

CITY OF OTTAWA BUSINESS ENERGY AND EMISSIONS PROFILE (BEEP)

PREPARED FOR ENVIROCENTRE

JUNE 1, 2017





climatesmart

Empowering businesses to reduce carbon emissions and cut costs.

Climate Smart Businesses Inc. is a social enterprise that provides a training and certification program for businesses to measure their carbon emissions, identify opportunities for cost, energy, and carbon savings, and communicate their efforts internally and externally.

We work not as consultants, but as teachers, using a capacity-building curriculum, top-rated software tool, and one-on-one client support. Businesses and organizations renew their Climate Smart certification by measuring their carbon emissions annually to track progress toward reducing emissions and add to their reduction plans. Individuals coming through our training learn to measure, analyze and reduce their company's impact: key skills in the emerging green economy.

Using our growing set of data, Climate Smart develops reports, case studies and analysis for community emission modeling, utilized by both local governments and businesses to benchmark their progress against emission and cost-saving goals and amongst their peers.



Climate Smart business training session (photo credit: Climate Smart)

850+

Climate Smart businesses to date (trained or in training)

11%

average carbon reductions achieved after 3 years of Climate Smart certification

2,012,000

total emissions measured by Climate Smart to date (tonnes CO₂e)

\$397

projected cost savings to a business, per tonne CO₂e reduced

30%+

GHG reduction achieved by year two by 20 top performing businesses

2.7%

average increase in staff over two years among Climate Smart businesses



envirocentre

Carbon 613 is our made-in-Ottawa, target-based sustainability program for business. The program is creating a network of like-minded businesses that are embedding sustainability into their operations and gaining a competitive advantage. All members commit to tracking their carbon emissions and to setting a reduction target within 3 years of joining the program. They then get the support they need to measure and reduce their company's carbon footprint, including education, one-on-one coaching, tools and resources. Carbon 613 members are recognized as sustainability leaders in the National Capital Region. Together we are demonstrating that sustainability is in business' best interest.

Carbon 613 is a program of EnviroCentre. EnviroCentre is a local environmental non-profit which brings environmental change to life by offering people, organizations and communities across Ottawa and the province practical solutions to lighten their environmental impact in lasting ways. For more information, please visit <http://envirocentre.ca>.



EnviroCentre gratefully acknowledges the financial support received from the City of Ottawa's Energy Evolution Catalyst Projects Program in order to complete this BEEP analysis.

EXECUTIVE SUMMARY

This City of Ottawa Business Energy and Emissions Profile (BEEP) provides a unique view of the business sector greenhouse gas (GHG) emissions by industry and highlights the areas with greatest potential for achieving reductions. This report is accompanied by an interactive dashboard that allows for deeper data exploration by industry sector, emitting activity, geography, and business size: <http://bit.ly/OttawaBEEPDashboard>.

By creating an emissions projection, this BEEP can help city staff and on the ground partners better understand and engage their local businesses in the transition to a clean innovation economy. The sector profile approach offers an industry sector lens on community-wide emissions. We hope this will serve to inform planning around emissions/energy reduction projects and business engagement programs.

Emissions data for sectors which are required to publically report their emissions is included in separate sections of this report. This includes large emitters reporting to Environment Canada as well as the broader public sector – hospitals, post-secondary institutions, school boards, etc.

An additional 3,981 businesses were not included because of insufficient industry data to accurately project their emissions profiles. We hope to include these industries in subsequent versions of this report as data becomes available.

The Ottawa BEEP covers 71% of businesses and organizations in the municipality from thirteen North American Industry Classification System (NAICS) sectors. These businesses have **324,000** employees and are projected to be responsible for **1,281,000** tonnes of carbon dioxide equivalent (CO₂e) emissions annually from electricity, natural gas, transportation (company-owned, leased vehicles and fleets), and waste.

In addition to these four key sources, businesses generate emissions from other activities such as reimbursed mileage, staff commuting, paper use, refrigerant use, and third party shipping. If we include these activities in the estimate, we project that **2,135,000** tonnes of CO₂e could be managed and reduced by city of Ottawa businesses.*

The table below highlights, in descending order, the largest sectors by the number of businesses, by total emissions, and by emissions per business.

Rank	By number of businesses	By emissions	By emissions per business
1	Office-Based Businesses (NAICS 51-55)	Accommodation and Food Services (NAICS 72)	Manufacturing (Metal Products, Machinery, Electrical Equipment) (NAICS 33)
2	Retail Trade (NAICS 44-45)	Construction (NAICS 23)	Accommodation and Food Services (NAICS 72)
3	Construction (NAICS 23)	Office-Based Businesses (NAICS 51-55)	Manufacturing (Food, Beverage, Textiles, Clothing) (NAICS 31)

Transportation and natural gas are the top two emission sources projected for the business community. The top three highest emitting sectors are Accommodation and Food Services, Construction, and Office-Based Businesses. Combined, these three sectors account for **60%** of business emissions (765,000 tonnes of CO₂e).

Accommodation and Food Services represent 37% of natural gas emissions, with the next highest natural gas emitting sector being Office-Based Businesses (23%).

The highest proportion of transportation emissions (36%) are attributed to the Construction sector, followed by Administrative and Support, Waste Management and Remediation Services (25%). The Construction sector generates 47% of the waste, with Retail Trade accounting for 19% of waste. The largest consumers of electricity are Retail Trade (33%) and Office-based Businesses (23%).

* Based on the proportion of these additional activities in the Climate Smart dataset to date. See "Importance of Emissions Beyond Electricity, Natural Gas, Transportation, and Waste" section below for more details.

// EXECUTIVE SUMMARY

In addition to emission projections, this report highlights the motivations for businesses to take on carbon management after the first year of GHG measurement with Climate Smart. In recent years, more businesses cite “anticipating future requirements”, “existing requirements”, and “customer/investor/partner demand” alongside the common motives of marketing and cost cutting. This trend is especially strong for the Construction sector, with 29% of businesses citing “anticipating future requirements” as a reason to participate. As more municipalities align their procurement policies to reward emissions management, more businesses will be motivated to take action on their emissions in order to stay competitive.

A summary of reduction strategies implemented by businesses after the first year of measurement is presented for each sector. Most sectors include a case study highlighting success stories of businesses achieving notable emission and cost reductions. Businesses tackle multiple reduction strategies at the same time and they prioritize them differently by sector. For example, data shows that Construction sector businesses pursue waste diversion, driver behaviour change, and sustainable building practices to reduce emissions. The Accommodation and Food Services sector prioritizes diverting waste, conserving electricity by upgrading equipment, and behaviour change campaigns. Office-based businesses are reducing paper use and exploring alternatives for staff commuting.

When considering business engagement approaches, it is helpful to know not only the total emissions generated by a given sector, but also the average per business emissions. “A View of Emissions per Business” section of this report highlights that the Manufacturing, Accommodation and Food Services sectors that have the highest average emissions per business in Ottawa.

Businesses are a key part of the transition to a prosperous clean innovation economy. On average, Climate Smart-certified businesses achieve an emission reduction of 11% by their third greenhouse gas inventory while growing their business (with top-performing businesses achieving a reduction of over 30% by year two). If one third of businesses profiled in this report were to achieve a 30% reduction in emissions, this would translate into 128,000 tonnes of CO₂e reduced. This is equivalent to removing 26,000 passenger vehicles off the road. This emissions reduction also represents cost savings of over \$50 million to these businesses.* These savings have been and could continue to be reinvested in hiring more people, expanding into other markets, or investing in additional clean innovation initiatives.

We hope that this report will assist in better understanding how to strategically engage businesses and help meet emission reduction goals.

* based on average Climate Smart business savings of \$397 per tonne of CO₂e reduced. See Climate Smart's 2012 report *Beyond Big: Small Businesses, Greenhouse Gases, and Competitive Advantage* for more details.

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INTRODUCTION

WHAT IS A BEEP?

A Business Energy and Emissions Profile (BEEP) is an analysis of the emissions produced and energy consumed by the City of Ottawa business community. A BEEP estimates emissions generated by various industry sectors within Ottawa's economy, and highlights the opportunities for business engagement and emissions reductions. Within each industry sector, emissions are broken down into the four key activities—electricity and natural gas use in buildings, on-road transportation, and waste.

This allows for comparison between sectors and activity types, informing planning around emissions and energy reduction projects and business engagement programs. In addition, a BEEP analysis can serve as a foundation for data-driven communication pieces to facilitate engagement of local business communities and stakeholders. For more information about the BEEPs, visit beep.eco.

CONTEXT FOR BEEP

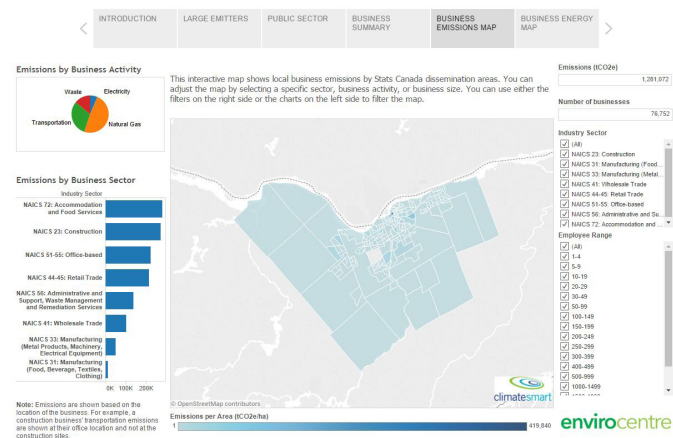
The first BEEP reports were produced in BC, where Community Energy and Emissions Inventory (CEEI) reports provide local governments with community-wide data on building energy use, transportation, waste, and associated GHG emissions. CEEIs support policy direction and target setting around GHG reductions as mandated by the Local Government (Green Communities) Statutes Amendment Act (Bill 27, 2008). CEEI reports provide high-level information on community energy and emissions; however, they do not provide resolution into business sector emissions.

The BEEP was first developed in partnership with the BC Climate Action Secretariat and the City of Victoria in 2013 as a reporting framework to augment municipal emissions data provided by CEEI or a community's own reporting. This profile is generated from Climate Smart's growing business emissions database along with local business demographic data to create an estimated profile of emissions generated by the key sectors in the business community. In 2016 the BEEP was awarded MIT's Climate CoLab Grand Prize in Innovation.

Using Climate Smart's growing database of business data we are able to generate a projected inventory of city of Ottawa business emissions by industry sector.

Ottawa's large emitters and public sector emissions are presented separately in the report and are based on publically reported data. The private sector emissions are projected using Climate Smart's per employee sectoral emission intensities - see Methodology section for more details.

City of Ottawa Business Energy and Emissions Profile (BEEP) Dashboard



BEEP Digital Dashboard Screenshot

METHODOLOGY

For this analysis, Climate Smart utilizes the data from its growing pool of 620+ baseline inventories representing over 950,000 tonnes in CO₂e emissions.

The Climate Smart database is parsed by two-digit NAICS sectors. For each business sector, average per-employee intensities for electricity, natural gas use, transportation, and waste are applied across the total number of employees in each sector in the city of Ottawa. Climate Smart per-employee electricity and natural gas emission intensities are adjusted for the Ontario climate using factors derived from the Natural Resources Canada's Comprehensive Energy Use Database.

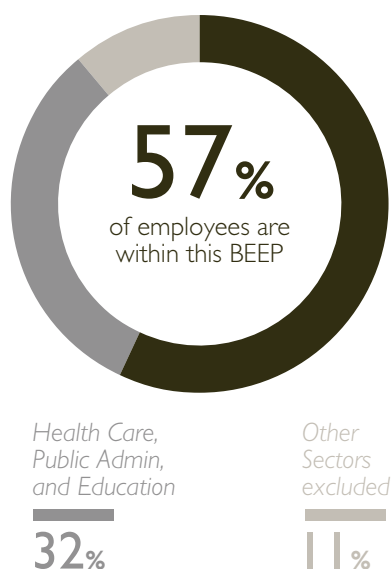
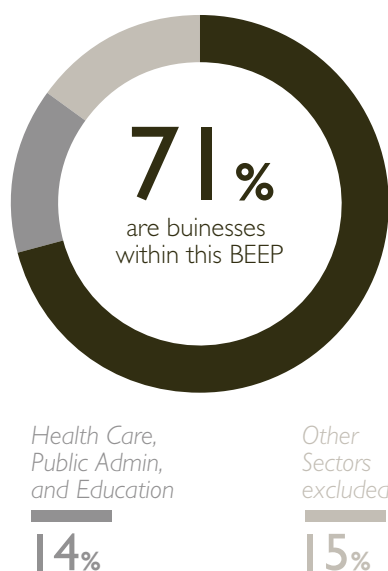
Sectors encompassing diverse operation types are further broken down into subsectors to improve accuracy. For example, for NAICS sector 72 (Accommodation and Food Services), per-employee averages are calculated separately for hotels, full-service restaurants, limited-service restaurants, and caterers.

Statistics Canada Business Register data as of December 2015 was used to calculate the total number of employees in each sector. Statistics Canada data presented business location counts for the city of Ottawa by six-digit NAICS. Business locations were broken down into employee size ranges (1-4, 5-9, 10-19 employees etc.) A midpoint of each range was used to estimate the number of employees. The words "business location" and "business" are used interchangeably in this report because in most cases they are equivalent. The self-employed category (locations with zero employees) was not included in this report's projections.

All projections are made in units of energy as well as in tonnes of CO₂e for electricity and natural gas. Emissions from electricity, natural gas and waste are calculated using the latest emission factors for Ontario based on Environment Canada's National Inventory Report (2016). Waste projections are made based on the weight of landfilled and incinerated waste reported by businesses, and are listed in tonnes of waste as well as tonnes of CO₂e.

Motivations for implementing carbon management and reduction strategies pursued after the first year of measurement are presented for each sector. These are based on the data collected from the Climate Smart businesses going through the program.

BUSINESS SECTORS INCLUDED IN THE BEEP



Businesses by NAICS Sector (2-digit)

	# of employees	# of businesses	average employees / business
44-45 Retail trade	69,153	3,464	21
54 Professional, scientific and technical services	54,406	5,547	10
72 Accommodation and food services	44,133	2,127	21
56 Administrative and support, waste management and remediation services	36,027	1,304	28
23 Construction	34,183	2,659	13
52 Finance and insurance	21,373	909	24
41 Wholesale trade	17,287	976	18
53 Real estate and rental and leasing	14,309	1,065	13
51 Information and cultural industries	14,231	444	32
33 Manufacturing	10,097	382	26
55 Management of companies and enterprises	7,169	195	37
31 Manufacturing	1,553	116	13
Total	323,917	19,188	17

The table above summarizes the city of Ottawa business data by sector and lists the sectors included in the projections made in this report. Note that while the business counts are exact, the number of employees are estimated using midpoints of employee size ranges provided in the business location counts (see Methodology section for more details). Businesses covered in this report represent 71% of all businesses and organizations in the region, and include 19,188 businesses employing an estimated 324,000 people.

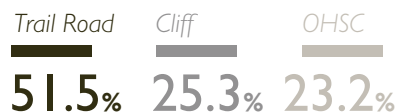
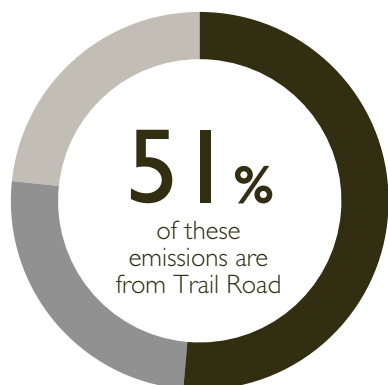
An additional 3,981 businesses were not included because of insufficient industry data to accurately project their emissions profiles. 2,717 of these businesses fall under NAICS code 81 – Other Services. The self-employed category was also not included in this report.

The sectors excluded from the analysis are Mining, Utilities, Transportation and Warehousing, Education, Health Care and Social Assistance, Arts, Entertainment, and Recreation, Public Administration, and Other Services. These sectors were excluded from the analysis due to limited Climate Smart data on these sectors.

As more data becomes available we hope to include additional industry sectors in subsequent versions of this report.

The top 3 sectors with the largest number of businesses are Office-Based Businesses (NAICS 51-55), Retail Trade (NAICS 44-45), and Construction (NAICS 23).

OTTAWA LARGE EMITTERS



171,961 total emissions from large emitters (tonnes CO₂e)

Large Emitters (2015 data)

Emissions
(tCO₂e)

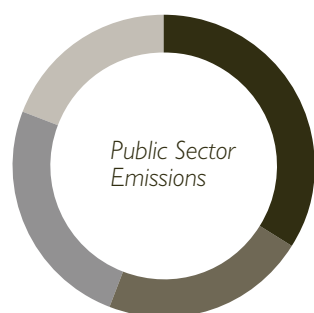
Trail Road Waste Facility – City of Ottawa	88,552
Cliff Temporary Central Heating and Cooling Plant – Public Works and Government Services Canada	43,551
Ottawa Health Sciences Centre (OHSC) Cogeneration Facility – TransAlta Generation Partnership	39,858

Total 171,961

There are three facilities in the City of Ottawa that report their emissions to Environment Canada under the Greenhouse Gas Reporting Program.

They are the Trail Road Waste Facility, Cliff Temporary Central Heating and Cooling Plant, and the Ottawa Health Sciences Centre (OHSC) Cogeneration Facility. In 2015, they collectively emitted 171,961 tonnes of CO₂e.

OTTAWA PUBLIC SECTOR



School Boards

19%

Post-secondary

25%

Hospital

34%

Municipal

22%

198,700

total emissions from the public sector (tonnes CO₂e)

Municipal Emissions (2014)

	Emissions (tCO ₂ e)	Proportion of Emissions
Equipment and Vehicle Repair/Storage	15,016	34%
Indoor Recreational Facilities	10,604	24%
Water and Sewage Treatment	6,401	14%
Community Centres	3,537	8%
Administrative Offices	3,499	7.9%
Fire Stations	1,996	4.5%
Cultural Facilities	1,061	2.4%
Police Stations	1,041	2.3%
Public Libraries	920	2.1%
Parking Facilities	160	0.4%
Ambulance Stations	99	0.2%
Total Municipal Emissions	44,333	100%

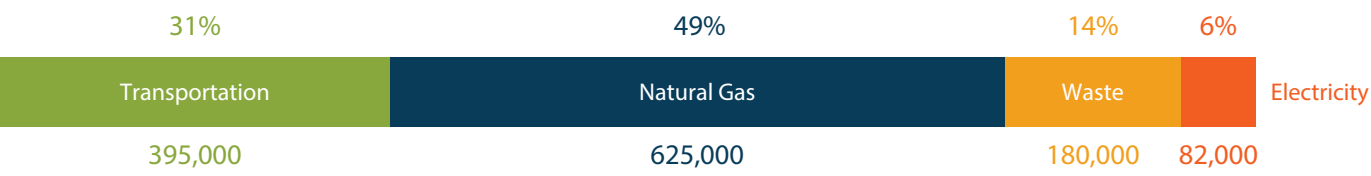
In Ontario, Broader Public Sector (BPS) organizations are required to report their energy use and greenhouse gas emissions annually to the Ministry of Energy. BPS organizations that are required to report include municipalities, municipal service boards, school boards, universities, colleges, and hospitals.

In Ottawa, these BPS organizations are responsible for **198,700 tonnes of CO₂e** (based on 2014 reporting data). These emissions break down as follows:

Municipal Emissions: 44,333 tCO₂e
Post-Secondary: 49,907 tCO₂e
Public Hospitals: 66,563 tCO₂e
School Board: 37,898 tCO₂e

More detailed municipal emissions data is shown in the table above. Equipment and Vehicle Repair/Storage represent the largest source of emissions (34% of municipal emissions) followed by Indoor Recreational Facilities (24%), Water and Sewage Treatment (14%) and Community Centres (8%).

BUSINESS EMISSIONS PROJECTION



1,281,000 total BEEP-
projected emissions
(tonnes CO₂e)

The largest projected emission source for businesses in this report is natural gas. It accounts for an estimated 625,000 tonnes of emissions (49% of total emissions). This includes natural gas used for space and water heating, as well as process heat (e.g. breweries, coffee roasters, cooking equipment in restaurants, etc.)

The second largest projected emission source for businesses in this BEEP is transportation. It accounts for an estimated 395,000 tonnes of emissions (31%). These emissions include only company vehicles and equipment, and do not account for other transportation emissions indirectly attributed to businesses, such as reimbursed business travel in personal vehicles, staff commuting, and third-party shipping.

Waste comprises a smaller portion (14%) of emissions, and accounts for 180,000 tonnes of CO₂e. Projections in base units (tonnes of waste) are also presented under each sector as well as in the summary table in the Appendix.

Electricity used by businesses in the city of Ottawa is projected to account for 82,000 tonnes of emissions: about 6% of the total emissions projected. Note that electricity represents a relatively small proportion of emissions because the makeup of the electricity grid in Ontario is comprised largely of nuclear and hydroelectric generation which is less carbon intensive than other provinces who rely on a greater proportion of fossil fuels to generate electricity.

IMPORTANCE OF EMISSIONS BEYOND ELECTRICITY, NATURAL GAS, TRANSPORTATION, AND WASTE

1,281,000

total BEEP
projected emissions
(tonnes CO₂e)

~2,135,000

total emissions potentially
under management by
BEEP businesses in Ottawa
(tonnes CO₂e)

It is important to acknowledge that business emissions projections in this report measure only company fleets, electricity, natural gas, and waste generated by businesses. These are large emission sources for many organizations, however, the impact of business operations goes beyond these figures and includes emissions that result from the use of personal vehicles for business, staff commuting, use of refrigerants, third-party shipping, business travel, paper use, product use, and other activities that are part of day-to-day business operations. For many businesses in the Climate Smart dataset, these additional emissions are greater than company fleet, electricity, natural gas, and waste emissions combined.

For example, if we take the median per employee staff commuting emissions of 0.72 tonnes from the Climate Smart dataset and apply this figure to the 324,000 people employed by BEEP businesses in the city of Ottawa, we will arrive at projected 233,280 tonnes in staff commuting emissions.*

In addition, many businesses provide services or deliver goods that influence community's emissions beyond business operations. Examples of this include construction companies, lighting and heating contractors and equipment distributors, car dealerships, and others. Climate Smart businesses implement strategies that will affect not just their direct business emissions, but community emissions overall. For example, Solus Décor – a Vancouver outdoor fire pit manufacturer – replaced

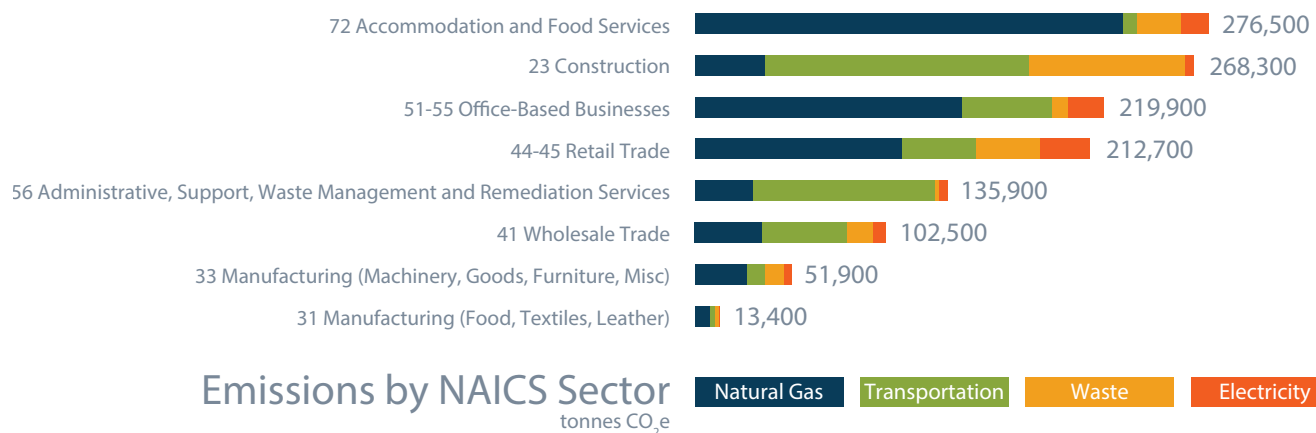
wooden crates with recycled cardboard to reduce the weight of their shipments and shipping emissions. These cardboard crates are easily recycled while wooden crates would often end up in the landfill. Miles Industries, a North Vancouver fireplace manufacturer, has developed a pilot light system with a timed shut-off that is projected to reduce GHGs associated with the use of their product by 1,165 tonnes.

The impact of businesses in the community goes well beyond the fleets and buildings they operate. This highlights the importance of engaging businesses in the community's emissions reduction efforts as partners in building a more efficient, cleaner economy.

Of the total emissions measured by Climate Smart to date, the BEEP activities – electricity, heat, scope 1 transportation (e.g. company-owned vehicles and fleets), and waste – comprise 60% of emissions measured, with the other activities accounting for a significant portion (40%) of emissions measured to date. If we add this 40% to the total of 1,281,000 tonnes of emissions projected above, we arrive at an additional estimate of 854,000 tonnes of emissions that could be measured and managed by Ottawa businesses, leading to a total of 2,135,000 tonnes.

* Note that this number is meant to illustrate the scale, rather than create an estimate, of the staff commuting emissions for Ottawa businesses.

EMISSIONS SUMMARY BY INDUSTRY SECTOR

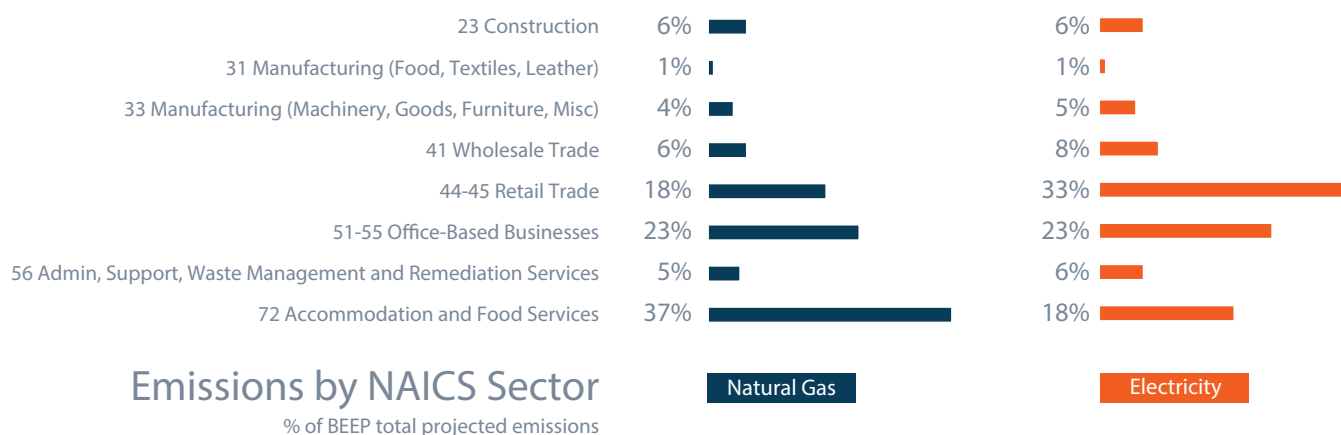


This chart summarizes emissions for each sector by source: electricity, natural gas, transportation, and waste. The top three emission generating sectors are Accommodation and Food Services (276,500 tonnes of CO₂e), Construction (268,300 tonnes of CO₂e), and Office-Based Businesses (219,900 tonnes of CO₂e).

Combined, these three sectors account for 60% of emissions projected in this BEEP. For the Construction sector, the highest emission source is transportation with waste being the next most significant emissions source. For the Accommodation and Food Services sector, the key emission source is natural gas used for cooking as well as space and water heating. For Office-Based Businesses, natural gas is the highest emissions source, accounting for more than half of Office-Based emissions.

Each sector is described in more detail below, starting with the highest emitting sector - Accommodation and Food Services.

// EMISSIONS SUMMARY BY INDUSTRY SECTOR



NATURAL GAS

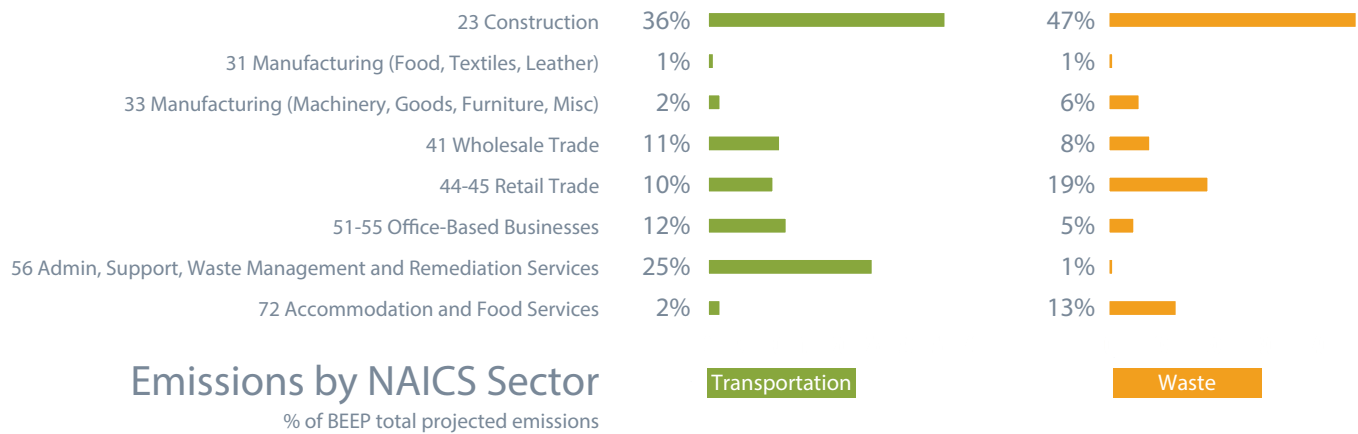
Natural gas emissions from businesses in this BEEP are projected to account for 625,000 tonnes of CO₂e. 37% of these emissions are attributed to Accommodation and Food Services Sector. This includes natural gas used for food preparation, as well as space and water heating.

The second largest contributor to natural gas emissions are Office-Based Businesses at 23%. Although the natural gas emission intensity for Office-Based Businesses is relatively low, the large number of employees in this group of businesses leads to a significant emissions total. Retail Trade accounts for 18% of the total natural gas emissions for this BEEP.

ELECTRICITY

Emissions from electricity use in this BEEP are projected to account for 82,000 tonnes of CO₂e. This is a comparatively small amount due to the high proportion of low-carbon electricity generating sources on the Ontario electricity grid. The Retail Trade sector accounts for 33% of electricity use of all BEEP sectors. The second largest consumer of electricity is Office-Based Businesses, which account for 23% of the total electricity usage projected in the BEEP.

// EMISSIONS SUMMARY BY INDUSTRY SECTOR



TRANSPORTATION

Emissions from transportation in this BEEP are projected to account for 395,000 tonnes of CO₂e. The Construction Sector accounts for more than one-third of the total transportation emissions projected in the BEEP. The Administrative and Support, Waste Management and Remediation Services sector is projected to be the second largest transportation emitter at 25%, followed by Office-Based Businesses at 12%.

WASTE

The Construction sector generates almost half of the waste projected in the BEEP, and has the highest per employee waste generation across all sectors. Waste generated by Ottawa construction businesses is estimated at 75,000 tonnes.

Retail Trade is the second largest in terms of waste generation, and accounts for 19% of waste. The third largest waste generator is Accommodation and Food Services, accounting for 13% of waste in the BEEP.

A VIEW OF EMISSIONS PER BUSINESS



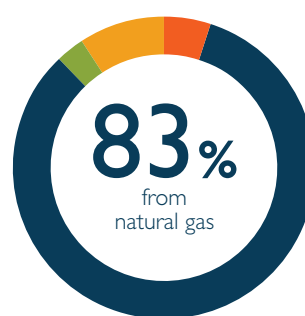
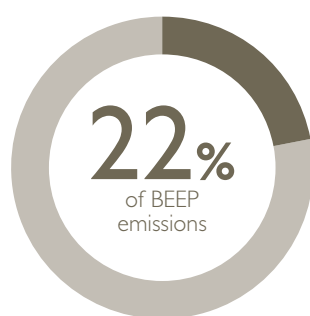
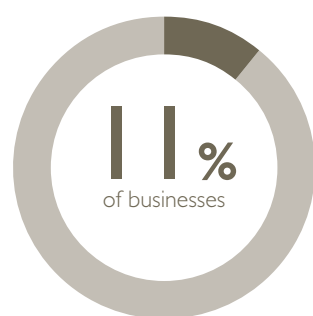
Emissions Per Business tonnes CO₂e

This chart presents the average emissions per business in each sector. The sector’s projected emissions are divided by the number of businesses to arrive at the average. The Manufacturing (Machinery, Goods, Furniture, Misc.) sector has the highest per business emissions (136 tonnes of CO₂e per business). 53% of emissions in this sector are projected to come from natural gas.

The Accommodation and Food Services sector has the second highest per business emissions, also with the majority (83%) coming from natural gas. The Food, Beverage, Textile, and Clothing Manufacturing sector has the third highest emissions per business (116 tonnes of CO₂e per business), also with the majority of emissions coming from natural gas. The natural gas used in these sectors is used for product processing and space and water heating.

NAICS 72: ACCOMMODATION AND FOOD SERVICES

SECTOR PROFILE



Sector Emissions Breakdown

Electricity	5%
Natural Gas	8%
Transportation	3%
Waste	9%

44,100 total employees

2,127 number of businesses

21 average business size (employees)

276,500 sector emissions (tonnes CO₂e)

4,512,000 natural gas usage (GJ)

363,037,000 electricity usage (kWh)

7,600 transportation emissions (tonnes CO₂e)

21,400 waste generated (tonnes)

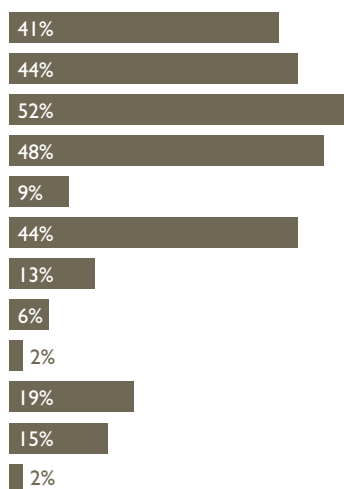
The Accommodation and Food Services sector accounts for 11% of businesses covered in this BEEP, and is the largest sector by generated emissions at 276,500 tonnes of CO₂e (22% of all BEEP sector emissions). It includes 2,127 businesses and employs 44,100 people in the city of Ottawa.

The Accommodation and Food Services sector is characterized by high natural gas emissions intensity, accounting for 230,000 tonnes of CO₂e of natural gas emissions. This is natural gas used for space and water heating, as well as food preparation.

The Accommodation and Food Services sector is composed of two large subsectors: Accommodation Services (NAICS 721) and Food Services and Drinking Places (NAICS 722). Food Services and Drinking Places represent 96% of the businesses and employees in the Accommodation and Food Services sector, with total emissions for this subsector estimated at 230,200 tonnes of CO₂e, or 83% of the total emissions from the Accommodation and Food Services sector.

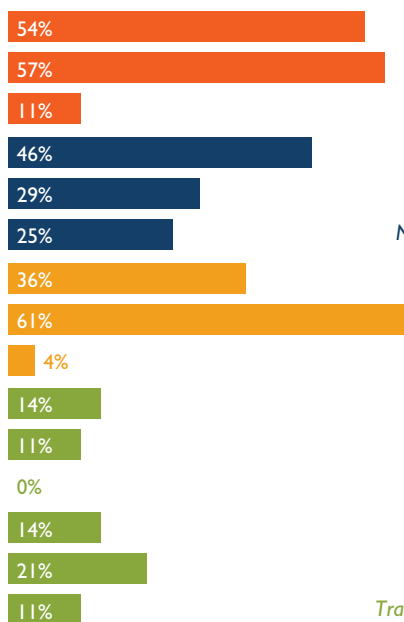
MOTIVATION AND REDUCTION STRATEGIES IMPLEMENTED AFTER FIRST YEAR OF MEASUREMENT

Marketing / reputation / brand image
Building on existing green initiatives
Cost-cutting / efficiency
Interest / personal motivation
Anticipating future requirements
Industry / community engagement
CSR mandate
Customer / investor / partner demand
Supply chain engagement
Networking / B2B opportunities
Employee retention
Other existing requirements



Motivations

Behaviour Change
Simple Equipment
Capital Equipment
Behaviour Change
Simple Equipment
Capital Equipment
Reduce Paper Use
Diverting Waste
Reduce Packaging Use
Driver Behaviour Change
Capital Replacement
Vehicle Fuel Switching
Reducing Business Travel
Alternative Staff Commuting
Targeting Third-Party Shipping



Reduction Strategies

Cutting costs appeared as the strongest driver for businesses in this sector to manage their carbon — over a half of businesses mentioned it as a reason for entering the Climate Smart program. Industry and community engagement, education, and expanding existing green initiatives are other strong drivers for businesses in this sector. Networking and business-to-business opportunities also appeared as a common motive as many hotels are looking for ways to attract business travelers from organizations with strong sustainability commitments.

Diverting waste is the most widely-adopted strategy for businesses in this sector. While waste is not the largest emission source for this sector, its impact is significant and businesses often find easy ways to reduce their waste emissions—e.g., composting organics.

Over a half of businesses implement behavioural strategies and purchase simple equipment such as motion sensor or dimmers to reduce their electricity use and cut associated costs.

Natural gas, the largest emission source for the sector, is targeted by many businesses through simple equipment (low-flow spray nozzles and programmable thermostats) and behavioural change initiatives such as “turn it off” campaigns for kitchen equipment.

CASE STUDIES

PACIFIC ARBOUR RETIREMENT COMMUNITIES

102 emissions reduction
(tonnes CO₂e)
\$41,700 cost savings

15% overall emission
reduction

Pacific Arbour Retirement Communities is committed to offering its residents a healthy, balanced lifestyle, and are always striving to enhance their services and amenities. For over three years they have worked with Climate Smart to measure their GHG emissions and to establish a wide variety of reduction strategies.

Through this partnership, Pacific Arbour Retirement learned that the largest source of GHG emissions from their operations came from the heating of their facilities.

To address this, they invested in new insulation for their buildings, and installed triple-paned windows to help retain heat throughout the day. In designing their buildings, they included “eyebrows” above windows on the southern exposure to cut down on passive solar heating and helping to keep the building cooler in the summertime. An air-to-water heat pump preheats hot water, giving them a 3-to-1 efficiency in producing hot water for the building. From 2008-2010, when these reductions in natural gas emissions were implemented, they saved \$41,700 on their heating bills.

Another opportunity that was identified was reducing their waste going to landfill. In feeding their residents, they were generating a significant amount of organic waste. They chose to investigate different technologies and methods, including the installation of an on-site compost digester, which helped to reduce their waste going to the landfill by 30%.

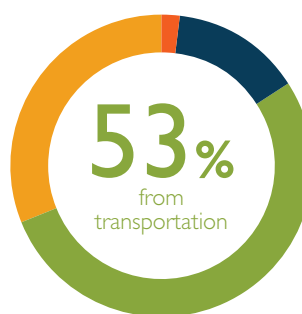
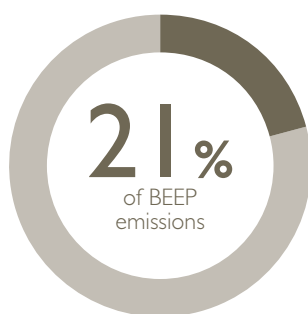
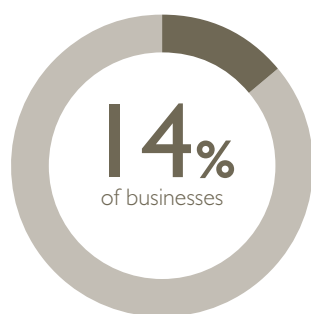
Over the three years that they have been with the Climate Smart program, the Pacific Arbour's Summerhill facility has seen a reduction in their carbon footprint by 15%.

Pacific Arbour Retirement Communities is passionate about the culture that they create at their facilities. In providing for their residents, while ensuring they reduce their impact on the planet, they have successfully engrained a culture of sustainability within their operations.

View Pacific Arbour's case study and video: <http://bit.ly/PacArbourCS>

NAICS 23: CONSTRUCTION

SECTOR PROFILE



Sector Emissions Breakdown

Electricity	2%
Natural Gas	14%
Transportation	53%
Waste	31%

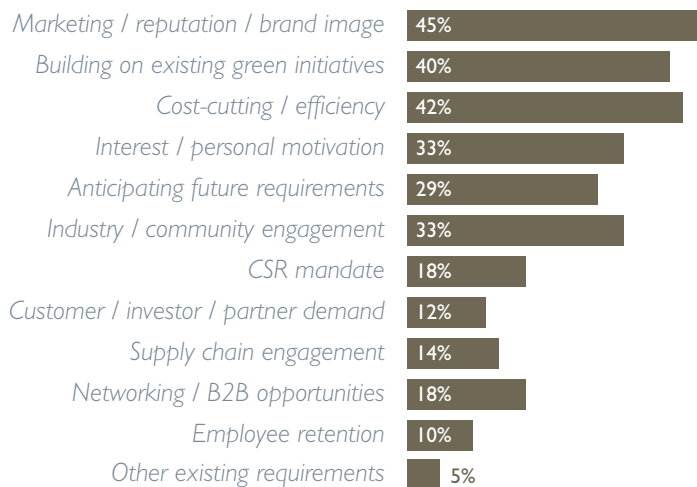
34,200 total employees
2,659 number of businesses
13 average business size (employees)
268,300 sector emissions (tonnes CO₂e)

732,000 natural gas usage (GJ)
111,184,000 electricity usage (kWh)
142,100 transportation emissions (tonnes CO₂e)
75,100 waste generated (tonnes)

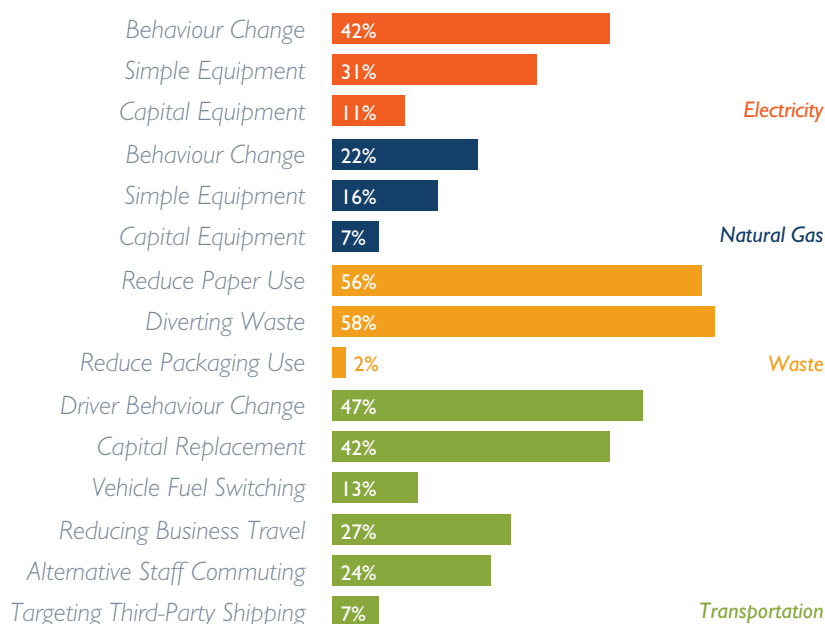
Construction is the third largest sector in this BEEP, consisting of 2,659 businesses (14% of all businesses in this BEEP), with the majority (1,668 businesses) representing the Specialty Trade Contractors subsector (NAICS 238). This subsector includes electrical, heating and air conditioning, lighting, plumbing, painting, roofing, and other contractors. The second largest subsector is Construction of Buildings (NAICS 236), which includes 773 businesses such as general contractors, residential remodelers, and commercial building construction businesses.

The Construction sector accounts for the second largest proportion of emissions (21%) in Ottawa. The largest emission source for this sector is transportation, accounting for 53% of total emissions. Note that these emissions include company fleets as well as fuel-powered equipment. Waste comprises 31% of emissions, and natural gas emissions account for 14% of the sector emissions total.

MOTIVATION AND REDUCTION STRATEGIES IMPLEMENTED AFTER FIRST YEAR OF MEASUREMENT



Motivations



Reduction Strategies

Personal interest, marketing, and cost savings are the top three motives for carbon management cited by construction businesses entering the Climate Smart program. Anticipation of future requirements and responding to existing regulations are starting to appear as drivers, as construction businesses encounter more requirements such as fuel use tracking for their municipal contracts and waste diversion rates for LEED projects.

Waste diversion is an area tackled by nearly 60% of businesses in this sector after their first year of Climate Smart. This often includes providing separate bins for recyclable materials at the site and educating workers and contractors on proper waste separation.

To reduce their transportation emissions and costs nearly half of businesses are implementing low-hanging fruit strategies such as driver behaviour change. This often includes company anti-idling policies and driver training. Over 40% of businesses are choosing to replace their fleet vehicles with more fuel-efficient models.

The Building Construction subsector is unique in that in addition to controlling their own operations, these businesses have influence over the operational footprint of buildings they create for years to come. By committing to sustainable building practices, they can have positive impact well beyond their operational boundaries.

CASE STUDY

CONCERT PROPERTIES

Concert has been developing and managing real estate for almost 25 years: rental apartments, condominium homes, retirement communities and commercial properties. Concert is involved in development, construction, sales and leasing, property management and ultimately customer service. Over the past three years Concert has worked with Climate Smart to inventory their greenhouse gas emissions and work towards a 20% reduction by 2020.

As a showcase, they have implemented a number of changes at 1190 Hornby Street, the office building that serves as their headquarters. A film applied to all windows reduces solar heat gain, helping to improve occupant comfort and reduce the energy needed to cool the building in summertime. Additionally, the boilers and chillers in their HVAC system were changed over to high-efficiency models. Adding direct digital control technology to their HVAC system allows the building operator to monitor and adjust energy performance throughout the building in real time. This combination of initiatives has reduced their electricity use at 1190 Hornby by 25%; likewise, their natural gas consumption has decreased by 50%.

All new Concert rental developments target LEED Gold or equivalent environmental construction standards. An example is their new Axis rental development currently underway at the University of British Columbia: Concert is aiming for a Gold rating under the UBC-specific Residential Environmental Assessment Program (REAP). One of the requirements of these programs is the diversion and recycling of construction waste,

which includes wood, metal, cardboard, plastics, and drywall. Concert has set a goal of 75% waste diverted from landfill at Axis. They have engaged their trade subcontractors to ensure everyone involved in the project understands how their actions affect Concert's sustainability goals. By placing the responsibility of diversion on their subtrades, and monitoring waste diversion throughout the project, Concert has achieved 82% diversion from landfill on the Axis construction site.

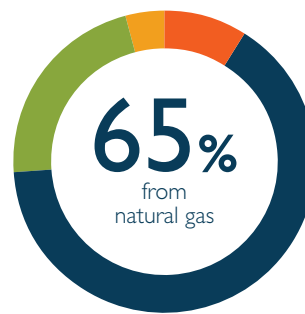
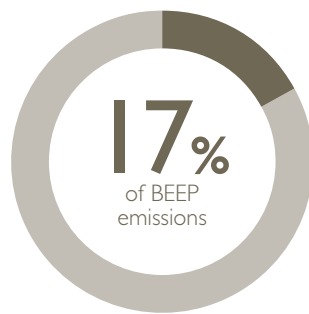
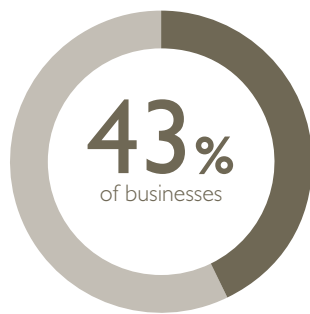
With many different properties and many facets of their business where change could be achieved, it was important to engage staff from across the organization. The creation of a dedicated Sustainability Manager position, to act as a resource for different projects and departments across the organization, highlights the degree to which sustainability is embedded at Concert.

Working with Climate Smart has helped draw the link between operational expenses and carbon/energy performance, and has catalyzed the development of internal systems for data management. For instance, gathering building energy data from across their portfolio, Concert now monitors energy use per square metre, and can identify particular properties on which to focus their efficiency efforts. Concert sees an additional benefit in the collaborative Climate Smart network of like-minded businesses, of which they are now a member. Knowledge-sharing with other companies yields strategies that they can implement within Concert's own operations.

View Concert's case study video: http://bit.ly/ConcertProperties_CS_Video

NAICS 51-55: OFFICE-BASED BUSINESSES

SECTOR PROFILE



Sector Emissions Breakdown

Electricity	9%
Natural Gas	65%
Transportation	22%
Waste	4%

111,500 total employees

8,160 number of businesses

14 average business size (employees)

220,000 sector emissions (tonnes CO₂e)

2,815,000 natural gas usage (GJ)

467,700,000 electricity usage (kWh)

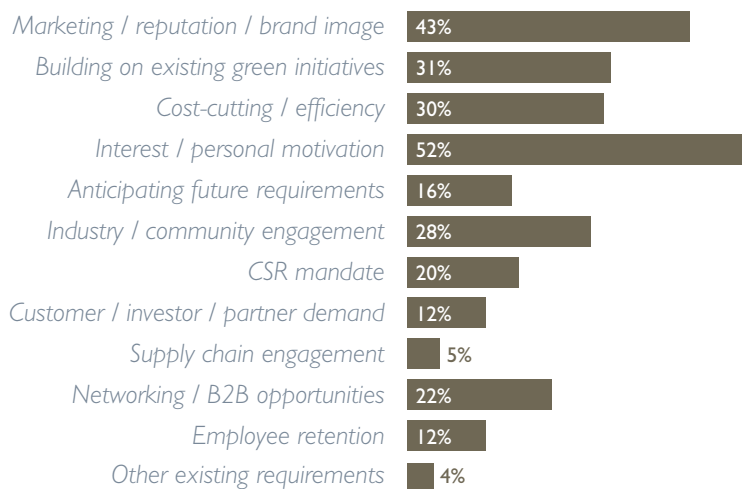
48,900 transportation emissions (tonnes CO₂e)

7,450 waste generated (tonnes)

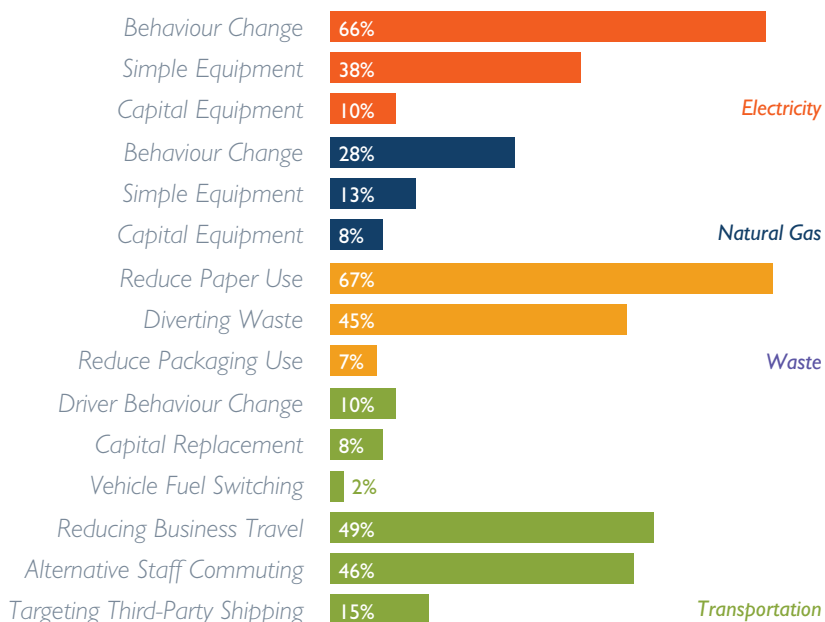
The office-based group of businesses encompasses NAICS sectors 51-55 and includes a diverse range of businesses including software firms, insurance companies, financial institutions, real estate agents, architects, law firms, marketing firms, etc. This is the largest group in this BEEP that includes 8,160 businesses (43% of all businesses in this report), employing 111,500 people. This group of businesses is projected to account for 220,000 tonnes (17%) of CO₂e in emissions due to its relatively low emission intensity.

Natural gas used for space and water heating is the primary emission source, accounting for 65% of the emissions. Transportation is the second largest emission source responsible for an estimated 22% of emissions. Note that this only includes emissions from company vehicles, and does not account for reimbursed business travel and staff commuting which are commonly found to be significant emission sources for office-based businesses. Office-based businesses generate relatively small amount of waste—the total projected waste emissions for this sector are 8,400 tonnes of CO₂e.

MOTIVATION AND REDUCTION STRATEGIES IMPLEMENTED AFTER FIRST YEAR OF MEASUREMENT



Motivations



Reduction Strategies

Personal interest and education is the top driver for office-based businesses to take up carbon management, followed closely by marketing and brand image. Building upon existing sustainable initiatives and cutting costs also appear as strong drivers cited by nearly a third of businesses entering the Climate Smart program. Anticipation of future requirements is starting to appear as a strong driver: 16% of businesses cited it as a reason to enter the Climate Smart program.

Office-based businesses often operate out of shared leased spaces where they do not have direct control over their heating and lighting, which is why capital heating and lighting upgrades are not as common for these businesses. Most widely chosen reduction strategies include tackling paper use, business travel, electricity through behaviour change, and staff commuting. Staff commuting is often the largest emission source for office-based businesses after air travel. While staff commuting is not included in the projections made in this report, it does contribute significantly to emissions at the community level. Ample opportunities exist for influencing commuting habits through initiatives implemented by the businesses, such as providing discounted passes, bike facilities, and shifting the company culture towards sustainable commuting and business travel.

CASE STUDIES

STARFISH MEDICAL

\$7,000 annual cost savings

7.7 emissions reduction
(tonnes CO₂e)

Starfish Medical works with clients all over North America and around the world to design, develop and manufacture medical devices. The company employs 51 people in Saanich, operating out of one facility. Starfish first measured its emissions inventory over fiscal 2011-2012, leading to emissions reduction strategies that included conducting waste and energy assessments, supporting sustainable commuting with incentives and improved facilities, purchasing Forest Stewardship Council certified paper, and teleconferencing with clients when possible.

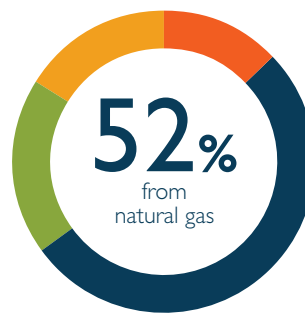
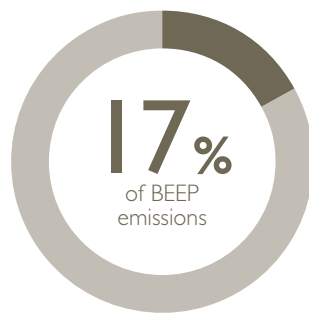
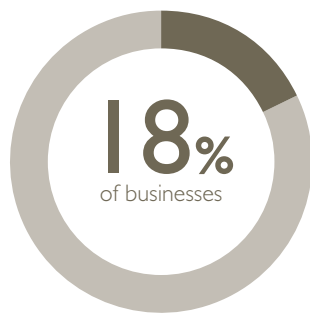
Starfish Medical's most innovative emissions reduction strategy is also likely the most impactful the company could pursue: encouraging project managers and clients to reduce their business air travel. On average, for office-based professional services firms, business air travel represents the largest source of emissions, at 37%. Starfish encouraged this behaviour by proactively supplying and encouraging the use of videoconferencing and webcam technology to both employees and clients. This initiative has worked well for the bottom line, with a nearly immediate payoff thanks to savings achieved from reduced air travel.

Since launching this strategy in 2009, Starfish has outfitted all project managers, senior management and numerous clients with top-of-the-line webcams and headsets, using either Skype or GoToMeeting as the software component. Each unit costs \$106 per set-up (not including shipping to clients). Starfish has invested \$2,755 to date, purchasing 26 of the webcams and headsets. Important to note is that the barrier to this type of initiative is much less likely to be technological than it is to be cultural. Perhaps the most important aspect of this "investment" has been the encouragement by senior management that project managers utilize teleconferencing whenever feasible.

While Starfish has found it difficult to provide exact figures for the value of air travel not expensed, and kilometres not flown, over the past three years encouraging this style of work has proven to be a positive investment, with a nearly immediate payback. Anecdotally, the company knows that numerous, otherwise necessary flights to clients (e.g., Charlottesville, West Virginia and San Mateo, California) have been avoided.

NAICS 44–45: RETAIL TRADE

SECTOR PROFILE



Sector Emissions Breakdown

Electricity	13%
Natural Gas	52%
Transportation	19%
Waste	16%

69,200 total employees

3,464 number of businesses

20 average business size (employees)

212,700 sector emissions (tonnes CO₂e)

2,178,000 natural gas usage (GJ)

662,300,000 electricity usage (kWh)

39,800 transportation emissions (tonnes CO₂e)

30,900 waste generated (tonnes)

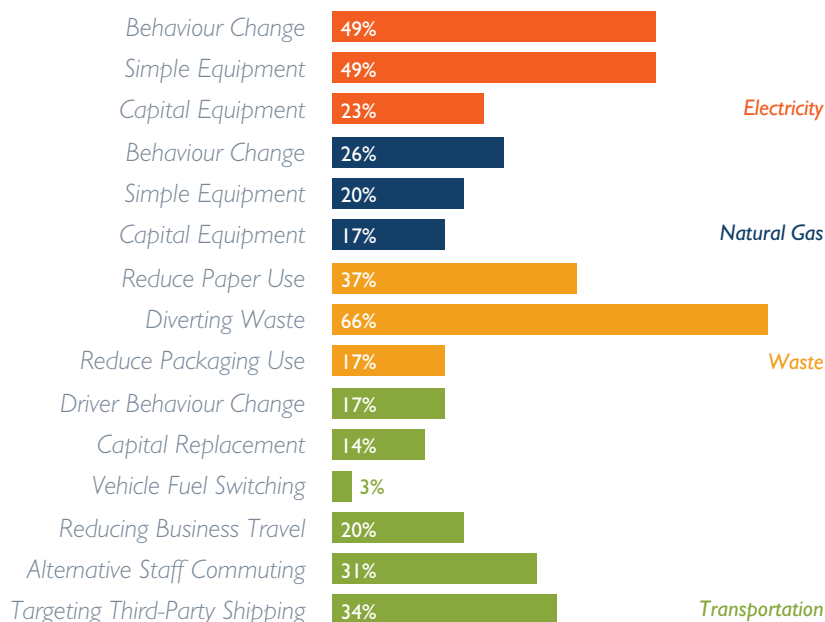
Retail Trade is the second largest sector projected in this BEEP, consisting of 3,464 businesses and accounting for 17% of emissions. More than half of retail sector emissions (52%) are attributed to natural gas, with transportation being the second largest source of emissions (19%). The Retail Trade sector employs the second largest number of people (69,200 employees) and has the highest proportion of electricity use of all the BEEP sectors.

While not projected in this BEEP, refrigeration is another significant emission source for Food and Beverage Retailers in the Retail Trade sector. This subsector accounts for 573 businesses in the city of Ottawa. Refrigerants are the largest emissions source for some retailers in the Climate Smart dataset. Refrigeration leakages often go unnoticed as the cost of topping up refrigerants is negligible compared to other operating costs for a business.

MOTIVATION AND REDUCTION STRATEGIES IMPLEMENTED AFTER FIRST YEAR OF MEASUREMENT



Motivations



Reduction Strategies

Personal interest and education, marketing, cost reduction and community engagement appear as the top drivers for retail businesses to manage their carbon emissions.

Following the Climate Smart program, over 60% of businesses in this sector choose to implement strategies aimed at reducing their landfilled waste.

Reducing electricity use through installing simple equipment such as light timers and dimmers as well as behaviour change campaigns (e.g., implementing a turn-it-off policy) are often-cited strategies for retail business.

Over 30% of participating businesses choose to tackle their third-party shipping. While this activity is outside of their direct emissions, retail businesses recognize its significant environmental impact and implement strategies such as bulk ordering and avoiding rush shipments.

Staff commuting is another emissions source commonly addressed by retailers. Aligning staff shifts with transit schedules, promoting carpooling, and providing secure bike parking are some of the initiatives tackling staff commuting emissions.

CASE STUDIES

VICTORIA WOMEN IN NEED COMMUNITY COOPERATIVE

41.1 emissions reduction
(tonnes CO₂e)

\$4,000 cost savings

49% reduction in waste

Victoria Women-in-Need (WIN) Community Cooperative operates three resale shops that offer high quality, affordable second-hand items, such as clothing, furniture and housewares. The revenue generated by the WIN stores allows the organization to be completely self sustaining in providing programs for local women who are in transition to self-sufficiency.

Over two consecutive years of measuring its emissions and associated expenses, WIN was able to understand better the extent of its carbon footprint. While it simultaneously pursued a lighting retrofit and comprehensively addressed its overall emissions, increased waste diversion had the most impact. Comparing its two years of data, WIN achieved a 49% reduction in waste.

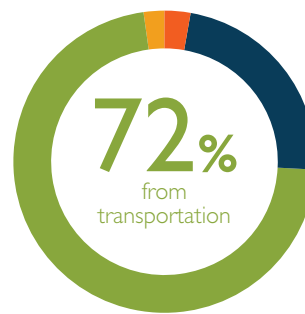
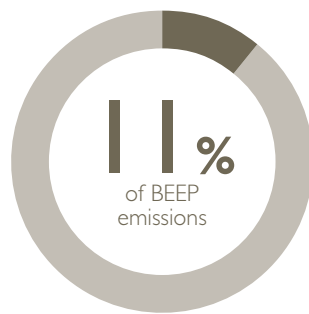
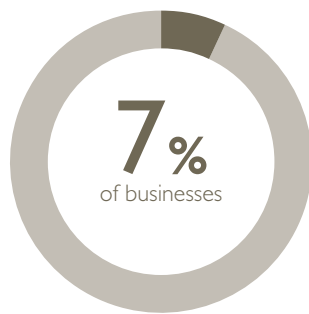
WIN started its waste reduction in 2010 by diverting and transporting the unsuitable donated goods via reusable bags or containers to more than 10 local recipient organizations. Some of the clothing unsuitable for re-sale is repurposed as packing material for overseas medical aid shipments. WIN also improved its approach to sorting materials, using rolling bins, Rubbermaid containers, and printed educational materials to communicate operation efficiencies across all participating parties: staff, partner organizations and donors. These fixed and operating costs associated with improving waste diversion are factored into the payback period calculation.

By halving their waste generation, WIN was able to greatly reduce their costs associated with solid waste hauling, after working to re-organize the process with fellow Climate Smart Business, Ellice Recycle Ltd.

The \$4,000 in cost savings achieved in the first year of this initiative meant that the payback of the initial \$1,236 investment for Victoria Women-in-Need's waste reduction efforts was less than four months. In terms of GHG emissions, WIN was able to achieve a 41.1-tonne CO₂e emissions reduction in the first year of implementing this project.

NAICS 56: ADMINISTRATIVE, SUPPORT, WASTE MANAGEMENT, REMEDIATION

SECTOR PROFILE



Sector Emissions Breakdown

Electricity	3%
Natural Gas	23%
Transportation	72%
Waste	2%

36,000 total employees

1,304 number of businesses

28 average business size (employees)

135,900 sector emissions (tonnes CO₂e)

605,000 natural gas usage (GJ)

113,950,000 electricity usage (kWh)

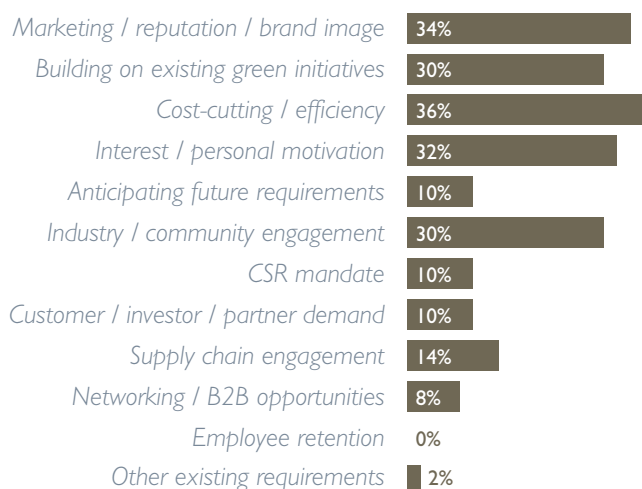
98,400 transportation emissions (tonnes CO₂e)

1,780 waste generated (tonnes)

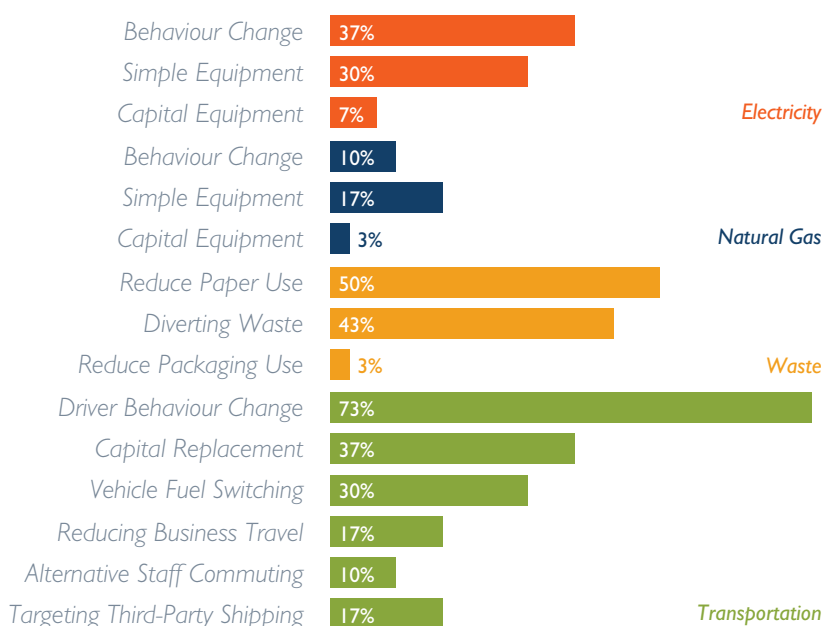
The Administrative Support, Waste Management and Remediation Services sector includes two subsectors: Administrative and Support Services (NAICS 561) and Waste Management and Remediation (NAICS 562). The Administrative and Support services subsector includes landscaping, janitorial, security, carpet cleaning, and other service providers. This subsector accounts for the vast majority of this sector, and includes 1,256 businesses. The Waste Management and Remediation subsector accounts for just 48 businesses in the city of Ottawa.

Transportation is projected to account for 72% of emissions in the sector, with natural gas comprising most of the remaining emissions (23%). These businesses are often characterized by high transportation emissions, as they often operate a fleet of vehicles and deliver their services at multiple client locations. Waste emissions for this sector are very small, estimated to be 2,000 tonnes of CO₂e. The waste generated by these businesses is often disposed at clients' sites, and becomes part of other businesses' waste stream.

MOTIVATION AND REDUCTION STRATEGIES IMPLEMENTED AFTER FIRST YEAR OF MEASUREMENT



Motivations



Reduction Strategies

Cutting costs appeared as the strongest motivating factor for businesses in this sector to take on carbon management. Marketing and brand image, education, and expanding existing sustainability initiatives are other strong factors cited by businesses. Responding to existing and anticipating future requirements also appeared as drivers for this sector, as some of the businesses are starting to see requests from their municipal and private clients for measurable sustainability action.

With transportation emissions forming a large part of emissions for this sector, the most oft-cited reduction strategy is reducing transportation emissions through behaviour change. This includes low-cost strategies such as eliminating idling, speeding, and abrupt braking, as well as purchasing equipment and software for vehicle tracking to optimize routes and monitor idling and speed. Nearly 40% of businesses coming through the program choose to replace some of their fleet vehicles with more fuel efficient models.

CASE STUDIES

SECURIGUARD

\$80,000+ annual cost savings

97+ emissions reduction (tonnes CO₂e)

Securiguard is a full-service integrated security solutions company offering customized corporate security services, security guards and security consulting. Through participating in the Climate Smart program, the company measured their baseline inventory for their North American operations for the 2010 fiscal year, and is currently measuring their footprint for 2011 and 2012.

Presently, the Securiguard fleet includes 17 hybrid vehicles and one diesel vehicle in their 47-vehicle fleet. In addition to replacing conventional vehicles with the 17 efficient hybrids vehicles, Securiguard was actually able to reduce the total number of vehicles in their fleet over the past two years by better optimizing their route planning. Securiguard is working to replace an additional 12 vehicles with leased hybrids in the next year.

The per-vehicle savings that Securiguard has realized from these changes are \$100 per month, taking the additional leasing costs into account. The overall yearly savings amount to \$21,000 in fuel costs (assuming a gas price of \$1.30 per litre). These savings translate into a projected greenhouse gas (GHG) emissions reduction of 97 tonnes CO₂e, or a 13% reduction in emissions from Securiguard's 2010 baseline measurement, with further reductions to come from increased fleet efficiency.

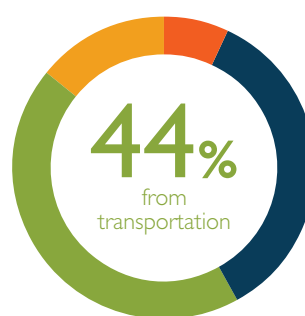
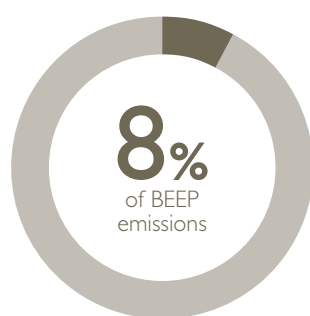
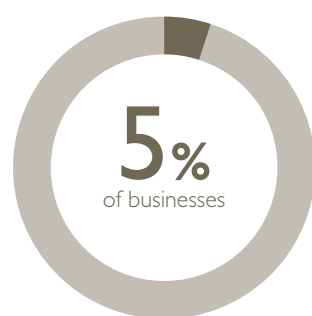
Securiguard is further reducing emissions significantly through the route optimization software implemented in their vehicles. Financial returns due to the implementation of this on-board software, and the subsequent fuel savings and reduced size of the Securiguard fleet have been substantial. Securiguard is realizing savings of \$5,000 on a monthly basis.

In total, Securiguard's fleet efficiency initiatives have achieved the company annual fuel savings of more than \$80,000, and reduced their carbon footprint extremely effectively.

Cutting down on vehicle idling, implementing electronic invoicing, improving their recycling infrastructure and reducing energy consumption by implementing 'turn-it-off' programs and reducing vampire power complete the Securiguard effort to thoroughly and thoughtfully green their operations.

NAICS 41: WHOLESALE TRADE

SECTOR PROFILE



Sector Emissions Breakdown

Electricity	7%
Natural Gas	35%
Transportation	44%
Waste	14%

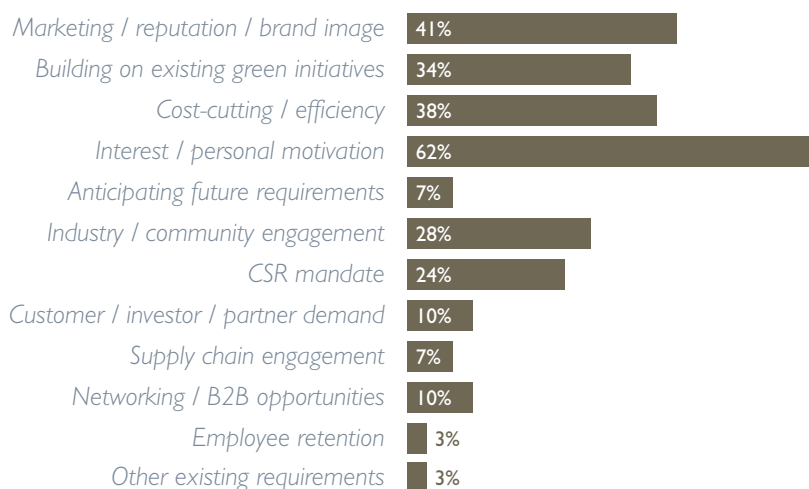
17,300 total employees
976 number of businesses
18 average business size (employees)
102,500 sector emissions (tonnes CO₂e)

708,000 natural gas usage (GJ)
161,300,000 electricity usage (kWh)
45,300 transportation emissions (tonnes CO₂e)
12,900 waste generated (tonnes)

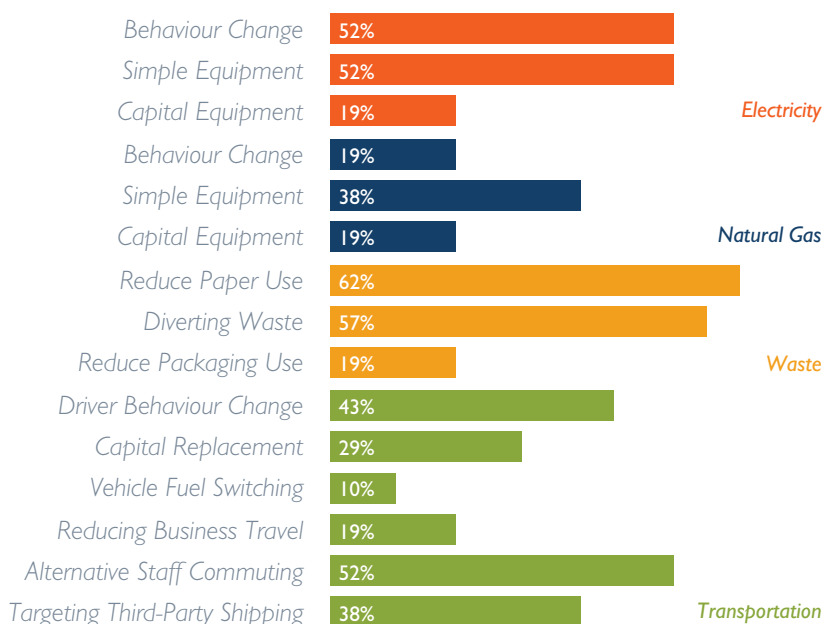
The Wholesale Trade sector is diverse and accounts for 5% of businesses and 8% of emissions measured in this BEEP. The largest portion of these emissions (44%) is from transportation – wholesalers often operate heavy delivery vehicles that contribute significantly to the footprint of their operations. Natural gas emissions for this sector are also significant, comprising 35% of the total footprint.

While not projected in this BEEP, refrigeration is another significant emission source for Food and Beverage Wholesalers subsector. Refrigerant emissions are higher than fleet emissions for some wholesalers in the Climate Smart dataset. Refrigeration leakages often go unnoticed as the cost of topping up refrigerants is negligible compared to other operating costs for a business. For example, a meat distributor that has gone through the Climate Smart program recorded 88 tonnes of CO₂e in refrigeration emissions, 4 tonnes more than emissions from their fleet. The cost of the topped up refrigerants was only \$1,300 compared to the company's \$70,000 Hydro bill and \$42,000 in annual fuel costs. In addition, a leaking cooling system is less efficient and leads to a higher electric bill.

MOTIVATION AND REDUCTION STRATEGIES IMPLEMENTED AFTER FIRST YEAR OF MEASUREMENT



Motivations



Reduction Strategies

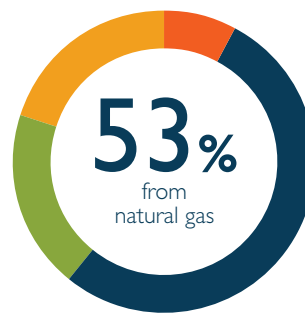
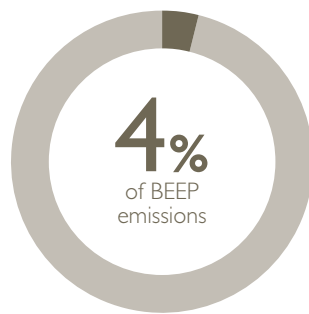
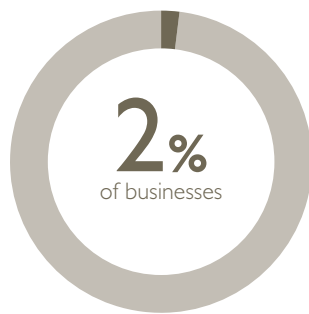
Marketing, personal interest, cost reduction, and building upon existing green initiatives top the list of drivers for carbon management in this sector. Responding to existing requirements and anticipating future requirements do not appear as strongly for this sector as they do for, for example, construction; where companies often compete on bids and tenders for municipal governments.

Following the Climate Smart program, nearly 60% implement initiatives aimed at increasing their waste diversion rate, such as starting to recycle their Styrofoam and soft plastics. Paper use is an area addressed by over 60% of businesses, as wholesalers often have good opportunities to reduce paper used for packaging slips and invoices. While paper use is a relatively small source of emissions for these businesses, reducing paper is a low-cost strategy that touches everyone in the organization and helps promote a culture of conservation.

Reducing natural gas use through installing simple equipment such as strip curtains is another widely adopted tactic, with one out of five businesses going a step further and choosing to implement capital lighting or heating upgrades.

NAICS 33: MANUFACTURING (FABRICATED METAL, MACHINERY, FURNITURE)

SECTOR PROFILE



Sector Emissions Breakdown

Electricity	8%
Natural Gas	53%
Transportation	19%
Waste	20%

10,100 total employees

382 number of businesses

26 average business size (employees)

51,900 sector emissions (tonnes CO₂e)

546,209 natural gas usage (GJ)

98,900,000 electricity usage (kWh)

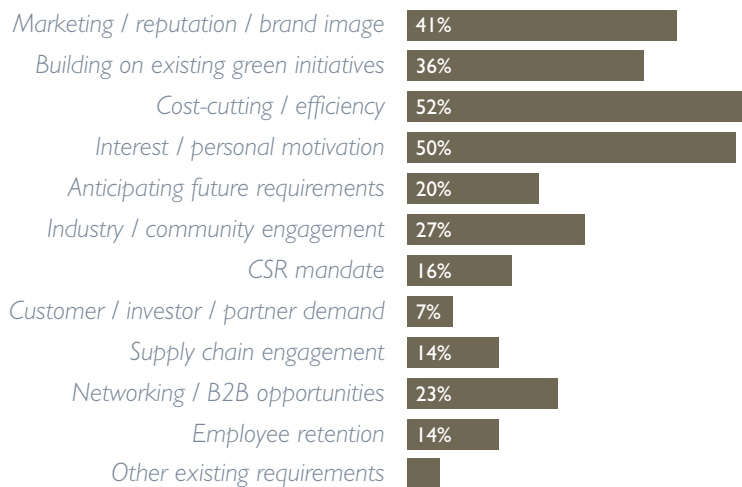
9,700 transportation emissions (tonnes CO₂e)

9,100 waste generated (tonnes)

The Manufacturing (Fabricated Metal, Machinery, Furniture) sector encompasses a diverse range of manufacturing businesses, including furniture, sign, dental equipment, jewellery, window, and other manufacturers. This sector has the highest emissions per business - 136 tonnes of CO₂e.

In the city of Ottawa, this sector is the second smallest of all the BEEP sectors — it consists of 382 businesses employing 10,100 people, accounting for 2% of businesses in this BEEP and 4% of projected emissions. Natural gas is the highest emission source in this sector at 27,800 tonnes of CO₂e (53% of total emissions).

MOTIVATION AND REDUCTION STRATEGIES IMPLEMENTED AFTER FIRST YEAR OF MEASUREMENT



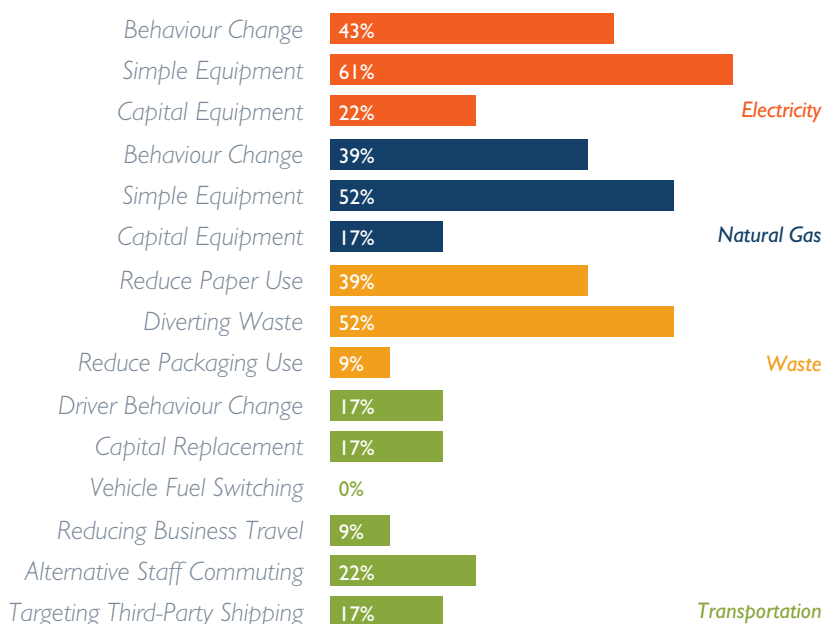
Motivations

Cutting costs appeared as the primary driver for businesses in this sector to take on carbon management. This is expected given the pressure on manufacturers to keep the production costs low with a lot of manufacturing now being done overseas. Networking and business-to-business opportunities also appeared as a strong driver for this sector.

Following the Climate Smart program over a half of manufacturing businesses in this sector have implemented initiatives to improve their waste diversion rates.

Over 50% of businesses tackled their natural gas use by installing simple, non-capital intensive equipment at their facilities such as insulation and motion sensors for lighting. Over a fifth of businesses invested in capital heating and lighting upgrades.

Behavioural change strategies aimed at reducing electricity and natural gas use are widely adopted by businesses as low-cost ways to reduce emissions. A typical example would be changing the thermostat settings and implementing a “turn it off” policy for unused equipment and lights.



Reduction Strategies

CASE STUDIES

AGGRESSIVE TUBE BENDING

compressor retrofit	initiative
\$27,800	project cost
\$15,300	incentive (BC Hydro Power Smart)
\$12,500	total investment

\$7,700	annual savings (23% electricity use)
1.6	payback period (years)
62.5%	rate of return
2.7	emissions reduction (tonnes CO ₂ e)

Aggressive Tube Bending is a manufacturer in Vancouver, BC, employing 45 people between two industrial facilities. It offers a wide spectrum of products and services, including pipe, tube, and structural steel forming. It also carries out custom fabricating and manufacturing. The company measured its baseline inventory for the 2010/2011 fiscal year at a time when it was undergoing extensive renovations. This experience gave the firm an additional lens—energy efficiency—through which to evaluate renovation options.

Aggressive Tube Bending is working to reduce its emissions by improving insulation in its new facilities, introducing anti-idling practices for vehicles and heavy equipment, retrofitting lighting for maximum efficiency, increasing recycling efforts and eliminating unnecessary paper use.

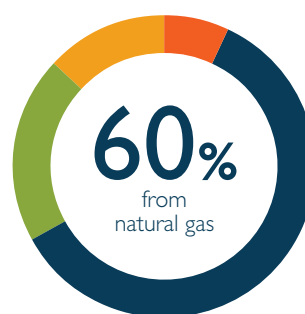
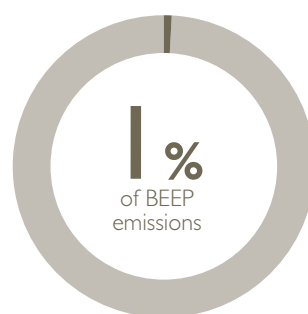
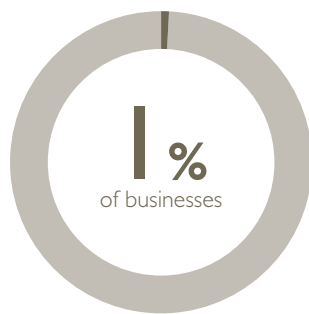
This case study focuses on the company's most impactful project: the replacement of two aging air compressors integral to its operations with a newer, considerably more efficient model in late 2012. The move followed a seven-day evaluation of the two-piston compressors' usage and efficiency, which indicated they were significantly oversized for the output that was required.

The higher upfront cost of moving to a right-sized, higher-efficiency variable frequency drive compressor, compared to a standard model, was manageable due to the energy savings and BC Hydro Power Smart incentives.

By replacing their two aging compressors with the high-efficiency model, and lowering the pressure of the compressor by 20 pounds-per-square-inch (psi)—which provides approximately 1% electricity savings per 1 psi lowered—Aggressive Tube is projected to save \$7,700 annually and 109,500 kWh. After BC Hydro provided an incentive of \$15,300, the projected payback on this \$27,800 investment was lowered to 1.6 years.

NAICS 31: MANUFACTURING (FOOD, BEVERAGE, TEXTILE, CLOTHING)

SECTOR PROFILE



Sector Emissions Breakdown

Electricity	7%
Natural Gas	60%
Transportation	20%
Waste	13%

1,550 total employees

116 number of businesses

13 average business size (employees)

13,400 sector emissions (tonnes CO₂e)

158,000 natural gas usage (GJ)

23,240,000 electricity usage (kWh)

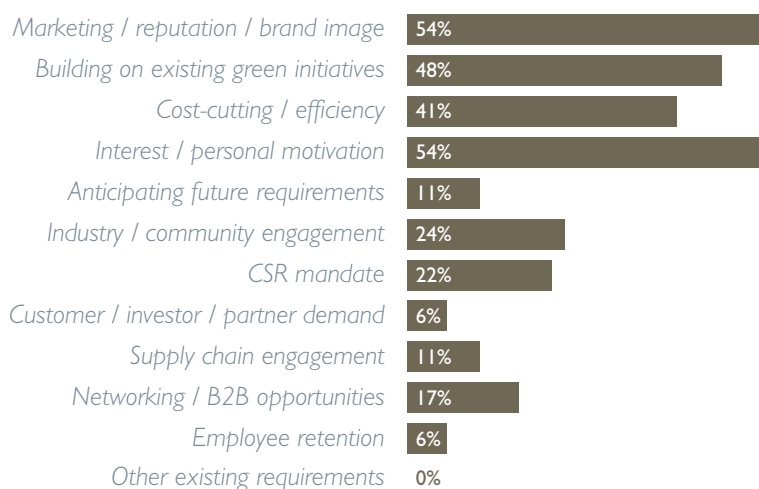
2,700 transportation emissions (tonnes CO₂e)

1,530 waste generated (tonnes)

The Manufacturing (Food, Beverage, Textile, Clothing) sector is the smallest sector in the city of Ottawa among the BEEP sectors, containing 116 businesses and employing 1,550 people. 90 of these businesses (76%) in this sector are food and beverage manufacturers. This Manufacturing sector accounts for 1% of all businesses, and is also responsible for 1% of emissions.

In addition, businesses in this sector have the third highest average per business emissions — 116 tonnes of CO₂e. The majority of emissions in manufacturing are from natural gas (60%), followed by transportation (20%), waste, and electricity (13% and 7%, respectively).

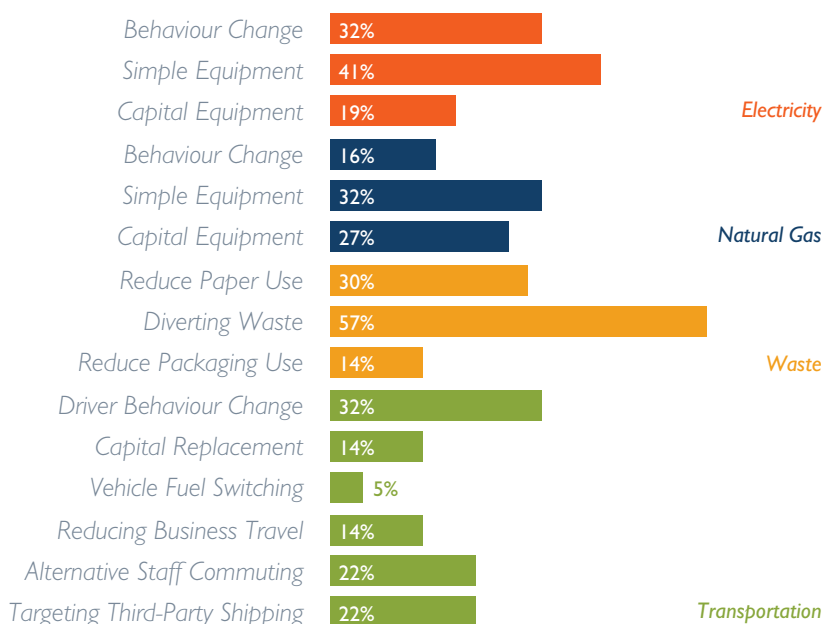
MOTIVATION AND REDUCTION STRATEGIES IMPLEMENTED AFTER FIRST YEAR OF MEASUREMENT



Motivations

Marketing alongside personal interest are the primary drivers for carbon management in this sector. With the growing demand for environmentally responsible products and services, companies are looking to improve their brand images. Building on existing green initiatives is another common motive, with many manufacturers already moving down the road of sustainability.

Strategies aimed at reducing waste going to landfill are widely adopted by this sector after going through the Climate Smart program: nearly 60% of businesses targeted waste in their reduction plan.



Over 40% of businesses chose to purchase simple equipment such as motion sensors to cut their electricity usage and costs, with nearly a fifth of businesses opting for capital electric upgrades such as lighting retrofits.

Nearly a third of businesses chose to tackle their natural gas use through capital equipment upgrades.

Reduction Strategies

CASE STUDIES

PURDYS CHOCOLATIER

47.2% waste emissions
reduction achieved

Purdy's Chocolates, the iconic Canadian chocolatier, was able to reduce their largest single source of emissions, solid waste, by nearly half in just one year through their work with Climate Smart. By the end of 2011, Purdy's had reduced emissions from this source by 47.2% compared to their 2010 baseline measurement year. This waste diversion effort cut Purdy's' emissions in this area by 112.3 tonnes of carbon dioxide, from 2010 to 2011.

Purdy's is also rigorously evaluating their emissions from areas such as electricity, transport and natural gas.

In terms of waste, however, Jim Pritchard, Director of Chocolate Operations at Purdy's, had encouraging words to say about the straightforward nature of their initiatives.

"There really [wasn't] much to it. I had asked [an employee] to try to find a company that would take items we were sending to landfill. He found one company that would take everything and we just had to separate it and store for them to pick up." The absolute number of waste and recycling-hauling trips made to the Purdy's facility have also been decreased.

However, not only has Purdy's addressed their waste diversion and sorting, initiatives such as the installation of energy-efficient hand dryers has reduced the production of wastepaper at their facilities. In addition, by discouraging the use of disposable plastic bags at the retail end of their operations, Purdy's has managed to reduce this waste stream by 10%.

112.3 emissions reduction
(tonnes CO₂e)

Duncan Johnston, Chief Financial Officer at Purdy's, and a participant in the Climate Smart program, was also able to provide some insight into the implementation of these waste reductions strategies, estimating that it required "30% education, 60% follow up, and 10% inspiration."

Purdy's continues to work towards reducing their emissions further by improving the recycling program at the factory, implementing a lower emission delivery program, performing a natural gas audit at the factory, and investigating alternative packaging. Through this process, Purdy's has retrofitted lighting, windows, heating systems and roofing materials in various areas of the Purdy's business. Says Johnston, "new opportunities are always coming up", and Purdy's is projecting a wide array of efficiency gains that have potential to reflect an even lighter organizational footprint in future years.

Paramount in the process has been the education of employees on electricity, paper and waste reduction strategies using staff, department manager and supervisor meetings in tandem with newsletters. Though it may seem impossible, it is initiatives like these that make Purdy's Chocolates that much more enjoyable.

CONCLUSION

This report is the first comprehensive estimate of the total emissions of Ottawa's local businesses. It provides a high-level analysis of greenhouse gas emissions produced and energy consumed by Ottawa's different business sectors. The purpose of the report is to examine the impact that each business sector plays as well as to highlight opportunities for reduction and mitigation as we move towards the low carbon economy.

Although this report includes profiles of Climate Smart businesses, it will be helpful for all Ottawa stakeholders in identifying local priorities and focus areas. Carbon 613, in particular, will use this initial report to work with local businesses and organisations to encourage further community reductions in the city of Ottawa. As more local case studies are identified and more businesses join Carbon 613, we will be in a position to attain and document more specific Ottawa-based data. Our intention is to update this work in the short-term future to measure those steps that have been taken by local businesses to reduce greenhouse gas emissions in our area.

APPENDIX

BUSINESS SECTOR EMISSIONS DATA TABLE

NAICS Industry Sector	% of Emissions	Total Emissions (tonnes CO ₂ e)	Natural Gas Use (GJ)	Natural Gas Emissions (tonnes CO ₂ e)	Electricity Use (kWh)	Electricity Emissions (tonnes CO ₂ e)	Transport Emissions (tonnes CO ₂ e)	Waste Produced (tonnes)	Waste Emissions (tonnes CO ₂ e)
NAICS 72: Accommodation and Food Services	21.58%	276,500	4,512,000	230,000	363,037,000	14,900	7,600	21,400	24,000
NAICS 23: Construction	20.94%	268,300	732,000	37,300	111,184,000	4,600	142,100	75,100	84,300
NAICS 51-55: Office-based	17.17%	219,900	2,815,000	143,500	467,705,000	19,200	48,900	7,500	8,400
NAICS 44-45: Retail Trade	16.61%	212,700	2,178,000	111,000	662,330,000	27,200	39,800	30,900	34,700
NAICS 56: Administrative and Support, Waste Management and Remediation Services	10.61%	135,900	605,000	30,800	113,949,000	4,700	98,400	1,800	2,000
NAICS 41: Wholesale Trade	8.00%	102,500	708,000	36,100	161,299,000	6,600	45,300	12,900	14,500
NAICS 33: Manufacturing (Metal Products, Machinery, Electrical Equipment)	4.05%	51,900	546,000	27,800	98,904,000	4,100	9,700	9,100	10,200
NAICS 31: Manufacturing (Food, Beverage, Textiles, Clothing)	1.05%	13,400	158,000	8,100	23,239,000	950	2,700	1,500	1,700
TOTAL:	100%	1,281,000	12,255,000	625,000	2,001,648,000	82,000	395,000	160,000	180,000

Note: Projections have been rounded; therefore totals may not exactly match the sum of row values.

CITY OF OTTAWA BUSINESS ENERGY AND EMISSIONS PROFILE

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