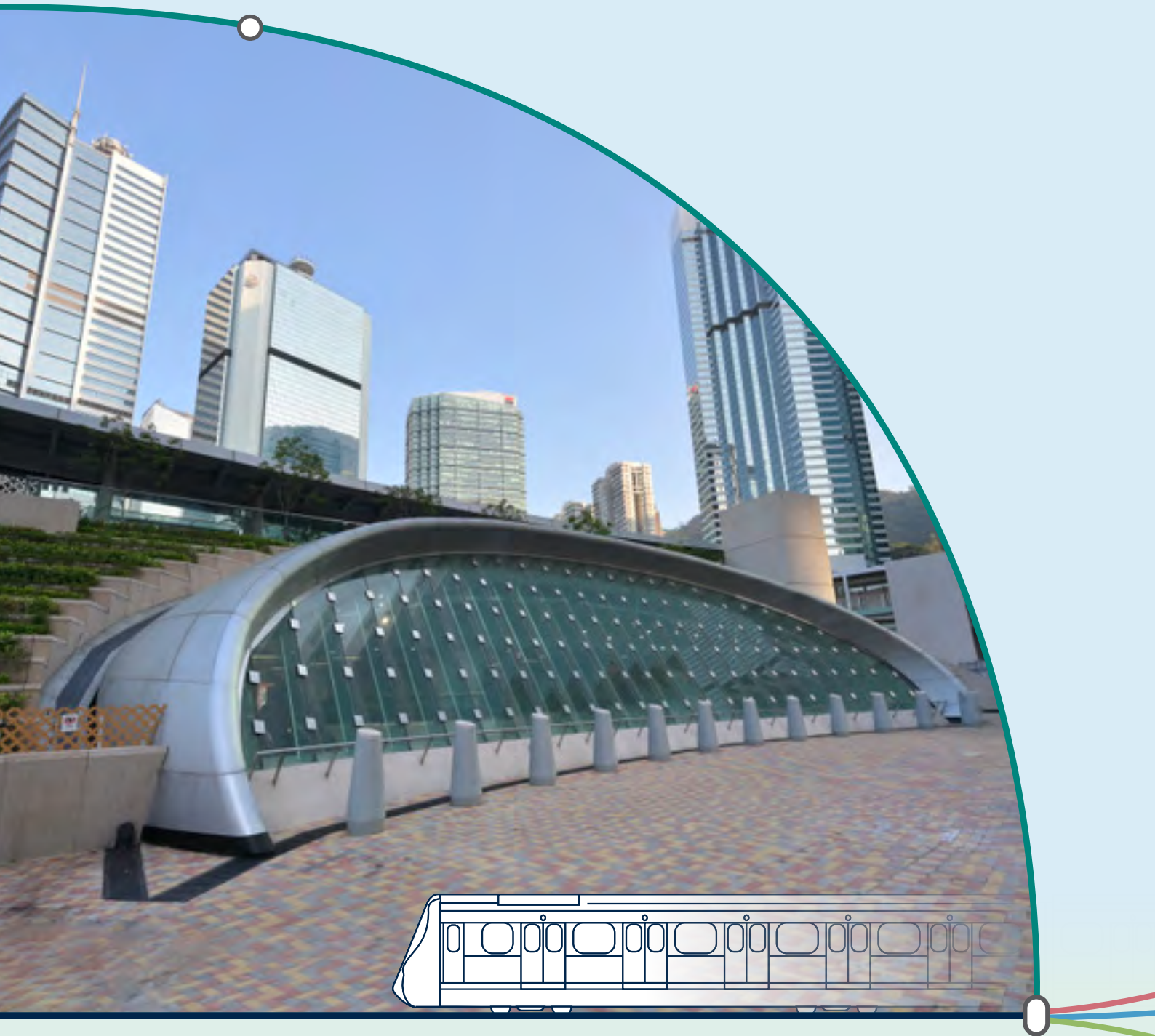


SUSTAINABLE FINANCE REPORT 2022



Introduction

As a corporation whose main business is to provide low carbon transportation to keep cities moving, sustainable financing constitutes a substantial portion of MTR's overall borrowing. MTR issued the first Green Bond in 2016, and has continued its efforts in raising different types of sustainable finance since then.

Up to the end of 2022, MTR has raised more than HK\$ 32 billion equivalent of sustainable financing to fund or refinance the various projects described in this report.

Within MTR, the Sustainability Team (previously part of the Public Affairs Department) has been grouped under the Environment and Social Responsibility Department, which is part of the Legal and Governance Function.

Sustainable Finance Portfolio

At the end of 2022, MTR's outstanding sustainable finance portfolio consisted of 20 bonds (in four different currencies) as well as two loans (in EUR and HKD). The bonds were issued by either MTR or its issuance vehicle MTR Corporation (C.I.) Limited ("MTR CI") with the guarantee of MTR.

In 2022, three bonds in the portfolio (one in HKD and two in CNY, totaling HK\$ 2.0 billion equivalent) were redeemed and two loans in HKD (totaling HK\$ 1.9 billion) were repaid/cancelled. Eight new bonds totaling HK\$ 2.8 billion equivalent were arranged to replace the matured financing and fund new projects. The outstanding sustainable finance at the end of 2022 slightly reduced to HK\$ 25.0 billion equivalent from HK\$26.1 billion a year ago.

The following table lists out the sustainable financing that were outstanding as of 31 December 2022.

Outstanding Green Bonds

| Year Issued | Identifier/ISIN | Issuer | Currency | Coupon (p.a.) | Maturity Date | Principal Amount |
|-------------|--------------------------------|--------|----------|---------------|---------------|-------------------|
| 2016 | MTRCIGB_USD_261102XS1509084775 | MTR CI | USD | 2.500% | 2 Nov 2026 | USD 600,000,000 |
| 2017 | MTRCIGB_AUD_270628XS1637858546 | MTR CI | AUD | 3.300% | 28 Jun 2027 | AUD 171,000,000 |
| 2017 | MTRCIGB_HKD_320920HK0000365228 | MTR CI | HKD | 2.460% | 20 Sep 2032 | HKD 722,000,000 |
| 2017 | MTRGB_HKD_470717HK0000352432 | MTR | HKD | 2.980% | 17 Jul 2047 | HKD 338,000,000 |
| 2017 | MTRCIGB_HKD_470906HK0000362761 | MTR CI | HKD | 2.830% | 06 Sep 2047 | HKD 315,000,000 |
| 2017 | MTRGB_USD_470927XS1690683211 | MTR | USD | 3.375% | 27 Sep 2047 | USD 100,000,000 |
| 2018 | MTRCIGB_HKD_480328HK0000409455 | MTR CI | HKD | 3.150% | 28 Mar 2048 | HKD 230,000,000 |
| 2020 | MTRGB_USD_300819XS2213668085 | MTR | USD | 1.625% | 19 Aug 2030 | USD 1,200,000,000 |
| 2020 | MTRGB_HKD_550624HK0000612025 | MTR | HKD | 2.550% | 24 Jun 2055 | HKD 500,000,000 |
| 2021 | MTRGB_CNY_230408HK0000722089 | MTR | CNY | 2.850% | 8 Apr 2023 | CNY 350,000,000 |
| 2021 | MTRGB_CNY_240324HK0000707460 | MTR | CNY | 2.900% | 24 Mar 2024 | CNY 1,000,000,000 |
| 2021 | MTRGB_CNY_240325HK0000707445 | MTR | CNY | 2.800% | 25 Mar 2024 | CNY 250,000,000 |
| 2022 | MTRGB_HKD_240815HK0000871613 | MTR | HKD | 3.250% | 15 Aug 2024 | HKD 500,000,000 |
| 2022 | MTRGB_CNY_240906HK0000874187 | MTR | CNY | 2.850% | 6 Sep 2024 | CNY 250,000,000 |
| 2022 | MTRGB_CNY_240912HK0000877156 | MTR | CNY | 2.870% | 12 Sep 2024 | CNY 420,000,000 |
| 2022 | MTRGB_HKD_241028HK0000881935 | MTR | HKD | 5.000% | 28 Oct 2024 | HKD 450,000,000 |
| 2022 | MTRGB_HKD_241101HK0000887429 | MTR | HKD | 5.000% | 1 Nov 2024 | HKD 312,000,000 |
| 2022 | MTRGB_HKD_240502HK0000887635 | MTR | HKD | 4.960% | 2 May 2024 | HKD 330,000,000 |
| 2022 | MTRGB_HKD_241103HK0000887742 | MTR | HKD | 4.970% | 3 Nov 2024 | HKD 310,000,000 |
| 2022 | MTRGB_HKD_271212HK0000895661 | MTR | CNY | 2.900% | 12 Dec 2027 | CNY 150,000,000 |

Outstanding Green Loans/Sustainable Loans/Credit Facilities

| Year Executed | Identifier | Currency | Maturity Date | Loan Amount |
|---------------|------------------|----------|---------------|-------------------|
| 2020 | MTRGL_HKD_250618 | HKD | 18 Jun 2025 | HKD 1,500,000,000 |
| 2021 | MTRGL_EUR_260111 | EUR | 11 Jan 2026 | EUR 100,000,000 |

Project Portfolio

In 2022, a new project (#M – Replacement of Light Rail Vehicles) was added under the Train Lines and Infrastructure section of the portfolio.

Details of the projects as well as the allocation of the financing to the various projects are available in later part of this report.

| # | Name of Project | Classification | Total Project Amount | Cost Incurred up to Dec 2022 | Amount Financed by Sustainable Finance Proceeds |
|-------------------------------------------|------------------------------------------------------|-------------------------------|----------------------------|------------------------------|-------------------------------------------------|
| Train Lines and Infrastructure | | | | | |
| A | Kwun Tong Line Extension | Low Carbon Transportation | HK\$ 6,900 million | HK\$ 6,581million | HK\$ 5,425 million |
| B | South Island Line (East) | Low Carbon Transportation | HK\$ 17,200 million | HK\$ 17,047 million | HK\$ 14,044 million |
| C | Replacement of 1 st Generation M-Trains | Low Carbon Transportation | HK\$ 7,100 million | HK\$ 1,589 million | HK\$ 1,200 million |
| D | Replacement of Rail Power Line | Low Carbon Transportation | HK\$ 4,900 million | HK\$ 445 million | HK\$ 194 million |
| E | Battery Locomotives Acquisition | Low Carbon Transportation | HK\$ 265 million | HK\$ 53 million | HK\$ 21 million |
| M | Replacement of Light Rail Vehicles | Low Carbon Transportation | HK\$ 980 million | HK\$ 822 million | HK\$ 400 million |
| Energy Efficiency Improvement | | | | | |
| F | Replacement of Chillers at Stations/Depot Facilities | Energy Efficiency | HK\$ 1,100 million | HK\$ 1,023 million | HK\$ 1,023 million |
| G | Trackside Energy Storage (pilot) | Energy Efficiency | HK\$ 21 million | HK\$ 21 million | HK\$ 21 million |
| H | Smart Intelligent Power Module (R-IPM) | Energy Efficiency | HK\$ 98 million | HK\$ 90 million | HK\$ 90 million |
| I | Regenerative Station Energy Saving Inverter System | Energy Efficiency | HK\$ 8 million | HK\$ 7 million | HK\$ 7 million |
| Sustainable Stations and Buildings | | | | | |
| J | Maritime Square Extension | Sustainable Real Estate | HK\$ 2,600 million | HK\$ 2,526 million | HK\$ 2,525 million |
| K | Carbon Neutral Station Design | Sustainable Transit Station | HK\$ 5 million | HK\$5 million | HK\$ 4 million |
| Biodiversity Preservation | | | | | |
| L | Lok Ma Chau Wetland | Biodiversity and conservation | HK\$ 4~5 million per year | HK\$ 28 million (from 2017) | HK\$ 28 million |
| Total: | | | HK\$ 41,200 million | HK\$ 30,237 million | HK\$ 24,982 million |

Use of Proceeds

The following table lists out how the financing proceeds were allocated to different projects, and the corresponding aggregate Greenhouse Gas (GHG) emission avoided.

| Year Raised | Description/ Identifier/ISIN | Principal Amount (HKD million equivalent) | Current Allocation in Projects (HKD million) | | | | | | | | | | | | | Total GHG emission avoidance (tonnes of CO ₂ e) |
|-----------------------------------------------------------------------------|----------------------------------------|----------------------------------------------|----------------------------------------------|---------------|--------------|------------|-----------|--------------|-----------|-----------|----------|--------------|----------|-----------|------------|---------------------------------------------------------------|
| | | | A | B | C | D | E | F | G | H | I | J | K | L | M | |
| Previous financings and allocation aggregated | | | | | | | | | | | | | | | | |
| 2016-2021 | Twelve green bonds and two green loan* | 22,150 | 5,425 | 13,138 | 700 | 194 | 5 | 731 | 19 | 90 | 1 | 1,825 | 4 | 18 | - | 48,480 |
| Allocation for financings raised in 2022 | | | | | | | | | | | | | | | | |
| 2022 | MTRGB_HKD_240815 HK0000871613 | 500 | - | - | 500 | - | - | - | - | - | - | - | - | - | - | 1,760 |
| 2022 | MTRGB_CNY_240906 HK0000874187 | 286 | - | - | - | - | - | - | - | - | - | 286 | - | - | - | 50 |
| 2022 | MTRGB_CNY_240912 HK0000877156 | 476 | - | 476 | - | - | - | - | - | - | - | - | - | - | - | 460 |
| 2022 | MTRGB_HKD_241028 HK0000881935 | 450 | - | 250 | - | - | - | - | - | - | - | - | - | - | 200 | 940 |
| 2022 | MTRGB_HKD_241101 HK0000887429 | 312 | - | - | - | - | - | 192 | - | - | 6 | 104 | - | 10 | - | 3,090 |
| 2022 | MTRGB_HKD_240502 HK0000887635 | 330 | - | 12 | - | - | 16 | - | 2 | - | - | 100 | - | - | 200 | 790 |
| 2022 | MTRGB_HKD_241103 HK0000887742 | 310 | - | - | - | - | - | 100 | - | - | - | 210 | - | - | - | 1,520 |
| 2022 | MTRGB_HKD_271212 HK0000895661 | 168 | - | 168 | - | - | - | - | - | - | - | - | - | - | - | 160 |
| Total Financing Amount and Allocation: | | 24,982 | 5,425 | 14,044 | 1,200 | 194 | 21 | 1,023 | 21 | 90 | 7 | 2,525 | 4 | 28 | 400 | |
| Total GHG emission avoidance for each project (tonnes of CO ₂ e) | | | 19,000 | 13,700 | 4,200 | 680 | 80 | 15,200 | - | 2,100 | 270 | 480 | - | - | 1,400 | 57,110 |
| GHG emission avoidance per HKD million investment | | | 3.51 | 0.98 | 3.51 | 3.51 | 3.89 | 14.86 | - | 23.4 | 37.26 | 0.19 | - | - | 3.51 | |

* Please refer to the 2016-2021 reports for the allocation of the financing proceeds raised in previous years. Allocation of outstanding individual financing will not change once assigned.

MTR Green Bond, Green Finance and Sustainable Finance Frameworks

MTR set up a **Green Bond Framework** (“GBF”) in October 2016. **Sustainalytics** opined that the GBF was in alignment with the four pillars of the Green Bond Principles (2016) established by the International Capital Market Association. Expanding upon the foundation of the GBF, MTR established a **Green Finance Framework** (“GFF”) in June 2018 to enable it to include green loan financing in its financing portfolio. The GFF took into account the recommendation of the Green Loan Principles issued by the Asia Pacific Loan Market Association.

In August 2020, a **Sustainable Finance Framework** (“SFF”) was established so that the scope of eligible investments was further broadened to include projects in the development of sustainable urban infrastructure in support of the United Nations Sustainable Development Goals. A second-party **opinion** was provided by Sustainalytics on the SFF.

The Frameworks set out how the Corporation uses sustainable finance proceeds to fund or refinance eligible projects and initiatives that enhance long-term service levels and propel ESG (Environmental, Social and Governance) targets, as well as the reporting thereon, thereby integrating ESG elements into its financing process.

Summary of the Frameworks are as follows:

MTR Frameworks:

- MTR Green Bond Framework established in October 2016
- MTR Green Finance Framework established in June 2018
- MTR Sustainable Finance Framework established in August 2020
- Proceeds of sustainable financings will be used to fund or refinance, in whole or in part, Eligible Investments
- Proceeds of sustainable financings may be used to repay borrowings under MTR’s general credit facilities pending allocation to Eligible Investments
- Eligible Green Investments include projects in the following sectors:
 - Renewable Energy
 - Low Carbon Transportation
 - Energy Efficiency
 - Sustainable Transit Stations and Real Estate Properties
 - Adaptation to Climate Change
 - Biodiversity and Conservation
 - Water Management
 - Waste Management
 - Pollution Prevention
- Eligible Social Investments include projects in the following sectors:
 - Relief measures and programmes for employment generation and unemployment prevention for populations adversely affected by unexpected economic disruptions caused by natural disasters or pandemics. Relief measures may include, but are not limited to, rent moratorium for tenants
 - Affordable basic infrastructure, including initiatives, subsidy or investments in:
 - » Projects that support passengers affected by socioeconomic situation including but not limited to relief measures such as fare discount
 - » Sanitation and infection preventative services and equipment at transit stations, trains, buildings, real estates properties, facilities and infrastructure
 - » Projects for the design, construction, maintenance and upgrade of station facilities, services and train environment including but not limited to baby care and breast-feeding rooms for women, accessibility and barrier-free infrastructure and facilities for elderly and special need groups, among others

Sustainable investment descriptions and environmental benefits

As there are no material changes in Projects #G, #H, #K, and #L, descriptions of the projects are not repeated here but can be obtained from earlier [reports](#). Computations of the equivalent GHG emission avoided for Projects #A, #B, #C, #D, #G, #H and #M are provided in Appendix 1.

| Name of Investment | (#A) Kwun Tong Line Extension |
|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total Investment Amount | HK\$ 6,900 million |
| Investment Amount Funded by Sustainable Finance | HK\$ 5,425 million |
| Category of Eligible Investment | Low Carbon Transportation |
| Description of Investment | <p>In May 2011, the Company entered into project agreements with the Hong Kong SAR Government to design, construct and operate the Kwun Tong Line Extension ("KTL") and the South Island Line (East) ("SIL").</p> <p>KTL extends the existing Kwun Tong Line from Yau Ma Tei station by 2.6km, with two new stations at Ho Man Tin and Whampoa. KTL commenced operation in October 2016.</p> |
| Benefits of Project | The project provides low carbon transportation services to densely populated areas and helps reduce road traffic congestions experienced by the residents. |
| Passenger Trips for 2022 | 44,732,000 |
| Equivalent Carbon Offset (GHG Emission Avoided in tonnes CO ₂ e) | <p>24,200 tonnes CO₂ equivalent at total investment amount</p> <p>19,000 tonnes CO₂ equivalent at investment amount funded by sustainable finance.</p> <p>The methodology for estimating the Carbon Offset for project #A has been amended from 2022 to better reflect the nature of the extension line within the heavy rail network.</p> |
| Carbon Offset per Million Investment (HK\$) | 3.51 tonnes |
| Other Benefits | <ul style="list-style-type: none"> • Reduction of road traffic and congestion around the new stations as fewer cars are needed to transport passengers from the area. • Energy conservation measures such as regenerative braking systems, full platform screen doors and efficient chiller equipment were implemented. |

Sustainable investment descriptions and environmental benefits

| Name of Investment | (#B) South Island Line (East) |
|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total Investment Amount | HK\$ 17,200 million |
| Investment Amount Funded by Sustainable Finance | HK\$ 14,044 million |
| Category of Eligible Investment | Low Carbon Transportation |
| Description of Investment | <p>In May 2011, the Company entered into project agreements with the Hong Kong SAR Government to design, construct and operate the Kwun Tong Line Extension (“KTL”) and the South Island Line (East) (“SIL”).</p> <p>SIL is a 7km medium capacity metro line connecting the existing Admiralty station to the Southern District of Hong Kong, with four new stations at Ocean Park, Wong Chuk Hang, Lei Tung and South Horizons. SIL commenced operation in December 2016.</p> |
| Benefits of Project | <p>The project provides low carbon transportation services to densely populated areas and helps reduce road traffic congestions experienced by the residents. SIL was also designed with environmentally friendly features like regenerative braking and trackside energy storage systems, extended noise barriers and green roofs.</p> |
| Passenger Trips for 2022 | 42,336,000 |
| Equivalent Carbon Offset (GHG Emission Avoided in tonnes CO ₂ e) | <p>16,900 tonnes CO₂ equivalent at total investment amount.</p> <p>13,700 tonnes CO₂ equivalent at investment amount funded by sustainable finance.</p> |
| Carbon Offset per Million Investment (HK\$) | 0.98 tonnes |
| Other Benefits | <ul style="list-style-type: none"> • Estimated 600 kWh of electricity saved annually with the regenerative braking and trackside energy storage systems. • Reduction of road traffic and congestion especially at the Aberdeen Tunnel. |

Sustainable investment descriptions and environmental benefits

| Name of Investment | (#C) Replacement of First-Generation Metro Cammell EMU Trains (“M-Trains”) |
|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total Investment Amount | HK\$ 7,100 million |
| Investment Amount Funded by Sustainable Finance | HK\$ 1,200 million |
| Category of Eligible Investment | Low Carbon Transportation |
| Description of Investment | <p>As part of MTR’s long-term asset renewal strategy, 93 eight-car trains were procured to replace some of the first-generation M-trains, which have been in service for decades on Tsuen Wan Line, Kwun Tong Line, Island Line and Tseung Kwan O Line.</p> <p>19 out of 93 trains have been received and three of them have been put into passenger service while the remaining are undergoing stringent testing and commissioning procedures before being put into service.</p> |
| Benefit of Project | Some of the first-generation M-trains have reached an age where asset replacement must be carried out to ensure continuity of reliable services and smooth operations. |
| Equivalent Carbon Offset (GHG Emission Avoided in tonnes CO ₂ e) | <p>24,900 tonnes of CO₂ equivalent at total investment amount.</p> <p>4,200 tonnes of CO₂ equivalent at investment amount funded by sustainable finance.</p> |
| Carbon Offset per Million Investment (HK\$) | 3.51 tonnes |

Sustainable investment descriptions and environmental benefits

| Name of Investment | (#D) Replacement of Rail Power Line |
|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total Investment Amount | HK\$ 4,900 million |
| Investment Amount Funded by Sustainable Finance | HK\$ 194 million |
| Category of Eligible Investment | Low Carbon Transportation |
| Description of Investment | <p>Replacement of High Voltage and Low Voltage rail power line systems for Kwun Tong Line, Tsuen Wan Line and Island Line to maintain the reliability of the power supply system.</p> <p>The replacement also improves energy efficiency by adding Power Convertors to recycle traction power back into the power network.</p> |
| Benefit of Project | <p>The replacement is to ensure the reliability of the transport infrastructure over the long term, avoiding break down due to aging of the systems.</p> <p>Enhancements to the existing power system have been added in conjunction with the asset replacement program, including:</p> <ul style="list-style-type: none"> • Installation of five power converters for power recycling • Higher efficiency transformers to reduce power losses |
| Equivalent Carbon Offset (GHG Emission Avoided in tonnes CO ₂ e) | <p>17,200 tonnes of CO₂ equivalent at total investment amount.</p> <p>680 tonnes of CO₂ equivalent at investment amount funded by sustainable finance.</p> |
| Carbon Offset per Million Investment (HK\$) | 3.51 tonnes |
| Other Benefits | <p>The new power converters and higher efficiency transformers provide the following expected benefits.</p> <p>Power Converter savings: 1.7 GWh / year</p> <p>Transformer savings: 1.6 GWh / year</p> <p>Applying average emission factors of 0.535kgCO₂e/kWh for CLP¹ and HK Electric², these energy savings would result in avoidance of around 1,700 tonnes of CO₂e emission when completed. This would further improve the carbon offset but was not included in the calculation of the carbon offset for this project.</p> |

1. CLP emission factors for 2022 : 0.39kgCO₂e/kWh

2. HKE emission factors for 2022 : 0.68kgCO₂e/kWh

Sustainable investment descriptions and environmental benefits

| Name of Investment | (#E) Battery Locomotives Acquisition |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total Investment Amount | HK\$ 265 million |
| Investment Amount Funded by Sustainable Finance | HK\$ 21 million |
| Category of Eligible Investment | Low Carbon Transportation |
| Description of Investment | Procurement of 13 battery operated locomotives to replace eight diesel and five old battery locomotives. |
| Beneficial Environmental Impact Estimate | <p>The operating efficiency and performance of the new electric-battery locomotives will be an improvement over the existing diesel and battery locomotives.</p> <p>On average, each locomotive is active 8 hours / day</p> <p>For diesel locomotive, approximately 51 litres of diesel is consumed each hour.</p> <p>Diesel consumption per day: 8 x 51L = 408L</p> <p>Total CO₂e emission per year⁺ = 2.61 * 365 * 408 = 388.7 tonnes</p> <p>For electric-battery locomotive, CO₂e emission is calculated based on average emission factor of the power companies^{1,2}.</p> <p>Electric-Battery Locomotive (old)</p> <p>electricity consumption = 1,408 kWh / day</p> <p>Total CO₂e emission per year = 365 * 1,408 * 0.535 = 274.9 tonnes</p> <p>Electric-Battery Locomotive (new)</p> <p>electricity consumption = 1,360 kWh / day</p> <p>Total CO₂e emission per year = 365 * 1,360 * 0.535 = 265.6 tonnes</p> <p>Total CO₂e emission reduction for 13 locomotive replacements = 8 * (388.7 – 265.6) + 5 * (274.9 – 265.6) = 1,031.3 tonnes</p> |
| Equivalent Carbon Offset (GHG Emission Avoided in tonnes CO ₂ e) | <p>1,031 tonnes of CO₂ equivalent based on the average CO₂e emission factors of 0.535kgCO₂e/kWh for CLP¹ and HK Electric² at total investment amount.</p> <p>80 tonnes of CO₂ equivalent based on the average CO₂e emission factors of 0.535kgCO₂e/kWh for CLP¹ and HK Electric² at investment amount funded by sustainable finance.</p> |
| Carbon Offset per Million Investment (HK\$) | 3.89 tonnes |

1. CLP emission factors for 2022 : 0.39kgCO₂e/kWh

2. HKE emission factors for 2022 : 0.68kgCO₂e/kWh

+ Emission of CO₂e for usage of diesel can be obtained [here](#) (report by the Environmental Protection Department and the Electrical and Mechanical Services Department).

Sustainable investment descriptions and environmental benefits

| Name of Investment | (#M) Replacement of Light Rail Vehicles |
|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total Investment Amount | HK\$ 980 million |
| Investment Amount Funded by Sustainable Finance | HK\$ 400 million |
| Category of Eligible Investment | Low Carbon Transportation |
| Description of Investment | The project is to purchase 40 new light rail vehicles (LRV) as part of MTR’s long-term asset renewal strategy, to replace as well as to add capacity to the existing vehicles (replacing 30 old Phase II LRVs). |
| Benefit of Project | Asset replacement must be carried out to ensure continuity of reliable services and smooth operations. |
| Equivalent Carbon Offset (GHG Emission Avoided in tonnes CO ₂ e) | 3,400 tonnes of CO₂ equivalent at total investment amount 1,400 tonnes of CO₂ equivalent at amount funded by sustainable finance |
| Carbon Offset per Million Investment (HK\$) | 3.51 tonnes |

Sustainable investment descriptions and environmental benefits

| Name of Investment | (#F) Replacement of Chillers at Stations/Depot Facilities |
|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total Investment Amount | HK\$ 1,100 million |
| Investment Amount Funded by Sustainable Finance | HK\$ 1,023 million |
| Category of Eligible Investment | Energy Efficiency |
| Description of Investment | <p>The project is to replace a total of 154 chillers at 38 MTR stations and four railway depots with more advanced and environmentally friendly systems by 2023.</p> <p>The new station chillers will provide a more comfortable station environment for passengers, with enhanced energy efficiency using variable-frequency drive inverter technology that could adjust the power output based on the actual temperature detected.</p> |
| Beneficial Environmental Impact Estimate | <p>With the higher operating efficiency and performance of the new chillers, the total number of chillers needed is reduced. Total energy consumption is expected to be reduced by 30.4 GWh when the project is completed:</p> <p><u>Estimation of benefit</u></p> <p>Old chillers total energy consumption per annum: 92.1 GWh</p> <p>New chillers total energy consumption per annum: 61.7 GWh</p> <p>Estimated energy conserved per annum: 30.4 GWh</p> |
| Progress of Investment and Measured Benefits | <p>As of December 2022, all 154 old chillers have been replaced by new chillers.</p> <p>Computation of savings in energy based on specification numbers is at approximately 30.4 GWh per year</p> |
| Equivalent Carbon Offset (GHG Emission Avoided in tonnes CO ₂ e) | <p>16,200 tonnes of CO₂ equivalent based on the average CO₂e emission factors of 0.535kg CO₂e/kWh for CLP¹ and HK Electric² at total investment amount.</p> <p>15,200 tonnes of CO₂ equivalent based on the average CO₂e emission factors of 0.535kg CO₂e/kWh for CLP¹ and HK Electric² at investment amount funded by sustainable finance.</p> |
| Carbon Offset per Million Investment (HK\$) | 14.86 tonnes |

1. CLP emission factors for 2022 : 0.39kgCO₂e/kWh

2. HKE emission factors for 2022 : 0.68kgCO₂e/kWh

Sustainable investment descriptions and environmental benefits

| Name of Investment | (#1) Regenerative Station Energy Saving Inverter System | | | | | | |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|--------|---------------------------------------------|--------|------------------------------------|--------|
| Total Investment Amount | HK\$ 8 million | | | | | | |
| Investment Amount Funded by Sustainable Finance | HK\$ 7 million | | | | | | |
| Category of Eligible Investment | Energy Efficiency | | | | | | |
| Description of Investment | <p>Installation of Station Energy Saving Inverter (S-EIV) at Hong Kong University Station (HKU) and Lai King Traction Substation (LKT).</p> <p>The S-EIV converts the regenerative energy produced by the train braking system into 415V low-voltage alternative current electricity that can be consumed by the station facilities, thereby increasing the utilization of regenerative energy and reducing external electricity consumption.</p> <p>At Hong Kong University Station, the installation of the S-EIV also helps to decelerate trains more effectively and improve stopping accuracy at the West Island Line stations.</p> | | | | | | |
| Beneficial Environmental Impact Estimate | <table border="0"> <tr> <td>Annual savings estimated in HKU station:</td> <td>170MWh</td> </tr> <tr> <td>Annual savings estimated in LKT substation:</td> <td>409MWh</td> </tr> <tr> <td>Total electricity saved per annum:</td> <td>579MWh</td> </tr> </table> | Annual savings estimated in HKU station: | 170MWh | Annual savings estimated in LKT substation: | 409MWh | Total electricity saved per annum: | 579MWh |
| Annual savings estimated in HKU station: | 170MWh | | | | | | |
| Annual savings estimated in LKT substation: | 409MWh | | | | | | |
| Total electricity saved per annum: | 579MWh | | | | | | |
| Equivalent Carbon Offset (GHG Emission Avoided in tonnes CO ₂ e) | <p>310 tonnes of CO₂ equivalent based on the average CO₂e emission factors of 0.535kgCO₂e/kWh for CLP¹ and HK Electric² at total investment amount.</p> <p>270 tonnes of CO₂ equivalent based on the average CO₂e emission factors of 0.535kgCO₂e/kWh for CLP¹ and HK Electric² at investment amount funded by sustainable finance.</p> | | | | | | |
| Carbon Offset per Million Investment (HK\$) | 37.26 tonnes | | | | | | |

1. CLP emission factors for 2022 : 0.39kgCO₂e/kWh

2. HKE emission factors for 2022 : 0.68kgCO₂e/kWh

Sustainable investment descriptions and environmental benefits

| Name of Investment | (#J) Maritime Square Extension | | | | | | | | | | | | |
|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-------------------------------|--------------------------------------------------|------|-------|-------|------|-------|-------|------|-------|-------|
| Total Investment Amount | HK\$ 2,600 million | | | | | | | | | | | | |
| Investment Amount Funded by Sustainable Finance | HK\$ 2,525 million | | | | | | | | | | | | |
| Category of Eligible Investment | Sustainable Real Estate Properties | | | | | | | | | | | | |
| Description of Investment | <p>It is a shopping mall building with the design of a “Floating Garden” with multi-level accessible green terraces, seamlessly integrated with the interior spaces and a water covered skylight at the roof garden which brings in dynamic natural lighting to the core atrium of the mall interior.</p> <p>Implementation of energy-saving initiatives includes 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.</p> | | | | | | | | | | | | |
| Benefits of Project | <p>The project has attained the Beam Plus Silver accreditation, a strong achievement for a non-office commercial building (shopping mall). The energy savings is estimated at 25.9% for the commercial portion and 21.6% for the car park respectively (average 23.8%).</p> | | | | | | | | | | | | |
| Beneficial Environmental Impact Estimate | <p>The annual electricity consumption for the Maritime Square extension for 2022 was 4,083 MWh.</p> <p>While most of energy consumption is at the commercial portion of the mall (versus carpark), conservatively we use the average of the 2 saving rates listed above to compute the total energy saved.</p> <p>Savings of 23.8% amounted to about 1,275MWh (for 2022), equivalent to CO₂e emission avoidance of 497 tonnes based on CLP’s¹ (provider of electricity in Tsing Yi area) CO₂e emission factor.</p> <p>The following was the recorded energy consumption for 2020-2022.</p> <table border="1"> <thead> <tr> <th>Year</th> <th>Electricity Consumption (MWh)</th> <th>Energy savings based on average 23.8% rate (MWh)</th> </tr> </thead> <tbody> <tr> <td>2020</td> <td>4,267</td> <td>1,333</td> </tr> <tr> <td>2021</td> <td>4,451</td> <td>1,390</td> </tr> <tr> <td>2022</td> <td>4,083</td> <td>1,275</td> </tr> </tbody> </table> <p>Energy Savings = Consumption/(1-Saving Rate) - Consumption</p> | Year | Electricity Consumption (MWh) | Energy savings based on average 23.8% rate (MWh) | 2020 | 4,267 | 1,333 | 2021 | 4,451 | 1,390 | 2022 | 4,083 | 1,275 |
| Year | Electricity Consumption (MWh) | Energy savings based on average 23.8% rate (MWh) | | | | | | | | | | | |
| 2020 | 4,267 | 1,333 | | | | | | | | | | | |
| 2021 | 4,451 | 1,390 | | | | | | | | | | | |
| 2022 | 4,083 | 1,275 | | | | | | | | | | | |
| Equivalent Carbon Offset (GHG Emission Avoided in tonnes CO ₂ e) | <p>497 tonnes of CO₂ equivalent at total investment amount.</p> <p>480 tonnes of CO₂ equivalent at investment amount funded by sustainable finance.</p> | | | | | | | | | | | | |
| Carbon Offset per Million Investment (HK\$) | 0.19 tonnes | | | | | | | | | | | | |

1. CLP emission factors for 2022 : 0.39kgCO₂e/kWh

Appendix I : Methodology for estimating environmental benefits

Key approach and assumptions:

The GHG emission avoidance for MTR is calculated with

- The total passenger-km number for the asset of the project.
- The GHG emission reduction versus the next best alternative (local public bus), which is a conservative assumption as passengers are also likely to use alternative means like mini-bus, private cars and taxis, all of which emit more GHG than a local bus.
- GHG Emission avoided =

$$\text{Number of Passenger-km} * (\text{Emission Factor of Average Bus} - \text{Emission Factor of MTR})$$

The emission factor for MTR trains is computed using the total GHG emission divided by the total number of passenger-km.

The total passenger-km travelled on MTR Heavy Rail system in 2022 was 14,349,896,907 (14,927,416,470 in 2021).

Total GHG emission from railway operation (including fuel consumption, refrigerants, purchased electricity and water consumption) in 2022 was 845,683,000 kgCO₂e (868,815,000 kgCO₂e in 2021).

The GHG emission MTR rounds to **0.059kg CO₂e/passenger-km** (0.058 kgCO₂e/passenger-km in 2021).

The emission factor for buses was obtained from a report published by [UK Department of Business Energy & Industrial Strategy](#) (DEFRA).

| Transport Mode | Emission Factor kgCO ₂ e per Passenger-km | Reference |
|---------------------------|---------------------------------------------------------|-------------------------|
| Buses (average local bus) | 0.0965 (2021: 0.10227) | Defra conversion factor |
| MTR Railway | 0.059 (2021: 0.058) | As computed above |

Hence total GHG emission avoidance for the MTR heavy rail transport (excluding Airport Express) rounds out to be:

$$14,271,361,534 * (0.0965 - 0.059) = 535,176 \text{ tonnes CO}_2\text{e}$$

Where 14,271,361,534 is the total passenger-km travelled on MTR heavy rail network excluding Airport Express.

Incremental Passenger Estimation Method for Project #B

Project #B is an extensions to the MTR network with an ending node. For estimation of the GHG emission avoidance, we assume any usage of the lines (i.e. passengers that used any one of the stations along the lines) as an incremental usage as the train trips would not have happened without the lines. i.e. passengers would have taken additional trip on a bus/car from the previous terminal station, or passengers would have taken outright the full trip on bus/car.

The average travelling distance of each passenger was 10.7km in 2022 (10.5km for 2021). Based on the number of passengers for South Island Line in 2022, the corresponding avoidance of GHG emission is computed as follows:

Annual GHG Emissions Avoided =

$$(\text{Emission Factor for MTRC} - \text{Emission Factor for Local Bus}) * \text{Annual Passenger number} * \text{Average Passenger Distance}$$

In 2022, the annual passenger number was 42,336,000 (2021: 44,611,000).

Hence the annual GHG Emission Avoided is computed to be **16,900 tonnes** (2021: 20,700) of CO₂ equivalent for the full project amount

Asset Value based Estimation Method for Projects #A, #C, #D and #M

Project #A was previously evaluated as an extension with an ending node along the Kwun Tong line. Since the Tuen Ma line’s opening in mid-2021, one of the stations along the extension (Ho Man Tin Station) has served as an interchange station between Kwun Tong line and the Tuen Ma line, therefore the GHG emission avoidance computation is switched to the asset value based approach to better reflect the station’s characteristics.

Projects #C, #D and #M are mid-life asset replacement projects that are crucial to upkeep the operation of the network.

The GHG emission avoidance number for each of these projects is estimated based on the amount of expenditure divided by the Total Asset Value of the MTR rail system (inclusive of KCRC rail system), multiplied by the total GHG emission avoided by the whole system.

- Total Asset Value of the heavy rail system:

HKD 99.5 billion¹ + HKD 52.9 billion²

- GHG Emission avoided for project =

Project Investment Amount/Total Asset Value * GHG Emission Avoidance for MTR Heavy Rail Network

| Projects | Current Investment Amount (Total investment amount) | Annual GHG Emissions Avoided [tonnes CO ₂ e] |
|----------|--------------------------------------------------------|------------------------------------------------------------|
| #A | HK\$ 5,425 million (HK\$ 6,900 million) | 19,000 (24,200 for complete project) |
| #C | HK\$ 1,200 million (HK\$ 7,100 million) | 4,200 (24,900 for complete project) |
| #D | HK\$ 194 million (HK\$ 4,900 million) | 680 (17,200 for complete project) |
| #M | HK\$ 400 million (HK\$ 980 million) | 1,400 (3,400 for complete project) |

1. Carry value of railway assets for MTRC as of end 2021 (page 283, 2021 MTRC [annual report](#))

2. Carry value of railway assets for KCRC as of end 2021 (page 52, 2021 KCRC [annual report](#))

Estimation Computation for Project #G (Trackside Energy Storage (pilot))

Project #G has been estimated to save 600MWh per annum (see earlier reports). The annual estimated GHG emission avoided works out to be 320 tonnes equivalent for the full project based on the average CO₂e emission factors of both CLP³ and HK Electric⁴.

Estimation Computation for Project #H (Smart Intelligent Power Module (R-IPM))

Project #H has been estimated to save estimated 4.3 GWh (by recycling them for use) per annum (see earlier reports). The annual estimated GHG emission avoided works out to be 2,300 tonnes equivalent for the full project (2,100 tonnes for the sustainable finance invested amount) based on the average CO₂e emission factors of both CLP³ and HK Electric⁴.

3. CLP emission factors for 2022 : 0.39kgCO₂e/kWh

4. HKE emission factors for 2022 : 0.68kgCO₂e/kWh

Appendix II : Verification Statement



VERIFICATION STATEMENT

Scope of Verification

Hong Kong Quality Assurance Agency (HKQAA) has been engaged by MTR Corporation Limited (“MTR”, Hong Kong stock code: 66) to undertake an independent verification for providing limited assurance on the compliance of the projects included in the green and social project portfolio and financed through the proceeds of 20 MTR Green and/or Social Bonds issued by MTR Corporation (C.I.) Limited (a subsidiary of MTR) and MTR Corporation Limited, and 2 green credit facilities (refer to annex 1 for details) under MTR Sustainable Finance Framework (“Framework”). The scope of HKQAA’s verification covers the data and information for the period 1st January 2022 to 31st December 2022.

Level of Assurance and Methodology

The process applied in this verification was based on the International Standard on Assurance Engagements 3000 (Revised) – “Assurance Engagement Other Than Audits or Reviews of Historical Financial Information” issued by the International Auditing and Assurance Standards Board (ISAE 3000). Our evidence gathering process was designed to obtain a limited level of assurance as set out in ISAE 3000 for the purpose of devising the verification.

Our verification procedure performed covered reviewing of relevant documentation, discussing with responsible personnel and verifying the selected representative samples of project, data and information. Raw data and supporting evidence of the selected samples were also thoroughly examined during the verification process.

Independence

MTR is responsible for the collection and presentation of the information presented. HKQAA does not involve in calculating, compiling, or development of the Framework. Our verification activities are independent from MTR.

Limitations

There are inherent limitations in performing assurance. Assurance engagements are based on selective testing of the information and data being examined. It is possible that fraud, error or non-compliance may occur and not be detected. The assurance did not provide assurance on information outside the defined reporting boundary and period. There are additional inherent risks associated with assurance over non-financial information including reporting against standards which require information to be assured against source data compiled using definitions and estimation methods that are developed by the reporting entity. Finally, adherence to ISAE 3000 is subjective and will be interpreted differently by different stakeholder groups.

Our assurance was limited to the MTR Sustainable Finance Framework post-issuance, and did not include statutory financial statements, financial statements and economic performance. Our assurance is limited to policies and procedures in place as of 31st December 2022.

Conclusion

Based on the procedures we have performed and the evidence we have obtained, nothing has come to our attention that causes us to believe that the selected information as at 31st December 2022 has not been prepared, in all material respects, in accordance with the specified criteria.

Signed on behalf of Hong Kong Quality Assurance Agency



Connie Sham
Head of Audit
11 April 2023
14857179-OTH



Jorine Tam
Director, Corporate Business



Annex 1: List of Bonds and Credit Facilities

| BONDS | |
|--------------------------------|--------------------------------|
| <u>Issuer name</u> | <u>Name of Bond</u> |
| MTR Corporation (C.I.) Limited | MTRCIGB_USD_261102XS1509084775 |
| MTR Corporation (C.I.) Limited | MTRCIGB_AUD_270628XS1637858546 |
| MTR Corporation (C.I.) Limited | MTRCIGB_HKD_320920HK0000365228 |
| MTR Corporation Limited | MTRGB_HKD_470717HK0000352432 |
| MTR Corporation (C.I.) Limited | MTRCIGB_HKD_470906HK0000362761 |
| MTR Corporation Limited | MTRGB_USD_470927XS1690683211 |
| MTR Corporation (C.I.) Limited | MTRCIGB_HKD_480328HK0000409455 |
| MTR Corporation Limited | MTRGB_USD_300819XS2213668085 |
| MTR Corporation Limited | MTRGB_HKD_550624HK0000612025 |
| MTR Corporation Limited | MTRGB_CNY_230408HK0000722089 |
| MTR Corporation Limited | MTRGB_CNY_240324HK0000707460 |
| MTR Corporation Limited | MTRGB_CNY_240325HK0000707445 |
| MTR Corporation Limited | MTRGB_HKD_240815HK0000871613 |
| MTR Corporation Limited | MTRGB_CNY_240906HK0000874187 |
| MTR Corporation Limited | MTRGB_CNY_240912HK0000877156 |
| MTR Corporation Limited | MTRGB_HKD_241028HK0000881935 |
| MTR Corporation Limited | MTRGB_HKD_241101HK0000887429 |
| MTR Corporation Limited | MTRGB_HKD_240502HK0000887635 |
| MTR Corporation Limited | MTRGB_HKD_241103HK0000887742 |
| MTR Corporation Limited | MTRGB_HKD_271212HK0000895661 |
| CREDIT FACILITIES | |
| <u>Year Executed</u> | <u>Identifier</u> |
| 2020 | MTRGL_HKD_250618 |
| 2021 | MTRGL_EUR_260111 |