG prices are 84% and 10% higher, respectively. Besides being cleaner burning, CNG continues to be the lowest-priced fuel per GGE.

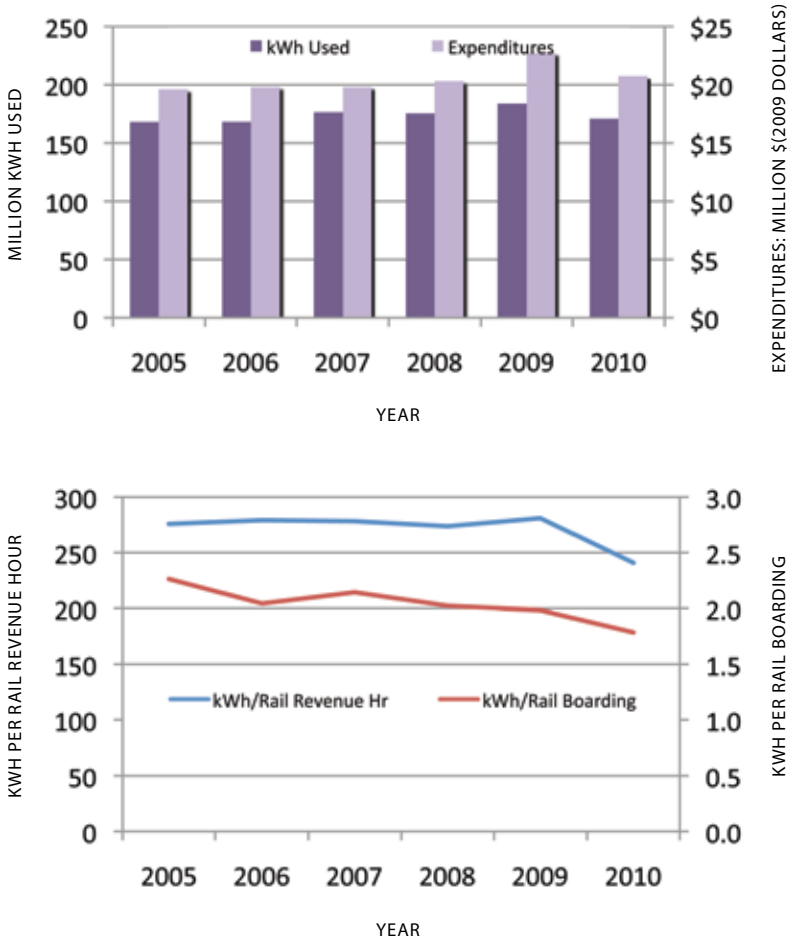
FIGURE 2 **Changes in Fuel Use (2002-2010)**



Rail Propulsion Power

3 Rail ridership (boardings) is increasing faster than consumption of propulsion power. In 2010, Metro used 1.78 kilowatt hours (kWh) of electricity per rail boarding, compared to 2.26 kWh per boarding in 2005—a 21% increase in efficiency. Since 2005, the efficiency of rail car operations has fluctuated between 241 and 281 kWh per vehicle revenue hour, a difference of 14%.

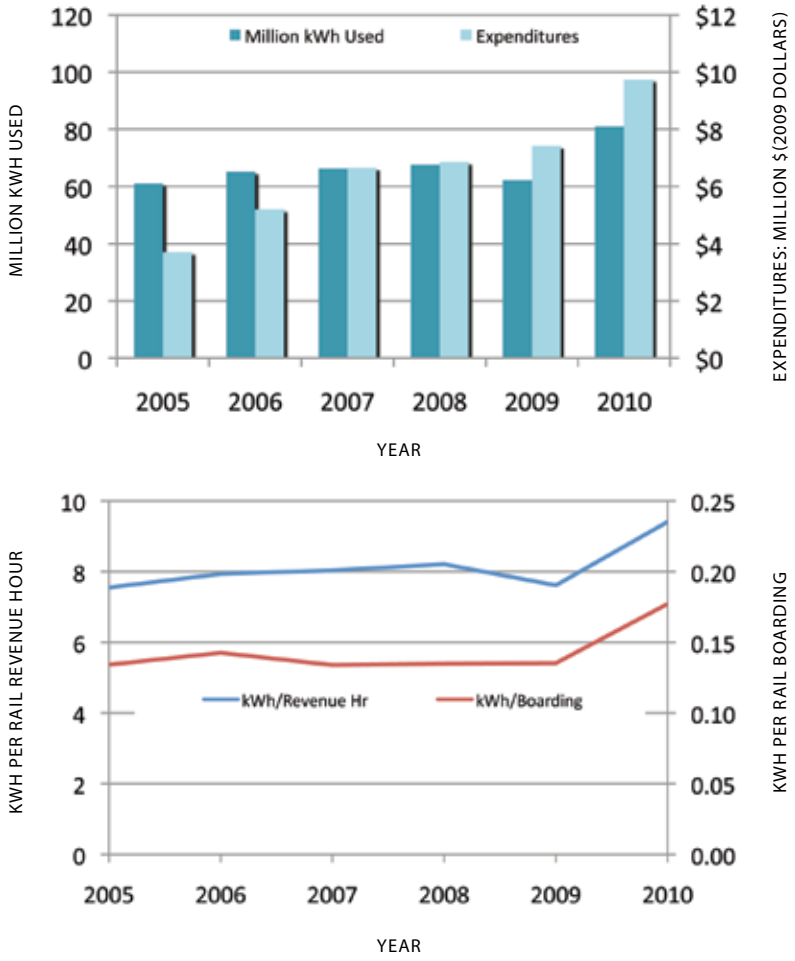
FIGURE 3 **Changes in Rail Propulsion Power (2005-2010)**



Facility Electricity Use

4 The cost of electricity used to power Metro's facilities is steadily increasing. In 2010, Metro spent $9.7 million on facility electricity, which was 31% more than the amount spent in 2009 (adjusted for inflation). This increase in cost follows an increase in Metro electricity consumption of 30% in 2010 compared to 2009. The cost and consumption increases are largely due to 2010 changes in how facility versus propulsion electricity is apportioned.

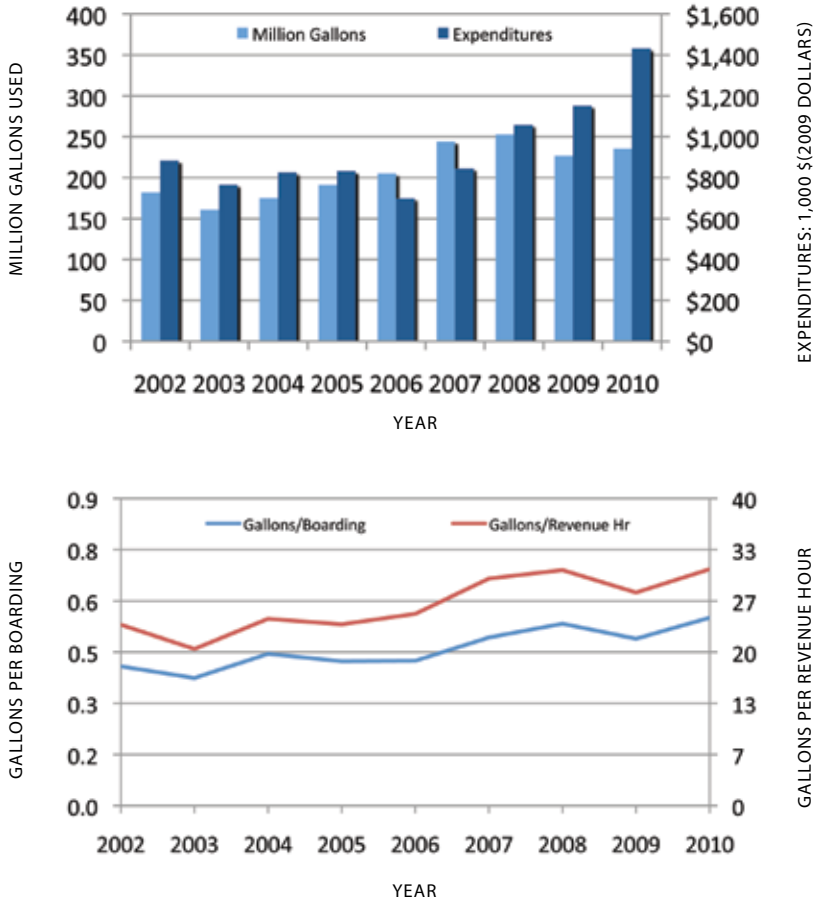
FIGURE 4 **Changes in Facility Electricity Use (2005-2010)**



Water Use

5 Metro's water use is growing at a faster rate than increases to transit service measured in revenue hours. This is a concern because water resources statewide are dwindling while water costs are simultaneously increasing. In 2010, although Metro's revenue hours decreased by less than 1% from 2009, water use increased by 10% from 2009 and 30% from 2002. Moreover, as illustrated in figure 5 below, water costs (adjusted for inflation) have increased substantially (nearly 53%) from 2002 to 2010. We spent more than $1.4 million on Los Angeles Department of Water and Power (LADWP) water in 2010. Water shortages over the past 4 years have caused water prices to increase. Although water prices continued to rise in 2010 as a result of the previous years' water deficiencies, precipitation levels were above average. Water costs should experience a short-term decrease due to the increased precipitation in 2010, but costs should continue to increase over the long term as droughts become more common. Metro must reduce water consumption in order to stabilize the associated annual cost.

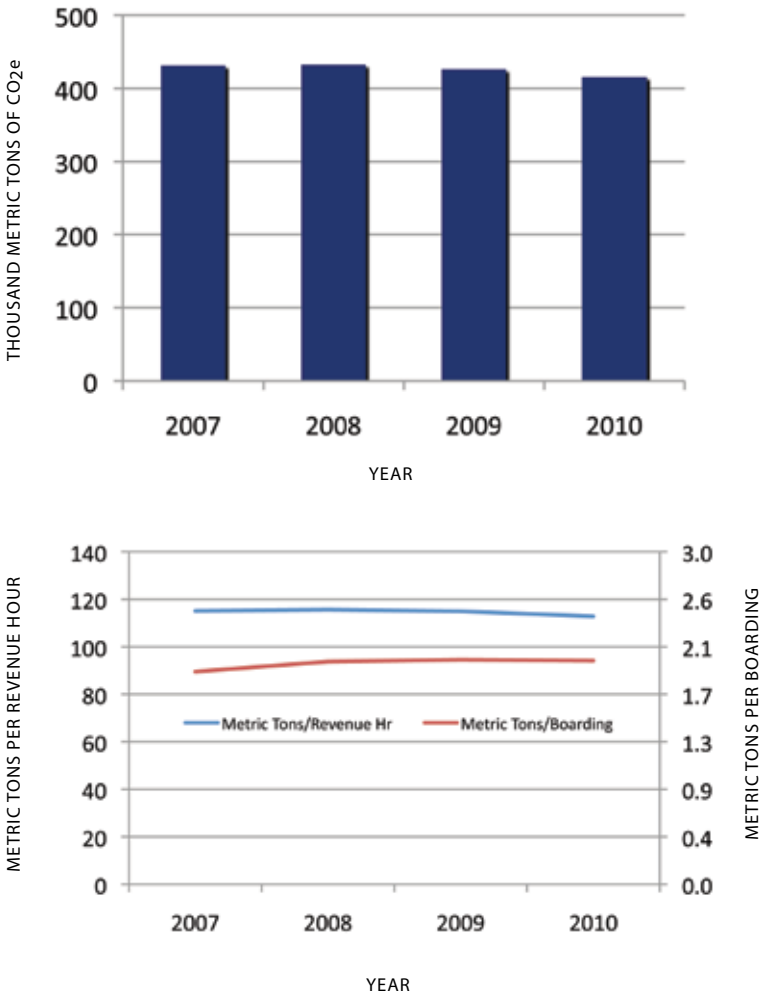
FIGURE 5 **Changes in Water Use (2002-2010)**



Greenhouse Gas Emissions

6 Metro emitted 465,000 metric tons of carbon dioxide equivalents (CO_2e) in 2010, 415,000 from mode transport, nearly 4% less than the previous 3 years. Ninety-four percent of Metro's emissions are from fueling the transit system that moves passengers. While Metro's operations create GHGe, the transit service helps to reduce regional emissions by reducing regional VMT and traffic congestion, and by creating denser, more pedestrian-friendly land use patterns. When the effects of Metro's service on VMT, congestion, and land use are considered, Metro prevents more GHGe than it produces. This reduction in GHG emissions has been calculated with guidance from the American Public Transportation Association (APTA) using three factors: Mode Shift, Congestion Relief, and Land Use Impacts. A detailed description of these factors along with GHG emission reduction calculations and associated analysis can be found in the Indicator Analysis - Greenhouse Gas Emissions section of this report.

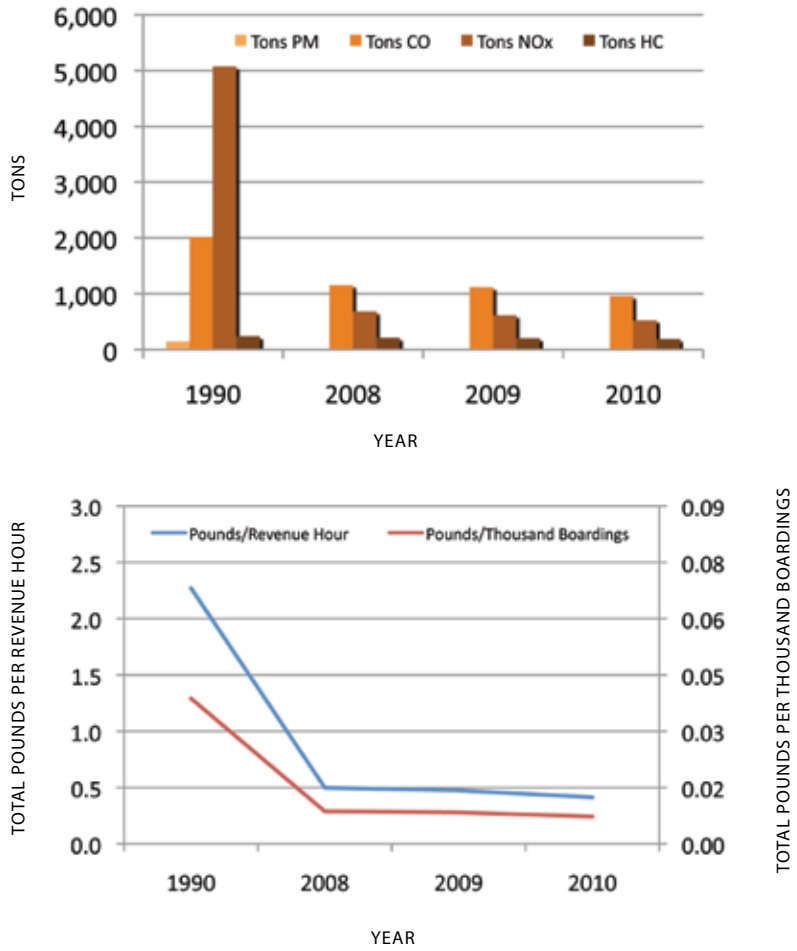
FIGURE 6 **Changes in Greenhouse Gas Emissions (2007-2010)**



Air Quality

7 Metro bus and rail operations continue to achieve significant reductions in "criteria" air pollutants regulated by the Environmental Protection Agency. An analysis was conducted comparing Metro's 2008, 2009, and 2010 emission levels. In conducting this analysis, each individual transit vehicle operated by Metro in 2008, 2009, and 2010 was characterized relative to the specific vehicle model, engine type, fuel used, and total annual miles of operation. Annual emissions of criteria air pollutants, including reactive organic hydrocarbon emissions (ROG), carbon monoxide (CO), nitrogen oxides (NOx), and exhaust particulate matter (PM), were quantified for all 3 years. From 2008 to 2010, Metro has experienced a steady decrease in criteria pollutants emitted. During 2010, Metro emitted a total of 1,783 tons of criteria air pollutant emissions compared to 2,042 tons emitted in 2009 and 2,149 tons emitted in 2008. These numbers reflects a 12.7% percent reduction from 2009 and a 17.0% reduction from 2008. In addition, Metro's 2008, 2009, and 2010 rail service was evaluated relative to air pollution produced. While electric rail transportation does not result in "tailpipe" exhaust emissions, the criteria pollutant emissions associated with the generation of electricity used by Metro's electric locomotives were quantified.

FIGURE 7 **Changes in Air Quality (1990-2010)**

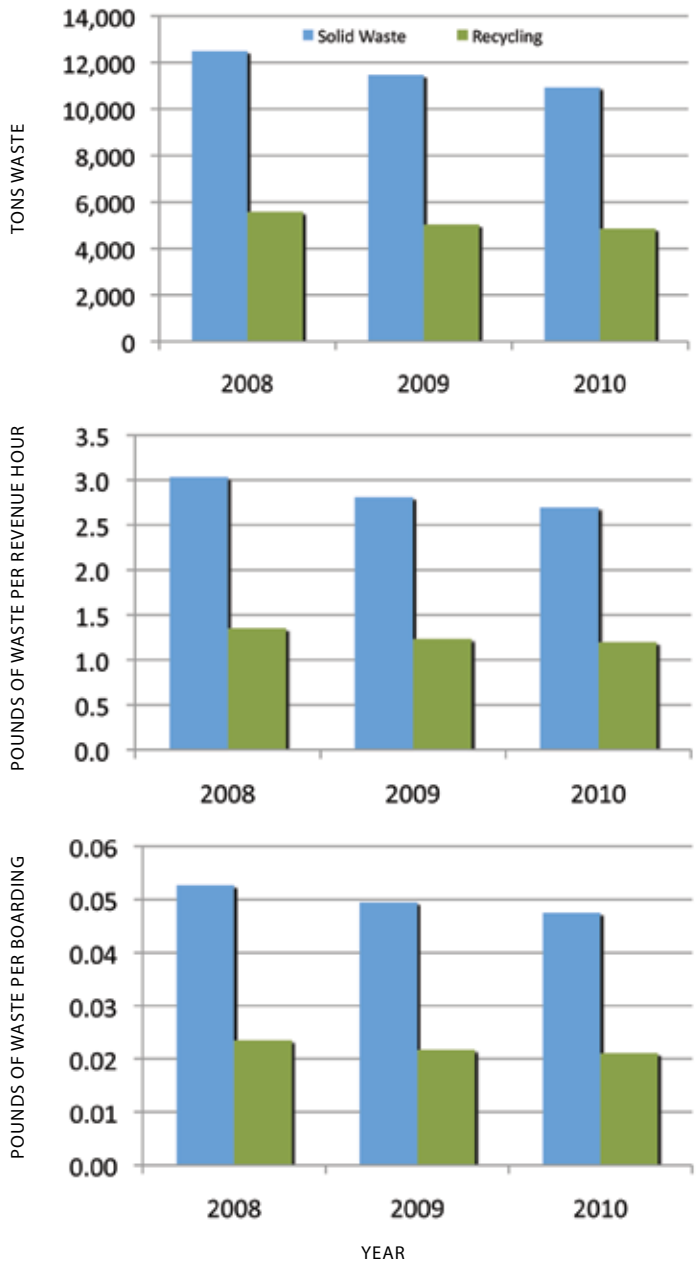


Waste

8 9 10 11 12 Metro has been and will continue to actively work on reducing waste. Metro has implemented several internal programs to divert waste from landfills. Amongst these programs are the bus battery, tire, construction, small battery, printer cartridge, and office recycling programs.

Further improvements to existing recycling programs are expected to further increase diversion rates, and waste reduction targets will be implemented to improve overall waste production. ,

FIGURE 8 **Changes in Recycling Rates and Total Waste Produced (2005-2010)**



Introduction

The purpose of this report is to provide an update to the previous year's report by presenting sustainability data for the calendar year 2010. Additionally, this report is intended to provide Metro's decision makers with information they can use to improve Metro's sustainability performance. The report first describes accomplishments within each indicator area that were achieved in 2010, and then presents and discusses data specific to each of the 12 indicator areas.

Additionally, this report discusses the methodology used to obtain and analyze the data, including how the different indicators were chosen; how efficiency is measured within the specific indicator, and potential weaknesses in the data. Accuracy within the data is essential; therefore, we used the best available data as of April 2011 and the most reliable sustainability guidelines to develop this report.

The indicator areas selected for historic and ongoing analysis include the following:

1. Ridership
2. Fuel Use
3. Rail Propulsion Power
4. Facility Electricity Use
5. Water Use
6. Greenhouse Gas Emissions
7. Air Quality
8. Solid Waste and Recycling
9. Used Oil Waste
10. Hazardous Liquid Waste
11. Non-Hazardous Liquid Waste
12. Anti-Freeze Waste

A detailed discussion of each indicator area is presented according to the following structure:

- **Indicator Area Definition –** Including relevance, description of linkages to other indicators, etc.
- **Accomplishments –** Significant actions or programs that impacted the indicator during the calendar year.
- **Data and Analysis –** Data graphs are provided along with analysis summaries.
- **Next Steps –** Specific actions that Metro is considering for future implementation; these include discussion of each indicator area as well as discussion of general next steps for Metro.

In addition to the specific issues discussed in the indicator sections, Metro has developed and implemented broad policies, goals, and standards in an effort to demonstrate our commitment to apply sustainable strategies throughout the planning, construction, and operation of various projects. Specifically, all Metro projects shall comply with all local, state, and federal codes; ordinances and regulations; and applicable Federal Transit Administration, Federal Highway Administration, and American Public Transit Association (APTA) guidelines. Furthermore we consider at a minimum the following strategies to achieve a sustainable approach to our projects:

- Reducing waste, reusing materials, recycling, and procuring environmentally friendly products;
- Including "green" and sustainable features through planning, design, construction, and operation of facilities and services; and
- Increasing the use of alternative energy solutions such as renewable energy sources.

Using Environmental Management System (EMS) principles as a tool, Metro is further identifying environmental issues of significant concern, proactively addressing those issues, implementing specific solutions to those issues as those issues are developed, and continuously engaging management to ensure continuous improvement. EMS is a tool identified in our environmental policy to ensure the implementation of sustainable principles in all planning, construction, operations, and procurement activities.

Accomplishments

Throughout 2010, Metro actively pursued sustainable and efficient strategies in an effort to maximize transportation efficiency, access, safety, and performance while minimizing energy use, consumption, pollution, and the generation of waste. Those efforts and sustainable strategies that were suggested in the previous sustainability report and the accomplishments achieved throughout 2010 are provided and discussed by indicator area. Some sustainable strategies are considered essential and ongoing; therefore, they are carried over from one year to the next. Each accomplishment is a confirmation that Metro is committed to increasing our sustainability, efficiency, and environmental performance.

In 2010, an EMS was fully implemented at the Metro Red Line Yard (Division 20). Along with the full implementation of the EMS, Division 20 also received certification as an International Organization for Standards (ISO) 14001 facility. ISO 14001 facilities have established a framework for improved environmental and economic performance.

In addition, Metro's Board of Directors tasked Metro staff with the development of clean/"green" construction equipment policies to require the use of "clean" construction equipment on all construction projects initiated and/or funded by Metro.

Also, as part of the accomplishments of 2010, Metro retired from service the remaining 14 diesel-fuel buses, thereby creating a 100% CNG fuel fleet, and established incentive programs for Metro employees who use bicycles in their daily work commute.

Also in 2010, Metro funded the development of an Energy Conservation and Management Plan (ECMP) that included a holistic assessment of energy supply and demand.

Ridership

1 Metro continues to provide resources to commuters throughout Los Angeles County in an effort to promote carpooling and the use of transit as transportation alternatives. As part of this effort, Metro continues to implement ridesharing and transit pass programs for Los Angeles (LA) employers. Metro also offers a transit subsidy program to provide its employees additional incentives to take alternative commuting to and from Metro offices.

Fuel Use

2 100% of Metro's directly operated bus fleet now runs on CNG. As of early 2011, all diesel buses have been transitioned from diesel to CNG, adding to the largest CNG bus fleet in North America.

Rail Propulsion Power

3 Metro continues to pursue implementation of Wayside Energy Storage System studies that use stationary electricity storage devices to capture energy generated when a rail car unit decelerates, releasing energy back into the system when required.

Facility Electricity Use

4 Metro has begun the development of a Light Retrofit Plan that will assist in the replacement of old, inefficient light fixtures throughout Metro facilities. These lighting retrofit projects will be accomplished through the establishment of Life of Project budgets using Sustainability Capital Project funds.

Additionally, Metro has performed energy efficiency audits at several divisions including 3, 5, 6, 7, and 9.

Leadership in Energy and Environmental Design (LEED) Existing Buildings, Operation and Maintenance (EBOM) activities and credits have been pursued for Metro's Gateway headquarters building, and a gold rating is expected to be awarded in the near future.

Water Use

5 In 2010, Metro began discussions with the LADWP to extend its recycled water line into Division 3. This will provide recycled water for Division 3's bus wash and steam bay. A water action plan was developed in 2010 and will be implemented in the near future. Also, as in previous years, Metro continues to install conservation features as part of standard retrofits and has taken steps to proactively reduce water consumption throughout all operations.

Greenhouse Gas Emissions

6 The efforts made in the indicator areas of Ridership, Fuel Usage, and Facility Electricity Use have all resulted in GHG reductions. Growth in overall ridership over the last 13 years has reduced VMT and associated GHG emissions.

To further reduce GHG emissions associated with employee commuting, Metro has established in-house incentive programs that encourage Metro employees to use bicycles during their work commute.

Air Quality

7 Metro bus and rail operations continue to achieve significant reductions in criteria air pollutants. Criteria pollutants measured include ROG, CO, NO_x, and exhaust PM.

Between 2008 and 2010, Metro was able to reduce overall air pollution emissions associated with bus and rail operations by approximately 17%. Additionally, Metro reduced emissions of harmful diesel PM pollution by 30%. This reduction is a significant achievement—emissions of fine PM in vehicle exhaust are known to have serious health effects. For this reason, the California Air Resources Board, the state's air quality regulatory authority, has designated diesel exhaust particulate as a "toxic air contaminant".

Waste

8 9 10 11 12 Metro continues to implement strategies that reduce its chemical, non-hazardous liquid, and oil usage and associated waste. Concurrently, Metro continues to recycle solid waste at a rate of 44% while decreasing solid waste output. Total solid waste output decreased by 531 tons from 2009 to 2010.

Page Intentionally Left Blank

Indicator Analysis

Metro's environmental performance throughout 2010 is assessed by our performance in each of the 12 indicator areas. This analysis provides the data that Metro uses both to track progress from year to year, and to set new targets, strategies, and goals for future years. Each indicator section provides a discussion of subject definitions and general indicator information followed by 2010 accomplishments. Specific indicator data are provided in graph form followed by an analysis discussion. Finally, next steps suggested for future implementation are provided.

How the Indicators Were Chosen

The indicators used in this report were derived using the GRI sustainability reporting framework. GRI is considered to be the gold standard in sustainability reporting and is used by entities throughout the world to report environmental performance. The flexibility and comprehensive nature of GRI's standard makes it a good reporting tool for Metro.

The GRI framework is structured to include the inputs (energy, water, materials) and the outputs (emissions, effluents, and waste) that are common to most organizations, as well as impacts on biodiversity. The framework was designed to be usable by any organization, which allows for intra-industry and inter-industry benchmarking. The GRI suggests a wide range of indicators. Reporters choose the indicators most relevant to their operations for which accurate data are available. Using this process, 12 indicators were established. They are: 1) Ridership, 2) Fuel Use, 3) Rail Propulsion Power, 4) Facility Electricity Use, 5) Water Use, 6) Greenhouse Gas Emissions, 7) Air Quality, 8) Solid Waste and Recycling, 9) Used Oil Waste, 10) Hazardous Liquid Waste, 11) Non-Hazardous Liquid Waste, and 12) Anti-Freeze Waste. Indicators 8 through 12 are collectively referred to as "Waste" indicators.

Measuring Efficiency: Comparing Changes in Ridership to Changes in Environmental Impacts

One of Metro's principal roles is to provide efficient and effective transit service to the Los Angeles region. Metro's transit service creates net sustainability benefits in the region through decreased congestion and VMT and increased mobility. As Metro increases our service capacity, the environmental impacts of our operations will grow. Efficient expansion of Metro's services will ensure that environmental impacts do not outpace the benefits to the region. By comparing the change in environmental impacts to the changes in service and ridership, the efficiency of growth can be estimated. This is not a perfect science, but it does provide added depth of information to decision makers.

Why We Measure Efficiency with Boardings and Revenue Hours

This report uses boardings and revenue hours to measure Metro's transit ridership and transit service. These statistics are reported annually by all transit agencies to the National Transit Database (NTD) and thus enable cross-agency benchmarking.

Boardings

The purpose of transit is to move people from one place to another; in other words, to enable travel. This report measures ridership in boardings. "Boardings" are defined as persons getting on a bus or train. It is an unlinked trip versus a linked trip.

Revenue Hours

Revenue hours measure the number of hours that all Metro revenue vehicles serve customers, but do not include the time that buses operate out of service. Measuring revenue hours enables us to see if increasing impacts are correlated to increased service. This is important because, as a transit agency, Metro must both anticipate and induce travel demand. For this reason, the ridership benefits of transit projects might not be realized until several years after the projects are implemented. Measuring revenue hours can help to under-

stand increased environmental impacts before they have translated into increased ridership.

Weaknesses in the Data

Analyzing the environmental performance of an agency as large and complex as Metro involves large amounts of data from many sources. We used the best data available as of April 2011 for this report and determined that these data provide an accurate analysis of the agency's performance. There were a few shortcomings in the data, however, that should be addressed in future reports:

1. *Lack of Sub-Meters:* Because a few of Metro's current utility meters monitor several buildings within a division (for example), it is difficult to accurately identify the source of increasing or decreasing energy usage within a specific division.
2. *Lack of Data:*
   - *Facility Electricity, and Solid Waste and Recycling* – Data were not available back to 2002. In these instances, all data that were available were used for analysis.
   - *Rail Propulsion Electricity* – Rail propulsion electricity data are not available before 2005. In 2010, Metro was unable to obtain rail propulsion versus facility electricity use account differentiation from Southern California Edison (SCE).
3. *Meter Issues:* Water billing and electricity use were provided by meter address, which does not always match up to a specific location/division.

Definition: Measures annual Metro ridership.

Units: Boardings and revenue hours

Relevance: Transit ridership increases economic production, social equity, and environmental integrity in the region and is Metro's main service as an agency.

Regulation: None

Linkages: All

Description of Linkages: Increasing service is likely to increase the agency's environmental impacts. In order to be sustainable, we should strive to not increase impacts faster than increasing service. Transit ridership can also reduce regional environmental impacts by reducing VMT.

Information Source: National Transit Database

Accomplishments

- **Continued to provide a variety of services and product offerings to commuters in LA County to promote carpooling and transit as alternatives to driving alone.**
- **Continued to provide a transit subsidy to Metro employees to encourage the use of alternative commuting.**

Data & Analysis

The Majority of Transit Riders Take the Bus

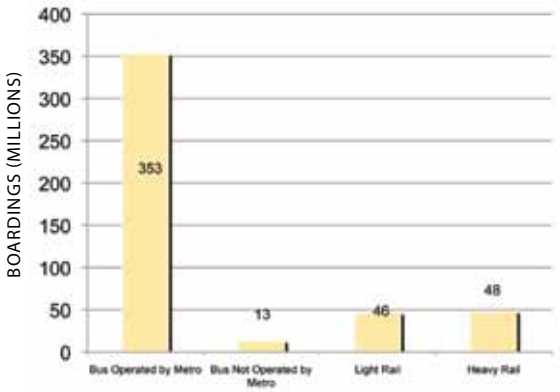


FIGURE 9 **Boardings by Mode (2010)**

Bus riders continue to make up the majority of Metro ridership. In 2010, more than three and a half times as many boardings were made on Metro buses than on the Metro rail. From 1997–2010, customers boarded Metro bus service 5.2 billion times and Metro rail only 936 million times. This is largely due to the fact that Metro's bus service is far more extensive than its rail service.

Ridership and Revenue Hours are Steadying

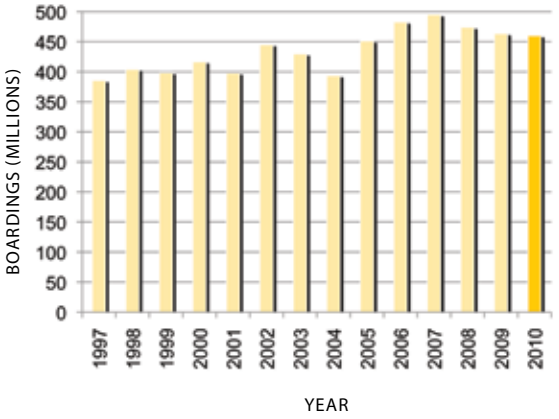


FIGURE 10 **Total Boardings (1997-2010)**

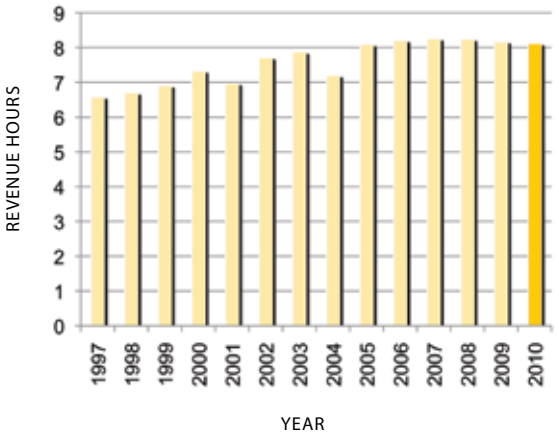


FIGURE 11 **Total Revenue Hours (1997-2010)**

In 2010, 460 million boardings were made on Metro's transit system. While this is 1% lower than 2009, total ridership has trended upward over the last 13 years. Lower boarding totals in 2010 are likely due to the continued effects of the regional economic downturn and rising unemployment. Despite the recent recovery from the recession, the most boardings were made in 2007 (495 million). The fewest, 386 million, were made in 1997. Overall, boardings increased 18% between 1997 and 2010, outpacing population growth in Los Angeles County by 15%.

Light Rail Ridership is the Fastest Growing Mode

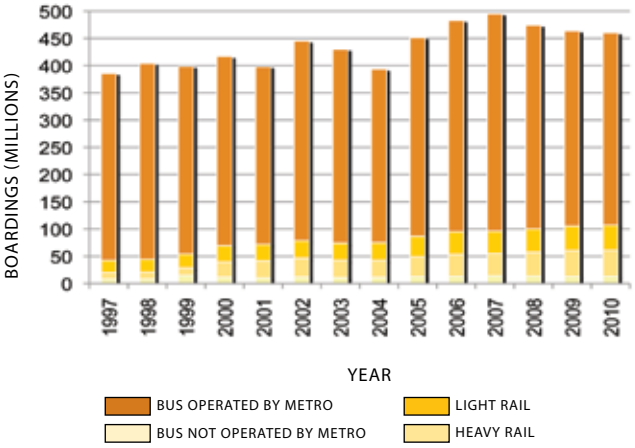


FIGURE 12 **Boardings by Mode (1997-2010)**

Rail is taking a larger and larger percentage of the mode share on Metro transit, supported by a decreasing bus mode share in the past 4 years. Metro plans on adding more rail lines as outlined in our 30/10 initiative that plans to build 12 additional mass transit projects within the next 10 years.

Between 1997 and 2010, 60 million (80%) of all new transit boardings were rail boardings. In this same period, bus revenue hours increased by 1.1 million, while rail revenue hours increased by only 402,000. For every increased rail revenue hour, rail gained 149 new boardings, while bus gained only 13 new boardings for each increased bus revenue hour.

Next Steps

R1	Continue ridesharing and transit pass programs for Los Angeles employers.
R2	Continue to provide a Metro employee transit subsidy program.
R3	Continue to support and plan transit-oriented development in strategic Metro-owned properties and locations.
R4	Continue to expand rail and BRT systems.
R5	Continue to expand the number of 45-foot composite fiberglass buses used by Metro.
R6	Support strategic and creative marketing efforts to promote transit in neighborhoods with underutilized existing or newly improved transit service.
R7	Continue to facilitate, analyze, and respond to travel surveys that reveal origin-destination areas with the least service, either in frequency or number of transit stations.
R8	Support and market inter-transit pass programs, similar to the Bay Area's Clipper program, to allow seamless transfers between transit organizations.
R9	Using the existing Transit Access Pass program, continue to improve bus and rail ticketing and barrier strategies to improve accuracy of ridership and origin-and-destination statistics.

Definition: Measures fuel used to power Metro's directly operated fleet (purchased transit not included).

Units: Gallons of Gas Equivalents (GGE)

Relevance: Fuel is made from limited natural resources and thus its use should be reduced whenever possible. In addition, fuel represents a significant cost to Metro.

Regulation: California fuel standards

Linkages: Ridership, criteria pollutants, greenhouse gas emissions

Description of Linkages: Increasing Metro service and ridership are likely to increase the amount of fuel used. The type and amount of fuel used also directly impact Metro's criteria pollutants and greenhouse gas emissions.

Limitations: This indicator does not include fuel used for purchased transit services.

Information Source: Metro's fuel use records and M3.

Accomplishments

- **In early 2011, Metro's last diesel bus was retired from service, helping Metro to achieve our goal of a 100% alternatively fuel fleet, with 95% of the fleet powered by clean-burning CNG.**
- **In 2010, Metro Board of Directors directed staff to develop a clean/green construction equipment policy to require the use of clean construction equipment on all construction projects initiated and/or funded by Metro.**

Data & Analysis

Fuel Efficiency Remains Stable

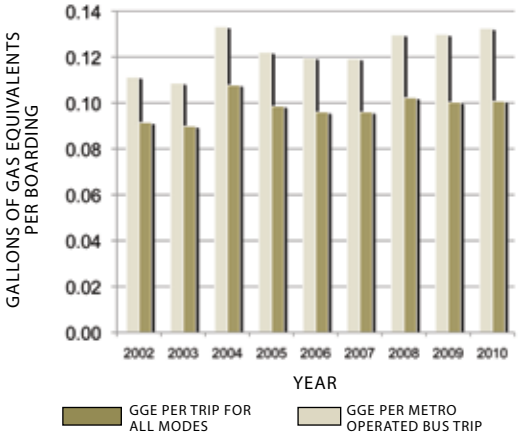


FIGURE 13 **Total GGEs per Boarding (2002-2010)**

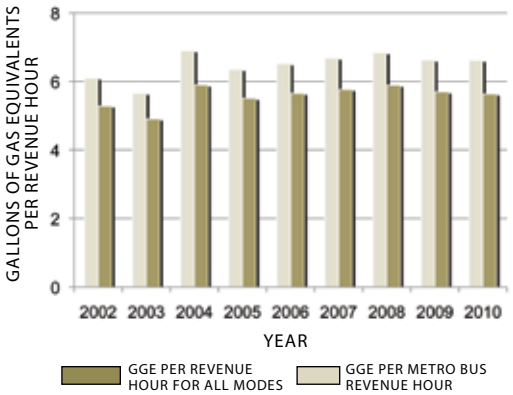


FIGURE 14 **Total GGEs per Revenue Hour (2002-2010)**

GGEs per system-wide boarding and per directly operated bus boarding were trending downward after 2004 but then increased again in 2008, remained at the same level for 2009, and decreased slightly in 2010. This increased level starting in 2008 is at least partially due to the dip in ridership in 2008-2010. Also, increases in traffic congestion and excessive idling decrease vehicle fuel efficiency, which may be reflected in this trend.

Overall Use is at a 5-Year Low, Diesel Use is Phasing Out, Gasoline Use is Steadying

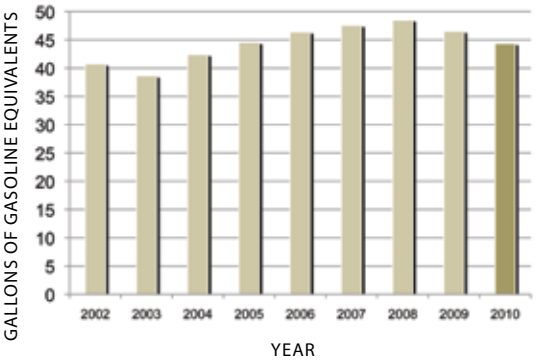


FIGURE 15 **Total Fuel Used in GGEs (2002-2010)**

In 2010, Metro's fleet, excluding vanpool services, used 43 million GGE of fuel, 3 million more than was used in 2002 (the earliest year recorded), but 4 million less than the peak usage in 2008. This usage in 2010 equates to a 1% annual overall increase since 2002. More recently, trends show a 4% annual decrease of bus fuel use in over the past 3 years. This recent drop in bus fuel usage is approximately correlated with the trends in bus ridership, where ridership also reached a historical high in 2008 and decreased 2% annually to 2010. Not included in this analysis is the impact of Metro's revenue vanpool gasoline usage for 2010 at nearly 1.4 million gallons; vanpool fuel accounts for 5% of total fuel usage in 2010[1].

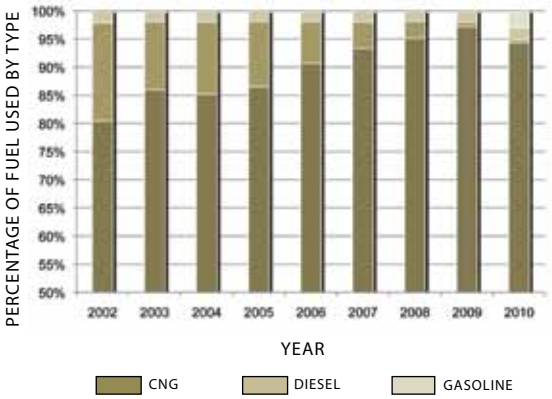


FIGURE 16 **Percentage of Fuel Used by Fuel Type (2002-2010)**

Due to Metro's conversion from diesel to CNG, bus diesel consumption has decreased by 97% between 2002 and 2010. Bus gasoline consumption increased by 11% during the same time period. Metro's fleet used 10.4 million more GGEs of CNG in 2010 than in 2002, a 32% increase. The dip in fuel usage in 2003 is likely due to the strike that year. Service cuts in 2009 caused fuel usage to decrease and to remain at the decreased level in 2010. In addition to these trends, Metro gasoline use accounts for 5% of all fuel use, when compared on a gallons-of-gasoline-equivalent basis.

[1] Because the vanpool fuel usage was newly added to the inventory in this 2011 report and inventories in previous years do not include vanpool fuel use, earlier fuel use trend analysis is limited to bus and non-revenue fuel use only.

Bus and Non-Revenue Fuel Costs Remain Unchanged from 2009

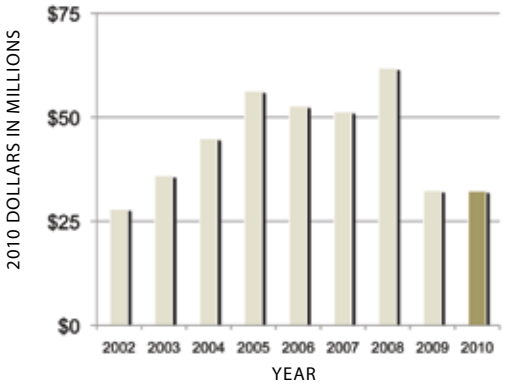


FIGURE 17 **Total Estimated Fuel Expenditures in Millions - 2010 Dollars (2002-2010)**

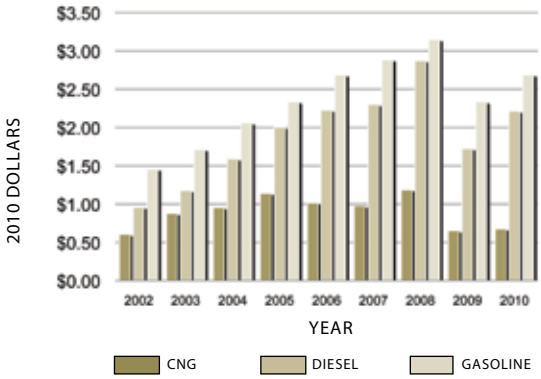


FIGURE 18 **Average Cost per GGEs - 2010 Dollars (2002-2010)**

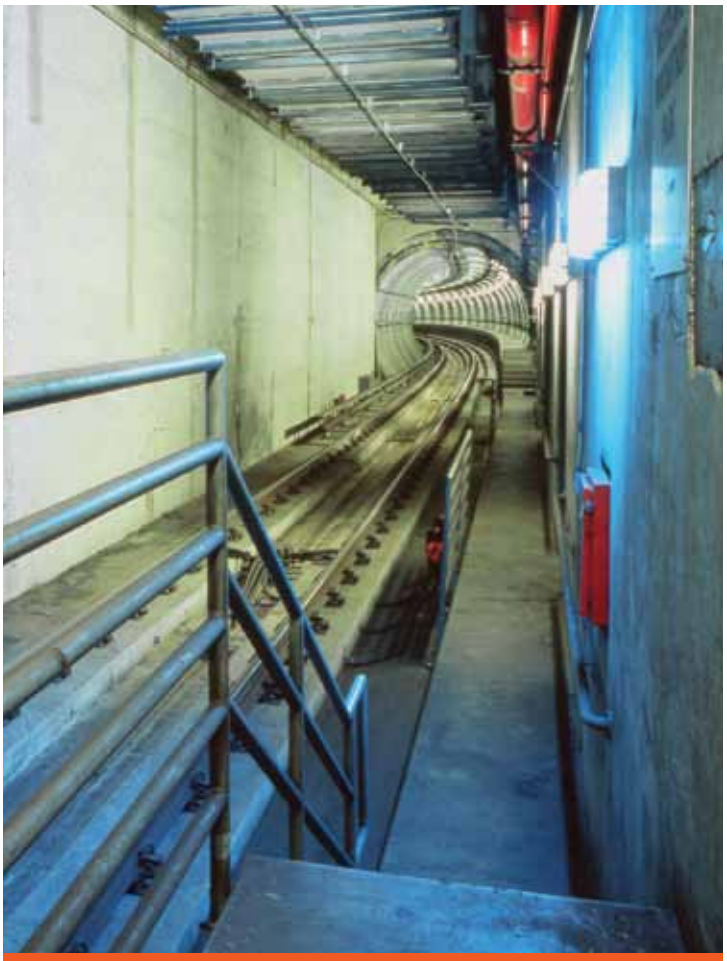
Metro spent $32.3 million on fuel in 2010 (excluding vanpool fuel) which is nearly half of the amount spent on fuel in 2008 but roughly the same amount as in 2009 ($32.2 million). This is a sharp reversal of the trend from 2002-2008, when fuel expenditures rose by 121% (after adjusting for inflation). This decrease from the 2002-2008 trend is in large part due to Metro's transition to a 100% CNG-powered bus fleet. The addition of vanpool usage in the 2010 inventory shows that Metro spent $3.7 million, or 10% of all fuel expenditures, on unleaded gasoline for this particular service.

Fuel expenditures on diesel decreased by 18% compared to 2009 due to Metro's concluding dependence on diesel fuels. Decreases in GGEs of CNG also contribute to the overall slight dip in fuel expenditures compared to 2009. Prices of all three fuels fell dramatically from 2008 to 2009, an average of 45%, and increased slightly in 2010. This dramatic change in fuel prices coincided with changes in nationwide fuel prices, which spiked in 2008, when crude oil prices reached nearly $140 a barrel, and dropped back down to 2005 levels at about $50 a barrel in 2009. Recent trends in crude oil price indicate another increase in 2011 to 2009 levels. While not nearly as dramatic as crude oil based fuels, CNG also experienced a nationwide decrease in fuel prices between 2008 and 2009 from $14 to $12 per thousand cubic feet (EIA 2011). Since the cost of CNG remains significantly lower than that of the other fuels, the combined effect of changes in all three fuel costs reflect the dramatic changes in the higher priced gasoline and diesel fuels than the small change in CNG prices. Phasing out of diesel and gasoline fuel use in the Metro fleet, however, will likely lessen the effect of crude oil prices on Metro's fuel expenditure

Next Steps

F1	Create a plan to reduce idling.
F2	Continue to seek ways to reduce non-revenue vehicle use.

Page Intentionally Left Blank



Definition: Measures electricity used to power Metro rail.

Units: Kilowatt hours (kWh)

Relevance: Propulsion power is 18% of Metro's carbon footprint and a significant cost to Metro. At the same time, rail has the potential to significantly reduce regional GHG.

Regulation: None

Linkages: Ridership, criteria pollutants, and greenhouse gas emissions

Description of Linkages: Increasing Metro rail service and ridership will increase propulsion power. This directly impacts Metro's criteria pollutants and greenhouse gas emissions. Increasing rail ridership increases the efficiency of the rail system per boarding.

Limitations: Propulsion power reports were not available before 2005, and there was some trouble verifying the accuracy of Gold Line's power consumption for 2004 and 2005. Full cost and consumption electricity data was not available from Pasadena Water and Power; therefore, 2010 estimates were made based upon 2005-2009 trends.

Information Source: Metro propulsion power records

Accomplishments

- **Metro continues to pursue implementation of wayside energy storage system studies.**

Data & Analysis

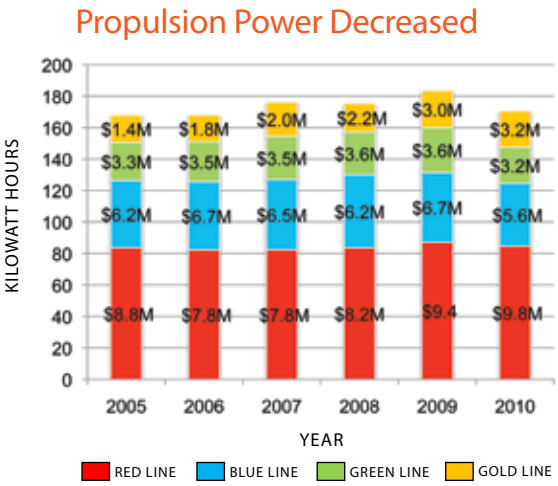


FIGURE 19 **Kilowatt Hours of Propulsion Electricity Use by Rail Line - 2010 dollars (2005-2010)**

Metro's rail lines consumed approximately 171 million kWh of electricity in 2010, which represents a 2% increase from 2005. The cost of powering Metro's trains increased by 12% during that period, from $19.6 million to $21.8 million. The Red Line consumes more power than any other Metro rail line, and the decrease in electricity consumption offset by an increase in the price of electricity caused the Red Line's electricity costs to increase by more than $450,000 between 2009 and 2010. The decrease in rail propulsion power has been attributed to the (corrected) electrical consumption differentiation between rail propulsion power and facility electricity use accounts.

Rail Efficiency is Improving

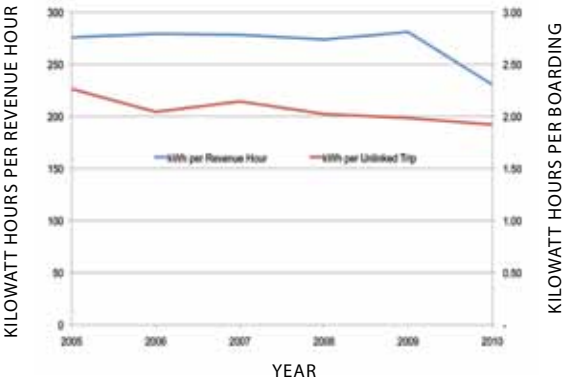


FIGURE 20 **Kilowatt Hours of Propulsion Electricity per Rail Revenue Hour and Kilowatt Hours of Propulsion Electricity per Boarding (2005-2010)**

In 2010, Metro used 1.78 kWh of electricity per rail boarding, compared to 2.26 kWh per boarding in 2005 – a 21% increase in efficiency. Since 2005, the efficiency of rail car operations has fluctuated between 241 and 281 kWh per vehicle revenue hour, a difference of 14%.

LADWP Provides Majority of Power

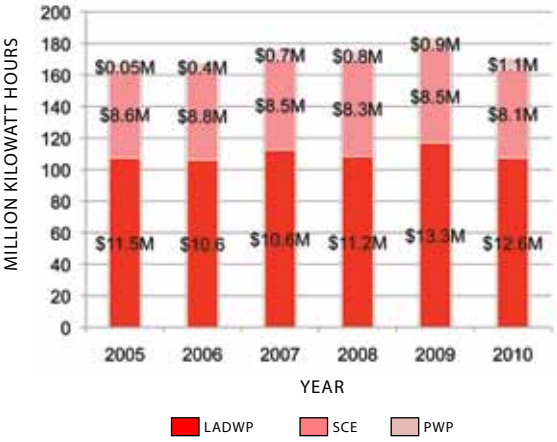


FIGURE 21 **Kilowatt Hours of Propulsion Electricity Use by Provider - 2010 dollars (2005-2010)**

Historically, LADWP has provided more than 60% of Metro's rail propulsion power. Electricity provided by LADWP is cheaper than that of SCE, but LADWP's electrical power is also more carbon intensive than that of the private utility.[2] Pasadena Water and Power (PWP) provided only a small fraction of Metro's power each year.

[2] Note: LADWP has plans to reduce the carbon intensity of their power generation in coming years.

Next Steps

RP1	Implement wayside energy storage system and/or on-board storage technology to capture electricity and energy produced by dynamic braking.
RP2	Research the on-board storage of regenerative braking energy strategy.
RP3	Install sub-meters to measure electrical use specific to rail propulsion and facilities.
RP4	Implement the recommendations contained within the completed 2011 Energy Conservation and Management Plan.
RP5	Work with electric utility providers to accurately identify and label all rail propulsion accounts.

Definition: Measures Metro's annual agency-wide electricity use for facilities (does not include kWh used to power trains).

Units: Kilowatt hours (kWh)

Relevance: Electricity costs Metro millions of dollars every year and contributes to Metro's carbon footprint.

Regulation: None

Linkages: GHG emissions, air quality

Description of Linkages: Approximately 8% of Metro's carbon footprint is attributed to the electricity our facilities use. Electricity use causes air pollution at the power generation site.

Limitations: Reports on electricity prior to 2005 combine rail propulsion and facility electricity use. Thus, we could only analyze facilities' electricity use for the years 2005-2010. A lack of sub-metering makes it difficult to understand usage and effectively target reduction projects.

Information Source: N/A

Accomplishments

- **Metro has fully implemented an EMS and received ISO 140001 certification at the Metro Red Line Yard (Division 20).**
- **LEED EBOM activities and credits have been pursued for Metro's Gateway headquarters building and, a gold rating is expected to be awarded in the near future.**

Data & Analysis

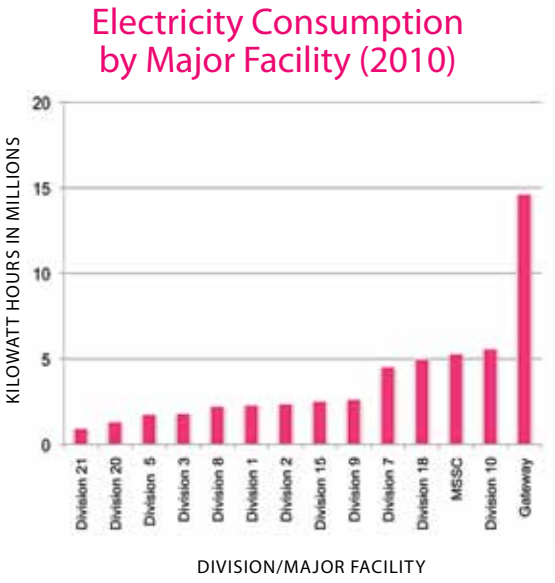


FIGURE 22 **Electricity Use by Major Facilities (2010)**

In 2010, the Metro facilities that consumed the most electricity were the Gateway Headquarters (14.6 million kWh) and the Metro Support Services Center (5.6 million kWh). The combined electricity consumption at these two facilities accounted for 25% of Metro's total facility electricity use in 2010.

Electricity Use Increased in 2010

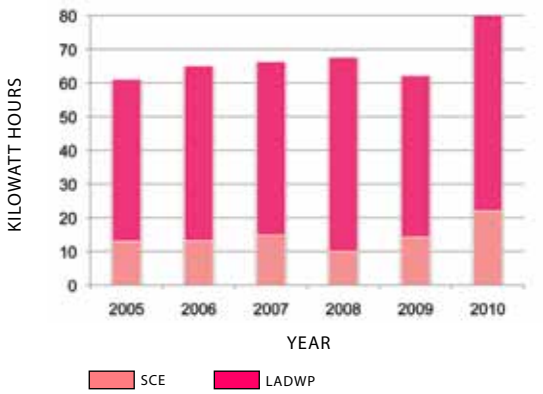


FIGURE 23 Facility Electricity Use in Kilowatt Hours (2005-2010)

Electricity Efficiency was Impacted by Measurement Change

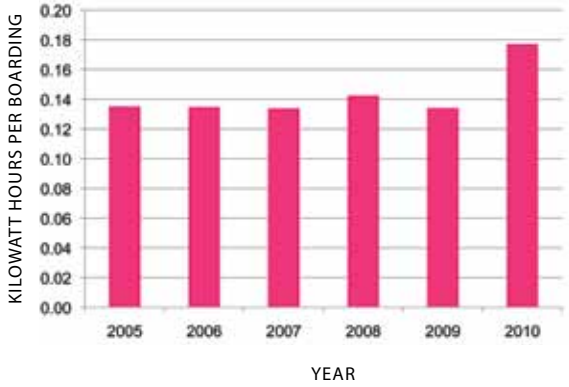


FIGURE 24 Facility Electricity Use in Kilowatt Hours per Boarding (2005-2010)

In 2010, Metro facilities used 81 million kWh of electricity. Metro's electricity consumption increased between 2006 and 2008, dropped in 2009, but rose significantly in 2010 due to changes in how facility versus propulsion electricity is apportioned. This increase can be attributed primarily to changes in consumption demand from Metro's facilities that are serviced by LADWP, for which consumption increased 23% (10.9 million kWh) compared to 2009. This increase was furthered by a 55% (7.8 million kWh) increase in electricity consumption from Metro's facilities that are serviced by SCE. In conjunction with an increase in Metro ridership (boardings), Metro facilities used 32% more kWh per boarding in 2010 than in 2009.

Electricity Expenditures (SCE, LADWP)

FIGURE 25 Facility Electricity Cost by Provider (2005-2010)

In 2010, Metro spent $9.7 million on facility electricity, $2.3 million more than in 2009. Facility electricity expenditures increased by 31% in real dollars, while electricity use increased by 30% compared to 2010. This was in part a result of an increase in Metro's consumption of LADWP-supplied electricity, which cost an average of $0.12/kWh, and an increase in consumption of SCE-supplied electricity, which also cost Metro an average of $0.12/kWh. The average cost per LADWP-supplied kWh increased by 4% compared to 2009, while the average cost per SCE-supplied kWh decrease 3% during the same time period. In 2010, SCE charged an average of 3% more for facility electricity than LADWP. Efficiency projects in SCE territory thus experience quicker payback periods and higher returns on investment than similar projects in facilities that are supplied by LADWP.

Next Steps

FE1	Develop a lighting retrofit plan to replace old, inefficient light fixtures at various Metro facilities.
FE2	Establish a Life of Project budget to fund lighting retrofit projects.
FE3	Provide sub-meters for appropriate funding for facilities and tracking of data.
FE4	Invest in energy management systems.
FE5	Track energy efficiency upgrades and measure their success.
FE6	Project life-cycle cost analysis at the beginning of every new construction or major renovation project.
FE7	Begin retrofit of lighting in the Red Line tunnel.
FE8	Implement the recommendations contained within the completed 2011 Energy Conservation and Management Plan.
FE9	Aggressively pursue renewable energy sources.
FE10	Construct new facilities and projects using energy efficiency and conservation strategies.
FE11	Fully implement of the EMS at the pilot sites.
FE12	Complete certification of LEED EBOM Gold for Metro's Gateway headquarters building.
FE13	Complete additional energy audits.
FE14	Develop additional renewable sources other than photo voltaics.
FE15	Install solar panels on infrastructure.
FE16	Pursue LEED EBOM certification at several sites to be assessed and evaluated.

Page Intentionally Left Blank

Definition: Measures Metro's annual agency-wide water use.

Units: Gallons

Relevance: Water is a critical issue in Los Angeles' arid climate and future water restrictions are likely. Water is a large Metro expense.

Regulation: None

Linkages: Ridership, GHG emissions

Description of Linkages: A large proportion of Metro's water is used to wash buses and train cars; therefore, water use is directly related to vehicle revenue hours. Water conservation is a critical part of climate change adaptation.

Limitations: The small municipal water agencies were not able to provide data in time to be incorporated into this report; therefore, the analysis is of LADWP accounts only. These accounts make up the vast majority of Metro's water use. LADWP does not always check meters regularly. Thus, water use is not necessarily recorded in the period it is used. This creates challenges in tracking the causes for changes in consumption and the benefits of efficiency upgrades.

Information Source: LADWP water bills

Accomplishments

- **Participated in discussions with LADWP to extend its recycled water line from San Fernando Road to the property line at Division 3.**
- **Initialized plans to connect LADWP's recycled water line to the Division 3 bus wash and steam bay.**
- **Completed development of a water action plan to identify water use reduction measures.**

Data & Analysis

Water Consumption Increased in 2010

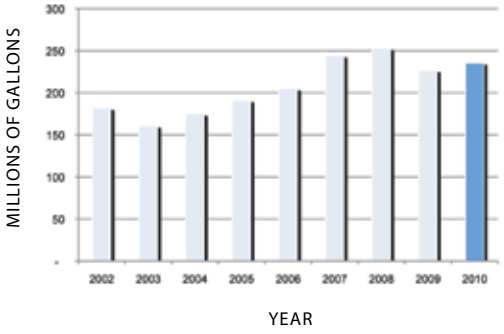


FIGURE 26 **LADWP Water Use in Million Gallons (2002-2010)**

Between 2003 and 2008, Metro water consumption had experienced a steady increase interrupted by a significant drop in 2009. In 2010, Metro's water consumption increased from 227 million gallons in 2009 to 236 million. The steady increase in water consumption over the years is likely due to an increase in Metro's service to satisfy demand of a growing Los Angeles population.

Water is a Significant and Rising Cost

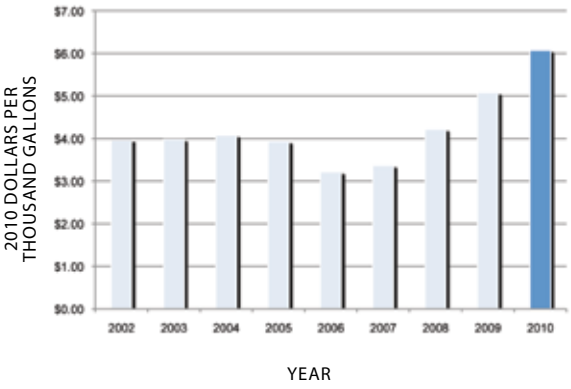


FIGURE 27 Average LADWP Water Cost per Thousand Gallons – 2010 Dollars (2002-2010)

Water costs continued to increase significantly in 2010. Between 2002 and 2010, the average water cost per gallon grew nearly 53%, and overall water use increased by 30%, resulting in a total water expenditure increase of 70%. Sewer expenditures increased 10% in that time. In 2002, Metro spent $722,000 on water and $546,000 on sewer (adjusted for inflation). In 2010, Metro spent more than $1.4 million on water and $645,000 on sewer. This is a 2010 dollar increase of $722,000 on water and $99,000 on sewer. This added cost is due both to Metro's growing consumption and the increasing cost of water. After adjusting for inflation, the average cost of water rose 53% between 2002 and 2010 (does not include sewer costs). Increasing water costs are likely due to increasing demand from the growing Los Angeles population and the water shortages in 2008 and 2009. Water costs are expected to continue to increase with population in the long run, but 2011 water costs are expected to be lower than in recent years due to above-average snowpack in early 2011, according to the California Department of Water Resources.

Water Efficiency Decreased in 2010

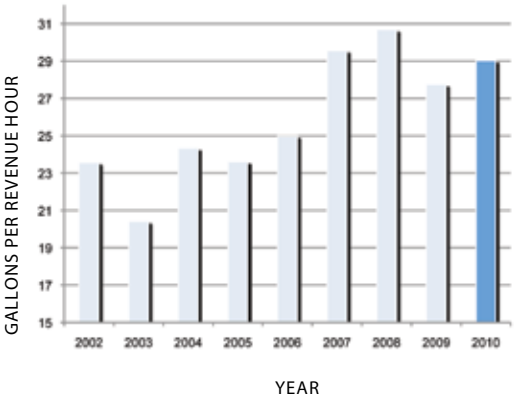


FIGURE 28 LADWP Water Use in Gallons per Revenue Hour (2002-2010)

In 2010, Metro purchased 250 million gallons of water from LADWP, 38% more than in 2002 and just over 10% more than 2009. A large portion of purchased water is used to wash buses and train cars. Thus, Metro's water use is expected to increase as service increases. Between 2002 and 2010, however, water use increased 38%, while vehicle revenue hours increased only 5%. In 2002, Metro's water efficiency was 23 gallons per revenue hour. In 2010, Metro was 23% less efficient and consumed 29 gallons per revenue hour, returning to just below 2008 efficiency levels.

LADWP Water Consumption at Major Facilities

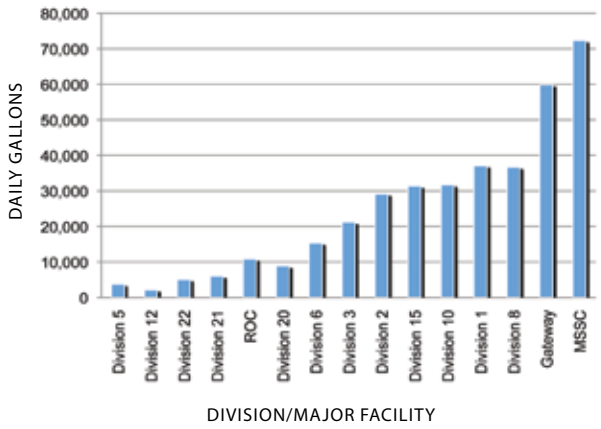


FIGURE 29 **Average LADWP Daily Water Use in Gallons by Major Facility (2010)**

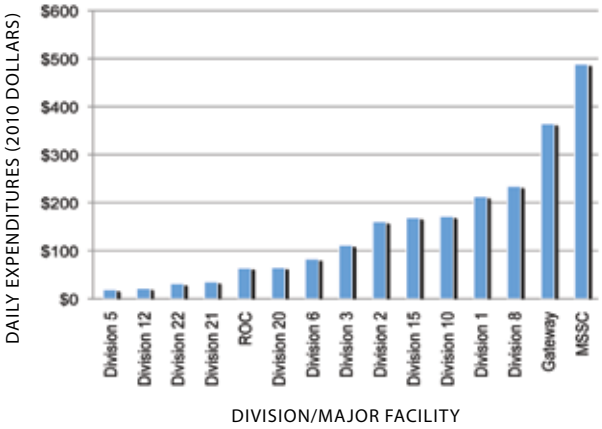


FIGURE 30 **Average LADWP Daily Water Expenditures by Major Facility (2010)**

In 2010, daily division water use varied from a low of 2,154 gallons at Division 12, to a high of 72,333 gallons at the MSSC. Both Division 12 and the MSSC building had higher daily water usages than in 2009, at 1,300 and 56,000 gallons, respectively. In 2010, MSSC surpassed Gateway headquarters as the facility with the highest daily water usage as compared to 2009. Average daily water costs varied between $19 (Division 5) and $489 per day (MSSC). As stated in the executive summary in this report, the MSSC division began pressure washing 6,000 new solar panels on an as-needed basis. This process is likely to account for the majority of the water use increase at the MSSC.

Next Steps

WU1	Substitute municipal recycled water for potable water when possible.
WU2	Increase amount of runoff from bus washing bays for recycling. This can include developing protocols to wash buses at evening or early morning periods to reduce evaporation during hot summer days.
WU3	Replace existing sanitary fixtures in bus and rail facilities with more efficient fixtures.
WU4	Prioritize recycling and reuse of onsite-created grey water from bus and other facilities.
WU5	Replace existing steamers with high-efficiency models.
WU6	Use recycled water for car washing throughout Metro's rail facilities.
WU7	Evaluate feasibility of using recycled water in place of potable water.
WU8	Use water conservation and efficiency guidelines outlined in LEED reference books.
WU9	Implement select measures identified in the water action plan.

Page Intentionally Left Blank

Definition: Measures Metro-wide greenhouse gas emissions.

Units: Metric tons (MT) carbon dioxide emissions.

Relevance: Greenhouse gas emissions cause global climate change. Climate change will have severe environmental, economic, and social impacts in Los Angeles.

Regulation: California AB-32 (no current direct regulation over Metro) and SB-375 (Metro is assisting our MPO in developing an SCS).

Linkages: Electricity, fuel, ridership

Description of Linkages: Electricity and fuel use directly impact Metro's level of GHG emissions. Ridership impacts Metro's carbon efficiency.

Limitations: Methane emissions from solid waste landfilling and GHG emissions from water conveyance are not included due to a lack of analysis tools.

Information Source: N/A

Accomplishments

- **Offered incentives to employees who use their bikes as part of their commute.**
- **Completed two bike studies, one on the Orange Line and one on Metro's overall rail system.**
- **Developed plans to procure 92 hybrid sedans, 20-25 hybrid utility vehicles, and at least one electric truck by 2012.**
- **Continued to plan and construct an additional 12 rail and bus lines to be added to the Metro transit service as a part of the 30/10 initiative. Present construction of the new Expo rail line is expected to be completed in 2012.**
- **Continued the use of solar panels on transportation infrastructure.**
- **Continued to provide a transit subsidy program to our employees.**
- **Continued to provide a variety of services and product offerings to employers and educational institutions in LA County to promote carpooling, vanpooling, and transit as alternatives to driving alone.**

Data & Analysis

Metro GHG Emissions are Decreasing Overall

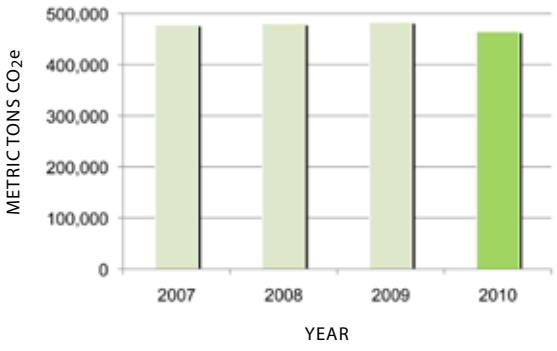


FIGURE 31 **Greenhouse Gas Emissions in Metric Tons CO_2e (2008-2010)**

The year 2007 was the first year Metro began documenting GHG emissions. There was a slight decrease in Metro's level of GHGe between 2007 and 2010. When the effects of Metro's service on VMT, congestion, and land use are considered, Metro prevents more GHG emissions than it produces.

Most Emissions Come from Transit Used to Move Passengers

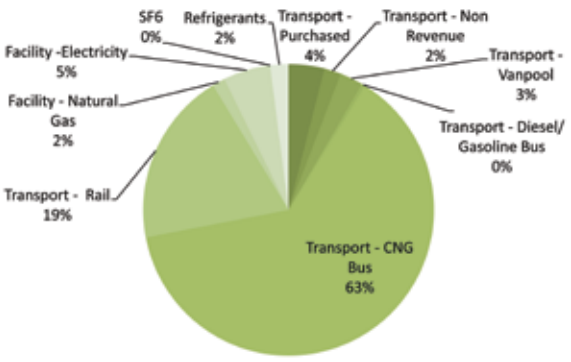


FIGURE 32 Percentage of Total CO_2e Emissions by Facility or Transport Mode (2010)

In 2010, 94% of Metro's emissions were related to operation of the transit system that moves Metro passengers. The majority of the other 6 percent are emissions from the energy use at Metro facilities. Emissions from vanpool gasoline usage were added to the inventory in 2010 and account for 3% of total emissions in 2010; they were not included in previous inventories. Refrigerant emissions of HFCs and PFCs, accounting for 2% of total emissions in 2010, were added to the inventory in 2009; they were not included in 2008. Although emissions of SF6, a high global warming potential gas used in electrical transformers, were accounted for in this inventory, it accounted for less than 1% of total emissions in 2010.

Directly Operated Buses and Light Rail are Most Carbon Efficient per Boarding

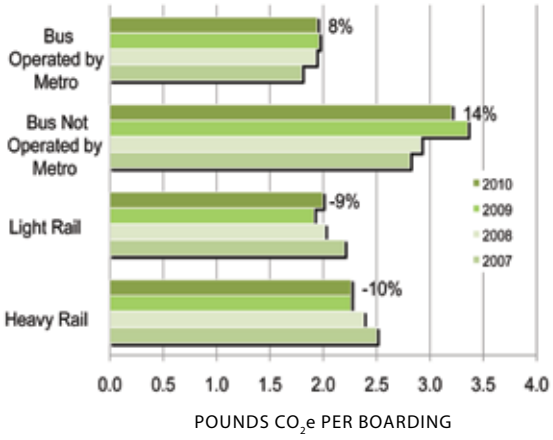


FIGURE 33 Pounds of Greenhouse Gas Emissions per Boarding by Mode (2008-2010)

In 2010, Metro's directly operated buses were the most carbon efficient transit mode per boarding at 1.94 pounds CO_2 per boarding, followed closely by light rail at 2.00 pounds CO_2 per boarding. Purchased bus transport continues to be the least carbon efficient mode per boarding, showing a slowed decrease in efficiency in the last 2 years. This was likely due to a transition of purchased transport to use CNG fuel over diesel fuel, but the efficiency remains low due to the continued reliance on diesel which accounted for 51% of total fuel used in purchased transport (61% in 2009). CNG and propane consisted of 36% and 13% (21% and 19% in 2009) of the remaining fuel use, respectively. The recent improvements in carbon efficiency reflect the shift away from diesel towards cleaner burning CNG while purchased ridership has only increased by less than 1%.

The greatest gains in efficiency came from light rail and heavy rail, which have experienced significant growth in ridership over the last few years, while propulsion methods have remained the same.

Metro GHG Reductions per APTA Protocol

In 2010, Metro emitted 464,841 $MTCO_2e$ from its buses, trains, non-revenue vehicles, and facilities[3]. The agency's more than 2,500 CNG buses emit greenhouse gases from their tailpipes, as do smaller numbers of gasoline and diesel buses. Light rail and heavy rail trains are responsible for greenhouse gases emitted in the generation of grid electricity. Metro's nonrevenue vehicles also emit greenhouse gases from their tailpipes. Facilities use grid electricity and some natural gas, thereby contributing to greenhouse gas emissions.

Metro also keeps greenhouse gases out of the atmosphere by allowing transit riders to leave their cars at home and supporting other forms of low emission travel options. In 2010, Metro saved 1.24 million $MTCO_2e$ from displaced driving, displaced congestion, and Metro's impact on land use. As discussed in guidance from the American Public Transportation Association (APTA), there are three ways that Metro's service reduces greenhouse gas emissions:

1. **Mode shift** – Metro reduces the amount of VMT on Los Angeles County's roads by getting people out of their cars and onto buses and trains.
2. **Congestion relief** – By reducing the number of vehicles on the road and smoothing the flow of traffic, Metro reduces emissions from cars that operate in congested traffic conditions.
3. **Land use impacts** – Over time, Metro's rail stations and other major transit hubs attract denser, pedestrian-friendly development patterns to their immediate vicinities. (Metro also actively promotes such development patterns through its transit oriented development program; see Strategy: Transit Oriented Development.) These development patterns allow people that live and work in the area to travel shorter distances and to walk and bike more, even if they do not ride Metro[4].

A summary of these greenhouse gas reductions is presented in the following table:

Metro Prevents More GHG Emissions Than It Produces

Source	Quantity (MTCO2e)
Mode shift	410,776
Congestion relief	85,051
Land use impacts	1,057,697
Total Offset Emission Reduction	1,533,524
Emissions from Metro Operations (2010)	464,841
Net Emissions Reductions Due to Metro	1,088,683

FIGURE 34 **Net Emissions Reductions During 2010**

[3] Los Angeles County Metropolitan Transportation Authority, "Moving Towards Sustainability: 2011 LACMTA Sustainability Report," June 2011.
[4] American Public Transportation Association, "Recommended Practice for Quantifying Greenhouse Gas Emissions from Transit" (2009).
TTI 2010, "Urban Mobility Report 2010" (http://mobility.tamu.edu/ums/congestion_data/tables/complete_data.xls (Accessed 5/12/11)
NTD 2009. Service.xls in "RY 2009 Database". Available at http://www.ntdprogram.gov/ntdprogram/data.htm. Accessed May 18, 2011.

APTA Efficiency Statistics Reveal Variety of Carbon Efficiency

Mode	Lbs CO2e/Veh. Mile	Lbs CO2e/ Rev. Hour	Lbs CO2e/Pas. Mile
Heavy Rail	17.63	416.46	0.46
Light Rail	9.80	212.97	0.29
Bus Not Operated by Metro	5.25	84.08	0.93
Bus Operated by Metro	6.93	97.04	0.46
Vanpool	1.32	60.16	0.22
Total	**39.62**	**810.55**	**2.15**

FIGURE 35 **APTA Suggested Statistics in Pounds* (Lbs) of CO_2e**

APTA's climate change standard recommends the performance statistics outlined above. Results from fuel use, travel, and ridership data indicate vanpools as having the best carbon efficiency of all modes by vehicle miles travelled, revenue hours, and passenger miles. In 2010, Metro's vanpool program was the most carbon efficient transit mode per passenger mile, emitting 0.22 pounds of CO2e per passenger mile (lbs CO2e per pass-mi). Following closely to vanpools, Metro's light rail system was the second highest carbon efficient mode per passenger mile at 0.29, but was slightly less efficient than it was in 2009 when the efficiency was at 0.26 pounds of CO2e per passenger mile. However, the light rail system was also the second least carbon efficient mode per revenue hour, emitting 213 pounds of CO2e per revenue hour, while vanpool remains the highest carbon efficient mode by revenue hour at 60 pounds of CO2e per revenue hour. Vanpools also achieved the highest carbon efficient per vehicle mile at 1.32 pounds of CO2e per vehicle mile. High ridership on vanpools combined with flexible travel routes and lighter weight vehicles as compared to bus and rail modes are likely to have contributed to the relatively high carbon efficiency of vanpools.

Although vanpools seem cleaner, unlike rail and BRT lane buses, their level of service is dependent on the level of congestion on publically shared roads and freeway space. Bus and rail systems still provide an essential public service and both can improve in their carbon efficiency through higher levels of ridership and improving the fuel efficiency of the vehicles.

*Average passenger car emits about 1.1 pound of CO_2 per mile.

Next Steps

GG1	Continue ridesharing and transit pass programs for Los Angeles employers.
GG2	Continue to provide a Metro employee transit subsidy program.
GG3	Continue and expand Metro's vanpool program.
GG4	Support and plan transit-oriented development in strategic Metro-owned properties and locations.
GG5	Continue to provide bike-to-transit commuter incentives and other bicycle amenities.
GG6	Continue to expand rail and BRT systems.
GG7	Increase the use of hybrid vehicles for non-revenue fleets.
GG8	Research on-board storage technology to capture the energy produced by dynamic braking.
GG9	Develop pilot program for retrofitting lighting in the Red Line tunnel.
GG10	Replace existing lighting and other energy end-use equipment in Metro facilities with more efficient and cost-effective equipment.
GG11	Conduct a bike-sharing feasibility study.
GG12	Continue implementation of the WESS pilot program.

Definition: Measures Metro's annual emissions of criteria air pollutants attributable to transit operations.

Units: Tons of criteria air pollutants per year.

Relevance: Metro operates within the jurisdiction of the South Coast Air Quality Management District (AQMD). As a region, the South Coast AQMD suffers from the worst air quality in the nation, and has been designated as "extreme nonattainment" for ozone and "nonattainment" for particulate matter air pollution.

Regulation: Metro is obligated under rules adopted by both the California Air Resources Board and the South Coast AQMD to purchase transit buses that use non-diesel alternative fuel.

Linkages: Compliance with national air quality standards is mandated by the Environmental Protection Agency. The South Coast AQMD is obligated to demonstrate compliance with particulate matter emission levels by 2015 and the 8-hour ozone standard by 2024. Therefore, it is critical that Metro continue to demonstrate progress in reducing both nitrogen oxides emission (NO_x), an ozone precursor, and particulate matter emissions from transit and rail operations.

Limitations: Air pollutant emissions associated with the generation of electricity used to power Metro electric locomotives are variable and difficult to quantify. Metro staff applies default power generation factors based on data published by the US Department of Energy; these values are highly conservative and tend to overestimate emissions attributable to electric rail operation.

Information Source: N/A

Accomplishments

- **Metro nearly completed the shift from diesel fuel buses to low-emission, clean fuel natural gas buses in 2010. The remaining diesel buses were retired from Metro's fleet in early 2011.**

Data & Analysis[5]

Metro Continues to Decrease Total Fleet Criteria Pollution in 2010

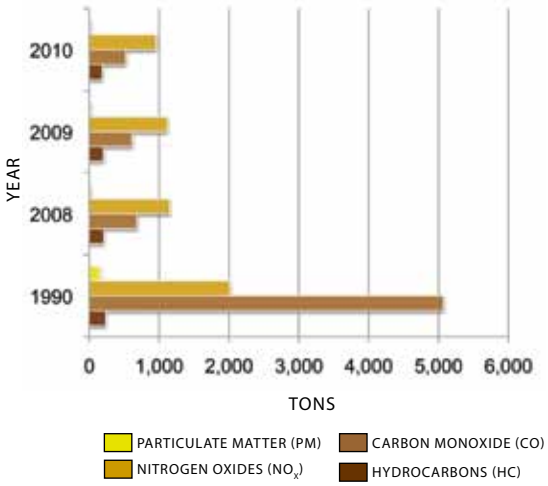


FIGURE 36 **Fleet Emission Levels (2008 - 2010)**

Between 2008 and 2010, Metro was able to reduce overall air pollution emissions associated with bus and rail operations by approximately 17%. Also in that span, Metro reduced emissions of harmful diesel particulate matter pollution by 30%. From 2009 to 2010, Metro decreased total fleet criteria pollutants by 13.5%. Reduction in diesel particulate matter is directly tied to Metro's continued efforts to modernize its bus fleet using state-of-the-art technologies. Today, Metro operates the nation's largest fleet of low-emission, clean fuel natural gas buses, as well as providing commuter rail service fueled by electricity that offers zero "tailpipe" emissions.

[5] Data analysis in this section was completed by Better World Group Inc.

Pollution per Vehicle Mile Continues to Decrease in 2010

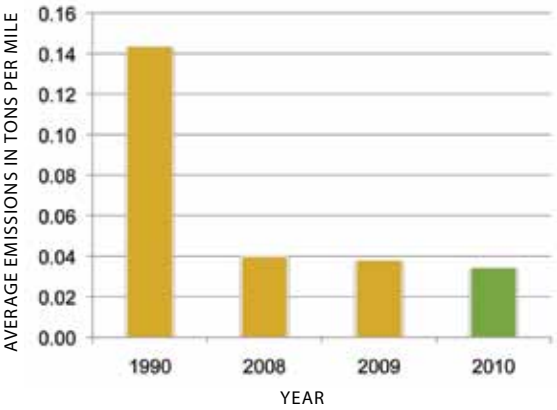


FIGURE 37 Average Criteria Pollutant Emissions per Mile in Tons (1990, 2008-2010)

Similar to 2009, the switch from diesel to CNG buses and increases in rail mileage meant that Metro was able to increase vehicle miles while simultaneously reducing total pollution emissions. In 2010, Metro emitted approximately 10% less criteria pollutants per vehicle mile than in 2009.

This reduction in criteria pollutants is a significant achievement—emissions of fine PM in vehicle exhaust specifically, have serious health effect consequences. Combustion particulates from diesel engines are known carcinogens. For this reason, the California Air Resources Board, the state's air quality regulatory authority, has designated diesel exhaust particulate as a "toxic air contaminant".

2010 Bus Less Polluting Than a 1990 Bus

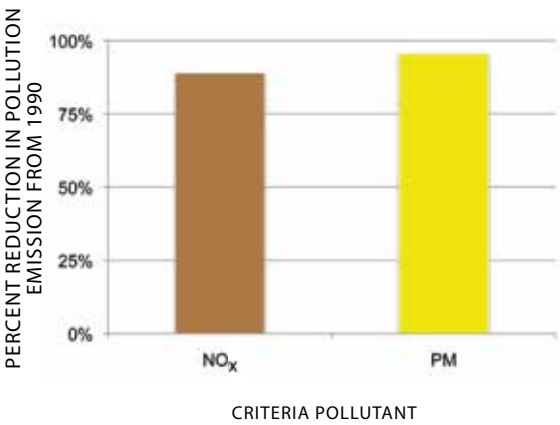


FIGURE 38 Reduction in Criteria Pollutants from the Average 2010 Bus

The average bus in 2010 emitted 89% less NO_x and 96% less PM than in 1990. As mentioned previously in this report, Metro retired all remaining diesel buses from its fleet and continues to operate the nation's largest fleet of low-emission, clean fuel natural gas buses, as well as providing commuter rail service fueled by electricity that offers zero "tailpipe" emissions.

Next Steps

AQ1	Continue to explore technological advancements in transit vehicles that decrease air pollution.

Definition: Measures Metro-wide garbage and recycling.

Units: Tons, waste

Relevance: Waste represents excess cost, contributes to environmental degradation, and should be minimized.

Regulation: California AB 939

Limitations: Data available for 2008 through 2010 only. No cost information was available.

Information Source: N/A

Accomplishments

- **Increased deskside recycling at the Gateway building. Some facilities included bottles and cans in their deskside recycling program, increasing the average reduction of solid waste created.**
- **Installed cardboard compactors in several locations, making cardboard box recycling more practical.**

Data & Analysis

Metro Facilities Continue Decrease in Solid Waste Output in 2010

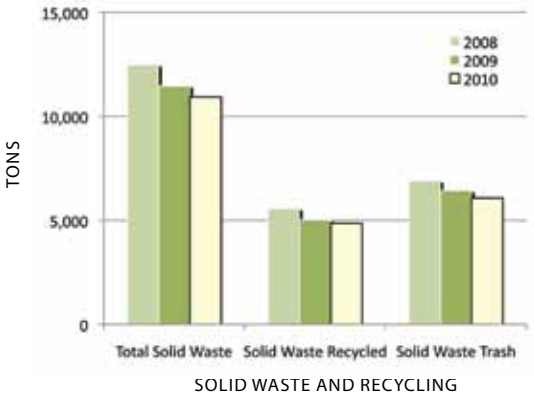


FIGURE 39 **Solid Waste and Recycling (2010)**

Metro uses a contractor to separate landfill waste from recycling. Under this agreement, the contractor must separate out all materials (paper, cans, and bottles) that can be recycled. Similar to 2009 data, 44% of this waste was recycled in 2010. Total solid waste decreased by 531 tons from 2009 (11,463 tons) to 2010 (10,932 tons). Due to changes in the way data have been collected, data are available only for 2008 through 2010.

Waste Production Efficiency Continued to Increase in 2010

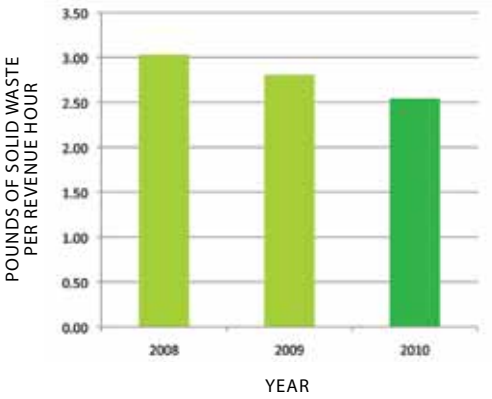


FIGURE 40 Solid Waste Production Efficiency (2008-2010)

Solid waste production efficiency has increased from 2008 through 2010. The volume of waste produced per revenue hour decreased from 2.8 pounds of waste per hour in 2009 to 2.5 pounds of waste per hour in 2010.

Recycling Rates Varied Slightly Throughout 2010

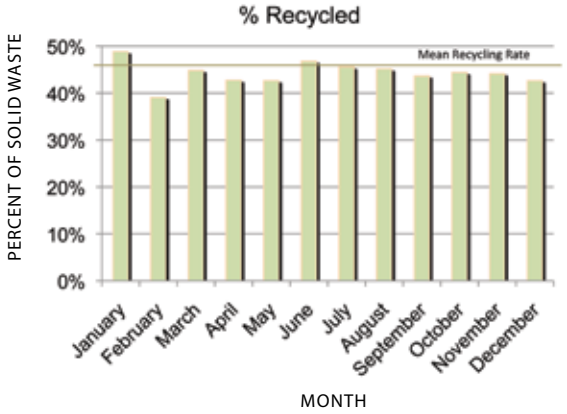


FIGURE 41 Percent Recycled by Month (2010)

Recycling rates varied between a low of 39.1% in February to a high of 48.8% in January. According to recycling data for 2010, June through August had the highest recycling rates (with the exception of January).

Next Steps

SW1	Continue to roll out deskside paper recycling at additional facilities.
SW2	Put clear instructions on the bins as to what should be placed within.
SW3	As feasible, increase deskside recycling capabilities to include bottles and cans.

Definition: Measures Metro's annual used oil waste.

Units: Gallons

Relevance: Oil waste is a highly polluting petroleum-based substance. In the interest of environmental and economic efficiency, waste should be reduced as much as is feasible.

Regulation: California Health and Safety Code, Chapter 6.5, Division 20 Article 13; California Code of Regulations Title 22, Division 4.5.

Information Source: N/A

Accomplishments

- **Continued to strengthen underground and above ground storage tank programs.**
- **Use of synthetic oils has extended service intervals and reduced used oil volumes.**

Data & Analysis

Used Oil Waste Increased Slightly

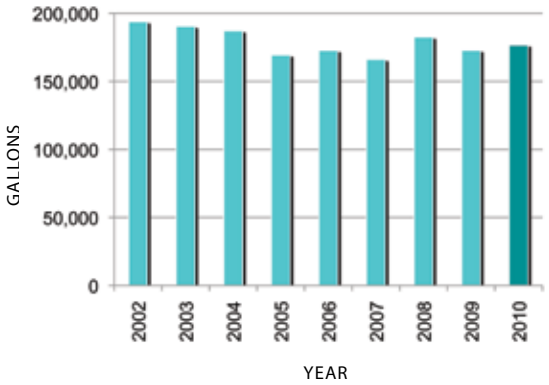


FIGURE 42 **Used Oil Waste in Gallons (2002-2010)**

Metro produced 177,000 gallons of used oil waste during 2010. This number reflects an increase of 4,000 gallons (2%) from 2009. Although there was a slight increase in used oil waste from 2009 to 2010, overall it is a decrease of approximately 17,000 gallons (9%) from 2002. The use of synthetic oil has allowed for an increase in revenue hours without causing significant increases in used oil waste produced.

Waste Varies across Divisions

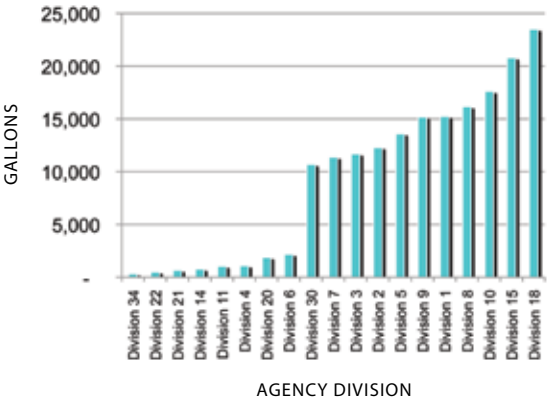


FIGURE 43 **Gallons of Used Oil Waste by Division (2010)**

The amount of waste oil produced in 2010 varied from a low of 330 gallons at Division 34 to a high of 23,500 gallons at Division 18. Division 18 has maintained the highest waste oil average since 2002. The large range in used oil produced is attributed to varying fleet sizes across divisions.

Used Oil Costs are Zero

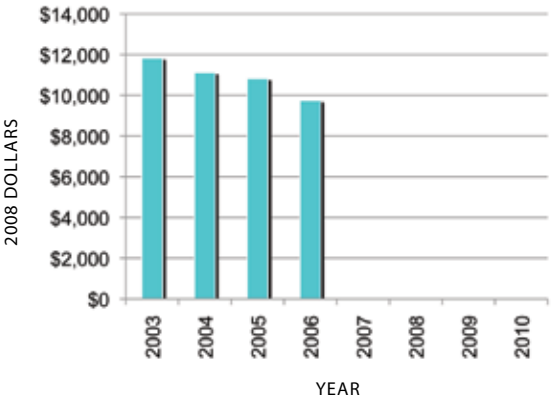


FIGURE 44 **Used Oil Waste Disposal Cost - 2010 Dollars (2002-2010)**

A no-fee service contract initiated in 2006 eliminated the cost of used oil waste disposal.

Efficiency per Revenue Hour Continues Improvement

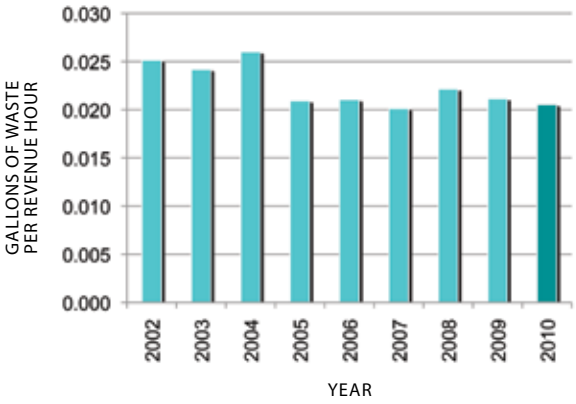


FIGURE 45 **Used Oil Waste per Revenue Hour (2002-2010)**

In 2010, 0.0206 gallon of waste oil was produced per revenue hour. This is approximately an 18% decrease from 2002 and approximately a 3% decrease from 2009.

Next Steps

U01	Decrease waste as much as possible through improved technology and operational procedures.
U02	Reduce oil use whenever feasible.

Definition: Measures Metro's Annual Liquid Waste 222.

Units: Gallons

Relevance: Waste classified as 222 is hazardous oil-water separation sludge. This waste comes from the servicing of fuel station clarifiers, steam rack clarifiers, chassis equipment, part washers, oil-water separators, maintenance shop sumps, etc. Waste should in general be minimized.

Regulation: County wastewater ordinance and LA municipal waste control ordinance.

Information Source: N/A

Accomplishments

- **Developed the chemical committee with a goal to reduce hazardous waste throughout the organization.**
- **Installed an electrolyzer that successfully reduced chemical use at the Gateway building.**
- **Developed the Green Chemical Procurement Collaboration Project.**
- **Continued to strengthen underground and above ground storage tank programs.**

Data & Analysis

Waste Stream Stability Continues

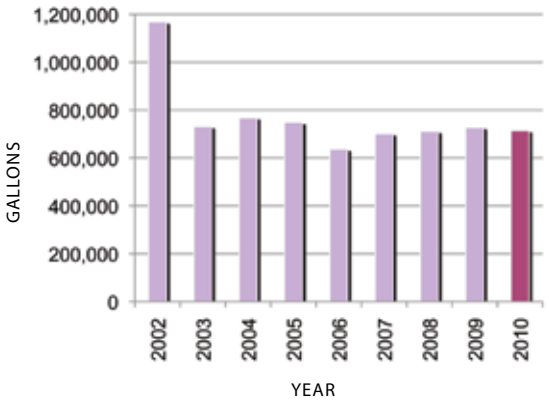


FIGURE 46 **Hazardous Liquid Waste Stream in Gallons (2002-2010)**

Metro produced 715, 000 gallons of hazardous liquid waste during 2010. This is a 2% decrease from 2009. The largest decrease from 2002 to 2003 (approximately 39%) was likely attributed to a change in how equipment was serviced.

Hazardous Liquid Waste Disposal Costs Continue to Increase

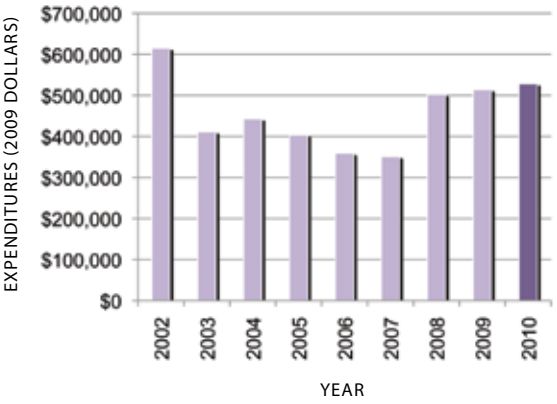


FIGURE 47 Hazardous Liquid Waste Stream Costs - 2010 Dollars (2002-2010)

In 2010, Metro paid approximately $529,000 in hazardous liquid waste disposal fees. This is approximately $86,000 less than 2002 (adjusted for inflation) but an increase of approximately $15,000 from 2009 (also adjusted for inflation). Although there was a slight decrease in total gallons of hazardous liquid produced from 2009 to 2010, rise in disposal fees accounted for an increase in total disposal costs. Since 2007, Metro's hazardous waste disposal costs have been steadily increasing.

Waste Production Varies by Facility

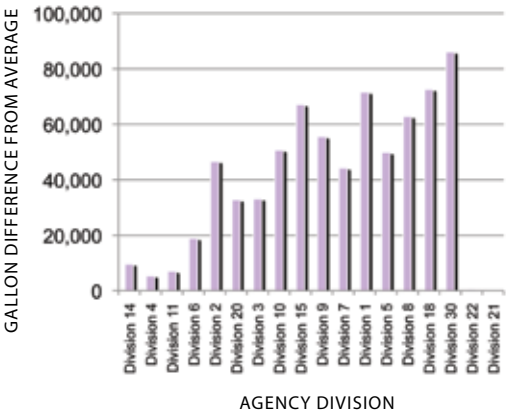


FIGURE 48 Hazardous Liquid Waste Produced by Division (2010)

In 2010, hazardous liquid waste produced by division ranged from a low of 330 gallons at Division 21 to a high of 86,000 at Division 30. Similar to 2009, Divisions 30 and 18 produced the most hazardous liquid waste. Divisions 12 and 34 did not produce any hazardous liquid waste in 2010.

Efficiency per Revenue Hour Continues Improvement

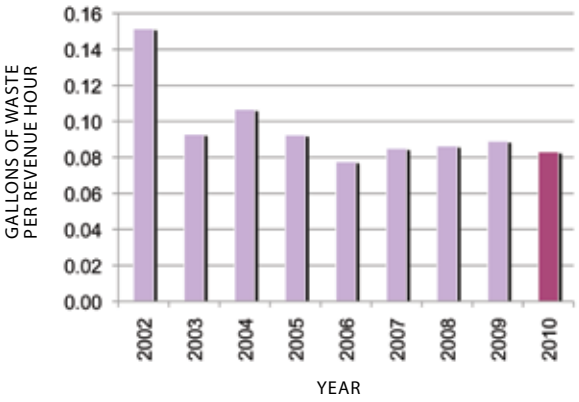


FIGURE 49 Hazardous Liquid Waste per Revenue Hour (2002-2010)

In 2010, 0.083 gallon of hazardous liquid waste was produced per revenue hour. This is a 7% decrease from 2009 and a substantial decrease of 45% from 2002's numbers.

Next Steps

HW1	Decrease waste as much as possible through improved technology and operational procedures.
HW2	Reduce hazardous chemical use whenever feasible.

Definition: Measures Metro's annual non-hazardous waste.

Units: Gallons

Relevance: Waste should, in general, be minimized. Non-hazardous liquid waste mostly comes from the bus, non-revenue, and rail car washes. The exception to this is the Orange Line site where waste comes from stormceptors at the park-and-ride locations.

Regulation: County wastewater ordinance and LA municipal waste control ordinance

Linkages: Water use

Description of Linkages: The more water used to wash train and rail cars, the more non-hazardous liquid waste.

Information Source: N/A

Accomplishments

- **Developed the Green Chemical Procurement Collaboration Project.**
- **Continued to strengthen stormwater and wastewater programs.**

Data & Analysis

FIGURE 50 **Non-Hazardous Liquid Waste in Gallons (2002-2010)**

In 2010, Metro produced 611,000 gallons of non-hazardous liquid waste. This number reflects approximately a 4% increase from 2009 and is a 32% increase from 2002. Since 2004, non-hazardous liquid waste production has increased gradually with the exception of 2007. The increase in non-hazardous liquid waste stream has been attributed to the increase in number of bus washers and facilities.

Non-Hazardous Liquid Waste Disposal Costs Continue Increase in 2010

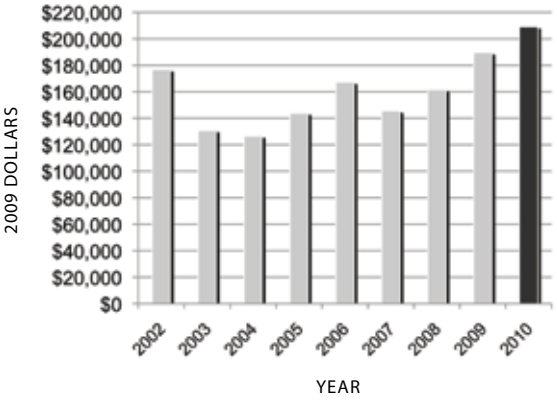


FIGURE 51 Non-Hazardous Liquid Waste Stream Costs - 2010 Dollars (2002-2010)

Metro paid approximately $209,000 in non-hazardous liquid waste disposal fees in 2010. This marks a 9-year high in disposal fee expenses (2002 through 2010). This expenditure is approximately a 9% increase from 2009 (adjusted for inflation) and approximately a 15% increase from 2002 (also adjusted for inflation). The increase in disposal costs for 2010 is attributed to a combination of both the rise in total gallons of non-hazardous waste produced and rising disposal fees.

Waste Stream Across Divisions

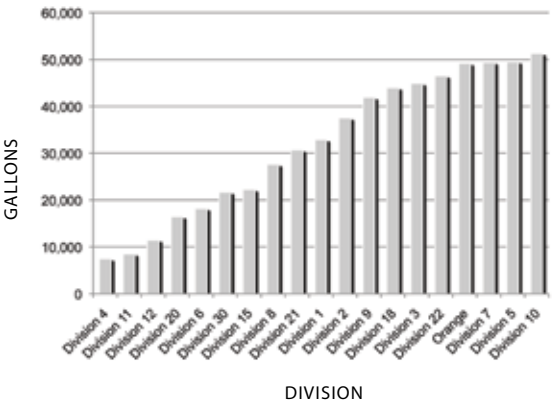


FIGURE 52 Non-Hazardous Liquid Waste by Division (2010)

Across all divisions, non-hazardous liquid waste fluctuated in 2010. Divisions 3 and 22 had the highest increase from 2009 to 2010 at 30% and 27%, respectively. Alternately, the most significant decreases from 2009 to 2010 occurred in Divisions 15 and 20, approximately 31% and 39%, respectively. Divisions 5, 7, 10, and Orange Line continue to contribute a larger percentage of the total waste stream (67% combined). The large contribution can be attributed in large part to having two bus washers.

Non-Hazardous Waste Production Efficiency Slightly Increased

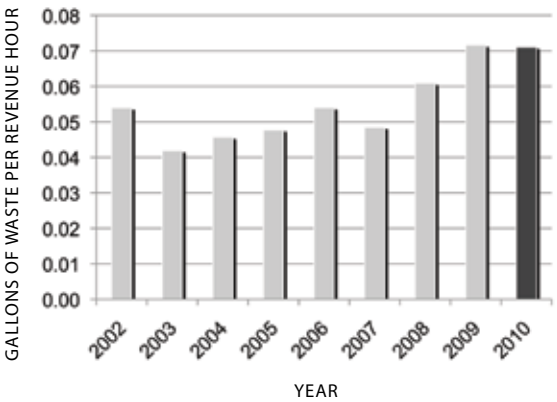


FIGURE 53 Gallons of Non-Hazardous Liquid Waste per Revenue Hour (2002-2010)

In 2010, 0.071 gallon of non-hazardous liquid waste was produced per revenue hour. This number reflects a 1% decrease from 2009. Although overall non-hazardous liquid waste production increased from 2009 to 2010, efficiency improved due to a significant increase in revenue hours.

Next Steps

NW1	Decrease waste as much as possible through improved technology and operational procedures.

Definition: Measures anti-freeze waste.

Units: Gallons

Relevance: Anti-freeze waste may contain heavy metals such as lead, cadmium, or chromium in high levels that make it a hazardous waste. Waste should be minimized.

Regulation: CCR 22

Linkages: None

Information Source: N/A

Accomplishments

- **Developed the Green Chemical Procurement Collaboration Project.**
- **Metro currently is investigating how this waste stream is managed to determine waste minimization and cost savings potential.**

Data & Analysis

Anti-Freeze Use Decreased Slightly in 2010

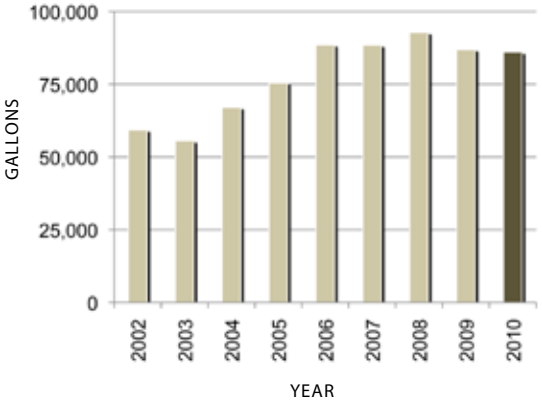


FIGURE 54 **Anti-Freeze Waste in Gallons (2002-2010)**

Metro produced approximately 86,000 gallons of anti-freeze waste in 2010. This number reflects a 1,000-gallon decrease from 2009. Since 2008, anti-freeze waste production has been trending downward.

Anti-Freeze by Division

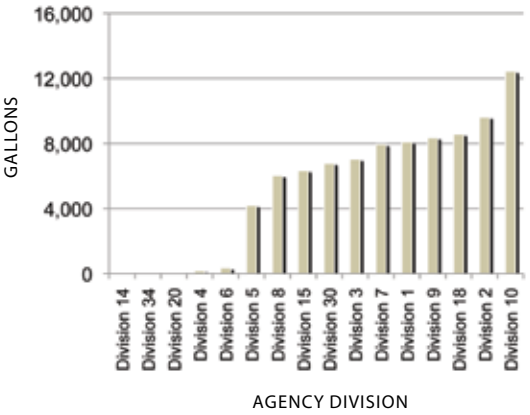


FIGURE 55 Anti-Freeze Waste in Gallons by Division (2010)

Anti-freeze waste produced varied by divisions in 2010. Anti-freeze production ranged from a low of 35 gallons at Division 14 to a high of 12,445 gallons at Division 10. Divisions 1, 2, 9, 10, and 18 produced the largest quantities of anti-freeze waste. These divisions accounted for 55% of Metro's total waste production. Similar to 2009, Divisions 4, 6, 14, 20, and 34 continue to produce the smallest quantities of anti-freeze waste. They account for 0.8% of Metro's total anti-freeze waste production.

Anti-Freeze Waste Disposal Costs Increased in 2010

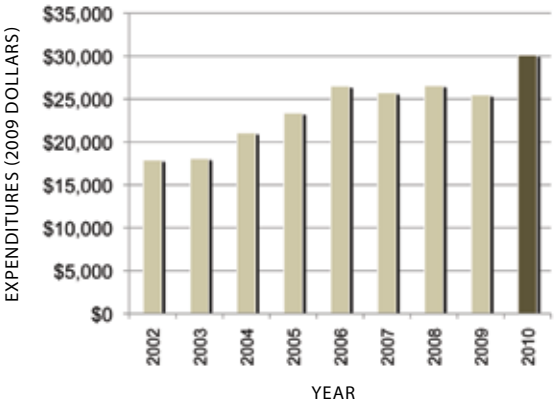


FIGURE 56 Anti-Freeze Waste Disposal Cost - 2010 Dollars (2002-2010)

In 2010, Metro spent approximately $4,650 more (adjusted for inflation) in anti-freeze disposal costs than in 2009. The disposal costs for 2010 remain a significant increase (approximately 41%) since 2002 (also adjusted for inflation).

Efficiency per Revenue Hour Continues to Improve in 2010

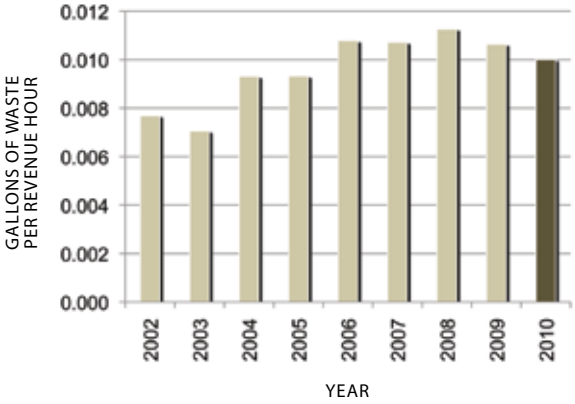


FIGURE 57 Anti-Freeze Waste per Revenue Hour (2002-2010)

In 2010, 0.010 gallon of anti-freeze waste was produced per revenue hour. This is approximately a 6% decrease from 2009. Despite the decrease in 2010, gallons of anti-freeze waste produced per revenue hour continues to be higher than in 2002 and 2003, when efficiency was at its highest (0.008 and 0.007 gallon of anti-freeze waste were produced per revenue hour respectively).

Next Steps

AF1	Decrease waste as much as possible through improved technology and operational procedures.

Page Intentionally Left Blank

Appendix

Figure 58
Next Step Matrix

General

GE1	Develop sustainability targets [for Board adoption], which should, at a minimum, include greenhouse gas emissions, waste, fuel use, and water use reduction targets.
GE2	Report sustainability performance to the Board on an annual basis using the indicators outlined in this report, updating the indicator metrics as needed every three years.
GE3	Establish a staff-level "Green Team" to inform, develop, and implement policies and procedures to meet the sustainability targets.
GE4	Develop a metric to measure greenhouse gas emission reductions and the congestion relief benefits of Metro's transit system.
GE5	Improve data collection capabilities, by using the appropriate sub-metering and by aligning Metro's address data with that of the utility companies.
GE6	Improve the flow of information.
GE7	Align incentives with goals.
GE8	Consider life-cycle costs.
GE9	Give preference to recyclable and recycled products during design and construction of Metro projects.
GE10	Review all licenses and permits for landfills, recycling facilities, and similar entities that will be used for the disposal or diversion of any waste or construction and demolition projects.
GE11	Develop a Sustainability Strategies Cost-Effectiveness document to determine the most appropriate strategy to implement.
GE12	Complete Phase 2 of Metro's Headquarters' LEED-EBOM certification.
GE13	Develop and conduct Environmental Management System awareness training.
GE14	Complete EMS audio/visual media including awareness video, training video, and small and larger posters.
GE15	Include sustainability principles on projects to be constructed under the new funding mechanisms such as Measure R and the American Recovery and Reinvestment Act.

Ridership

R1	Continue ridesharing and transit pass programs for Los Angeles employers.
R2	Continue to provide a Metro employee transit subsidy program.
R3	Continue to support and plan transit-oriented development in strategic Metro-owned properties and locations.
R4	Continue to expand rail and BRT systems.
R5	Continue to expand the number of 45-foot composite fiberglass buses used by Metro.
R6	Support strategic and creative marketing efforts to promote transit in neighborhoods with underutilized existing or newly improved transit service.
R7	Continue to facilitate, analyze, and respond to travel surveys that reveal origin-destination areas with the least service, either in frequency or number of transit stations.
R8	Support and market inter-transit pass programs, similar to the Bay Area's Clipper program, to allow seamless transfers between transit organizations.
R9	Using the existing Transit Access Pass program, continue to improve bus and rail ticketing and barrier strategies to improve accuracy of ridership and origin-and-destination statistics.

Figure 58
Next Step Matrix

Fuel Use

F1	Create a plan to reduce idling.
F2	Continue to seek ways to reduce non-revenue vehicle use.

Rail Propulsion Power

RP1	Implement wayside energy storage system and/or on-board storage technology to capture electricity and energy produced by dynamic braking.
RP2	Research the on-board storage of regenerative braking energy strategy.
RP3	Install sub-meters to measure electrical use specific to rail propulsion and facilities.
RP4	Implement the recommendations contained within the completed 2011 Energy Management and Conservation Plan.
RP5	Work with electric utility providers to accurately identify and label all rail propulsion accounts.

Facility Electricity Use

FE1	Develop a lighting retrofit plan to replace old, inefficient light fixtures at various Metro facilities.
FE2	Establish a Life of Project budget to fund lighting retrofit projects.
FE3	Provide sub-meters for appropriate funding for facilities and tracking of data.
FE4	Invest in energy management systems.
FE5	Track energy efficiency upgrades and measure their success.
FE6	Project life-cycle cost analysis at the beginning of every new construction or major renovation project.
FE7	Begin retrofit of lighting in the Red Line tunnel.
FE8	Implement the recommendations contained within the completed 2011 energy management and conservation plan.
FE9	Aggressively pursue renewable energy sources.
FE10	Construct new facilities and projects using energy efficiency and conservation strategies.
FE11	Full implementation of the EMS at the pilot sites.
FE12	Complete certification of LEED EBOM Gold for Metro's Gateway headquarters building.
FE13	Complete additional energy audits.
FE14	Develop additional renewable sources other than photo voltaics.
FE15	Implementation of solar panels on infrastructure.
FE16	Pursue LEED EBOM certification at several sites to be assessed and evaluated.

Water Use

WU1	Substitute municipal recycled water for potable water when possible.
WU2	Increase amount of runoff from bus washing bays for recycling. This can include developing protocols to wash buses at evening or early morning periods to reduce evaporation during hot summer days.
WU3	Replace existing sanitary fixtures in bus and rail facilities with more efficient fixtures.
WU4	Prioritize recycling and reuse of onsite-created grey water from bus and other facilities.
WU5	Replace existing steamers with high efficiency models.
WU6	Use recycled water for car washing throughout Metro's rail facilities.

Figure 58
Next Step Matrix

WU7	Evaluate feasibility of using recycled water in place of potable water.
WU8	Use water conservation and efficiency guidelines outlined in LEED reference books.
WU9	Implement select measures identified in the water action plan.

Greenhouse Gas Emissions

GG1	Continue ridesharing and transit pass programs for Los Angeles employers.
GG2	Continue to provide a Metro employee transit subsidy program.
GG3	Continue and expand Metro's vanpool program.
GG4	Support and plan transit-oriented development in strategic Metro-owned properties and locations.
GG5	Continue to provide bike-to-transit commuter incentives and other bicycle amenities.
GG6	Continue to expand rail and BRT systems.
GG7	Increase the use of hybrid vehicles for non-revenue fleets.
GG8	Research on-board storage technology to capture the energy produced by dynamic braking.
GG9	Develop pilot program for retrofitting lighting in the Red Line tunnel.
GG10	Replace existing lighting and other energy end-use equipment in Metro facilities with more efficient and cost-effective equipment.
GG11	Conduct a bike-sharing feasibility study.
GG12	Continue implementation of the WESS pilot program.

Air Quality

AQ1	Continue to explore technological advancements in transit vehicles that decrease air pollution.

Solid Waste and Recycling

SW1	Continue to roll out deskside paper recycling at additional facilities.
SW2	Put clear instructions on the bins as to what should be placed within.
SW3	As feasible, increase deskside recycling capabilities to include bottles and cans.

Used Oil Waste

UO1	Decrease waste as much as possible through improved technology and operational procedures.
UO2	Reduce oil use whenever feasible.

Hazardous Liquid Waste

HW1	Decrease waste as much as possible through improved technology and operational procedures.
HW2	Reduce hazardous chemical use whenever feasible.

Non-Hazardous Liquid Waste

NW1	Decrease waste as much as possible through improved technology and operational procedures.

Anti-Freeze Waste

AF1	Decrease waste as much as possible through improved technology and operational procedures.

Figure 59
Indicator Results Matrix

	2010 Efficiency	% Change from 2002	2010 Performance	% Change from 2002	2010 Expenditures	% Change from 2002
Ridership	Not Applicable	Not Applicable	460 Million Boardings	16.1% (1997)	$148 per Revenue Hour	-5.1% (1997)
Fuel Use	0.13 Gallons per Boarding	16%	46 Million GGE	11%	$36 Million	22%
Rail Propulsion Power	1.92 Kilowatt Hours per Rail Boarding	-15% (2005)	163 Million Kilowatt Hours	-3%	$20.7 Million	5%
Facility Electricity Use	0.18 Kilowatt Hours per Boarding	24% (2005)	81 Million Kilowatt Hours	25% (2005)	$9.7 Million	62% (2005)
Water Use	31 Gallons per Revenue Hour	23%	250 Million Gallons	27%	$1.4 Million	49%
Greenhouse Gas Emissions	2.01 Pounds CO2e per Boarding	5% (2007)	465,000 Metric Tons CO2e	-3%	Not Available	Not Available
Air Quality	0.03 Pounds per Vehicle Mile	-79% (1990)	1,678 Tons	-78% (1990)	Not Applicable	Not Applicable
Used Oil Waste	0.02 Gallons per Revenue Hour	-16%	177,000 Gallons	-9%	$0	-100%
Garbage and Recycling	2.54 Tons Solid Waste per Revenue Hour	-16%	6,077 Tons Trash, 4,855 Tons Recycling	-12% Trash (2008), -13% Recycling (2008)	Not Available	Not Available
Hazardous Liquid Waste	0.08 Gallons per Revenue Hour	-47%	715,000 Gallons	-39%	$529,000	-14%
Non-Hazardous Liquid Waste	0.07 Gallons per Revenue Hour	29%	611,000 Gallons	32%	$209,000	15%
Anti-Freeze Waste	0.01 Gallons per Revenue Hour	20%	86,000 Gallons	31%	$30,000	40%

*Unless otherwise noted, base year is 2002.

Los Angeles County
Metropolitan Transportation Authority

One Gateway Plaza
Los Angeles, CA 90012-2952

213.922.9200 Tel
213.922.5259 Fax
metro.net

Metro®