

# ***Building a Zero Waste Campus***

***Rethinking waste management for the next  
generation of sustainable campuses***

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Rocky Mountain APPA (RMA) and Western Canadian Physical Plant Administrators  
(WCUPPA) Conference – September 19, 2019

# Agenda

- Introduction and Context
  - Strategy, Goals & Targets
- Construction Waste Management
  - Campus Wide Program, Lessons Learned, Future Prospects
- Operational Waste
  - Current Operations, Challenges, New Initiatives
- Campus Waste Performance
  - Benchmarking, Performance, STARS

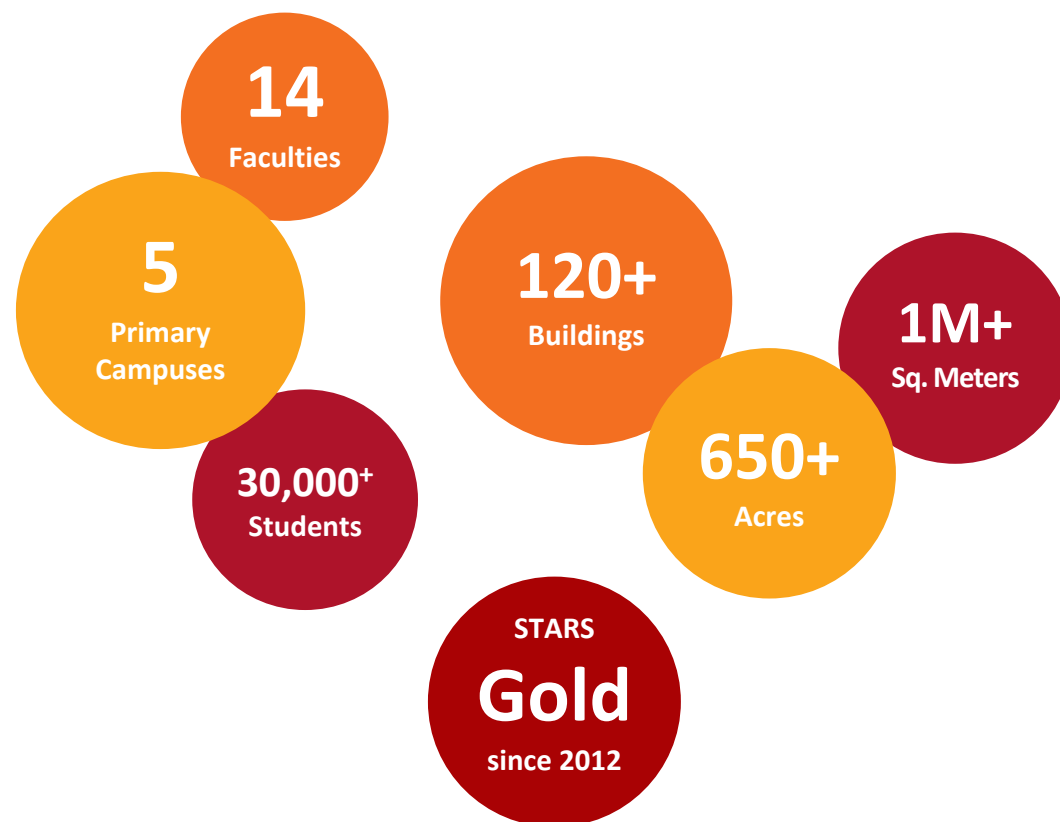
# University of Calgary



**1,800+ academic staff**  
actively engaged in research,  
scholarship and teaching

**3,200+ non-academic staff**  
focused on operating the institution  
and delivering against our core mandate

**\$1.2 billion operating budget**  
UCalgary contributes nearly \$8 billion  
annually to Alberta's economy

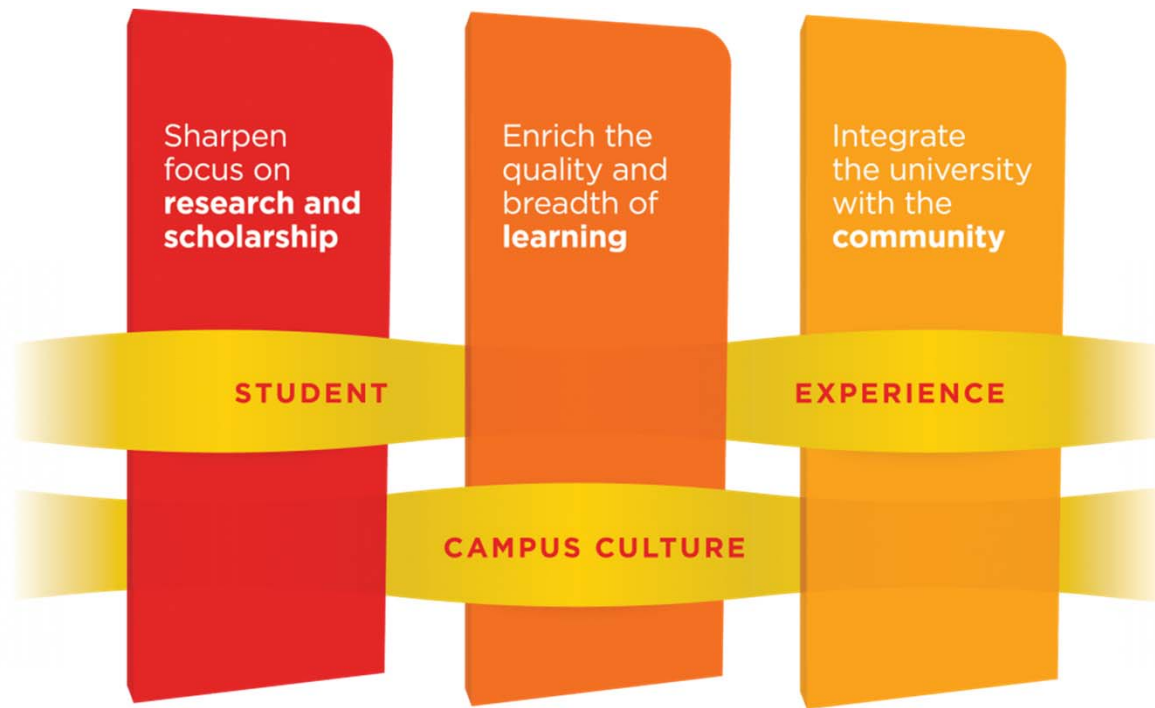


**U<sup>15</sup>**

**Group of Canadian Research Universities**

Regroupement des universités de recherche du Canada

# Strategic Direction



Our **Eyes High Strategy** identifies sustainability at the core of our campus culture; we come to the University of Calgary to work and learn in a sustainable manner.

# Institutional Plans and Strategies



# Institutional Plans and Strategies



The University of Calgary **Institutional Sustainability Strategy** is an institutional roadmap for leadership and excellence in sustainability.

# Sustainability Goals

The goals in our **Institutional Sustainability Strategy** capture our desire to lead by example with principled, socially responsible practices in our operational activities

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**Goal 4.2:** Continually improve our sustainability performance and infuse sustainability into the campus experience through **modeling principled practice** in social responsibility across our operational endeavors

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**Goal 4.3:** Build core competencies for **leadership in sustainability** and infuse and embed sustainability into the campus experience by utilizing our **campus as a learning-laboratory** for applied-practice in sustainability



# Path to Zero Waste Targets

Institutions moving toward **zero waste** play a significant role in minimizing the environmental effects of material extraction, product manufacturing, and disposal.

## Solid Waste

**Objective:** The University of Calgary strives to be a zero waste community; by 2020 eighty per cent of our waste will be diverted from landfill. (All Streams)

Primary Indicators and Performance Targets	2012-13 Actual	2019-20 Target
Annual volume of waste generated (inc construction waste + hazardous waste) in metric tonnes (MT)	3303 MT	3000 MT
Annual Per cent of waste diverted from landfill (inc construction + hazardous waste) (includes recycling, composting, reusing, donating, resale)	44%	80%
Annual Per cent of construction and demolition waste diverted from the landfill in current fiscal year	75%	85%



# Achievements and Recognition



STARS Gold Since  
2013



Corporate Knights



2017 Greenest Campus in Canada



UNIVERSITY OF  
CALGARY

# Construction Waste

# Construction Waste Outline

- Our Program
  - Where did we start?
  - What did we implement?
  - How does it work?
- Driving Innovation
  - Understanding waste breakdown
  - Project-to-project diversion rates
  - Year over year performance
- What is on the horizon
  - Reuse
  - Design and construction practices
  - Campus as a Learning Lab

# Where did we start?

## **Prior to the implementation of a campus approach:**

- Construction waste management for LEED projects only
- Numerous haulers, unknown receiving facilities
- No aggregation, no info on institutional performance
- No tracking of waste for small/midsized projects
- No diversion opportunities for small/midsized projects
- No performance expectations

# Construction Waste Diversion

- Campus-wide Construction Waste Program
  - **Standardization** between projects/contractors
  - Access to comprehensive information on **diversion rates**
  - Supports **LEED projects** with access to data
  - Creation of centralized **transfer stations** for small projects
- Communication and reinforcement are key in the successful operation of the program



# Construction Waste Process





# Construction Waste Diversion Streams

Collaboration has been instrumental in supporting our success to this point and will become even more critical as we address the challenge of moving to **zero waste**.

- ECCO Recycling and Energy Corporation is actively improving ways to divert construction waste from landfill.



WOOD



PAPER & CARDBOARD



METAL



DRYWALL



CONCRETE



BALLASTS

# Critical Partnerships



Recycling  
Partner



Waste  
Hauler

## ACCEPTABLE WASTE

ASPHALT SHINGLES  
 CAMPERS / TRAILERS\*  
 CARDBOARD / PAPER  
 CHIPBOARD  
 CLEAN FILL (end dump, tandem, triple-axle truckloads)  
 CONCRETE\*  
 DRY NON-HAZARDOUS MATERIALS  
 DRYWALL / GYPROC  
 FENCING  
 FRIDGES/FREEZERS/AIR CONDITIONERS (\$30 Freon charge)  
 GLASS  
 METAL  
 WOOD  
 MIXED CONSTRUCTION & DEMO LOADS  
 PLASTIC  
 OLD FURNITURE  
 PACKING CASES  
 PACKAGING MATERIALS  
 PALLETS  
 PLYWOOD  
 POLES\*  
 RENOVATION MATERIALS  
 SAWDUST  
 SHAKES  
 STEEL PIPE\*  
 STUMPS\*  
 UNPAINTED DIMENSIONAL LUMBER  
 MDF SAWDUST\*

\*HARD-TO-HANDLE FEES OF \$150-300 WILL BE  
 CHARGED DEPENDING ON THE SIZE OF THE  
 OFFENDING MATERIAL

## UNACCEPTABLE WASTE

ANIMAL WASTE / CARCASSES  
 ASBESTOS  
 BATTERIES  
 BIOMEDICAL WASTE  
 BURNED DEBRIS (72 HOUR NOTICE REQUIRED)  
 COMPRESSED CYLINDERS (PROPANE, OXYGEN, FIRE  
 EXTINGUISHERS, ETC.)  
 CONTAINERS WITH LIDS  
 SEALED DRUMS / CONTAINERS  
 EMPTY OIL CONTAINERS  
 FREE LIQUIDS  
 GRASS CLIPPINGS, FLOWERS, PLANTS, TREE  
 BRANCHES WITH LEAVES OR NEEDLES  
 GREASES / OILS OR THEIR CONTAINERS  
 HAZARDOUS MATERIALS OR ANY CONTAINER  
 HAVING CONTAINED SUCH MATERIALS  
 HOUSEHOLD / COMMERCIAL CHEMICALS  
 HYDROCARBON SOILS  
 OILY RAGS  
 OILY WASTE  
 PAINTS / SOLVENTS  
 PESTICIDES OR THE CONTAINERS  
 PROPANE TANKS  
 RAILROAD TIES  
 RESIDENTIAL / COMMERCIAL FOOD WASTE  
 SEMI-SOLIDS  
 SLUDGES  
 TIRES / RUBBER STRIPS  
 TRANSFORMERS  
 TREATED WOOD  
 TREE STUMPS  
 VITREOUS MATERIAL (LIKE GLASS IN APPEARANCE /  
 PHYSICAL PROPERTIES, INCLUDING GLASS DUST)

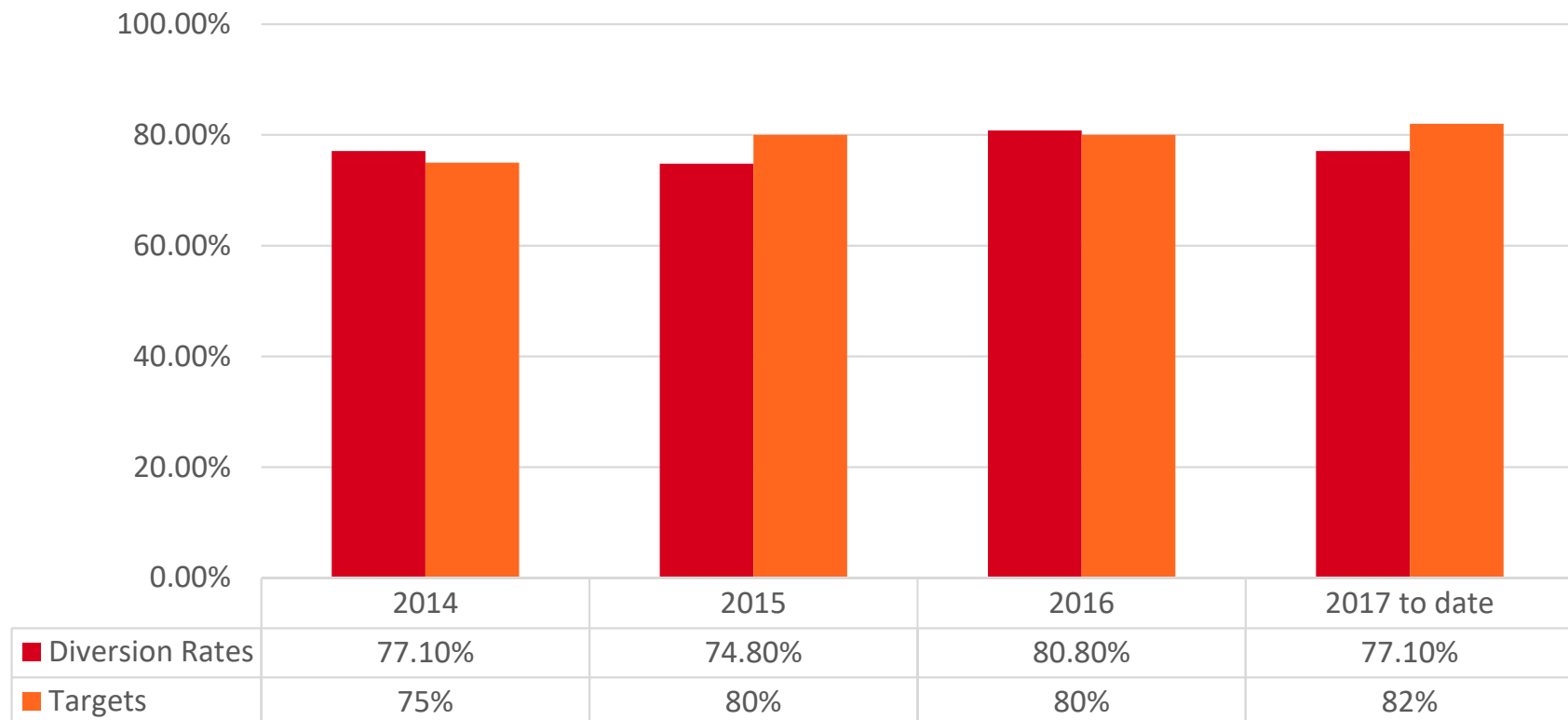
## ITEMS THAT ARE RECYCLED

Wood (non MDF)  
 Cardboard / Paper  
 Steel  
 Aluminum  
 Drywall (if in separate bin)  
 Concrete  
 Asphalt Variants (if in separate bin)

*Other materials in the acceptable waste table can  
 be potentially recycled if in large quantities  
 (roughly more than 4 bins full)*

# Construction Waste Diversion Trends

Our preferred vendor Waste Management has given us **reliable and institutional data** which is critical to planning and achieving improvements in waste diversion and reductions in waste generation to meet our targets.





# Sustainable Construction

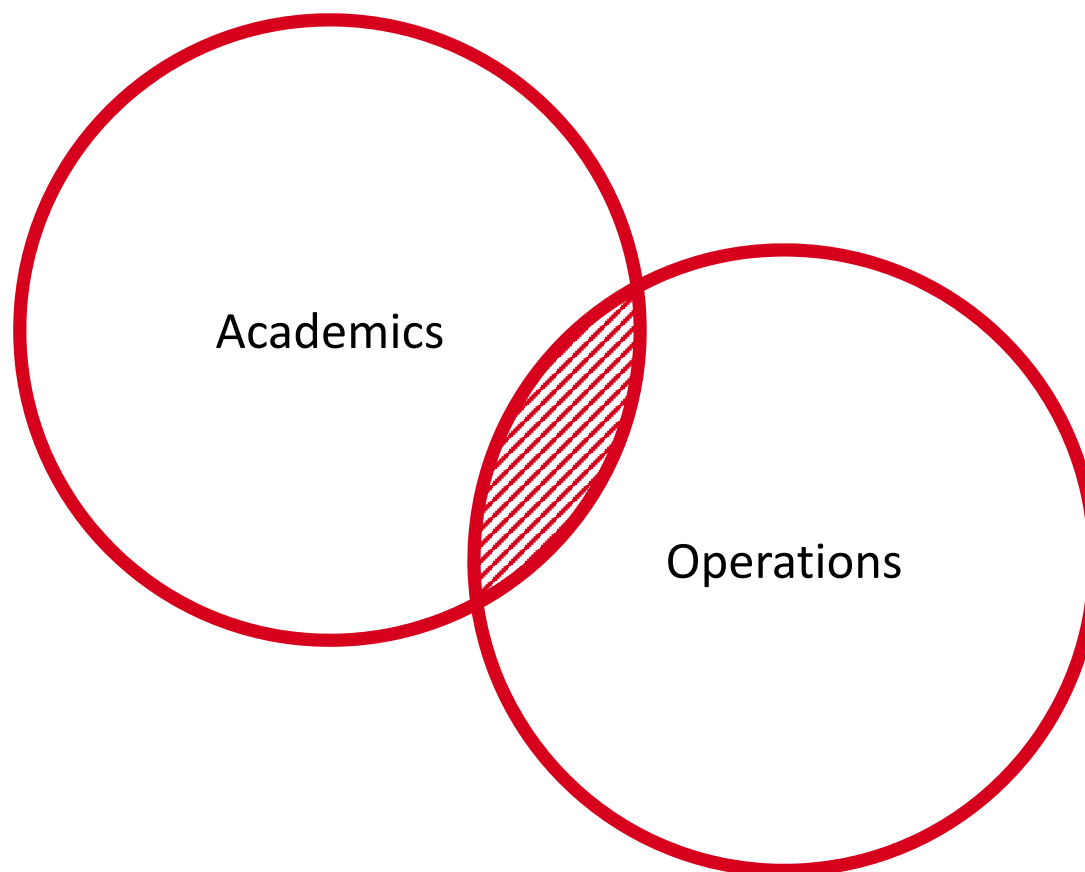
The next **step change** in construction waste management will be driven by a reevaluation of typical design and construction practices to consider:

- **design standards**
- **modular construction**
- **prefabrication**
- **deconstructability**
- **material reusability**



# Campus as a Learning Laboratory

Use the **Campus as a Learning Lab** will also be an important method to develop and implement innovation in the field of construction waste management





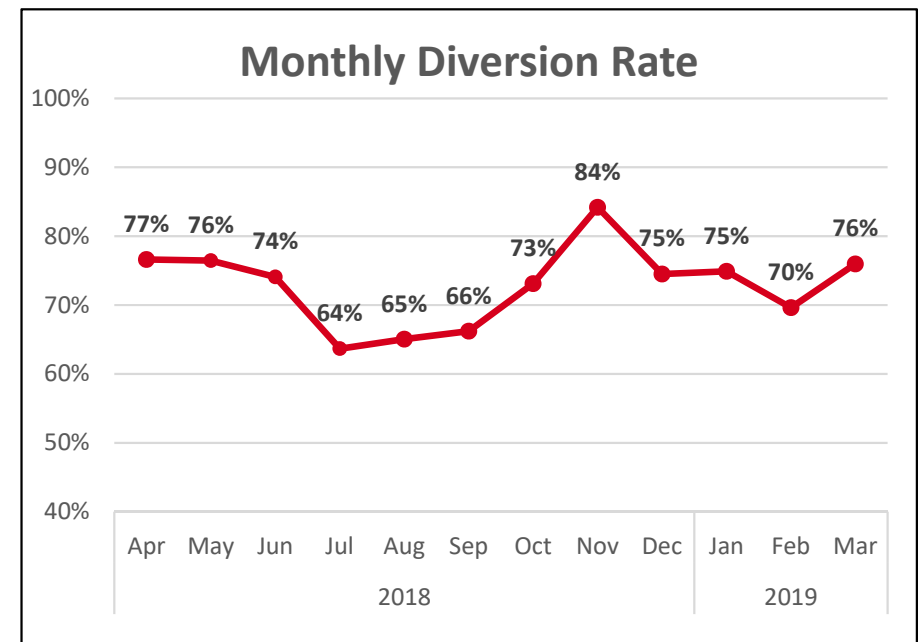
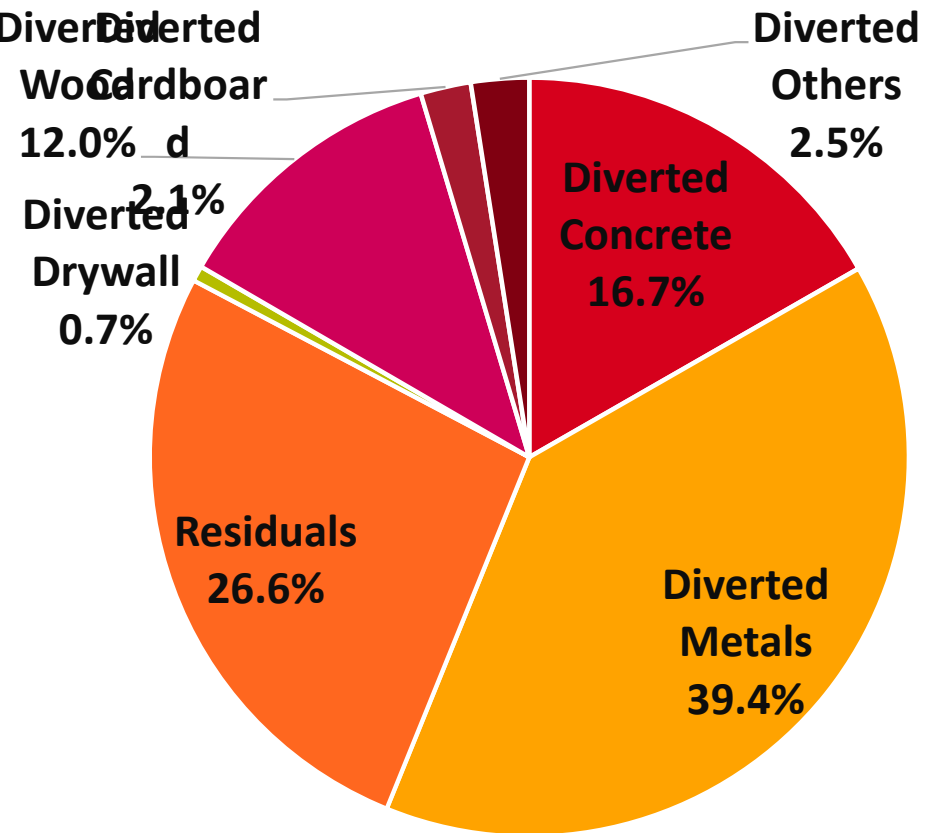
# MacKimmie Redevelopment Project



Life Cycle Assessment research conducted on the **MacKimmie Redevelopment Project** indicates that reusing the tower structure not only reduces **hundreds of tonnes of construction waste**, but also eliminates more than:

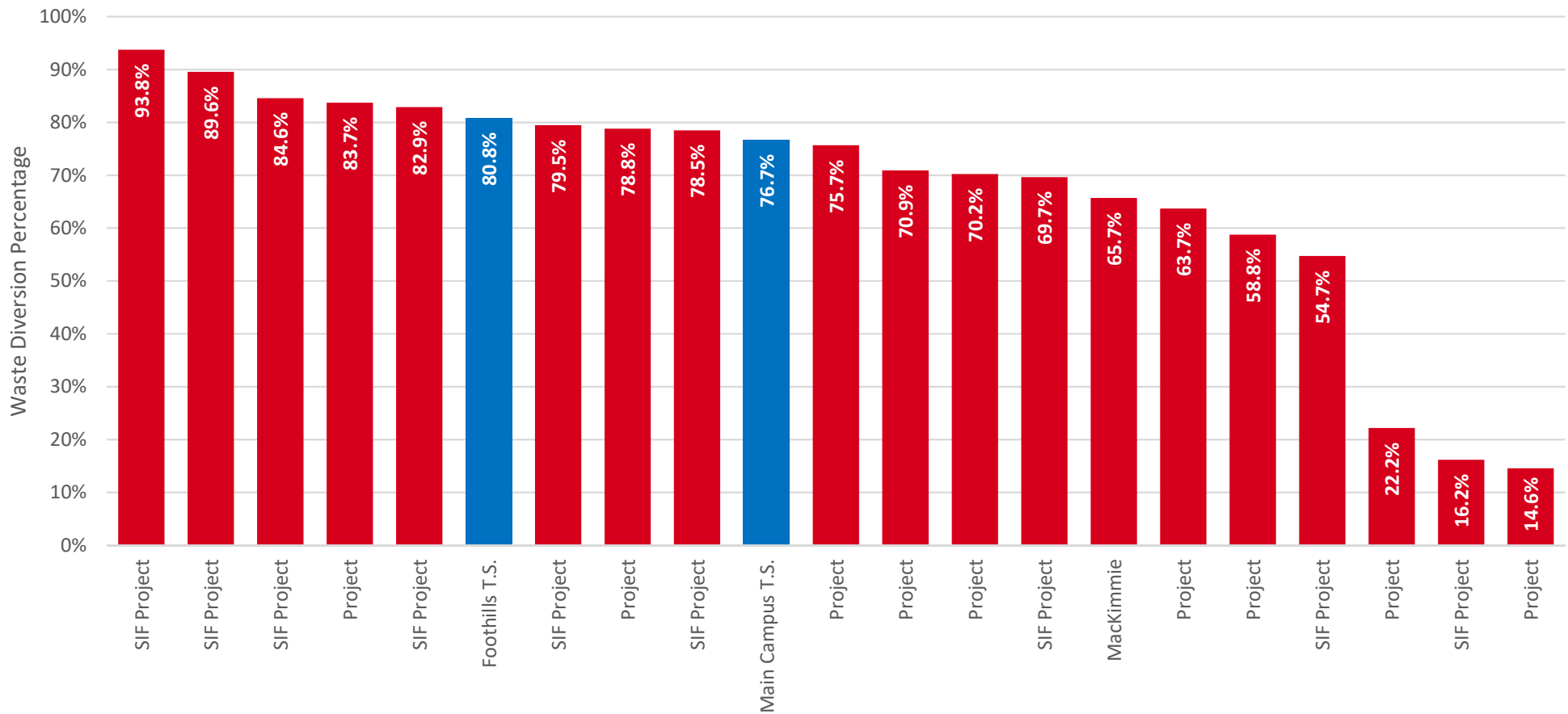
- 38,000 GJ of upstream fossil fuel consumption
- 3,300 tonnes CO<sub>2</sub>e of GHG emissions
- The equivalent of 11 tonnes of airborne particulate matter

## Waste Breakdown for 2018/2019 (not including MacKimmie)



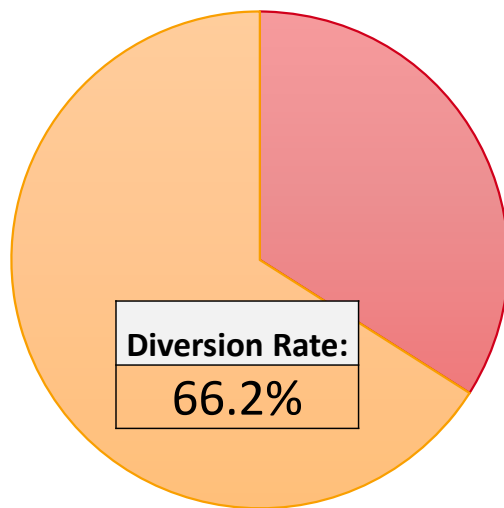
# Sustainability at the University of Calgary

Project Diversion Rates - FY 2017/18



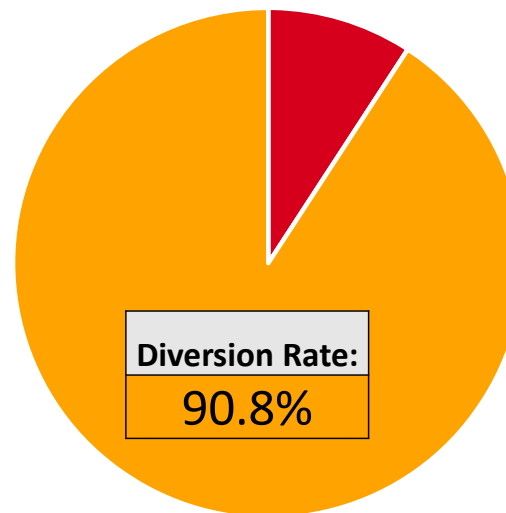
# Comparison to Last Year Waste Diversion

2017/2018 Waste  
Diversion



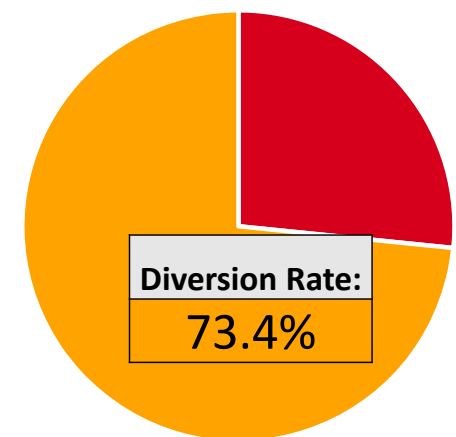
■ Residuals ■ Diverted Waste

2018/2019 Waste  
Diversion



■ Residuals ■ Diverted Waste

2018/2019 Waste  
Diversion  
(not including  
MacKimmie)



■ Residuals ■ Diverted Waste

# Successes from past year

- A variety of new opportunities to divert waste



Separate concrete bin on a project need basis allows 100% recycled rate via Fish Creek Excavating



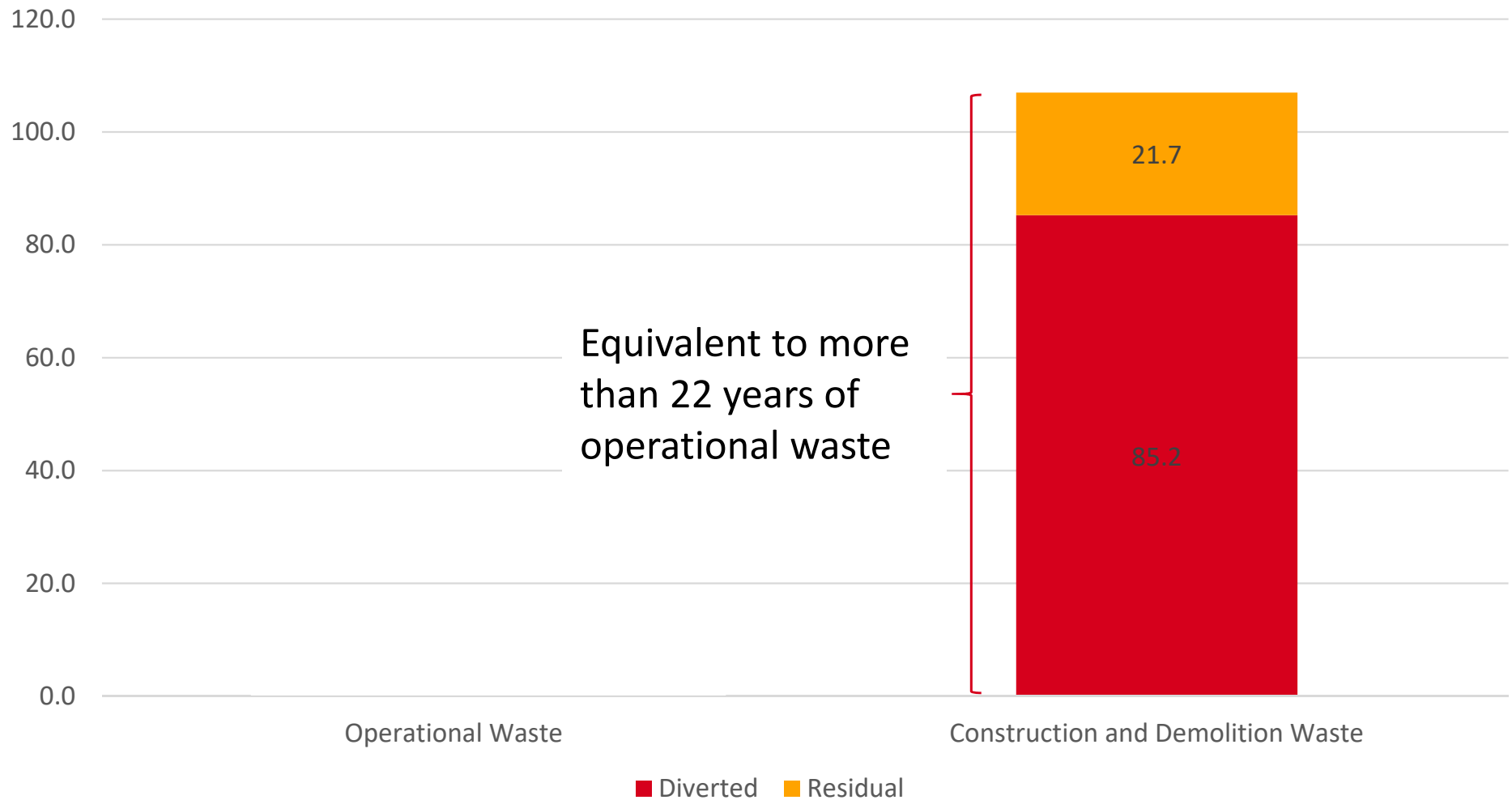
Dedicated drywall bin at main campus transfer station, since drywall can only be recycled if separated from other waste streams



Projects identifying unique items and contacting ECCO about diversion opportunities

# Beyond Bins

## Construction Waste vs. Operational Waste (kg/m<sup>2</sup>)





# McDonald's Sign

- Total cumulative since the beginning of the program



# Key Points

- Overview of Construction Waste
- Project Waste Amounts
- Waste Breakdown for 2018/2019
- Comparison to Last Year Waste Diversion
- Successes from Past Year
- Improvements Opportunities
- Comparison to Other Institutions

# Operational Waste

# Campus Wide Standardized Waste Bin Program

- The university strives to become a **zero-waste community** and a leader in post-secondary sustainability
  - **Target - Divert 80% of our waste from the landfill by 2020**
- As of **November 1, 2018** - the City of Calgary implemented a new municipal bylaw that requires all public institutions to divert compost/organics waste
- The program was implemented from **November 2018 to March 2019**
- UofC Standardized all interior waste bins in all **four campuses**:
  - **Main Campus (567 bins)**
  - **Foothills Campus (186 bins)**
  - **Downtown Campus (10 bins)**
  - **Spyhill Campus (12 bins)**
- Standardized exterior bins – 144 across all 3 campuses

**EXTERIOR  
BINS**



**INTERIOR  
BINS**



# Campus Wide Standardized Waste Bin Program

- The program aimed to create a **Closed Loop Circular Economy System**
  - The university didn't want to create more waste while rolling out the program, so it looked some innovative steps to minimize waste and make the most use out of resources
    - The bins selected were made from **97% recycled milk jugs** (for every bin built, an average of 100 milk jugs are diverted from the landfill).
    - At the end of the life of the bins the manufacturer will take them back to create new products
    - Old bins were re-use by the
      - **University of Regina**
      - **University of Lethbridge**
      - **Calgary Folkfest**



The universities are glad to facilitate the collaboration.  
Provided by: Jeremy Lague, University of Regina



# Campus Wide Standardized Waste Bin Program

- Innovative Educational Steps
  - Hosted several outreach booths during **Sustainability Week and Orientation Week**
    - Waste focused trivia wheel and prizes
  - Sustainable Dino's Waste Game (half time show) – during the first men/women's basketball game
- New Communication Material
  - Between **September and December 2018**
    - Webpage **views 1,389**
    - Promotional video was **viewed 3,076 times**
    - Social media impressions **reached 39,226 people.**
  - All metrics exceeded program goals.



Photo provided by: Ana Pazmino (University of Calgary)



Photo provided by: Ana Pazmino (University of Calgary)



# Accomplishments

- The project won the **Staff Sustainability Award** because of the level of **collaboration among different Departments**:
  - Facilities Management, Project Management, the Office of Sustainability, Caretaking, University Relations, Grounds, Campus Architecture, Supply Chain Management and the Students Union.



# Waste Audit 2019 (13 buildings)

- An audit is performed every 2 years but the university wanted to conduct an audit this year to measure the **participation rates on the new CW Standardized Waste Bin Program**
- Over the years, some of the buildings have not been audited and new ones introduced. However, the goal is to audit between 10 to 13 each audit cycle.
- In total **1.9 tonnes (2,621 kg) of waste was audited** among the 13 buildings

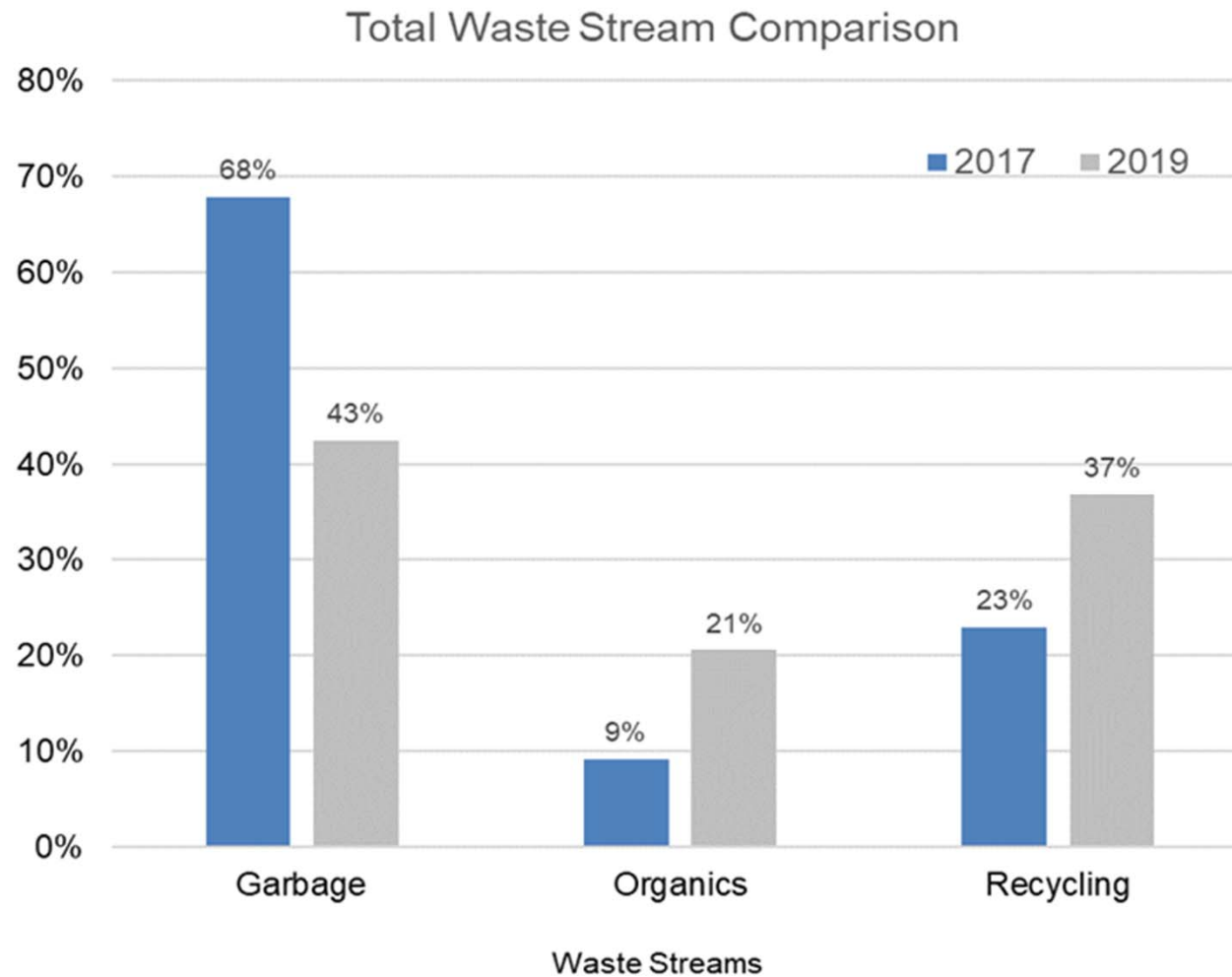


Photo provided by: Stacey Schaub-Szabo (S-Cubed Environmental)



Photo provided by: Stacey Schaub-Szabo (S-Cubed Environmental)

# 2019 Waste Audit Results



# Other Recycling on Campus

- **Textiles**
  - Used clothes and other textiles are collected on campus
  - This fabric is cleaned, sorted and recycled into new products such as wiping rags or stuffing for upholstery.
- **Beverage Container Recycling:**
  - This program is run in partnership with DDRC, Students Union and the University
  - The money made from the bottle collection is used to employ adults with learning disabilities
- **Mixed Recyclables Collection Program**
  - Since 1997 clients of Vecova Centre for Disability Services have gathered recycling material in buildings around campus.
  - This relationship has provided income as well as valuable work experience for people with disabilities.
- **Cellphones Battery Recycling:**
  - Used spillable and wet non-spillable batteries are collected on campus at designated batteries drop off locations.
  - The universities Hazmat program collects batteries from these locations



Photo provided by: Ana Pazmino (University of Calgary)

# Other Recycling on Campus

- **Electronic Waste**

- The electronics program at the university is run by Supply Chain Management (SCM).
- Equipment include: Computers, monitors, laptops, televisions, mice, keyboards, cables, printers, telephones etc.

- **Furniture and the Surplus Sale**

- The Surplus Sale program is run by SCM to sell items no longer in use such as desks, chairs, white-boards, computers, projectors and cameras.
- Before an item ends up at the Surplus Sale, the SCM team works to redistribute items on campus for re-use within departments or other common areas

- **Pallets Recycling**

- A contractor collects wooden shipping pallets at the loading docks.
- Pallets are either re-uses or recycle, saving hundreds of trees each year.
- The excess pallets on campus are repurposed if found to be in a good state.

## Help reduce UCalgary's footprint



Certify your events with UCalgary's Sustainable Events Program: you'll be provided with simple tools and resources to make your next event more inclusive, environmentally conscious and socially responsible

Work with your colleagues to earn a Waste badge through UCalgary's Sustainable Offices program. You'll be provided with simple tools and resources to help your team take action to reduce and sort out your waste and contribute to UCalgary's sustainability goals



Anyone can contact Facilities to request a desk-side recycling bin or outdoor event recycling and compost bins

Drop off worn textiles — everything from clothes and shoes to stuffed toys and used backpacks — in the textiles bin outside the Dining Centre or Yarnuska Hall to be recycled



Construction waste from all UCalgary projects is collected and sent to materials recycling facilities, resulting in up to 90 per cent of materials being diverted from landfill



# Other Recycling on Campus

- **Leftovers Foundation Program**

- The university has a partnership with Leftovers, an organization that works as an in-between for charities and food providers, to ensure extra food doesn't rot in the compost but nourishes people.
- University of Calgary Food Services and Aramark donate extra food safely and efficiently to two local charities: Made by Momma and Antyx Community Arts.

- **Lightbulb Recycling Program**

- Since 2010 the university has partner with a contractor to recycle light bulbs.
- The light recycling program started with a single pick up of florescent tubes and it has grown into a program that overs all three campuses.

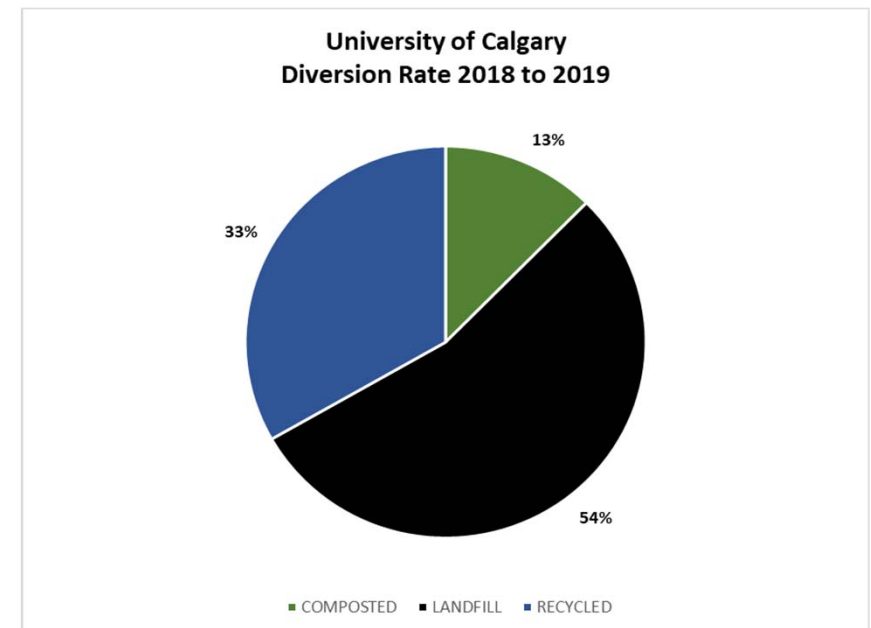
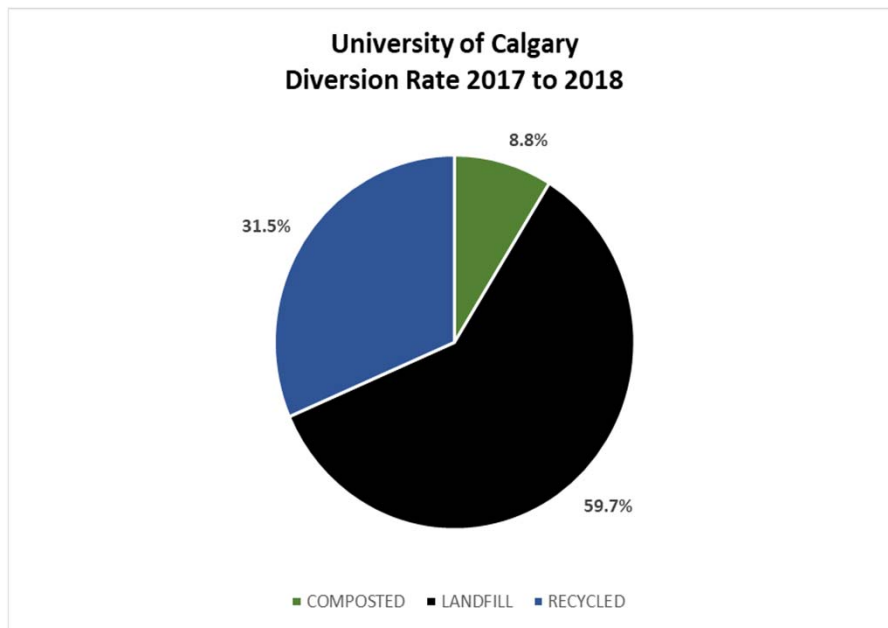


**Photo provided by:** Alison Murray (Aevitas Inc. Edmonton). From left to right Jerad and Kevin.



# Waste Diversion Performance

- University's Waste Diversion
  - Diversion Rate (2017 to 2018) = **40%**
  - Diversion Rate (2018 to 2019) = **46%**

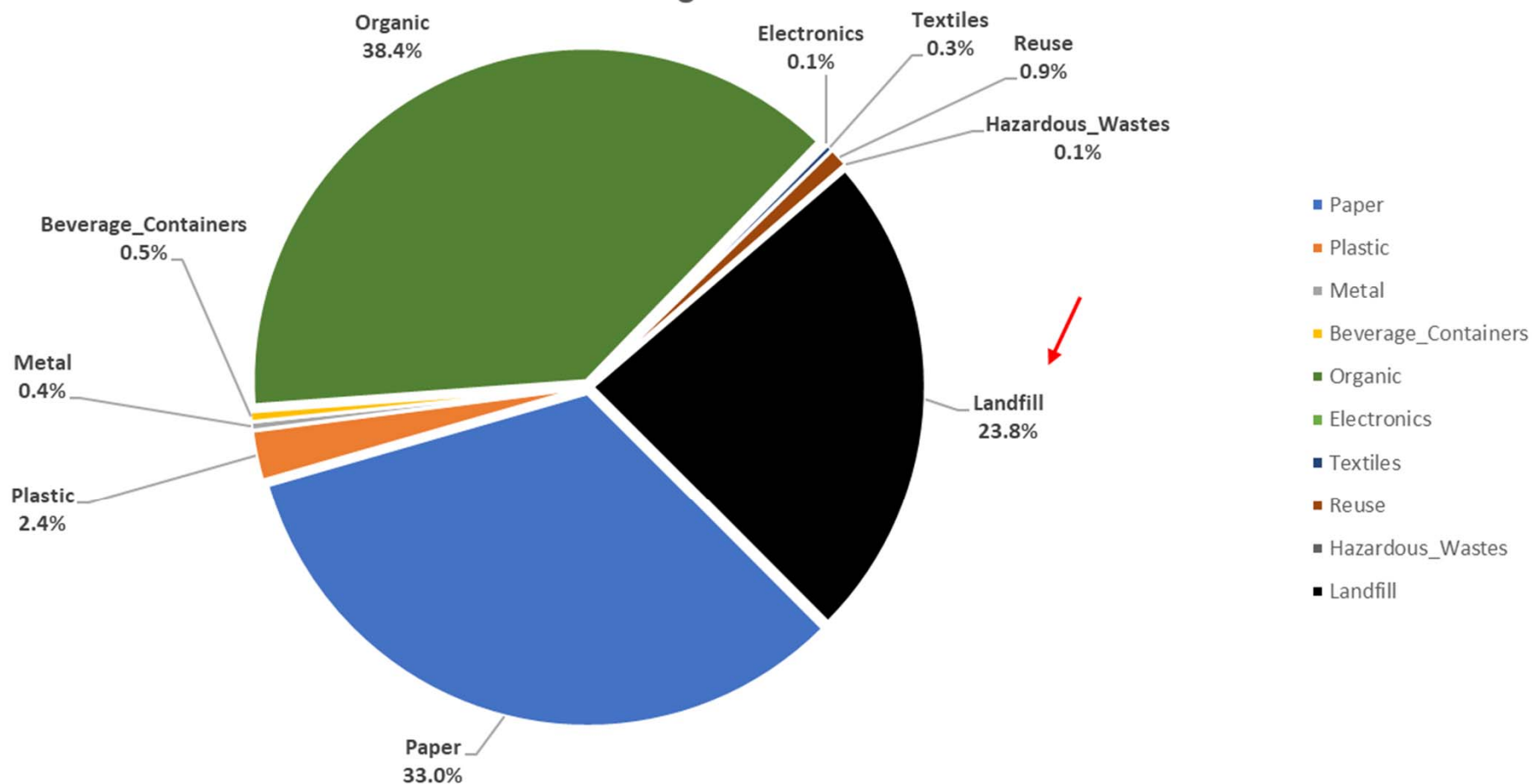


# How we'll get there...80% by 2020?

- Identify opportunities to **increase recycling and reduce cost**
- Determine **performance of existing programs**
- Identify **top contributor to landfill waste**

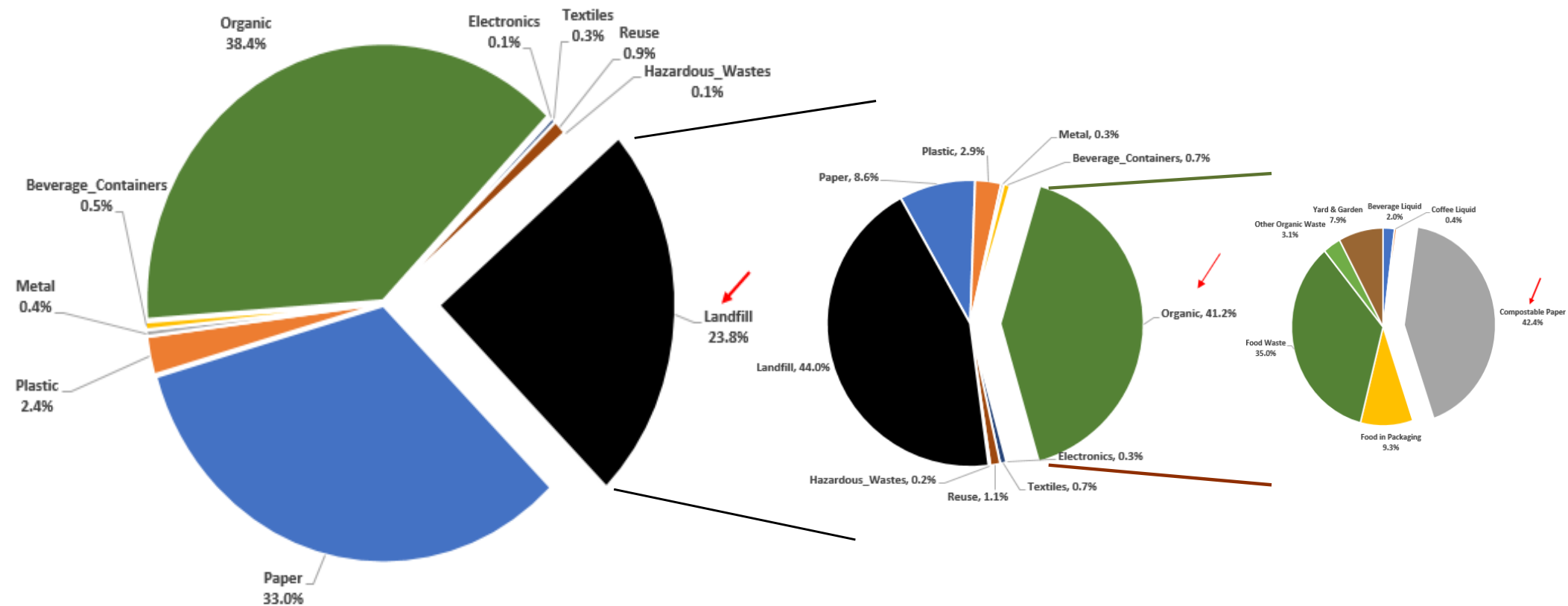
# How we'll get there...80% by 2020?

Waste Composition Study 2019  
13 Buildings Audited



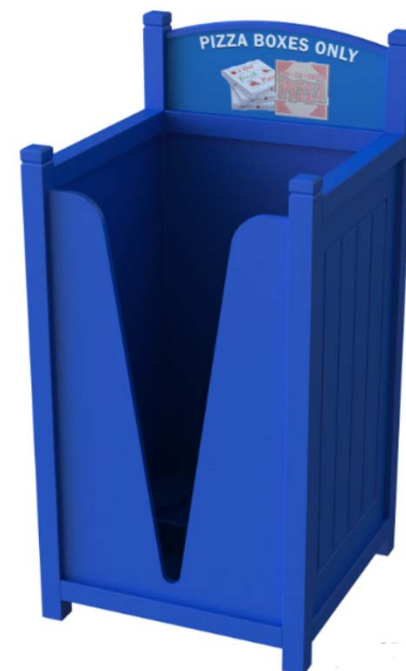
# How we'll get there...80% by 2020?

## Waste Composition Study 2019



# How we'll get there...80% by 2020?

- **Standardized Washroom Bin Program (Summer of 2019)**
  - Implementing Standardized Washroom Bin Program
  - This initiative will enable the university to compost paper towel waste from our washrooms
- The university will re-use and re-purpose existing classroom and conference rooms one-bin waste receptacles
- **Pizza Boxes (Pilot Study)**
  - Install pizza bins around campus for the collection of pizza boxes.
- **Residence Services (Summer of 2019)**
  - Implementing the new Standardized Four-Stream bins and the new pizza bins



# How we'll get there...80% by 2020?

- **Offices “I Walk Campaign”**
  - Staff and Faculty will be responsible for bringing their own desk side recycling bin and/or trash bin to the new centralized four stream bins
- **No Bins Classroom and Conference rooms**
  - New four stream bins will be approx. 30ft from any classroom and conference bins
- **Conference and Events Waste**
  - Engaging them to participate in proper waste diversion by providing additional bins to ensure proper waste collection and removal after each event.





# Campus Performance

# Benchmarking Campus Performance

- STARS is a self-reporting framework to measure sustainability performance
- Designed by AASHE specifically for higher education institutions
- All reported information is available for
- 967 participating institutions with 334 active ratings (last 3 years)



# STARS Open Data



## The Sustainability Tracking, Assessment & Rating System

(STARS) is a transparent, self-reporting framework for colleges and universities to measure their sustainability performance.

[About STARS](#)[Participate](#)[Reports & Data](#)[Resources & Support](#)[Contact](#) Gold

Overall Rating	Gold
Overall Score	80.45
Liaison	Megan Wibberley
Submission Date	Dec. 13, 2018
Executive Letter	Download

### STARS v2.1

#### INSTITUTIONAL CHARACTERISTICS

#### INSTITUTIONAL CHARACTERISTICS

IC-1: Institutional Boundary

IC-2: Operational  
Characteristics

IC-3: Academics and

## University of Calgary OP-20: Construction and Demolition Waste Diversion

Status	Score	Responsible Party
✓	0.69 / 1.00	<b>Adam Stoker</b> Sustainability Consultant Office of Sustainability

[Reporting Fields](#)[Credit Info](#)

"---" indicates that no data was submitted for this field

Construction and demolition materials recycled, donated, or otherwise recovered during the most recent year for which data is available within the previous three years:

1690 Tonnes

# STARS Open Data

[STARS Dashboard](#) [Category Display](#) [Score Display](#) [Content Display](#)


This STARS Data Display provides exact responses to specific reporting fields in STARS reports. The filter tool will enable you to focus on an increasingly specific group of institutions. For example, if the organization type "Baccalaureate" and STARS Rating "Gold" is selected only results for baccalaureate institutions that achieved a Gold rating will be displayed.

Once you generate a report, you can download the data by clicking the blue *Export Results* button. Note that all individual STARS reports are accessible in full through the [Participants & Reports](#) table. [Learn more](#).

**Step 1**

Selected STARS Version: **2.0** 1.0

Display results for institutions with the following characteristics:

Type of Characteristic	Specific Characteristic
 Institution Type	All Institutions
<input type="text"/>	<input type="text"/>
<a href="#">Add Filter</a>	

↓

**Step 2**

Use the drop down menus, below, to find the reporting field of interest (note: begin your search by selecting a category, then a subcategory, and so on):

Category:	Operations
Subcategory:	Waste
Credit:	OP-20: Construction and Demoli
Reporting Field:	Percentage of construction and c

# STARS Open Data

	A	B	C	D	E	F	G
1	AASHE believes transparency is a key component in communicating sustainability claims. STARS data are made publicly available, and can be used in research and publications, provided that certain Data Use Guidelines ( <a href="http://www.aashe.org/files/documents/STARS/data_use_guidelines.pdf">http://www.aashe.org/files/documents/STARS/data_use_guidelines.pdf</a> ) are met.						
2	Selected Filters: Institution Type   All Institutions						
3	Institution	Country	Institution Type	STARS Version	Points Earned	Available Points	Percentage of construction and demolition materials diverted from the landfill or incinerated
4	Agnes Scott College	United States	Baccalaureate	2.1	0.95	1	95.4%
5	American University	United States	Doctoral/Research	2.1	0.86	1	86.0%
6	Amherst College	United States	Baccalaureate	2.1	0.85	1	84.9%
7	Antioch College	United States	Baccalaureate	2.1	0.68	1	67.9%
8	Appalachian State University	United States	Master	2.1	0.93	1	92.7%
9	Aquinas College	United States	Master	2.1	0.94	1	94.4%
10	Arizona State University	United States	Doctoral/Research	2.1	0.91	1	91.0%
11	Arizona State University	United States	Doctoral/Research	2.1	0.99	1	98.8%
12	Auburn University	United States	Doctoral/Research	2.1	0.93	1	92.7%
15	Babson College	United States	Baccalaureate	2.1	0.86	1	8.9%
16	Baldwin Wallace University	United States	Master	2.1	1	1	84.6%
17	Bard College	United States	Baccalaureate	2.1	0.09	1	40.4%
19	Baylor University	United States	Doctoral/Research	2.1	0.85	1	99.2%
20	Belmont University	United States	Master	2.1	0.4	1	55.6%
23	Berea College	United States	Baccalaureate	2.1	0.9	1	77.7%
24	Binghamton University	United States	Doctoral/Research	2.1	0.99	1	87.9%
25	Binghamton University	United States	Doctoral/Research	2.1	0.56	1	99.2%
26	Black Hills State University	United States	Master	2.1	0.74	1	69.9%
28	Boston College	United States	Doctoral/Research	2.1	0.83	1	64.0%
31	Bowdoin College	United States	Baccalaureate	2.1	0.78	1	69.7%
34	Butler University	United States	Master	2.1	0.88	1	99.3%
36	California Polytechnic State University	United States	Master	2.1	0.99	1	80.8%
37	California State Polytechnic University, Pomona	United States	Master	2.1	0.7	1	97.5%
38	California State University, Bakersfield	United States	Master	2.1	1	1	93.2%
39	California State University, Chico	United States	Master	2.1	0.64	1	89.3%
40	California State University, Dominguez Hills	United States	Master	2.1	0.81	1	50.0%
41	California State University, East Bay	United States	Master	2.1	0.85	1	71.9%
42	California State University, Fullerton	United States	Master	2.1	0.7	1	99.7%
43	California State University, Long Beach	United States	Master	2.1	0.96	1	76.5%

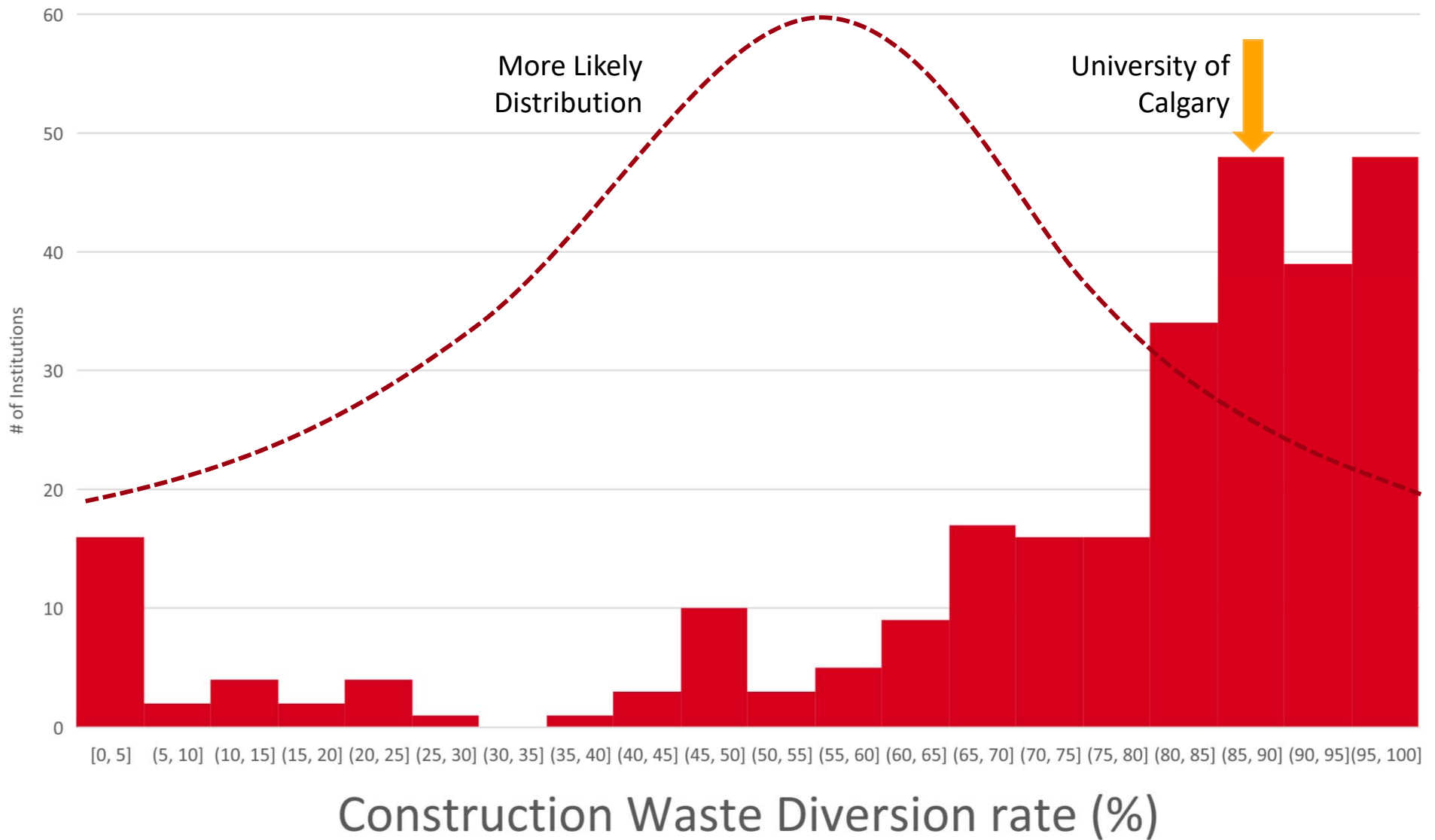
# Comparing to Other Institutions

- Limitation to STARS data:
  - Self-declared data
  - Some institutions appear to be only reporting on LEED buildings/major project waste diversion
  - Not all institutions report on waste diversion
  - Some data is old, from expired STARS submissions

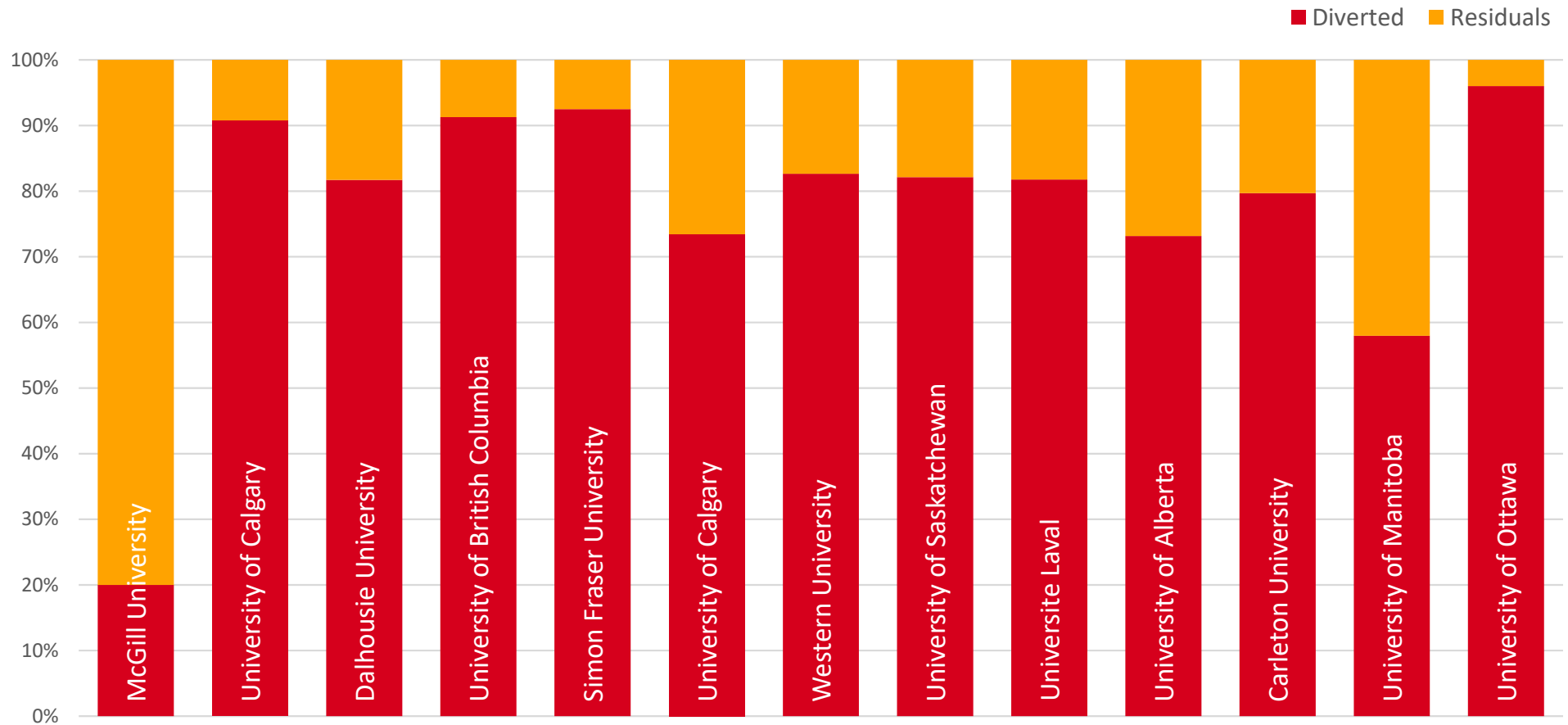




# Comparing Against Other Institutions

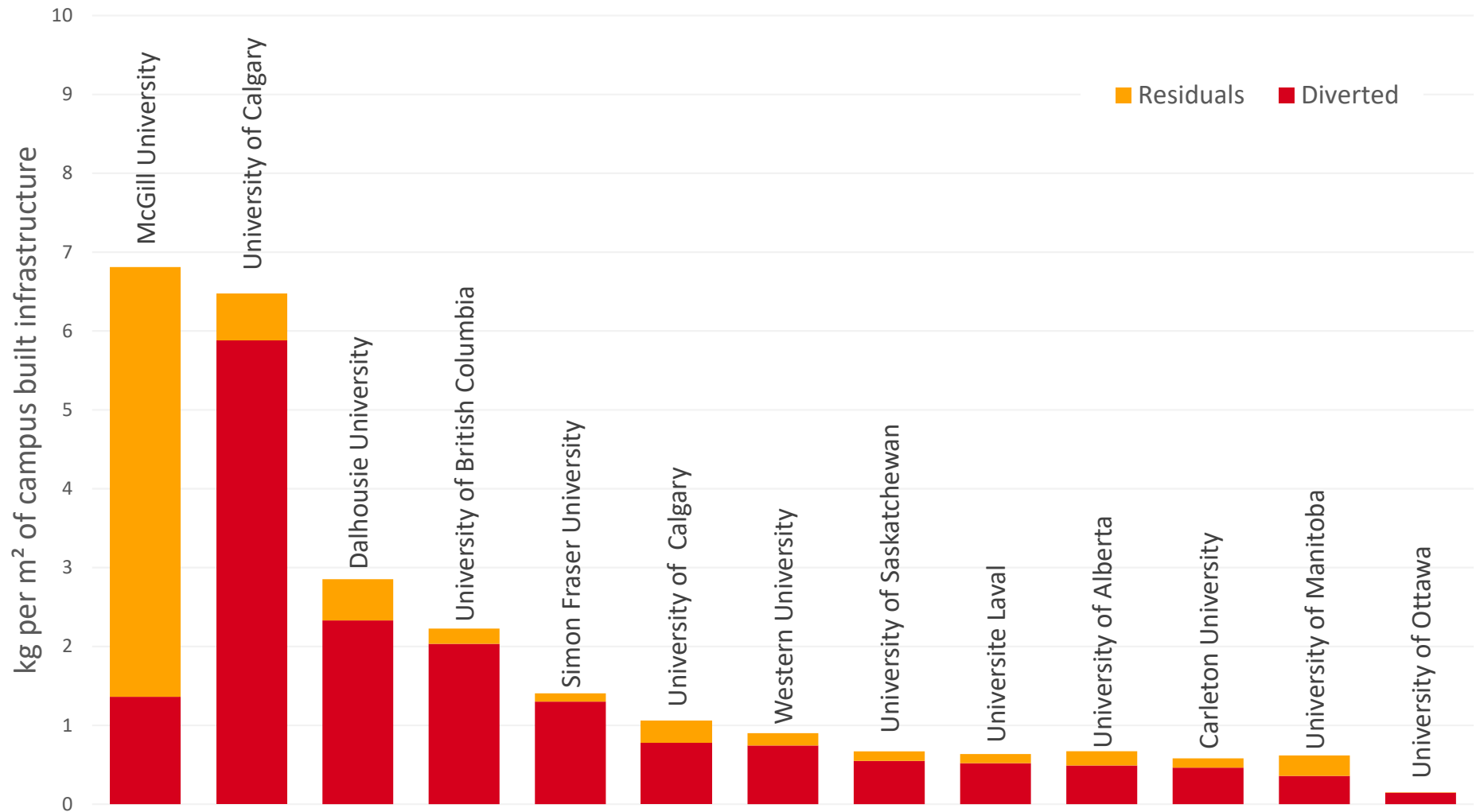


# Comparing Against Canadian Institutions



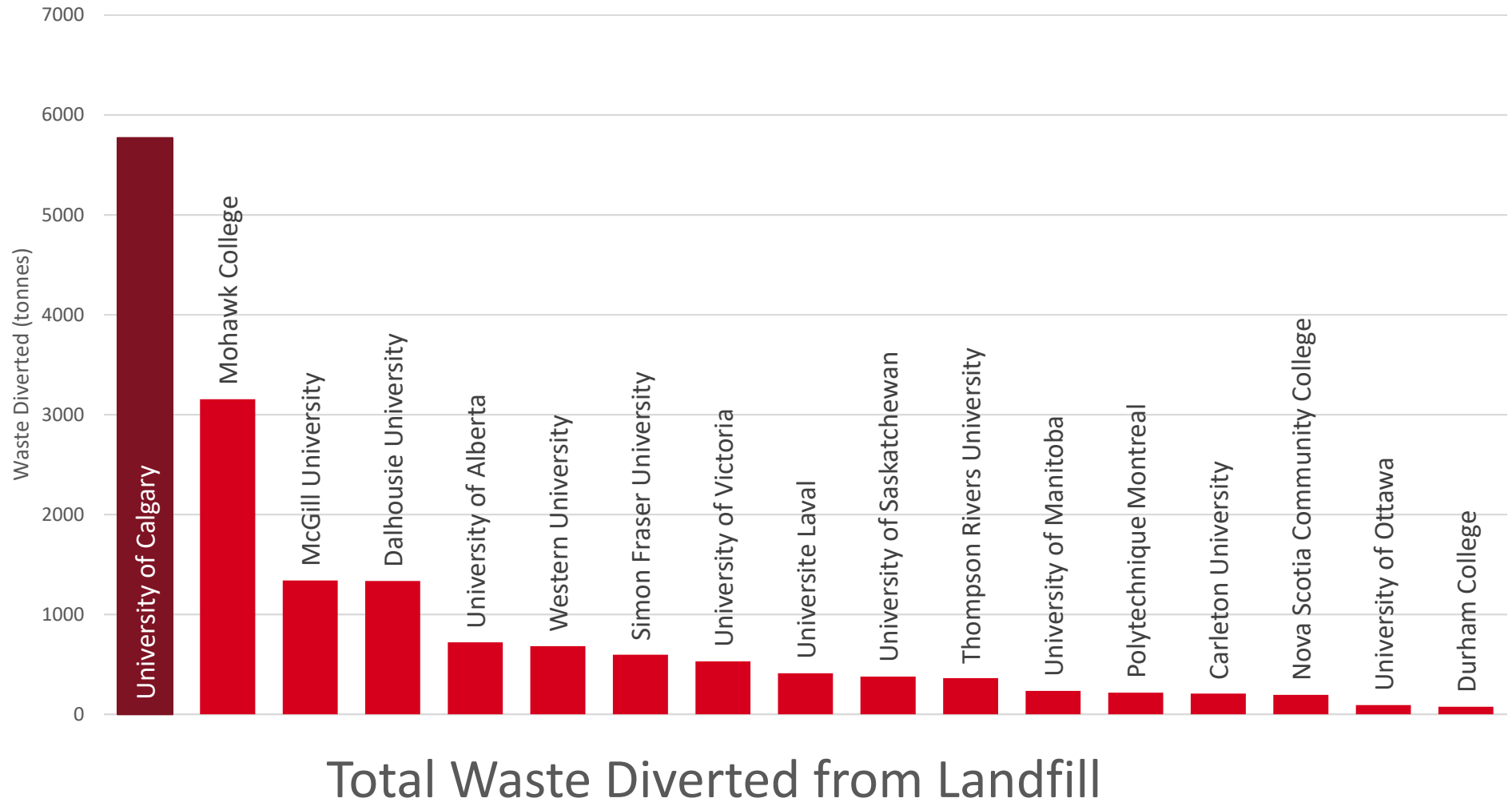
Institutional Construction Waste - Diversion Rate

# Comparing Against Canadian Institutions

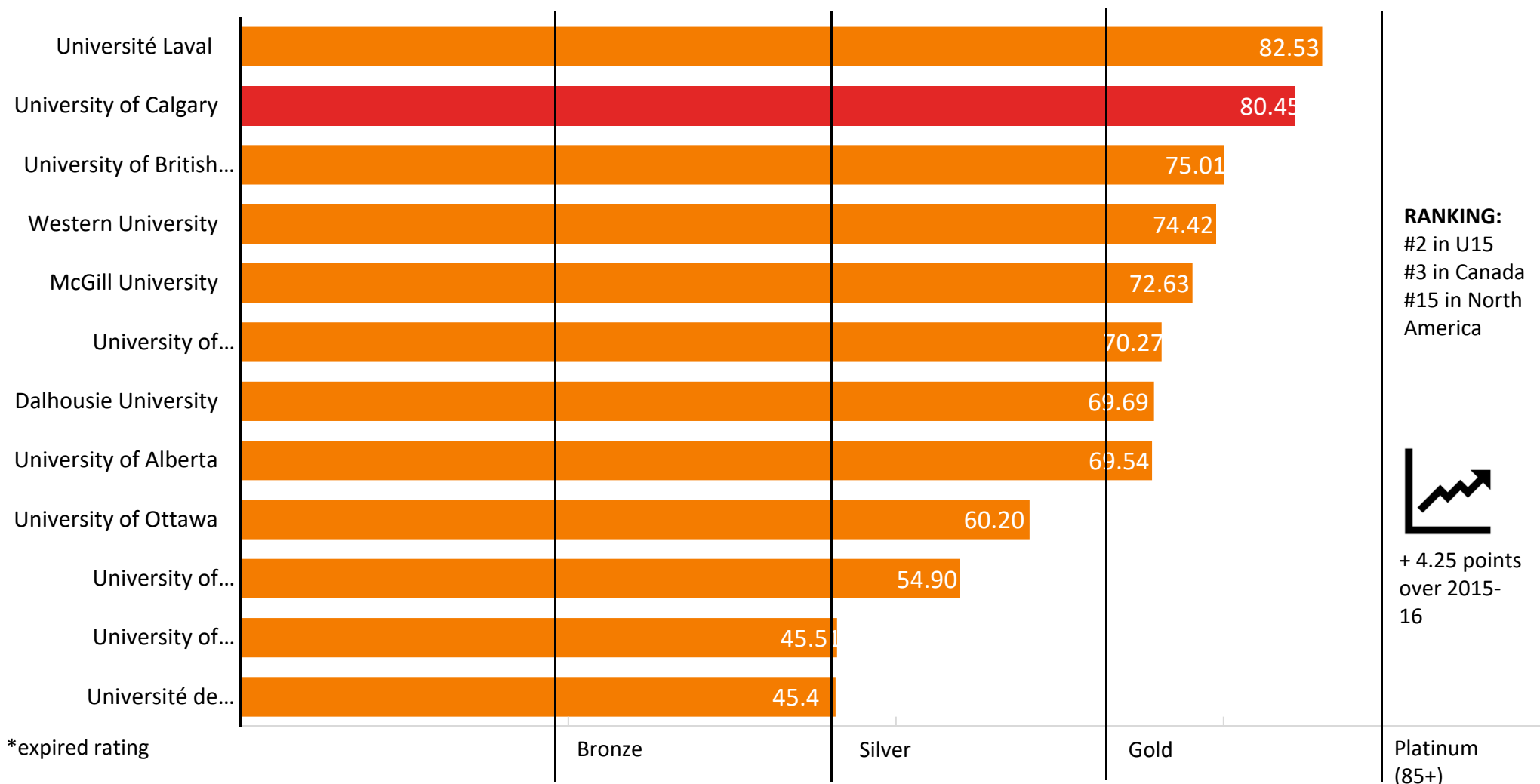


Institutional Construction Waste Production

# Contribution to STARS



# STARS U15 Comparison – June 2019



**Questions?**  
**Comments?**  
**Complaints?**  
**Concerns?**