



Arcadis

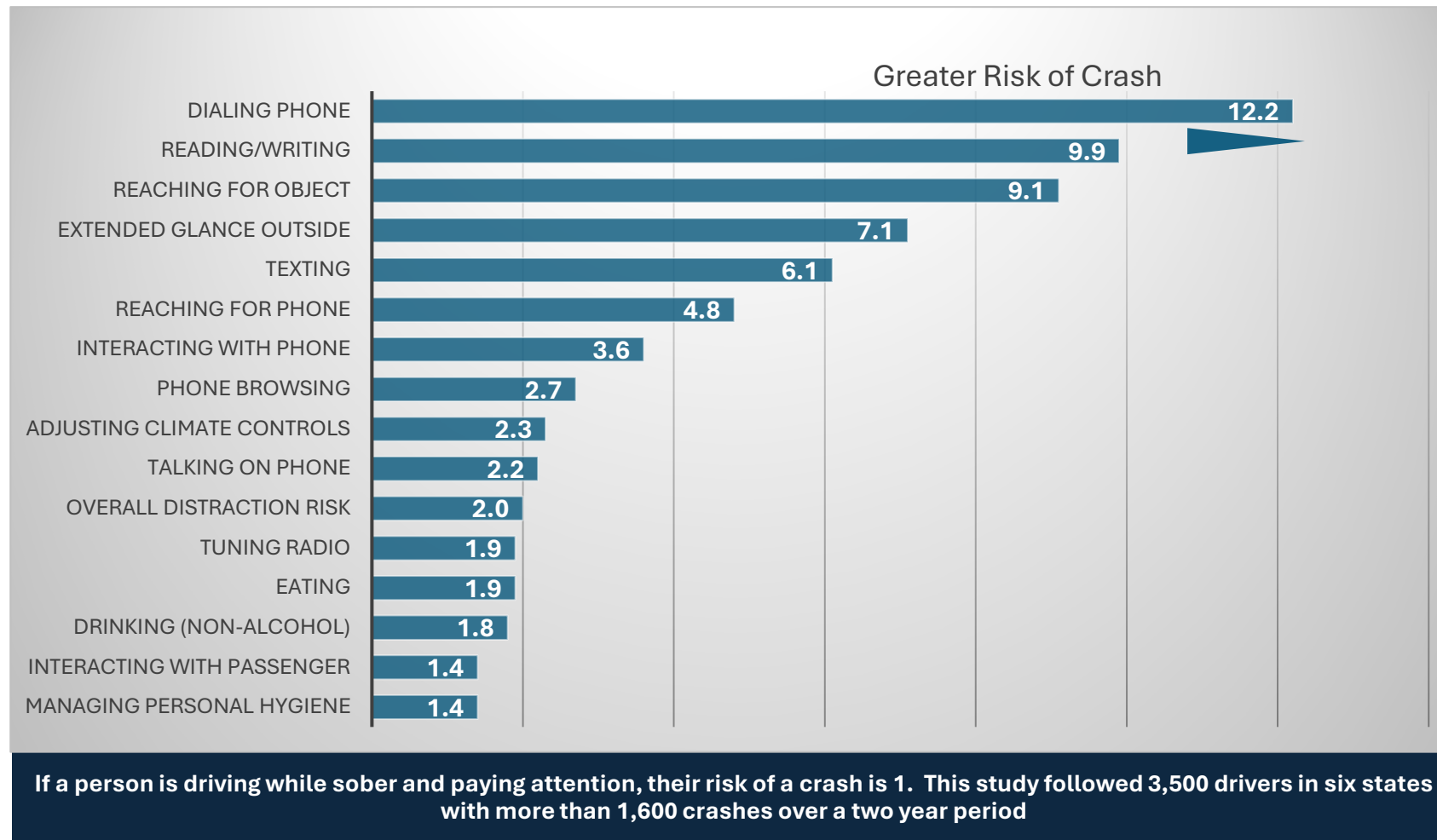
Sustainability / Decarbonization
Overview

Friday January 24, 2025



Health and Safety: Eyes off the Road

- Risk of crash caused by type of distraction



Source: Eyes off the road. WallStreet Journal. 2016. March 12-19.

Arcadis Origins

Arcadis was founded in 1888 as the *Nederlandsche Heidemaatschappij* (English: *Association for Wasteland Redevelopment*) a land reclamation business promoting agricultural productivity of Dutch heather lands.



The Arcadis Sustainable Cities Index 2024



6th
Edition

67
Metrics

100
Cities

17
Sustainable
Development
Goals

4
Pillars

Overall SCI Ranking (Top 20)

1	Amsterdam , Netherlands	11	Seoul , South Korea
2	Rotterdam , Netherlands	12	Stockholm , Sweden
3	Copenhagen , Denmark	13	Edinburgh , United Kingdom
4	Frankfurt , Germany	14	Paris , France
5	Munich , Germany	15	Dublin , Republic of Ireland
6	Oslo , Norway	16	Vienna , Austria
7	Hamburg , Germany	17	Brussels , Belgium
8	Berlin , Germany	18	Singapore , Singapore
9	Warsaw , Poland	19	Shanghai , China
10	London , United Kingdom	20	Beijing , China

City Spotlight

49

overall ranking



Toronto,

Canada



Planet



People



Profit



Progress

- **Toronto secures a spot in the top half of the Sustainable Cities Index 2024, ranking 49th overall. As the second-best-performing Canadian city, it falls just behind Vancouver and leads Ottawa and Calgary in the rankings.**
- The Canadian city demonstrates moderate performance in the Planet pillar, excelling in green space access but facing challenges in energy consumption and sustainable transport.
- In the People pillar, Toronto shines with consistent scores, despite high living costs, benefiting from robust social provisions like paid parental leave. The city stands out in the Profit pillar, showcasing a strong business base and high female labor force participation.
- Lastly, in terms of progress, Toronto lags in income equality reduction and renewable energy growth despite notable improvements in the transport sector over the past decade.

Mission Zero

An Arcadis & CoolPlanet Partnership

Facilities / Operations / Capital Management

Facility decision makers, operations, capital planning

Industrial Manufacturing (Primary), Property & Investment

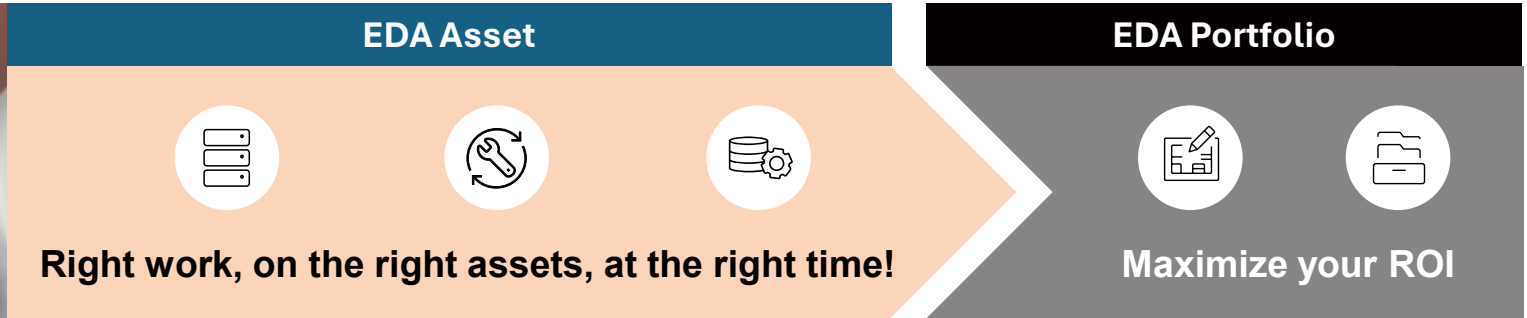
- Identify projects through analysis of real-time facility data and front-end engineering design services
- Deliver decarbonization projects as prime contractor
- Measure and verify outcomes of decarbonization projects through software

Portfolio- and/or asset-level identification and execution of decarbonization projects (scope 1 and 2)

Technical services provided by Arcadis, supported by CoolPlanet software and specialist design expertise



Enterprise Decision Analytics (EDA) at a high level.....



- Asset Maintenance Optimization**
- Asset Predictive Modelling**
- Asset Health Monitoring**
- Scenario Planning Optimization**
- Capital Project Optimization**

Optimize asset performance while controlling cost, risk, resourcing

Predict the future performance of assets against key operating KPI's

Know real-time asset health and where, when and how to react to changes

Understand how investment decisions impact your strategic objectives

Optimize your portfolio and plans against key objectives and constraints

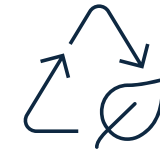
Individual Assets

Complex Asset Portfolios

Enterprise Decision Analytics: Net Zero Optimization

- **The challenge:**
 - Net zero (NZ) strategies are delivered at scale. Mandatory disclosures require a “credible” strategy however these are not “investable”.
 - Fundamentally, **net zero plans are a capital delivery program** that needs to be balanced with performance impacts, social and environmental constraints and delivering optimal RoI/ value for the client.
- **How EDA can help:**
 - EDA can **capture the NZ initiatives and create an optimized plan** – considering time to deliver, impact/ disruption to normal operations, value or benefit, capex / opex.
 - Through integration with existing Arcadis end-to-end **we can create an end-to-end strategy** development to planning platform play. This also allows improved differentiation by being able to identify the **hotspots, develop benchmarked interventions and optimize a delivery plan.**
- **Focus markets:**

USA	UK	Netherlands	Canada	Australia
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Net Zero Optimization

Maximize net zero investments

Fast Start:

JHG: Net Zero Strategy

With Resilience Aus, delivered optimizing net zero pathways.

- Delivering a roadmap for future expansion
- JHG requested annual analysis as results exceeded expectations

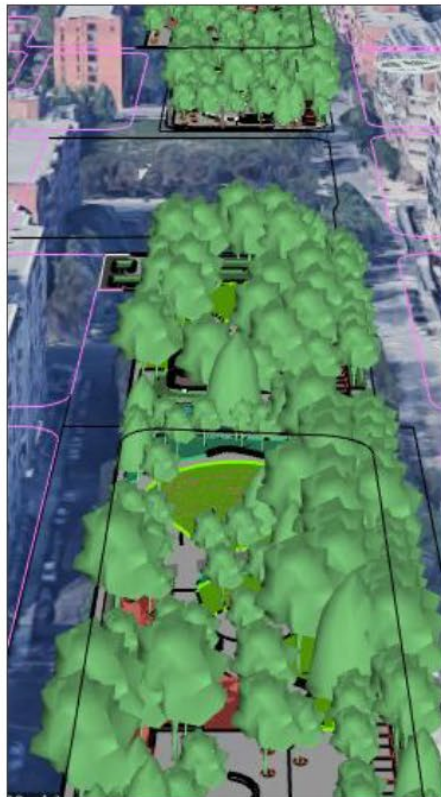
Arcadis NZ Strategy

Deliver Arcadis’ corporate decarbonization plan

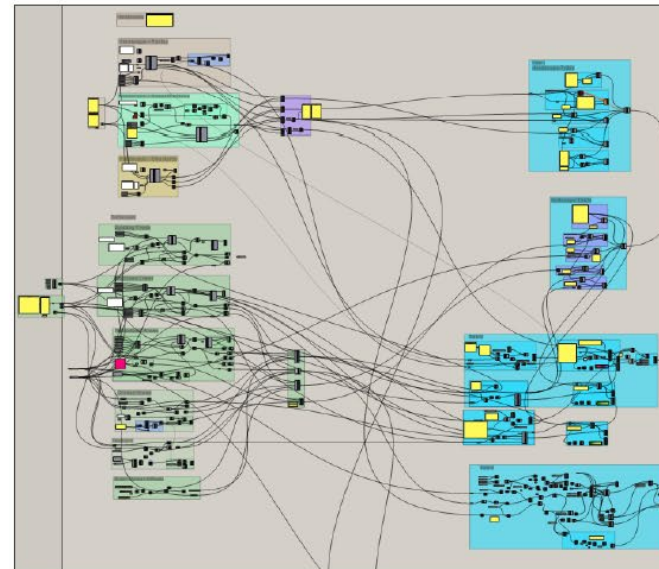
Citibank Portfolio Decarbonization Program

With Resilience and Places, 400+ sites optimized in EDA to deliver a global strategy to a key client.

DYNAMIC CARBON MODEL- MEASUREMENT TOOL



1. BUILD 3D MODEL



2. RUN DYNAMIC CARBON MODEL



3. ANALYZE DATA OUTPUT

Journey to Net Zero



Carbon Management for Ontario Line – Metrolinx

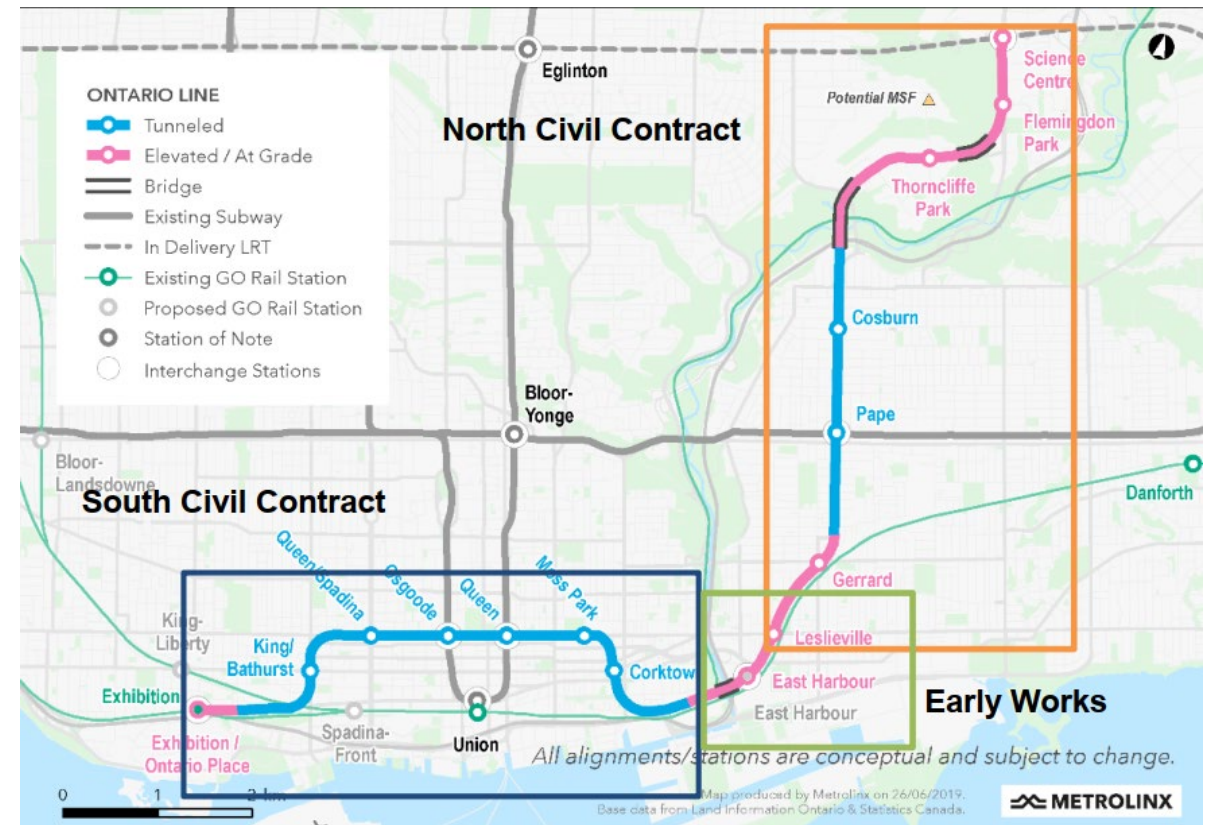
Session Leader:
René de Vries & Ian Minnes

September 16th, 2024



Ontario Line – Overall Project

- The Ontario Line is a fully integrated, stand-alone, driverless rapid transit system that connects Ontario Science Centre to the Exhibition and Ontario Place grounds. Key highlights of the overall alignment are as follows:
- Approx. 16 km in length with 15 potential stations.
- GOA4 system – fully automated system
- Over half the route will be in a tunnel and will be served by 8 underground stations.
- 6 interchange stations
- Overall project was planned to be delivered under 3 contracts
 - Rolling Stock, Systems, Operations and Maintenance (DBFOM)
 - Southern Civils, Stations and Tunnel (DBF)
 - **Northern Civils, Stations and Tunnel (DBF)**
- North DBF Contract scope is now being optimized and repackaged into discreet and meaningful packages



Value: CAD\$17+B (estimated Capital Cost)

Client: Infrastructure Ontario

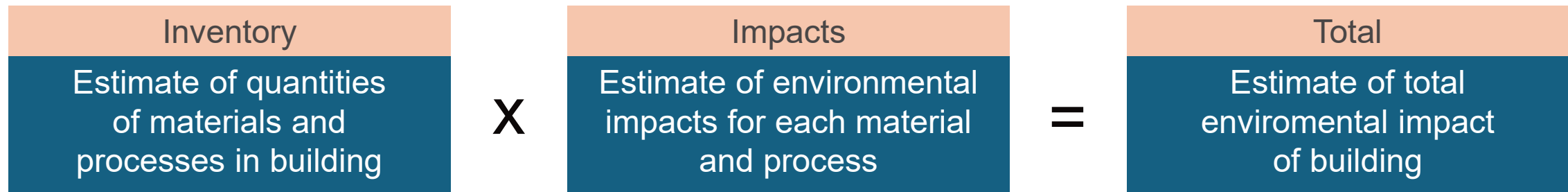
Owner: Metrolinx

What does it include:

Life Cycle Assessment Calculations

Environmental Product Declarations (EPD)

Formal document that communicates the environmental impact and performance of a product



Example calculations

100 kg Steel	X	0.43 kg CO _{2e}	=	43 kg CO _{2e}
50 kg Glass	X	1.064 kg CO _{2e}	=	53.2 kg CO _{2e}

Examples to Reduce the Project's Carbon Impact

Sourcing:

- Partnered with suppliers who offer low carbon materials for steel products
- Reduce carbon footprint and support local economies by sourcing materials from local suppliers

Circular:

- Choose materials that can be easily reused or recycled at the end of their life cycle.

Product Substitutions:

- Select materials with low Global Warming Potential (GWP) to minimize environmental impact.

Journey to Net Zero



UTSC Harmony Commons: Incorporating Passive House Principles in Building Design

Session Leaders:
Steve Donnelly &
Nanette Shahinian
September 16th, 2024



3 Significant Challenges

- The current shortage of student housing
- Rising Higher Education costs
- The carbon footprint of major institutions



Passive House Key Strategies

1. OPTIMAL INSULATION

- Roof – R41.6 Effective R-Value
- Ext. Walls – R30.8 Effective R-Value
- 25% window area
- Slab on Grade – R10

2. THERMAL BRIDGE FREE BUILDING

- Fibreglass clips
- Fibreglass blocking
- Stainless steel fasteners

3. AIR TIGHT BUILDING ENVELOPE

- Air leakage 5-10x tighter than an average building
- Extensive air and water testing procedures

Passive House Key Strategies

4. PASSIVE HOUSE WINDOWS AND DOORS

- Triple Glazed Vinyl Windows
- Triple Glazed Curtain Wall

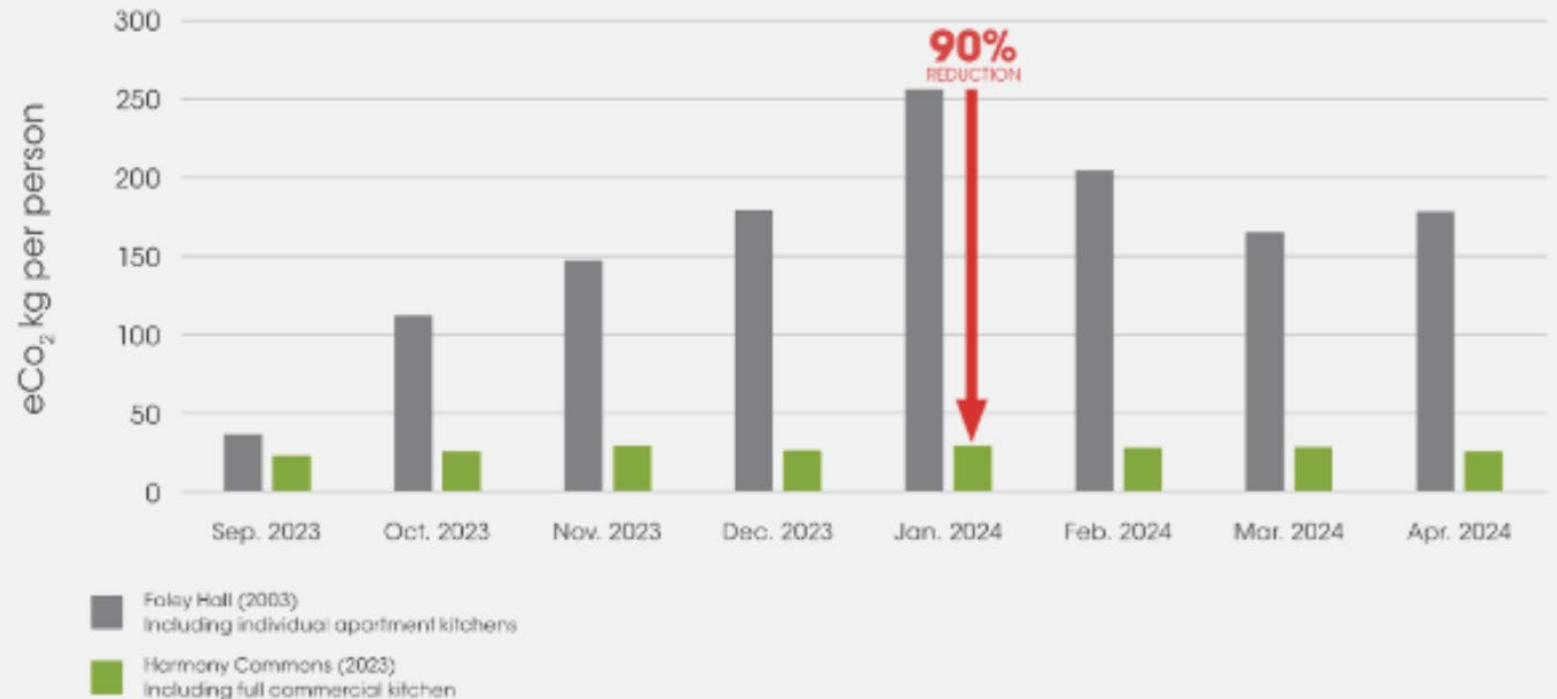
5. HEAT RECOVERY

- Exhaust Air
- Kitchen Exhaust
- Laundry Dryer Exhaust
- Shower Drainage

Outcomes

- A healthier interior environment for students
- Superior indoor air quality via fresh filtered ventilation to every habitable rooms 24/7
- A quieter interior environment for the students
- Durability of building materials
- Elimination of drafts/temperature differentials and superb thermal comfort
- Significant operational cost savings that come with lower energy costs
- Lower loads on the building's mechanical system: a pathway to all-electric-net-zero

Monthly Greenhouse Gas Emissions Per Person



Source: UTSC Sustainability Department

Infrastructure Ontario Capital Asset Management Project

Ontario, Canada

Our EDA solution is an asset investment planning platform that empowers asset-intensive organizations like IO to enhance the understanding of their portfolio, enabling optimal, data-driven decision-making.



The Challenge

In preparation to **expand its current asset portfolio**, Infrastructure Ontario (IO), a government-owned agency, **sought to refresh its technologies to manage its growth.**



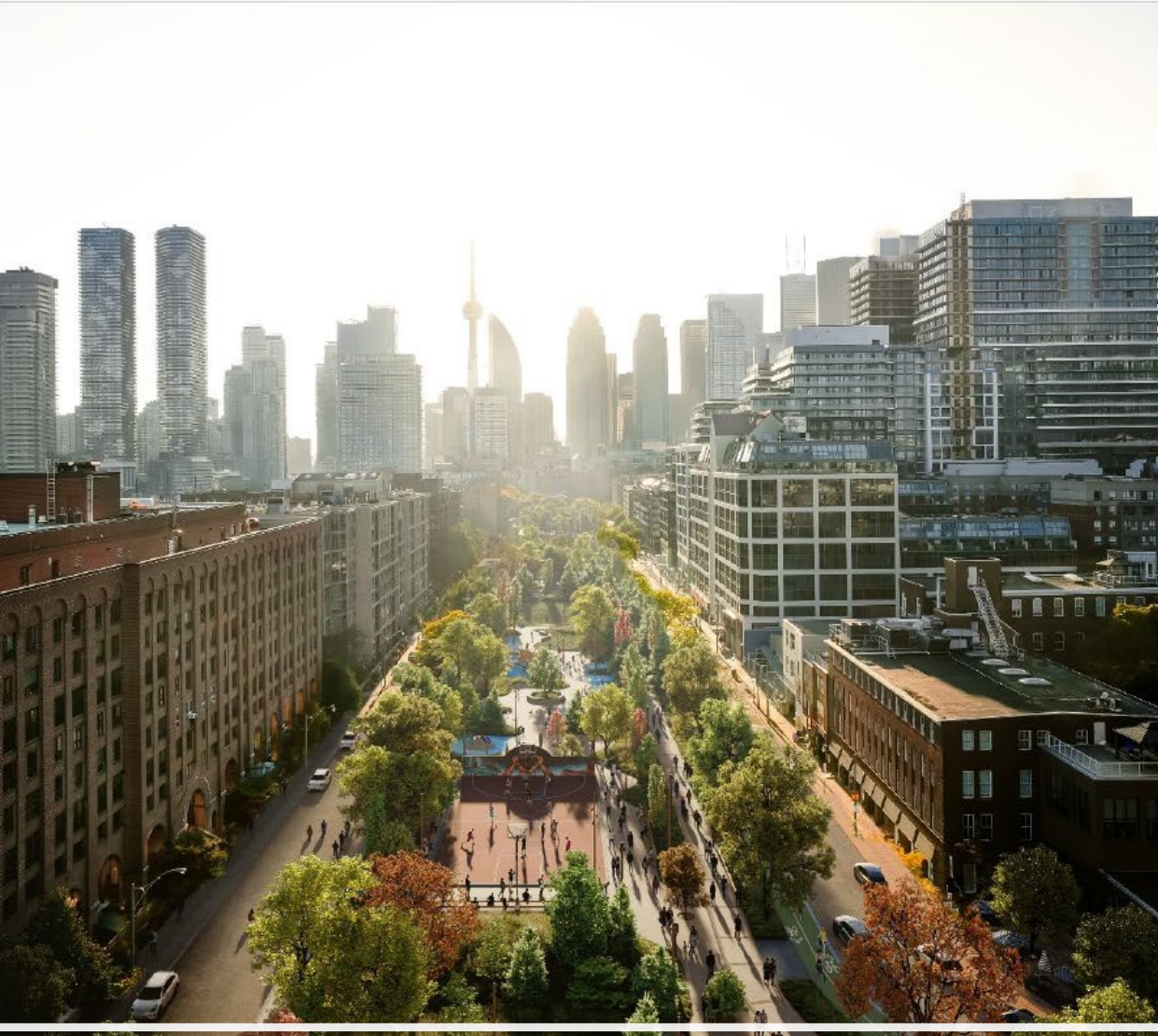
Our Solution

Over a 5-year period, Enterprise Decision Analytics (EDA) software and expertise will support IO in **collecting condition-assessment data** across its entire portfolio of facilities and property assets and **creating Capital Improvement Plans** for the Government body

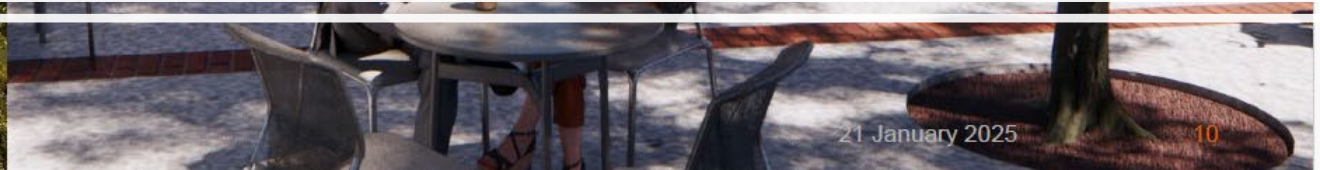


The Impact

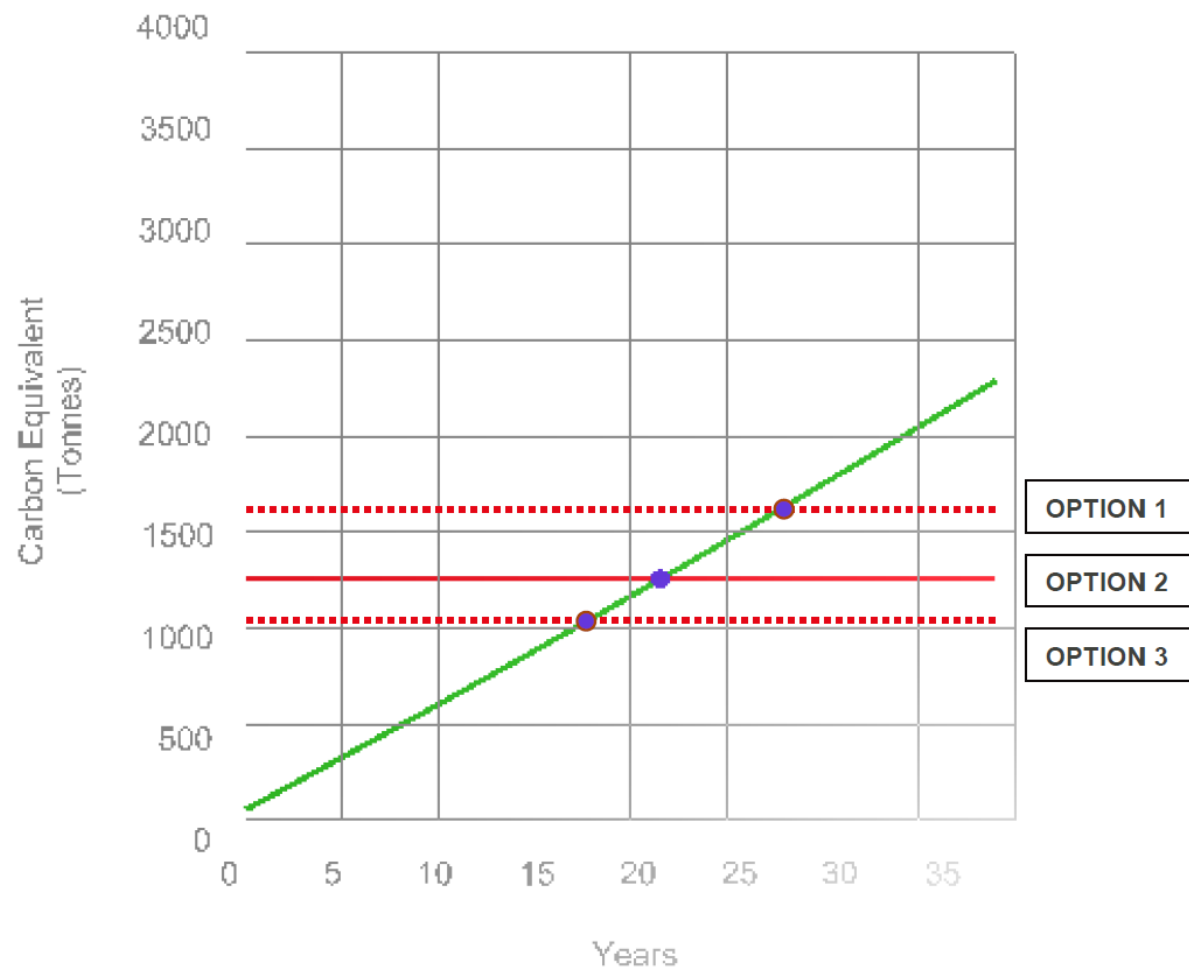
- As a starting point, the **digital management of more than 3,000 of Ontario's facilities**, helping IO in making future **investment decisions** to grow its portfolio.
- Where previously applied, EDA has **improved system efficiency by 30%**, **reduced planning and reporting times by 80%**, and **increased project execution accuracy by 20%**.



David Crombie Park



DAVID CROMBIE PARK BALANCE CURVE



OPTION 1: BUILD NEW PARK

TOTAL CARBON FOOTPRINT 1641 TONS

DAVID CROMBIE PARK FULLY RECONSTRUCTED USING ALL NEW MATERIALS WILL BE CARBON NEUTRAL IN YEAR 28

OPTION 2: PRESERVE & REVITALIZE

TOTAL CARBON FOOTPRINT 1256 TONS SAVING 385 TONS OF CARBON COMPARING TO OPTION 1

DAVID CROMBIE PARK WITH PRESENTED CONCEPT WILL BE CARBON NEUTRAL IN YEAR 21

OPTION 3: PRESERVE, REVITALIZE + LOW CARBON CONCRETE

TOTAL CARBON FOOTPRINT 1045 TONS SAVING 211 TONS OF CARBON COMPARING TO OPTION 2

DAVID CROMBIE PARK WITH PRESENTED CONCEPT USING LOW CARBON CONCRETE WILL BE CARBON NEUTRAL IN YEAR 17



WORLD
EXCHANGE
PLAZA



Thank You!

