ONTARIO TEACHERS' PENSION PLAN

2019 Climate Change Report

We lead We learn We last

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Context

We are Ontario Teachers' Pension Plan Board (Ontario Teachers'), the administrator of Canada's largest single-profession pension plan. We managed $207.4 billion in net assets as of December 31, 2019, and actively invest on behalf of 329,000 active and retired Ontario teachers. Our mission is to provide outstanding service and retirement security for our members – today and tomorrow.

We believe that our actions have the potential to create lasting value for our members, our partners and the communities where we operate. The world is transitioning to a low-carbon economy. How quick and orderly that transition occurs will depend on many factors. While we cannot predict the future, we can and must prepare for the possibilities. The transition is expected to bring new products, markets and opportunities, but also large-scale disruption and risk.

Our goal with respect to climate change is to successfully manage the pension plan through the transition to a low-carbon future, and ensure the plan remains sustainable for current and future generations of our members.

This climate change report supplements information available in our 2019 Annual Report and 2019 Responsible Investing Report, which are available on otpp.com.

EVOLUTION OF OUR CLIMATE CHANGE DISCLOSURE

2017

- Endorsed the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), thereby committing to adopt these recommendations in our engagements with companies, as well as in our own reporting.
- Published our first responsible investing report (for 2016), which included climate change considerations.

2018

- Mapped our annual disclosures to the TCFD.
- Published our first portfolio carbon footprint, covering global public equities.
- Introduced our Climate Change Working Group and our climate scenarios.

2019

- Published our first stand-alone TCFD-aligned climate change report for 2018, which provided details on our approach to managing climate change risks and opportunities, including our Low Carbon Economy (LCE) Transition Framework and expanded scenario analysis.
- Increased the scope of our portfolio carbon footprint by including our private assets.

2020

In this report:

- We elaborate on the work of our Climate Change Working Group, a senior-level internal working group with representation from investment teams across asset classes.
- We discuss our new strategic relationship with Wellington Management Company LLP and Woods Hole Research Center to advance physical climate risk and opportunity management.
- We present our 2019 portfolio carbon footprint, which was externally reviewed for the first time, providing assurance of our calculation and methodology.

Governance

Responsible investing and climate change governance begins with our board and extends through every level of our organization.

BOARD

- Oversees the management of climate-related risks
- Reviews Ontario Teachers' climate change strategy annually
- Reviews and approves annual objectives and scorecards, which include climate change–related objectives and are used to assess performance and determine annual compensation
- Constructively challenges management on environmental, social and governance (ESG) matters, including climate change–related topics, when investment transactions come to the board for approval

MANAGEMENT

- Chief Executive Officer (CEO), as chair of our Enterprise Risk Management (ERM) Committee, ensures processes are in place to manage material risks, including climate change
- CEO is chair of the Investor Stewardship Committee and reviews and approves our climate change strategy
- Chief Investment Officer (CIO) integrates climate change considerations into investment strategy
- CIO ensures processes and practices are in place to manage climate change risk for the investment portfolio
- CIO updates the board on responsible investing and climate change at every meeting of the board Investment Committee

INVESTMENT TEAMS

- Investment executives oversee the day-to-day integration of climate change considerations into investment activities
- Identify, assess and manage material climate change–related risks and opportunities in assets under their management
- Develop macro views and assess climate-related opportunities
- Responsible investing team provides subject-matter expertise and develops tools, resources and reporting

ERM COMMITTEE

Chaired by CEO, includes executive team

- Works with the board to establish our risk appetite
- Oversees, assesses and monitors material risks to the organization, including climate change

INVESTOR STEWARDSHIP COMMITTEE

Chaired by CEO, includes investment executives

Oversees stewardship activities, including:

- Climate change strategy
- Changes to proxy voting guidelines
- Engagement plan

CLIMATE CHANGE WORKING GROUP

Cross-departmental group that includes representatives from all asset classes, and from the responsible investing, total fund management and legal teams

- Informs our approach to climate change
- Advises on climate metrics and analytics
- Champions climate change awareness across Ontario Teachers'
- Identifies and arranges climate change education opportunities

Spotlight: Board perspective

Ontario Teachers' board is highly engaged on climate change. Chair Steve McGirr explains the board's current thinking and activities.

Q: WHY IS CLIMATE CHANGE IMPORTANT TO THE BOARD?

Steve McGirr: We recognize that climate change is a systemic issue. The effects of a warming planet influence every region of the world and sector of the economy. The impacts of climate change on our current and future investment portfolio will be profound, and the investment choices the organization makes today will have ripple effects for retired teachers in the coming decades. Boards of directors everywhere have a wide range of issues to grapple with in their oversight role, but the scope of climate-related risks and opportunities is incredibly far-reaching and long term in nature. With sustainability of our pension plan top of mind, it's essential for our board to be involved.

Q: HOW IS THE BOARD INVOLVED IN CLIMATE-RELATED DECISIONS?

SM: We review the climate change strategy annually. At every meeting of the board Investment Committee, the CIO reports on climate change and responsible investing. In our oversight role, we work closely with, and pose difficult questions to, management to understand how Ontario Teachers' long-term strategy can withstand the impacts of climate change. We also want to ensure that management finds good investment opportunities as the world shifts to a low-carbon economy.

In practice, we ask a lot of questions when deals come to the board for approval and when we receive reports. We also participate in ongoing education and do our own research. This may include board members accompanying investment teams on site visits to see some of the pension plan's assets around the world.

Q: HOW IS CLIMATE CHANGE LINKED TO COMPENSATION AT ONTARIO TEACHERS'?

SM: Each year, management prepares a scorecard containing goals and metrics in key areas. The scorecard is used to measure performance and factors into compensation for all employees. We at the board level review and approve the annual objectives and scorecard, which includes climate-related objectives along with other performance criteria. This year, climate change objectives were given added weight, meaning they will have a greater impact on employee compensation in 2020.

"The impacts of climate change on our current and future investment portfolio will be profound, and the investment choices the organization makes today will have ripple effects for retired teachers in the coming decades."

– Steve McGirr, Chair

Strategy and risk management

We integrate climate change considerations across our investments, with a focus on understanding the impacts of the transition to a low-carbon economy. As a pension plan with defined future obligations to our beneficiaries, our business strategy inherently includes robust risk management practices.

Our goal with respect to climate change is to successfully manage the pension plan through the transition to a low-carbon economy, and ensure the plan remains sustainable for current and future generations of our members. Our strategy to achieve this goal has three main elements, which are described below.

Our strategic approach

USE LEADING RISK MANAGEMENT PRACTICES	INVEST IN CLIMATE-FRIENDLY OPPORTUNITIES	INFLUENCE CHANGE AS ACTIVE OWNERS
We assess and manage climate change risks to our investments and potential investments. We must be adequately compensated for taking risks. We aim to use leading-edge practices and tools, and we are committed to learning and innovation in risk management. We developed and continue to refine our proprietary LCE Transition Framework to understand the impacts to Ontario Teachers' under possible scenarios and to monitor key trends.	We pursue attractive climate-friendly investment opportunities that will help pay teachers' pensions. Sectors and technologies that enable the transition to a low-carbon economy and increase resilience to climate change impacts are potentially attractive investment opportunities. Using our LCE Transition Framework and other resources, we have identified and invested in climate-friendly opportunities in renewables, energy efficiency and storage, clean energy transmission and other sectors.	We aspire to play a constructive role in addressing the global challenges of climate change. Through engagement with policy-makers, regulators and industry, we aim to encourage climate-positive actions as well as clarity on policies and standards. We support our direct portfolio companies that are developing their own climate strategies, investing in resilience to climate change impacts and creating resource efficiencies. We engage with companies to encourage proactive disclosure and management of climate-related risks. We believe engagement with companies is a more effective tool for managing climate change than divestment.

Effective risk management is key to a pension plan's success. Ensuring the sustainability of the plan requires having a robust ERM program in place. Climate change was identified as an enterprise risk in 2007. Since then, climate change has been assessed, managed and reported in the context of all material risks to Ontario Teachers'.

Enterprise risk management

Risk management is an important capability at Ontario Teachers' and plays a key role in all our activities. The board, with the support of the executive team, helps establish a strong risk culture and sets the appetite for risk, including how much risk the organization is willing to accept to achieve our strategic objectives.

Through our enterprise risk management (ERM) program, management is able to understand important enterprise risks and how these risks are being managed. Climate change is an enterprise risk within our ERM framework, where it is defined as a systemic risk that can impact investment returns through physical, transition and/or reputation risks.

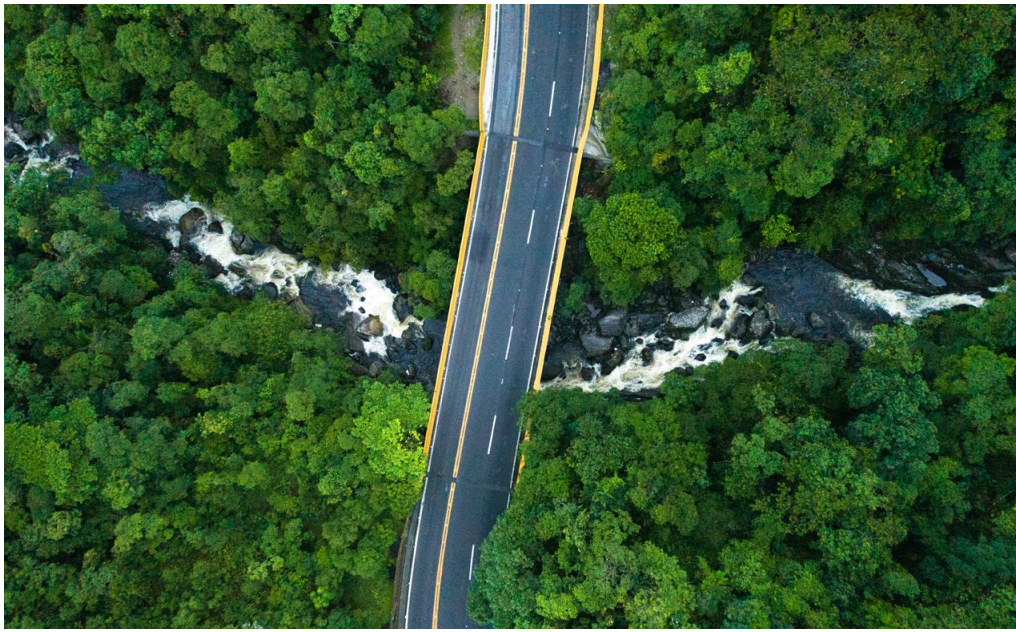
Our CEO chairs the ERM Committee, which includes the executive team. The ERM Committee reviews enterprise risks at least twice a year and makes decisions on risk appetite, prioritization of mitigation strategies and resourcing. The CIO is accountable for ensuring processes and practices are in place to manage climate change risk for the investment portfolio.

Climate-related investment risk management

We consider material climate-related factors alongside other factors through the entire investment lifecycle to manage risk and add value. We do that initially based on an analysis of the sector(s) and geographies in which companies operate, and our own professional expertise in finance, business, economics, environmental science and engineering. We also use external resources, such as the TCFD's recommended framework and the Sustainability Accounting Standards Board (SASB) materiality map, to help identify and assess the key drivers of climate change risks to a business.

We assess the implications of climate change to an investment or portfolio through a variety of lenses, which can be categorized into physical and transition risks.

- To assess **physical risks** (which are mainly location-based), we analyze factors such as exposure to extreme heat, extreme weather, flooding, wildfires, drought and others. This may include supply chains, where relevant. We leverage advanced mapping tools that include current state and future projections of climate hazards. Where warranted, local studies and supplemental analysis are used as well. Our new initiative with Wellington Management Company LLP (Wellington Management) and Woods Hole Research Center (Woods Hole) provides us access to the latest climate research and experts, and focuses on the investment implications of physical risks. Read more on page 9.
- To assess **transition risks**, we analyze the following factors:
  - *Policies and legislation*, such as action aimed at reducing carbon emissions, efficiency standards for buildings, subsidies and support for particular industries, mandates around fuel switching and other measures that could increase operating and capital expenditures;
  - *Technology*, such as shifts and disruption to certain industries that may make them less competitive or obsolete;
  - *Consumer preferences and reputation*, such as changes in consumption habits (e.g., vehicles or food) due to climate awareness, or social unrest due to reduced availability of resources;
  - *Human capital impacts,* such as changes in employment dynamics in disrupted economies or industries.



Where possible, risks are quantified and integrated into sensitivity analysis, stress testing and asset valuations. Variables in these types of analyses include potential reductions in the availability of resources and/or increases in the costs of resources, or greater need for capital expenditures to adapt to climate change and increase resilience, such as flood barriers or implementation of water efficiency measures. Physical risks tend to be more quantifiable than transition risks, which present more uncertainty and a wider range of possible futures.

See page 10 for our LCE Transition Framework, which addresses both physical and transition risks.

Spotlight: Physical climate-related risks

New Wellington Management, Woods Hole initiative to advance science-based insights

As part of our strategy, we develop practices and tools that can help us understand, analyze and project the future impacts of climate change. We have built on our relationship with Wellington Management, one of the world's largest independent investment management firms, to integrate leading climate science research into our investments.

Along with Wellington Management, we are collaborating with Woods Hole, the world's top-ranked climate change think tank, to draw on its scientific expertise. We are using Woods Hole's leading-edge climate research to complement our investment strategies and perform in-depth physical climate change risk analysis focused on private equities, public equities, real estate and infrastructure assets.

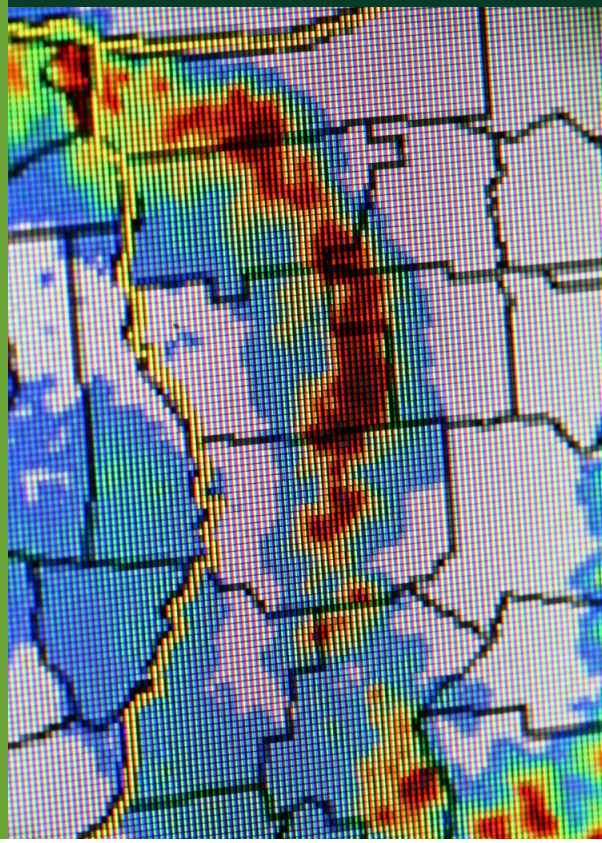
The insights we expect to glean include:

- data and assistance in developing a science-based framework to translate general physical climate risks into investment opportunities and decisions;
- risk peril maps to understand and identify the concentration of climate risks and opportunities in a range of asset classes, strategies and locations;
- the societal impacts of climate change and potential investment consequences;
- company and industry strategies to address physical climate risks and inform effective climate action plans.

For example, we have been working with Wellington Management and Woods Hole to examine the implications of heat, water scarcity and flooding on both the current portfolio and potential investments in the infrastructure and natural resources space. We are seeking to understand how these factors could affect labour, productivity, yields, asset integrity and capital expenditures. By furthering the understanding of how to price in physical risks, we facilitate better capital allocation decisions and bridges between climate science and finance.

Leading-edge climate research and detailed physical risk analysis.

Better investment decisions.



LCE Transition Framework

Another tool designed to help us understand the future impacts of climate change is our Low Carbon Economy (LCE) Transition Framework.

We developed the LCE Transition Framework in 2017 and launched it in 2018. At the core of the framework are three scenarios that describe how the future could evolve. The scenarios are defined by the direction and rates of change in five key catalysts: policy, technology, consumer preference, capital and physical impacts. Each scenario gives rise to very different implications, so we have also identified 12 "signposts" that indicate which scenario may be unfolding.

The LCE Transition Framework provides a reference point for our investment teams to understand climate change risks and opportunities. We believe that a qualitative approach in addition to quantitative measures can be a powerful agent of change within our organization. It provides transparency and common understanding, which we use to inform our long-term investment decisions. It also promotes creativity in imagining the world's future responses to various scenarios.

In our 2018 Climate Change Report, we outlined the transition scenarios and catalysts of our LCE Transition Framework in detail.

We also identified specific climate-related risks and opportunities for the short, medium and long terms in low- and high-carbon worlds, and discussed impacts for companies in general and for Ontario Teachers' in particular.

High-Carbon World

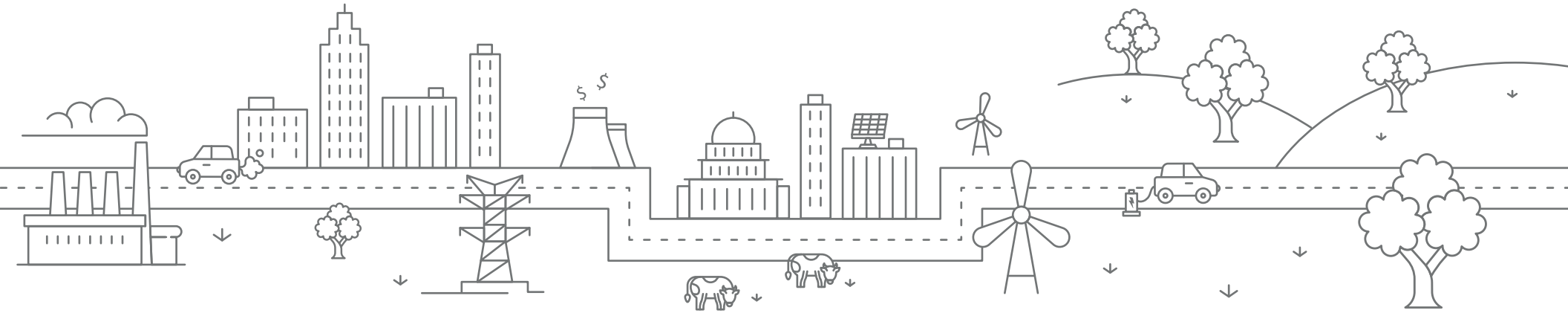
Fossil fuels dominate until drastic and disruptive action is taken

Pre-2018 World Commitments

Mixed future of both fossil fuels and clean technologies

Low-Carbon World

Globally coordinated transition to a low-carbon future



Update on LCE Transition Framework

The 12 signposts in our LCE Transition Framework are leading indicators that give us insights into which of the three scenarios we are trending towards: a **Low-Carbon World** where we'd see a near-term, globally coordinated transition; **Pre-2018 World Commitments** where policies in effect before 2018 continue and a combination of fossil fuels and clean technologies are used; or a **High-Carbon World** in which fossil fuels continue to dominate in the near term, leading to drastic policy and societal responses further in the future.

We monitor these signposts and compare them with expected outcomes under the three transition scenarios noted above. We consider possible outcomes to 2030.

Based on our 2019 monitoring, three signposts are pointing to a Low-Carbon World, six to the Pre-2018 World Commitments, and three to the High-Carbon World (see image to the right). Altogether, this broadly points to the Pre-2018 World Commitments scenario, meaning a mixed future of both fossil fuels and clean technologies.

Notable movements in the speed and direction of transition include a continued increase in fossil fuel subsidies and mixed signals from the energy market. Increased electricity trade between regions (e.g., North America or Europe) suggests more resilient and reliable electricity networks that enable the incorporation of variable, low-carbon power generation. However, the speed of deployment of distributed energy systems has not been fast enough to stay aligned with the Low-Carbon World scenario.

We will keep tracking the 12 signposts separately so as not to be caught by surprise by rapid changes in certain geographies or sectors. It is also important to monitor them in aggregate to capture broader trends.

While the unfolding COVID-19 pandemic may dramatically affect climate change action, the impacts are highly uncertain at the time of publication of this report. Depending on the decisions that governments make around economic stimulus and virus-related business support, the transition to a low-carbon economy could be accelerated or delayed. We are monitoring how policy-makers are contemplating ESG matters and climate change as the COVID-19 emergency evolves.

2019 SIGNPOSTS UPDATE

Climate-friendly opportunities

We pursue investment opportunities that will enable or benefit from the global shift to a low-carbon economy, as well as resilient assets that can withstand the effects of a warming world. We strive to identify trends that will affect existing assets or result in new opportunities.

Generally, these opportunities may include energy storage, energy efficiency, renewable power, industrial/commercial redesign and retrofit projects, electrification across sectors, and water treatment, distribution and efficiency. Opportunities can also relate to changes in weather patterns, such as higher temperatures that may result in higher yields for certain types of crops or unlock new zones of development.

Here are a few specific portfolio examples:

techem

Energy efficiency: In 2018, we invested in Techem GmbH, a global market leader in the provision of heat and water sub-metering services. Techem is based in Germany and has more than 50 million devices installed, serving over 11 million apartments in more than 20 countries.

Energy efficiency is one of the most cost-effective contributors to the transition to a low-carbon economy. By lowering energy use, costs are avoided while reducing the energy system's environmental footprint, including carbon emissions. For example, through the use of its products and services, Techem avoids over 7 million tonnes of carbon dioxide (CO_2) emissions per year. Supportive legislation and consumer preferences in Europe and around the world continue to increase penetration rates for energy efficiency measures in buildings, including sub-metering.

Cubico SUSTAINABLE INVESTMENTS

Renewable energy generation: Cubico Sustainable Investments is a global renewable energy platform that invests in wind and solar electricity generation. Since Ontario Teachers' first invested in Cubico in 2015, the company has grown from 19 facilities located in seven countries to 87 assets in different stages of development in 12 countries in the Americas, Europe and Australia.

As of 2019, wind and solar are estimated to account for 8% of the global energy mix. According to *Bloomberg New Energy Outlook 2019*, wind and solar will account for approximately 48% of the energy mix in 2050 and represent approximately 71% of all capital expected to be invested in new power generation assets by 2050. Cubico will continue working to expand with this growing market, while contributing to the transition to a low-carbon economy.

SYDNEY DESALINATION PLANT

Water desalination: The Sydney Desalination Plant in Australia uses the process of reverse osmosis to desalinate seawater and produce high-quality drinking water. Under its operating licence, the plant is able to supply about 15% of Sydney's total drinking water requirements and is 100% powered by renewable energy.

Sydney has faced extreme droughts in the recent past, it has highly variable rainfall, and according to the World Resources Institute Aqueduct Water Risk Atlas, future projections (2030–2040) indicate high levels of water stress[1] in the region. Along with dams, recycling and water efficiency programs, desalination can help address the impacts of drought, population growth and climate change.

[1] According to the World Resources Institute Aqueduct Water Risk Atlas, "water stress" measures the ratio of total water withdrawals to available renewable surface and groundwater supplies. It can be defined informally as human demand for water divided by available water.

Engagement and influence

We engage with the companies we invest in to promote positive change and nurture success, and to encourage proactive disclosure and management of climate-related risks. We do this with a partnership mindset, and by seeking confidential, pragmatic and constructive dialogue.

Through the adoption of the TCFD recommendations, we want companies to:

- have effective board oversight of climate change;
- disclose how climate change is addressed in corporate strategy;
- provide clear and specific information on climate change–related risk management practices;
- set appropriate targets on key metrics, such as energy use, emissions and water use.

Climate Action 100+ is an investor initiative to push the world's largest corporate greenhouse gas emitters to take action on climate change.

The initiative is designed to implement the investor commitment first set out in the months leading up to the adoption of the historic Paris Agreement in 2015. More than 450 investors with more than US$40 trillion in assets under management have signed on to the initiative.

As part of this group, Ontario Teachers' encourages companies to commit to a timeline for adoption of the TCFD recommendations in their public annual financial filings. Through collective efforts, since the initiative started in 2018, 48 companies have publicly committed to supporting the TCFD recommendations and 112 companies have set long-term quantitative targets for reducing greenhouse gas emissions.

In parallel with collaborative ventures such as Climate Action 100+ and other global initiatives, we engage with additional portfolio companies that have elevated exposure to climate change–related risks. We identify public company holdings for engagement through an internal prioritization process and also as follow-up to our proxy voting activity when we have questions about climate-related shareholder proposals. Direct engagements are usually done in person or by phone.

We select companies for engagement based on:

- the materiality of climate change risk to the company and industry;
- the value of our holdings;
- the company's performance on key metrics;
- the existence (or lack thereof) of relevant disclosures.

Our engagement program is routinely updated to include new engagement candidates or exclude companies where results have been achieved, and to reflect our evolving expectations as companies make progress on their climate change strategies.

Engagement does not usually deliver quick results – it can take years of dialogue to see positive change. We use a milestone-based system to track our public company engagement progress and success. The companies in our engagement program are at various stages.

At the end of 2019, we were in active discussions with 15 companies. In addition, six companies have agreed to review and consider enhancing their disclosure through frameworks, such as the recommendations from the TCFD and SASB; four have made commitments towards improved disclosure in line with these frameworks.

We believe engagement with companies is a more effective tool for managing climate change than divestment. Led by the responsible investing and governance teams, our engagement program is overseen by our Investor Stewardship Committee, whose members include our CEO and CIO, and senior members of the Investments, Risk and Corporate Affairs departments.

Using our vote

Climate change is a consideration when we vote our public company shares. It continues to be specifically addressed in our Corporate Governance Principles and Proxy Voting Guidelines.

Shareholders may submit proposals asking companies to take specific action on climate change impacts to the business. We support proposals when we determine that the request addresses a material issue at the company and where current reporting is lacking. We do not support proposals if, through our assessment, we determine that the request is overly prescriptive, if current disclosure already addresses the request or if the company has already agreed to implement the proposed change.

In 2019, we supported 100% of shareholder proposals where the shareholder asked the company to produce a report on the impacts of climate change on their operations. We supported 30% of shareholder proposals that sought reporting on greenhouse gas (GHG) reduction efforts.

Examples of our assessment and decision-making rationale are below:

CHEVRON CORP.

PROPOSAL: That the company report how it can reduce GHG emissions, consistent with the goals of the Paris Agreement.

OTPP VOTE	RATIONALE FOR THE VOTE DECISION	OVERALL VOTE RESULT
Support ✓	In our assessment, the company lags peers in GHG disclosure and in plans to achieve meaningful emissions reductions. The requested information would provide clarity on related risks for shareholders.	33% of shareholders supported this proposal.

EQUINOR ASA

PROPOSAL: That the company set and publish GHG emissions targets for the company's operations and use of its energy products that are aligned with the Paris Agreement.

OTPP VOTE	RATIONALE FOR THE VOTE DECISION	OVERALL VOTE RESULT
Against ✗	In our assessment, the company already provides GHG emissions targets and extensive disclosure on relevant climate scenarios, making this proposal a duplication of effort. Furthermore, the company continued to enhance disclosures on its climate risks.	2% of shareholders supported this proposal.

Private companies

We support our portfolio companies that have been developing their own climate strategies, investing in resilience to climate impacts, and creating resource efficiencies. In our private company investments, we have regular discussions with management, and often have at least one board seat. We encourage proactive identification and management of climate risks and opportunities. We also share new knowledge from our engagement activities across our organization and with the companies we invest in.

For example, in 2019 we performed a sustainability benchmark exercise among our private airport companies, which culminated in a workshop with senior leaders from the five airports along with our investment teams. A range of good practices, ideas and challenges was discussed, including aviation and global greenhouse gas emissions; climate strategies and targets; data benchmarking (e.g., emissions, water, electric vehicle fleets); geothermal energy and energy efficiency. We also discussed physical and transition impacts of climate change, trends in mobility, and the implications of electrification for airports.

Each of our five airports is actively working towards reducing its emissions and three have already achieved carbon-neutral certification from the Airport Carbon Accreditation. They also work to reduce climate change impacts from partners and third parties, including airlines. For example:

- In January 2020, Bristol Airport became the first in Europe to offset carbon emissions from all passenger journeys to and from the airport by road;
- Starting in 2021, Brussels Airport will study the application of the "polluter pays" principle, where higher-emitting aircraft will pay higher charges, and newer planes with lower carbon and nitrogen oxide emissions will receive a discount;
- By 2030, Copenhagen Airport facilities and transport to and from the airport will be emissions free. This will be achieved partly by continued investment in solar panel systems and improvements in the charging infrastructure for electric vehicles within and outside the airport area.

Influence

We use our influence as a global investor to help drive progressive action and meaningful change on climate-related risks and opportunities.

We lead or participate in organizations and initiatives to shape ESG standards and undertake research on common challenges. This way, we can address a far greater number of companies and issues than we could on our own.

For example, since 2018, our Chief Financial Officer, David McGraw, has been a member of the Accounting for Sustainability CFO Leadership Network (Canadian Chapter), which convened a working group to help guide valuation professionals in their assessment of the financial impact of climate change factors.

As markets start considering the financial impacts of climate change, there's a need for consistency in how those impacts are priced in. That is one of the core objectives of the working group, which is composed of members from Ontario Teachers' and three other pension plans, a leading real asset company and experts from accounting and valuation bodies. We believe that the pricing of climate change risks into asset prices will facilitate capital allocation decisions at Ontario Teachers', our portfolio companies and the broader market.

Another example is the work we are developing as a founding sponsor of the Canadian Standards Association (CSA) Group on Green and Transition Finance. The group is developing a Canadian Transition Finance Taxonomy to define activities that significantly reduce greenhouse gas emissions and enable the transition to a low-carbon economy.

We're a member of the governance advisory committee, providing input and acting as a sounding board to the executives of the CSA technical committee. We also participate in the technical committee, which is developing the principles for the taxonomy.

Spotlight: Investor Leadership Network

Ontario Teachers' is a founding member of the Investor Leadership Network (ILN), a group of 14 global institutional investors taking concrete actions on sustainability, with a focus on climate change, diversity and sustainable infrastructure. As of the end of 2019, members represent more than US$5 trillion of assets under management.

We are co-chair of the Climate Change Advisory Committee of the ILN, which is working to expand the adoption of uniform and comparable climate-related disclosures aligned with the TCFD framework. We believe enhanced disclosure will inform better decision making regarding the investment risks and opportunities stemming from climate change.

In September 2019, the ILN published a report entitled TCFD Implementation: Practical Insights and Perspectives from Behind the Scenes for Institutional Investors. It is intended to assist asset owners and fund managers in making better choices to define their climate change strategies and disclosures. The report is a glimpse of the work done by global investors to incorporate climate change in our organizations and report to the TCFD standard. It offers practical insights on the common challenges we faced, the thinking behind decisions, and lessons learned along the way.

The next phase of the ILN's climate change work is focused on developing a guide for investors to evaluate the quality and rigour of Paris Agreement–aligned scenario analysis performed by companies. Our objective is to improve the ability to compare scenario analyses across companies, make better assessments of companies' resilience to climate change, and help shape engagement discussions.

Sharing our climate disclosure experience with peers.

Playing a leadership role.

Resilience of our strategy

Many of our investments are long-lived assets with ownership horizons of over 30 years. It is important to take both a short- and long-term view when assessing risk and opportunity.

In 2016, we undertook a preliminary scenario analysis using the findings from Mercer's *Investing in a Time of Climate Change*. Overall, the analysis showed that the impact on our portfolio and funding ratio was small. As well, the results assumed a static portfolio that did not change over the scenarios or time horizons. As a result, we decided to use a qualitative scenario approach that would be more useful to our investment teams and immediately actionable.

Following the recommendations of the TCFD, we use the scenarios in our LCE Transition Framework as one of the tools to assess the resilience of our strategy. Pages 5 to 10 of our 2018 Climate Change Report describe our assessment of investment opportunities and risks, and the implications for companies and our portfolio at different time horizons and scenarios. This includes our Low-Carbon World scenario, which represents a quick and orderly transition to a 2°C future.

The LCE Transition Framework is also applied at the asset level, where we use the scenarios to stress test our investment theses against relevant signpost assumptions (such as electric vehicle adoption rates and battery technology costs) under each of our transition scenarios.

Regardless of the scenario, over the near and medium term (three to 10 years), expected physical climate risks are largely "known" as the impact of our past emissions has a lagged effect. We have made strides to manage physical risks to our portfolios through, among other efforts, our work with Wellington Management and Woods Hole, as described on page 9.

The range of transition risks and opportunities will depend on which path the world takes, and how quickly. We continue to evaluate tools and approaches to assess our portfolios, adapt our strategy and maintain a resilient and growing portfolio to successfully deliver on the pension promise to our members.

Metrics and targets

We use frameworks and guidance provided by SASB, the Global Real Estate Sustainability Benchmark (GRESB) and the TCFD framework as key building blocks around ESG measurement. We also continue to develop our ESG Maturity Framework, a proprietary tool that helps us assess companies based on a set of levels and expectations for ESG practices and performance, including climate change ones where relevant.

SASB develops global sustainability standards for companies to report on sector-specific, relevant sustainability metrics. GRESB is the global standard for ESG benchmarking and reporting for real assets (real estate and infrastructure). These frameworks generally include guidance and standards for performance metrics that demonstrate outcomes or achievements.

Within these frameworks, climate-related metrics are based on materiality, sector or subsector, but generally include such measures and targets as: absolute and relative emissions; energy and water management; physical resiliency; supply chain management; and the proportion of operations in climate-sensitive locations. These serve as reference points for our portfolio companies or potential deals we are assessing.

We use these frameworks and our internal assessments to judge the quality and effectiveness of companies' approaches to climate change and to identify opportunities to improve our analysis of company performance.

Total-fund metrics

Following the TCFD recommendations, Ontario Teachers' measures and publishes a portfolio carbon footprint. While it can be a useful tool, we believe a portfolio carbon footprint is insufficient by itself to provide a full view on climate-related risks and opportunities for our portfolio (see Appendix A for more details). We are researching and assessing supplementary metrics to better capture the impact of physical and transition risks at the total-fund level. We have not been able to source a satisfactory metric for transition risk and are currently looking to develop a proprietary one.

Internal metrics and targets

Beyond the investment portfolio, we think it is important to establish internal metrics and targets for ourselves as well. We've had climate considerations on our corporate scorecard for a number of years, which, in turn, impacts compensation. This year, climate change objectives were given added weight on the scorecard, meaning they will have a greater impact on determining employee compensation in 2020. We aim to:

- identify climate change metrics to assess and manage the portfolio, including targets;
- conduct at least 20 corporate or investment initiatives that contribute to a low-carbon economy transition.

These initiatives may include the evaluation of investment opportunities that benefit from the transition to a low-carbon economy, the assessment of climate factors in potential deals, the embedding of climate factors in valuations, climate-positive investments, actions by portfolio companies, as well as internal activities.

By the end of 2020, we aim to have a set of metrics that will allow us to monitor and manage the total-fund exposure to and alignment with the transition to a low-carbon economy. This will allow us to set our commitments for 2021 and beyond.

Portfolio carbon footprint

A portfolio carbon footprint is a common starting place for organizations trying to understand climate risk. Following industry practice, we consider it to be the sum of the equity ownership of each portfolio company's greenhouse gas emissions, resulting in our equity portfolio's exposure to greenhouse gas emissions.

Looking at changes in a company's carbon emissions over time, or between companies in the same sector, can offer meaningful information on efforts to improve energy efficiency and reduce environmental impact. Carbon footprints are also useful starting points in identifying companies and sectors facing higher transition risks. However, carbon footprints have limitations at both the portfolio and company levels.

For more information about limitations, and details of our methodology, please see Appendix A.

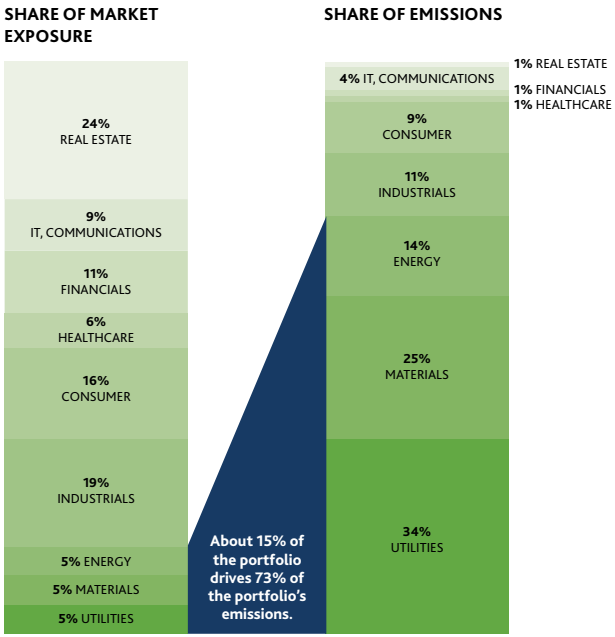
The carbon emissions associated with our 2019 portfolio were approximately 15% less than in 2018. The table below shows our carbon footprints for both years.

	2019[1]			2018		
PORTFOLIO CARBON FOOTPRINT	**PUBLIC EQUITIES**	**PRIVATE ASSETS[2]**	**TOTAL**	PUBLIC EQUITIES	PRIVATE ASSETS[2]	TOTAL
Market exposure of holdings (C$ millions)[3]	**28,703**	**94,030**	**122,733**	16,554	92,235	108,789
Carbon footprint (tonnes of CO_2e/C$ millions)	**203**	**41**	**79**	283	59	93

Some of the key highlights of the 2019 carbon footprint and main changes in relation to 2018 include:

- By covering public equities (equity, derivatives, short positions) as well as private equities for the second year, we continue to be in line with leading practices globally.
- We engaged Deloitte, an independent third party, to conduct an independent assurance engagement on our 2019 carbon footprint. This increases confidence in and the transparency of our calculations.
- Our year-over-year portfolio carbon footprint was reduced by approximately 15%. This is mainly due to the sale of a particularly high-carbon-intensity private asset. The carbon intensity in public equities declined over the previous year, driven by overall reduced emissions intensity in the utilities, materials and energy sectors. In addition, our high-conviction equities program had higher exposure to low-carbon-intensity stocks.
- We've increased the proportion of company-reported emissions in relation to estimations from 38% of market exposure in 2018 to 49% in 2019 (see Appendix A). This is a result of our engagement with our portfolio companies and a broader trend toward more emissions disclosure.

SECTOR-BASED CARBON FOOTPRINT CONTRIBUTION



[1] Deloitte provided limited assurance on our 2019 amounts (see assurance report in Appendix B).

[2] Private Assets include internally and externally managed private equities, infrastructure assets, real estate and natural resources.

[3] Market exposure values are not directly comparable to the Ontario Teachers' Pension Plan consolidated financial statements, due to exclusions (refer to Appendix A), differences in asset categorization, and the use of notional value to account for equity exposure of derivatives.

Elevating and evolving our approach

The science of climate change, the nature of the information that investors are seeking, and investment practices related to climate risks and opportunities continue to evolve.

Investors do not have all the information required to make a robust assessment of climate-related risk exposures. However, we use the data we have, and we engage with companies and work with peers to foster proactive corporate behaviours and promote disclosure of information. These activities help us to learn and stay abreast of leading practices.

We remain committed to:

- evaluating new tools and relevant metrics for a diversified portfolio such as ours;
- helping push the industry forward to better enable analysis of climate risks and opportunities;
- better equipping our board and senior management to continue improving the evaluation of climate factors in our investment strategy;
- building internal capacity and expertise through education and ongoing partnerships with external climate experts, such as Woods Hole.

Our CIO is responsible for integrating climate change considerations into our investment strategy. We have ambitious near-term plans in the following areas:

1. STRATEGY AND IMPLEMENTATION

- Integrating climate change considerations in our corporate strategy development.
- Providing input into the organization's objectives and aspirations regarding climate change management, and how to reach them.
- Supporting the implementation of our approach to climate change management, including continued support for the LCE Transition Framework.

2. MEASUREMENT AND REPORTING

- Providing analysis and advice on analytics required to support and assess our climate change objectives.
- Consulting with relevant internal stakeholders and conducting cost/benefit analysis on climate-related benchmarking and reporting for portfolio companies.

3. AWARENESS AND EDUCATION

- Championing climate change awareness across the organization and sharing climate-related insights.
- Providing thought leadership on climate change and advising on the key resources and events needed to stay abreast of climate change developments.

APPENDIX A – Portfolio carbon footprint methodology

METHODOLOGY

Our portfolio carbon footprint includes our public equities and private assets and is calculated as:

$$\sum_{i}^{n} \frac{\text{OTPP's equity share}_i * \text{Issuer}_i\text{'s scope 1 and 2 GHG emissions}}{\text{Market exposure of OTPP's equities}}$$

SCOPE

We assess our shares held in public companies and derivative positions in our public equity strategies. Derivative positions include index swaps and futures used to obtain cost-effective exposure to equity growth and equity options held as part of our equities strategy.

We also calculate the portfolio carbon footprints of our private assets, including internally and externally managed private equities, infrastructure assets, real estate and natural resources.

Combined, the public equities and private assets portfolios (as defined above) represent close to 60% of our net assets as of December 31, 2019.

Subject to data and standards, we are assessing the ability to incorporate fixed income products in our carbon footprint assessment in future years.

EXCLUSIONS

The following asset classes and strategies were excluded from the portfolio carbon footprint assessment: investments held in absolute return strategies, hedge funds and other investments benchmarked against cash or the investment itself. Commodities futures, inflation-linked securities, sovereign and corporate credit, and money market instruments were excluded as there is no current methodology available to measure their carbon footprint or the investments are expected to be short term in nature.

LIMITATIONS

At the portfolio level, a carbon footprint is not a direct measure of portfolio risk. The implications of higher footprints vary, depending on sector and geography, and companies' supply chain and competitive risks are not captured. All assets face additional risks relating to climate change, not just risks relating to emissions. At the company level, the data do not capture forward-looking dynamics, such as corporate decisions that may reduce future emissions. Many companies still do not report their carbon footprints, necessitating estimation, thus reducing accuracy and making carbon footprints less useful as the basis for engagement or targeting reductions. In addition, because of different reporting timelines and delays in data availability, companies may provide carbon footprint data one to two years after their financial data.

EMISSIONS DATA

Public equities: Emissions data was taken from Trucost[1], part of S&P Global. Trucost applies the following approach for estimating emissions:

1. Company-reported emissions
2. Estimate based on company-specific factors
3. Proprietary sector-based model

Trucost has data for 94% of our public equities portfolio. The remaining 6% was estimated by proxy using Global Industry Classification Standard (GICS) sub-industry average emissions calculated from Trucost's database.

Private assets: Carbon emissions were assessed using the following approach, which is similar to Trucost's, in preferential order:

1. Company-reported emissions
2. Estimate based on company-specific factors
3. Estimate based on similar publicly listed companies
4. Proxy based on sub-industry average emissions

The following table breaks down the estimation methods used by number of companies and percentage of market exposure (ME):

	PUBLIC EQUITIES		PRIVATE ASSETS		**TOTAL**		2018 VS. 2019
	COUNT	PERCENT OF ME	COUNT	PERCENT OF ME	**COUNT**	**PERCENT OF ME**	CHANGE IN PERCENT OF ME
Company-reported emissions	1,232	52	25	48	**1,257**	**49**	29%
Estimated based on company-specific factors	1,035	20	12	5	**1,047**	**9**	-40%
Trucost models	3,628	22	–	–	**3,628**	**5**	67%
Proxy based on custom peer group	–	–	31	20	**31**	**15**	114%
Proxy based on GICS sub-industry average	478	6	1,094	27	**1,572**	**22**	-41%
Total	**6,373**	**100**	**1,162**	**100**	**7,535**	**100**	

[1] Source: ©2020 S&P Trucost Limited ("Trucost"), an affiliate of S&P Global Market Intelligence. All rights in the Trucost data and reports vest in Trucost and/or its licensors. Neither Trucost, nor its affiliates, nor its licensors accept any liability for any errors, omissions or interruptions in the Trucost data and/or reports. No further distribution of the data and/or reports is permitted without Trucost's express written consent.

APPENDIX B – Independent limited assurance report

To: The Administrators of Ontario Teachers' Pension Plan

WHAT WE LOOKED AT: SCOPE OF OUR WORK

We have reviewed the portfolio carbon footprint in the Climate Change Report of Ontario Teachers' Pension Plan Board ("Ontario Teachers'") for the year ended December 31, 2019. Management is responsible for the determination and presentation of the portfolio carbon footprint and information set out in the Climate Change Report. Based on our review, we are providing our opinion (below) on the portfolio carbon footprint. This review does not constitute an audit.

PORTFOLIO CARBON FOOTPRINT

We reviewed Ontario Teachers' portfolio carbon footprint using the World Resources Institute ("WRI") and the World Business Council for Sustainable Development ("WBCSD") Greenhouse Gas ("GHG") Protocol, Task Force on Climate-related Financial Disclosures ("TCFD"), and the definitions by Ontario Teachers' as stated in the Climate Change Report. The GHG Protocol and TCFD definitions can be found at http://ghgprotocol.org/ and https://www.fsb-tcfd.org/, respectively.

2019 PORTFOLIO CARBON FOOTPRINT	PUBLIC EQUITIES	PRIVATE ASSETS	TOTAL
Market exposure of holdings (C$ millions)	28,703	94,030	122,733
Carbon footprint (tonnes carbon dioxide equivalent (tCO_2e)/C$ millions)	203	41	79

RESPONSIBILITIES

Management is responsible for determining the portfolio carbon footprint, including the scope and its presentation in the Climate Change Report. We did not review the narrative sections of the Climate Change Report, including footnotes, except where they incorporated the portfolio carbon footprint, nor did we review other indicators included in the Climate Change Report. Our responsibility is to express an independent conclusion on whether anything has come to our attention that causes us to believe that the portfolio carbon footprint is not presented fairly, in all material respects, in accordance with the GHG Protocol, TCFD, and Ontario Teachers' definitions described in the Climate Change Report.

OUR INDEPENDENCE AND QUALITY CONTROL

We have complied with the relevant rules of professional conduct/code of ethics applicable to the practice of public accounting as related to assurance engagements, issued by various professional accounting bodies, which are founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality, and professional behaviour.

We apply the International Standard on Quality Control 1, *Quality Control for Firms that Perform Audits and Reviews of Financial Statements, and Other Assurance and Related Services Engagements,* and accordingly maintain a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards, and applicable legal and regulatory requirements.

WHAT WE DID: ASSURANCE STANDARDS AND KEY ASSURANCE PROCEDURES

We conducted our work in accordance with the *International Standard on Assurance Engagements (ISAE) 3000 Revised, Assurance Engagements Other than Audits or Reviews of Historical Financial Information,* issued by the International Auditing and Assurance Standards Board. As such, we planned and performed our work in order to provide limited assurance with respect to the portfolio carbon footprint. Environmental and energy use data are subject to inherent limitations of accuracy given the nature and methods used for determining such data. The selection of different acceptable measurement techniques can result in materially different measurements. The precision of different measurement techniques may also vary.

Considering these inherent limitations, to perform a limited assurance engagement, we obtained and evaluated evidence using a variety of procedures including:

- Performing risk assessment procedures to identify the public and private equities that present the greatest risk of material misstatement to the Climate Change Report;
- Interviewing relevant management and staff responsible for data collection and reporting to understand the process used to calculate the portfolio carbon footprint;
- Obtaining an understanding of the management systems, processes and the relevant controls used to generate, aggregate, and report the data;
- Reviewing relevant documents and records to reconcile the carbon intensities of sampled public and private equities;
- Re-calculating and reconciling market exposure and carbon intensity data to confirm portfolio carbon footprint calculations; and,
- Assessing the portfolio carbon footprint data for consistency with our knowledge of Ontario Teachers' operations, including comparing Ontario Teachers' portfolio carbon footprint to publicly available third-party information.

Our assurance criteria is comprised of the GHG Protocol, TCFD, and Ontario Teachers' definitions as described in the Climate Change Report. Our engagement team included individuals with environmental and assurance experience.

WHAT WE FOUND: LIMITED ASSURANCE CONCLUSION

Based on our work as described in this report, nothing has come to our attention that causes us to believe that the portfolio carbon footprint is not, in all material respects, presented fairly using the WRI and WBCSD GHG Protocol, TCFD, and Ontario Teachers' definitions.

RESTRICTED USE

This report is intended solely for the information and use of Ontario Teachers' management. Deloitte's engagement was not planned or conducted in contemplation of, or for the purpose of reliance by any third party (other than the Administrators of Ontario Teachers' Pension Plan to whom Deloitte's limited assurance report is addressed).

Deloitte LLP

Chartered Professional Accountants
Toronto, Ontario, Canada
July 6, 2020

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