
BC | Climate Resilience Summit 2025
Vancouver, Robson Square March 3rd/4th

# URBAN DATA LAB

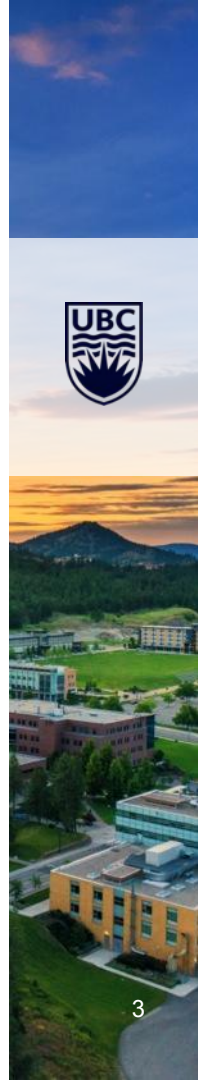
## Leveraging Campus as a Living Lab

March 3rd 2025

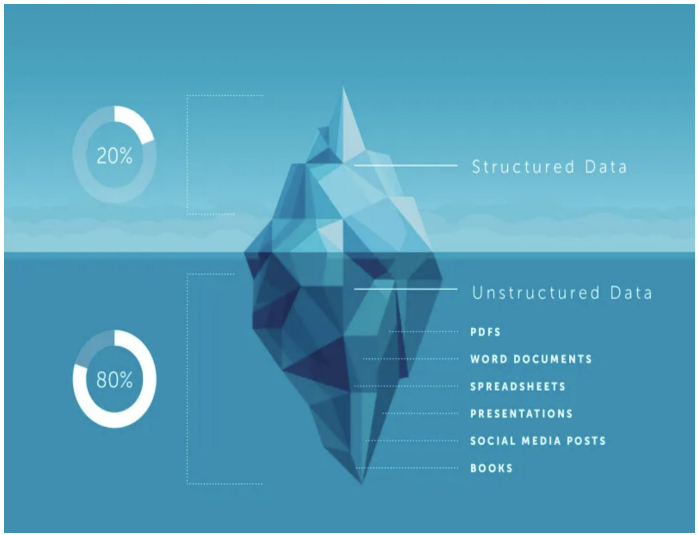
URBAN DATA LAB

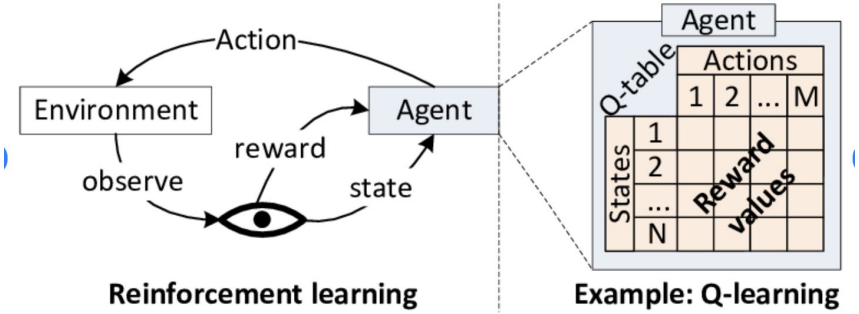
# Research Motivation

Data driven decision-making to enable and support the decarbonization of the built environment.



# Making Sense to Take Action



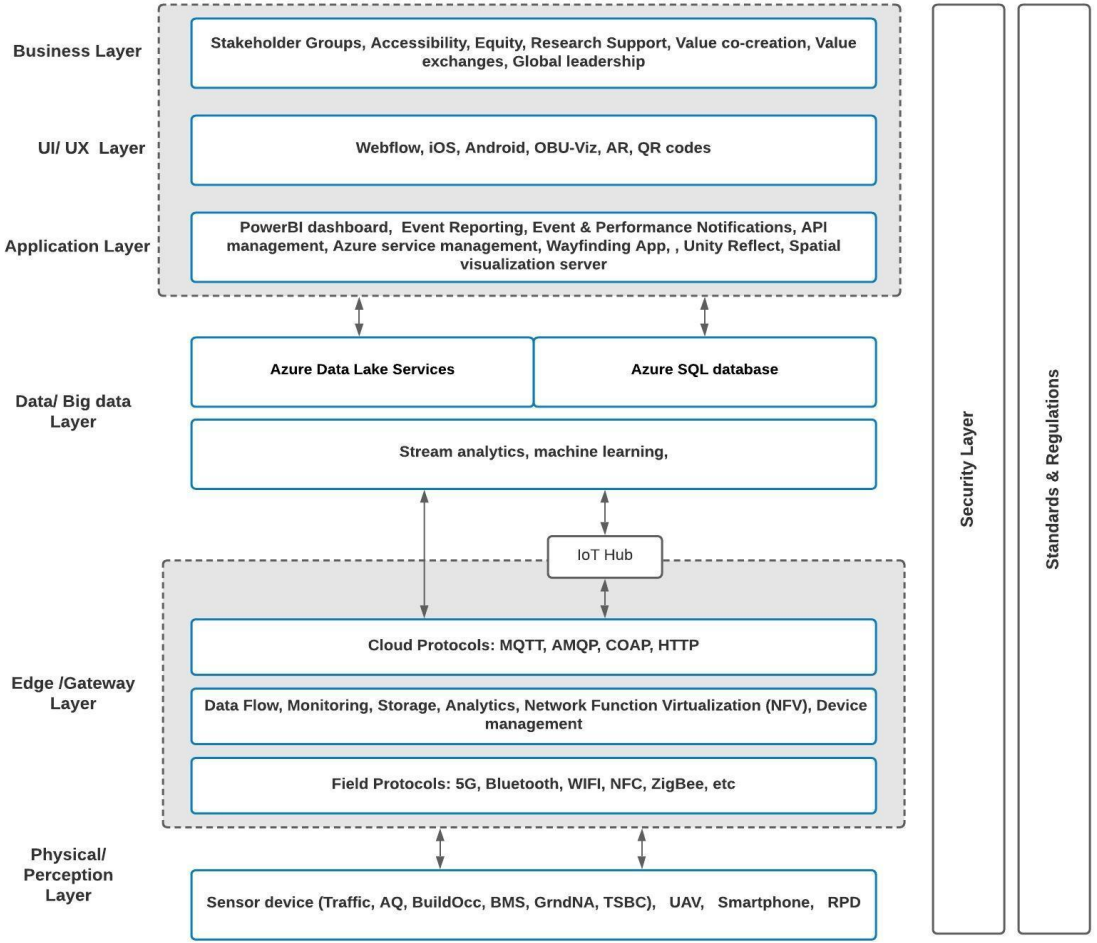

Source: Samie et al. 2019

# Value Creation through Data

**What value proposition can AI provide to sustainability practitioners?**

- Make the data and information readable to humans (e.g. building permits)
- Reduce operational costs by being informed about current and near-future anomalies (e.g. water leak detection in Allard).
- Define cost-optimal and actionable decisions to complex problems (e.g. electrical vehicle charging station placement)
- Reduce “time-to-insight,” allowing humans to focus on strategizing, communicating, managing and interpreting data.

# Urban Data Lake Reference Architecture

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# Smart City Research Strategy


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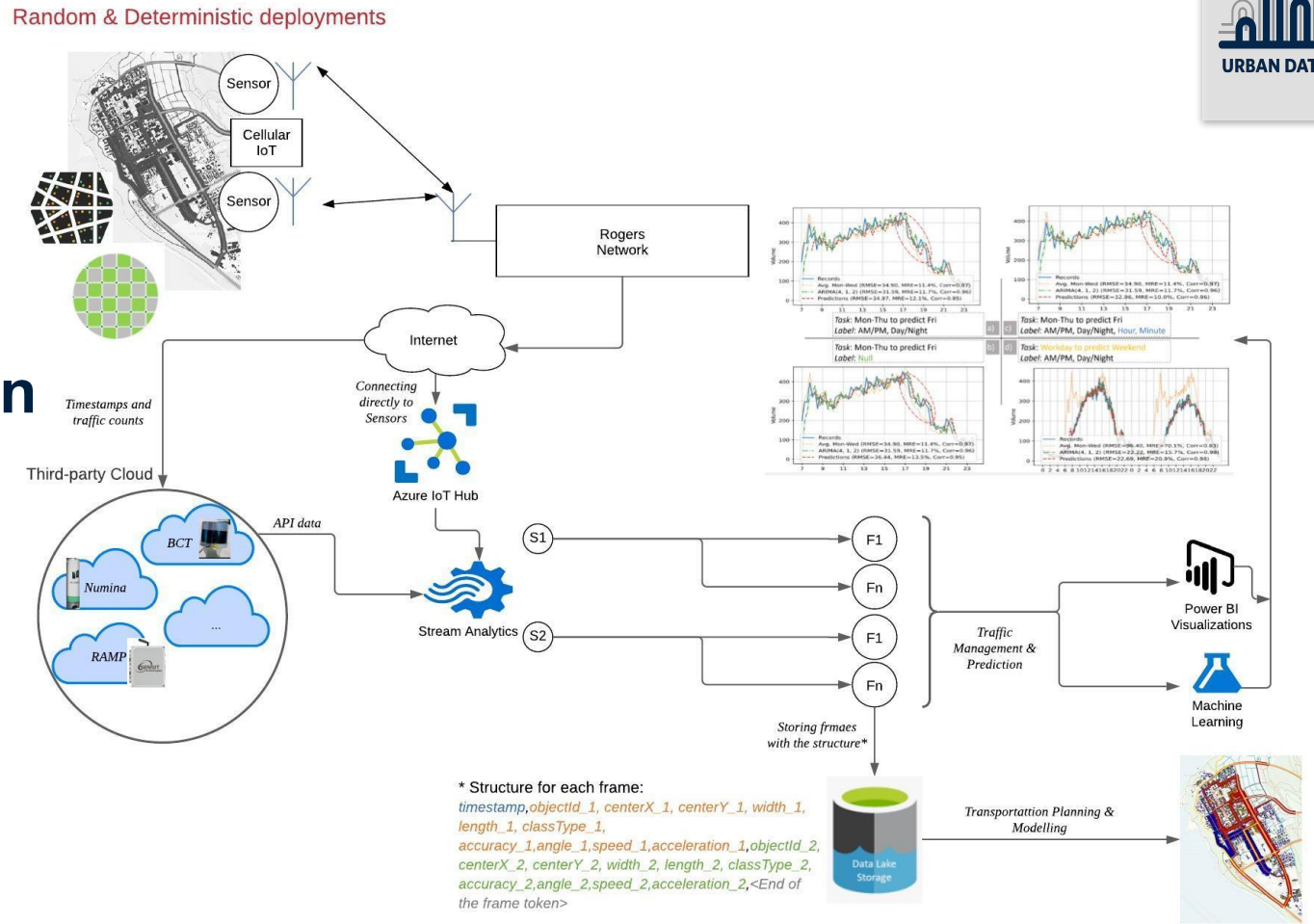
# Solution Architectures for the Built Environment

# Intelligent Transportation Solution

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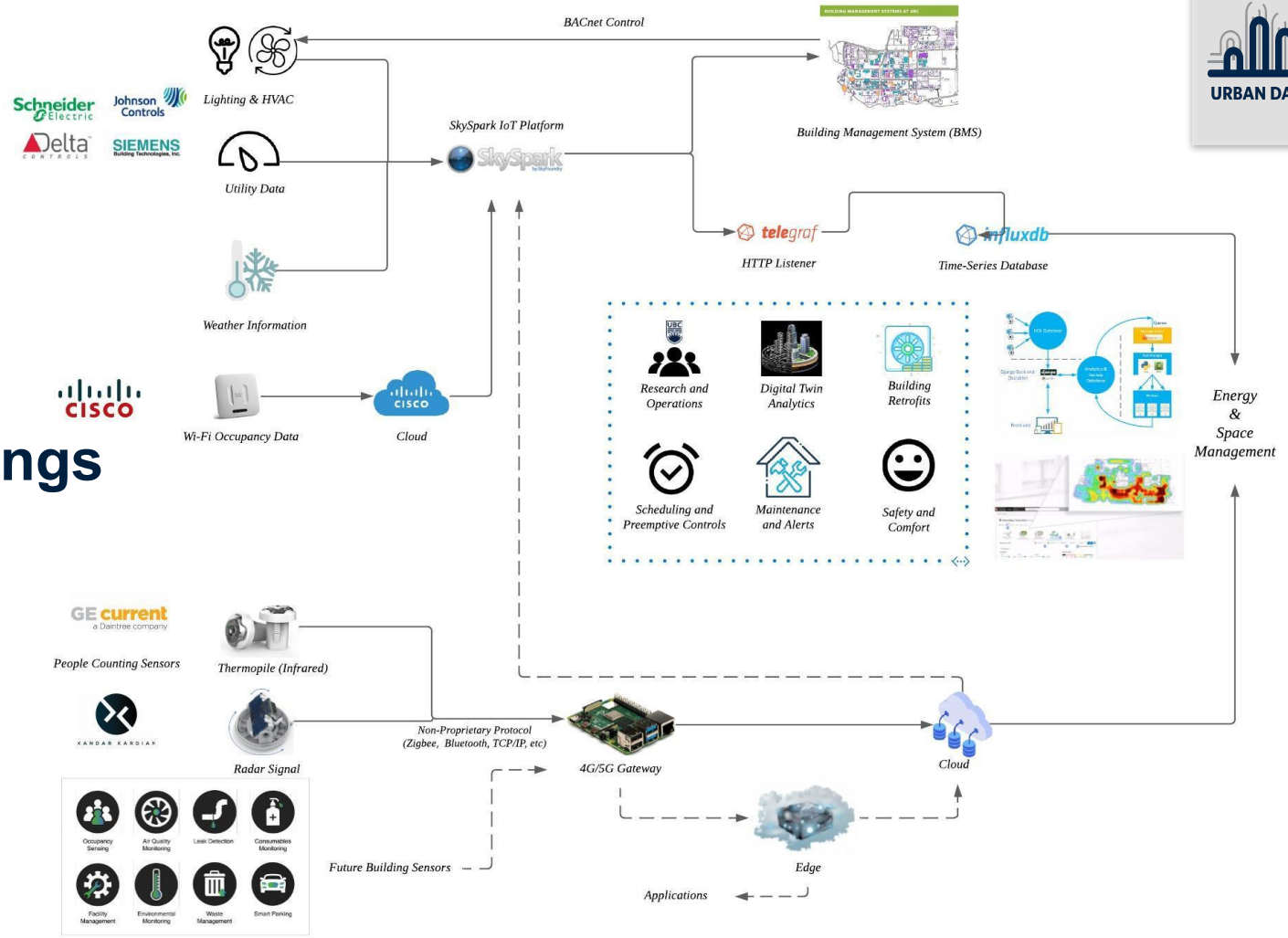
# Smart Buildings Solution

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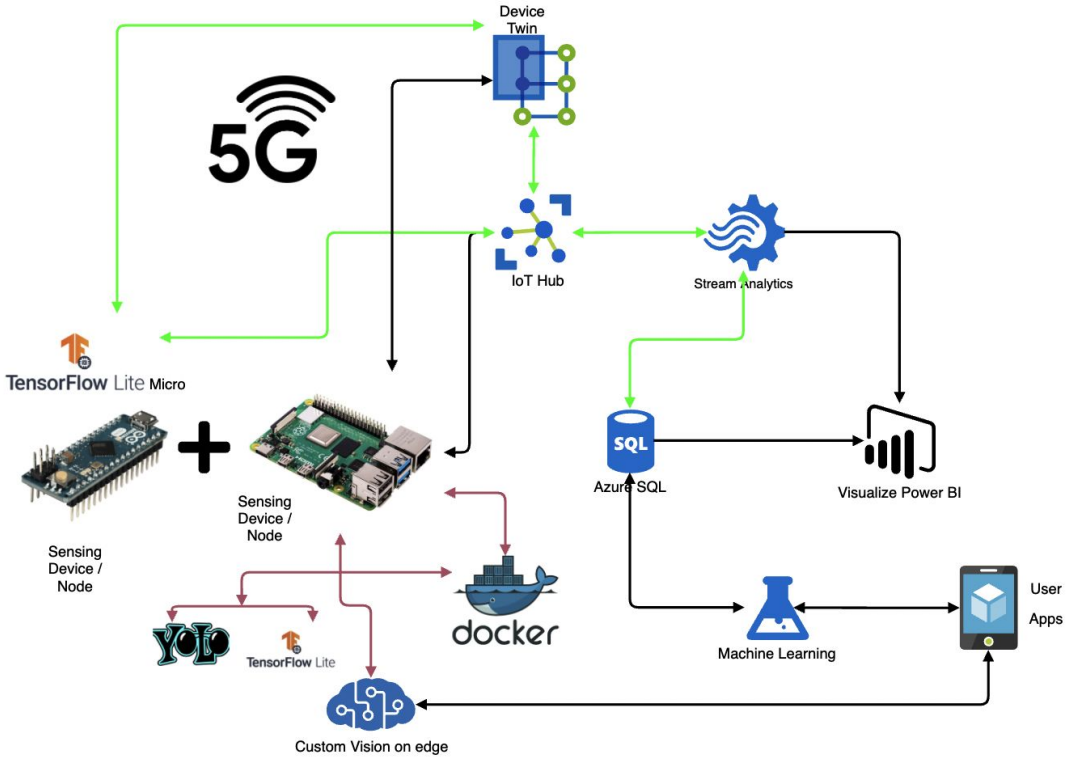
# Natural Assets
## Ground based Sensors

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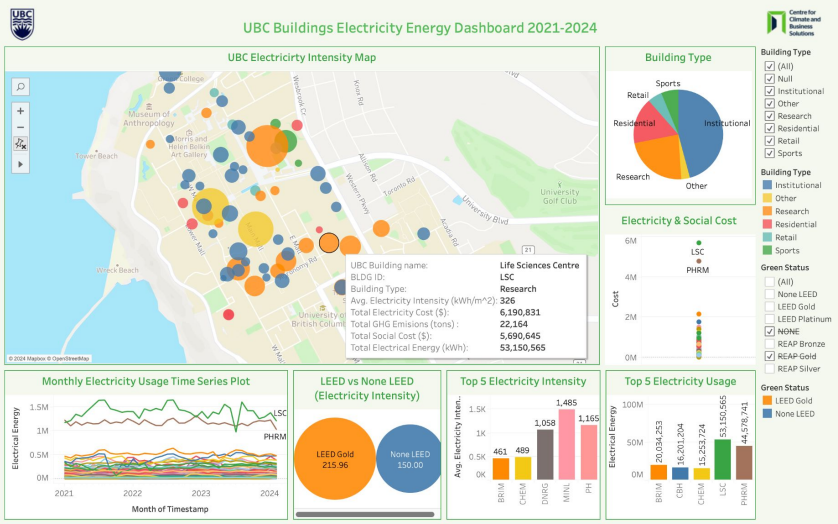
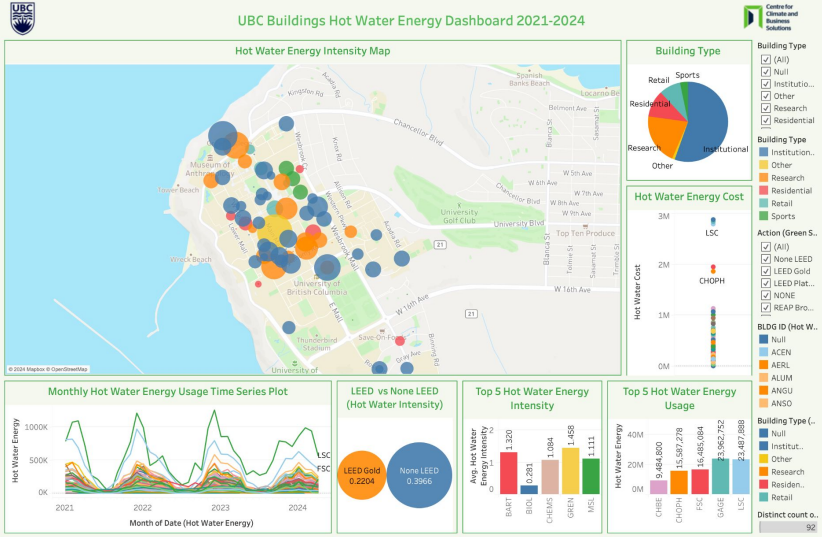
# Data Analysis & Visualizations

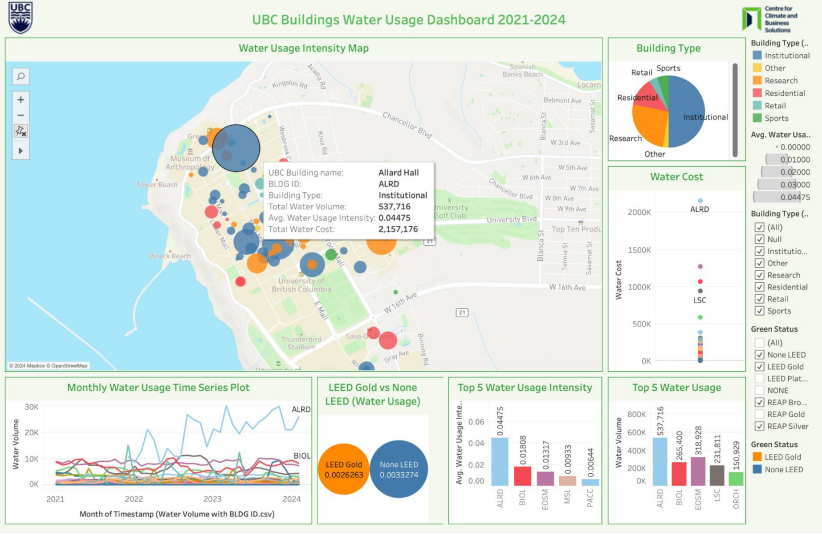
- 190 Buildings
- Avg. Year Built: 1988 (1924-2021)
- Total square meters: 1,661,230
- Millions of data points
- Hundreds of data points per hour in Pharmacy
- Most comprehensive live streaming database in Canada

# UBC Energy Dashboards

**Main Data Source: UBC Sky Spark**
**# Buildings: ~** 107
**Energy Types:** Electricity, Hot Water, Water.
**Building Types:** Institutional, Research, Residential, Retail, Sports.
**Key Measures:** Energy Usage & Intensity, Energy Cost, GHG Emissions, Social Cost from GHG emissions.



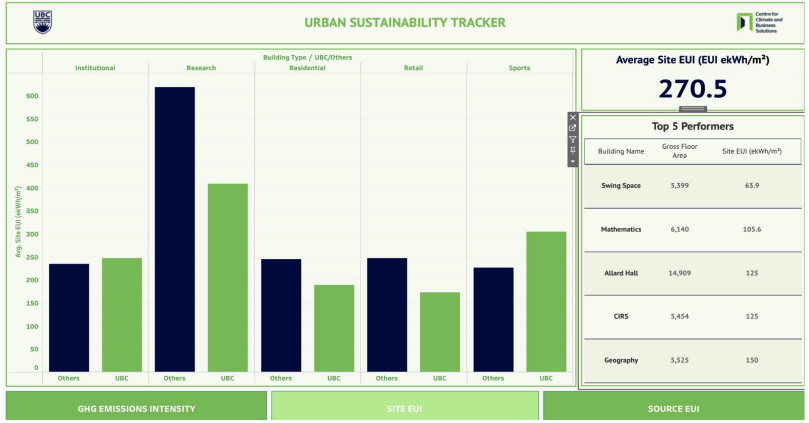
# Real Estate Comparative Analysis

**UBC Vs Lower Mainland**

**Data Source: Grid OpenTech**
**# Buildings: ~** 141
**Building Types:** Institutional, Research, Residential, Retail, Sports.
**Key Measures:** GHG Emissions Intensity, Site EUI, Source EUI

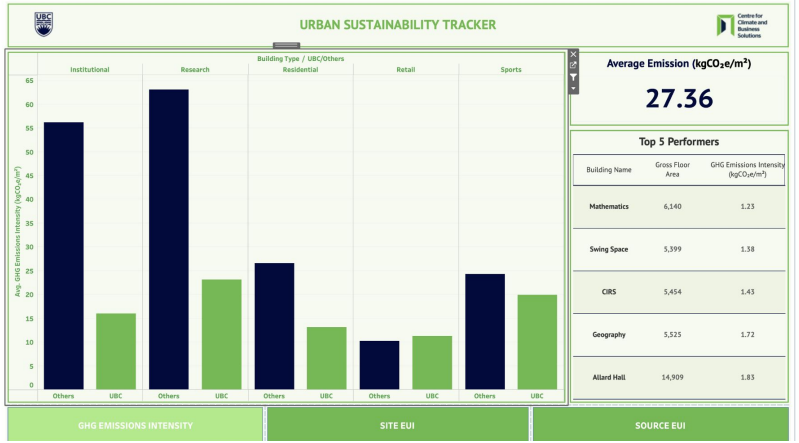
## Site Energy Use Intensity (EUI)

**Site EUI** measures the energy efficiency of a building by calculating the total energy consumed on-site relative to its gross floor area.



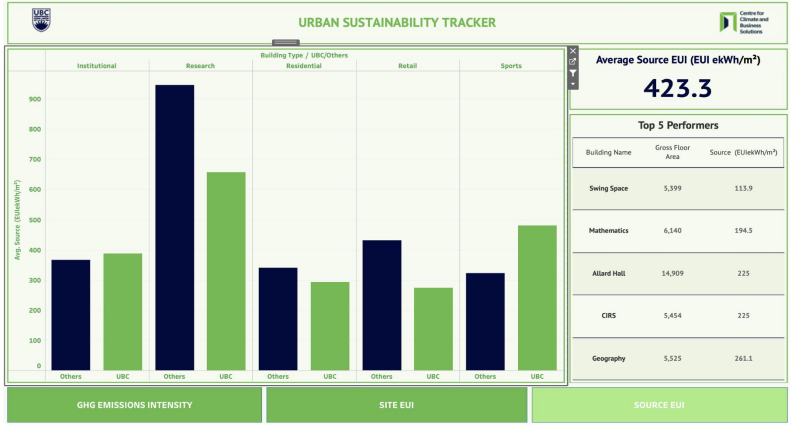

## Greenhouse Gas (GHG) Emissions Intensity

**GHG Emissions Intensity** measures the amount of greenhouse gas emissions produced per unit of activity or output, relative to the scale of operations.

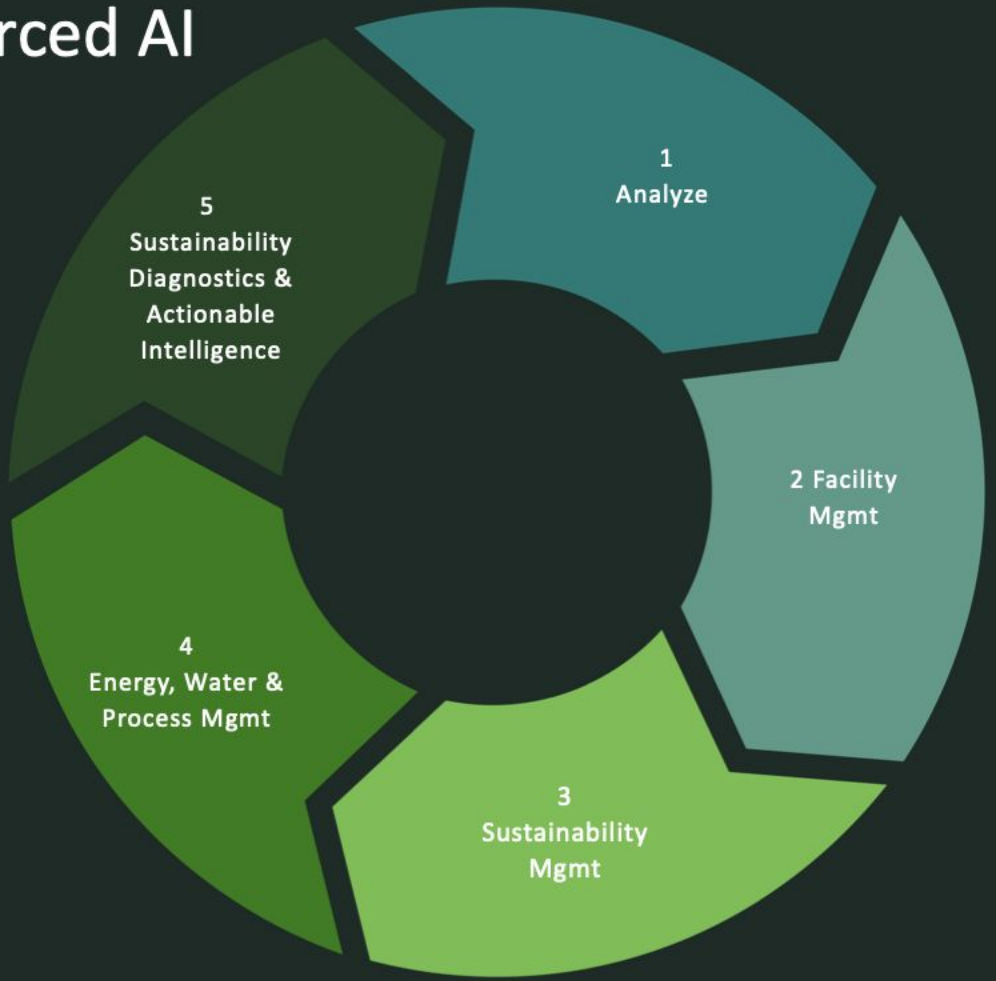



## Source Energy Use Intensity (EUI)

**Source EUI** measures the total amount of energy used by a building, includes Site EUI and the energy's supply chain - energy lost during the production, transmission, and delivery of that energy to the building.



# Human-Reinforced AI




**1. Analyze**

- Assess facility performance
- Benchmark against portfolio and industry archetypes
- Enhance strategic planning through data-driven decision making

**2. Facility Mgmt**

- Digitize Asset Inventory, Schedules, and Predicts recommendations for improvements.
- Predictive and routine maintenance scheduling
- Identify cost inefficiencies
- Target notifications to pertinent personnel
- Optimize to align with operational goals

**3. Sustainability Mgmt**

- Emission reduction and continuous improvement
- Monitor resource use, carbon emissions and other environmental data points
- Aggregate analytical data into a central dashboard and track KPIs
- Drive emission compliance
- Continuous resource monitoring equipment

**4. Energy, Water & People**

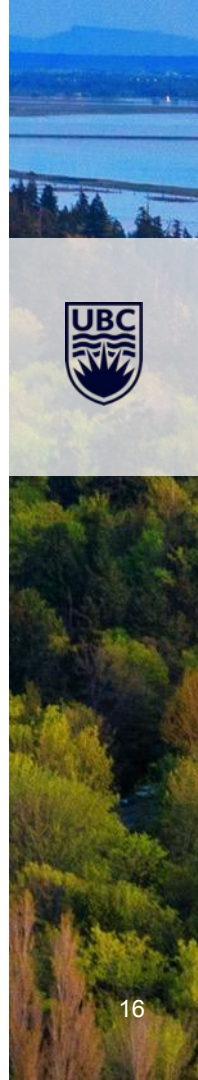
- Monitor energy consumption on a facility and systems level
- Actively engage with energy-consuming systems to pinpoint inefficiencies
- Auditable data records for energy emissions offset monetization
- Manage energy cost and emissions against operational KPIs

**5. Sustainability Advisor**

- Monitor energy and water consumption and facility conditions
- Asset monitoring provides 24 hour near real-time data
- Improve facility management through targeted in-app notifications
- Share data and access to automated tasks and functions

## Impact of the Urban Data Lab

- Established a sustainability reporting framework https://data.sustain.ubc.ca/
- Pilot new “IoT” development project approvals process
- Multi-disciplinary research teams have developed more than 8 research projects, across 4 Faculty, 7 departments and 2 campuses
- Members of our Urban Data Lab team have secured data science jobs at: Deloitte, BlueCityAI, UBC Biosciences, etc.
- Identified water and energy use savings across multiple building types.
- Working to lay out a 3 year vision to scale-out of UBC to other municipalities and real estate portfolios.



**THANK YOU!**

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