ENVIRONMENT

1,343,723 tCO₂e
Total GHG Emissions

15%
MTR Malls food waste reduction target
All participating tenants have achieved the target

21%
Electricity intensity reduction target by 2020, compared with 2008
INTRODUCTION

We strive to become one of the most resource-efficient and ecologically sustainable railway and property service companies in the world. This means that we will:

- Increase energy efficiency
- Use natural resources sustainably; and,
- Adapt to climate change.

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 other modes of transport instead of trains.

In support of this view, the International Association of Public Transport (UITP) and management consultancy Arthur D Little concluded that Hong Kong has “the most advanced urban system in the world” and ranks first in terms of low carbon transport.

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.
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.

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 Statement

Our Climate Change Statement 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. An example is our management of the Lok Ma Chau 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 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.

Tree Protection

We are committed to enhancing the urban environment by protecting existing trees and introducing new trees according to established guidelines. Our approach includes evaluating the impact of our projects on trees and determining whether they can be preserved in place or need to be transplanted. Where they have to be removed, we undertake compensatory planting of new trees after the project is completed.

Landscape/Visual Impacts

To enhance the visuals surrounding our stations, greening elements such as green roof and vertical greening are included where feasible in the new stations, entrances and ventilation shaft designs. For example, to reduce visual impacts, we are designing the ventilation shafts for the West Kowloon Terminus of the Express Rail Link in collaboration with the West Kowloon Culture District (WKCD) Authority to be seamlessly integrated within the area.

Environment 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 (through the selected property developments) to estate managements to identify environmental impacts and achieve continuous improvement. Where appropriate, we will be transitioning to the new ISO 14001:2015 version.

Internal Working Groups

To ensure that we adequately minimise the environmental impact of our businesses, we have set-up relevant environmental working groups across the Company. For example, we have formal and ad-hoc working groups on overall environmental management, energy, waste, food waste and wastewater.

On the construction of our new railway lines, we have specific environmental teams assigned to manage environmental issues for each line.

Working with Stakeholders in the New Lines

As part of our new railway lines engagement, we launched a Continuous Environmental Improvement Programme (CEIP) in 2012. CEIP provides a platform for knowledge sharing among our construction and environmental staff as well as our consultants, contractors and relevant government officials.

We also conduct regular engagements with environmental NGOs to update them on the environmental aspects of the construction of the new lines.
Environmental Impact Assessment

We follow a statutory process of Environmental Impact Assessment (EIA) for new projects involving impact avoidance, minimisation and mitigation recommendation. The process also involves public consultation and expert review. Based on the outcomes of this process, environmental permits issued by the Environmental Protection Department specify conditions that must be complied with throughout the lifespan of our projects, including control and monitoring of environmental impacts relating to noise, water quality, air quality, waste disposal and ecology, to name a few.
SUSTAINABLE RESOURCE USE

In 2015, we purchased over 1,950 GWh from Hong Kong’s two electricity providers, representing about 4% of Hong Kong’s total energy consumption. Heavy rail accounts for the vast majority, or about 76%, of the electricity that we consume, with our Property Division also representing about 21% 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).

Electricity consumption (MWh)

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1,881,469</td>
<td>1,954,893</td>
</tr>
<tr>
<td>Railway Operations</td>
<td>1,471,301</td>
<td>1,541,108</td>
</tr>
<tr>
<td>Heavy Rail</td>
<td>1,417,339</td>
<td>1,486,014</td>
</tr>
<tr>
<td>[Share of total]</td>
<td>75%</td>
<td>76%</td>
</tr>
<tr>
<td>Light Rail and Bus</td>
<td>53,962</td>
<td>55,094</td>
</tr>
<tr>
<td>[Share of total]</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Properties</td>
<td>410,168</td>
<td>413,785</td>
</tr>
<tr>
<td>[Share of total]</td>
<td>22%</td>
<td>21%</td>
</tr>
</tbody>
</table>

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 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 km on heavy rail operations

By 2020, our target is to reduce by 21% 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. Due to unprecedented passenger demand in 2014, our performance against our electricity target in our heavy rail operations adjusted in 2015. We have now recorded a 16.1% reduction of electricity intensity compared with the baseline from 2008.
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 Agreement (SCA) 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 energy markets, including the impact of environmental policies.

During 2015, we participated in a consultation exercise organised by the Environment Bureau to consider the future arrangements of the SCA in Hong Kong. We reiterated our views for the Government to continue to find an appropriate balance between the objectives of safety, reliability, affordability and environmental protection. To reinforce the introduction of renewable energy and demand side management measures, we also suggested that the Government provide more financial support to the private sector, not only through tax incentives.

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.

At the procurement phase of our new railway lines, we implement a lifecycle cost assessment with our potential suppliers. This assessment enables us to embed energy saving technologies as early as possible, ensuring energy efficient operations at the onset.

In our railway operations, our Energy Management Working Group explores energy efficiency initiatives, including promoting energy conservation amongst staff. At our malls, comprehensive energy saving plans have been established including promotion of energy conservation with staff, tenants, contractors and the public. In 2015 we were awarded for our energy saving efforts with the GREEN PLUS Award in Hong Kong, a collaborative platform that recognises energy efficiency and conservation:

- Railway Operations and The Palazzo received the Grand Award – Prestige Honour Awards for their initiatives; continuing efforts in implementing new energy saving initiatives;
- PopCorn mall received a Bronze Award in the Property Management – Shopping Mall Category.

We are a pioneering signatory of the Government’s Energy Saving Charter, voluntarily setting the 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. We are also a pioneering signatory of the new Charter for External Lighting – switching off external non-essential lighting after midnight daily.

This infographic in the next page brings together all these initiatives into a concise summary. Please click on the different parts of the diagram to learn more about what we are doing in each area.
### Energy Savings Initiatives

#### LIGHTING
- Light Emitting Diodes (LEDs)
- Photo-Sensor Control Systems

#### STATIONS
- Temperature Gradient
- Platform Screen Doors
- Winter Full Exhaust Mode
- Escalator Energy Saving Mode
- Variable Frequency Drives (VFD)
- Chiller Replacement

#### TRAINS AND TRACKS
- Regenerative Braking
- Trackside Energy Storage (new technology)
- Train Coasting
- Trackside Ventilation Fans

#### PROPERTIES - MALLS / OFFICES
- Water-cooled air conditioning system with a combination of conventional and oil-free chillers
- Air Lock Lobbies

#### PROPERTIES - MANAGED RESIDENTIAL
- Air Curtains
- Adjustment of Operating Time for Energy Consumption Equipment
Energy Savings Initiatives

**Light Emitting Diodes (LEDs)**
- Ongoing replacement to LED lights in stations, advertising panels on trains, tunnelling of new lines, and managed properties including managed residential to provide energy savings of up to 40% 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 Systems**

**STATIONS**
- Temperature Gradient
- Platform Screen Doors
- Winter Full Exhaust Mode
- Escalator Energy Saving Mode
- Variable Frequency Drives (VFD)
- Chiller Replacement

**TRAIN AND TRACKS**
- Regenerative Braking
- Trackside Energy Storage (new technology)
- Trackside Ventilation Fans

**PROPERTIES - MALLS / OFFICES**
- Water-cooled air conditioning system with a combination of conventional and oil-free chillers
- Air Lock Lobbies

**PROPERTIES - MANAGED RESIDENTIAL**
- Air Curtains
- Adjustment of Operating Time for Energy Consumption Equipment
Energy Savings Initiatives

**LIGHTING**

- Light Emitting Diodes (LEDs)
- Photo-Sensor Control Systems

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

**STATIONS**

- Temperature Gradient
- Platform Screen Doors
- Winter Full Exhaust Mode
- Escalator Energy Saving Mode
- Variable Frequency Drives (VFD)
- Chiller Replacement

**TRAIN AND TRACKS**

- Regenerative Braking
- Trackside Energy Storage (new technology)
- Train Coasting
- Trackside Ventilation Fans

**PROPERTIES - MALLS / OFFICES**

- Water-cooled air conditioning system with a combination of conventional and oil-free chillers
- Air Lock Lobbies

**PROPERTIES - MANAGED RESIDENTIAL**

- Air Curtains
- Adjustment of Operating Time for Energy Consumption Equipment
**Energy Savings Initiatives**

**LIGHTING**
- Light Emitting Diodes (LEDs)
- Photo-Sensor Control Systems

**STATIONS**
- Temperature Gradient

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

**STATIONS**
- Platform Screen Doors
- Winter Full Exhaust Mode
- Escalator Energy Saving Mode
- Variable Frequency Drives (VFD)
- Chiller Replacement

**TRAINS AND TRACKS**
- Regenerative Braking
- Trackside Energy Storage (new technology)
- Train Coasting
- Trackside Ventilation Fans

**PROPERTIES - MALLS / OFFICES**
- Water-cooled air conditioning system with a combination of conventional and oil-free chillers
- Air Lock Lobbies

**PROPERTIES - MANAGED RESIDENTIAL**
- Air Curtains
- Adjustment of Operating Time for Energy Consumption Equipment
Energy Savings Initiatives

**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.

**Light Emitting Diodes (LEDs)**

**Photo-Sensor Control Systems**

**Temperature Gradient**

**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 Full Exhaust Mode**

**Escalator Energy Saving Mode**

**Variable Frequency Drives (VFD)**

**Chiller Replacement**

**Regenerative Braking**

**Trackside Energy Storage (new technology)**

**Train Coasting**

**Trackside Ventilation Fans**

**Water-cooled air conditioning system with a combination of conventional and oil-free chillers**

**Air Lock Lobbies**

**Air Curtains**

**Adjustment of Operating Time for Energy Consumption Equipment**
Energy Savings Initiatives

**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.

**Light Emitting Diodes (LEDs)**

**Photo-Sensor Control Systems**

**Temperature Gradient**

**Platform Screen Doors**

**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**

**Variable Frequency Drives (VFD)**

**Chiller Replacement**

**Regenerative Braking**

**Trackside Energy Storage (new technology)**

**Train Coasting**

**Trackside Ventilation Fans**

**Water-cooled air conditioning system with a combination of conventional and oil-free chillers**

**Air Lock Lobbies**

**Air Curtains**

**Adjustment of Operating Time for Energy Consumption Equipment**
Energy Savings Initiatives

- Escalator Energy Saving Mode - Redundant escalators are turned off during non-peak hours.
- Winter Full Exhaust Mode
- Platform Screen Doors
- Photo-Sensor Control Systems
- Temperature Gradient
- Light Emitting Diodes (LEDs)
- Variable Frequency Drives (VFD)
- Chiller Replacement
- Regenerative Braking
- Trackside Energy Storage (new technology)
- Train Coasting
- Trackside Ventilation Fans
- Water-cooled air conditioning system with a combination of conventional and oil-free chillers
- Air Lock Lobbies
- Air Curtains
- Adjustment of Operating Time for Energy Consumption Equipment
Energy Savings Initiatives

Variable Frequency Drives (VFD)
- We are installing VFDs at station ventilation systems enabling better energy efficiency. These are now being implemented in stations on the West Rail Line, which started as a pilot C40 Cities Climate Leadership Group initiative.

Variable Frequency Drives (VFD)
- Escalator Energy Saving Mode
- Winter Full Exhaust Mode
- Platform Screen Doors

Lighting
- Light Emitting Diodes (LEDs)
- Photo-Sensor Control Systems

Stations
- Temperature Gradient
- Platform Screen Doors
- Winter Full Exhaust Mode
- Escalator Energy Saving Mode
- Variable Frequency Drives (VFD)

Trains and Tracks
- Regenerative Braking
- Trackside Energy Storage (new technology)
- Train Coasting
- Trackside Ventilation Fans

Properties - Malls / Offices
- Water-cooled air conditioning system with a combination of conventional and oil-free chillers
- Air Lock Lobbies

Properties - Managed Residential
- Air Curtains
- Adjustment of Operating Time for Energy Consumption Equipment
### Energy Savings Initiatives

**Chiller Replacement**
- Implementing life cycle cost assessment, we will be implementing our 10-year chiller replacement plan in stations, equipping them with higher efficiency chillers (variable speed drive/oil free).

**STATIONS**
- Temperature Gradient
- Platform Screen Doors
- Winter Full Exhaust Mode
- Escalator Energy Saving Mode
- Variable Frequency Drives (VFD)

**LIGHTING**
- Light Emitting Diodes (LEDs)
- Photo-Sensor Control Systems

**PROPERTIES - MALLS / OFFICES**
- Water-cooled air conditioning system with a combination of conventional and oil-free chillers
- Air Lock Lobbies

**PROPERTIES - MANAGED RESIDENTIAL**
- Air Curtains
- Adjustment of Operating Time for Energy Consumption Equipment

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**SAFETY**
- Regenerative Braking
- Trackside Energy Storage (new technology)
- Train Coasting
- Trackside Ventilation Fans

**ENVIRONMENT**
- Air Curtains
- Adjustment of Operating Time for Energy Consumption Equipment
Energy Savings Initiatives

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.

STATIONS
- Temperature Gradient
- Platform Screen Doors
- Winter Full Exhaust Mode
- Escalator Energy Saving Mode
- Variable Frequency Drives (VFD)
- Chiller Replacement

TRAINS AND TRACKS
- Regenerative Braking

Light Emitting Diodes (LEDs)
Photo-Sensor Control Systems

PROPERTIES - MALLS / OFFICES
- Trackside Energy Storage (new technology)
- Trackside Ventilation Fans

PROPERTIES - MANAGED RESIDENTIAL
- Water-cooled air conditioning system with a combination of conventional and oil-free chillers
- Air Lock Lobbies

ADJUSTMENT OF OPERATING TIME FOR ENERGY CONSUMPTION EQUIPMENT
Energy Savings Initiatives

**Trackside Energy Storage (new technology)**

We are in the process of implementing new super-capacitor trackside energy storage devices on some lines aimed at better utilisation of surplus energy generated by train regenerative braking.

**Light Emitting Diodes (LEDs)**

**Photo-Sensor Control Systems**

**STATIONS**

**Temperature Gradient**

**Platform Screen Doors**

**Winter Full Exhaust Mode**

**Escalator Energy Saving Mode**

**Variable Frequency Drives (VFD)**

**Chiller Replacement**

**TRAIN AND TRACKS**

**Regenerative Braking**

**Trackside Energy Storage (new technology)**

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

**Train Coasting**

**Trackside Ventilation Fans**

**PROPERTIES - MALLS / OFFICES**

**Water-cooled air conditioning system with a combination of conventional and oil-free chillers**

**Air Lock Lobbies**

**PROPERTIES - MANAGED RESIDENTIAL**

**Air Curtains**

**Adjustment of Operating Time for Energy Consumption Equipment**
Energy Savings Initiatives

Trackside Energy Storage (new technology)

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 Fans

Water-cooled air conditioning system with a combination of conventional and oil-free chillers

Air Lock Lobbies

Air Curtains

Adjustment of Operating Time for Energy Consumption Equipment
Energy Savings Initiatives

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

STATIONS
- Temperature Gradient
- Platform Screen Doors
- Winter Full Exhaust Mode
- Escalator Energy Saving Mode
- Variable Frequency Drives (VFD)
- Chiller Replacement

TRAINS AND TRACKS
- Regenerative Braking
- Trackside Energy Storage (new technology)
- Train Coasting

Trackside Ventilation Fans

PROPERTIES - MALLS / OFFICES
- Water-cooled air conditioning system with a combination of conventional and oil-free chillers
- Air Lock Lobbies

PROPERTIES - MANAGED RESIDENTIAL
- Air Curtains
- Adjustment of Operating Time for Energy Consumption Equipment
Energy Savings Initiatives

**Lighting**
- Light Emitting Diodes (LEDs)
- Photo-Sensor Control Systems

**Stations**
- Temperature Gradient
- Platform Screen Doors
- Winter Full Exhaust Mode
- Escalator Energy Saving Mode
- Variable Frequency Drives (VFD)
- Chiller Replacement

**Trains and Tracks**
- Regenerative Braking
- Trackside Energy Storage (new technology)
- Train Coasting
- Trackside Ventilation Fans

**Properties - Malls / Offices**
- Water-cooled air conditioning system with a combination of conventional and oil-free chillers

Water-cooled air conditioning system with a combination of conventional and oil-free chillers - The use of water-cooled systems are more energy efficient than traditional air coolers, and can save up to 20% in energy use.

**Properties - Managed Residential**
- Air Curtains
- Adjustment of Operating Time for Energy Consumption Equipment
**Energy Savings Initiatives**

**Air Lock Lobbies**
- Preventing external hot air from entering and keeping lobbies cooled more effectively.

**Energy Saving Initiatives**
- Water-cooled air conditioning system with a combination of conventional and oil-free chillers
- Air Lock Lobbies
- Air Curtains
- Adjustment of Operating Time for Energy Consumption Equipment

**Sustainable Resource Use**
- Climate Change
- Environmental Protection
- Light Emitting Diodes (LEDs)
- Photo-Sensor Control Systems

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- Customers
- Supply Chain
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**View Stories**

**Environment**
- Temperature Gradient
- Platform Screen Doors
- Winter Full Exhaust Mode
- Escalator Energy Saving Mode
- Variable Frequency Drives (VFD)
- Chiller Replacement

**Trains and Tracks**
- Regenerative Braking
- Trackside Energy Storage (new technology)
- Train Coasting
- Trackside Ventilation Fans

**Properties - Malls / Offices**
- Air Lock Lobbies
- Air Curtains
- Adjustment of Operating Time for Energy Consumption Equipment

**Properties - Managed Residential**
- Air Curtains
Energy Savings Initiatives

Air Curtains - installing air curtains to the air-conditioning fresh air unit at the Clubhouse’s Olympic Hall of The Palazzo to enable energy savings.
Adjustment of operating time for energy consumption equipment - re-adjusting the operating time for lighting and chillers at common areas.
Green buildings

In 2010, we became the first company involved in property development in Hong Kong to implement voluntary environmental standards in a systematic way with a commitment that a number of our new residential property developments would achieve as a minimum the 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.

As we develop more properties in the coming years and renovate our existing managed properties, we are planning to install and utilise equipment that will reduce the buildings' environmental impact.

This table provides a summary of properties and stations that received provisional assessment or certification for environmental standards by the end of 2015.

### BEAM Plus, BEAM and LEED Certifications for Properties and Stations

<table>
<thead>
<tr>
<th>Building Standard</th>
<th>Property</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEAM Plus Gold (Provisional Assessment)</td>
<td>Austin Station Residential</td>
<td>2012</td>
</tr>
<tr>
<td>BEAM Plus Gold (Provisional Assessment)</td>
<td>Nam Cheong Station Residential</td>
<td>2013</td>
</tr>
<tr>
<td>BEAM Plus Gold (Provisional Assessment)</td>
<td>Tsuen Wan West Station Bayside Residential</td>
<td>2014</td>
</tr>
<tr>
<td>BEAM Plus Gold (Provisional Assessment)</td>
<td>Tsuen Wan West Station Cityside Residential</td>
<td>2015</td>
</tr>
<tr>
<td>BEAM Plus Gold (Provisional Assessment)</td>
<td>Tsuen Wan West Station Tsuen Wan 6 Residential</td>
<td>2015</td>
</tr>
<tr>
<td>BEAM Silver</td>
<td>Kowloon West Rail Terminus</td>
<td>2010</td>
</tr>
<tr>
<td>BEAM Platinum</td>
<td>The Riverpark, Shatin</td>
<td>2013</td>
</tr>
<tr>
<td>LEED Operations and Maintenance: Gold</td>
<td>Two IFC</td>
<td>2013</td>
</tr>
<tr>
<td>LEED Core and Shell: Silver</td>
<td>University Station Entrance</td>
<td>2013</td>
</tr>
</tbody>
</table>

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**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 for new buildings, 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% 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%, 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 Consumptions (m³)

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1,960,585</td>
<td>2,023,116</td>
</tr>
<tr>
<td>Railway Operations</td>
<td>851,639</td>
<td>870,630</td>
</tr>
<tr>
<td>Managed and Investment Properties</td>
<td>1,108,946</td>
<td>1,152,486</td>
</tr>
</tbody>
</table>

Conservation of water

We implement measures to conserve water in our managed properties. For example, grey water recycling system at the LOHAS Park collects and treats up to 440,000 litres of water a day from the Capitol and Le Prestige. The system recycles some of the wastewater for re-use in landscaping and cleaning of outdoor public spaces.
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.

We fully support the UITP Declaration on Climate Leadership, which is an 11-point declaration outlining the impact of climate change, our responsibility to act and our commitment to be Climate Leaders.

On 12 December 2015, the Paris Agreement was adopted by the governments of 195 countries following two weeks of negotiations at the 21st Conference of Parties in Paris (COP 21). The international agreement sets an ambition to keep temperature rise below 2°C; as well as to make efforts to keep it below 1.5°C with countries to set emission reduction targets. The MTR Corporation applauds this milestone. Leading up to COP 21 and in support of it, we provided information regarding our climate change measures in the Hong Kong Government’s Climate Change Report 2015 launched in November 2015.

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.

Climate Risks

At corporate level, the Company’s Enterprise Risk Management (ERM) Framework also includes a yearly risk assessment of climate risks. Specific issues related to climate change impacting railway operations, property development, investment and management facilities are identified and managed at asset-level by respective departments. When reviewing the risks, we make reference to local and international organisations including the UITP and the Hong Kong-based Business Environment Council.

Mitigation

Greenhouse gas emissions

We have been reporting 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.

With the majority of our GHG emissions coming from energy use, our mitigation strategy is significantly dependent on our energy saving efforts.
GREENHOUSE GAS EMISSIONS (tCO\textsubscript{2}e)

Scope 1 emissions are direct GHG emissions from sources that are owned or controlled by the Company, such as emissions from fossil fuels burned on site.

Scope 2 emissions are indirect GHG emissions resulting from the generation of electricity, heating and cooling, or steam generated off site but purchased by the Company.

Scope 3 emissions include indirect GHG emissions from sources not owned or directly controlled by the Company but related to our activities.
### BREAKDOWN OF SCOPE 1 EMISSIONS (tCO₂e)

- **Corporate Support Functions and Main Office Buildings**
  - 2014: 13.8% (8,053)
  - 2015: 5.0% (2,895)
- **Transport Operations**
  - 2014: 80.8% (47,116)
  - 2015: 76% (39,311)
- **Total: 58,342**

- **Corporate Support Functions and Main Office Buildings**
  - 2014: 0.4% (278)
  - 2015: 0.5% (274)
- **Properties & Other Business**
  - 2014: 5.7% (2,943)
  - 2015: 2.3% (1,953)
- **Total: 51,752**

### BREAKDOWN OF SCOPE 2 EMISSIONS (tCO₂e)

- **Corporate Support Functions**
  - 2014: 20.4% (276,972)
  - 2015: 19.5% (245,776)
- **Transport Operations**
  - 2014: 78.0% (1,056,204)
  - 2015: 79.0% (1,004,316)
- **Properties & Other Business**
  - 2014: 0.4% (4,804)
  - 2015: 0.4% (4,705)
- **Total: 1,354,625**

### BREAKDOWN OF SCOPE 3 EMISSIONS (tCO₂e)

- **Corporate Support Functions**
  - 2014: 0.4% (661)
  - 2015: 0.8% (761)
- **Network Expansion**
  - 2014: 96.3% (81,375)
  - 2015: 90.7% (30,064)
- **Transport Operations**
  - 2014: 1.2% (16,645)
  - 2015: 1.1% (14,029)
- **Properties & Other Business**
  - 2014: 2.1% (1,928)
  - 2015: 5.8% (475)
- **Total: 84,468**

- **Corporate Support Functions**
  - 2014: 0.4% (4,705)
  - 2015: 0.6% (479)
- **Network Expansion**
  - 2014: 90.7% (39,311)
  - 2015: 96.3% (81,375)
- **Transport Operations**
  - 2014: 1.1% (14,029)
  - 2015: 1.4% (475)
- **Properties & Other Business**
  - 2014: 4,804
  - 2015: 4,705
- **Total: 1,258,826**
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.

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 2015 from their website.

Climate change mitigation
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.

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% 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.

Did you know?
In 2015, the Hong Kong Construction Industry Council launched 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** — To increase by 1.5–3°C by 2060 and 3–6°C by 2100.
- **Average Annual Rainfall** — To increase by 11% by 2100.
- **Extreme Rain** — Rain events > 100mm 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.

Heavy rain and flooding

Railway structures are designed and built for a long lifespan. 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. To provide safe and reliable service to our customers, our Operations Division has incorporated appropriate procedures for frontline staff, including special procedures and equipment for extreme weather such as stronger typhoons, rainstorms, amongst others. Our Property Division has also taken steps to ensure the implementation of procedures and that there is sufficient manpower and equipment to handle serious flooding situations.

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. We have been implementing heat stress prevention measures and guidelines across all our sites during hot summer months in line with the advice published by the Hong Kong Labour Department.

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.

Learn more...

During 2014, we published MTR Typhoon Travelling Tips, a guide to promote safe travel for passengers during extreme weather.
ENVIRONMENTAL PROTECTION

Noise

Rail operations

Noise generated by operations of our trains and maintenance activities on our railway network is a major concern for affected stakeholders. During 2015, our Operations Division received 246 complaints about noise, accounting for 91% of all environment-related complaints received throughout the year.

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. While our railway is kept in good condition, we are also continually making improvements to mitigate the effects of operational train noise on the community. For example, in 2015 we implemented several initiatives such as modifying two turnouts to plain tracks near Yim Po Fong Street on the East Rail Line, and installing rail dampers on a section of the track from Sai Ying Pun Station to Sheung Wan Station to improve the saloon noise inside our trains.

Construction of new lines

When construction is in proximity to a densely populated area, we take extra care to control noise reasonably. As such, we have implemented a number of systematic initiatives to ensure consistent application of noise mitigation measures across the construction of new lines. These include:

- The employment of independent acoustic consultants
- Provision of a construction noise permit management plan
- Establishment of a permit-to-work system to ensure equipment use meets specifications and users are trained in noise control compliance.

Noise mitigation measures are typically developed through inter-departmental collaboration in the different project stages. This cooperation has enabled us to come up with innovative mitigation measures.

Innovative noise mitigation measures on new lines

To minimise noise disturbance in the construction of our new lines, we developed a “mobile sound insulation booth” for the East Rail Line platform strengthening works. These mobile, full noise enclosures can be set up within 15 minutes to reduce noise by 25 dB(A). The flexibility provided by these noise enclosures means we are able to carry out the retrofitting works at night during the non-traffic hours without disturbing neighbouring residents, and the platforms can be quickly restored to operational condition every morning.

Our noise mitigation measures are often designed to be aesthetically pleasing as well. The green noise enclosure/barriers around the viaduct section of South Island Line (East) will be complemented by trees and shrubs planted under the viaducts to help structures blend in with the natural landscape in the area.
Air Quality

Monitoring air quality in our trains and stations helps to ensure healthy and comfortable journeys for our passengers, whilst contributing to the wellbeing of our workers. We undertake regular indoor air quality monitoring in our railway system in accordance with the Government’s guidance note for railway facilities.

The carbon dioxide levels at our stations and in our trains in 2015 are within 2,500 ppm in peak traffic hours.* No measurements of carbon dioxide levels during the monitoring periods exceeding the EPD Level One hourly average criteria have been recorded. Air quality of this standard indicates “good air quality of a comfortable railway facility with no health concerns identified,” and is defined as Level One Criteria by the Environmental Protection Department (EPD) of Hong Kong’s Practice Note for managing air quality in air-conditioned railway facilities.

*Carbon dioxide is selected as a surrogate indicator because its concentration in an indoor environment is a good indicator of the effectiveness of ventilation systems and the adequacy of ventilation. Reference: “Practice Note for Managing Air Quality in Air-conditioned Public Transport Facilities.”

Did you know?

Using modern Euro buses

MTR Bus has been providing a safe and comfortable feeder service for residents of the Northwest New Territories since the railway merger.

Since 2012, a total of 52 replacement buses have been introduced, all fitted with environmentally friendly Euro V engines, meeting the latest and most stringent emissions standards in Hong Kong. The next round of replacement involves 68 buses which will be in full service before the end of 2017.
Waste

Our new rail projects generate large 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, and to reuse excavation materials on-site and on other projects.

Recycling of construction waste

We are able to reuse or recycle about two-thirds of excavation materials 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% of the waste generated during construction of our Austin Station residential development into eco-friendly paving blocks and also recycled 60% of waste generated from demolition of an existing car park at our Tsuen Wan West Station Cityside development.

Recycling waste from railway operations

Each station in our heavy rail network has at least one set of recycling bins, and more for larger and more frequented stations. We are working to add more recycling bins in selected stations, as well as to inform customers of the locations of these bins. We are also currently working on the robust collection and reporting of our waste data – both recycled and general waste in preparation for the Government’s proposed regulation on waste.

We have also implemented recycling programmes for metals and spent oil.

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 storm drainage/sewerage system, which is maintained by the Drainage Services Department.

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 liaise with waste recyclables collection contractors and organise green visits for our residents. We also work jointly with the 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.

Partnerships to reduce food waste

To contribute to tackling the issue on food waste, MTR joined the Food Wise Hong Kong Campaign as one of its first signatories and as a member of its steering committee to support the Government and other stakeholders. We strive to reduce the environmental impacts of food waste in the following ways:

**MTR Malls** — Under our self-initiated MTR Malls Food Waste Reduction Pledge, we work with food and beverage tenants to minimise potential waste at source and to promote food-waste reduction practices in the shopping mall sector. In 2015, we partnered with Food Angel for a pilot programme to collect edible surplus food from our Food and Beverage tenants to benefit the underprivileged communities in Hong Kong.

**Managed residential estates** — Under our Central Food Waste Recycling for Improving Estate Environment initiative, we have organised different promotional programmes such as Leftover Dyeing Workshop to encourage residents to turn their food waste into other uses and installed food waste composting machines to convert food waste into compost at some of our managed properties.

According to a report issued by the Environmental Protection Department, Hong Kong generates over 3,000 tonnes of food waste every day. The Food Wise Hong Kong Steering Committee formulates and oversees the implementation strategy of the Food Wise Hong Kong Campaign.
Ecology

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

Tree Protection

In 2015 we developed DANTE Tree for implementation on Shatin to Central Link. It is a collaborative platform that acts as a central control hub for conducting tree health and risk evaluation for over 3,000 trees. This web-based application is loaded with built-in local arboriculture knowledge and provides visualisation interfaces for our new railway projects. Since the implementation of the system, the survival rate of our trees (both transplanted and retained) has been maintained well above 90% with no incidents or accidents related to tree health. The DANTE Tree was awarded the Certificate of Merit in the Best Innovation (Green ICT Innovation) category under the annual Hong Kong ICT Awards scheme.

To date, we have transplanted about 2,000 trees as part of the five railway projects.

Lok Ma Chau (LMC) Ecological Enhancement Area

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 ecologically 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. For the past 13 years, we have been working with a group of environmental professionals on the management of the EEA. This arrangement is the first of its kind and an example of best practice in the region on biodiversity management.
The LMC EEA is an exemplary example of wetland compensation. Through consistent implementation of high quality habitat management, ecological monitoring and research, it has set the standard for similar projects in Hong Kong. Part of its success can be attributed to the management team’s flexibility to adapt management practices, willingness to introduce new measures, and receptiveness to advice given by the Environmental Committee.

Bena Smith, Mai Po, WWF - Hong Kong, LMC Environmental Committee Member

Conservation of migratory birds

The marshes and fishpond areas of the EEA provide important nesting sites for migratory birds. During the 2015 breeding season, for example, 136 pairs of birds representing 10 different species are believed to have bred successfully. Overall, more than 260 species have been spotted in the EEA since 2007, about half of all species ever recorded in Hong Kong. There is also high abundance of a globally-threatened species called the Black-faced Spoonbill (Platalea minor).

We are working on implementing measures to improve the habitat of a local concern targeted species such as the Pheasant-tailed Jacana (Hydrophasianus chirurgus).

Conservation of other species

The EEA also provides various habitats to 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.

Karen Barretto, Friends of the Earth Hong Kong, LMC Environmental Committee Member

MTR have demonstrated their commitment by putting money towards the project and monitoring its performance and this has meant that a highly valuable model of excellence has been created which sets the benchmark for other projects here in Hong Kong and elsewhere.