



Introduction

Electrically-powered mass railway is generally acknowledged to be the most environmentally sustainable way to transport the world's growing and urbanising populations. We believe that our most significant contributions to the environment arise from impacts that do not occur as a result of our services. For example, Hong Kong has cleaner air, less congested roads and makes better use of limited land resources than would otherwise be the case if passengers used our trains instead of other modes of transport.

In support of this view, the International Association of Public Transport (UITP) and management consultancy Arthur D Little have recently concluded that Hong Kong has "the most advanced urban system in the world". Compared with 28 other centres in the Asia Pacific region, our city ranks first in terms of low carbon transport.

This graphic represents the number of buses, mini-buses and cars that it would take to transport the same number of passengers, on average, as just one of our trains travelling at full capacity. In our view, this image captures our most significant contribution to a clean and healthy environment in Hong Kong and the other cities where we operate modern and efficient railway systems.

Learn more...

Download a copy of [Future of Urban Mobility 2.0](#) to read more about the findings published by Arthur D Little and UITP in January 2014, including an updated version of the Urban Mobility Index covering 84 cities.

Clearing the air

In 2014, we replaced eight older buses on our feeder service to and from West Rail Line stations and Light Rail stops. The new buses are fitted with Euro V engines, meeting the latest and most stringent emissions standards in Hong Kong.

Snapshot of MTR's Contribution to the Environment

1 MTR Train



25 Buses



150 Mini-buses



1,500 Cars



Management Approach

In this section, we introduce the key elements of our approach to the sustainable use of resources, climate change and environmental protection. A data table containing all key performance indicators (KPIs) for [environmental performance](#) is available in the Performance Metrics section.

GUIDING STRUCTURE

Climate Change Policy

Our [Climate Change Policy](#) acknowledges that climate change is affecting Hong Kong and other locations where we operate. We are committed to [mitigating climate change](#) by providing low carbon transport and lifestyle opportunities for customers and communities, and also to [adapting to climate change](#) in order to ensure safe, reliable and efficient delivery of our services in years to come.

Biodiversity Policy

Our [Corporate Biodiversity Policy](#) commits us to safeguarding ecologically sensitive areas. Under this policy, we have integrated biodiversity considerations into our Environmental Management Systems and continue to manage the [Lok Ma Chau Wetlands Ecological Enhancement Area](#).

Green Procurement Policy

Our [Green Procurement Policy](#) incorporates principles for responsible management of natural resources.

Managing Risk

Risks associated with the environment are subject to regular assessment by our [Enterprise Risk Committee](#). In the case of [climate change](#) for example, we distinguish between direct risks that impact service delivery, asset management, staff, and customers, and indirect risks that affect our supply chain and the communities that we serve.

Energy Efficiency

We have been a signatory of the World Business Council for Sustainable Development (WBCSD) Manifesto for Energy Efficiency in Buildings since October 2012. When it comes to

Did you know?

In support of the Environmental Protection Department's Energy Saving Charter, we voluntarily set average indoor temperatures at MTR Headquarters and common areas of office buildings and shopping malls under our management to 24–26°C during summer months.

Learn more...

According to the Electrical and Mechanical Services Department, buildings account for about 90 per cent of total energy consumption in Hong Kong. The regulatory framework governing energy efficiency in Hong Kong comprises the [Building Energy Efficiency Ordinance](#) and [Building Energy Code](#).

energy efficiency, we strive to go well beyond regulatory compliance.

For more information about energy efficiency, please refer to [electricity consumption](#) and [energy-saving measures](#).

KEY PROCESSES

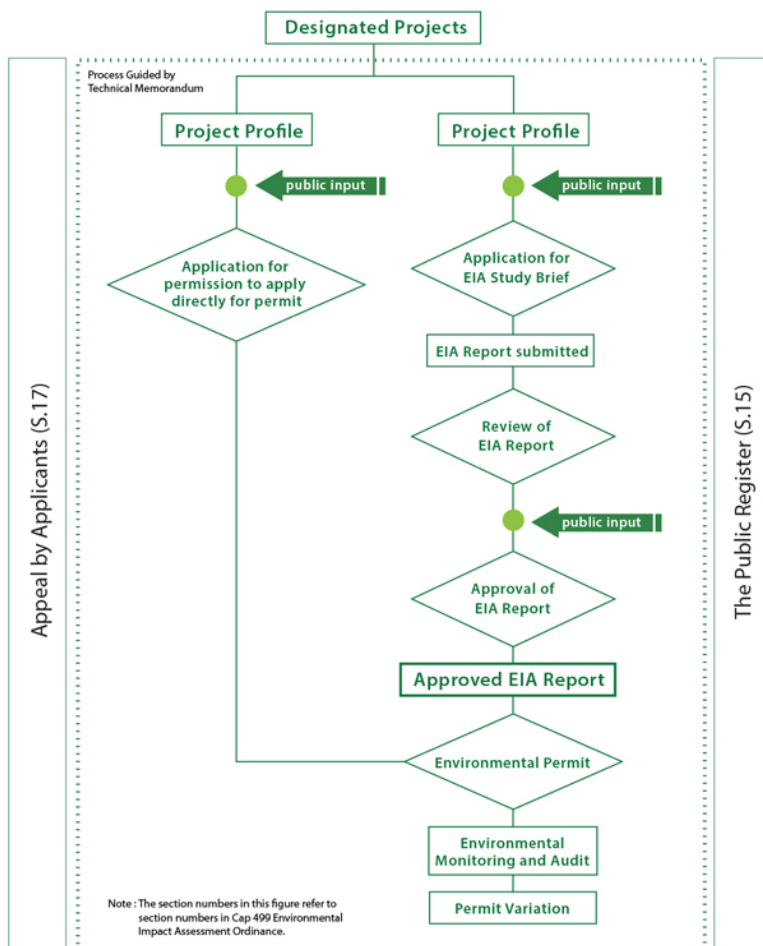
Environmental Impact Assessment

We follow a robust statutory process of Environmental Impact Assessment (EIA) for new projects involving public consultation, report preparation and expert review. Based on the outcomes of this process, environmental permits issued by the Government specify conditions that must be complied with throughout the lifespan of our projects, including control of environmental impacts relating to noise, water pollution, air pollution and waste disposal.

Learn more...

ISO (International Organization for Standardization) is the world's largest developer of voluntary international standards. [ISO 14001:2004](#) provides a framework that any company or organisation can follow to set up an effective environmental management system.

The Statutory Environmental Impact Assessment Process



Environmental Management Systems

Our Environmental Management Systems (EMS), which are designed and certified to the standard of ISO 14001:2004, support our teams from the Operations, Projects and Property Divisions to identify environmental impacts and achieve continuous improvement.





Sustainable Resource Use

In 2014, we purchased over 1,880 GWh from Hong Kong’s two electricity providers for railway and property operation, representing about 4 per cent of Hong Kong’s total energy consumption. Heavy rail accounts for the vast majority, or about 75 per cent, of the electricity that we consume, with our Property Division also representing about 22 per cent of our total electricity consumption. This calculation includes all properties that we own and manage, but only takes account of energy use that we control in those properties (i.e. it does not reflect energy consumed by our tenants).

Learn more...

Information about the regulatory framework governing the supply of electricity in Hong Kong is available from the [Environment Bureau](#).

Electricity Consumption (MWh)

	2013	2014
Total	1,832,919	1,881,469
Railway Operations	1,424,953	1,471,301
Heavy Rail	1,371,918	1,417,339
(Share of total)	75%	75%
Light Rail and Bus	53,035	53,962
(Share of total)	3%	3%
Properties	407,966	410,168
(Share of total)	22%	22%

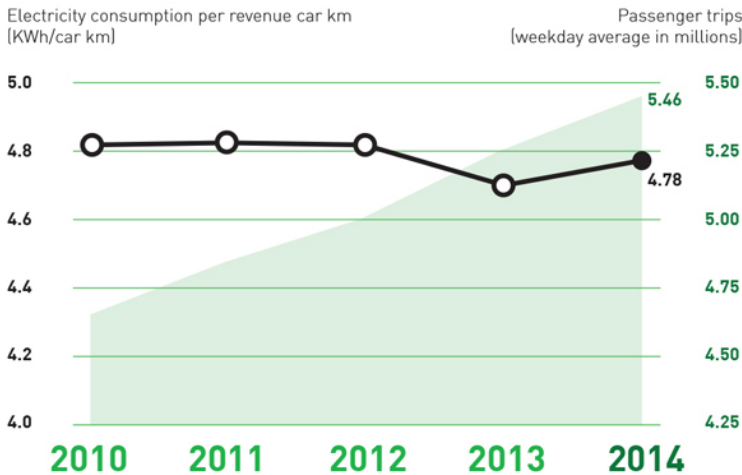
Energy Efficiency

Purchased electricity represents our largest non-staff operating cost. Even without taking into account the environmental benefits of consuming less energy, the cost consideration alone constantly provides an important incentive to seek out innovative ways to improve energy efficiency.

We normalise electricity consumption in two ways in order to evaluate our performance on energy efficiency:

- Electricity use per revenue car km (as illustrated in the chart)
- Electricity use per passenger-kilometre (km) on heavy rail operations

ELECTRICITY EFFICIENCY RATIO OF RAIL ASSETS (HONG KONG)



By 2020, our target is to reduce by 21 per cent the amount of electricity consumed per passenger-kilometre in our heavy rail network compared with 2008 levels, the first full year after the merger of the rail operations. In 2014, we achieved a 19.35 per cent reduction of electricity intensity in our heavy rail operations compared with the baseline from 2008.

Trends in Electricity Demand

We anticipate that our demand for energy will continue to increase due to higher patronage, new rail lines and continued growth in other areas of our business.

Trends in Electricity Supply

In Hong Kong, our choice of energy suppliers is restricted to two vertically-integrated companies that are regulated by the Government under a Scheme of Control (SOC) Agreement that is valid until 2018. We anticipate that in the coming years the cost of our electricity will rise on account of tariffs being adjusted to reflect developments in world and regional energy markets, including the impact of policies to reduce air pollutants and mitigate climate change.

During 2014, we participated in a consultation exercise organised by the Environmental Protection Department to consider the future fuel mix of electricity supply in Hong Kong. We emphasised the need for the Government to continue to find an appropriate balance between competing objectives of safety, reliability, affordability and environmental protection.



Energy Saving Measures

We have implemented many initiatives to save energy over the years and continue to find new ways to reduce energy consumption in all areas of our business, particularly in the operation of our railways, management of our properties and design and planning of new buildings. This infographic brings together all these initiatives into a concise summary. Please click on each initiative to learn more about what we are doing in each area.

Energy Savings Initiatives

+ LED LIGHTING

Light Emitting Diodes (LEDs) - These are used in stations, advertising panels and on trains to provide energy savings of up to 40 per cent compared to conventional light bulbs. They can last up to 50,000 hours, which is two and a half times longer than conventional bulbs.

+ PHOTO SENSOR CONTROL

Photo-Sensor Control Systems - Redundant lights are switched off automatically on sunny days.

+ TEMPERATURE GRADIENT

In Hong Kong's sub-tropical climate, we rely on air conditioning to keep cool for over 200 days a year. Environmental Control Systems (ECS) are an important means of managing energy efficiency in our stations.

Temperature Gradient - We implement gradual changes of temperature from station entrances to the concourse and to platforms in order to reduce overall cooling demand.

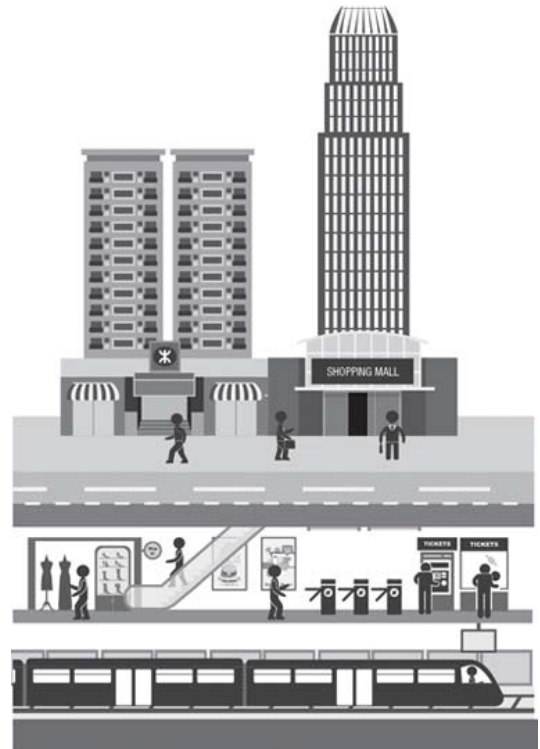
+ PLATFORM SCREEN DOORS

Platform Screen Doors - These are important for minimising the cooling volume on platforms and for reducing the piston effect, whereby moving trains pull cooled air from the station into the tunnel and push hot air from the tunnel into the station.

+ WINTER FREE EXHAUST MODE

Winter Full Exhaust Mode - When the outside temperature is below 22°C, extractor fans are used to create negative pressure in the station, allowing cool ambient air to be drawn into the station through its entrances and to reduce the overall cooling demand.

+ ESCALATOR ENERGY SAVING MODE



Escalator Energy Saving Mode - Redundant escalators are turned off during non-peak hours.

+ REGENERATIVE BRAKING

Regenerative Braking - We convert kinetic energy from trains when they are braking into electrical energy and feed it back into the power supply network for use by other trains through the overhead power system.

+ TRACKSIDE ENERGY STORAGE

Trackside Energy Storage (new technology) - We are in the process of implementing new trackside energy storage devices on some lines aimed at better utilisation of surplus energy generated by train regenerative braking.

+ TRAIN COASTING

Train Coasting - When trains are going downhill or preparing to slow down for upcoming stations, the driver puts the engine into neutral to save energy.

+ TRACKSIDE VENTILATION FAN

Trackside Ventilation Fans - These are optimised during peak and non-peak hours to maintain trackside temperatures suitable for train operation.

Efficient Lighting Systems

Our Operations and Property Divisions are implementing programmes to install energy efficient lighting systems in our railway network and managed properties. This table provides a summary of recently completed and ongoing initiatives.

Status of Energy-saving Lighting Initiatives

Initiatives	Description of Initiatives	Status
LED lighting on trains	93 M-trains on Urban Lines 21,000 LED lamps installed between 2009 and 2013	Completed in 2013
	11 trains on Airport Express Line; 3,400 LED lamps installed between 2013 and 2014	Completed in 2014
	32 trains on Disneyland Resort Line, Tung Chung Line and Urban Lines	Ongoing
LED lighting in stations	Fluorescent lamps replaced by LEDs at all heavy rail stations	Ongoing
	365 light boxes installed at Lam Tin Station	Completed in 2014
	400 light boxes installed at Kowloon Tong Station	Ongoing
	100 light boxes installed at Diamond Hill Station 110 light boxes installed at Tai Koo Station	
LED advertising panels	467 panels installed at Choi Hung, Hung Hom, Causeway Bay, Kowloon Tong, Hong Kong, Kowloon, Airport, Kwai Hing, Kwai Fong and Sheung Wan stations	Completed in 2014

Energy saving initiatives in our Maritime Square Extension

When designing the Maritime Square Extension, one of our managed properties, we implemented a number of energy-saving initiatives such as an energy management system, water-cooled air conditioning system with a combination of conventional and oil-free chillers, air lock lobbies and energy efficient lighting.

C40 Pilot Scheme

We implemented a pilot project in 2011 for energy savings at Olympic Station in partnership with the C40 Cities Climate Leadership Group (C40). We applied energy-saving window films to reduce heat gain from sunlight and deployed highly efficient Variable Frequency Drives (VFD) in the ventilation system. We have been monitoring the impact of these initiatives over time, and following on from the success of this scheme VFD are being implemented in seven other stations on the West Rail Line and Tseung Kwan O Line.

Learn more...

The [C40 Cities Climate Leadership Group](#) is a network of the world's megacities committed to addressing climate change.

C40 Pilot Scheme Outcomes

	Energy Savings (MWh)	Carbon Savings (Tonnes CO ₂ e)
2011 to 2012	324	~190
2012 to 2013	518	~325
2013 to 2014	547	~350
Total to date	1,389	~865

Green Buildings

Starting in 2010, we were the first company involved in property development in Hong Kong to implement voluntary environmental standards in a systematic way when we decided that most of our new residential property developments would achieve a minimum of Hong Kong BEAM Plus Gold certification. This is the second highest level in a five-tier system. Where appropriate, we are also implementing BEAM or LEED standards in other properties and railway stations.

This table provides a summary of properties and stations that received provisional assessment or certification for environmental standards by the end of 2014.

BEAM Plus, BEAM and LEED Certifications for Properties and Stations

Building Standard	Property/Station	Year
BEAM Plus Gold (Provisional Assessment)	Austin Station Residential	2012
BEAM Plus Gold (Provisional Assessment)	Nam Cheong Station Residential	2013
BEAM Plus Gold (Provisional Assessment)	Tsuen Wan West Station Bayside Residential	2014
BEAM Silver	Kowloon West Rail Terminus	2010
BEAM Platinum	The Riverpark, Shatin	2013
LEED Operations and Maintenance: Gold	Two IFC	2013
LEED Core and Shell: Silver	University Station entrance	2013

Learn more...

Building Environmental Assessment Method (**BEAM**) is a rating system for green buildings launched in Hong Kong in 1996. BEAM Plus is a comprehensive environmental assessment scheme for buildings recognised by the [Hong Kong Green Building Council](#). The current version, BEAM Plus version 1.2, has been available for formal registration since November 2012. Leadership in Energy and Environmental Design (**LEED**) is a set of rating systems developed by the US Green Building Council (USGBC) for design, construction, operation, and maintenance of green buildings.



Water Consumption

All of our water is sourced from the mains supply provided by the Water Supplies Department. The most important uses of water in our railway operations are for cleaning trains, railway infrastructure, and stations.

Water Supply Risks

We recognise that consumption and availability of water is an important issue for our stakeholders. Hong Kong is highly dependent on the Dongjiang River basin for up to 80 per cent of its water supply, which is threatened by rapid urbanisation and climate change, among other factors.

Water Consumption Trends

Managed and investment properties account for the majority, about 60 per cent, of our total water consumption. In recent years, there has been a trend towards greater consumption of water in our properties due to the growing size of our property portfolio and more intensive use of water from landscaping and swimming pools.

Water Consumption (m³)

	2013	2014
Total	2,060,759	1,960,585
Railway Operations	846,709	851,639
Managed and Investment Properties	1,214,050	1,108,946

Conservation of Water

We implement measures to conserve water in our managed properties. For example, grey water recycling systems at The Capitol, Le Prestige and LOHAS Park collect and treat up to 440,000 litres of water a day. These systems recycle some of our wastewater for re-use in landscaping and cleaning of outdoor public areas.





Environment



Climate Change

Our response to climate change is consistent with the latest recommendations from climate scientists, namely, that adaptation and mitigation are complementary strategies for reducing and managing expected risks.



Mitigation

Greenhouse Gas Emissions

We have reported on our greenhouse gas (GHG) emissions since 2002. We monitor Scope 1, 2 and 3 GHG emissions in accordance with the Greenhouse Gas Protocol, and also make reference to guidelines published by the Environmental Protection Department and Electrical and Mechanical Services Department in Hong Kong and other international sources.

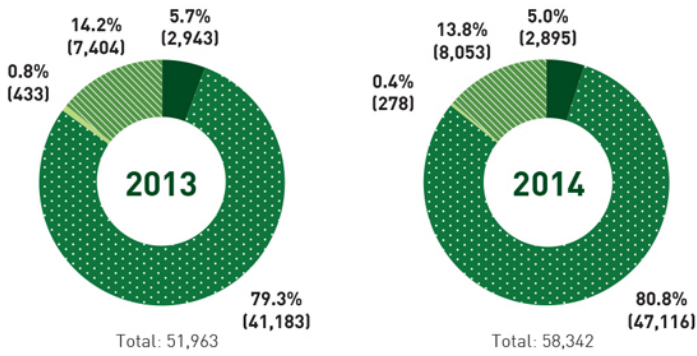
Learn more...

In 2014, the Intergovernmental Panel on Climate Change (IPCC) concluded its Fifth Assessment Report. The key findings of this report are that human influence on the climate system is unequivocal, climate change is already having widespread impacts, and continued emissions of greenhouse gases (GHG) are likely to increase the frequency and severity of impacts over the coming decades.



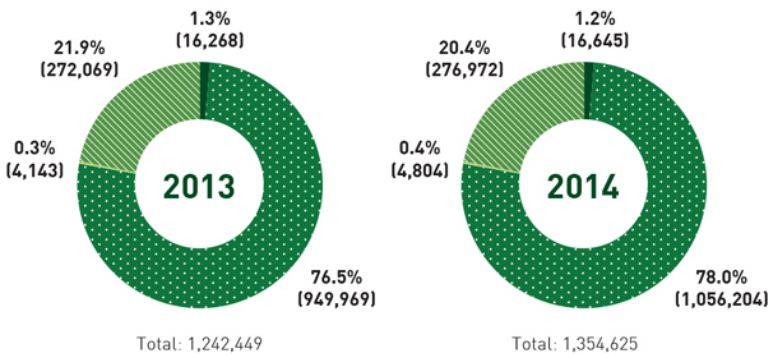
BREAKDOWN OF SCOPE 1 EMISSIONS (tCO₂e)

- Corporate Functions and Main Office Buildings
- Transport Operations
- Network Expansion
- Properties & Other Business



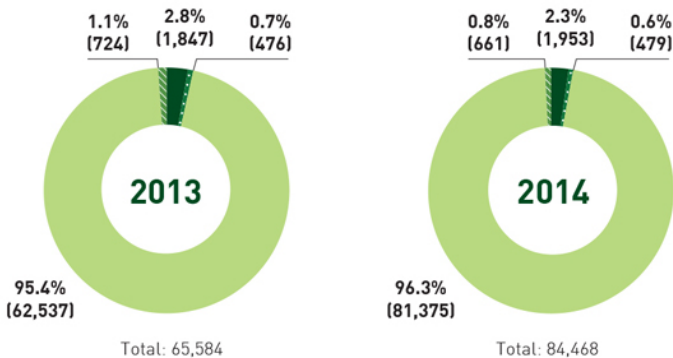
BREAKDOWN OF SCOPE 2 EMISSIONS (tCO₂e)

- Corporate Functions and Main Office Buildings
- Transport Operations
- Network Expansion
- Properties & Other Business



BREAKDOWN OF SCOPE 3 EMISSIONS (tCO₂e)

- Corporate Functions and Main Office Buildings
- Transport Operations
- Network Expansion
- Properties & Other Business



Climate Change Mitigation

Total GHG emissions reported by the Company in 2014 increased by 10 per cent compared with 2013. This outcome is largely attributable to GHG emissions from transport operations, associated with increased train frequency and higher patronage, and from our network expansion projects. The majority of our GHG emissions are indirect emissions arising from purchased electricity for transport operations, properties and other businesses. This electricity is supplied by two vertically-integrated suppliers and is generated from a mix of coal, natural gas and nuclear power. Since we exercise minimal influence over the source of electricity that we consume, our mitigation efforts focus on energy saving measures and improving energy efficiency is one of our top environmental objectives.

Carbon Disclosure Project

We have participated in the Carbon Disclosure Project (CDP) Climate Change Programme each year since 2006 and have also been included in the CDP's Asia ex-Japan Climate Disclosure Leadership Index since 2012. The main advantage of this programme is the opportunity to benchmark our performance with other organisations. In 2014, our response to the CDP's climate change questionnaire achieved a performance band score of B, representing an improvement from C in 2013. This result means that the CDP recognises climate change is a priority for our organisation but believes there is still room for improvement to ensure that our initiatives are fully established.

Lifecycle Carbon Assessment

It is widely acknowledged that emissions associated with daily operations, such as environmental control systems and lights, account for up to 90 per cent of the total lifecycle GHG emissions from buildings. Our pilot study in 2010 confirmed that a similarly high proportion of total lifecycle GHG emissions arise during the operational phase of our railway projects. This means that in comparison to railway operations, the overall contribution to climate change from construction and decommissioning phases of rail projects is relatively minor.

Learn more...

The Carbon Disclosure Project (CDP) is an organisation based in the United Kingdom, which works with shareholders and corporations to disclose GHG emissions of major corporations around the world. It is possible to obtain a copy of the Company's response to the CDP's climate change questionnaire in 2014 from their website.

Did you know?

In 2014, the Hong Kong Construction Industry Council announced that it will establish a new labelling scheme for embodied carbon of selected construction materials. Although we support this initiative, we believe that it will take significant time for the market in low-carbon products to mature in Hong Kong.



Adaptation

Research by climate scientists around the world provides increasingly accurate information about the projected impacts of climate change over the next 20 to 100 years. If significant reductions in GHG emissions are not achieved in the short term, we now know that very significant impacts may be experienced in Hong Kong over the coming decades. We are already responding to potential threats by implementing adaptation strategies to address the direct impacts of climate change on our business.

Major Drivers of Climate Change Impacts in Hong Kong

Annual Mean Temperature expected to increase by 1.5–3°C by 2060 and 3–6°C by 2100.

Average Annual Rainfall expected To increase by 11% by 2100.

Extreme Rain - Rain events exceeding 100mm of rainfall per hour to occur more frequently.

Coastal Flooding - Cities in the Pearl River Delta, including parts of Hong Kong and Shenzhen, are at risk of flooding from major storm surges combined with rising sea levels.

Learn more...

The [Hong Kong Observatory](#) provides extensive information about climate change on its website, including projections for Hong Kong's climate in the 21st century.

Heavy Rain and Flooding

Railway structures are designed and built for a lifespan of over 100 years. In preparation for the longer term effects of climate change, we regularly review our Design Standard Manual to ensure that new railway projects have appropriate protection for 1:200 year rainfall events. We also inspect and assess our existing railway infrastructure on a regular basis to ensure its robustness in extreme weather events.

Extreme weather has the potential to disrupt normal operations and to endanger the safety of our customers. Our Operations Division has incorporated appropriate procedures into the Standing Operations Procedures Manual (SOPM) for frontline staff, including special procedures for super typhoons, strong winds and hailstorms. Our Property Division has also taken steps to ensure that there is sufficient manpower and equipment to handle serious flooding situations.

Learn more...

During 2014, we published [MTR Typhoon Travelling Tips](#), a guide to promote safe travel for passengers during extreme weather.

Rising Temperatures

Hotter weather will have a direct impact on Heat, Ventilation and Air-Conditioning (HVAC) systems, leading to increased maintenance requirements and higher operational costs.

Extreme heat also presents a direct risk to the well-being of staff and contractors, especially those working on construction sites. With reference to advice published by the Hong Kong Labour Department, we have put strong guidelines in place governing outdoor work on hot weather days.





Environment

Noise

Noise generated by operations of our trains and maintenance activities on our railway network is a major concern for stakeholders who are affected. During 2014, our Operations Division received 170 complaints about noise, accounting for 94 per cent of all environment-related complaints received throughout the year.

In addition to following up on every complaint in accordance with our internal procedures, we conduct regular surveillance on noise levels along our railway and monitor saloon noise inside our trains with reference to an internal benchmark that was established based on feedback from passengers. We are also continually making improvements to mitigate the effects of operational train noise on the community. For example, in 2014 we implemented several initiatives on the East Rail Line such as rail dampers in Tai Po North and a noise mitigation scheme near The Palazzo in Fo Tan.

Waste

Our new rail projects generate tremendous amounts of construction waste and excavation materials. We adhere to a Government-regulated trip ticket system on all sites in order to keep track of waste and ensure proper disposal, while also continuously exploring new ways to reduce waste.

GENERAL WASTES FROM NETWORK EXPANSION PROJECTS (TONNES)

2013 58,967

2014 187,831

Discharge of Wastewater

Apart from greywater recycling in LOHAS Park residential estate, all of the water consumed by the Company in Hong Kong is discharged, with appropriate treatment, into the public drainage/sewerage system, which is maintained by the Drainage

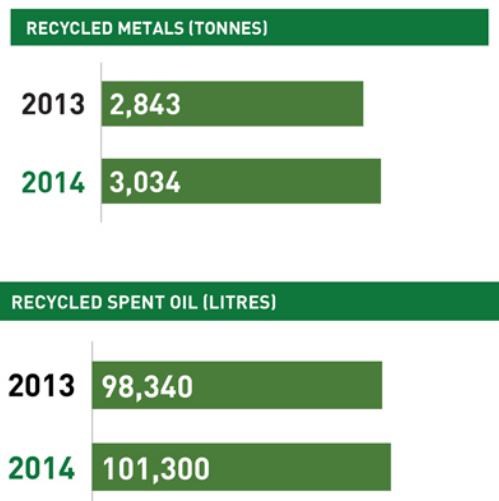
Services Department.

Recycling of Construction Waste

We are able to reuse or recycle about two-thirds of excavation waste from our network expansion projects and try to find uses for demolition waste generated from our property development business in the local recycling industry. For example, we recycled 60 per cent of the waste generated during construction of our Austin Station residential development into eco-friendly paving blocks and also recycled 60 per cent of waste generated from demolition of an existing car park at our Tsuen Wan West Station Cityside development.

Recycling Waste from Railway Operations

Our Operations Division implements recycling programmes for metals and spent oil. The diagram shows the scale of these initiatives.



Recycling in Managed Properties

We provide waste recycling bins to separate waste for recycling at all common areas of our managed properties. Where possible, we also work jointly with Owners' Committees and Incorporated Owners to promote waste separation programmes to residents. Through our Green Train initiatives and provision of special recycling bins in the common areas of our managed properties, we collect used clothes, ink cartridges and CD discs. Under the Glass to Brick programme, we went one step further to collect and turn waste glass bottles into reusable materials.

Reducing Food Waste

To learn more about our work to reduce food waste generated by customers in our shopping malls and residential developments, please refer to [Value Chain](#).



Ecology

We are committed to protecting the natural environment during construction of new rail projects and take particular care on sections of the lines that impact natural habitats and areas with high ecological sensitivity.

Lok Ma Chau Wetlands

In 2002, the Sheung Shui to Lok Ma Chau Spur Line, part of the East Rail Line, became a Designated Project under the Environmental Impact Assessment Ordinance. The Environmental Impact Assessment (EIA) for this project identified the need for a 32-hectare Ecological Enhancement Area (EEA) to mitigate impacts from construction and operation of the spur line on wetland fauna in this biologically sensitive part of Hong Kong. Located on the eastern side of the Mai Po Inner Deep Bay Ramsar Site in the northeast New Territories, the EEA was established in 2007 and helps to maintain biodiversity by providing habitat environments for target species. Its success relies on active management of the wetland environment, including water management, structural management, control of access and prevention of avian influenza and botulism.

Conservation of Migratory Birds

The marshes and fishpond areas of the EEA provide important nesting sites for migratory birds. During the 2014 breeding season, for example, 87 pairs of birds representing five different species are believed to have bred successfully. Overall, more than 240 species have been spotted in the EEA since 2007, including the first recorded sightings in Hong Kong of Greater White-fronted Goose (*Anser albifrons*), Lesser White-fronted Goose (*Anser erythropus*) and Common House Martin (*Delichon urbicum*). There is also high abundance of a globally-threatened species called the Black-faced Spoonbill (*Gracupica nigricollis*).

Learn more...

Project teams working on the [Express Rail Link](#) are conserving natural habitats located near the Mai Po marshes.

Did you know?

In our [case study on the Island Line Extension to Western District](#), we mention our efforts to preserve century-old tree walls at Forbes Street in Kennedy Town. The full story of conserving this precious natural heritage is told in a book that was launched on 14 July 2014 entitled *Conservation of Stonewall Trees*, co-authored by tree specialist Professor Jim Chi-yung, Department of Geography of The University of Hong Kong, and Dr Glenn Frommer, former Head of Corporate Sustainability at MTR Corporation (now retired).

Conservation of Other Species

The EEA attracts a large diversity of dragonfly and amphibian species. There have been regular sightings of the Chinese Soft-shelled Turtle (*Pelodiscus sinensis*), which is a threatened species, and the Eurasian Otter (*Lutra lutra*), which is a near-threatened species.

Food Angel

Each winter it is necessary to drain fish ponds in the Lok Ma Chau EEA to allow migratory birds to feed on small fish and water creatures. This management activity leaves behind larger fish that are unable to survive in shallow water. In 2014, we donated this nutritious and delicious resource to underprivileged communities in Hong Kong via a not-for-profit food assistance programme called Food Angel.

