



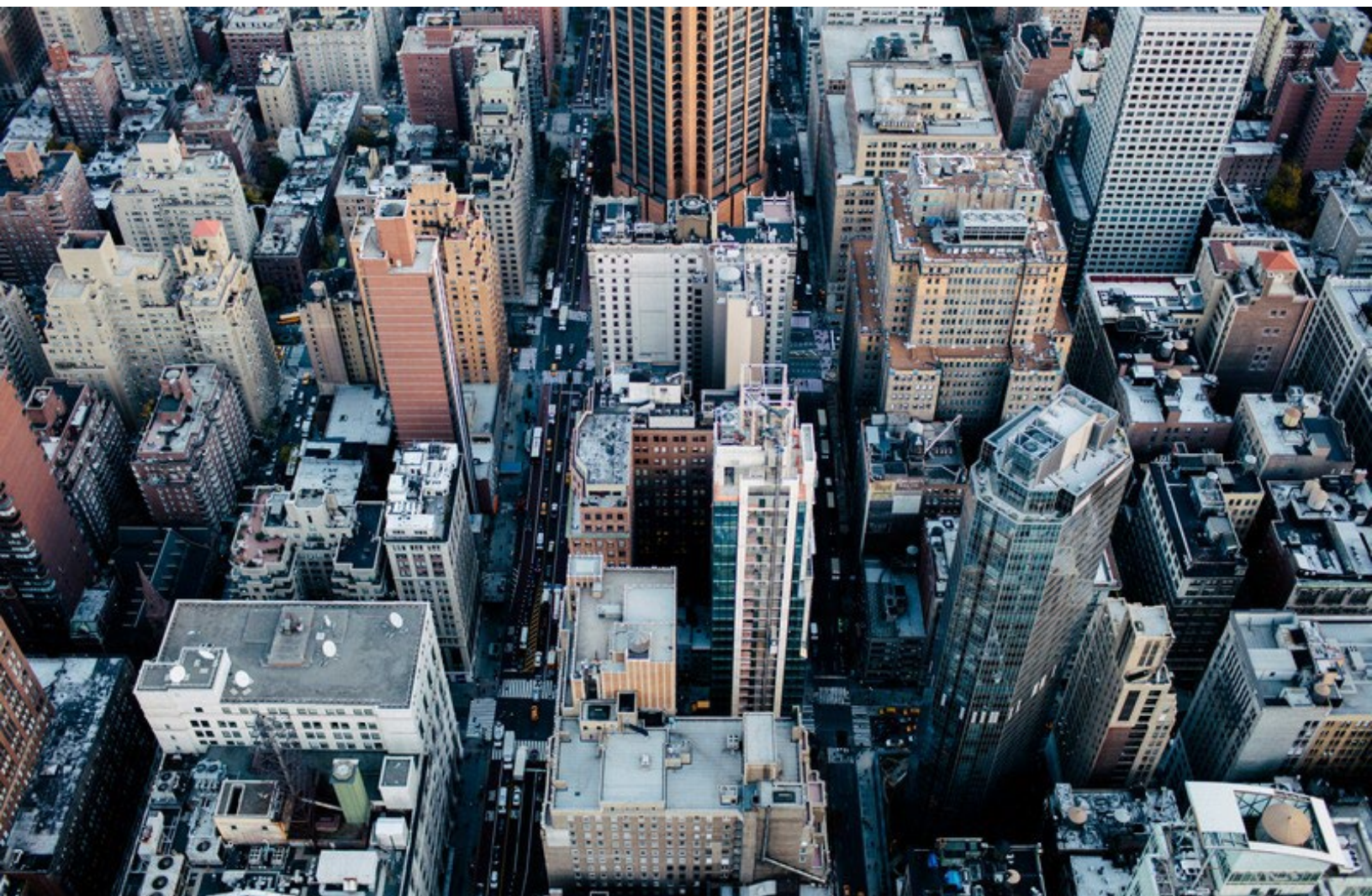
Verification Report

2022 CDP GHG Report

Union Pacific Railroad Company

14 July 2023

→ The Power of Commitment



GHD 735



455 Phillip Street, Unit 100A

Waterloo, Ontario N2L 3X2, Canada

T 519-340-4213 | E erik.martinez@ghd.com | **ghd.com**

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Project manager	Erik Martinez
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Appendices

Appendix A Assurance Opinion

1. Overview

Date of Verification Report:	July 14, 2023
Member Name and Responsible Party for GHG Report (Statement)	Union Pacific Railroad Company
Emission Year Report Verified:	2022
Reporting Classification:	Complete
Member Organizational Boundaries:	Control Only; Operational
Geographic Scope:	North American
Verification Body Name:	GHD Limited
Verification Body Contact:	Mr. Gordon Reusing
Title:	Principal
Telephone:	519-340-4231
Email:	gordon.reusing@ghd.com
Verification Team Members	
Lead Verifier:	Mr. Erik Martinez
Independent Peer Reviewer:	Mr. Gordon Reusing
Type of Verification:	Full Verification
Criteria for Verification:	The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard (Revised Edition) ISO 14064 Greenhouse Gases - Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions
Total Entity-Wide Emissions Verified	
Total Scope 1 Emissions:	9,266,469 tonnes CO₂e
CO₂:	9,164,742 tonnes CO ₂ e
CH₄:	22,317 tonnes CO ₂ e
N₂O:	71,232 tonnes CO ₂ e
HFCs:	8,177 tonnes CO ₂ e
Biomass Scope 1 Emissions:	404,876 tonnes CO ₂ e
Total Scope 2 Emissions (location-based):	237,327 tonnes CO₂e
Total Scope 2 Emissions (market-based):	245,798 tonnes CO₂e
Total Scope 3 Emissions:	5,811,176 tonnes CO₂e
Purchased Goods and Services:	868,106 tonnes CO ₂ e
Capital Goods:	682,196 tonnes CO ₂ e
Fuel and Energy Related Activities:	3,024,059 tonnes CO ₂ e
Upstream Transportation and Distribution:	556,190 tonnes CO ₂ e
Waste Generated in Operations:	148,375 tonnes CO ₂ e
Business Travel:	38,905 tonnes CO ₂ e
Employee Commuting:	174,299 tonnes CO ₂ e
Downstream leased assets:	4,530 tonnes CO ₂ e
Investments	314,515 tonnes CO ₂ e
Summary of Verification Findings:	See Appendix A for the Assurance Opinion

2. Introduction

Union Pacific Railroad Company (UP) retained GHD Limited (GHD) to complete a verification of its greenhouse gas (GHG) inventory report (Report) for the period of January 1 to December 31, 2022. GHD understands that UP intends to use the GHG inventory to support its submission to the CDP. Further, GHD understands UP has prepared their GHG Report for 2022 in general accordance with the requirements of *The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard (Revised Edition) (GHG Protocol)*.

GHD has prepared this Verification Report in accordance with ISO document entitled ISO 14064 Greenhouse Gases - Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions (ISO 14064-3), an accepted verification standards for use under the CDP. GHD notes that, as UP reported only at the corporate level, rather than at the individual facility level, no site visits were completed as part of the verification.

3. Verification Objective

The purpose of verification is to have an independent third party assess the 2022 GHG Report, calculations and compliance with the requirements of the *The GHG Protocol* and associated guidance.

UP has reported Scope 1, Scope 2, and selected Scope 3 emissions. GHD verified UP's Scope 1 and Scope 2 emissions in accordance with the requirements of the CDP and ISO 14064-3. GHD notes that Scope 3 emissions are typically not verified under CDP; however, GHD verified the Scope 3 emissions calculations in accordance with ISO 14064-3 to ensure that the source information and methodologies are appropriate, and the calculations are correct.

4. Level of Assurance

The verification was conducted to a reasonable level of assurance in accordance with the requirements of ISO 14064-3. Based on this level of assurance, GHD verified that UP's assertion is:

- Materially correct and is a fair representation of the GHG data and information
- Prepared in accordance with the applicable GHG quantification, monitoring, and reporting, standards or practice

5. Verification Standard

CDP is based upon the principles of ISO 14064-3. ISO 14064-3 is also an accepted verification standard under the CDP¹. Therefore, for the verification of the 2021 GHG Report, GHD applied ISO 14064-3 as the verification standard.

¹ Acceptable verification standards under CDP available at: <https://www.cdp.net/en/guidance/verification>.

6. Verification Criteria

For this verification, GHD applied the following verification criteria:

- ISO 14064 Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals (ISO 14064-1)
- ISO 14064 Greenhouse gases - Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions, ISO, March 2016 (ISO 14064-3:2016)
- The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard (Revised Edition)
- Technical Guidance for Calculating Scope 3 Emissions Version 1.0, Greenhouse Gas Protocol, 2013

7. Verification Scope

7.1 Client Contact

Tom Cappucci was GHD's contact for this verification.

7.2 Emission Sources

UP operations assessed as part of this verification included UP's entire corporate operations, with the exception of the passenger service sector and properties, where UP ownership was less than 50 percent (project boundary is based on UP operational control). The inventory boundary also included the UP vehicle fleet (locomotive, corporate jet, and other vehicles such as corporate cars/trucks), UP corporate operations buildings, and other indirect emission sources including air travel, car rentals, waste generated in operations, and fuel extraction, production, and transportation. Verification was completed at the corporate level.

Emission sources therefore include the following:

Scope 1 – Direct Emissions Sources:

- Mobile Combustion:
 - Locomotives (CO₂, CH₄, N₂O)
 - Corporate jets (CO₂, CH₄, N₂O)
 - Other UP owned vehicles (CO₂, CH₄, N₂O)
- Stationary Combustion (CO₂, CH₄, N₂O)
- Fugitive Emissions – Refrigerants (HFCs)

Scope 2 – Indirect Emissions Sources (location-based and market-based):

- Imported Electricity (CO₂, CH₄, N₂O)
- Imported Chilled Water (CO₂, CH₄, N₂O)
- Imported Steam (CO₂, CH₄, N₂O)

Scope 3 – Other Indirect Emissions Sources:

- Purchased Goods and Services (CO₂e)
- Capital Goods (CO₂e)
- Fuel-and-energy-related activities (WTT) (CO₂e)
- Waste generated in operations (CO₂, CH₄, N₂O)

- Mobile Combustion - Employee Business Travel:
 - Airline Travel (CO₂, CH₄, N₂O)
 - Rental Car Travel (CO₂, CH₄, N₂O)
- Employee Commuting (CO₂, CH₄, N₂O)
- Downstream leased assets (CO₂, CH₄, N₂O)
- Investments (CO₂e)

7.3 Geographical and Organizational Boundaries

The verification included all North American UP corporate operations.

7.4 Reporting Period

The reporting period is between January 1 and December 31, 2022.

7.5 Use of this Report

This report has been prepared for the use of UP to demonstrate compliance with the CDP in obtaining third party verification of its 2022 GHG Report for UP North American operations.

Statements from GHD's Verification Report, including the Assurance Opinion must reference the date of issuance of GHD's report, the applicable verification period and the associated programme for which the verification was conducted. The GHG assertion provided by GHD can be freely used by UP for marketing or other purposes other than in a manner misleading to the reader. The GHD mark shall not be used by UP in any way that might mislead the reader about the verification status of the organization. The GHD mark can only be used in relation to the specific time period verified by GHD.

8. Verification Plan

8.1 Strategic Analysis

GHD's Verification Team performed a strategic analysis to understand the activities and complexity of UP's operations and emissions sources to determine the nature and extent of the verification activities.

GHD's strategic analysis included:

- a. Relevant sector information.
- b. Nature of operations of the Facility and product.
- c. Criteria requirements, including applicable regulatory and/or GHG programme requirements.
- d. Materiality threshold, including the quantitative and qualitative components.
- e. Likely accuracy and completeness of the GHG statement.
- f. Scope of the GHG statement and related boundaries.
- g. Time boundary for data.
- h. Emissions sources and their contribution to the overall GHG statement.
- i. Changes in GHG emissions from the prior reporting period.
- j. Appropriateness of quantification and reporting methods, and any changes.
- k. Sources of GHG information.

- l. Data management information system and controls.
- m. Management oversight of the reporting data and supporting processes.
- n. Availability of evidence for the GHG information and statement.
- o. Results of previous verifications.
- p. Results of sensitivity or uncertainty analysis.
- q. Allocation approach.
- r. Type of GHGs.
- s. Applied monitoring methodology (i.e., direct measurement of GHGs or calculation of GHGs with indirect measurement of activity and calculation data).
- t. Other relevant information.

8.2 Summary of Emissions

The following is a summary of the emissions reported by UP in the GHG Report and the calculation methodology applied for each emission source.

Source Group	Approximate Emissions ² (metric tons as CO ₂ e)	% Total of Scope Emissions	Calculation Methodology
Scope 1 Emission Sources³			
Mobile Combustion Sources	9,188,973 (Total for all mobile combustion)	99.2%	See below for estimation methods by source.
Locomotives	8,938,733	96.5%	Calculation based on fuel consumption from Tableau Report and emission factors used from the US EPA Greenhouse Gas Emission Factors Hub (March 16, 2023), Table 2 for CO ₂ and Table 5 for CH ₄ and N ₂ O.
Corporate Jets	3,986	< 0.1%	Emissions are based on aviation jet fuel purchase data (actual gallons) and emission factor for kerosene-type jet fuel from the US EPA Greenhouse Gas Emission Factors Hub (March 16, 2023), Table 2.
Vehicles and other mobile sources	242,477	2.6%	Emissions are based on fuel purchase data (costs) obtained from finance department and the relevant emission factors from the US EPA Greenhouse Gas Emission Factors Hub (March 16, 2023) based on vehicle and fuel type, Table 2 for CO ₂ and Table 3 for CH ₄ and N ₂ O. Fuel costs are converted to quantity based on the average price per unit of fuel.
Stationary Combustion Sources Fuel Consumption (i.e., heating, emergency generators, etc.)	68,524	0.7%	Emissions are based on fuel purchase data (costs) obtained from finance department and the relevant emission factors from the US EPA Greenhouse Gas Emission Factors Hub (March 16, 2023), Table 1, based on vehicle and fuel type. Fuel costs are converted to quantity based on the average price per unit of fuel.

² Emissions as shown for Scope 1, 2, and 3 emission groups are based on excel spreadsheet entitled "UPRR 2022 GHG Emission Inventory Calculation FINAL.xlsx" provided by UP to GHD on May 4, 2023.

³ Of the total Scope 1 emissions, biodiesel/renewable diesel combustion contributes a total of 263,522 tonnes CO₂ (not included in any totals above). The remaining Scope 1 emission sources are fossil-fuel based.

Source Group	Approximate Emissions ² (metric tons as CO ₂ e)	% Total of Scope Emissions	Calculation Methodology
Refrigerant Usage - Fugitive Emission Source	8,177	< 0.1%	Calculations are based on UPRR's inventory of refrigerant replacements during the reporting year (provided by Facilities Department), multiplied by their respective Global Warming Potential Factors. For 2022, the refrigerant was based on an estimate due to changes within the department. Refrigerant losses include use in buildings, railcars, vehicles and other miscellaneous sources. In accordance with the GHG Protocol Guidance, only contaminants included in the Kyoto Protocol (HFCs) should be included. Ozone Depleting Substances (ODS) such as CFCs and HCFCs, which are being phased out may be included in the inventory but should not be reported.
Oil Water Separators (OWS)	794	< 0.1%	Emissions are based on the quantity of OWSs and the CH ₄ emission factor from the American Petroleum Institute (API) Compendium of GHG Emissions Methodologies for the Oil & Gas Industry, 2009 version (Section 6, Table 6-3).

Source Group	Approximate Emissions ¹ (metric tons as CO ₂ e)	% Total of Scope Emissions	Calculation Methodology
Scope 2 Emission Sources – Location-Based			
Imported Electricity	237,247	99.9%	CO ₂ , CH ₄ , and N ₂ O emissions are based on electricity use and the eGRID emission factors.
Imported Chilled Water	30	< 0.1%	CO ₂ , CH ₄ , and N ₂ O emissions based on simplified estimates, using known chilled water purchases (demand), and an assumed Coefficient of Performance (COP) to determine the electrical equivalence and the relevant eGRID emission factors.
Imported Steam	50	< 0.1%	CO ₂ , CH ₄ , and N ₂ O emissions based on simplified estimates, using known steam purchases, and the USEPA GHG Emission Factor Hub for steam, Table 7.

Source Group	Approximate Emissions ¹ (metric tons as CO ₂ e)	% Total of Scope Emissions	Calculation Methodology
Scope 2 Emission Sources – Market-Based			
Imported Electricity	245,718	100%	CO ₂ , CH ₄ , and N ₂ O emissions are based on electricity use and the eGRID emission factors. CO ₂ emissions followed a similar method, with residual mix emission rates published on Green-e.
Imported Chilled Water	30	< 0.1%	CO ₂ , CH ₄ , and N ₂ O emissions based on simplified estimates, using known chilled water purchases (demand), and an assumed Coefficient of Performance (COP) to determine the electrical equivalence and the relevant eGRID emission factors.
Imported Steam	50	< 0.1%	CO ₂ , CH ₄ , and N ₂ O emissions based on simplified estimates, using known steam purchases, and the USEPA GHG Emission Factor Hub for steam, Table 7.

Source Group	Approximate Emissions ¹ (metric tons as CO ₂ e)	% Total of Scope Emissions	Calculation Methodology
Scope 3 Emission Sources			
Purchased goods and services	868,106	14.9%	All UP purchasing data is managed and obtained through UP's SourceHub BI portal. All UP cost classifications were reviewed to determine the source group. Each UP costing category was then matched with the closest corresponding sector category for life cycle assessment emission factors derived from the US EPA Economic Input Output (USEEIO) dataset published by the U.S. EPA Office of Research and Development (ORD) November 2020. The USEEIO dataset uses more recent life cycle results (2018 USD) using the methodology described in Yang, Ingwersen et al. (2017). Costs were adjusted to the 2018 base year using published inflation data.
Capital goods	682,196	11.7%	Each UP costing category was then matched with the closest corresponding sector category for life cycle assessment emission factors derived from the US EPA Economic Input Output (USEEIO) dataset published by the U.S. EPA Office of Research and Development (ORD) November 2020. The USEEIO dataset uses more recent life cycle results (2018 USD) using the methodology described in Yang, Ingwersen et al. (2017). Costs were adjusted to the 2018 base year using published inflation data.

Source Group	Approximate Emissions ¹ (metric tons as CO _{2e})	% Total of Scope Emissions	Calculation Methodology
Fuel-and-energy-related activities (WTT)	3,025,471	52.1%	<p>Fuel Emissions resulting from extraction, production, and transportation of fuel consumed by UP including diesel (locomotives), diesel (other mobile sources), gasoline, jet fuel, propane and natural gas were based on consumption and the emission factors from The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model.</p> <p>Electricity UP calculated the upstream emissions associated with transmission and distribution losses of electricity using the eGRID emission factor and quantity electricity purchased, for each region.</p>
Upstream transportation and distribution	556,190	9.6%	<p>All UP purchasing data is managed and obtained through UP's SourceHub BI portal. UP extracted company-wide spend on Truck & Vans and Air Transportation, and converted spend into emissions using an appropriate emission factors for each spend category. Emission factors obtained from the Supply Chain Greenhouse Gas Emission Factors v1.2 by NAICS.</p>
Waste generated from operations	148,375	2.6%	<p>Emissions were calculated using data directly collected by UP from waste suppliers for total tonnage sent to landfills, total tonnage of Municipal Solid Waste Recycling, and total tonnage of waste incinerated. No calculations were made using secondary data (i.e. industry averages). Emissions were calculated by applying the emissions factors from the USEPA GHG Emission Factor Hub, Table 9.</p> <p>For the 2022 reporting year, UP determined that energy recovery and recycling should be excluded from the inventory as these emissions are attributed to the user of the recycled materials, not the producer of the waste. Therefore, UP excluded the following from Scope 3 Category 5 emissions: Scrap metal, wood ties sent to co-gen, recycled/repurposed concrete ties, recycled/repurposed composite ties, and used oil/recovered oil.</p>
Business travel	38,905	0.7%	<p>Emissions associated with business travel includes supplier provided data for rental car miles, aircraft miles, hotel stays, and crew shuttle miles. Emission factors used are based on fuel type (gasoline, diesel fuel and jet fuel) from USEPA GHG Emission Factor Hub.</p>

Source Group	Approximate Emissions ¹ (metric tons as CO _{2e})	% Total of Scope Emissions	Calculation Methodology
Employee commuting	174,299	3.0%	Emissions were calculated using UP data for employee count, and assumptions about use of UPs 50% allowable work from home policy for non-agreement employees. The average number of commute miles per person was estimated (Numbeo), using "Average when using primary Car" value, and emission factors from USEPA GHG Emission Factor Hub.
Downstream leased assets	4,530	< 0.1%	This category includes emissions from the operation of real estate assets owned by UP and leased to other entities. Emissions were calculated using square footage of the buildings and average energy intensities from the U.S. Energy Information Association (EIA) Electricity Consumption and Conditional Energy Intensity by Building Size, 2018 (Table C21) - Release date December 2022; EIA Natural Gas Consumption and Conditional Energy Intensity by Building Size, 2018 (Table C31) - Release date December 2022, to determine natural gas and electricity consumption and emission factors from USEPA GHG Emission Factor Hub.
Investments	314,515	5.4%	Emissions were calculated using Scope 1 & 2 emissions data provided directly by UPs investment & joint venture partners. UPs locomotive emission estimates for locomotives were based on an assumption that each locomotive burns 75,000 gallons of diesel fuel per year. Office & shop emissions were calculated using square footage measurements and average emission factors USEPA GHG Emission Factor Hub. Total emissions were based on UP's percent stake in each investment.

8.3 Assessment of Risk and Magnitude of Potential Errors, Omissions, or Misrepresentations

Based on GHD's review of the Facility's operations, the following table summarizes the potential risk and magnitude of potential errors, omissions or misrepresentations:

Potential Risk Area	Percentage of Emissions (%) and Percent Change Year Over Year	Risk Type (Inherent, Control, Detection)	Risk Level (High, Medium, Low)	Justification
General				
Facility Boundary	NA	Inherent	Low	All equipment within the project boundary is operated by UP and all emission sources are included in the Emissions Report.
		Control	Low	Boundary is well defined, and all emissions processes are considered in the quantification.
		Detection	High	GHD confirmed the boundaries through review of UPs operations, emission sources, supporting documentation, and interviews with UP personnel.
Use of ICT	NA	Inherent	Low	GHD has previously conducted verifications for UP. The GHD project team has knowledge of UPs operations and data from previous verifications.
		Control	Low	ICT technologies (e.g., Microsoft Teams, video conferencing, site photographs) are available to both GHD and UP. Systems are in place, documented and reviewed during previous verifications and was made available through Teams.
		Detection	High	UP and the GHD project team used ICT software to conduct discussions, share screens, and view key documents. GHD worked with UP to arrange meeting at a mutually agreed time to aid the verification process.
Scope 1 - Emission Sources				
Mobile Combustion – Locomotives	96.5% (0.7% increase, or 0.7 relative change since 2021)	Inherent	Low	Low complexity in calculations.
		Control	Medium	Many consumption sources measured through fuel supplier records and invoicing. High magnitude of fuel consumption but fuel usage is closely monitored for accounting purposes. Errors in compilation of fuel usage (especially diesel consumption) can lead to a significant change in overall emissions. However, as the majority of diesel consumption invoices are received electronically and the data are retrieved directly from the purchasing database for use in the GHG calculations, there is little opportunity for corruption/loss of the data

Potential Risk Area	Percentage of Emissions (%) and Percent Change Year Over Year	Risk Type (Inherent, Control, Detection)	Risk Level (High, Medium, Low)	Justification
				from the point of entry to the use of the data in the GHG inventory.
		Detection	Low-Medium	GHD reviewed all electronic invoicing totals from the UP database system to ensure accuracy, the detection risk is low-medium.
Mobile Combustion – Corporate Jets	0.04% (53% increase, or 0.02% relative change since 2021)	Inherent	Low	Low complexity in calculations.
		Control	Low	Data from third party supplier invoicing. Low control risk that UP would not detect a discrepancy in the invoicing.
		Detection	Medium	As both the inherent and control risks are low, the detection risk could be set to high. This is also a low magnitude source where an error in the data or calculations would have a low risk of resulting in a material discrepancy. The detection risk was set to medium.
Mobile Combustion Vehicles and other mobile sources	2.6% (7% decrease, or - 0.2% relative change since 2021)	Inherent	Low	Low complexity in calculations.
		Control	Low	Data for fuel purchases maintained in electronic database. Low risk that UP would not detect a discrepancy in the data.
		Detection	Medium	As both the inherent and control risks are low, the detection risk could be set to high. This is also a low magnitude source where an error in the data or calculations would have a low risk of resulting in a material discrepancy. The detection risk was set to medium.
Stationary Combustion (i.e., heating, emergency generators, etc.)	0.7% (1.6% increase, or - 0.01% relative change since 2021)	Inherent	Low	Many consumption sources measured through fuel supplier records and invoicing. Stationary combustion is also a low magnitude source for Scope 1 emissions.
		Control	Low	Data for fuel purchases maintained in electronic database. Low risk that UP would not detect a discrepancy in the data.
		Detection	Medium	As both the inherent and control risks are low, the detection risk can be set to high. This is also a low magnitude source where an error in the data or calculations would have a low risk of resulting in a material discrepancy. The detection risk was set to medium.
Fugitive Emissions - Refrigerants	0.09% (76% decrease, or 0.07% relative change since 2021)	Inherent	High	Low complexity in calculations and low magnitude source, however, due to the large change in emissions from year to year, the inherent risk is set to high.
		Control	Low	Based on inventory records for refrigerants used during the reporting

Potential Risk Area	Percentage of Emissions (%) and Percent Change Year Over Year	Risk Type (Inherent, Control, Detection)	Risk Level (High, Medium, Low)	Justification
				year. Due to low magnitude of source, there is a low potential for material error resulting from data management procedures.
		Detection	Low	As the inherent risk is high, the allowable detection risk must be set to low although this is also a low magnitude source where an error in the data or calculations would have a low risk of resulting in a material discrepancy. The detection risk was set to low.
Fugitive Emissions - Oil Water Separators	0.01% (New for 2022)	Inherent	Low	Low complexity in calculations and very low magnitude source.
		Control	Low	Based on inventory records of owned oil water separators (OWS). Low risk UP would not detect an error.
		Detection	High	As both the inherent and control risks are low, the allowable detection risk is high.
Scope 2 - Emission Sources				
Imported Electricity	99.97% (13.8% increase since 2021)	Inherent	High	Calculations are based on actual consumption data. Higher complexity in calculations due to variability in emission factors for electricity production from state to state. High potential for material discrepancy in the event of incorrect emission factor use.
		Control	High	Large data set with many different sources resulting in a high control risk. UP uses electronic invoicing and determines postal codes to apply region-specific emission factors or applies a US average emission factor to derive emission totals. Medium-high risk in this emission total accuracy due to variability in region-specific emission factors when compared to US average value that is used in a portion of the electricity purchases. There is a medium risk UP would not discover a material error in this reporting.
		Detection	Low	As both the inherent and control risks are high, the allowable detection risk must be set to low.
Imported Chilled water	< 0.1%% (966% increase, or - 0.1% relative change since 2021)	Inherent	Low	Low complexity in calculations and low magnitude source.
		Control	Low	This is a low magnitude source where an error in the data or calculations would have a low risk of resulting in a material discrepancy.
		Detection	High	As both the inherent and control risks are low, the detection risk could be set to high. This is also a low magnitude source

Potential Risk Area	Percentage of Emissions (%) and Percent Change Year Over Year	Risk Type (Inherent, Control, Detection)	Risk Level (High, Medium, Low)	Justification
				where an error in the data or calculations would have a low risk of resulting in a material discrepancy.
Imported Steam	< 0.1%% (7.3% decrease, or -0% relative change since 2021)	Inherent	Low	Low complexity in calculations and low magnitude source.
		Control	Low	This is a low magnitude source where an error in the data or calculations would have a low risk of resulting in a material discrepancy.
		Detection	High	As both the inherent and control risks are low, the detection risk could be set to high. This is also a low magnitude source where an error in the data or calculations would have a low risk of resulting in a material discrepancy.
Scope 3 - Emission Sources				
Purchased goods and services	14.9% (New for 2022)	Inherent	Medium	Low complexity in calculations but large volume of data to process.
		Control	Medium	Calculations are based on money spent on goods and services. All purchasing data is obtained through UP's Source Hub BI data management system. Requires significant processing to obtain relevant data for the category emissions, but code mapping is transparent and explained in worksheets. USEEIO dataset emission categories and factors also presented clearly in worksheets for ease of matching data categories to USEEIO factors. The categories can be quite broad, resulting in a low risk a discrepancy in matching data sets would be missed by UP. Control risk is set to medium.
		Detection	Medium	As both the inherent and control risks are medium, the detection risk is medium.
Capital goods	11.7% (New for 2022)	Inherent	Low	Low complexity in calculations but large volume of data to process.
		Control	Low	Calculations are based on money spent on capital goods. All purchasing data is obtained through UP's Source Hub BI data management system. Requires significant processing to obtain relevant data for the category emissions, but code mapping is transparent and explained in worksheets. USEEIO dataset emission categories and factors also presented clearly in worksheets for ease of matching data categories to USEEIO factors. The categories can be quite broad, resulting in a low risk a discrepancy in matching data sets would be missed by UP.

Potential Risk Area	Percentage of Emissions (%) and Percent Change Year Over Year	Risk Type (Inherent, Control, Detection)	Risk Level (High, Medium, Low)	Justification
		Detection	Medium	As both the inherent and control risks are medium, the detection risk is medium.
Fuel-and-energy related activities (WTT)	52.1% (1.3% decrease, or 0.7% relative change since 2021)	Inherent	Low	Low complexity in calculations.
		Control	Low	Estimates are based on UP fuel use data and the application of emission factors assigned for the fuels extraction, production, and transportation. Data for fuel purchases are maintained in UP's electronic database. Low risk that UP would not detect a discrepancy in the data. The control risk is set to low.
		Detection	Low	As the inherent and control risks are low, the detection risk can be set to high. However, as GHD verified fuel use data as part of the majority of Scope 1 emissions, the risk that GHD would not detect a discrepancy in the supporting data would be low.
Upstream transportation and distribution	9.6% (New for 2022)	Inherent	Low	Low complexity in calculations but large volume of data to process.
		Control	Low	Calculations are based on money spent on transportation and distribution. All purchasing data is obtained through UP's Source Hub BI data management system. Requires significant processing to obtain relevant data for the category emissions, but code mapping is transparent and explained in worksheets. Some data is also provided directly by suppliers. This results in a low control risk.
		Detection	High	As both the inherent and control risks are low, the allowable detection risk is high.
Waste generated from operations	2.6% (New for 2022)	Inherent	Low	Low complexity in calculations.
		Control	Low	All data provided directly by waste suppliers for total tonnage sent to landfills, total tonnage of Municipal Solid Waste Recycling, and total tonnage of waste incinerated, resulting in a low control risk.
		Detection	High	As both the inherent and control risks are low, the allowable detection risk is high.
Business travel	0.7% (264% increase, or 1.9% relative change since 2021)	Inherent	Low	Low complexity in calculations.
		Control	Low	Data provided directly by suppliers, resulting in a low control risk.
		Detection	High	As both the inherent and control risks are low, the allowable detection risk is high.
Employee commuting	3.0% (New for 2022)	Inherent	Low	Low complexity in calculations.
		Control	Low	Data is obtained directly from UP published data and a single emission factor. The control risk is low.

Potential Risk Area	Percentage of Emissions (%) and Percent Change Year Over Year	Risk Type (Inherent, Control, Detection)	Risk Level (High, Medium, Low)	Justification
		Detection	Low	As both the inherent and control risks are low, the allowable detection risk is high.
Downstream leased assets	< 0.1% (New for 2022)	Inherent	Low	Low complexity in calculations and very low magnitude source.
		Control	Low	Large amount of data that is relatively static and would generally not change significantly year to year. This is also a very low magnitude source where an error in the data or calculations would have a low risk of resulting in a material discrepancy. The control risk is set to low.
		Detection	High	As both the inherent and control risks are low, the allowable detection risk is high.
Investments	5.4% (New for 2022)	Inherent	Low	Low complexity in calculations.
		Control	Low	Emissions were calculated using Scope 1 & 2 emissions data provided directly by UPs investment & joint venture partners, resulting in a low control risk.
		Detection	High	As both the inherent and control risks are low, the allowable detection risk is high.

8.4 Evidence Gathering Plan

GHD developed an Evidence -Gathering Plan (EGP) for internal use based on review of the objectives, criteria, scope, and level of assurance detailed above. The EGP was designed to lower the verification risk to an acceptable level and specifies the type and extent of evidence gathering activities. The EGP was reviewed and approved by the Lead Verifier. The EGP was dynamic and was revised, as required, throughout the course of the verification. Any modifications to the EGP were reviewed and approved by the Lead Verifier, with the final EGP completed prior to issuing the final verification report and opinion.

8.5 Materiality Level

Neither CDP nor ISO 14064-3 specify a materiality threshold for verification. Therefore, materiality for this verification has been set at 5 percent for both UP's direct (Scope 1) and indirect (Scope 2) emissions as per the guidance of The GHG Protocol. The GHG Protocol does not specify a materiality threshold for the verification of other indirect (Scope 3) emissions; however, GHD applied a materiality threshold of 5 percent for the Scope 3 emissions for consistency. In addition, a series of discrete errors, omissions or misrepresentations or individual or a series of qualitative factors, when aggregated may be considered material.

9. Verification Procedures

9.1 Verification Methodology

The purpose of GHD's verification procedures was to assess the following critical items:

1. Accuracy and completeness of annual GHG emissions
2. Uncertainty of external data sources used
3. Emission assumptions
4. Accuracy of emission calculations
5. Potential magnitude of errors and omissions
6. Percentage of total emissions (i.e., the sum of Scope 1 and 2 emissions) calculated using simplified estimation methods

The GHD Project Team identified and determined risks related to emissions during both the desktop reviews and the follow-up interviews. The components of the document review and follow-up interviews were:

- Document Review:
 - Review of data and information to confirm the correctness of presented information
 - Cross-checks between information provided in the report and information from independent background investigations
- Follow-up Interviews via:
 - Microsoft Teams or similar virtual meeting program
 - telephone
 - email

The GHD Project Team's document review during the verification process was comprised of, but not limited to, an evaluation of the following:

- Documentation is complete and comprehensive and follows the structure and criteria given in ISO 14064-3, The GHG Protocol, and associated guidance.
- Monitoring methodologies are justified and appropriate.
- Calculation of the inventory is appropriate and uses conservative assumptions.
- GHG Report clearly identifies the frequency of and responsibility and authority for monitoring, measurement, and data recording activities and sufficiently describes quality control/quality assurance/management control procedures.

The GHD Project Team interviewed UP staff in order to:

- Cross-check information provided.
- Review data management and recording procedures.
- Test the correctness of critical formulae and calculations.
- GHD's document review established the degree to which the 2022 GHG Report meets the verification standards and criteria.

9.2 Details of Site Visit

Based on the sources of emissions and required supporting information for the verification and the fact that UP is only reporting at the corporate level, GHD and UP have determined that a site visit would not be necessary. A site visit is not explicitly required by either the CDP or ISO 14064-3.

10. Verification Findings

10.1 Scope Review and Noted Discrepancies

Scope 1 Emissions

As noted in Section 8.1, mobile combustion from locomotive sources accounts for 96.6 percent of the total Scope 1 emissions, with mobile combustion in general accounting for 99.2 percent of the total Scope 1 emissions. Therefore, when reviewing the Scope 1 emissions GHD focused mainly on the locomotive emission estimates, methodologies, and supporting information for determining whether any material discrepancies existed. All other mobile combustion sources, stationary combustion sources, refrigerant use and oil water separator sources that comprise the balance of the Scope 1 emissions were reviewed to determine the adequacy of the methodologies and calculations used.

Regarding fuel purchases other than for locomotive fuel or corporate jets, for non-highway vehicles, UP uses a credit card purchase-based fueling system that limits UP fleet purchases to fuel and provides a management system for all purchase data to differentiate between fuel purchased by vehicle. For highway vehicles, fuel purchases are also based on a card-purchasing system. When a new highway vehicle is purchased by UP, the car comes with a fueling card. These cards can only be used by UP employees that have a registered personal identification number (PIN) through CSI Voyager (managed company fleet fuel purchasing). With each fuel purchase, the data is delivered to CSI Voyager. Final UP fleet billing details (including volumes of fuel purchased by vehicle) is in turn provided to UP for use in the GHG Report. For both of these integrated and secure purchasing and tracking systems, UP provided the purchasing data for 2022, for cross-referencing against the reported totals by UP.

Based on GHD's previous knowledge of the UP locomotive diesel fuel invoicing management system, GHD understands that this invoicing data is managed in three ways:

1. By "Electronic Data Interchange" (EDI) – EDI is the practice of exchanging information or data between organizations in a standardized format, such as invoicing information from a provider of fuel and a purchaser of the fuel.
2. By ORISS – ORISS is a central website used by rail industry suppliers for submitting invoices, where EDI capabilities are not available. ORISS data are electronically imported into EDI.
3. Hardcopy invoices, which are manually entered into the EDI system by UP (representing a small percentage of total invoicing).

GHD reviewed the locomotive emission estimates and methodologies and noted no material discrepancies when recalculating the total emissions using the reported fuel consumption data provided by UP in the 2022 GHG Report. GHD reviewed the 2022 diesel purchases, provided in a spreadsheet by UP. The data in this spreadsheet is an output from UP's electronic invoice management systems as described below. The locomotive diesel consumption reported by UP (909,092,000 gallons) matched the inventory records reviewed by GHD. UP also provided a live demonstration of Tableau to show the data pulled by UP and provided to GHD. GHD did not identify any discrepancies in the reported locomotive emission estimates. In addition, GHD reviewed the year-to-year change in emissions associated with locomotive diesel fuel combustion, which increased by 0.7 percent (below material threshold) from 2021 to 2022.

GHD has reviewed the remaining methodologies and calculations associated with mobile combustion, stationary combustion, and refrigerant use sources and noted no material discrepancies.

Discrepancy	Magnitude as a Percent of Reported Scope 1 Entity-Level Emissions	Current Disposition of the Discrepancy
N/A	0.00	N/A

Net sum of all Scope 1 discrepancies at the entity level: 0.00 percent

Scope 2 Emissions

UP’s Scope 2 emissions account for approximately 1.6% of the total inventory with electricity purchases accounting for essentially 100 percent of the total Scope 2 emissions. Purchased steam and chilled water contribute a negligible amount to the overall totals. UP electricity calculations are based actual energy consumption from purchased electricity by eGRID subregions.

For the electricity consumption that is based upon value spent on electricity, UP applied a conversion factor based on an average retail price of electricity for the industrial and commercial sectors (e.g., determined using simplified estimation methods [SEMs]; as provided through the U.S. Energy Information Administration) to convert to a consumption value as kilowatt hours (kWh). The emission calculations based on actual electricity consumption data known does not require a similar estimation for conversion of known amount paid for electricity to a consumption value in kWh.

UP’s Scope 2 emissions are reported in two ways, using the location-based method and the market-based method. The location-based method reflects the GHG emissions from locally-generated energy delivered through the grid. While the market-based method reflects the GHG emissions associated with choices an organization makes about its energy supply or product.

Location-Based Emissions:

UP takes this billing data and imports it into the US EPA “Power Profiler Emissions Tool”, which takes the address ZIP codes and assigns the energy use to an eGRID region. The energy use totals are then multiplied by the corresponding eGRID region-specific emission factors to obtain GHG emission values. For purchasing data where ZIP codes are not available, the Power Profiler Emissions Tool assigns U.S. average eGRID emission factors for determining emissions associated with that electricity use.

GHD reviewed the electricity emission estimates, methodologies, and available invoicing and noted that for electronic consumption in areas where ZIP codes are not available, UP did not use the US national average eGRID emission rates to calculate indirect emissions from purchased electricity consumption.

In addition, GHD’s review of UP’s use of the US EPA “Power Profiler Emissions Tool” indicated the tool was up to date and using the correct emission factors in the calculation.

Market-Based Emissions:

The GRP V3.0 has listed the types of contractual instruments that convey specific emissions factors for the market-based method in order from the most specific to least specific in the hierarchy. UP has selected the method of Market-D Residual mix emission factors. The published 2022 Green-e® residual mix emissions rates provide CO₂ emissions rates that are adjusted to remove all Green-e® Energy certified sales for each Emissions & Generation Resource Integrated Database (eGRID) subregion to prevent double counting of these claims. CH₄ and N₂O emissions are based on the US EPA eGRID subregion emission factors, following the same approach used for location-based emissions.

GHD reviewed the US Green-e residual mix emission rates, electricity consumption data and electricity emission estimates and has observed no discrepancy. Similar as the location-based approach, the US average residual mix emission rate for CO₂ is calculated using the average residual mix rates from the subregions where UP had electricity usage.

GHD has reviewed the remaining methodology and calculations associated with purchased steam and chilled water and noted no material discrepancies.

Net sum of all Scope 2 discrepancies at the entity level: 0.00 percent

Scope 3 Emissions

In 2022, UP added several new scope 3 categories to the inventory. GHD reviewed the Scope 3 emission estimates, methodologies, and supporting data relating to the following Scope 3 emissions:

- Category 1: Purchased goods and services (CO₂e) **New for 2022**
- Category 2: Capital goods (CO₂e) **New for 2022**
- Category 3: Fuel- and energy related activities (CO₂e)
- Category 4: Upstream transportation and distribution (CO₂e) **New for 2022**
- Category 5: Waste generated in operations (CO₂e) **New for 2022 (previously reported rail-tie combustion)**
- Category 6: Business travel (CO₂e)
- Category 7: Employee commuting (CO₂e)
- Category 9: Downstream leased assets (CO₂, CH₄, N₂O) **New for 2022**
- Category 15: Investments (CO₂e) **New for 2022**

The following sections provide a more detailed review of the 9 reportable Scope 3 category emissions that account for 34.8 percent of the total reported emissions.

Category 1: Purchased goods and services and

Category 2: Capital goods

Both Category 1 and 2 emissions are based on purchasing data and the associated cost element codes to determine applicable purchasing categories. Any purchasing data related to other inventory elements (e.g., fuel purchasing data for Scope 1 reporting) or that were unrelated to purchased goods and services or capital goods were screened out of this Scope 3 reporting. All final screened cost element codes were then summed and matched with the closest corresponding sector category for life cycle assessment emission factors obtained from the US EPA Economic Input-Output (USEEIO) dataset (version 1.1). The emission factors from the USEEIO dataset can be quite broad categories and are not always an exact fit for each cost element but broad association matching/choosing a category of best fit based on the available factors.

Category 3: Fuel and energy-related activities

GHG emissions associated with fuel extraction, production, and transportation to UP facilities account for 52 percent of the total Scope 3 emissions included in the inventory. For this calculation UP used emission factors presented in the California Air Resources Board (CARB) document “CA-GREET3.0 Lookup Table Pathways Technical Support Documentation” (August 13, 2018). Included in this calculation are all of UP’s 2022 purchases for all mobile and stationary fuel sources, which were reviewed as part of the Scope 1 verification. For diesel, kerosene, jet fuel, and gasoline purchases, UP approximated their emissions using life cycle emission factors for ultra-low sulfur diesel (ULSD). For propane and natural gas purchases, UP approximated their emissions using the life cycle emission factors for natural gas.

UP calculated the upstream emissions associated with transmission and distribution losses of electricity using the eGRID emission factor and quantity of electricity purchased, for each region.

In addition, GHD reviewed the year-to-year change in emissions associated with Scope 3 fuel extraction, production, and transportation, which decreased by 1.3 percent from 2021 to 2022. This decrease is largely driven by the inclusion of offsets from the use of biogenic fuels in the calculation.

Category 4: Upstream transportation and distribution

Category 4 emissions are based on the transportation and distribution of products purchased by a company between their Tier 1 suppliers⁴ and UP's own operations, in vehicles not owned or operated by the company. These also include third-party transportation/distribution services purchased by the company including inbound/outbound logistics and third-party transportation/distribution between the company's own facilities. UP maintains cost element codes in their finance data management system for the tracking of purchased material transportation or for other purchased third-party transportation/distribution services.

In some cases, actual data (ton-miles) was provided directly by the 3rd party service (LOUP) and the emission factors from the US EPA Emission Factor Hub, Table 8 for Scope 3 Category: Upstream Transportation and Distribution for medium and heavy-duty trucks or rails.

GHD reviewed the Scope 3 emission estimates and methodologies relating to upstream transportation and distribution and noted no discrepancies in the 2022 GHG Report when recalculating the total emissions using the spend data and other supporting documentation provided by UP.

Category 5: Waste generated in operations

Emissions from waste were calculated using data directly collected by UP from waste suppliers for total tonnage sent to landfills, total tonnage sent to recycling, and total tonnage of waste incinerated. Emissions were calculated by applying the emissions factors from the USEPA GHG Emission Factor Hub, Table 9.

Previously, UP reported the emissions from rail tie combustion used to generate electricity. For the 2022 reporting year, UP determined that energy recovery and recycling should be excluded from the inventory as these emissions are attributed to the user of the recycled materials, not the producer of the waste. Therefore, UP excluded the following from Scope 3 Category 5 emissions: Scrap metal, rail ties sent to co-gen, recycled/repurposed concrete ties, recycled/repurposed composite ties, and used oil/recovered oil. GHD reviewed the calculations and emission factors and did not identify any discrepancies.

Category 6: Business travel

Category 6 emissions are quantified for air travel, car rentals, hotel stays, and crew shuttles. Flight data, car rental data and hotel stays are obtained by UP directly from the suppliers. Emission factors were obtained from the USEPA GHG Emission Factor Hub. Business travel emissions account for 0.7% of UP's inventory.

Based on a comparison to UP's 2021 inventory data and GHD's prior verification findings, GHD confirmed that these emission sources are of similar magnitude to the total reported in 2022 (although business travel emission totals have increased significantly as a result of normal business travel returning to pre-pandemic levels) and are unlikely to be the source of a material misstatement.

GHD reviewed the Scope 3 emission estimates and methodologies relating to business travel noted no discrepancies when recalculating the total emissions using the base consumption data provided by UP in the 2022 GHG Report.

Category 7: Employee commuting

Employee commuting emissions were calculated using UP's data for employee count directly from their published 10K filing, and assumptions about use of UP's 50% allowable work from home policy for non-agreement employees. The average number of commute miles per person was estimated, using "Average when using primary Car" value (Numbeo, https://www.numbeo.com/traffic/country_result.jsp?country=United+States), and emission factors from the USEPA GHG Emission Factor Hub.

GHD reviewed the Scope 3 emission estimates and methodologies relating to employee commuting and noted no discrepancies when recalculating the total emissions using the data provided by UP in the 2022 GHG Report.

⁴ Companies with which the reporting company has a purchase order for goods and services.

Category 9: Downstream Leased Assets

This category includes emissions from the operation of real estate assets owned by UP and leased to other entities. Emissions were calculated using square footage of the buildings and average energy intensities from the U.S. Energy Information Association (EIA) Electricity Consumption and Conditional Energy Intensity by Building Size, 2018 (Table C21) - Release date December 2022; EIA Natural Gas Consumption and Conditional Energy Intensity by Building Size, 2018 (Table C31) - Release date December 2022, to determine natural gas and electricity consumption and emission factors from USEPA GHG Emission Factor Hub.

GHD reviewed the Scope 3 emission estimates and methodologies relating to downstream leased assets and noted no discrepancies when recalculating the total emissions using the data provided by UP in the 2022 GHG Report.

Category 15: Investments

Emissions were calculated using Scope 1 & 2 emissions data provided directly by UP's investment & joint venture partners. Investment partners provided UP with the number of locomotive units and building square footage. UP calculated Scope 1 and 2 emissions using the same methods described above. The emission estimates for locomotives were based on an assumption that each locomotive burns 75,000 gallons of diesel fuel per year based on an internal model estimate. Office & shop emissions were calculated using square footage measurements and average emission factors USEPA GHG Emission Factor Hub. Total emissions were based on UP's percent stake in each investment. The investment accounting for the largest emissions, Ferromex, provided their already calculated Scope 1 and 2 emissions for CDP reporting purposes.

GHD reviewed the Scope 3 emission estimates and methodologies relating to investments and noted no discrepancies when recalculating the total emissions using the data provided by UP in the 2022 GHG Report.

Net sum of all Scope 3 discrepancies at the entity level: 0.00 percent

11. Assurance Opinion

GHD has completed an Assurance Opinion using the specified CDP format. GHD has provided this Assurance Opinion in Appendix A of this report.

12. Review Team

Lead Verifier/Technical Expert	
Name	Erik Martinez, P.Eng., CEM
Roles and Responsibilities	The lead verifier/technical expert lead the verification and was responsible for development of the verification plan. The lead verifier reviewed the risk assessment, recalculated raw data, reviewed data management and drafted findings. The lead verifier also prepared and signed the verification statement and verification report.
Qualifications	<p>Mr. Martinez is a licensed air quality engineer in Ontario with over 18 years of experience in atmospheric science, air dispersion modelling, emission inventories, and environmental compliance. Mr. Martinez has a Bachelor of Applied Science in Environmental Engineering - Chemical Specialization from the University of Waterloo. Erik is an accredited Lead Verifier and Lead Validator for greenhouse gas reports and offset projects for numerous programmes, including those under the American National Standards Institute, CSA GHG CleanProjects®, and the Carbon Disclosure Project (CDP).</p> <p>Mr. Martinez has extensive experience preparing emissions inventories, and Facility GHG assessments in accordance with the ISO protocols and reporting requirements under O. Reg. 390/18, the Output Based Pricing System Regulations, SOR/2019 266, and other</p>

Lead Verifier/Technical Expert	
	<p>various programmes. Mr. Martinez has over 6 years of verification experience including acting as the Lead Verifier and Lead Validator on numerous GHG assessments in Ontario and Alberta and has completed peer reviews and acted as the Technical Expert for compliance reports, emission reduction projects and offsets under the OCE TargetGHG Program, GreenON Industries, the Alberta Specified Gas Emitters Regulation, and Alberta Emission Offset System.</p> <p>Erik has direct experience and been lead verifier for verification of emission reduction projects applying the Quantification Protocol for Diversion of Biomass to Energy from Biomass Combustion Facilities, the Protocol for Waste Heat Recovery facilities, and the Protocol for Energy Efficiency Projects.</p> <p>Erik has completed over 100 verifications and validations and has competent knowledge of ISO 14064-1, ISO 14064-2, and ISO 14064-3 guidance documents and various GHG programmes, regulations, and protocols. In addition, Erik has received training in ISO14064 3 through GHD's greenhouse gas assurance services accreditation process that requires multiple competency requirements to be achieved before being approved as a lead verifier on March 27, 2015.</p>

Independent Reviewer	
Name	Dana Lauder, P.Eng.
Roles and Responsibilities	The independent reviewer/technical expert conducted an independent review of the verification plan, risk assessment, and verification report and findings.
Qualifications	<p>Ms. Lauder is a Project Manager with GHD in the Air Quality Services group and is a Lead Verifier and Ontario Program Manager in GHD's Greenhouse Gas Assurance Services Group. Ms. Lauder is a licensed professional engineer in the Province of Ontario. Ms. Lauder has over 16 years of practical experience with air quality, emissions inventories, dispersion modelling, compliance and greenhouse gas emissions assessment.</p> <p>Ms. Lauder has extensive experience completing GHG inventories and verification projects in accordance with the ISO protocols for regulatory and voluntary reporting. Ms. Lauder has acted as Lead Verifier, Peer Reviewer and Technical expert for verifications in Ontario, Alberta, and Quebec. Ms. Lauder is well versed with the current regulations and reporting guidance, with respect to reporting GHG emissions.</p>

13. Limitation of Liability

Because of the inherent limitations in any internal control structure, it is possible that fraud, error, or non-compliance with laws and regulations may occur and not be detected. Further, the verification was not designed to detect all weakness or errors in internal controls so far as they relate to the requirements set out above as the verification has not been performed continuously throughout the period and the procedures performed on the relevant internal controls were on a test basis. Any projection of the evaluation of control procedures to future periods is subject to the risk that the procedures may become inadequate because of changes in conditions, or that the degree of compliance with them may deteriorate.

The verification opinion expressed in this report has been formed on the above basis.

GHD's review of the 2022 GHG Report included only the information discussed above. GHD did not conduct any direct field measurements and has relied on the primary measurement data and records provided by UP as being reliable and accurate. No other information was provided to GHD or incorporated into this review. GHD assumes no responsibility or liability for the information with which it has been provided by others.

The information and opinions rendered in this report are exclusively for use by UP. GHD will not distribute or publish this report without UP's consent except as required by law or court order. The information and opinions expressed in

this report are given in response to a limited assignment and should only be evaluated and implemented in connection with that assignment. GHD accepts responsibility for the competent performance of its duties in executing the assignment and preparing this report in accordance with the normal standards of the profession but disclaims any responsibility for consequential damages.

All of Which is Respectfully Submitted,

GHD

A handwritten signature in blue ink, appearing to read 'Erik Martinez', is positioned above the printed name and contact information.

Erik Martinez, P.Eng.
Engineering Leader
+1 519 340-4213
erik.martinez@ghd.com