Welcome!

Kris Ann Bolt, SBR President

SBR WELCOMES YOU TO AN EDUCATIONAL WORKSHOP

CALCULATING YOUR CARBON FOOTPRINT

Thursday February 6th, 4:00 to 6:00 PM @ National Grid
144 Kensington Avenue, Buffalo

nationalgrid


WESTERN NEW YORK
SUSTAINABLE BUSINESS ROUNDTABLE
wendel
Harmac
MEDICAL PRODUCTS
buffalozoo
CURBELL
INDUSTRIAL SUPPORT INC.
ecology and environment, inc.
Member of WSP
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TAPECON INC.
CANNONDESIGN
Perry's Ice Cream
TESLA
ECIDA
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Hillcrest
CHANGE
NOTTINGHAM ADVISORS
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Montante SOLAR
NEW YORK STATE OF OPPORTUNITY.
NY Power Authority
McCULLAGH COFFEE ROASTERS
COMMUNITY BEER WORKS
Catholic Health
blueRock SOLAR
Panasonic
ARCA
Asset Recovery Company of America
THAT'S
FIFCO USA
SOLARLIBERTY
THE FUTURE OF ENERGY INDEPENDENCE
RICH'S
GUARD CONTRACTING CORPORATION
Solar by CIR
MODERN
Disposal Services
Eaton
All for a day's work
sonwil
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TRIAD
RECYCLING AND ENERGY
NATIONAL SOLAR TECHNOLOGIES
AXA ADVISORS
SIGNITY FINANCIAL
SIEMENS
Niagara
PREMIUM CHOCOLATE
The Knoer Group, PLLC
Green Home Innovations Inc.
Reduce-Recycle-Reuse
EcoTech Office Environments
FOR
mcCallumSather
ARCHITECTURE ENGINEERING INTERIORS
ME
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ATR
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Tri-Main
center
NORTH WOODS
ASSET MANAGEMENT
Rising Tide Energy Services
Niagara Malt
www.wnysustainablebusiness.org

Western New York
Sustainable Business Roundtable

Invest – Connect - Learn – Recognize

www.wnysustainablebusiness.org

WNY SUSTAINABLE BUSINESS ROUNDTABLE 2020 EDUCATION CALENDAR

Quarterly topic perspectives on:

- By the numbers - metrics matter
- Clean production & chemical reduction
- Sustainability Basics to build & develop your business
- Challenges & trends in pollution prevention
- The business case for action
- Resource connections

Western New York Sustainable Business Roundtable

WINTER SEMESTER - CARBON FOOTPRINT

- How to calculate, collaborate and cut your carbon footprint
- What CLCPA will mean for your business
- Exploring the circular economy, green engineering & chemistry
- Wasted food & Renewable Energy Credits

GOAL- REDUCE ENERGY INTENSITY

SPRING SEMESTER - LAND & LAKES

- Smart pesticide use and management for toxics reduction
- Ideas for green and blue infrastructure solutions
- Maximizing pollinators & native plants in corporate landscapes
- The future of facility and grounds maintenance

GOAL - TRANSFORM CORPORATE LANDSCAPES

SUMMER CAMP - RETHINKING BUILDINGS

- Net Zero Buildings
- Energy Conservation
- Renewable Energy
- Healthy Material Selection & Use
- Greener parking lots & roofs

GOAL - CREATE BUILDINGS FOR TOMORROW

FALL SEMESTER - TRANSFORMING TRANSPORTATION

- Electric charging stations
- Policies to reduce employee commute
- Test drive electric vehicles
- The importance of healthy materials in electric vehicles

GOAL - CONNECTING PEOPLE & PLACES

www.wnysustainablebusiness.org


BUILDING
THE LOW CARBON
ECONOMY
- THE VALUE OF ZERO -
SAVE THE DATE!
SUSTAINABLE BUSINESS SUMMIT
@ TEMPLETON LANDING
MAY · 6 · 2020

Apply before March 18th!

Nominate before March 18th!

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CALCULATING YOUR CARBON FOOTPRINT

Thursday February 6th, 4:00 to 6:00 PM @ National Grid
144 Kensington Avenue,
Buffalo

nationalgrid

Today's host

nationalgrid

Ken Kujawa
Regional Director
National Grid

Derek Nichols
Sustainability Engagement Coordinator, University at Buffalo

CALCULATING YOUR CARBON IMPACT

GOALS

WHAT IS A GREENHOUS E GAS INVENTORY

UNIVERSITY OF NEW YORK AT BUFFALO

Percent Change in Greenhouse Gas Emissions 2017 vs. Baseline 2006 and Emission Reduction Target Goals

	TOTAL SCOPE 1	TOTAL SCOPE 2	TOTAL SCOPE 3	TOTAL SCOPE 1 & 2	TOTAL SCOPE 1, 2, & 3	TOTAL NET
CHANGE IN EMISSIONS	↑ 13.00%	↓ 90.19%	↑ 49.64%	↓ 61.51%	↓ 33.56%	↓ 31.83%
PER 1,000 SQ. FT.	↑ 5.29%	↓ 90.86%	↑ 39.43%	↓ 64.14%	↓ 38.10%	↓ 36.48%
PER FULLTIME ENROLLMENT	↑ 3.10%	↓ 91.05%	↑ 36.52%	↓ 64.88%	↓ 39.39%	↓ 37.80%
EMISSION REDUCTION TARGETS	75% by 2020	100% by 2030		75% by 2020	100% by 2030 75% by 2020	

Institutional Information

SIGN DATE
Mar 7, 2007

PRESIDENT
Satish K Tripathi

IMPLEMENTATION LIAISON
Ryan Mcpherson

SUSTAINABILITY WEBSITE
Link

Membership – Ratings

STARS RATING	GRITS
Gold	-

Emissions over Time

Select Data Series: Emissions MTCO2e ▾ LINE/BAR

Reports

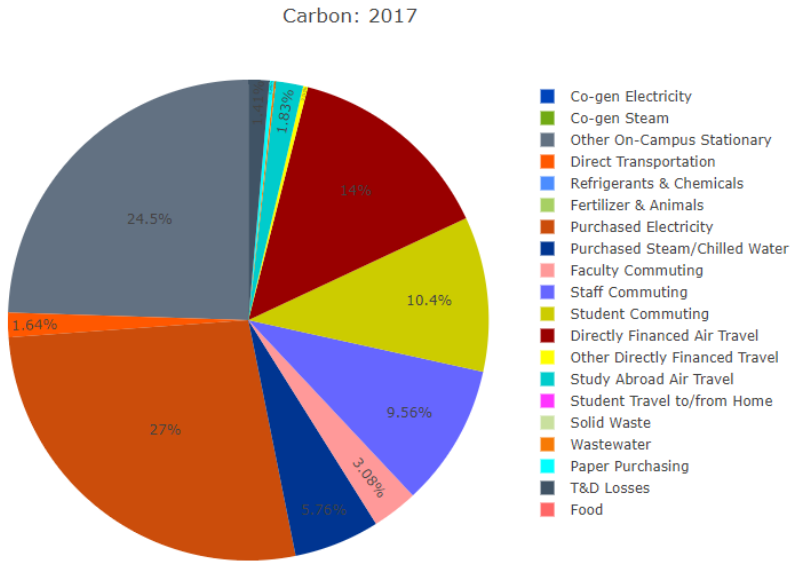
INSTITUTIONAL PROFILE
View

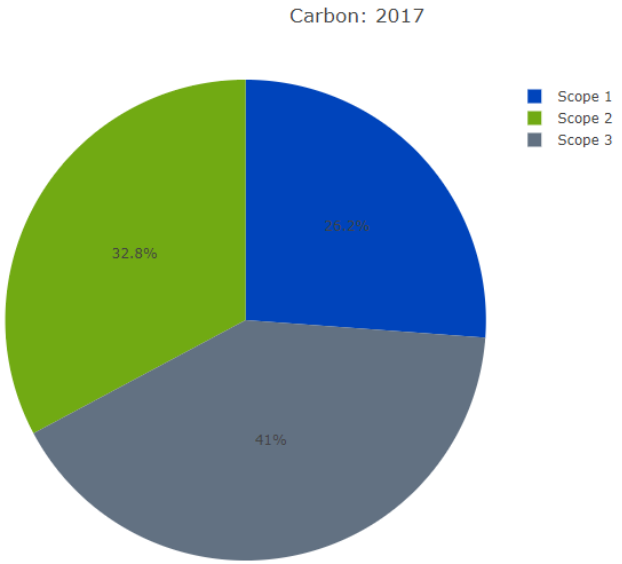
ANNUAL PROGRESS EVALUATION
2017

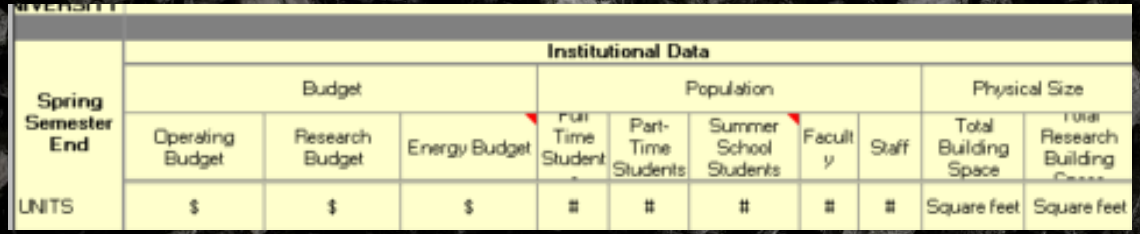
CLIMATE ACTION PLAN
2009

GHG REPORTS
2014, 2011, 2010, 2009, 2008, 2007, 2006, 2005, 2004, 2003, 2002, 2001, 2000, 1999, 1998

with graphs


Carbon: 2017
1.83%
14%
24.5%
10.4%
1.64%
9.56%
27%
3.08%
5.76%
Co-gen Electricity
Co-gen Steam
Other On-Campus Stationary
Direct Transportation
Refrigerants & Chemicals
Fertilizer & Animals
Purchased Electricity
Purchased Steam/Chilled Water
Faculty Commuting
Staff Commuting
Student Commuting
Directly Financed Air Travel
Other Directly Financed Travel
Study Abroad Air Travel
Student Travel to/from Home
Solid Waste
Wastewater
Paper Purchasing
T&D Losses
Food


Carbon: 2017
26.2%
32.8%
41%
Scope 1
Scope 2
Scope 3



Spring Semester End	Institutional Data									
	Budget			Population					Physical Size	
	Operating Budget	Research Budget	Energy Budget	Full Time Student	Part-Time Students	Summer School Students	Faculty	Staff	Total Building Space	Total Research Building
UNITS	$	$	$	#	#	#	#	#	Square feet	Square feet

	--- Scope 1 Emissions Sources ---																													
	On-Campus Stationary Sources																					Direct Transportation Sources								
	On-Campus Cogeneration Plant(s)				Other On-Campus Stationary Sources																	University Fleet								
	Electric Output	Steam Output	Electric Efficiency	Steam Efficiency	Residual Oil (#5-6)	Distillate Oil (#1-4)	Natural Gas	LPG (Propane)	Coal (Steam Coal)	Incinerated Waste	Wood Chips	Wood Pellets	Grass Pellets	Residual BioHeat	Distillate BioHeat	Attributable Solar - Electric	Attributable Solar - Thermal	Attributable Wind	Other	Gasoline Fleet	Diesel Fleet	Natural Gas Fleet	E85 Fleet	B5 Fleet	B20 Fleet	B100	Hydrogen	Other		
	kWh	MMBtu	%	%	Gallons	Gallons	MMBtu	Gallons	Short Tons	Short Tons	Short Tons	Short Tons	Short Tons	Gallons	Gallons	kWh	MMBtu	kWh	MMBtu	Gallons	Gallons	MMBtu	Gallons	Gallons	Gallons	Gallons	MMBtu	MMBtu		

	Direct Transportation Sources										Refrigerants & Chemicals						--- Scope 2 Emissions Sour		
	University Fleet										Refrigerants & Chemicals						Electricity	Steam	C
	Gasoline Fleet	Diesel Fleet	Natural Gas Fleet	E85 Fleet	B5 Fleet	B20 Fleet	B100	Hydrogen	Other	Electric Fleet	HFC-134a	R-404a	HCFC-22	HCFE-235da2	HG-10	Other	SET eGRID SUBRE	SET FUEL MI	S
	Gallons	Gallons	MMBtu	Gallons	Gallons	Gallons	Gallons	MMBtu	MMBtu	kWh	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	kWh	MMBtu	

--- Scope 2 Emissions Sources ---			Commuting - click here to enter data									Directly Financed Outsourced Travel							Study Abroad Travel
Purchased Electricity, Steam, and Chilled Water			Faculty / Staff Commuting					Student Commuting				Air Travel		Other					
Electricity	Steam	Chilled Water	Carbon-free Modes	Automobile	Bus	Light Rail	Commuter Rail	Carbon-free Modes	Automobile	Bus	Light Rail	Commuter Rail	Faculty / Staff	Students	Train	Taxi / Ferry / Rental Car	Bus	Alternative Fuel Bus	Personal Mileage Reimbursement	Air
SET eGRID SUBREG	SET FUEL MIX	SET FUEL MIX																		
kWh	MMBtu	MMBtu	Miles	Miles	Passenger Miles	Passenger Miles	Passenger Miles	Miles	Miles	Passenger Miles	Passenger Miles	Passenger Miles	Miles	Miles	Passenger Miles	Miles	Passenger Miles	Passenger Miles	Miles	Passenger Miles

Wastewater			Paper					--- Offsets ---								
Central Treatment System			Uncoated Freesheet	Uncoated Freesheet	Uncoated Freesheet	Uncoated Freesheet	Uncoated Freesheet	Offsets					Renewable Energy Certificates (RECs) are now entered in Scope 2 to align with new methodology			
Aerobic	Anaerobic	Anaerobic Digestion	0% Recycled	25% Recycled	50% Recycled	75% Recycled	100% Recycled	On-campus Composting	Forest Preservation	Retail Offsets (High End)	Retail Offsets (Low End)	Other	Green Power Certificates	Retail Offsets (High End)	Retail Offsets (Low End)	Other
Gallons	Gallons	Gallons	lbs	lbs	lbs	lbs	lbs	Short Tons of Wet Organic Compost	MT eCO_2	MT eCO_2	MT eCO_2	MT eCO_2				

WHAT ARE WE MEASURING?

SCOPE 1

- Energy produced on site
- Direct transportation
- Refrigerants and chemicals

SCOPE 2

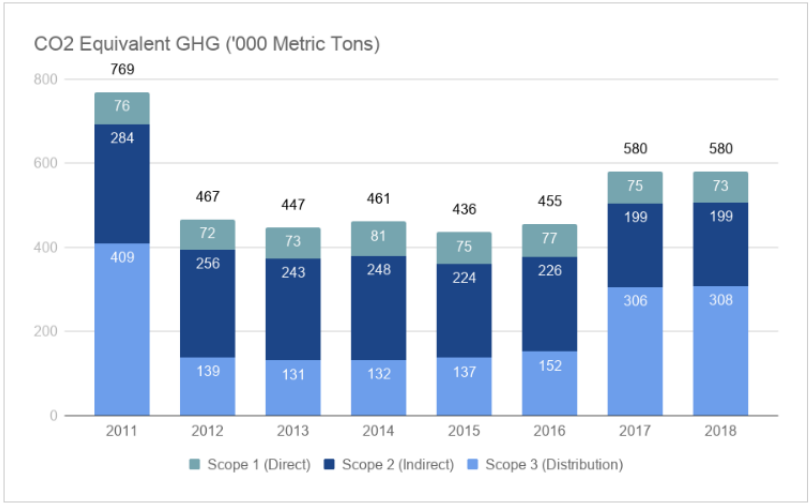
- Purchased electricity, steam and chilled water

SCOPE 3

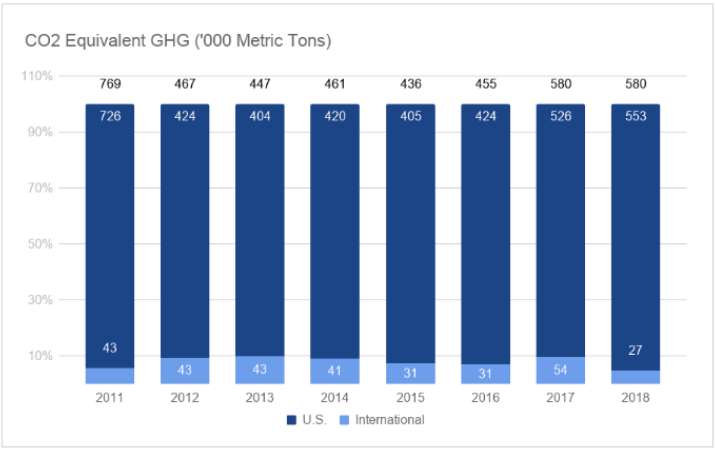
- Everything else

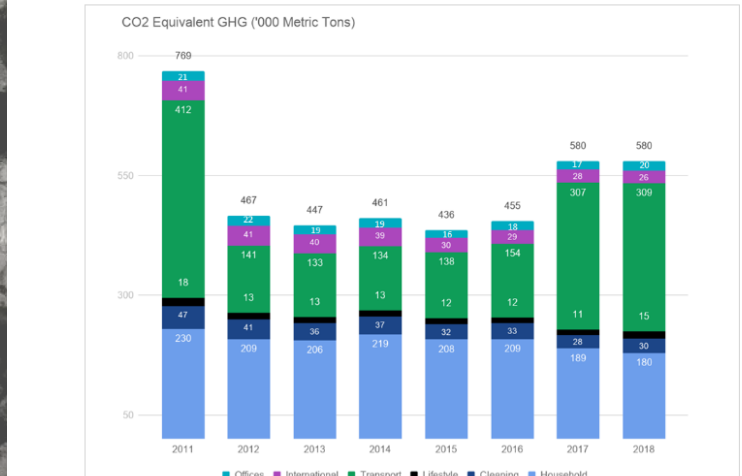
CLOROX

Scope 1, 2 and 3 GHG Emissions Trends



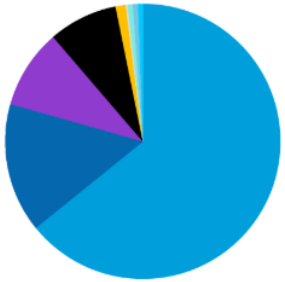
GHG Emissions by Geography





AT&T

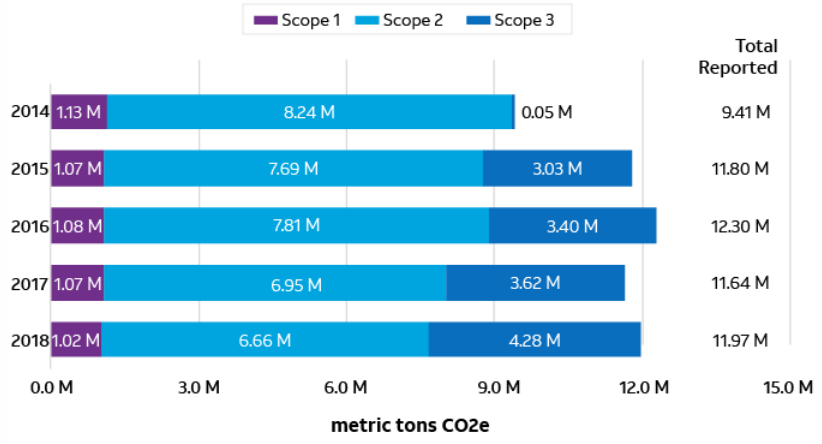
2018 Scope 1 Emissions by Source



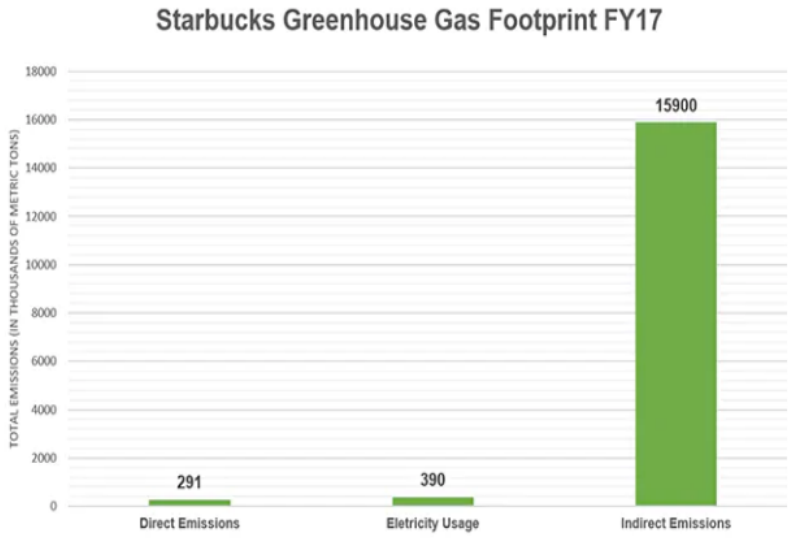
- Ground Fleet: **64.18%**
- Natural Gas: **8.10%**
- Refrigerant: **15.20%**
- Stationary Engines: **9.34%**
- FlightOps: **1.19%**
- Propane: **0.61%**
- #2 Fuel Oil: **0.23%**
- Diesel: **0.60%**
- Portable Engines: **0.56%**
- Gasoline: **0.00%**
- LPG: **0.00%**

1,019,696 total metric tons CO_2e

AT&T Domestic and International Carbon Foorprint, Year-over-Year[1]



STARBUCKS



The 2017 inventory found our Scope 1, Scope 2 and Scope 3 emissions were 16,581,000 metric tons of carbon dioxide equivalent. According to the Protocol, Scope 1 includes direct GHG emissions from sources that are owned or controlled by the company. For Starbucks these include manufacturing plants, store operations, and company-owned vehicles and aircraft. Scope 2 includes market-based electricity emissions from the generation of purchased electricity consumed by the company. Through the purchase of Renewable Energy Credits (RECs) we are able to offset 62% of our store emissions globally. Scope 3 emissions is the largest component to our footprint. It includes purchased goods and services, as well as, emissions from our licensees and partnerships. The leading contributors for Starbucks are food, dairy, coffee and packaging.

WHO'S INVOLVED?

- HR
- Utility officers
- Project Managers
- Contract/Finance
- Marketing
- Logistics
- Sustainability champion
- Consultants?

WHERE TO START

- Build a committee
- Decide on a scope
- Develop a plan for monitoring and improvement (a Climate Action Plan)

WHY BOTHER

- Sets a baseline
- Establishes a system driven towards efficiency
- Value alignment

TOOLS

GREENHOUSE GAS PROTOCOL

SIMAP
SUSTAINABILITY INDICATOR MANAGEMENT & ANALYSIS PLATFORM

CoolClimate Network
Smart Tools for a *Cooler* Planet

CARBON TRUST

NEW YORK STATE
DEPARTMENT OF
ENVIRONMENTAL CONSERVATION

LESSONS LEARNED / CHALLENGES

CONTACT

Derek Nichols,
djn2@buffalo.edu

DOWNLOAD RESOURCES HERE:

https://tinyurl.com/SBRGHG

J. Willems Ransom
Senior Designer, McCallum Sather


mcCallumSather
ARCHITECTURE ENGINEERING INTERIORS

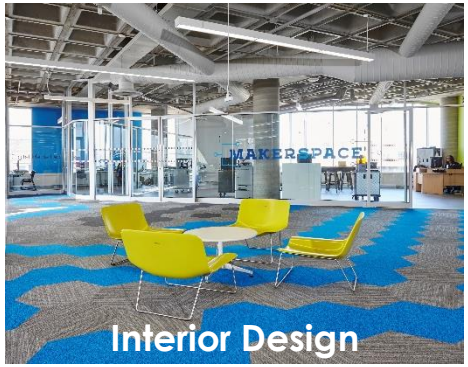
Mission

Advancing sustainable design intelligence

Vision

Transforming design to create a more resilient world

mcCallumSather



The Joyce Centre

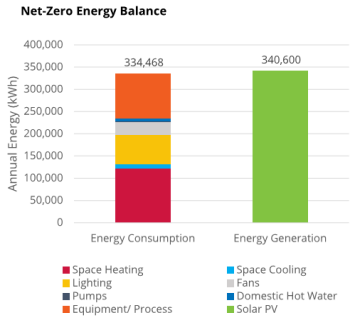
- Largest institutional, Zero Carbon building in Canada
- 96,000-square-foot, solar-powered, state-of-the-art research, learning and lab facility
- Modular, future-proofed furniture and spaces that adapt to change

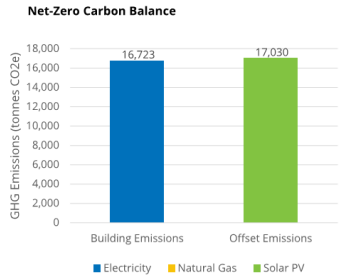
Endress+Hauser

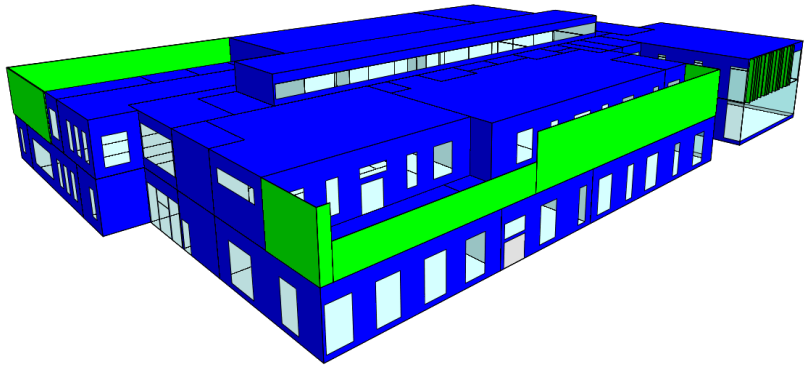
- Institutional projects inspire/catalyst for private industry
- Net Zero Energy, Zero Carbon, LEED Gold
- Natural light, control, comfort, accessibility
- Science on display

Endress+Hauser

- Geothermal
- Heat pump
- DOAS
- Solar panels
- EUI targets
- Interactive dashboards







MacNaughton Building

- Two phase lab renovation
- New HVAC & plumbing
- Provision of 58 low-flow variable volume fume hoods
- New major mechanical equipment

energy and emissions reductions

$96,756
energy cost savings

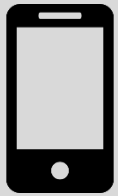
311 tCO2e
estimated greenhouse gas emissions per year

CO2 emissions from

37.2

homes' energy use for one year

CO2 emissions from



40 million

smartphones charged

CO2 emissions from

339,993

pounds of coal burned

GHG emissions from

760,391

miles driven by an average car

GHG emissions avoided by

13,570

trash bags of waste recycled instead of landfilled

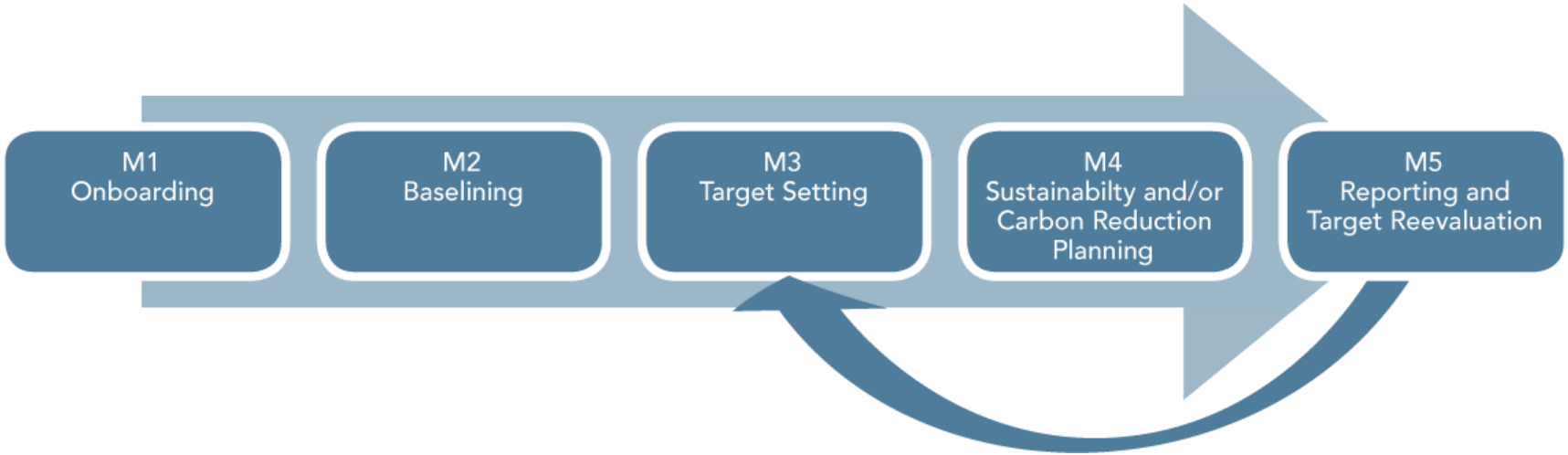
Carbon sequestered by

5,142

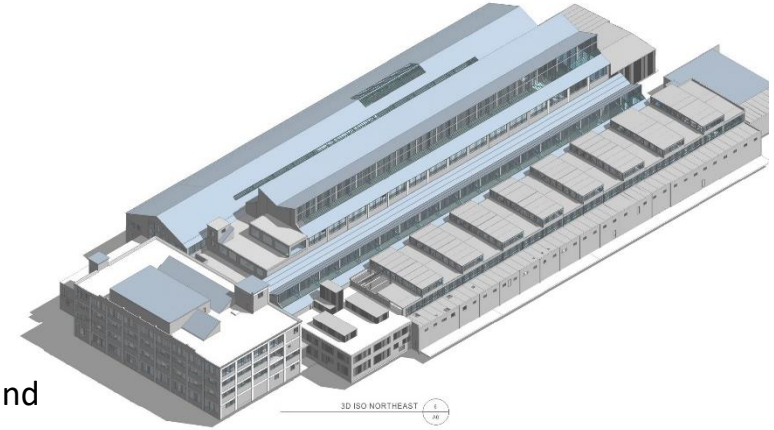
tree seedlings grown for 10 years

Choluteca Bridge - 1930

New Choluteca Bridge - 1997


M1
Onboarding
M2
Baselining
M3
Target Setting
M4
Sustainabilty and/or
Carbon Reduction
Planning
M5
Reporting and
Target Reevaluation

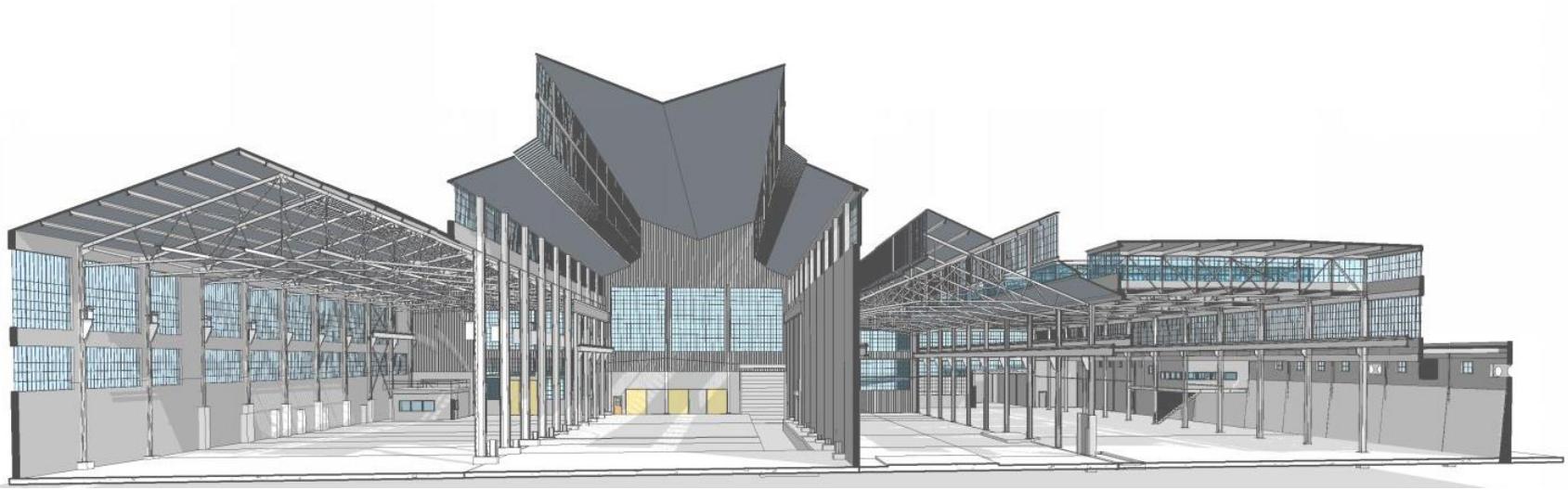
LCA LIFE CYCLE ASSESSMENT METHODS



LCA standards ISO 14040-14044, ISO 21930:2017,
ISO 21931:2010, EN 15804:2012, and EN 15978:2011

GaBi databases and modeling principles

LCA database that combines material attributes, assembly details, and architectural specifications with environmental impact data

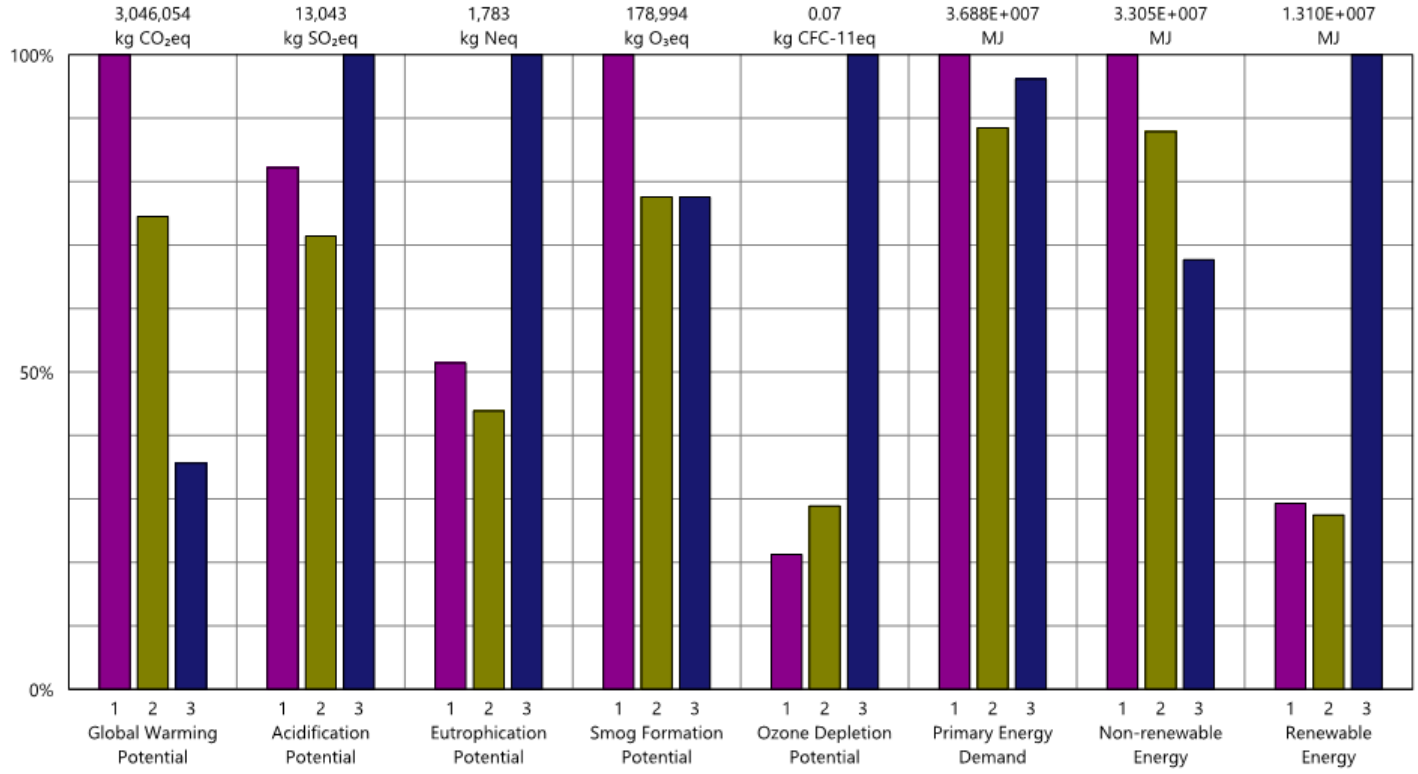


LCA - ENVIRONMENTAL IMPACT CATEGORIES

1. **Acidification Potential (AP) kg SO_2eq**
    1. A measure of emissions that cause acidifying effects to the environment.
2. **Eutrophication Potential (EP) kg Neq**
    1. A measure of macronutrients (nitrogen (N) and phosphorus (P)
3. **Global Warming Potential (GWP) kg CO_2eq**
    1. A measure of greenhouse gas emissions
4. **Ozone Depletion Potential (ODP) kg CFC-11eq**
    1. A measure of air emissions that contribute to the depletion of the stratospheric ozone layer
5. **Smog Formation Potential (SFP) kg O_3eq**
    1. A measure of ground level ozone, caused by various chemical reactions between nitrogen oxides (NO_x) and volatile organic compounds (VOCs) in sunlight.
6. **Primary Energy Demand (PED) MJ (lower heating value)**
    1. A measure of the total amount of primary energy extracted from the earth.
7. **Non-Renewable Energy Demand MJ (lower heating value)**
    1. A measure of the energy extracted from non-renewable resources (e.g. petroleum, natural gas, etc.)
8. **Renewable Energy Demand MJ (lower heating value)**
    1. A measure of the energy extracted from renewable resources (e.g. hydropower, wind energy, solar power, etc.)

LIFE CYCLE STAGES

PRODUCT	CONSTRUCTION	USE	END-OF-LIFE	MODULE D
A1. Extraction **A2. Transport (to factory)** **A3. Manufacturing**	**A4. Transport (to site)** ***A5. Construction Installation***	B1. Use **B2. Maintenance** **B3. Repair** **B4. Replacement** **B5. Refurbishment** ***B6. Operational energy*** B7. Operational water	C1. Demolition **C2. Transport (to disposal)** **C3. Waste processing** **C4. Disposal**	**D. Benefits and loads beyond the system boundary from:** **1. Reuse** **2. Recycling** **3. Energy recovery**

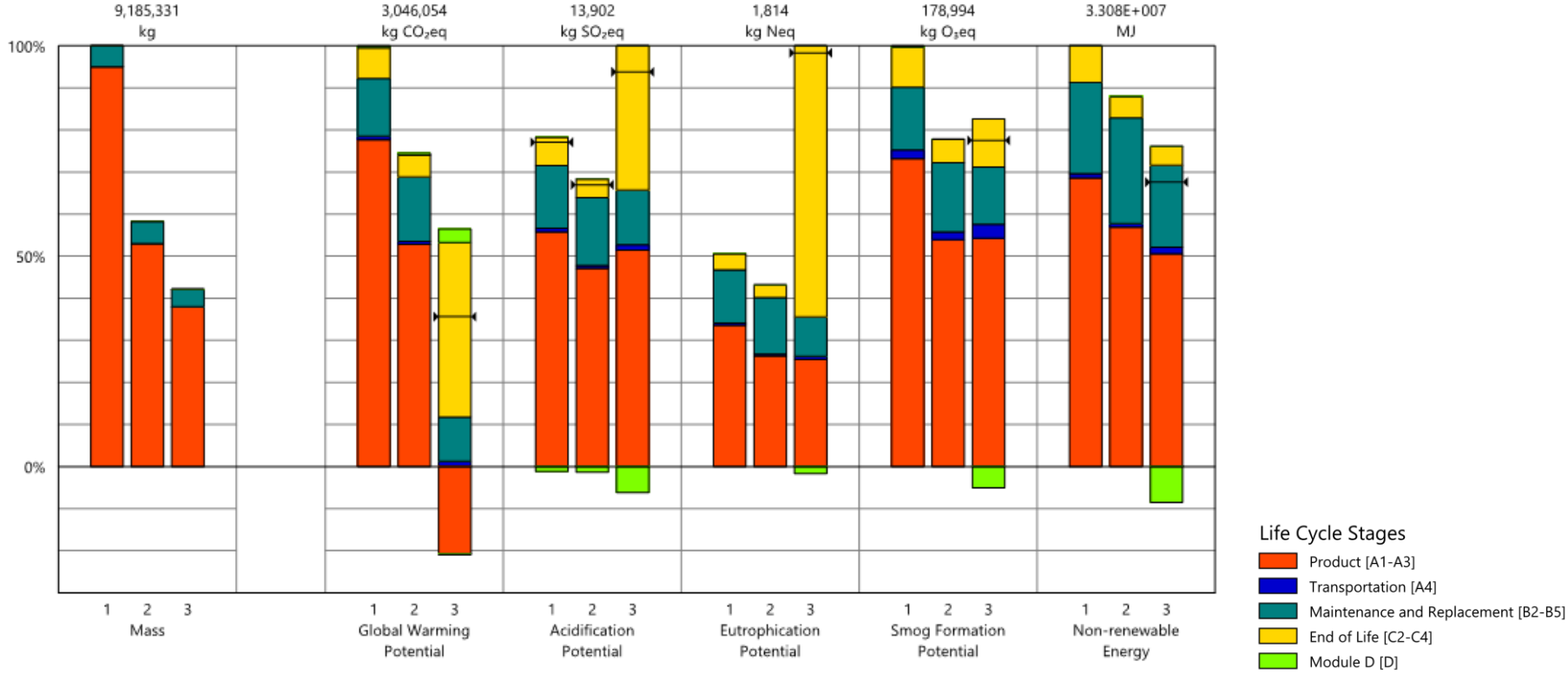


Legend

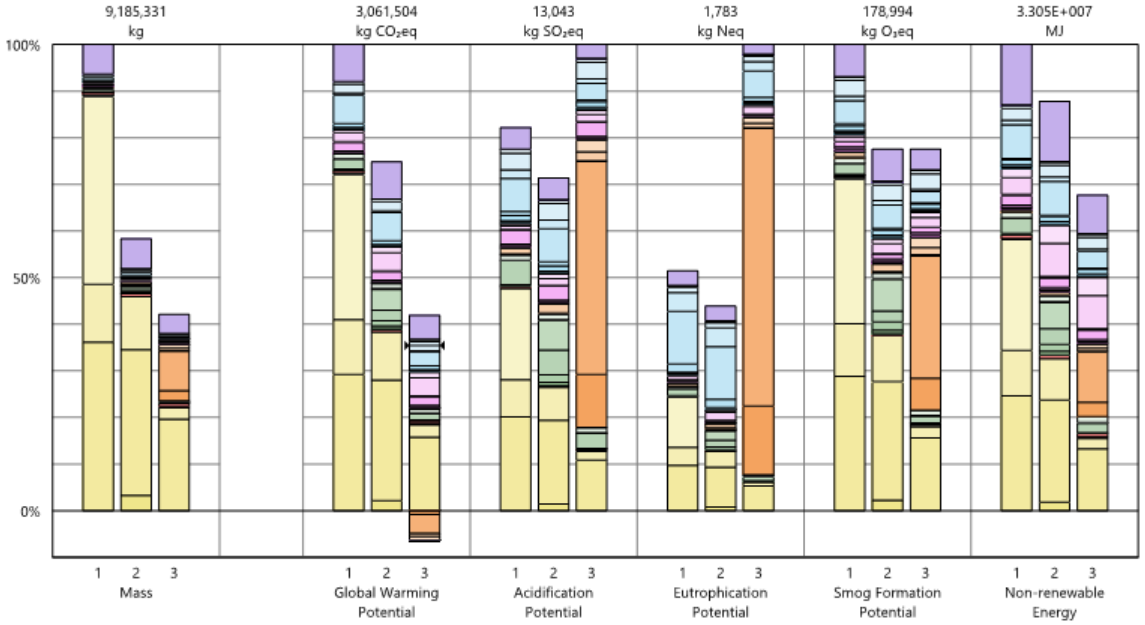
Design Options

- CONCRETE
- STEEL
- WOOD

Results by LIFE CYCLE STAGES



Results by DIVISION



03 - Concrete
- Cast-in-place concrete, structural concrete, 2501-3000 psi
- Cast-in-place concrete, structural concrete, 3001-4000 psi
- Cast-in-place concrete, structural concrete, 4001-5000 psi
- Precast concrete slab
- Stair, precast single run (stretcher)

04 - Masonry
- Brick

05 - Metals
- Aluminum, round tube
- Stair, steel plate
- Steel, 2L-section
- Steel, C-stud metal framing
- Steel, C-stud metal framing with insulation
- Steel, deck
- Steel, furring channel
- Steel, HSS section
- Steel, sheet, carbon steel
- Steel, W section (wide flange shape)

06 - Wood/Plastics/Composites
- Cross laminated timber (CLT)
- Glue laminated timber (Glulam)
- Ornamental wood
- Plywood, exterior grade
- Plywood, interior grade
- Wood framing

07 - Thermal and Moisture Protection
- Aluminum siding
- Asphalt felt sheet
- Metal wall panels, plate
- Mineral wool, board, generic
- Polyethelene sheet vapor barrier (HDPE)
- Polyurethane (PUR), board
- SBS modified bitumen, sheet

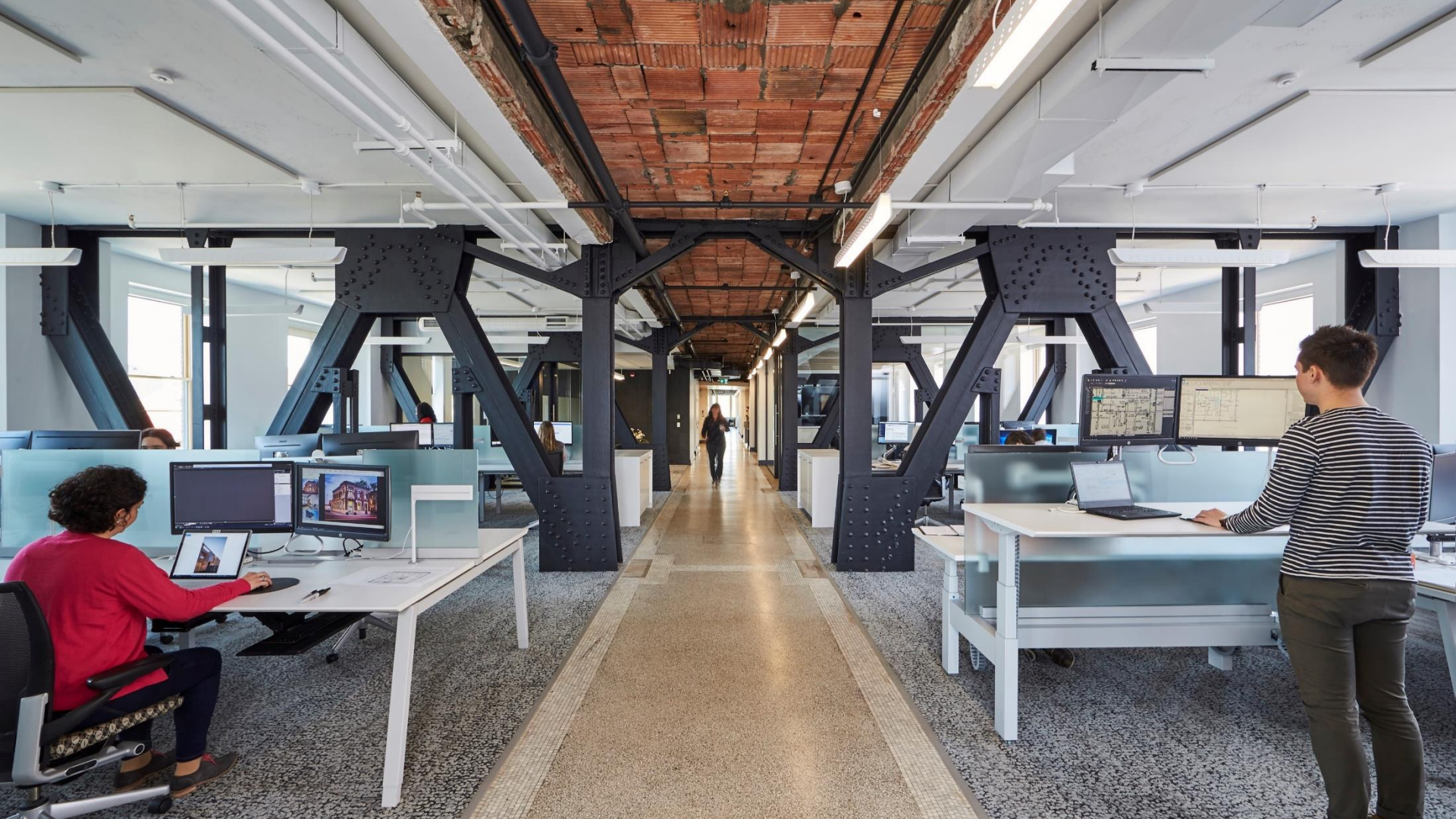
08 - Openings and Glazing
- Aluminum mullion system
- Aluminum mullion, inclusive of finish
- Curtainwall System (including glazing)
- Door, exterior, glass
- Door, exterior, wood, solid core
- Door, interior, steel
- Door, interior, wood, MDF core, flush
- Glazing, double pane IGU
- Post or guard rail, laminated glass

09 - Finishes
- Flooring, engineered wood plank
- Wall board, gypsum


Catharine St N

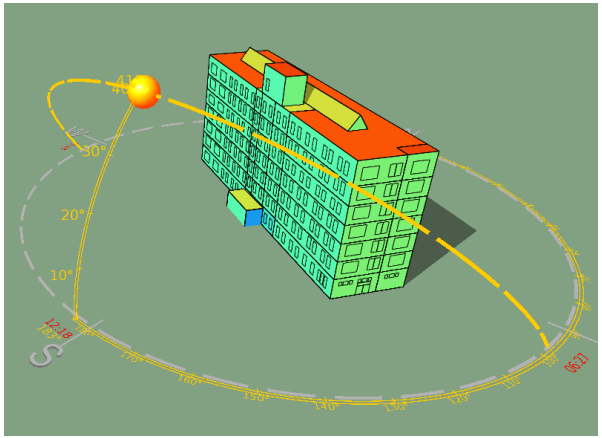
Westinghouse HQ


CAUTION
CAUTION
CAUTION
CAUTION
CAUTION
CAUTION

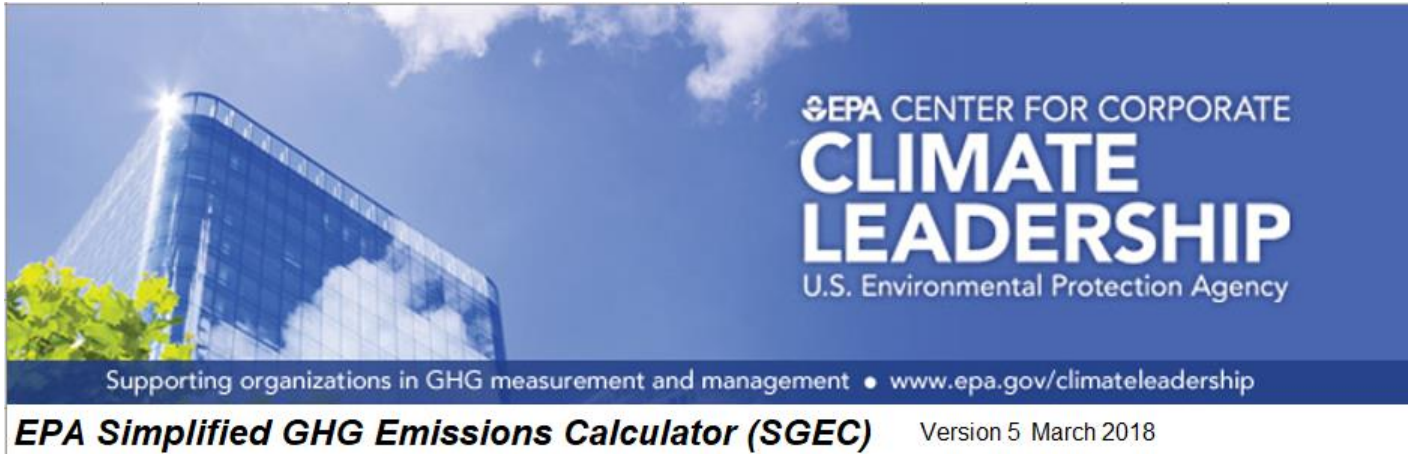


Westinghouse HQ

- With RDH we completed an Energy Consumption, Cost and Net Present Value Analysis Report
- Heat pumps
- DOAS
- Net zero ready



Assessment Methods



GRI Empowering Sustainable Decisions

Western New York
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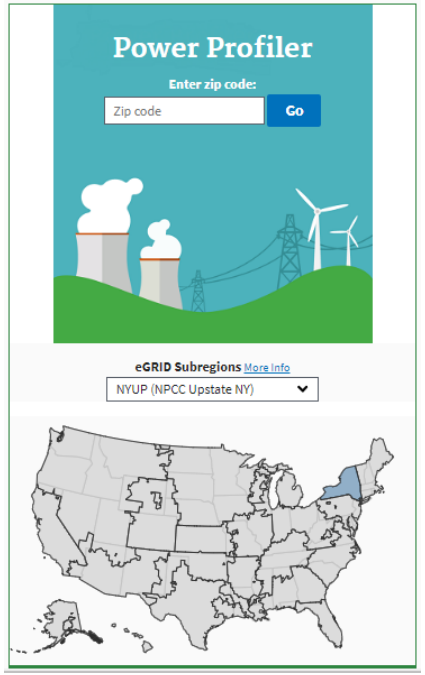
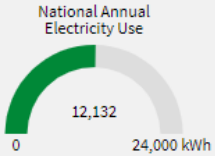
Operational

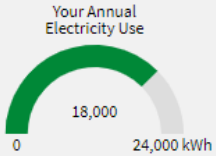
Boundary

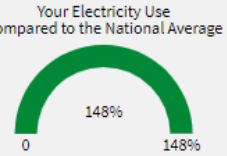
Energy – Transportation – Waste

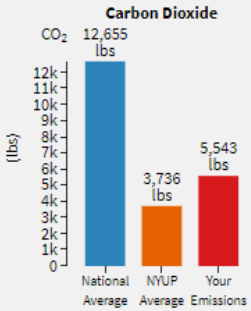
	Energy	Transportation	Waste
Direct	-Stationary Combustion -Refrigeration -Electricity -Steam (Purchased)	Vehicles that fall within your organizational boundary - cars, trucks, propane forklifts, aircraft, boats. Only vehicles owned or leased by your organization are typically included	Fire Suppression Purchased Gases – Industrial gases used in manufacturing Waste Gases – Flare gases
Indirect	Data Centers – Cloud Computing Greenhouse gas offsets Onsite renewables	Travel for business using transportation other than owned or leased vehicles (e.g., commercial airline flights, rental cars, trains) Employees commute to work in personal vehicles or use public transportation	Waste Recycling Compost

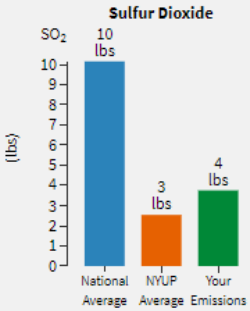


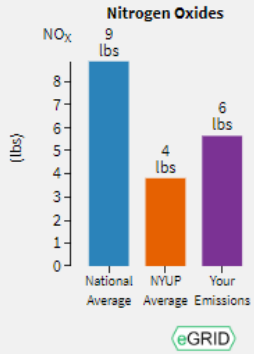




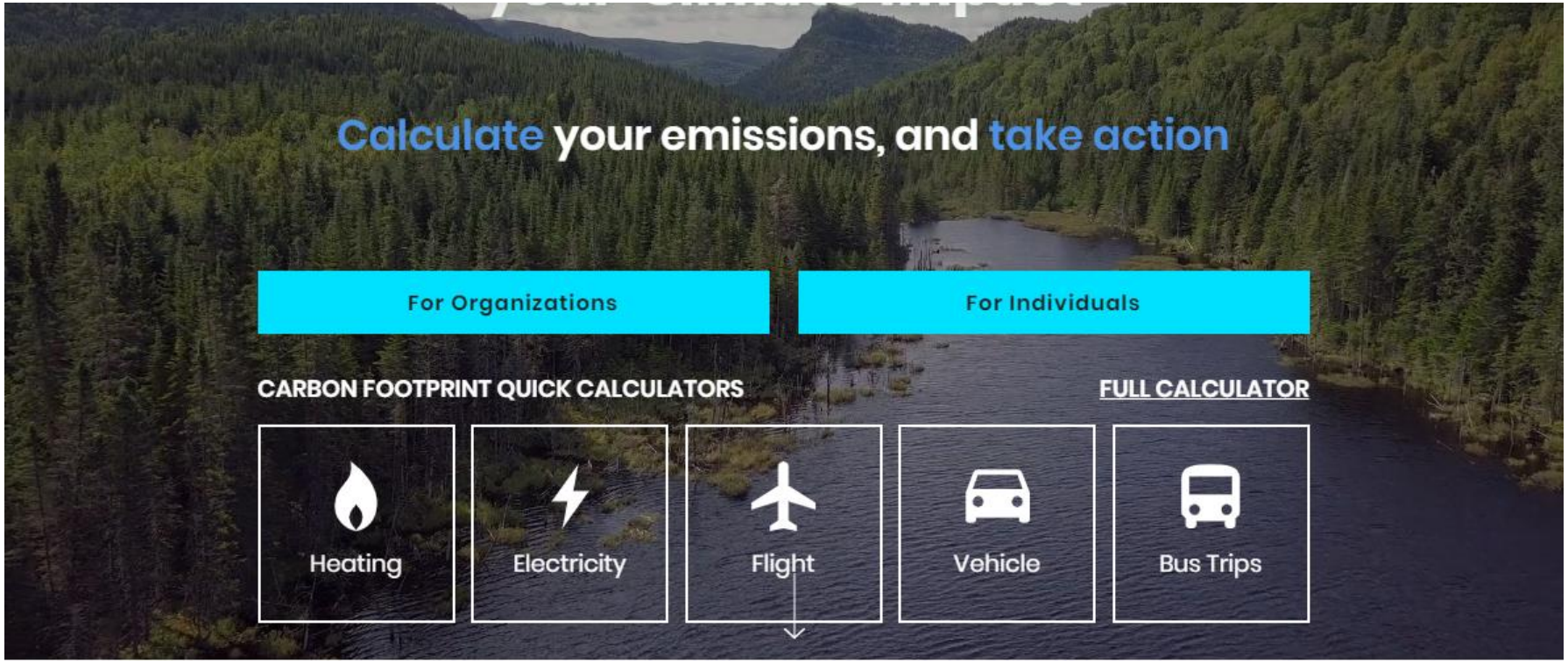




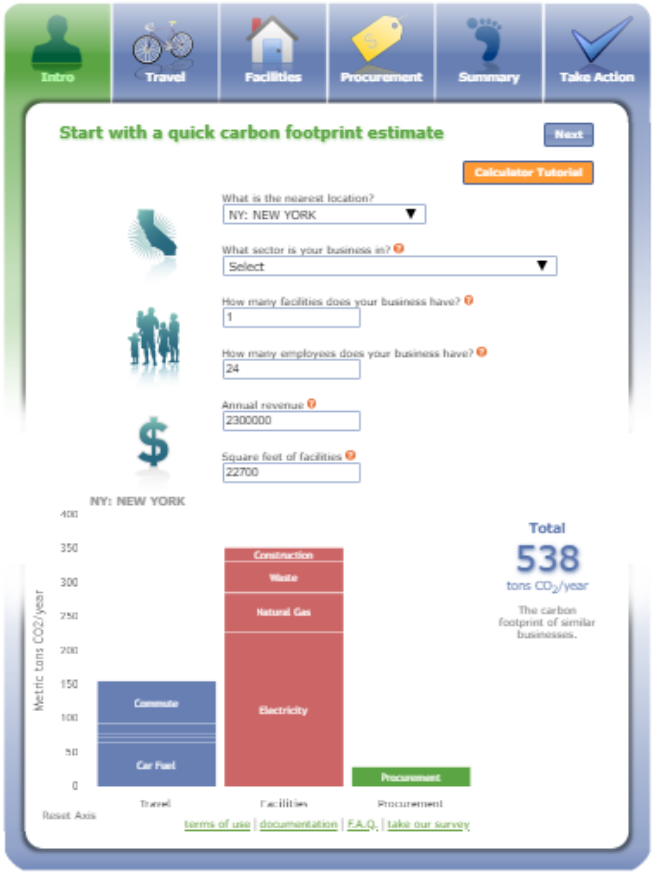




https://www.epa.gov/energy/power-profiler#/NYUP



https://www.carbonzero.ca/



https://coolclimate.berkeley.edu/calculator

Average Footprint

3mT per employee / year

McCallumSather averaged 117mT per year – average

(On average individuals average 18mT per person / year)

https://www.terrapass.com/about-us/newsletter

Direct vs Indirect Sources

Direct 20%

Office Power and Heat

AC and Refrigeration

Fire Suppression

Mobile Devices

Waste

Recycling

2018 Direct - 18 Tonnes CO2e

Indirect 80%

Work From Home

Personnel Cell Phones

Employee Commuting

Business Travel

Data ?

Transportation – 39 employees surveyed

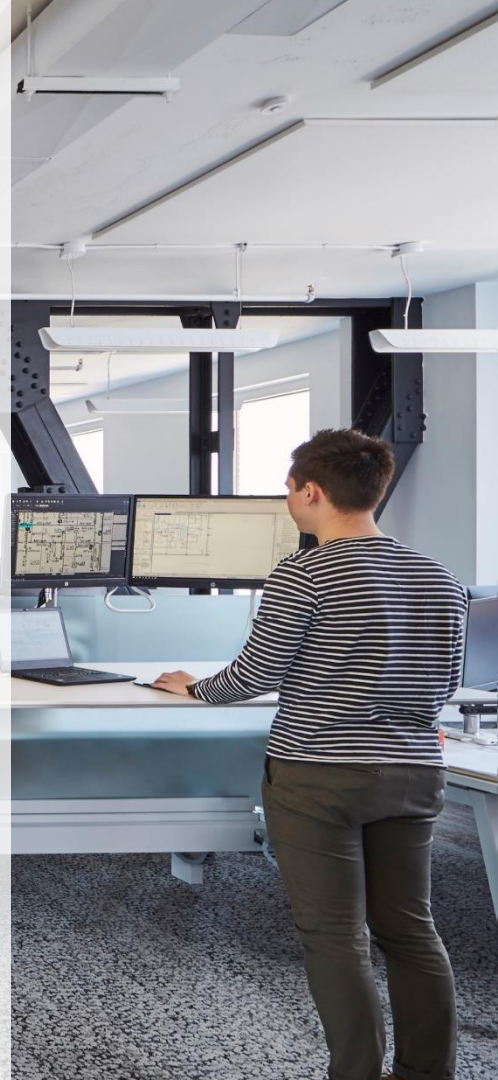
Average of 740 L of gas per employee per year
2.96 L of gas per employee per day (Based on 250 working days a year)

2018 - 28,864.19 L or **67.8 Tonnes CO2e**
2019 - 40,700.00 L or **93.56 Tonnes CO2e**

Data

- Monitors
- Laptops,
- Connectivity Hardware

- Bandwidth – Send Receive
- Compute – Data Processing
- Storage – Flash Data Array – Active not Latent
- Connectivity– Network at Datacenter

Thank you and stay in touch!

www.mccallumsather.com


Discussion

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Thanks for coming!

www.wnysustainablebusiness.org