



7. ENVIRONMENT

Environmental Management

Metro is essentially an environmentally-friendly transit system that requires a significant quantity of electric power for its operations. As the backbone of the Santiago public transit, Metro is responsible for millions of train rides every day, which do not release gases or particulate matter directly into the environment, and, as such, represent a veritable contribution to de-polluting the city of Santiago.

The company is also concerned with being more energy efficient and the efficient use of its resources. This is Metro's way of controlling its greenhouse gas emissions and assuming responsibility for its repercussions on climate change. By choosing Metro as a means of transportation, users are also reduce their own emissions.

Even though Metro's environmental impact is low, the company is still responsible for addressing it and has implemented appropriate mitigation methods. All of this is reflected under its Sustainability Policy which establishes that the company must take "better care of the environment, while fully complying with regulations, fostering best practices, managing and using our resources and energy in all areas responsibly and efficiently."

The Public Affairs and Environment Division of the Commercial and Corporate Affairs Department is responsible for managing all processes and activities related to this matter. A multidisciplinary team of professionals and experts in environmental engineering working on different areas of the company, such as operations, maintenance and engineering staffs this division. As for the construction work on the new lines, the company also has a number of full-time professionals working directly with the Project Development Department, and their mission is to comply with environmental regulations during the construction stage.

In order to deliver on our commitment set forth under our Sustainability Policy, the company focuses its work on five different areas:

Environmental assessment and management of new projects

Ensuring compliance with environmental regulations

Furthering continuous improvement in environmental practices

Improving Metro's environmental conditions

Accountability for climate change and local depollution



The main challenges faced by the Company in this regard in 2014 were:

- Introducing environmental criteria at the beginning of critical processes.
- Executing projects in the Environmental Mitigation Program.
- Consolidating environmental indicators for reporting.
- Metro's carbon footprint preparation and reportability.
- Environmental Management of new line construction work.

The following section contains information on 2014 achievements and work carried out.

Mitigating Environmental Impacts

Mitigating Operational Environmental Impacts

[G4-EN27, G4-EN33] As a means to transportation, Metro's contribution to making Santiago a less polluted city is well-known. However, like any other activity, environmental impacts arise mainly from the work conducted at its maintenance facilities, such as, noise pollution, vibration and waste generation.

As part of its pledge to reduce these impacts, in 2014 Metro continued implementing its Environmental Mitigation Program, which consists of ten projects related to noise and vibration, solid and liquid waste, and hazardous chemicals, all of which are at a different stage of implementation.

Progress went according to plan for the period. The following actions are worth noting: progress on the preliminary engineering designs aimed at reducing noise and vibration levels at our workshops; implementation of noise control measures in power units; and an assessment of solid and liquid waste and hazardous chemicals.

Noise and Vibration

Phase I of the "Substation Soundproofing Project" was completed. This entailed installing acoustic insulation in ventilation shafts at four network substations, thereby complying with current noise regulations enforced by the Ministry of the Environment. Phase II of the project will be implemented at four more substations during the 2015-2016 period.

Additionally, as far as noise is concerned, an acoustic insulation solution was devised for the viaduct section along Line 5 in the Maipú district.

[G4-EN29] Despite Metro's efforts to mitigate impacts around its operations, in 2014 the company was fined up to \$48,208,968 by the Environmental Protection Authority for exceeding noise limits at one of our train depots, in addition to a \$126,300 fine imposed by the Municipality for disturbing noise at one electric substation.

Waste

As for waste generation, in 2014 Metro began taking stock of infrastructure management as it relates to non-hazardous industrial waste handling, with a view to mitigating waste impact while ensuring wastes are disposed of properly.

[G4-EN23] In 2014, Metro's operations generated 2,400 tons of waste broken down as follows: 88% corresponded to domestic waste from stations and workshops, 7% to industrial waste (tires), and 5% to hazardous industrial waste.

All waste produced by Metro operations and its construction sites is stored, transported, treated and disposed of in accordance with existing regulations. Depending on the waste type, certified third-party companies are in charge of final disposal at sanitary landfills, recycling and incineration, among others.

Waste Produced by Metro Operations (kg)

Waste Type	Waste Quantity (kg)		
	2012	2013	2014
Hazardous waste	212,402	148,057	132,709
Industrial Waste	202,742	145,916	196,880
Domestic Waste	2,156,584	2,785,675	2,398,170

Metro is continuously looking for ways to reduce the amount of waste sent to final disposal. As a result, inert waste generated at the construction sites of the new lines, mainly earth works material removed from the excavations, is entirely reused to level the height of terrain elevations, thereby extending the life of such sites.

Waste Produced during Construction of New Lines 3 and 6

Waste Type	Waste Quantity (tons)		
	2013	2014	
		Line 3	Line 6
Debris and Muck	4,797,582	683,428	-
Domestic Waste	ND	1,978,8	697,6
Scrap Metal	ND	346,8	324,8
Inert Construction Waste	ND	2,568,960	1,605,600



[G4-EN25] In 2014 we continued working on our “Scheduled Decommissioning of PCB Transformers” project, in order to comply with the Stockholm Convention. Four tons of PCB loaded transformers were decommissioned in 2014 and shipped to France for final incineration.

Environmental Investments

[G4-EN31] Environmental mitigation requires a significant investment. Accordingly, Metro’s pledge to reduce the environmental impact of its operations is evidenced by its investment in environmental mitigation projects, which doubled from 2013 to 2014.

Environmental Expenses and Investment for Operations

Environmental Expenses (M\$)	2013		2014	
	Projects	Operations	Projects	Operations
Noise and Vibrations	9,472	24,628	0	41,326
Waste Treatment	0	38,886	0	33,369
Seepage Water	0	102,438	0	106,984
Env. Management	186,181	0	0	7,782
Parameter Monitoring	0	0	0	8,008
Total Expenses	195.635	165,952	0	197,469
Environmental Investments	2013		2014	
	Proyectos	Operaciones	Proyectos	Operaciones
Noise and Vibrations	0	8,709	12,666	163,124
Waste Treatment	0	45,791	3,529	46,765
Environmental Management	0	0	105,856,602	0
Total Investment	0	54,500	105,872,797	209,889

Mitigation of Environmental Impact of Lines 3 and 6

Metro understands that introducing environmental criteria as early as the project design phase helps to minimize environmental risks and their negative impact on surroundings. That is why various professional views are taken into consideration during design and construction phases of new lines, workshops and lines currently in operation.

With regards to the new Line 3 and 6 project, Metro has met all environmental regulatory requirements and adopted necessary mitigation measures to ensure that the expansion process is as least invasive as possible on both the city and neighboring communities. In 2014, mitigation measures to deal with environmental impacts resulting from early construction works were taken on all fronts, i.e.: shaft sinking, station, workshop and train depot construction. Some of the measures adopted are as follows:

1. **Noise:** noise is mitigated through physical barriers located at all construction sites, training workers, posting signs and scheduling the noisiest jobs for daytime hours.
2. **Muck disposal:** since we are dealing with underground construction works, a great deal of muck is generated. Much is hauled out on covered trucks to disposal locations approved by authorities.

[G4-EN29] Despite the above measures taken by Metro in 2014, the company was fined by the municipality for disturbing noises coming from a shaft construction site and for obstructing rainfall runoff with debris placement.

As for citizens participating in processes related to the Environmental Impact Assessment System, Metro filed four Environmental Impact Statements (DIAs) in 2014, two for each new line. Metro withdrew one of these declarations as a result of changes to the construction process, and eliminated one new working front. The company plans on completing these processes in 2015 upon publishing the corresponding Environmental Qualification Resolutions.

[G4-EN34] During the citizens' participation process in 2014 a group of neighbors living near Line 3 filed two claims with the Executive Management of SEA (Environmental Assessment Bureau). These were addressed at a single administrative procedure conducted that same year instead of taking administrative action.

Energy

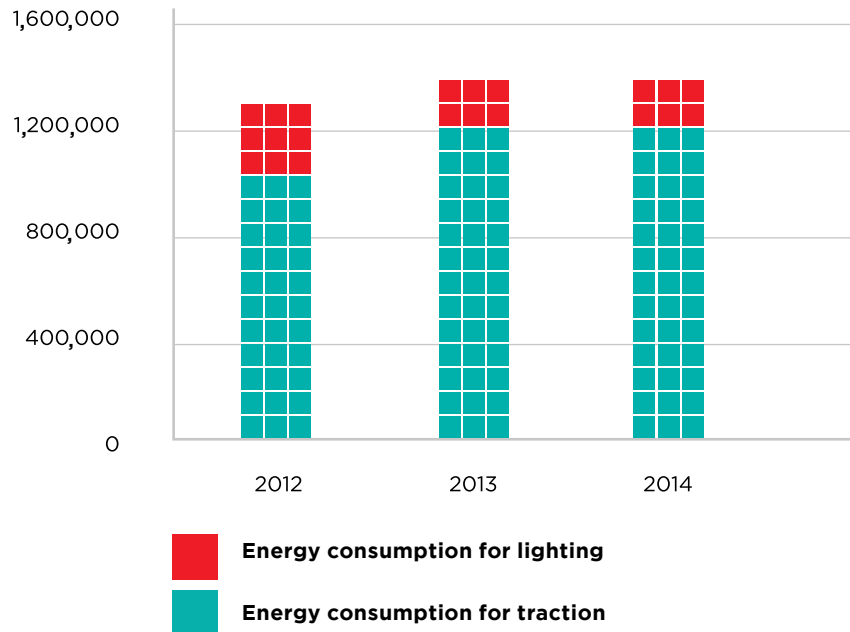
Energy Consumption

[G4-EN3] Metro considers energy consumption to be a strategic concern. Accordingly, as outlined under the company's strategic objectives and its Sustainability Policy, it has pledged to foster the efficient use of energy resources.

Its primary source of electric power consumption are train traction mechanisms, which account for 82% of the company's total energy consumption of 1,478,496 GJ. The 18% remaining is used for lighting.



Metro's Electric Power Consumption (GJ)



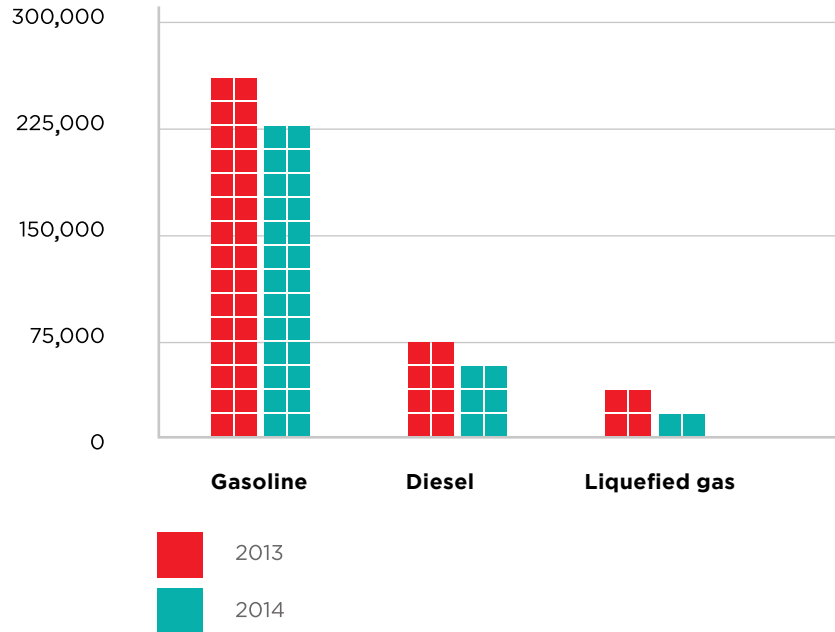
For ten years prior to March 10, 2014, Metro held a contract with Chilectra for electric power supply at a constant price and indexed to the node price. In 2012, the company began two tendering processes and one direct negotiation in order to secure long-term stable supply. Neither of these processes panned out for a number of reasons.

In view of this context, Metro's Board of Directors crafted a strategy to secure its medium-term power supply by buying energy at the marginal price, which explains why a private negotiation was undertaken. In March 2014, the Company signed an Electric Power Supply Agreement with Enorchile S.A., effective as of April 1, 2014, securing supply from the current grid for a three-year period (until March 31, 2017).

Although this agreement secures the company's power supply, it does not minimize the risks associated with spot price variability. As a result, in 2014 the company began negotiating directly with several potential suppliers in order to guarantee its long-term power supply at stable prices.

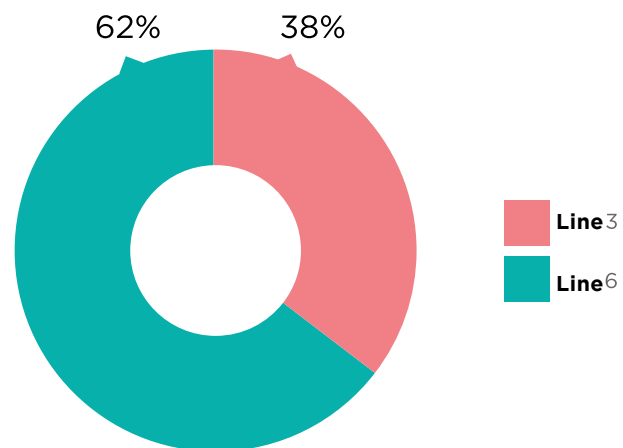
In addition to electric power, Metro uses other fuels to operate the machinery running on its tracks, maintain its equipment, fuel taxis employed for personnel transportation, its backup power generators, and heating its facilities and cafeterias. Gasoline, diesel and LPG consumption decreased slightly from 2013 to 2014.

Fuel Consumption 2014 (L)



As for power used during construction of new lines, 100% comes from diesel, amounting to a grand total of 10,604,587 liters in 2014.

2014 Diesel Consumption at Construction Sites (L)



Energy Efficiency

[G4-EN6] Metro has an Energy Efficiency Program focused on gradually reducing energy consumption on its own network in order to reach a 10% reduction by 2018, using 2013 as the base scenario and counting all lines currently in operation (2014).



One of the most significant challenges taken on under the Program consists of encouraging and supporting energy efficiency initiatives. The Systems and Infrastructure Engineering Division of the Engineering and Technology Department is in charge of developing those initiatives, which have resulted in remarkable savings over the last few years.

In 2014 the company outlined a very ambitious plan for the next few years, intended to greatly improve our energy performance by using more efficient technologies, adopting best practices and creating an energy savings culture.

Last year the company embarked upon a lighting renewal project at the 18 oldest stations along Line 1. This entailed replacing current light fixtures with more efficient and technologically-improved solutions, thereby enhancing the safety and quality of services provided to our users, not to mention considerably reducing electric power consumption at stations and replacing obsolete equipment.

Moreover, an engineering firm was hired to manage the lighting upgrade of another 18 stations along Lines 2 and 5, marking the beginning of a new effort to promote a culture of energy efficiency and savings among our workers. A new, ISO 50,001-certified energy management system was set up at the Puente Cal y Canto and Pedro de Valdivia stations.

Existing efficiency initiatives such as loop systems, regenerative braking energy, use of software-based electric power management and the implementation of smart lighting systems all contributed to a total savings of 79.8 GWh of electricity during 2014.

Energy Efficiency Initiatives & Energy Consumption Reductions

Initiatives	2013 Energy Reduction (GWh)	2014 Energy Reduction Methods (GWh)	Standards & Assumptions Used
Loop Systems	9.8	11.2	4% estimated reduction in total traction power on lines 1, 2 and 5.
Regenerative braking power	60.2	60.6	18% estimated reduction in total traction power for Metro S.A.
Software-based power management and transport supply scheduling	6.2	6.2	1.5% estimated reduction in total energy for Metro S.A.
Smart lighting implementation	1.7	1.8	10% estimated reduction of lighting consumption and electric power on lines 4 and 4A.
Total	77.9	79.8	

[G4-EN5] One method employed to analyze energy consumption efficiency involves determining the consumption intensity of a specific measure within the organization. At metro we measure the consumption intensity of traction energy per car/kilometer and energy used to light each m² of facilities.

Energy Intensity of the Operations

Traction energy intensity	2013	2014
Consumption (kWh)	341,549,969	336,574,654
Car/Kilometer	142,912,905	139,996,472
Intensity (kWh/Car km)	2,39	2,0
Intensity of lighting energy	2013	2014
Consumption (kWh)	76,332,762	77,781,428
m ²	430,381	430,381
Intensity (kWh/m ²)	177,4	180,7

Air Emissions

Carbon Footprint

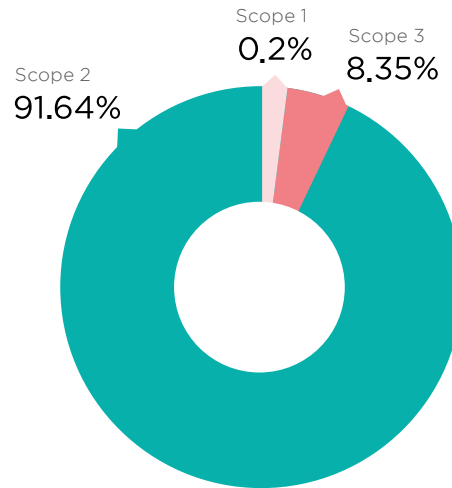
[G4-EN15, G4-EN16 Y G4-EN17, G4-EN19] In 2011 Metro began measuring its operations-related carbon footprint. This process entails identifying all activities or areas within the company that have a higher impact in terms of carbon dioxide equivalent emissions (CO₂-e). The marks the company's first step towards developing an effective emissions reduction plan.

It is worth noting that every year new variables are added to the equation for determining the company's carbon footprint is concerned, making it unfeasible to compare data from one year to the next.

Metro's main source of operations-related Greenhouse Gas Emissions (GHG) is electric power consumption (Scope 2). As a result, 91.64% of the company's total footprint is due to electric power consumption, whereas the remaining 0.2% is due to fuel consumption (Scope 1), and 8.35% is attributed to direct emissions related to Scope 3. Scope 3 direct emissions are connected to drinking water production, sewage water treatment, production of consumables, cargo and employee transportation, business trips, and waste treatment.



Breakdown of the Carbon Footprint of Metro's operations



Carbon Footprint of Metro Operations

Source	Greenhouse Gas Effect Emissions (tCO ₂ e)			% of total foot print
	2012	2013	2014	
SCOPE 1	1,086	1,681	328	0.20%
Fuel	119	174	154	
Air Conditioning	967	1,507	174	
SCOPE 2	153,489	180,525	149,168	91.64%
Administration	1,493	1,729	1,319	
Lighting	27,673	31,247	26,683	
Traction	124,323	147,550	121,167	
SCOPE 3	11,324	16,885	13,597	8.35%
Energy	20	28	26	
Drinking Water Production	35	33	39	
Production of Consumables	263	121	9	
Cargo Transportation	24	51	46	
Employee Transportation	3,568	7,713	5,387	
Sewage Water Treatment	166	59	142	
Waste Treatment	7,019	8,706	7,742	
Business Trips	229	174	206	
TOTAL	165,899	199,091	162,783	

NOTE: Metro's carbon footprint reduction from 2013 to 2014 is explained by an adjustment in the emission factor of the Central Power Grid (Sistema Interconectado Central) by the Ministry of Energy (<http://huelladecarbono.minenergia.cl/factores-de-emision>). Additionally, footprint calculations for 2014 are based on actual data, whereas in 2013 much of data were estimates.

In 2014, for the first time ever the company calculated the carbon footprint associated with construction work on the future Lines 3 and 6. Since construction work was contracted out and is not directly under Metro's supervision, the company only measured Scope 3 of the footprint, leaving out Scopes 1 or 2. The company's carbon footprint is mainly related to the use of consumables for construction works, amounting to a total of 838,012 tons of CO₂-e.

Carbon Footprint from Construction Work on Lines 3 and 6

	tCO ₂ e	%
Line 3	241,271	28.79%
Line 6	596,741	71.21%
Total	838,012	100.00%

[G4-EN18] Bearing in mind that Metro continues to expand its operations by building new lines, the best way to conduct a year-to-year comparison of the carbon footprint is by calculating the intensity of GHG emissions under Scopes 1 and 2. In 2014 said intensity was 0.00107 tCO₂-e/Car Km, compared to 0.00128 tCO₂-e/Car Km in 2013.

Other Air Emissions

[G4-EN21] Underground transit systems have a positive environmental impact since their operations help reduce emissions and pollution in the city. However, construction works undertaken during expansion and construction stages do generate air emissions, which is why it is important to report emissions contributed by Line 3 and 6 construction work.

Major Air Emissions related to Construction Work on Lines 3 and 6 in 2014

Major Air Emissions	Quantity of Emissions (kg)
NOx	95,376
SOx	7,965
Particulate Matter (MP)	35,185
Other air emission categories (CO)	47,376
Other air emission categories (HC)	125,577

* Emissions are estimated using the January 2012 Guide to Estimating Air Emissions for Real-Estate Projects for the Metropolitan Region issued by the Regional Environment Agency. ("Guía para la Estimación de Emisiones Atmosféricas de Proyectos Inmobiliarios para la Región Metropolitana, SEREMI del Medio Ambiente, enero 2012).



[G4-EN20] Metro also measures emissions put out by ozone depleting substances, the main source of which are AC units. In 2014 there weren't any gas refrigerants used on trains, which contributed to a significant reduction in emissions.

Consumption of Gas Refrigerants (kg)

Source		2012	2013	2014
Ac	R 22	200	80	54
	R407C	50	60	11
	R410A	20	20	34
Trains	R407C	324	810	0

Responsible Use of Resources

Water Consumption

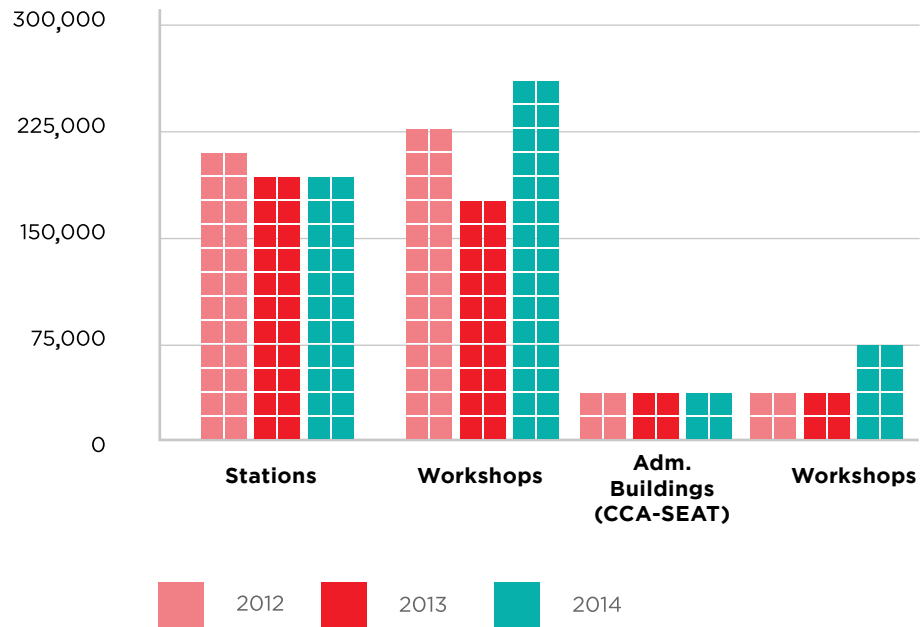
Given that we operate in the public transit industry water consumption is not a critical operational issue for our Metro lines at present. However, bearing in mind the national context and water scarcity, Metro closely monitors water consumption at all its facilities.

[G4-EN8] Ninety-eight point ninety-two percent (98.92%) of Metro's water supply comes from water companies located in the Metropolitan Region. They source their water primarily from surface sources such as the Maipo River, La Laguna Negra, and the Yeso and Estero San Ramón reservoirs. The remainder (1.08%) comes from water wells and it is used as emergency supply. This water is used to keep enough water in the storage tank so that the pumps have enough pressure to deliver water to all the workshops, thereby preventing unforeseen shutdowns and failures.

In 2014, Metro consumed a total of 544,425m³ of water compared to 440,000m³ in 2013. Consumption at workshops accounts for 45% of total water use and it is mainly used for cleaning trains, 36% is used at the stations, 13% at intermodal terminals, and 5% in the administrative buildings.

Increased water consumption at workshops and intermodal terminals is due to restoration work, mainly at the Neptuno Workshop and the Pajaritos Intermodal terminal.

Water Consumed during Metro Operations (m3)



Water consumed during Line 3 and 6 construction work grew significantly from 5,738m³ in 2013 to 89,996m³ in 2014. This increase was due to the start of drilling work, earth works and removal, truck traffic and an increased headcount at each shaft. The most water-intensive process is washing truck tires at shaft entrances. This task aims to reduce dust in suspension and thereby lessen the impact of construction work on our neighbors.

[G4-EN10] Although Metro does not have a company-wide water saving and recycling practice, Taller Neptuno has its own system to recycle nearly 70% of all water used to wash trains. In 2014 approximately 315m³ of water were reused on account of this process.

[G4-EN22] All water used in company operations is disposed of through the residential sewage water system after being adequately treated, which is a responsibility of water companies.

Materials Consumption

[G4-EN1] In order to ensure Metro operates properly, the company manages and reports of use and supply of materials and consumables, especially at maintenance facilities. In 2014 Metro added new materials to its report (Acetylene, Refrigerant, Water and Paper) given the role these play in measuring the carbon footprint.



Materials Consumed during Metro Operations

Material	Unit of Measure	2013	2014
		Quantity	Quantity
Tires	Ton	33*	67
Lubricants	L	19,353	3,584
Grease	Kg	4,877	3,295
Nitrogen	m ³	6,485	6,640
Oxygen	m ³	242	578
Lumber	PMA	1,285*	817
Solvents	L	13,391	10,229
Acetylene	Kg	145	419
Refrigerants	L	-	268
Water	m ³	458,637	554,188
Paper	UN	9,904	9,991

* These data differ from those in the 2013 Report due to a change in the unit of



measure and in the footprint calculation.

Steel and concrete are the main materials used during Line 3 and 6 construction work.

Materials Consumed during Line 3 and 6 Construction Work

Materials used in Construction of Lines 3 & 6	Unit of Measure	2013	2014	
			LINE 3	LINE 6
Concrete*	Ton	1,434,7	252,499	701,083
Steel*	Ton	68,297	9,868	7,320
Water	m ³	ND	52,592	37,404

*The amount of concrete and steel used is estimated on the basis of progress made in tunnels and galleries in a year.

