SÉRIE DE WEBINAIRES | IMMOBILIER ET CHANGEMENTS CLIMATIQUES

CHAIRE Ivanhoé Cambridge d'immobilier ESG UQÀM

OCVI² Observatoire et centre de valorisation des innovations en immobilier ESG UQÀM

« Mesurer la performance économique de la décarbonation des immeubles : présentation d'Autocase et Carbonsight »

Présenté par Riley McKillop, Principal Economist, Autocase.

École des sciences de la gestion, Université du Québec à Montréal (ESG UQAM)

Montréal, le 14 mars 2024

Partenaire de la Chaire

Ivanhoé Cambridge

Partenaires de l'OCVI²

Ivanhoé Cambridge

BOMA QUÉBEC La référence en gestion immobilière

FONDS immobilier de solidarité FTQ

ADM Aéroports de Montréal

SÉRIE DE WEBINAIRES | IMMOBILIER ET CHANGEMENTS CLIMATIQUES
« Mesurer la performance économique de la décarbonation des immeubles : présentation d'Autocase et Carbonsight »

Plan de la présentation

11h30 : Mot d'introduction par Yvon Rudolphe, MBA fin., E.A., CMC, F. Adm.A., chercheur, Observatoire et centre de valorisation des innovations en immobilier (OCVI^2) et Chaire Ivanhoé Cambridge d'immobilier, École des sciences de la gestion, ESG UQAM.

11h40 : Conférence : « Présentation d'Autocase », par Riley McKillop, Principal Economist, Autocase.

12h10 : Conférence : « Présentation de Carbonsight », par Riley McKillop, Principal Economist, Autocase.

12h40 : Période de questions.

12h55 : Mot de clôture.

SÉRIE DE WEBINAIRES | IMMOBILIER ET CHANGEMENTS CLIMATIQUES
« Mesurer la performance économique de la décarbonation des immeubles : présentation d'Autocase et Carbonsight »

Mot d'introduction

Prononcé par

Yvon Rudolphe, MBA fin., E.A., CMC, F. Adm.A.

Chercheur, Observatoire et centre de valorisation des innovations en immobilier (OCVI²) et Chaire Ivanhoé Cambridge d'immobilier
École des sciences de la gestion, ESG UQAM

CHAIRE Ivanhoé Cambridge d'immobilier ESG UQÀM

OCVI² Observatoire et centre de valorisation des innovations en immobilier ESG UQÀM

SÉRIE DE WEBINAIRES | IMMOBILIER ET CHANGEMENTS CLIMATIQUES
« Mesurer la performance économique de la décarbonation des immeubles : présentation d'Autocase et Carbonsight »

Série de webinaire « Immobilier et changements climatiques »

- Cette série de webinaires vise à sensibiliser les différents acteurs de l'immobilier aux grand enjeux et défis liés aux changements climatiques et à la protection de la biodiversité.

Objectif de cette conférence

- Présenter des solutions numériques et technologiques permettant de mesurer les impacts économiques et environnementaux des stratégies de décarbonation des immeubles et des infrastructures.

Deux unités de recherche institutionnelles à l'ESG UQAM

CHAIRE
Ivanhoé Cambridge d'immobilier
ESG UQÀM

OCVI²
Observatoire et centre de valorisation des innovations en immobilier
ESG UQÀM

La Chaire Ivanhoé Cambridge d'immobilier

Mission

Depuis plus de 25 ans, la Chaire Ivanhoé Cambridge d'immobilier de l'ESG UQAM est un lieu privilégié de rencontres où collaborent chercheur.e.s, étudiant.e.s, professeur.e.s et expert.e.s des milieux académiques et professionnels, dans le but de mettre en commun la richesse de leur expérience pour penser l'immobilier autrement et stimuler l'innovation dans l'écosystème immobilier.

CHAIRE
Ivanhoé Cambridge d'immobilier
ESG UQÀM

Partenaire :

Ivanhoé Cambridge

L'Observatoire et centre de valorisation des innovations en immobilier (OCVI²)

OCVI²
Observatoire et centre de valorisation des innovations en immobilier
ESG UQÀM

Mission

L'Observatoire et centre de valorisation des innovations en immobilier (OCVI²) est un lieu soutenant et facilitant le transfert et la valorisation des connaissances développées en recherche académique auprès des différents acteurs de l'écosystème de l'immobilier québécois.

L'OCVI² s'est donné pour mission de rendre accessibles à ses partenaires, à la communauté universitaire et au monde des affaires des informations, des données et des outils permettant de suivre les innovations et les changements touchant le secteur de l'immobilier pour faciliter la prise de décision des différents types d'acteurs.

Partenaires :

ADM Aéroports de Montréal

BOMA QUÉBEC

FONDS immobilier de solidarité FTQ

Ivanhoé Cambridge

SÉRIE DE WEBINAIRES | IMMOBILIER ET CHANGEMENTS CLIMATIQUES
« Les impacts des changements règlementaires en gouvernance durable et climatique sur l'investissement en immobilier »

Conférencier :

Riley McKillop

Principal Economist

Autocase

SÉRIE DE WEBINAIRES | IMMOBILIER ET CHANGEMENTS CLIMATIQUES
« Mesurer la performance économique de la décarbonation des immeubles : présentation d'Autocase et Carbonsight »

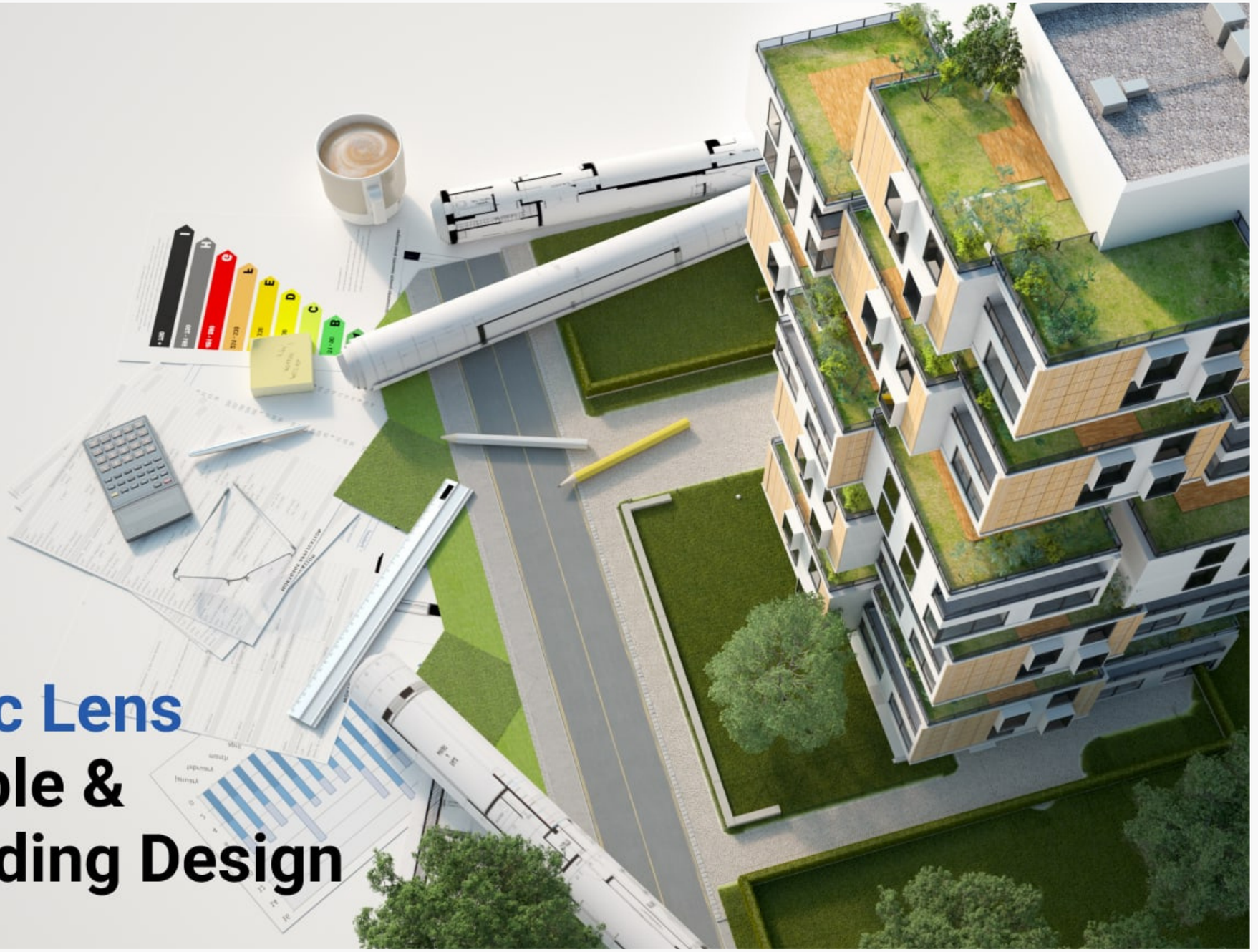
Biographie de Riley McKillop

Riley est économiste principal chez Autocase. Il accompagne la recherche et la modélisation économique utilisées dans les projets de logiciels et de conseil. Son expérience comprend la réalisation d'analyses coûts-avantages et de Triple Bottom Line sur les plans d'action climatique au niveau municipal et étatique, la politique des bâtiments neutres en carbone, les plans directeurs de développement des campus et les projets d'infrastructures vertes pour les eaux pluviales.

Riley est passionné par l'économie financière et l'analyse des investissements liés aux infrastructures durables. Il est titulaire d'une maîtrise en économie d'entreprise de l'Université Wilfrid Laurier et d'un baccalauréat double majeure en économie et gestion financière également de l'Université Wilfrid Laurier. Riley est actuellement à la recherche de son titre d'analyste financier agréé (CFA) et est un candidat de niveau II.

Autocase

The Economic Lens For Sustainable & Resilient Building Design



Autocase

Our clients rely on us to bring them objective social & environmental data and metrics that they can rely on for decision making

Autocase

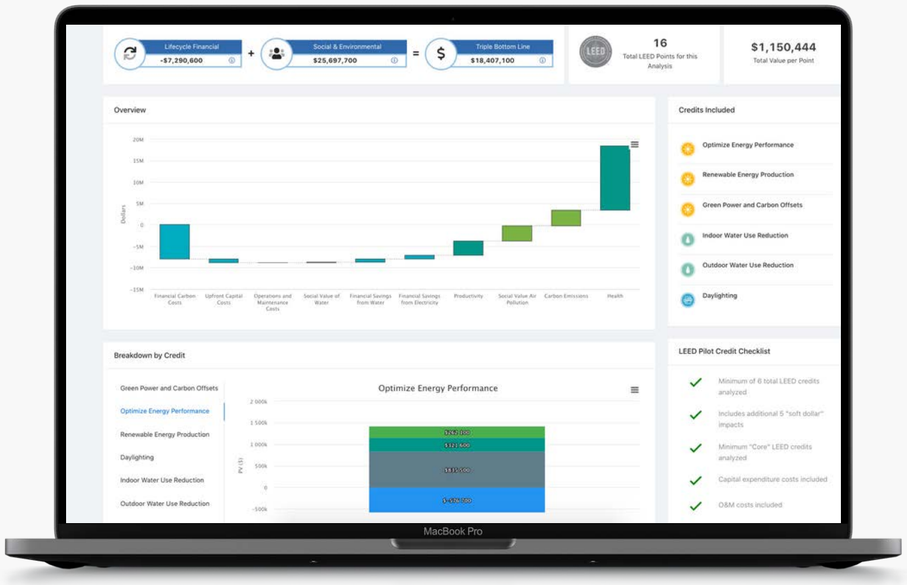
We have software and services

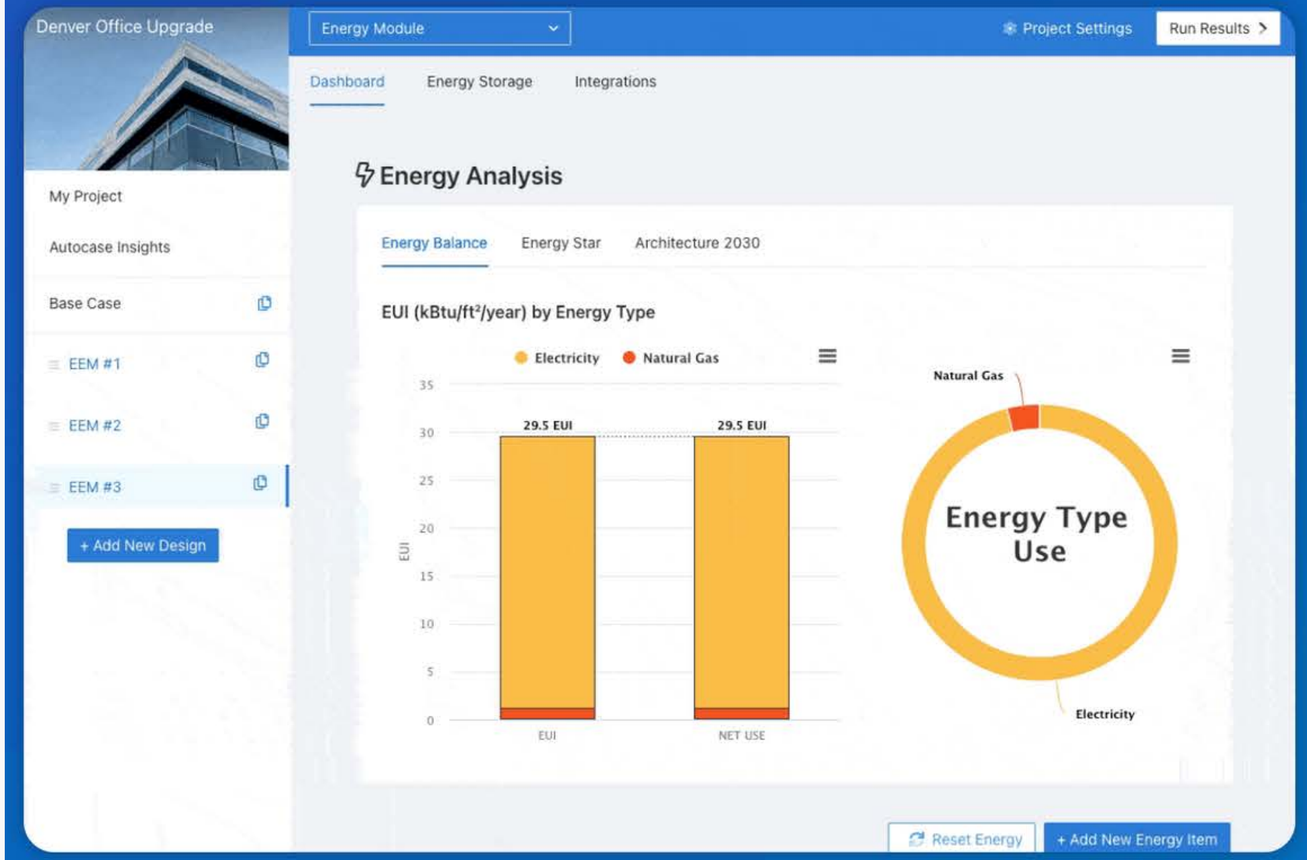
Autocase

Carbonsight® BETA

Building EJ Tool

Autocase Advisory Services





AUTOCASE® SOFTWARE

The Leading Business Case Software For Green Buildings

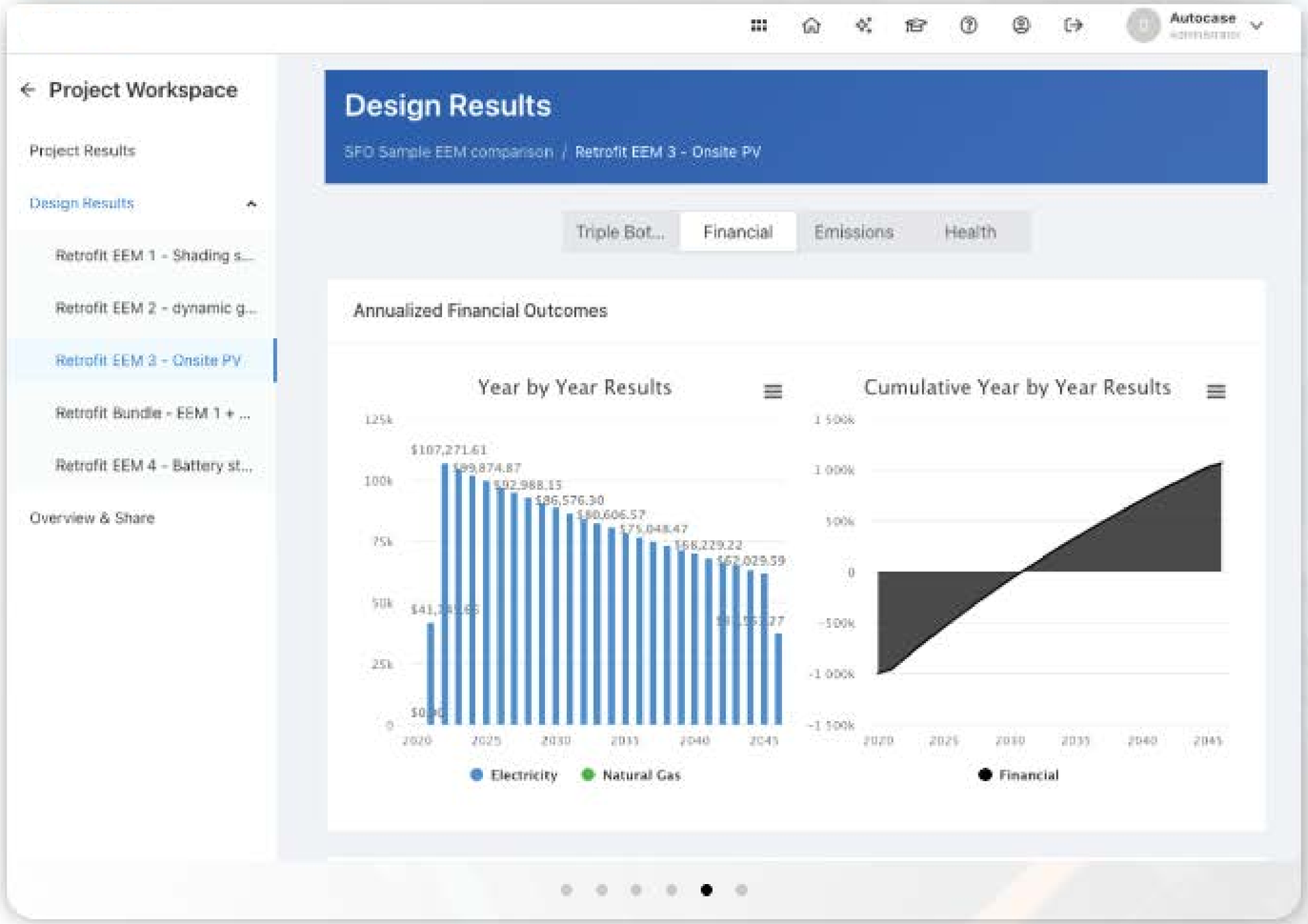
When constructing a building, **justifying the economics can be a difficult task** when it comes to environmentally and socially conscious design. Autocase aligns the multi-trillion dollar global buildings and construction industry with the growing Environmental, Social, and Governance (ESG) paradigm.

- **Co-Benefits Quantified And Monetized**
- **Whole-Life Carbon Footprint**
- **Lifecycle Financial Impacts**

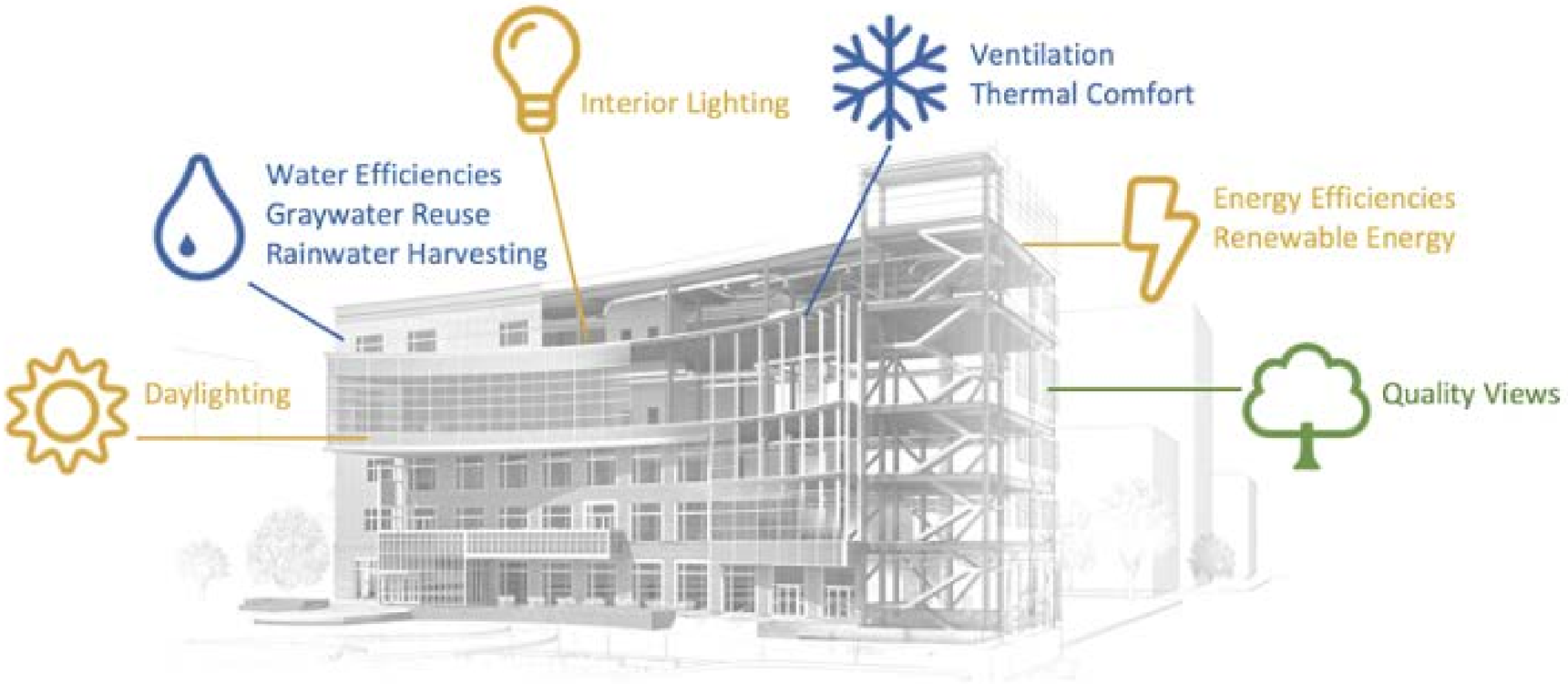
Automate The Business Case for Sustainable Design with Autocase®

Autocase cloud-based software (SaaS) **automates cost benefit analysis** to translate sustainable and eco-friendly building design impacts into **triple-bottom-line metrics.**

- Life-Cycle Costs
- Location Specific Data
- Predictive Analytics For Carbon
- Stakeholder Benefits



Green Building Design Elements



Impacts from Green Buildings

Financial impacts from green buildings are just the **tip of the iceberg** when analyzing the costs and benefits from building design.

Below the surface, buildings also have broad implications to **society and the environment**.

Design elements can generate co-benefits to both occupant and community stakeholders by incorporating resilience strategies into the project design.

Triple Bottom Line (TBL) Analysis

Design Strategies

Financial

- Life Cycle Costs
- Utility Cost Savings from Energy & Water
- Renewable Energy Revenue
- Carbon Tax Impacts
- Return on Investment (ROI)
- Discounted Payback Period

Social & Environmental

- Operational Carbon from Energy & Water
- Carbon Sequestered, Avoided (Transportation & Clean Energy) & Offset
- Urban Heat Island Health Impacts
- Recreation Benefits
- Air Pollution Reduction
- Reduced Water Scarcity
- Occupant Health Impacts
- Absenteeism & Productivity
- Electric Vehicle (EV) Financial Savings
- Road Congestion, Maintenance, Vehicle Operation & Accident Risk

Integrations & Partners

We integrate with other tools for data like:

- Embodied carbon impacts with our Tally & One Click LCA integrations
- Energy storage utility cost and carbon savings with WattTime's hourly emissions profiles
- Life cycle costs including early stage estimates with RSMeans
- Energy Star & Architecture 2030 scores
- Estimated incentives using our new Incentifind partnerships
- EPA's COBRA tool for health impacts from air pollution

We are official partners with USGBC, which enables you to get up to two LEED innovation pilot credits and free CE credits!

How to integrate environmental justice on your projects

71 minutes • Basic

1 CE hours

Defining Value in Sustainability: Informing Design Through...

67 minutes • Basic

1 CE hours

You Have Your Data, Now Do More With It

Basic

1 CE hours

Measure The Impact of Green Design & Earn 2 LEED Credits

Pilot Credit 1:

Informing Design Using Triple Bottom Line Analysis

INpc113 | Possible 1 Points

One point possible by conducting a TBL analysis to identify the value provided from the financial, social and environmental **impacts to owners, occupants and the community across at least six LEED credits.**

Pilot Credit 2:

Informing Design by Major Credit Category Using Triple Bottom Line Analysis

INpc122 | Possible 1 Points

A secondary or alternative point possible by running TBL against two LEED credits in two LEED categories.

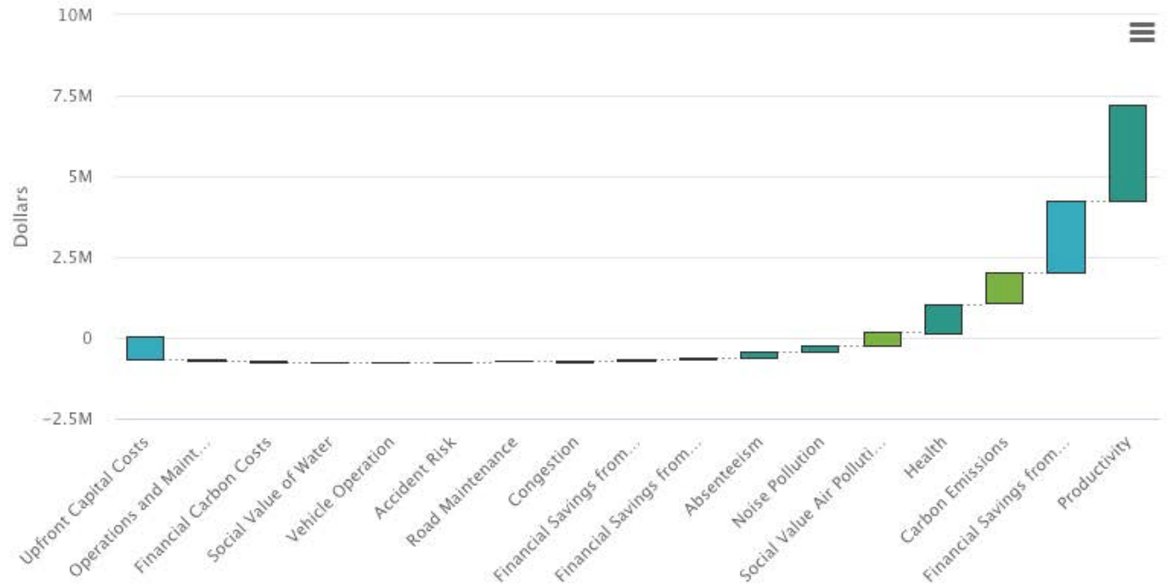
Automated Business Case & Reporting

Lifecycle Financial		Social & Environmental		Triple Bottom Line
$1,504,400	+	$5,670,945	=	$7,175,345

27
Total LEED Points for this Analysis

$265,754
Total Value per Point

Overview



Credits Included

- Optimize Energy Performance
- Renewable Energy Production
- Green Power and Carbon Offsets
- Indoor Water Use Reduction
- Outdoor Water Use Reduction

Design team uses Autocase to pursue project and inform the client of PHIUS 2018 + Timber design benefits

Overview

Client: Architecture Firm

Design Phase: Concept Design

Size: 240,000 sqft

Building type: Mixed-use Office

Location: North-East US

Strategies Assessed

HVAC, MERV & temp

Natural gas

Embodied CO_2

Electricity use

On-site and Off-site Renewables

Project Description

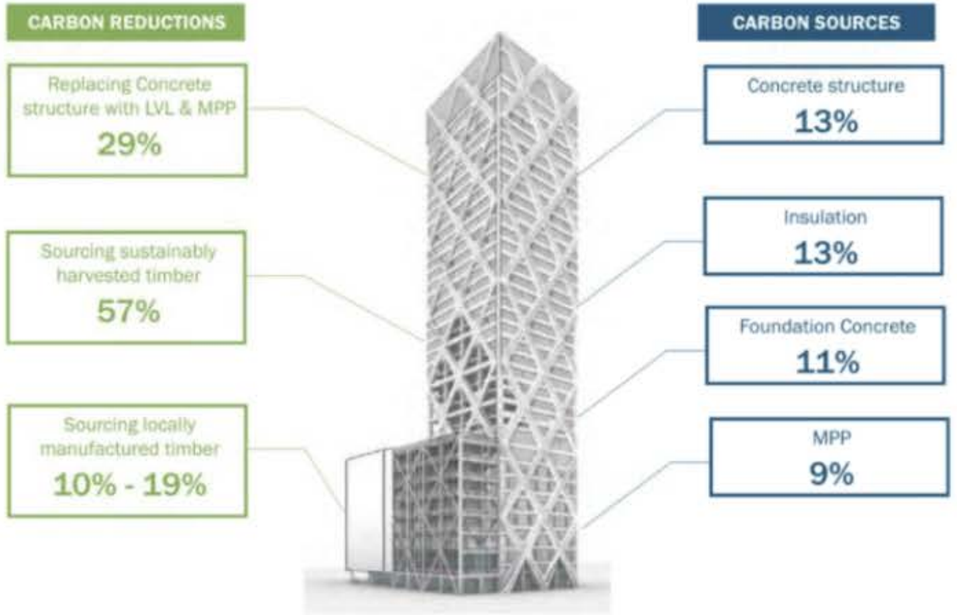
The design team wanted to use data and metrics to support and differentiate their project pursuit. They were considering varying three material frames of a building and showing the impacts of designing to Passive House Institute US (PHIUS) +2018 standards.

They were weighing the impacts of EUI, on-site and off-site renewables, embodied carbon, and indoor environmental quality aspects like MERV filters, air flow rates and thermal comfort controls.

Strategy/Inputs		Baseline Design	PHIUS + 2018 Scenario
Energy	Annual Electricity Usage (EUI)	39.83	30
	Annual Natural Gas Usage (EUI)	32.98	15
	On-site PV Potential (EUI)	0	8.53
	Off-site Renewables (EUI)	0	36.47
Materials	Base Material	Concrete	Wood
	Embodied Carbon (Tonnes)	8,778	3,473
Indoor Environmental Quality	Air Flow Rate (cfm/person)	10	18
	MERV Filter Rating	6	12
	Thermal Comfort Controls	0%	75%
	Temperature Band	70-75	68-77

CARBON ACCOUNTING

TRIPLE BOTTOM LINE ANALYSIS



PMX TIMBER GWP

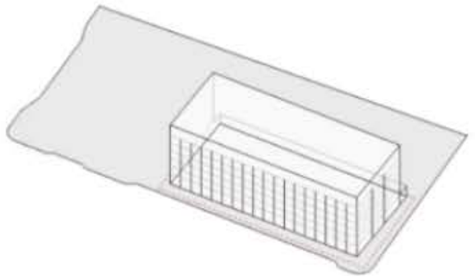
1,7117,526 kgCO2E / 380 kgCO2e/m2

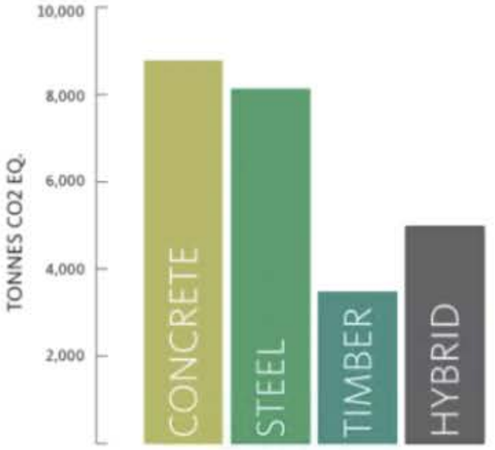
PMX TIMBER GWP W/ SEQ

3,335,144 kgCO2E / 74 kgCO2e/m2

Autocase

CATEGORY	IMPACT TYPE	PHIUS+ 2018 SCENARIO
FINANCIAL	SAVINGS FROM ELECTRICITY	$3,771,000
FINANCIAL	SAVINGS FROM NATURAL GAS	$1,004,000
SOCIAL	OCCUPANT PRODUCTIVITY	$14,340,000
SOCIAL	OCCUPANT HEALTH	$2,499,000
SOCIAL	OCCUPANT ABSENTEEISM	$1,424,000
ENVIRONMENTAL	CARBON EMISSIONS	$1,740,000
ENVIRONMENTAL	AIR POLLUTION	$652,400
TRIPLE BOTTOM LINE		**$25,430,400**





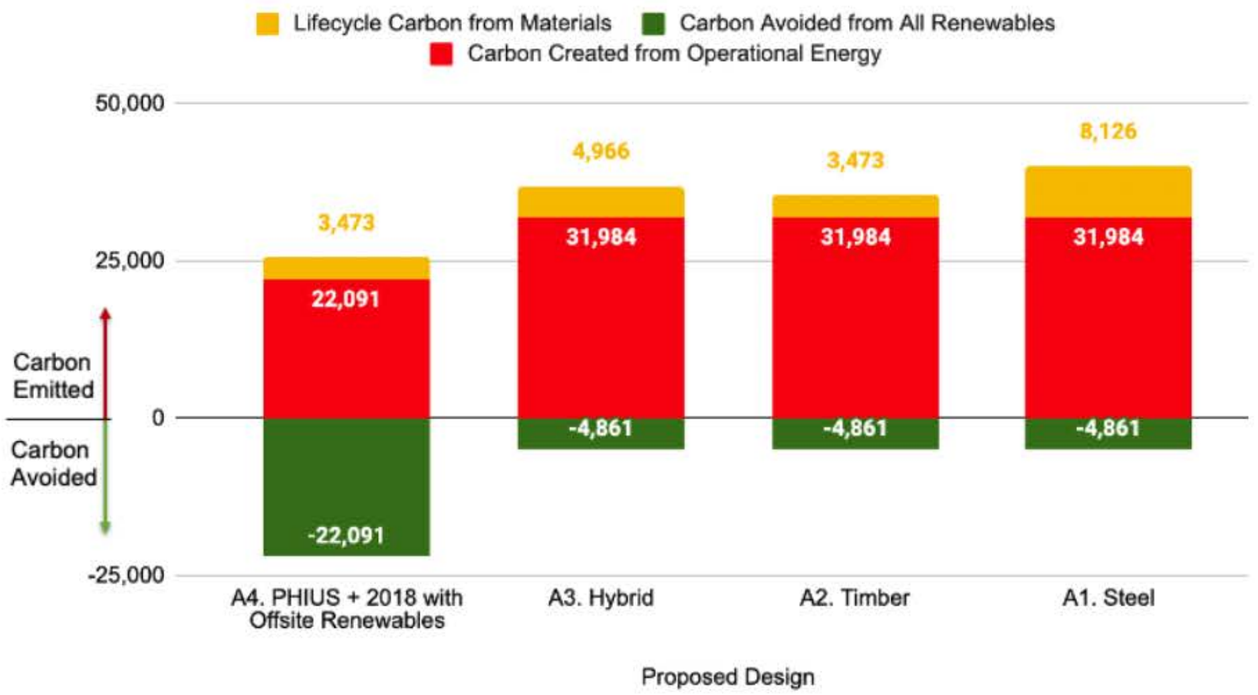
Gensler

How Autocase was used

The team used conceptual design assumptions, Autocase defaults and Passive House standards to enter data into the following Autocase modules:

- Energy & Renewable Energy
- Materials
- HVAC and Thermal Comfort

Carbon Story



Outcome

The design team was able to bolster their project pursuit by adding the triple bottom line impact of their design using conceptual data. They were also able to quantify CO_2 emitted and avoided from energy, renewables and materials using Autocase's defaults and location-specific carbon calculator.

Net Zero Strategies for Terminals

Overview

Client: LAWA

Design Phase: SD

Size: >250,000 sq ft

Building type: Terminal

Location: California

Strategies Assessed

- Upfront costs
- Natural gas
- Water use
- Electricity use
- Embodied CO_2
- Renewables

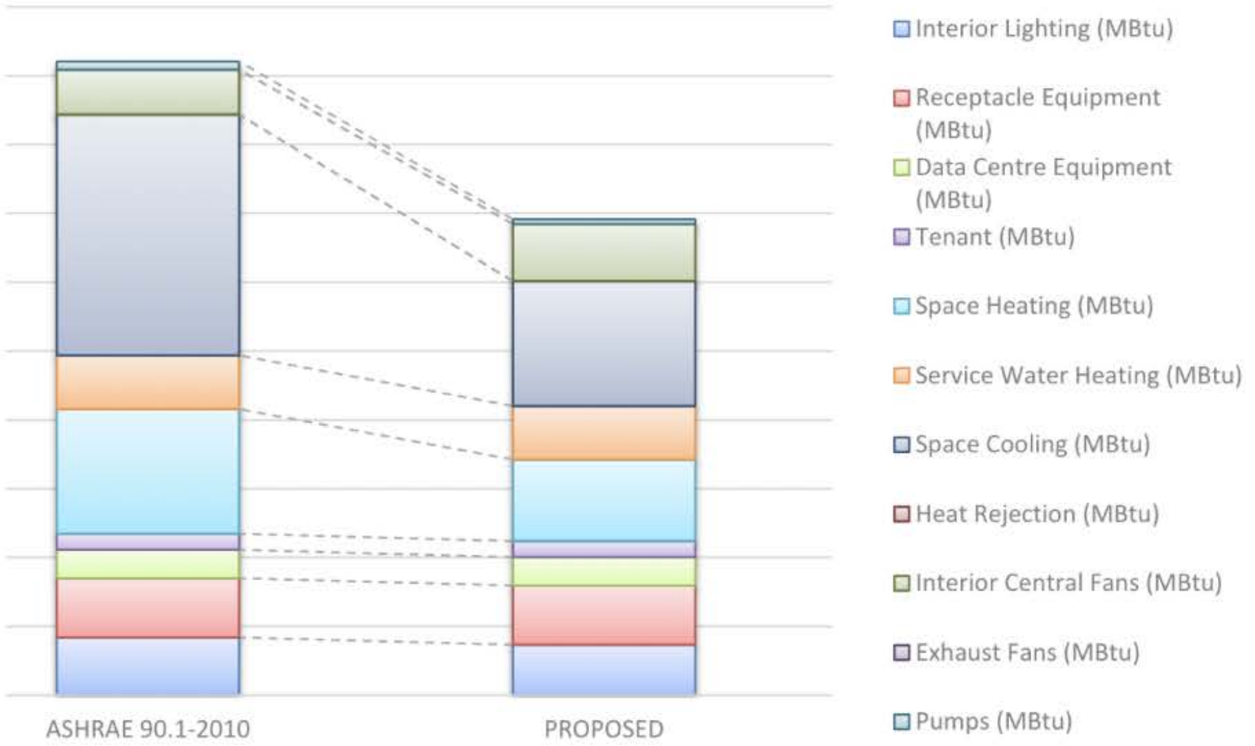
Project Description

A large new terminal had competing energy model alternatives, material choices, water efficiencies, and PV alternatives.

The design team wanted to quickly compare the models side by side for the financial performance and implication to lifetime carbon and improved health from eliminating natural gas.

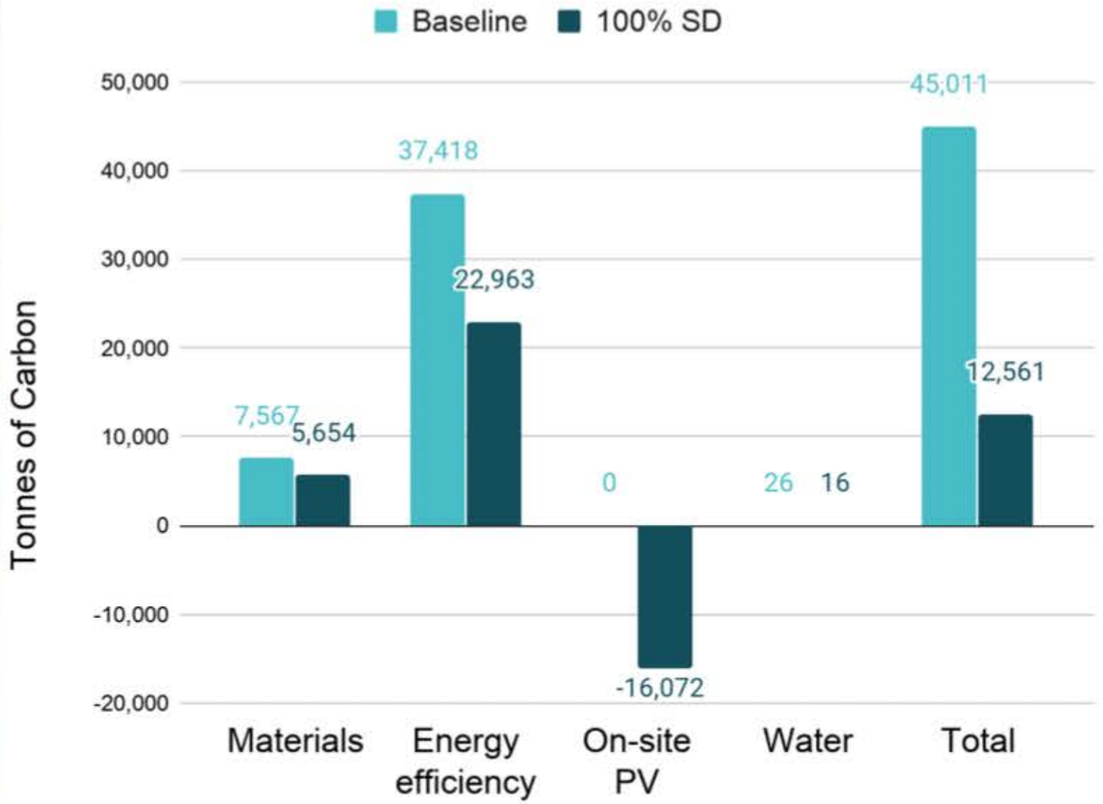
Pathway to Net Zero

Energy Efficiency Measure	EUI (kBtu/sf) [Site]
ASHRAE 90.1-2010 Baseline	117
Proposed Basis of Design	100
EEM1. Curved exterior shading structure	95
EEM2. Install Vitro "Solarban 90" glazing	98
EEM3. Reduce 24-hour operation to 5am-12am	92
EEM4. Implement HVAC Temp setback Htg 70 → 60, Clg 72 → 80	89
EEM5. Relax HVAC setpoint Htg: 68, Clg: 74	93
EEM6. Combo of "4" and "5": Setback & relaxed setpoints	84
EEM7. Reduce E/W WWR to 40%	97



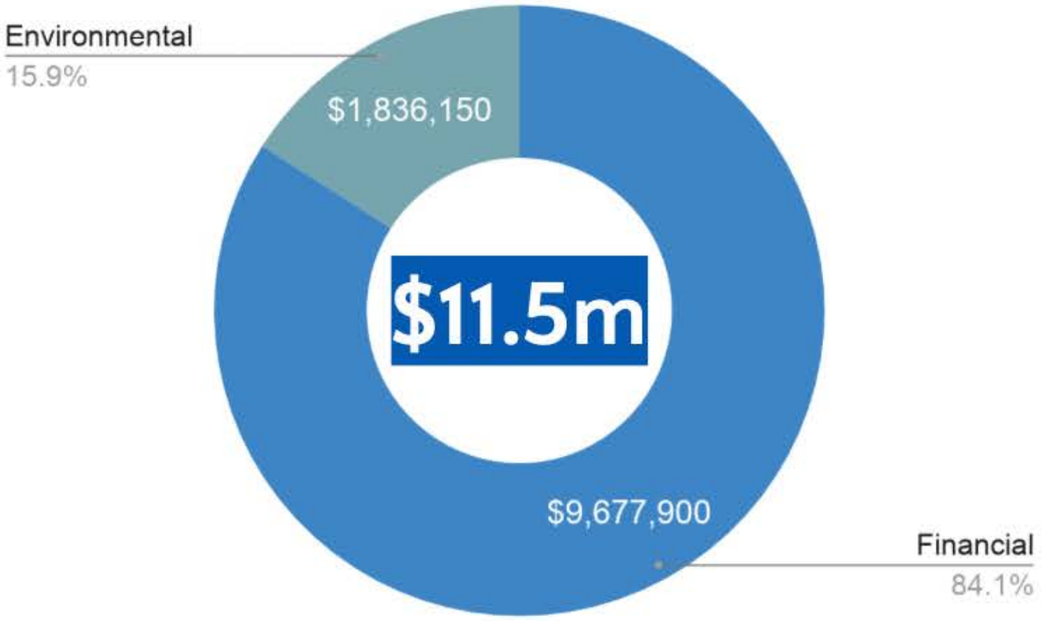
How Autocase was Used

The team was able to enter in energy use, water use goals, embodied carbon data from OneClick LCA, and PV capacity. Autocase's location-specific carbon calculator did the rest!



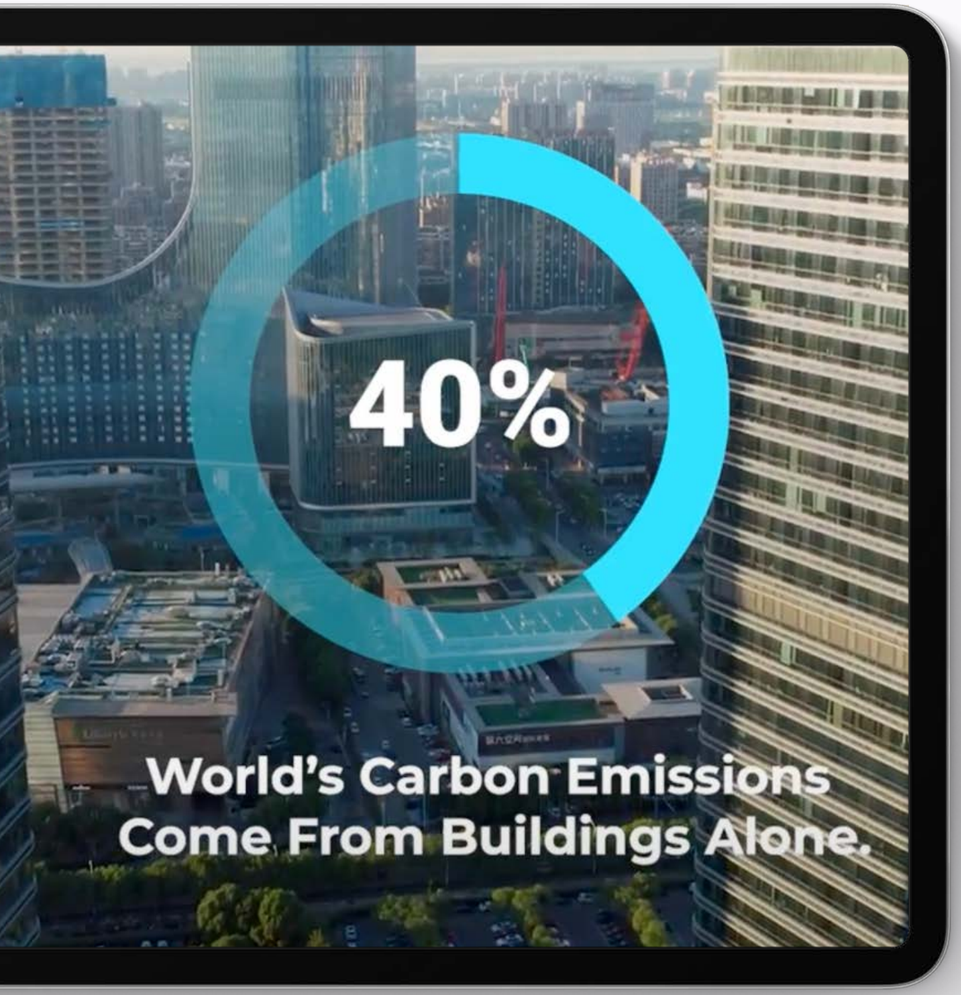
Outcome

The team showed the client the results in terms of utility savings, embodied & operational carbon, and the health improvements from eliminating natural gas.




Carbonsight®
Brought to you by
Autocase

Carbonsight



Firms and local governments have set organization-wide carbon reduction targets and are tracking/reporting emissions.

Carbonsight allows teams to shift from reporting on emissions to planning how to reach those targets, while maximizing the effectiveness of capital budgets.

Carbonsight

Workflow Steps

1. Baseline

Add your existing property and energy data using our easy upload options. Let Carbonsight fill in any data gaps with robust EUI baselines.

2. Target

Benchmark existing GHG emissions, set reduction targets, and quickly identify top emitters and low-hanging fruit to reduce CO2.

3. Apply

Apply relevant building decarbonization measures across your portfolio to estimate the carbon and cost impact towards your target.

4. Evaluate

Evaluate and compare decarbonization measures across your properties to assess which strategies are most cost-effective.

5. Roadmap

Build and visualize your decarbonization roadmap. Assess how ‘what-if?’ scenarios affect the economics of the plan.

6. Adapt

Share the plan with stakeholders and keep track of implementation progress to see how the plan should adapt.

Carbonsight

Features

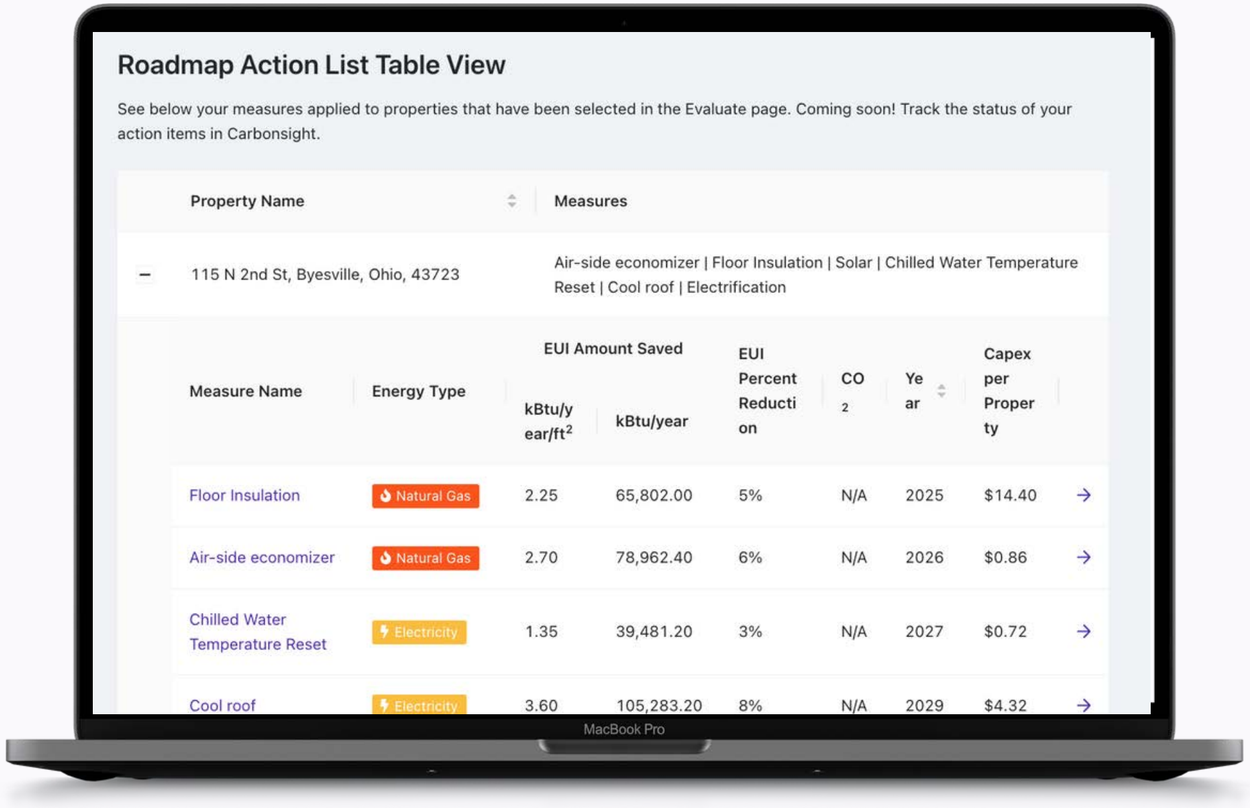
Energy Efficiency and Conservation Measures

Renewables & Fuel Switching

Portfolio wide Economic Risk Analysis for Grid Emissions and Utility Rate Savings

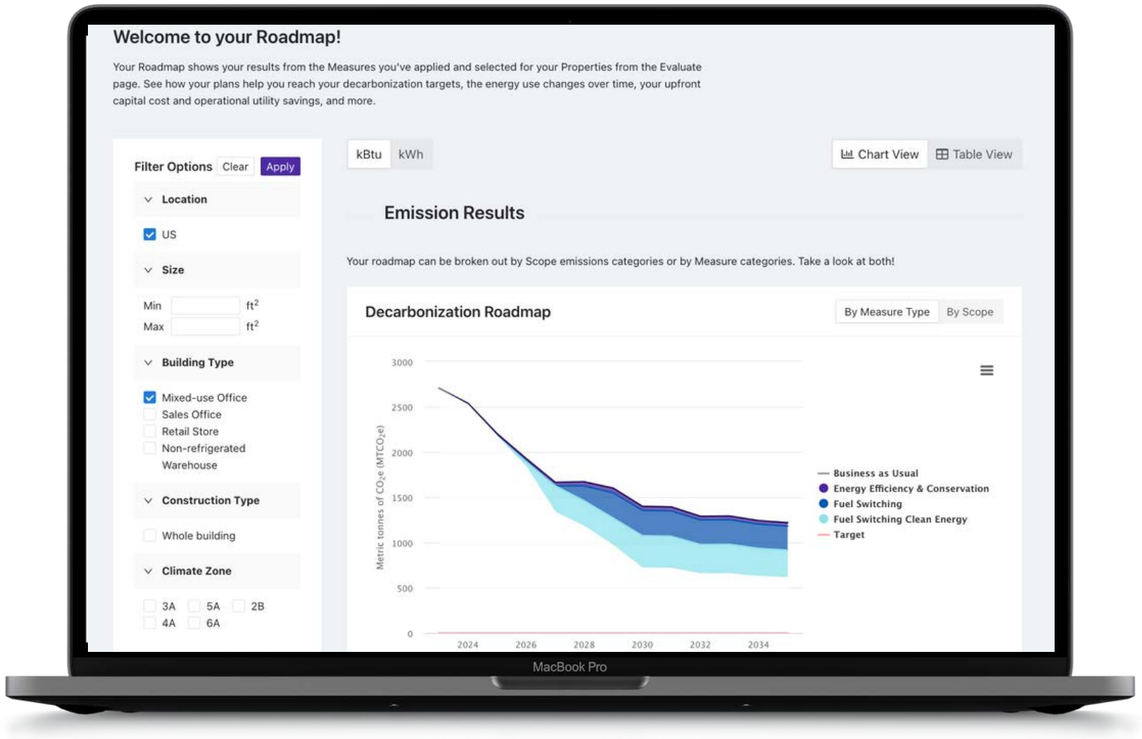
Capital Costs and Operational Cost Savings

Standardized Portfolio Wide Roadmaps to Create an Actionable Decarbonization Strategy for Each Property



Carbonsight

ENTERPRISE-SCALE BUILDING PORTFOLIO DECARBONIZATION PLANNING TOOL



Carbonsight Essentials

Platform for delivery of portfolio plans by the use of consultants compatible with any energy modeling solution

Carbonsight Pro *beta*

Beta accessible *now*

Building-specific typology-scale energy modeling feature built-in

Carbonsight Pro *with AI*

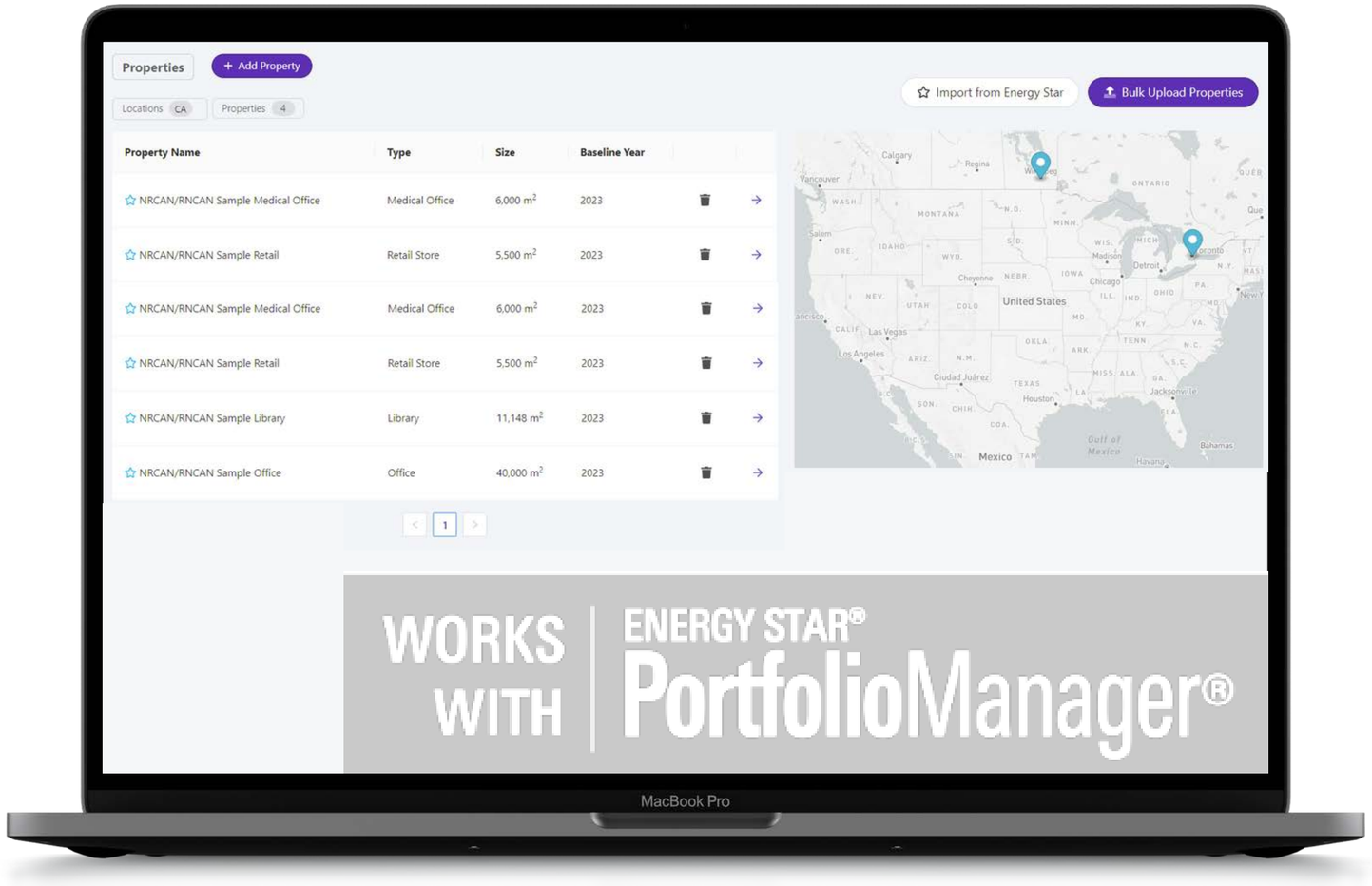
2024 release

AI to “replace” typology scale energy modelling

Carbonsight

Carbonsight Essentials

- **Decarbonization Roadmapping:** Create cloud-based, shareable and actionable decarbonization roadmaps for building portfolios
- **Building-Focused:** Standardizes property-specific measure data for energy efficiency, fuel switching, renewables, RECs, PPAs, offsets, investing and divesting
- **Macroeconomic Risk Analysis:** Layering on emissions and utility forecasts

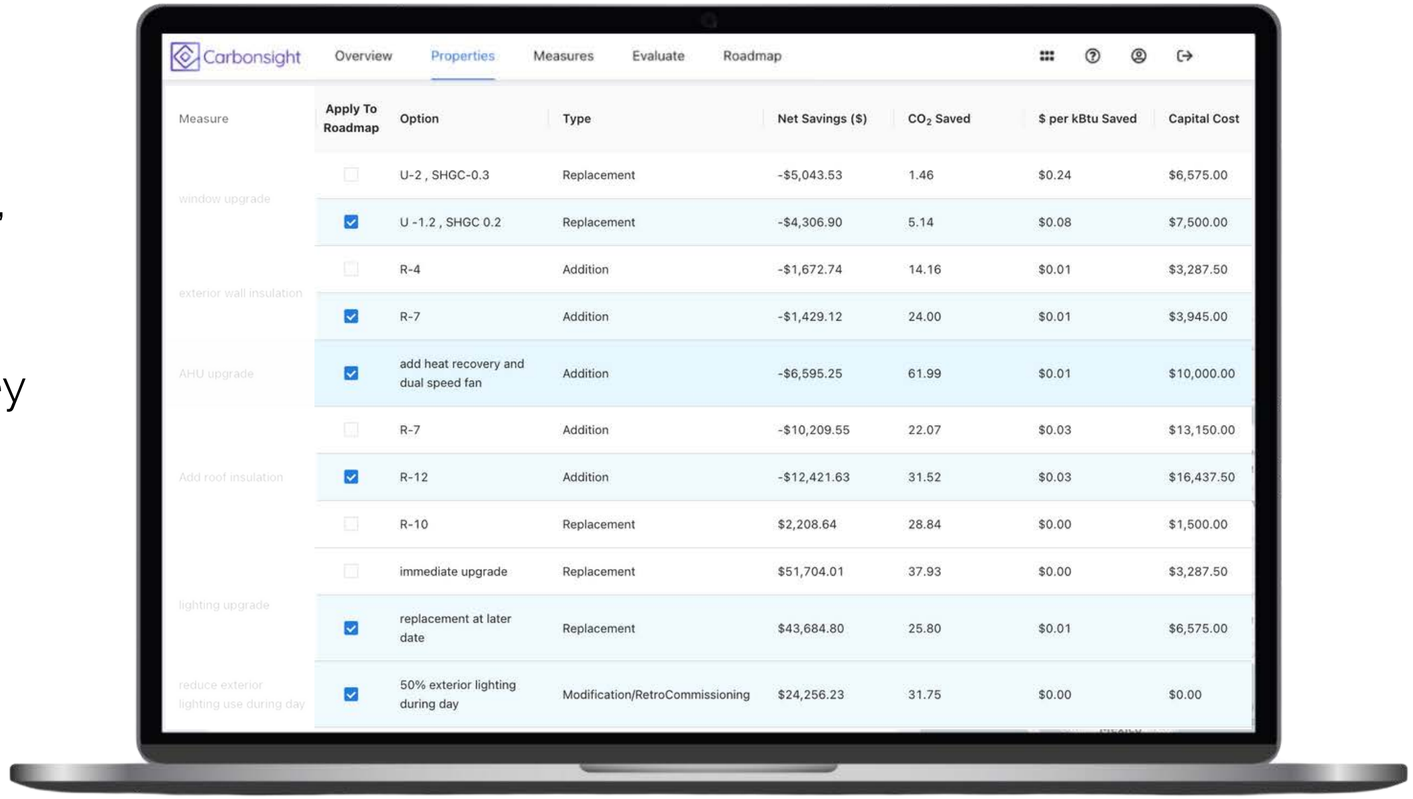


Carbonsight

Carbonsight Pro beta

Carbonsight Pro is portfolio-scaled, building-specific energy simulations

- **Cloud-based, portfolio wide energy simulations** instantly, at a fraction of the cost, in a single dashboard.
- **Allows for iterative planning** and keeps the dynamic synergies between measures as they are applied over time
- **Effortless collaboration** on a secure, cloud-based platform, with seamless data storage, and smooth integrations into your existing workflows



Measure	Apply To Roadmap	Option	Type	Net Savings ($)	CO_2 Saved	$ per kBtu Saved	Capital Cost
window upgrade	☐	U-2 , SHGC-0.3	Replacement	-$5,043.53	1.46	$0.24	$6,575.00
	☑	U -1.2 , SHGC 0.2	Replacement	-$4,306.90	5.14	$0.08	$7,500.00
exterior wall insulation	☐	R-4	Addition	-$1,672.74	14.16	$0.01	$3,287.50
	☑	R-7	Addition	-$1,429.12	24.00	$0.01	$3,945.00
AHU upgrade	☑	add heat recovery and dual speed fan	Addition	-$6,595.25	61.99	$0.01	$10,000.00
Add roof insulation	☐	R-7	Addition	-$10,209.55	22.07	$0.03	$13,150.00
	☑	R-12	Addition	-$12,421.63	31.52	$0.03	$16,437.50
lighting upgrade	☐	R-10	Replacement	$2,208.64	28.84	$0.00	$1,500.00
	☐	immediate upgrade	Replacement	$51,704.01	37.93	$0.00	$3,287.50
	☑	replacement at later date	Replacement	$43,684.80	25.80	$0.01	$6,575.00
reduce exterior lighting use during day	☑	50% exterior lighting during day	Modification/RetroCommissioning	$24,256.23	31.75	$0.00	$0.00

Carbonsight

Interacting with the **Design Space**

Mechanical

Number of elevators
Boiler efficiency
Chiller COP
Temperature Setpoint
Supply Air Temperature
Outside Air Rate per person
Fan Efficiency
Fan Pressure rise
Fan Motor efficiency

Electrical

Lighting power density
Core & Perimeter LPD
Top floor LPD
Basement equipment power density
Core & Perimeter equipment power density

Envelope

Window wall ratios
Elevation specific wall R-values
Slab-on-grade R-Value
Roof R-Value
Air infiltration/leakage rate (ventilation on/off)

Structure

Number of repeated floors
Building orientation
Width/Depth of building
Floor height
Perimeter zone depth

Interiors

Maximum occupant density
Internal mass
Basement maximum occupant density

Water

Water Heater efficiency

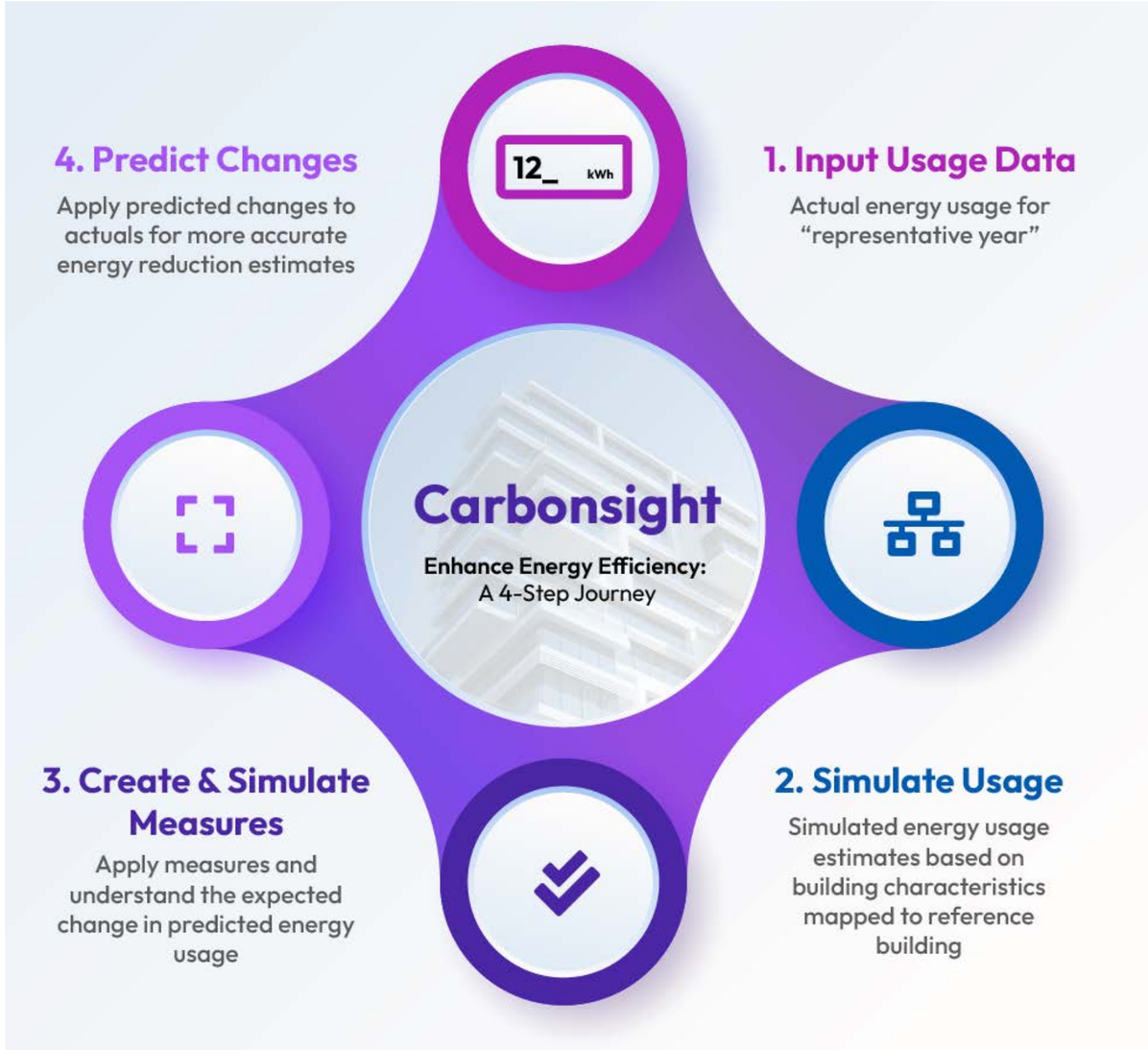
Carbonsight Pro *with AI*

Carbonsight

Generative AI principles used to Create Dataset

Discriminative AI used to to build **Design Space**

- **Building Typology Design Space:** A multi-dimensional building typology design space is created using AI.
- **Accessing the Design Space:** Interact with the design space created by AI by providing building performance values.
- **Answers provided by the Design Space:** Predicted simulated energy use by fuel type.



Carbonsight

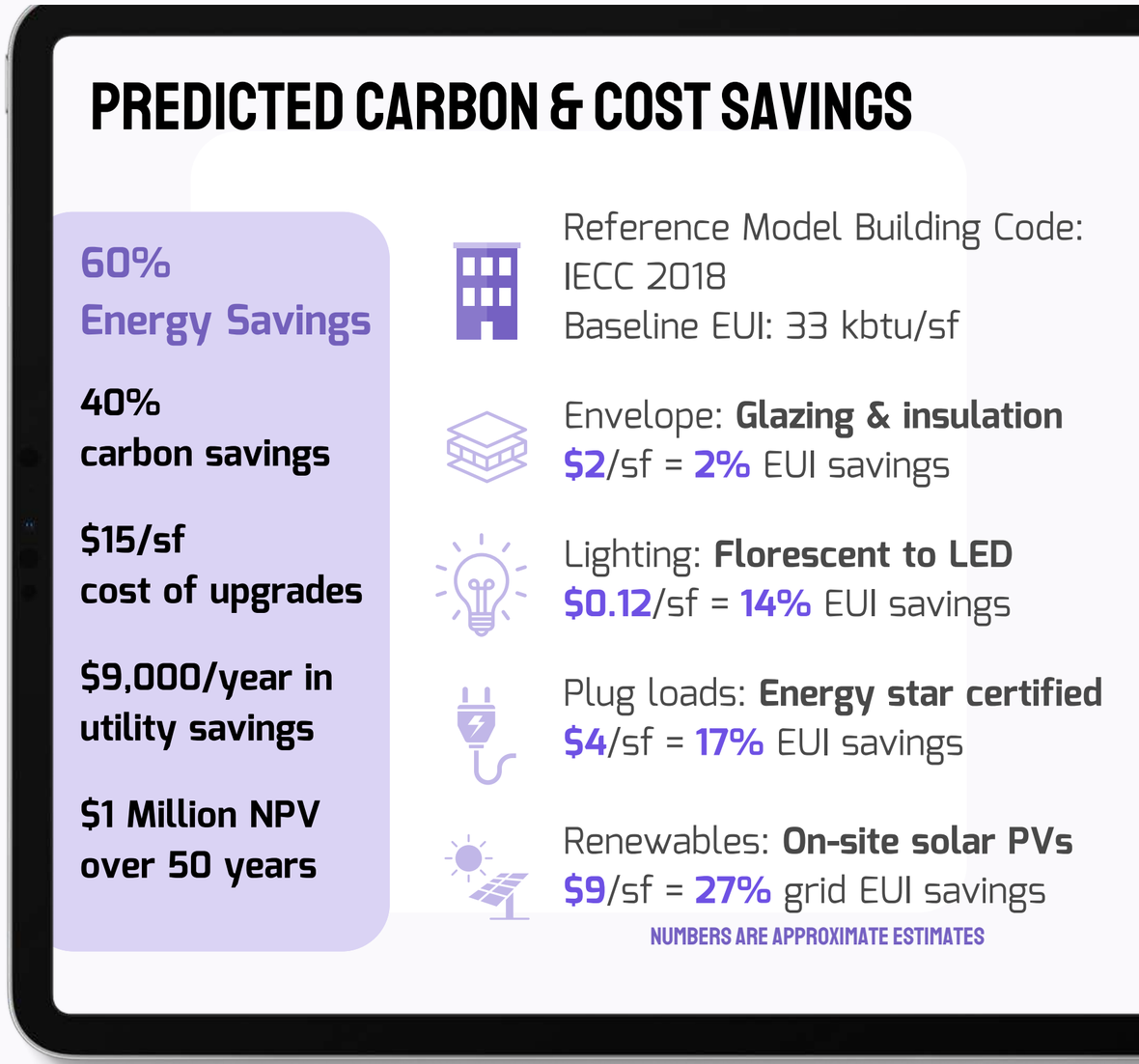
Case Study - San Antonio

San Antonio leveraged our early stage energy modeling tool to predict the impacts of various proposed energy efficiency measures to improve building performance standards.

The project team assessed the incremental impacts of the following sustainable design enhancements to a library facility:

- **LED Lighting Upgrades**
- **Envelope Improvement**
- **Plug Load Management**
- **Solar PV system**

These insights were gathered for a fraction of the cost of commissioning a full energy model.

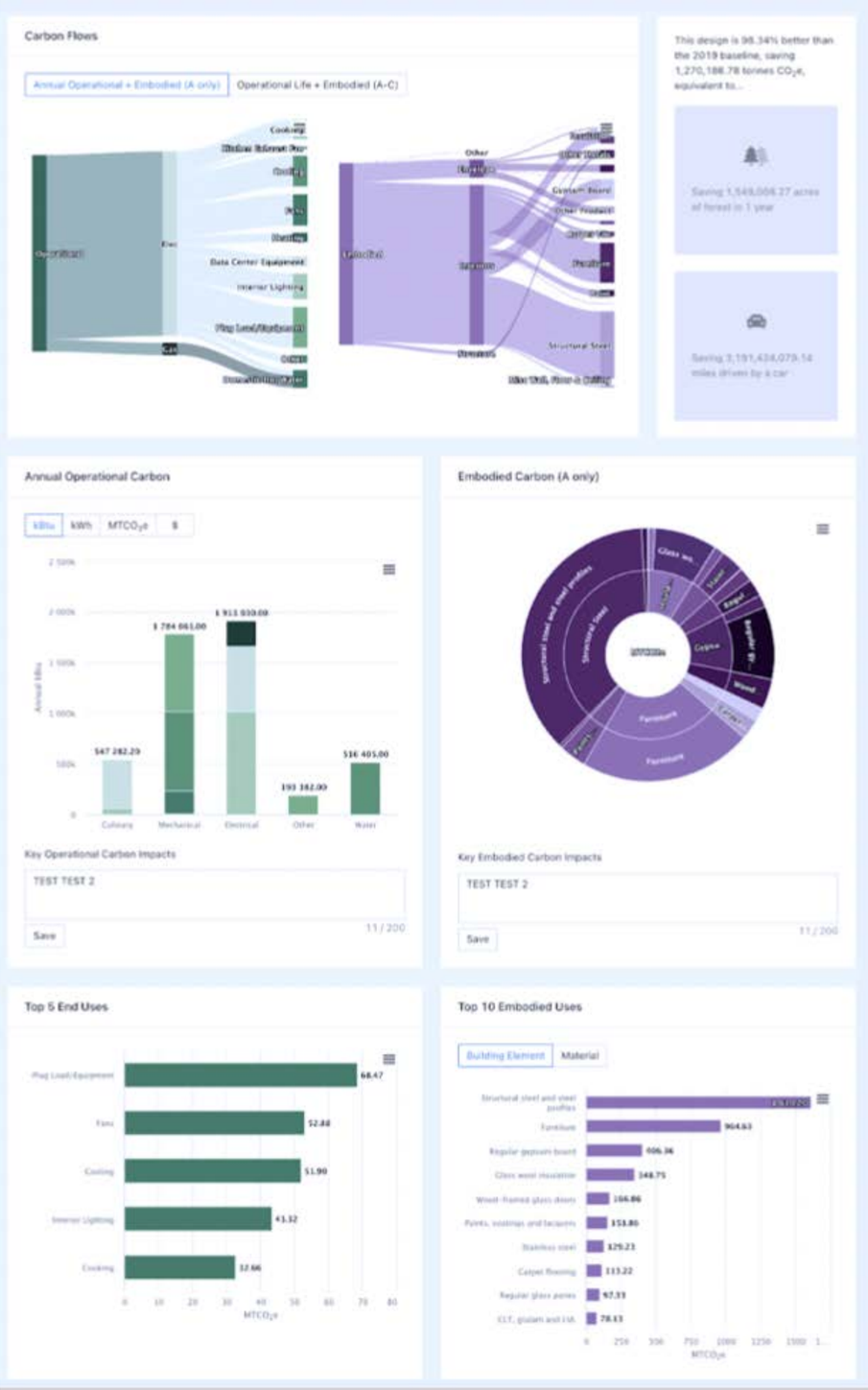


Carbonsight

Case Study - Global Tech Giant

We have customized and implemented Carbonsight for one of the large technology companies with global presence (under NDA) to measure scope 1, 2 and 3 emissions for their future global building projects to ensure each design will help them achieve their carbon reduction goals across dozens of facilities.

They've been using the application with their sustainability consultants, actively entering their retrofit design data monthly. The client was able to market the positive changes using outputs from Carbonsight at both the individual building level and across the entire portfolio.

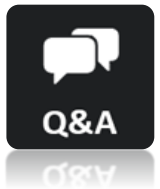


Période de questions

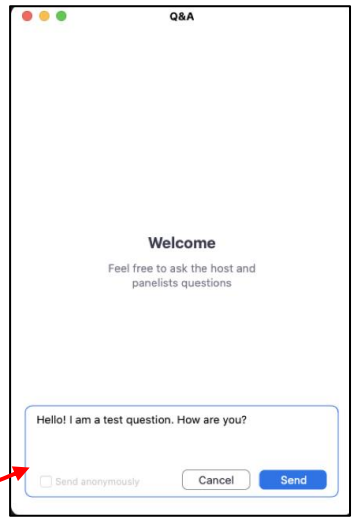
SÉRIE DE WEBINAIRES | IMMOBILIER ET CHANGEMENTS CLIMATIQUES
« Mesurer la performance économique de la décarbonation des immeubles : présentation d'Autocase et Carbonsight »

Pour nous envoyer vos questions pendant la conférence

Ouvrez la fenêtre « Q&R » en cliquant sur le bouton au bas de l'écran.



Tapez votre question dans la fenêtre et appuyez sur la touche « Entrée ».



Pour consulter les présentations et les enregistrements des webinaires

Voir le site de la chaire :

www.ivanhoecambridge.uqam.ca

Mot de la fin

SÉRIE DE WEBINAIRES | IMMOBILIER ET CHANGEMENTS CLIMATIQUES
« Mesurer la performance économique de la décarbonation des immeubles : présentation d'Autocase et Carbonsight »

L'enregistrement vidéo du webinaire sera disponible sous peu sur la page Web de la Chaire : www.ivanhoecambridge.uqam.ca

Pour recevoir nos nouvelles, n'oubliez pas de vous inscrire sur la liste d'abonnés sur notre site web à : https://uqam.us9.list-manage.com/subscribe?u=0764766cfdffbd5e14a53f8ab&id=e7a11000df

SÉRIE DE WEBINAIRES | IMMOBILIER ET CHANGEMENTS CLIMATIQUES
« Mesurer la performance économique de la décarbonation des immeubles : présentation d'Autocase et Carbonsight »

Pour en savoir plus sur nos projets de recherche en cours

et sur la série de webinaires

« Immobilier et changements climatiques », visitez notre site web à :

www.ivanhoecambridge.uqam.ca

CHAIRE
Ivanhoé Cambridge d'immobilier
ESG UQÀM

OCVI²
Observatoire et centre de valorisation des innovations en immobilier
ESG UQÀM

Merci pour votre attention!