

The Board of Governors acknowledges and respects the Algonquin First Nation, on whose traditional territory the Carleton University campus is located.

The 610th Meeting of the Board of Governors
Thursday, May 24th, 2018 at 4:00 p.m.
Room 2440R River Building, Carleton University

AGENDA

OPEN SESSION

1. CALL TO ORDER AND CHAIR'S REMARKS

2. DECLARATION OF CONFLICT OF INTEREST

3. APPROVAL OF OPEN AGENDA

- The agenda was circulated with the meeting material.

4. OPEN CONSENT AGENDA

- Circulated with this agenda is a Consent Agenda which lists items presented to the Board for approval or for information.

5. OPEN – ITEM(S) FOR EDUCATION & STRATEGIC INITIATIVES

5.1 Employability and Experiential Learning Update

- Verbal presentation will be given.

6. OPEN – ITEM(S) FOR APPROVAL

6.1 Board of Governors Award for Outstanding Community Achievement

- A working paper were circulated in advance.

6.2 Nicol Building

- A working paper were circulated in advance.

7. OPEN – ITEM(S) FOR INFORMATION

7.1 Report from the Chair (C. Carruthers)

- A verbal report will be given.

7.2 Report from the President (A. Summerlee)

- Written report was circulated in advance.

7.3 Update on Comprehensive Campaign (D. Fortin)

- Materials were circulated in advance.

7.4 Committee Chair Updates

- a) Building Program (D. Craig)
- b) Community Relations & Advancement (L. Daly)
- c) Finance Committee (B. Wener)
- d) Governance Committee (K. Evans)

8. OPEN - OTHER BUSINESS

9. OPEN - QUESTION PERIOD

- There is one question to be addressed.

10. END OF OPEN SESSION AND BRIEF NETWORKING BREAK

- Guests and observers are asked to step out of the meeting.
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Thursday, May 24th, 2018 at 4:00 p.m.
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11. APPROVAL OF CLOSED AGENDA

- The agenda was circulated with the meeting material.

12. CLOSED - CONSENT AGENDA

- Circulated with this agenda is a Closed Consent Agenda which lists items presented to the Board for action or for information.

13. CLOSED – ITEM(S) FOR INFORMATION

13.1 Dominion Chalmers United Church – Update (S. Levitt)

- A verbal update will be given.

13.2 Report from the Chair (C. Carruthers)

- A verbal report will be given.

13.3 Report from the President (A. Summerlee)

- A verbal report will be given.

13.4 Committee Chair Updates

- a) Audit Committee (B. Wener)
- b) Nominating Committee (C. Carruthers)
- c) Executive Committee (C. Carruthers)

14. CLOSED - OTHER BUSINESS

15. CLOSED - IN CAMERA SESSION

16. ADJOURNMENT

AGENDA ITEM

6.1

COMMITTEE: Board of Governors
MEETING: 610th – May 24, 2018
ORIGINATOR: Community Relations & Advancement Committee
ITEM: Board of Governors Award for Outstanding Community Achievement

I. INFORMATION PRESENTED TO THE BOARD

On February 26th, 2018, the Board Award Jury met to review the nominations for the Board Award. This year, ten nominations were received. It was agreed by the Jury that this year's recipient of the award be Christian Robillard.

The Jury was impressed by Christian's significant and consistent volunteerism both at Carleton and in the Ottawa community. In February of this year, Christian completed his Bachelor of Public Affairs and Policy Management with a specialization in Social Policy and his Master's degree in Philanthropy and Nonprofit Leadership.

Christian has been described as caring, motivated and a determined individual who is truly a Carleton ambassador. Just recently, Christian has secured a \$37,000 TD fellowship from the Canadian Council for Advancement of Education, which is one of only two fellowships awarded each year to a university, college or independent school. Christian's heart has truly no limit when it comes to giving back and serving his community.

In addition to his direct fundraising, Christian empowers others and demonstrates an impressive ability to inspire people to do more. Whether it is through recruiting fellow philanthropic-minded students to become more proficient in their fundraising, planning events, developing corporate sponsorship strategies, or helping others to pursue careers in the philanthropic sector.

To empower more students to be philanthropic and explore careers in the charitable sector, Christian founded the Carleton Collegiate Chapter of the Association of Fundraising Professionals. In addition, he served as the sponsorship co-ordinator for the Carleton University Students' Association to raise funds to support the student experience and has co-chaired the Carleton Community Campaign, helping the team raise over \$300,000 and \$75,000 respectively. He also co-founded the Beyond the Bake Sale Podcast and the first ever Carleton – Dance Marathon, raising \$16,000 for the Children's Hospital of Eastern Ontario. From children causes, to civic engagement to health care, overall Christian has helped raise over a million dollars for worthy causes in the community. Christian has unparalleled leadership and has balanced all this volunteering, in addition to other numerous pursuits, with his academic studies and achieved a solid GPA.

Christian Robillard will be presented the award at the June convocation ceremony.

II. RECOMMENDATION TO THE COMMITTEE

It is recommended that the Board approve the recommendation of the Jury that Christian Robillard receive the 2018 Board of Governors Award for Outstanding Community Achievement.

AGENDA ITEM

6.2

COMMITTEE: Joint Building Program and Finance Committee

MEETING: May 22, 2018

ORIGINATOR: Vice-President (Finance and Administration)

ITEM: Sprott School of Business Building – Award of Contract

I. MATERIAL ATTACHED

- Capital Project Approval and Control Document and Financial Projections

II. DECISIONS REQUIRED

- To approve the award of contract and proceed with the construction of the Sprott School of Business (Nicol) Building.

III. BACKGROUND

On September 19, 2017, the Building and Program Committee reviewed and recommended approval of the final design of the Sprott School of Business (Nicol) building, and the Finance Committee recommended going to tender with an estimated cost of \$48 million. On October 5, 2017, the Board of Governors approved the Building Program and Finance committee's recommendations to move ahead with the tender process. Funding for this project include \$10 million donated by Wes Nicol (now worth \$11.8M), \$8M appropriated from the 2017-18 operating budget, and \$28.2M accumulated in the university capital reserve fund.

The project of about 115,000 square feet will include public assembly space, electronic and interactive classrooms, student resources room, office space and space for entrepreneurial programs. The estimated \$48 million costs left the 5th floor unfinished (for future expansion).

Carleton has a high degree of classroom utilization (90%), and this building will provide, in addition to, much needed space for the Business School, additional classroom space to bring the rate down closer to an 80% utilization. There is a need on campus for more flexible teaching and learning spaces, which this building would provide. Some of the negative impacts of not proceeding include a loss of competitiveness and enrollment in the Sprott School of Business. The Business School comprises about 8% of Carleton's total enrollment. If enrolment drops the university could see a loss in base funding.

As part of the Board approval, it was requested that management provide a rationale for and to include in the tender the option of completing the 5th floor. This could save considerable long-term costs for the university and minimize disruption to faculty, staff and students in the future.

IV. ANALYSIS

According to the Classroom Utilization and Sensitivity Analysis performed by Educational Consulting Services, (ECS) Carleton currently has shortage of classrooms in various categories required to schedule projected activity. Therefore, our classroom mix requires improvement to better match room capacity with instructional size.

The planned classrooms in the Business building would assist in providing the instructional space in the group 1, capacity range of 1-20 seats. This increase in smaller sized classrooms accommodates instructional requirements while minimizing the projected need to modify larger classrooms into smaller classrooms.

The Business building is planned to increase the group 3 (medium size classrooms) in the 41-60, 61-80 and 81-100 seat capacity. While this range is not identified as essential in the ECS report, general pool classrooms in this size range seem to be in the highest demand according to scheduling.

The Business building also provides three large scale classrooms under group 4. Two are 105 seats and the other is 212 seats. The addition of these three larger lecture halls fulfills a requirement for larger instructional space that is currently missing from our general pool classroom inventory.

With the design and fit up of the shelled floor the total project budget was expected to increase from \$48.0 million to \$50.5 million (construction tender value \$40 million). The business building will be located on parking lot 2 next to the Architecture Building and could be completed and ready for occupancy in the summer 2020.

V. ABOUT THE TENDER PROCESS

The following is a summary of the tender results:

- 6 general contractors were shortlisted through a prequalification process through MERX and invited to submit bids.
- The contractors had 6 weeks to prepare their bids (March 12 to April 24).
- Five bids were received. One contractor declined to bid due to workload.
- The low bid for the construction part of the project was * \$53.4M (total project costs of \$63,1M) compared to tender costs estimate of \$38.0M (total approved project costs of \$48.0M)
 - * *The \$53.4M includes construction costs for the fit-up of the 5th floor, worth approx. \$2.2 million*
- The other 4 bids received were in a range of 2% to 8% over the low bid.

Bids Received for Construction Contract

Buttcon East Ltd.	\$57,856,000
Doran Contractors	\$54,751,000
Ellisdon Corp.	\$55,900,000
PCL Constructors	\$57,175,000
R.E. Hein Construction	\$53,366,000

The following table provides a high-level analysis of the significant variances between the December 2017 construction costs estimate and the low bid received.

	Variance to estimate	Reasons for variance
Scope of work	\$2,000,000	Construction component of the fit-up of the 5 th floor not included in the approved estimate
Budget to estimate variance	\$1,000,000	The most recent construction cost estimate was higher than the approved budget
Earthworks, civil and landscape	\$1,300,000	Associated with complexity of work around tunnel, required shoring, underpinning, rock excavation and construction details introduced after cost estimate
Form, Place and finish concrete	\$4,000,000	\$1.8M is associated with formwork complexity related to bubble deck. A solution is being developed to resolve this, which would reduce the amount of bubbles and allow for traditional forming approach.
Rebar	\$1,600,000	Assumed to be associated with steel escalation related to the US tariffs
Stone/masonry	\$ 450,000	Error in estimating quantity for lime stone
Structural steel	\$1,500,000	Assumed to be associated with steel escalation related to the US tariffs
Misc. metals	\$1,200,000	Assumed to be associated with steel escalation related to the US tariffs
Millwork	\$ 350,000	Likely associated with increase in millwork between 95% and 100%
Curtain wall, interior/exterior glazing	\$ 900,000	Assumed to be associated with aluminum and glass escalation
M&E	\$ 200,000	
misc.	\$ 900,000	Results from various issues across all areas
Total variance	15,400,000	

There has been extraordinary inflation in steel, aluminum, and glass in the past 6 months. This escalation was not captured in the Class A estimate of December 2017. The escalation risk became known to the project team in March 2018, however at that point the documents were 100% complete and issued for tender March 12.

The most notable negative impact of the steel escalation is that steel suppliers are not holding their prices for more than 15 days because of expectations of further escalation. For the Nicol building the majority of the steel will not be delivered and installed for at least a year. The steel contractors have likely carried contingencies for further escalation.

The bid includes about \$7.6M in steel (rebar, structural steel, misc. metals vs \$3.3M in the costs estimate. The steel costs account for \$4.4M of the total variance. It is also assumed that the \$900k variance in curtain wall and glazing is associated with similar cost escalation.

VI. OPTIONS

Option 1

- Negotiate \$2.0M cost savings with the low bid contractor related to adjustments to the traditional formwork construction for a revised contract value of \$51.4M including the fit-up of all floors
- This option will require an increase to the total project budget of \$15.1M, from \$48.0M to \$63.1M (including fit-up of the shelled floor)
- Start construction immediately, and concurrently seek potential cost savings through adjustments to the structural design as already identified by the concrete sub trade in coordination with the general contractor. In addition a small number of modifications to the glazing installation and fit-up would be pursued.

Option 2

- Major cost savings realized through program reductions and re-tender
- Total project budget would increase by \$4.5M, from \$48.0M to \$52.5M (including fit-up of all floors)
- Target of \$11.0M reductions in the construction contract for new target tender price of \$42.4M
- The program reductions would consist of the following:
 - Based on Deleting Level 3 = 20,820sf
 - Brings down GFA to 95,100 SF
 - 3 of the 5 classrooms on Level 3 would be brought down to Level 2 (ground floor)
 - 3 of the meeting rooms would be brought down to ground floor
 - Lose one 50 person classroom plus another 25 seats = 75 classroom seat loss
 - Lose the 4 seminar rooms including the one that was reconfigured to a small 28 person classroom = 72 seat loss (*Note the current design has about 200 more seats than what was in the initial program*)
 - Lose 1 meeting room
 - Accelerator, Undergrad Office Suite, and Trading Lab would all have to move to above the atrium levels

- These relocated functions would fill the ‘shell space’ leaving no future shell space
- The atrium would become 2 stories – eliminating the smoke control system

Option 3

- Delay the project.
- Costs already incurred of \$3.2M

VII. PROJECT FUNDING

Funding for the approved cost estimate of \$48.0M has been secured through donation and appropriations to the university capital reserve. The additional \$15.4M would come from expected additional operating surpluses in 2017-18 and 2018-19, and budgeted operating funds in 2019-20, backstopped by the university’s capital reserve tentatively earmarked for the new University Centre (which is not planned until after completion of the business building).

The financial projections (see attached document) support the availability of operating funds in the coming years.

VIII. RECOMMENDATION

Approve Option 1 above.

CAPITAL PROJECT APPROVAL AND CONTROL DOCUMENT

- I. **PROJECT NAME:** Sprott School of Business Building
PROJECT NUMBER:
CSP NUMBER:

II. **DESCRIPTION**

What

The School of Business Building will be approximately 115,000 square feet gross and include the following: public assembly space, electronic and interactive classrooms, student resource room, office space, space for entrepreneurial programming. The approved cost estimate used for the tender process was \$48.0M (with a shelled floor) compared to total project costs of \$63.1M (with no shelled floor and expected negotiated cost savings of \$2.0M).

Where

The School of Business Building will be located on Parking Lot 2 next to the Architecture Building.

When

Appointment of Architect	May 2016
Completion of Preliminary Design	October 2016
Construction Start	June 2018
Substantial Completion	August 2020
Occupancy	September 2020

Why

Carleton has a high degree of classroom utilization (90%), and this building will provide, in addition to, much needed space for the Business School, additional classroom space to bring the rate down closer to an 80% utilization. There is a need on campus for more flexible teaching and learning spaces, which this building would provide.

Why now

The construction of a Business School Building is our highest major capital priority and was given significant impetus by the donation of \$10 million by Wes Nicol in 2014 (which is now worth \$11.8M).

III. Cost Estimate

	Needs Study	Preliminary Design	Final Design	Contract
Construction Cost	38,000	38,000	38,000	51,366
Furnishings/Equipment	1,500	1,500	1,500	1,800
Site Development/Landscaping				
Sub-Total Building Cost	39,500	39,500	39,500	53,166
Fees	4,000	4,000	4,000	4,200
Contingencies	2,000	2,000	2,000	2,434
Sub Total	45,500	45,500	45,500	59,800
Communications (ITS)	1,000	1,000	1,000	1,300
Financing Costs				
HST	1,500	1,500	1,500	2,000
TOTAL	48,000	48,000	48,000	63,100

IV. Cost by Fiscal Year

	2016-2017	2017-2018	2018-2019	2019-2020
Ministry				
University	1,500,000	3,000	25,500,000	33,100,000
Others				
TOTAL				

V. Approvals

	Needs Study	Preliminary Design	Final Design	Contract
Board of Governors	June 28, 2016		September 19, 2017	

Carleton University – 2018-2019 Budget Notes

4.0 Financial Planning

The university operates on a five-year rolling financial plan. The underlying premise is that in the final year of the plan, base expenditures will equal base revenue. The 2018-2019 to 2022-2023 plan, summarized below, meets this obligation while allowing for significant fiscal (one-time) expenditure allocations in the first four years of the plan, as well as modest real base growth (i.e. after compulsory increases) in the Faculties, Student and Professional Services.

Revenue projections reflect a continuation of the current fee increase framework, enrolment growth from undergraduate flow-through, modest growth in graduate enrolment, and the associated fees and grant.

	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
	Base Budget	Base Budget	Outlook	Outlook	Outlook	Outlook
	(\$M's)	(\$M's)	(\$M's)	(\$M's)	(\$M's)	(\$M's)
<u>Base Revenues</u>						
Tuition	287	307	324	338	353	364
Grants	172	173	175	175	176	176
Other revenues	24	25	25	25	25	25
Total revenue	483	505	524	538	554	565
<u>Base Expenditures</u>						
Faculties, Student and Professional Services	284	306	325	348	370	391
Provisions and Contingencies	13	14	15	16	17	18
University Budgets	136	141	146	151	154	156
Total Base Expenditures	433	461	486	515	541	565
Fiscal amount available	50	44	38	23	13	-

AGENDA ITEM

7.2



DATE: May 8, 2018

TO: Members of the Board of Governors

FROM: Alastair JS Summerlee

COPIES: Amanda Goth
Sandra Slater

RE: President's Report to the Board – Agenda Item 7.2

Report on activities and events in the past few weeks.

➤ **Dominion Chalmers United Church:**

- Negotiations: A final version of the Purchase, Sales and Lease agreement for the Dominion-Chalmers United Church has been agreed by the two negotiating teams. The agreement has been ratified by three levels of authority within the Church community and is presented to the Board of Governors at Carleton for final approval. University Management has completed, satisfactorily, the thirteen caveats that were attached to the motion approved by the Board at its meeting on December 5, 2017 when the Board authorized the University to move ahead with the negotiations (Appendix I).
- Communications plan: A comprehensive communications plan for the Dominion-Chalmers United Church has been established. This will include: a formal press joint press release from Carleton University and the Church Authority; opportunities to thank current and past donors that have made the purchase and renovation of the facility possible; and a formal occasion to thank donors and volunteers who have campaigned to see that the project has been realized. Members of the Board will be made aware of events planned to celebrate donors and volunteers and are welcome to attend. The plan was shared with CR&A at its May meeting.
- Use of the facility: University Management has developed a time-line and schedule for required and necessary renovation of the Church space – the scheduling of construction work will be dovetailed into existing bookings by external groups for use of the facilities. The University has established an academic steering committee to guide and monitor the use and booking of space that is scheduled for Carleton academic programming. University Management is now finalizing long-term contracts for use of the rentable space with the Ottawa Symphony Orchestra, Chamberfest and Jazzfest. (However, these cannot be signed until the purchase is complete). In addition, working with community groups and the National Arts Centre, a number of cultural events have been provisionally booked in the facility. In the medium-term, the University will develop a more robust management plan for the facility that will include a process for active recruitment and advertising for groups to use the facility.

- **Council of Ontario Universities (COU) Advocacy Campaign**: COU has developed an advocacy campaign for all nominees of all parties in the lead up to the provincial election. Working with University Management, including the President Designate, the Interim President will be working to meet with nominees in the Ottawa-Gatineau ridings to ensure that nominees of all parties understand that universities are willing to work with, and an important part of, the agenda of all three parties in helping maintain a strong, healthy and productive economy for Ontario. The concept of the unique partnership between the four post-secondary institutions in the region (University of Ottawa, Carleton University, Algonquin College and Collège La Cité) will be strongly promoted. This partnership is a pilot project funded by the provincial government to form an Education Hub, known as *Education City* in Ottawa with a focus on employability and job trained-readiness. There are long-term implications for additional government funding from

both the Liberal and Conservative parties if elected. The four presidents and provosts have been meeting to establish a series of goals for the pilot program including milestones and are working closely with *Invest Ottawa* who will work as a collaborative partner, providing in-kind support (rent-free use of facilities) and support for working with the Federal Development Fund. The initiative is being led by the interim President until a full-time project manager can be appointed from the provincial funds available to the four institutions.

- **Onley Fund:** building on the concept of *Education City* and in response to long-term advocacy with the provincial government, strongly supported and championed by Yasir Naqvi and the Minister of Advanced Education and Skills Development (MAESD) Mitzi Hunter, have established a fund in David C. Onley's name to support developing entrepreneurial and employability skills for students. David Onley was the former Lieutenant Governor of Ontario. Carleton's world leadership and commitment to accessibility, through the activity of the Paul Menton Centre form the basis of the application. However, the provincial government in making the announcement requested that Carleton works with the other postsecondary institutions in Ottawa to develop programming and help students from all four institutions. The Fund will be established at \$5 million which needs to be expended over two years. The activities associated with the Fund will be linked to *Education City* and Carleton is reviewing ways to create sustainable funding for the programming. The Fund will be used to train students but also to research ways in which to reduce barriers for entry into the workplace. There will be an impact assessment developed as one of the outcomes from the Fund in the hopes that the processes and ideas generated can be used a model across Ontario (and perhaps Canada). The interim President has further linked this initiative with an internship/employment opportunity program for students with disabilities offered by the Federal Government and the University will continue to press for matching federal funds for this program. *Invest Ottawa* has again expressed an interest in supporting this project both in-kind and in actual dollars.
- **Succession plan:** As requested by the Board, a succession plan has been developed for senior administrative and managerial positions in the institution. The Plan will be considered in detail by the Human Resources Sub-Committee of the Board. The importance of *Carleton Leader* in preparing and training potential staff and faculty leaders is recognized in the Succession Plan. Over the past several years, more than 350 faculty and staff and faculty have taken various modules in leadership through *Carleton Leader*. This commitment on behalf of the University was part of the rationale for Carleton receiving Platinum recognition for a Healthy Workplace at the Canada Awards of Excellence in the workplace celebrations in fall 2017. A number of key issues have been identified which will be discussed in detail with the President Designate. Over the past year University Management has (1) worked to stagger senior administrative appointments to ensure that there is a gradual but continuous change in positions; (2) in an open process, three external search consultants were pre-qualified for a limited period of time to assist search committees find a broad range of applicants for positions;¹ (3) efforts have been increased to advertise and recruit more widely to create a more diverse pools of candidates; and (4) specific recruitment activities for affirmative action for Indigenous hires have been implemented. In addition, a number of concerns have been highlighted and some key vulnerabilities with respect to particular positions which will be important for the President Designate to discuss and determine whether or not to take action.
- **Union contact negotiations:** The University has been in negotiation with the Carleton University Academic Staff Association (CUASA) since July 2017. The University and Union teams are working towards a negotiated settlement and are confident that an agreement can be reached. Members of the Board will continue to receive published updates on the situation. For general information, the chair and vice-chair of the Board suggested that a primer on the process of negotiation should be developed and shared with the Board. The primer outlines the normal steps in the process of negotiation and suggests general areas where Board members make comment about the process. The draft primer is attached in Appendix II. The University has currently asked for conciliation to support timely resolution of outstanding issues.
- **Self-identity of Indigenous members of the community:** Concerns have arisen within members of the Indigenous community on campus about self-identification. This is an issue in many other institutions across the country that has been brought into focus with affirmative action plans to hire Indigenous faculty and Indigenous doctoral students. There is considerable media interest in navigating these challenges and Carleton may be featured in press discussions of the issue. The incoming dean of the Faculty of Arts and Social Science (FASS) and the incoming senior Indigenous faculty member also in FASS will be working with the community to develop a clearer sense and appropriate definitions of self-identity. The working group will take counsel from Peter Dinsdale from the Board.

¹ To date, all three pre-qualified search consultants have been used or are being used in searches. There has been a notable increase in the breadth and diversity of candidates in the recruitment pools and a reduction in the number of 'failed' searches for senior administrative and managerial positions in the institution.

- **International Graduate Student Tuition:** On Thursday May 3, 2018, the provincial government announced its international graduate student strategy. After years of advocacy from universities, the government relented on charging high international tuition fees for a proportion of doctoral students. This is seen as part of the Liberal strategy to attract high-quality international graduate students to Ontario. The Liberal government has indicated that over time it will expand this program for international students studying at the doctoral level. It is not clear whether the commitment would be maintained if there was a change in government. (The so-called *Common Sense Revolution* in the 1990s was associated with sharp increases in tuition fees especially for international students and there is some evidence that a new Ontario Conservative would likely follow suit which would be completely contrary to the current governments initiative). Carleton University is currently reviewing its overall policy for tuition fees for international doctoral students to ensure that the University remains in a competitive position compared with its peer institutions.
 - **Spring Convocation:** There will be a total of eight convocations this year (two per day) Tuesday 12 – Friday 15 June and Board members are welcome to attend any (or all) of the convocations. The University will honour a number of individuals from various walks of life including Ms. Helen Clark, Former Prime Minister of Canada, Head of the United Nations Development Programme and the person who was short-listed to be the first woman Secretary General of the United Nations. A documentary was made following her year-long campaign to break the glass ceiling within the United Nations – a campaign that was eventually not successful. Working with the New Zealand High Commission in Ottawa and a number of other groups in Ottawa, Carleton will host the premier of the documentary in the Dominion Chalmers United Church on Monday 11th June in the evening. This will be an event attended by a number of diplomats and government officials and will be open to the public. Members of the Board are welcome to attend. In addition, members of the Board will receive an invitation to attend the Convocation Dinner on Thursday 14th June which will be held in Residence Commons on campus. The dinner is an opportunity for the University community to honour the eight honorary degree recipients and the community and celebrate convocation season. Board members will receive an official invitation to these events shortly.
 - **On-boarding for the President Designate:** A draft on-boarding plan, developed in early March, has been revised since the announcement that Dr. Benoit-Antoine Bacon is the President Designate. Working closely the President Designate, details of this plan will be completed. A small group has been identified to support the President Designate, to advise on appropriate introductions to the community and to offer mentorship where necessary. The Executive Committee and key members of the Search Committee will be kept closely informed and offer advice to the President Designate.
 - **Performance review for Interim President:** Material for the performance review of the Interim President will be circulated to the Executive and then be available for discussion at the Board meeting at the end of June 2018.
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Appendix I – Update on caveats for potential purchase Dominion-Chalmers United Church

DATE: May 1, 2018
TO: Board of Governors
FROM: Alastair JS Summerlee
RE: Update on the negotiations for the purchase of the Dominion Chalmers United Church

At the meeting of the Board of Governors on December 5, 2017, Governors approved that Carleton University proceed to negotiate and draft a Purchase, Sale and Lease Agreement (the Agreement) for the Dominion-Chalmers United Church property subject to satisfactory resolution of a number of conditions and caveats. The Agreement was negotiated by a small team comprising General Counsel for the University (Steve Levitt), a member of the Board and Finance Committee (Greg Farrell) and the Vice-President (Finance and Administration).

The motion raised thirteen caveats and conditions. All these have been resolved or negotiated as outlined below:

- a) That the negotiated purchase price not to exceed a maximum of \$7.8M.
The purchase price has been set at \$6.65 million which is within the framework set by the Board.
- b) Receiving written confirmation from the Crabtree Foundation of their donation of \$2M to support the required renovations for the facility
A signed the gift agreement and the first installment of their payment has been received by the University – full payment is expected by early 2019 (ahead of the schedule in the signed agreement between the Foundation and the University).
- c) A condition for environmental assessment reports and other investigative reports to be done including a structural assessment of the balcony to determine that it can withstand the anticipated load and assessment of asbestos and other potential containments in the facility all to the sole satisfaction of Carleton
All required assessments including: an environmental assessment; structural assessment; assessment for potential deferred maintenance; Heritage Conservation; Asbestos assessment and abatement have been completed or initiated to the satisfaction of the Building Programs Committee.
- d) Identification of the specific space that will be used by the Church Authorities, the University and the remaining space that will be available to rent to tenants
Space that will be used by the Church Authorities has been agreed as part of the lease agreement.
- e) Lease terms to be negotiated with the Church Authorities for a renewable lease for a term not to exceed 5 to 10 years in length with specific conditions on the process for renewal and for termination of the lease at Carleton's sole discretion on a defined period of reasonable notice (i.e. six months) as recommended by legal counsel
A ten-year lease with the option of two five-year extensions and a satisfactory termination clause are included in the Purchase, Sales and Lease Agreement.
- f) Clear provisions in the agreement of purchase and sale allowing the University to terminate at its discretion as recommended by legal counsel
The Agreement includes a condition that termination is at the sole discretion of the University.
- g) An approved financial plan for the facility demonstrating operating costs and the estimates of rentals to off-set costs including lease agreements with potential tenants
The Finance Committee reviewed and approved the draft facility financial operating plans

- h) A condition that the agreement of purchase and sale would not be binding unless all required planning applications for the uses intended by Carleton for the property, including an official plan and Zoning Amendment, as recommended by counsel are approved and all appeal periods have expired and all conditions of approval are to the sole satisfaction of Carleton
The City expedited appropriate re-zoning of the property which has been completed.
 - i) A re-examination of the roof renovations costs and the timing of required renovations to the roof
The proposed roof renovation costs and the timing have been reviewed by an external party and no changes were deemed necessary to the scope, nature, timing and cost of the work.
 - j) Management to provide for approval a clear definition of and the metrics for success of the project
Metrics for success were submitted and reviewed by the full Board at its meeting March 2018.
 - k) An estimated cost for approval and completion of a heritage conservation study and all other studies as well as consultant work required for the project
See item (c) – this work has been instigated and will direct the process and timing of future renovations, repair or remediation.
 - l) The Purchase, Sale and Lease Agreement to be prepared by legal counsel and to include all appropriate legal terms and conditions as recommended by counsel including and not limited to those already identified in the legal opinion
The Agreement has been prepared by General Counsel for the University in accordance with appropriate legal terms and conditions.
 - m) The draft Purchase, Sale and Lease Agreement to be to be approved by the Executive Committee
Completed and approved.
 - n) Final Board approval of the purchase is required following the closing conditions being met in the agreement of purchase and sale.
The Board of Governors will receive the final version of the Purchase, Sale and Lease Agreement for approval (on the recommendation of the Executive Committee) after ratification of the document by the Church Authorities in accordance with their requirements.
-

Appendix II – Background information on negotiations between employee groups and the University

DATE: April 13, 2018

TO: Members of the Board of Governors

FROM: Alastair JS Summerlee

COPIES: Amanda Goth (University Secretary), Sandra Slater (Administrative Assistant President)

RE: Outline of the bargaining process

Background: There are 8 Unions and 4 employee groups (non-Unionized) on campus. The relationship between the University and each Union is managed through a collective agreement. Most collective agreements are negotiated for a three-year period, although rarely they may be shorter or long. Each contract describes the ways in which the University (management) will deal with and respond to issues pertaining the terms and conditions of Union members. Much of the language in the contract is focused on terms and conditions of employment as well as internal processes. An important component of Union / Management relations are the monthly Joint Committees that are maintained between Human Resources and the Union Executive. These are monthly meetings for each Union that are used to facilitate and manage the vast majority of issues.

Normal process for bargaining: the two sides form bargaining teams and normally, as one contract comes to an end, the Union indicates that it is ready to begin the bargaining process. The University proposes a mandate that will define the bargaining process. That mandate is reviewed and approved by the Executive and remains confidential throughout the process. Conditions in the mandate usually include: the terms of any wage settlement;² and any specific significant changes in governance proposed by the University. It is common for the Human Resources department to have identified a series of proposed adjustments in language that they believe will facilitate interaction between the Union and Management. At the same time, the employee group bargaining team will develop a series of language and wage and benefit-related changes that they would like to propose.

The procedures that each negotiation follow may vary by group but, in general, the two sides meet and agree on a bargaining protocol and agree to a series of dates for negotiations.

As the negotiations proceed, the two sides exchange proposals (usually delivered in a sequence determined by each side) and articles are agreed, modified, rejected or put on one side as the bargaining continues. Usually the last items placed on the table refer to the monetary components.

The ideal situation is that the parties work collaboratively through all the articles and come to agreement but more commonly than not, at some point, either side may decide to seek external help in resolving difficult issues. Normally, the first step is for one party or the other (or by mutual agreement of both parties), the negotiating team(s) file for conciliation. This triggers the appointment of a provincial conciliator (a trained expert in the field of trying to bring together groups where issues are not settled). It can take up to 2 weeks to find a conciliator that is available. The conciliator will help both sides resolve differences and most commonly the two parties will come to an agreement.

² For the purposes of definition wage settlements will include increases in pay (normally expressed as an annual percentage increase) and any indirect increases in costs to the University i.e., improvements in benefits

At some point in the negotiations, the Union may decide to call a strike vote of their members. The Union simply asks its members whether or not they would support a strike, if necessary. It is customary for the Union to receive a strong strike mandate (85%+ support from members).

There is technically no time limit to the duration of conciliation. However, either side or both sides together can agree that they have come to an impasse and declare a “no board”. This starts a clock where 17 days later, the employee group can call a strike and/or management could lock out employees. (The latter rarely happens). Commonly during this period, the two parties agree to meet with a mediator. Again, these are trained professionals who work to resolve differences. Throughout this period, the issues raised by both parties at the negotiating table remain confidential.

If a contract is agreed, the employee negotiating team will present the draft contract to their membership, normally accompanied by a recommendation whether to accept the draft contract. Once the membership ratifies the draft agreement, the Executive Committee of the Board will review the agreement and ratify the revised contract. The bargaining team negotiations pursuant to the authorized mandate. At times during the negotiation process (especially if the negotiations are over an extended period of time when market conditions etc. may change), a recommendation may be made to the board to revise the mandate.

In the event that the parties cannot agree, the Union can, 17 days after calling a ‘no board’, instigate a strike. When a strike is called, University Management is able to provide factual data on the issues that were presented to the employee negotiating team as part of their commitment in the negotiating process.

Once a strike has been called, the Union has the right to picket. The University and the Union normally establish a strike protocol that defines the ways in which striking workers can participate in pickets and defines various picketing processes and activities.

It is customary, once a strike has been called, for either or both sides to call for returns to the bargaining table and usually the sides return with the aid of a professional mediator. The mediator is focused on wringing a deal from both parties that usually involves compromise on both sides. Almost all negotiations at this stage result in an agreement although reaching that agreement may take time.

In very rare cases, the parties may remain at an impasse. At this point, there are limited options for the negotiations to continue.

Steps following the ratification of new collective agreement: In the event that an agreement is made without a strike, the two sides take time to ensure that the revised collective agreement is drawn up and checked to ensure that all the items negotiated in the bargaining process are integrated into the new document. This usually takes about a month. At this point the full transcript of the new collective agreement is published.

During the time that the final document is prepared, both sides carry out a series of meetings to inform members and management of various aspects of the agreement and their implications for both sides.

The same process will be followed after a strike, but the process is often complicated by the need to reintegrating striking workers back into the community. It is common that a series of different emotions and feelings will be generated during a strike and care is taken by both parties to support workers returning to work and to ensure that any hard feelings do not impinge on collegiality and the work environment.

Communication: There are a series of controls on the communications of both sides in a negotiation and violating these controls usually results in the Union filing a complaint for Unfair Labour Practice (ULP). For this reason, University Management has to be careful about public statements during negotiations and particularly during a strike. There are, however, no controls on individual members of the Union from communicating their observations on the process, on the people involved or the issues that may be contentious.

Role of Board members: It is possible that members of the Board may be asked for comment during a negotiation. Members of the Board should feel comfortable making the following comments:

- All negotiations taken part within a frame-work (mandate) proposed by University Management and approved by the Executive Committee of the Board which remain confidential
- The Board has confidence in the negotiating teams to reach and final settlement
- The negotiations are carried out between the employee group and the University and do not involve the Board directly, but the final draft agreement will be ratified by the Executive Committee of the Board
- Any media inquiries should be referred to the Chair of the Board or President for specific comment



REPORT TO THE BOARD OF GOVERNORS

BOARD OF GOVERNORS MEETING

May 24, 2018



Office of the
Vice-President (Students and Enrolment)

ENROLMENT MANAGEMENT

The following charts outline Carleton's applications and the Ontario University Application Centre System applications for Ontario high school applicants.

Ontario University Application Centre System Secondary School (101) Applications (as of May 3, 2018)

	2017	2018	% difference
1 st choice	90,147	89,844	-0.3
Total	432,991	453,077	+4.6

Ontario High School Applications to Carleton (as of May 3, 2018)

	2017	2018	% Change
1 st choice	4,309	4,212	-2.9
Total	19,891	19,836	-0.3

Carleton University First Year Applicants by area (as of May 9, 2018)

	2017	2018	% Change
Ottawa	5,607	5,462	-2.6
GTA	6,398	6,533	+2.1
International	4,502	5,061	+12.4

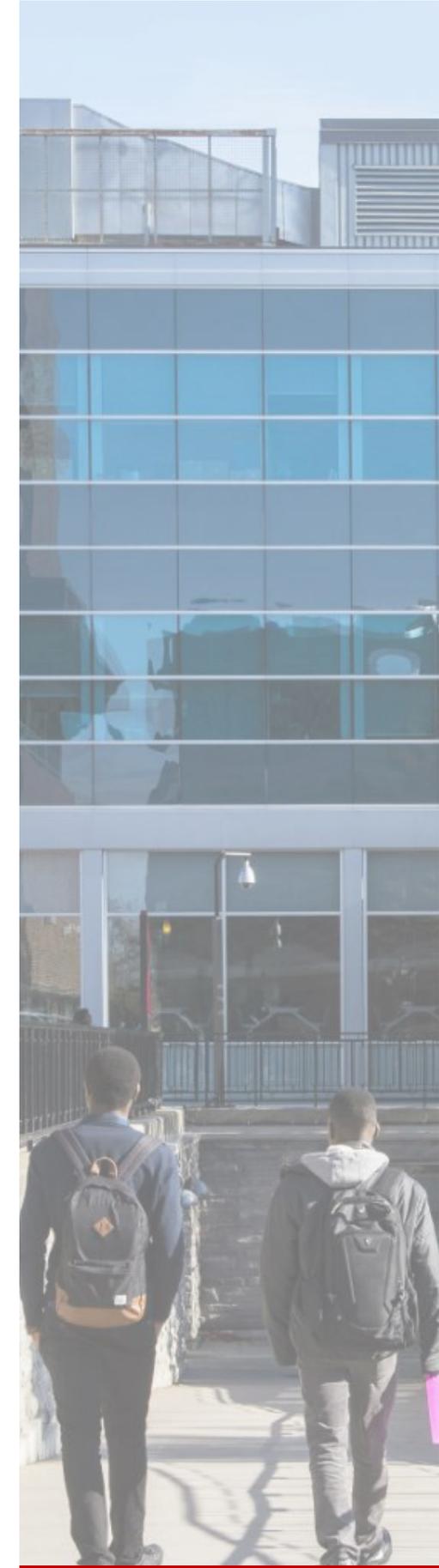
Carleton University First Year - all applicant types (as of May 9, 2018)

	2017	2018	% Change
Applicants	23,090	23,597	+2.2
Approved	16,457	16,538	+0.5

Additional Information

- The Undergraduate Recruitment Office has been focusing on congratulation phone calls to students who have received offers of admission to help increase the confirmation rate.
- New Spring Open Houses were added this year to provide prospective students with another opportunity to visit Carleton's campus. There were over 1,300 guests registered across all events which were held on April 28, 2018 and May 5, 2018.
- Carleton's USA recruitment visits continued throughout March and April reaching prospective students in the northeastern region of the USA and California.
- Carleton, along with all the other Ontario universities, are meeting with guidance counsellors across the province for the annual Region Dialogues meeting in order to provide counsellors with our universities' updates.





STUDENT SUCCESS AND STUDENT EXPERIENCE

- We have received \$1.5M over three years from the Government of Ontario for the Ontario Postsecondary Access and Inclusion Program (OPAIP). This funding has been provided to Carleton to allow us to deliver initiatives for outreach, access and retention of students who, without interventions and supports, would not be able to access postsecondary education. This was a very competitive process to apply for this funding and Carleton had one of the top submissions received by the Government.
- In April, the Office of the Vice-President (Students and Enrolment) celebrated the 9-year anniversary of our [@Carleton_U](#) Twitter account. We also hit the milestone of more than 40,000 followers.
- Nine students from the Student Experience Office (SEO) and nine students from the Science Student Success Centre (SSSC) received Ontario Volunteer Service Awards on April 15, 2018. This award recognizes volunteers for providing committed and dedicated service to an organization.
- Our local Community Service Learning program, Campus to Community, saw 440 engagements this year. We held 43 Campus to Community Days where students had the opportunity to work with 23 different community partners including organizations such as The Ottawa Mission, The Ottawa Food Bank, Bethany Hope Centre, L'Arche and the Canadian Centre for Gender and Sexual Diversity.
- The Co-Curricular Record (CCR) is up 23% this year with nearly 8,000 positions added to students records this calendar year. This also exceeds the Strategic Mandate Agreement (SMA) target (7,150) that was set for 2020.
- Our international exchange program will see 201 incoming students and 202 outgoing students in the 2018-19 academic year.
- We have 33 students in Bachelor of Global and International Studies (BGIInS), 55 students in Bachelor of International Business (BIB) and 22 students in Bachelor of Commerce going on exchange as part of their respective programs this upcoming year.
- The Academic Advising Centre (AAC) advised 1,732 transfer students this year compared to 774 transfer students in 2016-17.
- To increase instructor convenience, Scheduling and Examination Services expanded their exam upload procedure pilot to both accommodated and non-accommodated exams, so that a completely paperless procedure is available. This has been very well received and utilized by faculty and course instructors.





- Health and Counselling Services has been temporarily moved to the third floor in the Carleton Technology and Training Centre (CTTC) building. This move is required so that their permanent space can be renovated and expanded to meet an increase in demand. It is anticipated that they will move back into their permanent location in August, 2018.

EMPLOYABILITY AND EXPERIENTIAL LEARNING

- We have received \$5M from the Ministry of Advanced Education and Skills Development (MAESD) for the creation of the David C. Onley Initiative for Employment & Enterprise at Carleton University. The funding will assist students with disabilities at all Ottawa post-secondary institutions through support and mentorship for entrepreneurial development; employment support, including connecting students to employers; and one-on-one coaching and mentoring for students.
- We have launched the Carleton University Accessible Experiential Learning (CUAEL) project with funds (\$800,000) from the Province of Ontario's Career Ready Fund – Stream 2. The CUAEL project aims to place 300 students with disabilities in subsidized employment opportunities and provide them with hands-on quality experiences while they obtain their post-secondary degree at Carleton University.
- We saw 294 students participate in the Work Study program this past year – an increase of 100 students.
- Our international internship program has seen 52 students take opportunities across 5 continents and in 26 countries. Of particular note is a placement with the Permanent Mission of Canada to the United Nations in New York City and another with NATO in Brussels, to name just a couple.
- The total number of students attending Career appointments in the Career Services Office has increased 10% over last year.

ATHLETIC EXCELLENCE

- On Thursday, May 3, 2018, three members of the Carleton Raven's football team were selected in the 2018 CFL Draft.
 - KC Bakker (4th Year, Bachelor of Arts in Criminology and Criminal Justice) was selected 27th overall by the Montreal Alouettes.
 - Kene Onyeka (4th Year, Bachelor of Engineering in Mechanical Engineering) was selected 29th overall by the Ottawa Redblacks.
 - Justin Howell (3rd Year, Bachelor of Arts in Psychology) was selected 55th overall by the Ottawa Redblacks.





- Taffe Charles, Head Coach, Women's Basketball will be named the OUA Coach of the Year and the Women's Basketball team will be named the OUA Team of the Year on May 16, 2018 in Niagara Falls as part of the OUA Annual Awards banquet.
- A new 4-on-4 Junior Ravens hockey program for this spring has 250 children registered, while the Junior Ravens football spring program has 232 children registered, which is a record.



Carleton's New Energy Plan Provides an Innovative Road Map to Greater Sustainability

To view this release online visit: <http://bit.ly/2rMG9t4>

Carleton University released its latest [Energy Master Plan](#) (attached) May 17, 2018, part of an ambitious sustainability strategy that reduces current energy and water consumption and ensures the highest possible conservation levels are maintained as the campus evolves.

"Since launching Carleton University's inaugural Energy Master Plan in 2014, we have achieved great success in reducing our campus energy and water consumption by two per cent per year. In Phase 1, we partnered with Honeywell to conduct building audits and, as a result of our energy retrofit initiative, we have seen a 16 per cent average reduction in energy and water consumption in the five buildings targeted," said Darryl Boyce, assistant vice-president (Facilities Management and Planning).

"The new Energy Master Plan builds on our progress since 2014. We now take a more holistic sustainability approach to our renovation projects, as well as when planning new buildings. We also know that by engaging our faculty, staff and students in our sustainability efforts – such as the \$1-million Green Revolving Fund – and the facilitation of research opportunities within the Faculty of Engineering and Design, we will make continuous improvements in our sustainability efforts."

The Carleton 2018-2021 Energy Master Plan builds on the success of previous initiatives, sets goals and creates a road map forward. The new plan addresses:

- Facility conditions;
- Energy utilization and sustainability ratings;
- A detailed analysis of energy and water use and utility requirements needed for campus growth; and
- Building retrofits to reduce energy consumption and lower greenhouse gas emissions.

Ambitious Goals

As a result of a comprehensive review of utility data and campus growth, the plan sets ambitious goals for the university, including:

- Build a co-generation energy plant;
- Developing a program to increase efficiency by optimizing equipment;
- Complete LED lighting replacement;
- Increase research opportunities;
- Introduce a Green Engagement Fund to support smaller programs which have the intent to educate or engage our campus community on an element of sustainability;
- Explore private-sector partnerships to take early advantage of emerging technologies; and
- Expand access to energy data, including more energy display screens in key campus locations.

Recognizing Success

Carleton has been recognized for its efforts and sustainability success. It achieved a silver rating for the Sustainability Tracking Assessment Rating (STARS) and is ranked in the top 35 global schools in the UI Green Metric rankings.

The first phase of implementing building energy retrofits has been completed and they've provided energy and water savings, as well wider environmental benefits. Carleton has achieved a 2,693,298 kWh reduction in annual electricity use, a 25,247 m³ reduction in annual water use and a 19,076 m³ reduction in annual natural gas use. This is the equivalent greenhouse gas emissions from 440 passenger vehicles driven for one year.

For more information, please go to carleton.ca/sustainability.

Sustainability and the Environment at Carleton:

One of Carleton's unofficial colours is green. Our faculty and students are focused on developing sustainable solutions to critical real-world problems facing the environment, offering an enviable mix of undergraduate and graduate programs with research cornerstones and links to government agencies like Environment Canada's National Wildlife Research Centre, which is housed on Carleton's campus. From innovative research on better ways to produce safer drinking water and wastewater to implementing carbon emissions reduction strategies and assessing the impacts of climate change on Canada's North, Carleton is becoming a leader in environmental stewardship. The university has established a Sustainable Energy Research Centre (CSERC) with a mission to advance the transition to a more sustainable energy future for Canada. Carleton also launched new master's degrees in sustainable energy engineering and sustainable energy policy.



CARLETON UNIVERSITY ENERGY MASTER PLAN

2018-2021



Sustainability
CARLETON UNIVERSITY



Carleton
UNIVERSITY

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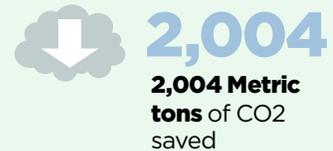
OUR JOURNEY

The Carleton University 2018-2021 Energy Master Plan builds on the work and progress the campus has realized as a result of initiatives implemented in its inaugural Energy Master Plan launched in early 2014.

Carleton has had a long-standing commitment to sustainable operations, including recycling, and energy efficient design that date back to the early 1990s. In 2009, the university conducted a pilot project with Green Globes to develop an environmental assessment tool for university campuses. As a result, the Canal Building became a living laboratory with cutting-edge sustainable design features. Engineering students have had the opportunity to use the building for their research to assess green building operation standards.

Over the course of the last three years, Carleton has made tremendous progress in reducing energy and water consumption across campus, incorporating energy efficient designs for new construction, retrofitting existing buildings to decrease energy consumption and creating initiatives to engage our faculty, staff and students in sustainability best practices and research opportunities, as well as implementing green practices in our buildings, including residences.

When the university started on this journey, the idea was to implement a three-pronged, campus-wide approach that addresses the facility's condition, energy utilization and improving sustainability ratings. To assist us in this work, Carleton engaged the services of Honeywell which provided its expertise in creating a multi-year, detailed roadmap to improving the efficiency and functionality of all buildings. Comprehensive audits/assessments were conducted to help us establish a list of buildings to be included in the first phase of renewal; the audits identified the buildings which would benefit the most from the renewal efforts.





429 Annual Greenhouse Gas emissions from 429 cars

In each building, renewal included: lighting upgrades, new plumbing fixtures to improve water consumption, building envelope improvements and upgrades to the building's heating and cooling systems. The analysis of consumption confirmed marked improvement to making the buildings more efficient.

Overall, the analysis of initiatives carried out over the last three years shows the university has realized continuous improvement in reducing its energy, water, waste and carbon footprint 2015-2017 (inclusive).

25,000 m³



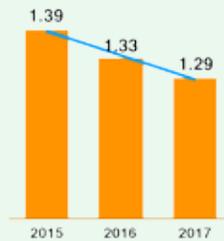
Water reduction



1 Co-generation plant

ENERGY

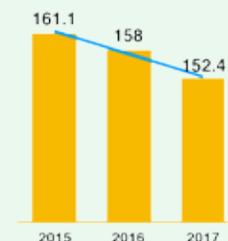
Site EUI Energy GJ/kWh/m²



Down 7.2%

ELECTRICAL

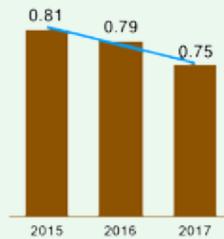
Weather normalized site electricity intensity kWh/m²



Down 5.4%

GAS

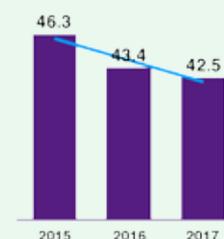
Weather normalized site natural gas intensity GJ/m²



Down 7.4%

CARBON FOOTPRINT

Total greenhouse gas emissions intensity kgCO₂e/m²

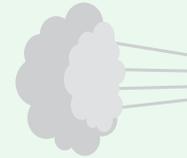


Down 8.2%

These savings have provided the university with a baseline by which to further develop goals and initiatives for the 2018-2021 Energy Master Plan that also takes into account future campus growth, and the university's priorities as outlined in the Strategic Integrated Plan (SIP), and the Campus Master Plan. The new Energy Master Plan also supports the Carleton University Sustainability Strategic Plan that embeds environmental sustainability in university operations. This Plan is being updated in 2018.

Other achievements (2014 to 2017) include:

- Implementation of the Green Globes rating system, achieving a minimum rating of 3 out of 5 (9 buildings are now certified): New Health Sciences Building has 4 Green Globes rating
- \$1-million Green Revolving Fund established: 13 projects funded and over 75 submissions since 2013
- Eco Reps staff and student program established
- Electric Vehicle charging station program established and is expanding
- Development of campus bike share program
- Implementation of Energy Display Screens, showing live energy data
- Improved waste reduction offerings (compostable/single stream collection)
- Research Opportunities for students created in partnership with the Faculty of Engineering (Smart building technology research project expanded to five buildings)
- Carleton Sustainable Energy Research Centre established
- New master's degree in Energy Engineering and Sustainable Energy Master's Policy
- Global Water Institute established and Carleton Jarislowsky Chair in Water and Global Health announced



4.2 Million

4.2 Million lb of steam saved



652,000 kWh LED

replacement energy savings



13 Projects funded through the Green Revolving Fund



We have learned that “sustainability” and “renewal” are comprehensive terms that reflect work that often intersects and overlaps in our project planning and that of other departments, including Dining Services. Taking this into account, our renewal initiatives are now developed with a holistic approach that includes energy, water, building operations functionality and work environment improvements. We have also integrated a collaborative approach with stakeholders so we are better aware of departmental priorities in advance to ensure our work has the best possible impact on building occupants and users.



In order to measure our progress, Carleton has adopted two tools that help us continuously improve - the STARS (Sustainability Tracking and Assessment Rating System) certification program and Green Globes building assessment. To date, Carleton has achieved Silver Level in the STARS certification program and we have committed to bringing existing buildings up to a minimum three Green Globes rating. The new Health Sciences Building has been rated at four Green Globes and 8 other buildings on campus have at least a 3 out of 5 green globe rating or better.

Green Globe Buildings

- Canal Building - 5 Green Globes
- Frontenac Residence - 3 Green Globes
- Herzberg Laboratory Addition - 4 Green Globes
- Lennox-Addington - 3 Green Globes
- MacOdrum Library - 3 Green Globes
- Residence Commons Addition - 4 Green Globes
- River Building - 4 Green Globes
- Russell-Grenville - 4 Green Globes
- Health Science - 4 Green Globes



We know we are on the right path because Carleton has received national and international recognition for initiatives to make the campus greener in terms of our buildings, our dining services, transportation and our efforts to engage students, faculty and staff. Some of these include:

- Carleton is ranked 33rd globally and 2nd in Canada by UI Green Metric, World University Rankings
- Named one of Sierra Magazine's "Coolest Schools" in 2017
- Fairtrade Campus Certified in 2017
- Zero waste status achieved in University Centre Food Court
- Richcraft Hall winner of the Unique Venues, Best Earth Friendly Venue
- Recipient of the Effective and Innovation Practices Award from the Association of Physical Plant Administrators (APPA)
- Bronze level bicycle friendly business award, Share the Road Cycling coalition

These are just a sample of our achievements and the future looks bright. We have measured our progress from the past to build this new Energy Master Plan for the next three years.

I would like to take this opportunity to thank the Facilities Management and Planning team and Honeywell for the research and work that went into developing the 2018-2021 Energy Master Plan.

I am pleased to present the 2018-2021 Energy Master Plan.

Darryl K. Boyce
Assistant Vice-President (Facilities Management and Planning)



17%

17% projected energy savings from phase 2 of energy retrofits



7 building energy retrofits planned

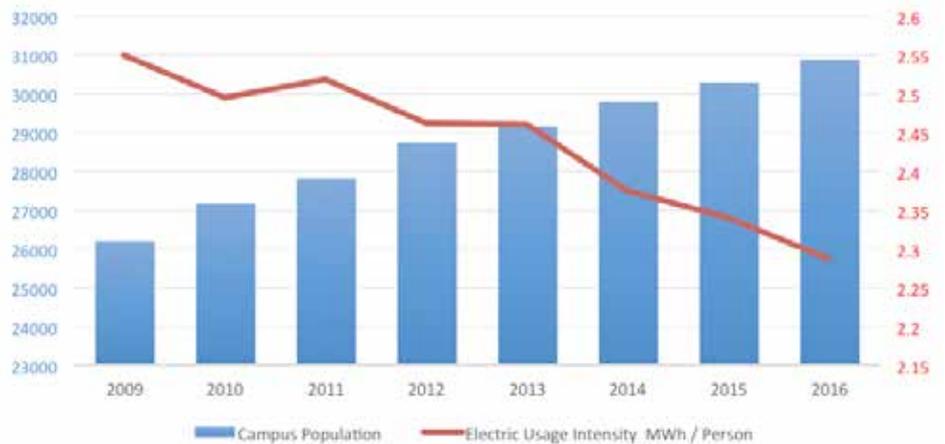
OUR ACCOMPLISHMENTS

UTILITIES VS. CAMPUS GROWTH

The foundation of the first Energy Master Plan was to implement strategies to ensure that everything we do includes measures to save water, energy and reduce the university's carbon footprint. The challenge was to do this while the campus population, as well as its built environment, was growing. Despite this reality, we were successful in making progress and produced reductions in each area.

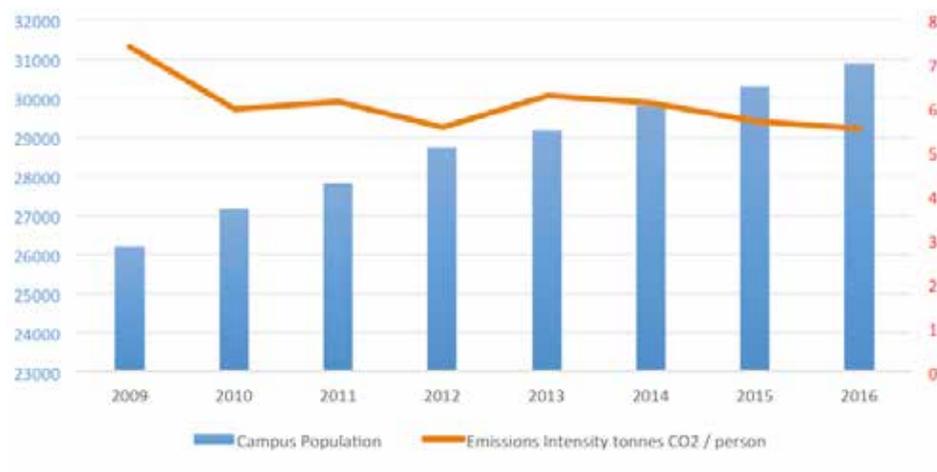
While Figures 1.1, 1.2, and 1.3 take into consideration a longer time frame (2009-2016) than the original Energy Master Plan, it also includes the total annual energy and water consumption for the entire campus population. These figures also include total student enrolment data.

Figure 1.1 - Campus Population Growth vs. Energy Usage Intensity



This highlights that overall campus population has increased since 2009 by 18%, while over the same time frame energy consumption per person has decreased by 11%, from 2.55 MWh/person to 2.29 MWh/person.

Figure 1.2 - Campus Population Growth vs. CO2 Emissions Intensity



The graph above demonstrates the decrease in CO₂ emissions per person of 20% from 2009 to 2016, while the overall campus population growth was 18% for the same time frame.

In Phase 1 of Carleton’s building renewal program, five buildings were identified as benefitting most from upgrades to lighting, water measures and electricity. The results of the building renewals are shown below.

1.3 Annual Utility Consumption Savings

Buildings	Electricity (kWh)	Steam (lb)	Natural Gas (m3)	Water (m3)
Robertson	526,503	598,219	-	3,948
Loeb	436,928	388,938	-	9,739
Athletics	335,287	1,755,013	19,076	6,404
Mackenzie	839,430	1,183,680	-	1,464
Minto	555,060	364,538	-	3,692
Totals:	2,693,208	4,290,388	19,076	25,247



Overall, the electrical savings shown in table 1.3 is the equivalent of the **annual electricity usage of 300 Canadian homes¹** and the green house gases savings would be equivalent to **taking 435 cars off the road for every year.²**

In addition to these initiatives, the university invested \$1.6 million to replace all exterior lighting to brighter, more efficient LED lights. Included in this project was replacement of the lighting in the tunnel system. This initiative will be concluded in 2018 and will save an estimated \$115,000 annually.

An example of an operational efficiency project is our steam trap survey inspection program. The last inspection identified faulty steam traps that were leaking steam resulting in an estimated annual loss of \$54,000. Including the cost of the inspection and required repair, the payback period of this project was 55 days.

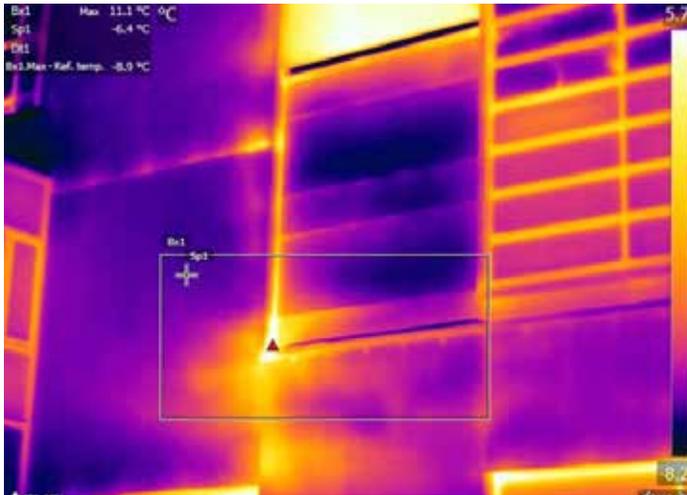
Carleton is using the CopperTree analytics tool that allows the university to optimize the use of data from buildings to improve efficiency. As well, the university also began implementing the ASHRAE BEQ (Building Energy Quotient) that provides a building audit and steps that can be taken to improve its energy rating.

We are also incorporating innovative technologies into our energy analysis, including campus-wide energy metering and the use of infrared thermographic inspections to identify problem areas on building exteriors.

1 Based on Statistics Canada 2015 energy consumption of 92.5 GJ per household

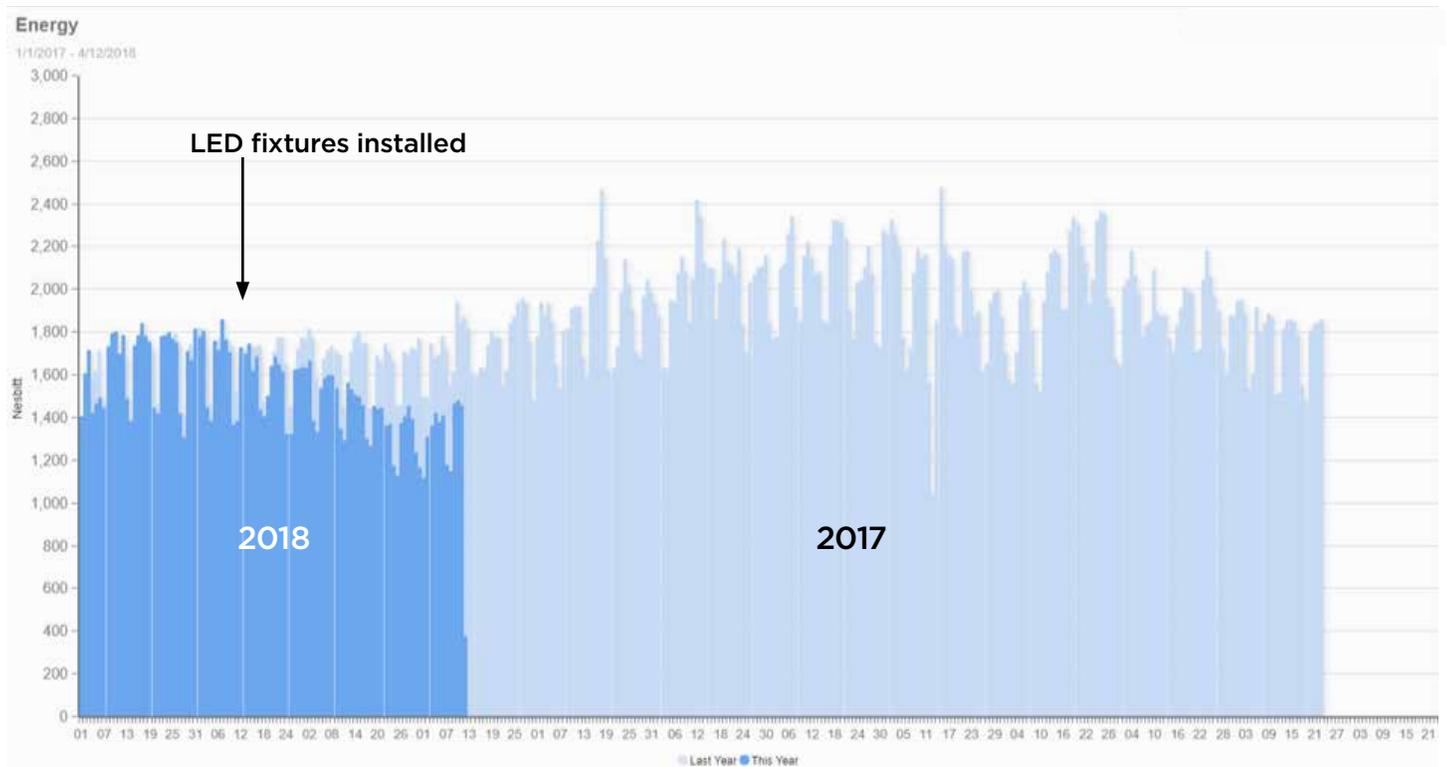
2 Based on US EPA average of 4.6 metric tons of carbon dioxide per year

The thermographic image below is an example which indicates an area where warm air is escaping the building. This allows for a more targeted approach to repairs and upgrades to the building envelope.



The energy metering allows for continuous hourly tracking of a building's energy usage. For example, as part of the energy retrofit work at the Nesbitt Building, all the interior lighting fixtures were replaced. The immediate impact on the energy consumption of the building can be tracked as shown below:

1.4 Data Summary



MOVING FORWARD

The 2018-2021 Energy Master Plan provides a road map for Carleton University's energy and carbon reduction initiatives over the next three years.

This Energy Master Plan is intended to support the Campus Master Plan by providing a detailed analysis of the campus' historical energy and water use, as well as future utility requirements to satisfy the campus' physical development outlined in the Campus Master Plan. This Energy Master Plan also identifies energy and water conservation opportunities in existing buildings to further reduce future energy requirements.

Once the current Campus Master Plan (last updated in 2016) is implemented, the total campus building floor area will grow by 88%, compared to the 2016 base year. The new campus' annual electricity, fuel and water consumption is expected to increase 66%, 61% and 45% respectively, from 2016 base year levels.

As a result of a comprehensive review of utility data, projected campus growth (student and buildings) and in keeping with Carleton University's commitment to achieve overall energy reduction of 2% annually, the following key priorities have been identified for the 2018-2021 Energy Master Plan:

2% Annual energy reduction commitment



1. New Co-generation Energy Plant

This project includes the installation of a 4.6 megawatt natural gas fired turbine which will provide approximately 40% of the campus electrical consumption. The waste heat generated by the turbine will be captured by a heat recovery boiler which will provide steam to the campus and, for most of the year, will replace the university's existing steam boiler system. This will increase the efficiency of steam production for the campus by 7-9% on a higher heating value basis.

During summer months when the campus steam load is reduced, excess steam will be supplied to a new 1,000 tonne absorption chiller which will be tied into the existing chiller plant in the Steacie Building to provide cooling for the surrounding buildings. This new absorption chiller will be the primary source of cooling which will further reduce the campus electrical consumption by allowing the existing electrical chillers to be used as a secondary source.

As well, additional instrumentation will be added to the co-generation plant which will feed live data to a lab within the Faculty of Engineering and Design to offer students new research opportunities.

Overall this project is estimated to reduce the campus CO₂ emissions by 5,000 tonnes annually.

2. Implement Phase 2 of the Energy Renewal Plan

In Phase 2 of the building renewal program, the university will continue to build on the successes of Phase 1. The data and analysis contained in this report is intended as benchmark for future planning.

Energy conservation efforts offer an opportunity for the university to mitigate future energy requirements and reduce or delay future capital expenditures for building infrastructure renewal and services. Based on the preliminary assessment of the selected facilities, about 17% and 3% reduction of energy and water respectively, is possible.

An in-depth analysis of water and energy consumption influenced which buildings were identified for renewal in the 2018-2021 Energy Master Plan.

3. Develop an ongoing program to increase operational efficiency

Significant energy savings can be realized through the operational optimization of our existing systems and equipment. This optimization will include the commissioning of new/renovation building projects, ongoing preventative maintenance program and operation adjustments to reduce energy consumption.

4. Completion of LED lighting replacement (all exterior lights and tunnel lighting)

All exterior light fixtures, including parking lots, roadways, pathways and tunnels, were replaced with more energy efficient LEDs. This project will provide an annual savings of 652,000 kWh. With funding with the Green Revolving Fund, a \$1-million initiative to engage our campus community to bring forward ideas that will make our campus more sustainable, tunnel lighting was also upgraded. The overall LED lighting project will save the equivalent CO₂ emissions from 53 homes energy for one year and annual cost savings of an estimated \$115,000.

5. Update and operationalize the Sustainability Strategic Plan: In Progress

The updated Sustainability Strategic Plan will provide a road map for Carleton and outline concrete steps to reduce the university's environmental impact. With an eye towards the future, the plan will provide guidance and focus for the many sustainability initiatives already happening on campus, as well as those still in the planning stages. The new plan includes actions to enhance sustainable travel, will link to our work to manage energy use and other resources, will provide actions towards sustainable procurement and wider engagement on our campus.

6. Increase research opportunities

Building on Phase 1, this next Energy Master Plan incorporates opportunities on all fronts to provide Carleton students with research opportunities. The new Co-generation plant will be outfitted with a live data feed to the Faculty of Engineering and Design and ongoing research will be conducted within the Canal Building, as a few examples. Over the next three years, engaging our students and offering them the chance to conduct research linked to sustainability will continue to be part of our action planning.

7. Introduce Green Engagement Fund (expansion of existing \$1-million Green Revolving Fund)

The Green Revolving Fund was created to build upon our culture of sustainability and to allow us to better embrace innovation and thinking outside of normal boundaries. The Green Revolving Fund is a \$1-million investment in sustainability-related projects across campus, which are suggested by our wider community, including staff, faculty and students. The extension of this program to include an Engagement Fund will allow for smaller projects and ideas, which don't necessarily have a payback but would benefit the campus, to be implemented. The main criteria for projects will be to undertake initiatives and ideas with positive environmental impacts to engage the community to embrace carbon reduction actions.

8. Exploring partnerships with the private sector to act as a demonstration host for emerging technologies

Carleton University will continue to seek out partnerships in this field. We are known for our ability to form collaborations between our cutting-edge researchers and the private sector. The Energy Master Plan allows for these activities to continue and flourish.

9. Expand access to energy data, including expansion of energy display screens at key campus locations

Carleton has a number of existing energy display screens on campus which allows for real time energy data to be presented. The focus has been on residence buildings and our student population living on campus, where during focused engagement weeks we have seen reduction of up to 10% on baseline electricity performance due to increased awareness. The expansion of this program will allow for additional screens across campus which will link to energy and water data, waste and recycling information, events and ideas for carbon reduction.



10. Ensure that Energy Master Plan takes into account plans for the future growth of the campus as outlined in the Campus Master Plan

The Campus Master Plan outlines a long-term vision for the development of the campus. This road map for the future will be consulted throughout the implementation of the Energy Master Plan to ensure that planning reflects future growth and development across the campus.

Future energy requirements to support campus expansion were considered (refer to Section 4). These requirements were calculated based on the assumption that all new buildings will be designed and operated to achieve a minimum rating of 3 Green Globes as defined by the Green Building Initiative.

The analysis that supports the 2018-2021 Energy Master Plan is included in Sections 3 and 4 of this document.

BUILDINGS RENEWAL PLAN – PHASE 2

The seven facilities listed in the table below have been identified for Phase 2 building energy conservation projects. These have the potential to create approximately \$581,000 in annual utility savings. In early 2018, work began in the Nesbitt Building.

Phase 2.1 Opportunities

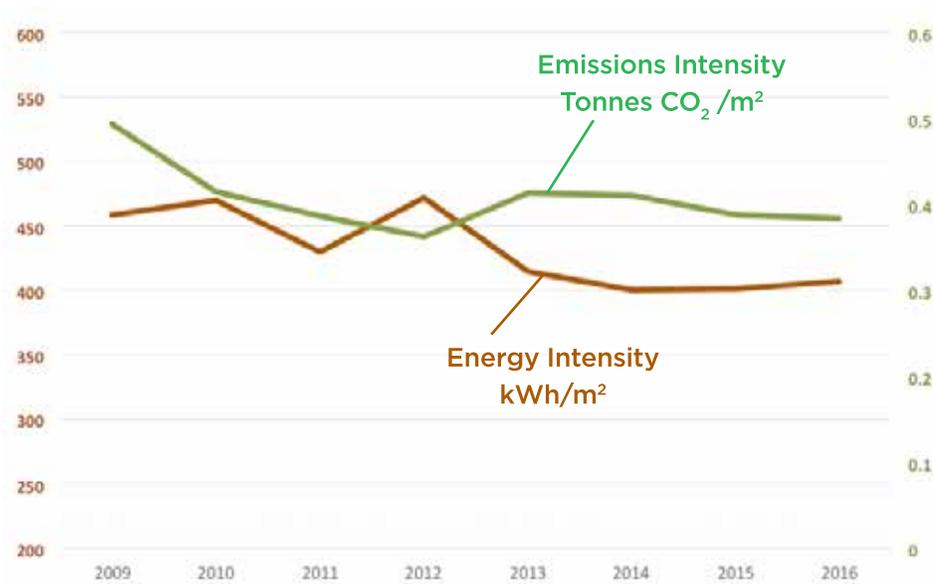
Building	Electricity kWh	Steam Lbs	Water m ³	Total Savings	Percentage Reduction	GHG Reduction eCO ₂ t/yr
University Centre	656,070	1,390,183	10,315	164,365	23%	119
Nesbitt Building	156,823	2,558,018	880	68,927	31%	176
St. Patrick's	218,092	107,322	2,035	50,489	8%	19
Tory Building	381,367	475,897	5,871	92,599	13%	50
Dunton Tower	490,125	786,695	186	119,542	24%	76
Southam Hall	385,195	1,559,834	2,357	85,131	30%	74
Maintenance Building	60,705	456,000	0	16,825	6%	32

UTILITY ANALYSIS

The Utility Analysis contained in this section is a detailed examination of the data that supports the goals identified in the 2018-2021 Energy Master Plan.

Utility data that has been compiled, reviewed and analyzed includes campus utility bills for the period between January 2009 and December 2016. In addition, sub-metered utility data for individual campus buildings was also reviewed and analyzed for the 2009 to 2016 calendar years. The results of this analysis are presented in this report. The energy performance trends identified in the analysis are summarized below and demonstrate the impact resulting from the university's commitment to reduce the energy and greenhouse gas footprint, while facing a continuously developing campus and increased population growth.

Figure 3.1 - Carleton University Campus Energy Performance Indices



UTILITY ANALYSIS

ELECTRICITY

An electric meter measures three feeds of electricity consumption for the entire university campus, which is further sub-metered at the building level.

The historic trend of campus energy and peak demand in Figure 3.2 shows a large base load: energy = 5,200,000 kWh/month and peak monthly demand = 11,000 kW and a characteristic summer cooling component.

Figure 3.2 - Campus Electrical Consumption and Peak Demand



NATURAL GAS

Several meters measure natural gas consumption on campus. For the purpose of this report, campus gas consumption has been divided into 2 categories:

- 1. Central Heating Plant (CHP) gas - natural gas consumed in the CHP.**
 The CHP supplies steam to the majority of the buildings on campus. This is the largest gas account in terms of volume. The historic trend of CHP gas used on campus is shown in Figure 3.3 and indicates a base load of about 200,000 m³ and a characteristic winter heating component.
- 2. Other gas - natural gas consumed in the individual buildings**
 The historic trend of other gas use on campus is shown in Figure 3.4 for the years 2009-2016 and indicates a base load of about 17,000 m³ and a characteristic winter heating component. Partial consumption data was available for 2012; hence the trend displays an abnormal consumption profile.

Figure 3.3 - Campus CHP Natural Gas Consumption

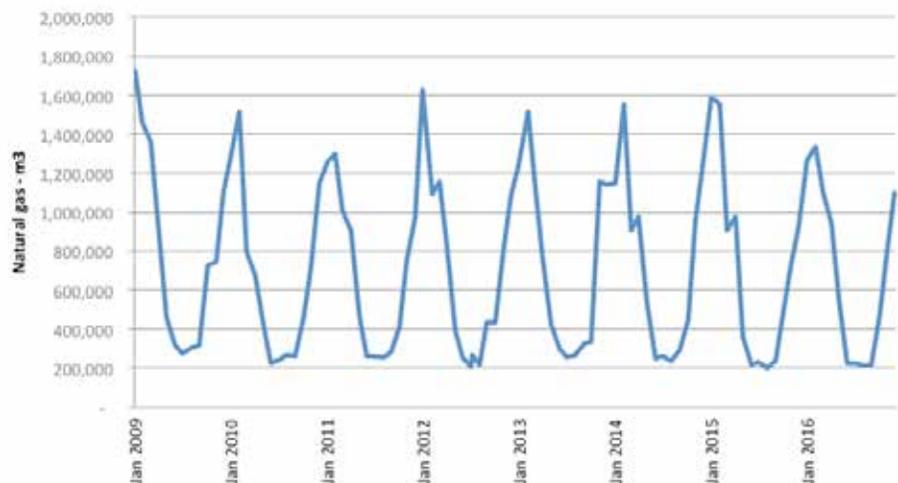
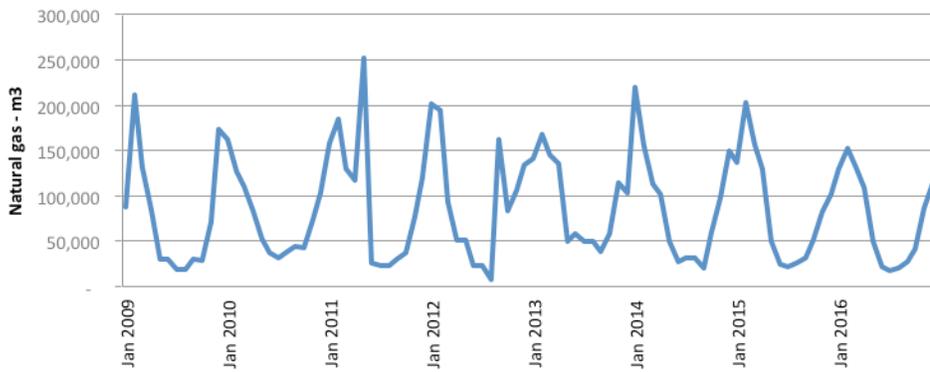


Figure 3.4 - Other Natural Gas Consumption



WATER

Three meters measure total water consumption on campus. For the purpose of this report, the data has been consolidated to reflect the entire campus' use. The historic trend of campus water use shown in Figure 3.5 indicates a relatively constant consumption of approximately 35,000 m³/month up to May 2010 and again from March to December 2016. In the period between these dates, the campus water consumption pattern was skewed by a series of meter reading errors. A metering issue regarding water consumption was identified and resolved in 2015, which resulted in ongoing consumption misreadings throughout 2014 and 2015 and possibly prior. This has been resolved with Carleton's operations team and the City of Ottawa.

Figure 3.5 - Campus Water Consumption

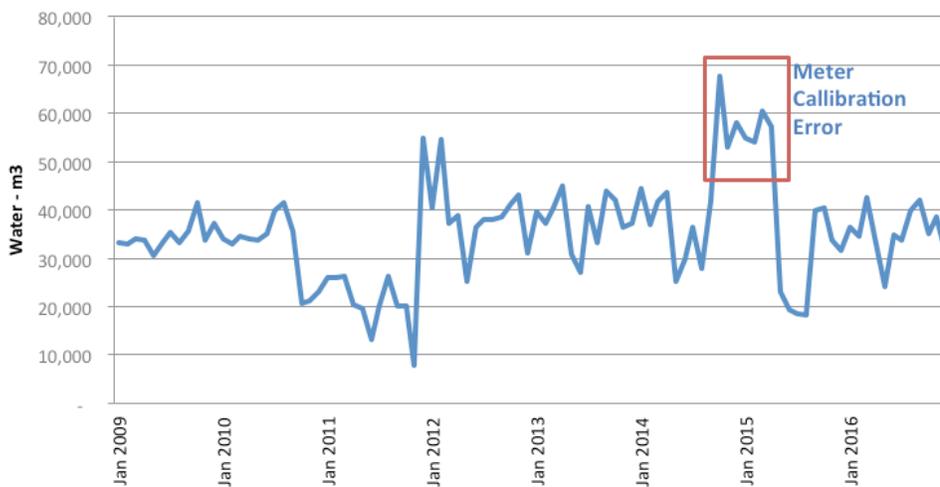


Figure 3.6 - Utility Energy Breakout



Table 3.7 - Utilities vs. Campus Growth

Year	2009	2010	2011	2012	2013	2014	2015	2016
Energy Indices								
EUI (ekWh/ft ²)	42.6	38.5	35.7	43.8	37.3	36.8	35.9	35.5
EUI ¹ (ekWh/ft ²)	42.6	43.7	40.0	43.8	38.6	37.3	37.4	37.9
EUI (ekWh/Person)	6.9	6.2	6.2	7.1	6.2	6.0	5.8	5.6
HDD	4,605	4,063	4,112	4,004	4,447	4,546	4,428	4,320
CDD	146	308	301	345	247	229	252	340
Water Indices								
WUI (10 x m ³ /m ²)	10.6	9.9	6.4	10.5	10.2	11.4	10.2	9.6
WUI (m ³ /person)	15.9	14.7	10.3	16.6	15.8	17.4	15.1	14.1
Utilities								
Hydro - MWh	66,766	67,773	70,090	70,744	71,787	70,798	70,922	70,636
Hydro - kW (peak)	12,535	12,867	13,596	13,854	14,313	13,656	13,748	14,141
CHP Gas (100xm ³)	96,601	79,891	81,177	77,035	88,346	87,874	84,240	83,864
CHP Oil (l)	0	0	325,977	6,792	517,663	924,708	0	231,560
Gas (100xm ³)	9,091	8,997	11,716	10,251	11,066	10,488	10,083	8,958
Water (10xm ³)	41,433	38,599	27,970	46,198	45,320	50,598	45,094	42,580
Building Data								
Total bldg. area (m ²)	391,492	391,492	440,097	440,097	442,985	442,985	442,985	442,95
Student Population								
Students	24,295	25,262	25,893	26,773	27,212	27,824	28,289	28,845
Faculty	833	849	861	875	859	869	878	893
Staff	1,057	1,052	1,073	1,083	1,090	1,103	1,128	1,137

1 EUI shown is weather Normalized to 2009 base energy consumption for annual performance comparison

For the period between 2009 and 2016, the total building floor area increased from 391,492 m² to 442,985 m² and full- and part-time student enrolment increased from 24,295 to 28,845. In this comparison, the weather sensitive factors affecting electricity and gas consumption patterns are somewhat muted except for the sharp drop in CHP gas consumption from 2009 to 2010 due to a warm winter in 2010. This is shown in Figure 3.6. The upward trend in energy and water consumption was expected due to the internal load growth, increase in student enrolment and the addition of new campus buildings.

ENERGY AND WATER SUB-METERING

The majority of buildings on campus are equipped with the following types of sub-meters:

Electricity - measures individual building energy consumption in kWh

Steam - measures individual building steam or medium temperature hot water (MTHW) consumption in klbs (of steam)

Natural gas - measures individual building gas consumption in m³ (these are Enbridge gas meters, see Utility Map Tables 3.10, 3.11 and 3.12)

Water - measures individual building water consumption in m³

Chilled water - measures individual building cooling energy consumption in kBtu (1000 Btu).

Sub-metered energy and water use data for individual buildings between 2009 and 2016 are summarized in Tables 3.10, 3.11 and 3.12 respectively. The deviations in energy and water use between the actual utility bills and the sub-meter data are noted below:

Electric sub-meters

Total billed electricity consumption on campus was 10% and 11% higher in 2009 and 2012 respectively, compared to the total individual building electrical sub-meter readings for these years. In 2016, an issue with the phasing of the electrical sub-meter serving the Residence Commons building was discovered and corrected. The resulting effect improved the sub-meter discrepancy from the main utility account to 5%.

The following non-metered electrical loads may account for the remaining deviations:

- Campus street and parking area lights
- Tunnel lights
- Sports field lights
- Grounds Building
- Bronson Sub-station
- Accuracy of building electric sub-meters:
 - Depends on the meter class and typically ranges between +/- 0.5% accuracy for Class .5 meters to +/- 0.2% accuracy for Class .2 meters (as per ANSI C12.2 Standard)



Steam/MTHW sub-meters (CHP gas)

Individual building sub-meters measure thermal energy consumption expressed in klbs (1000 pounds) of steam. Conversion of natural gas input to CHP steam output was necessary to facilitate a comparison. For the purpose of this analysis, the following assumptions and conversion factors have been used:

- CHP seasonal plant efficiency = 70%
- Steam consumed within CHP = 15% of total steam output
- 1 m³ of natural gas = 0.03584 MMBtu
- 1 klbs of steam = 1 MMBtu

Total steam/MTHW use in individual buildings had a high correlation with the total billed natural gas consumption at the CHP. However, a growing disparity is developing with - 0.1%, 2.5% & 9.2% deviations in 2009, 2012 and 2016, respectively.

Other Gas

Campus total billed “other gas” consumption was 18.4%, 6.8% and 33% lower in 2009, 2012, and 2016 respectively, as compared to the total individual building gas sub-meter readings for these years. These deviations may be due to billing estimates and subsequent corrections by Enbridge.

Water

Campus total billed water consumption was 7.2%, 3.9%, and 9.5% lower in 2009, 2012, and 2016 respectively, as compared to the total individual building water sub-meter readings for these years. These deviations may be attributed to water sub-meter inaccuracies.

Chilled water

Some of the university buildings, which do not have their own cooling plants, are equipped with the chilled water meters. These meters measure the supplied cooling energy by electric chillers located in the nearby buildings. The consumption of electricity and steam is captured by the electricity and steam sub-meters of the chiller plant host.

Figure 3.8 – Weather Normalized Annual Energy Index by Building

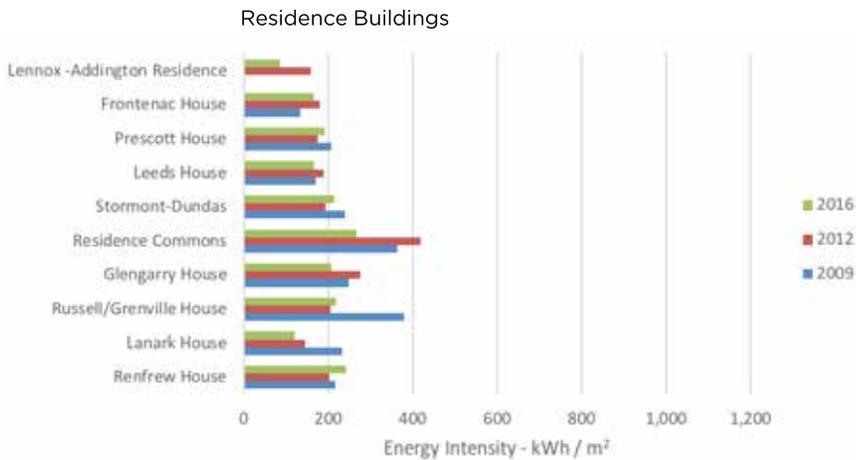
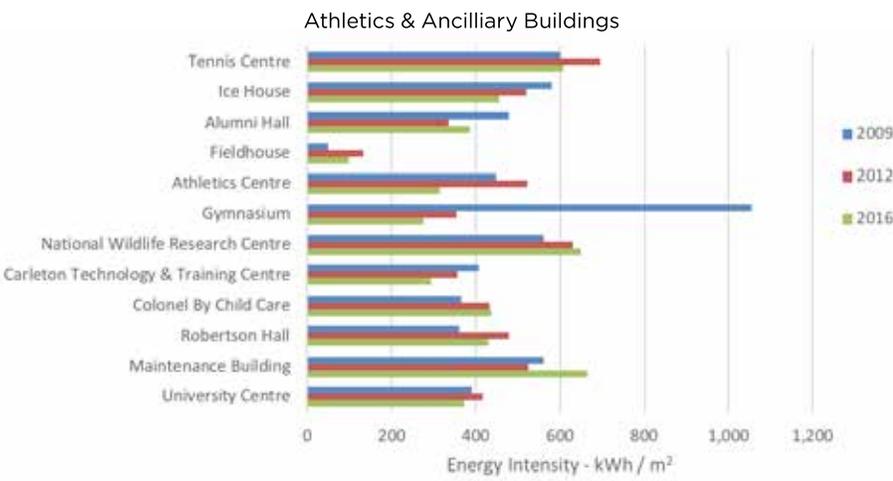
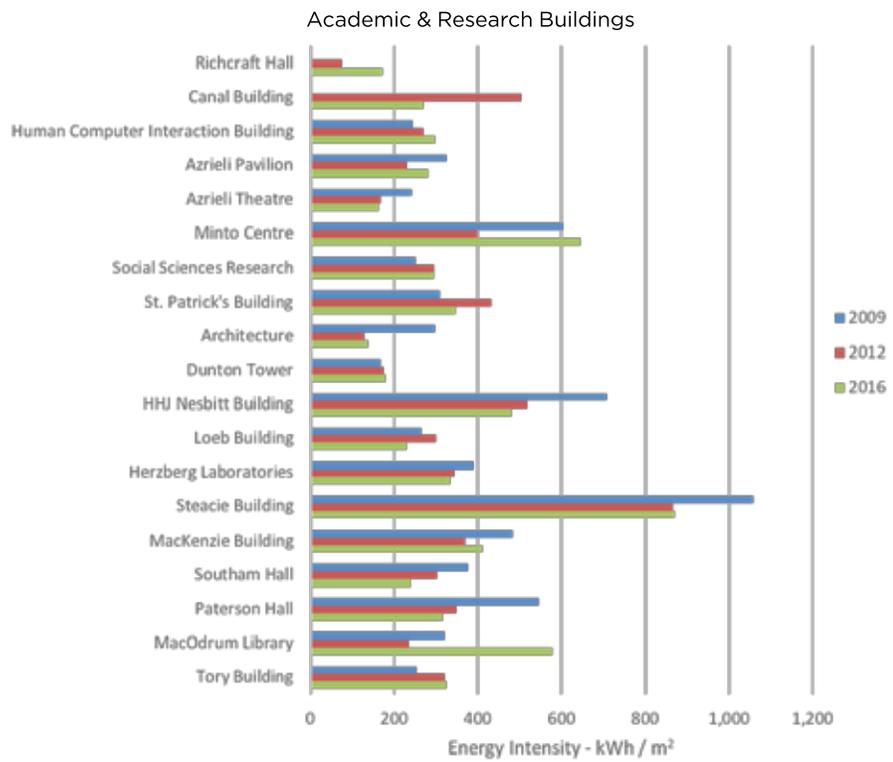


Figure 3.9 -Annual Water Use Index by Building

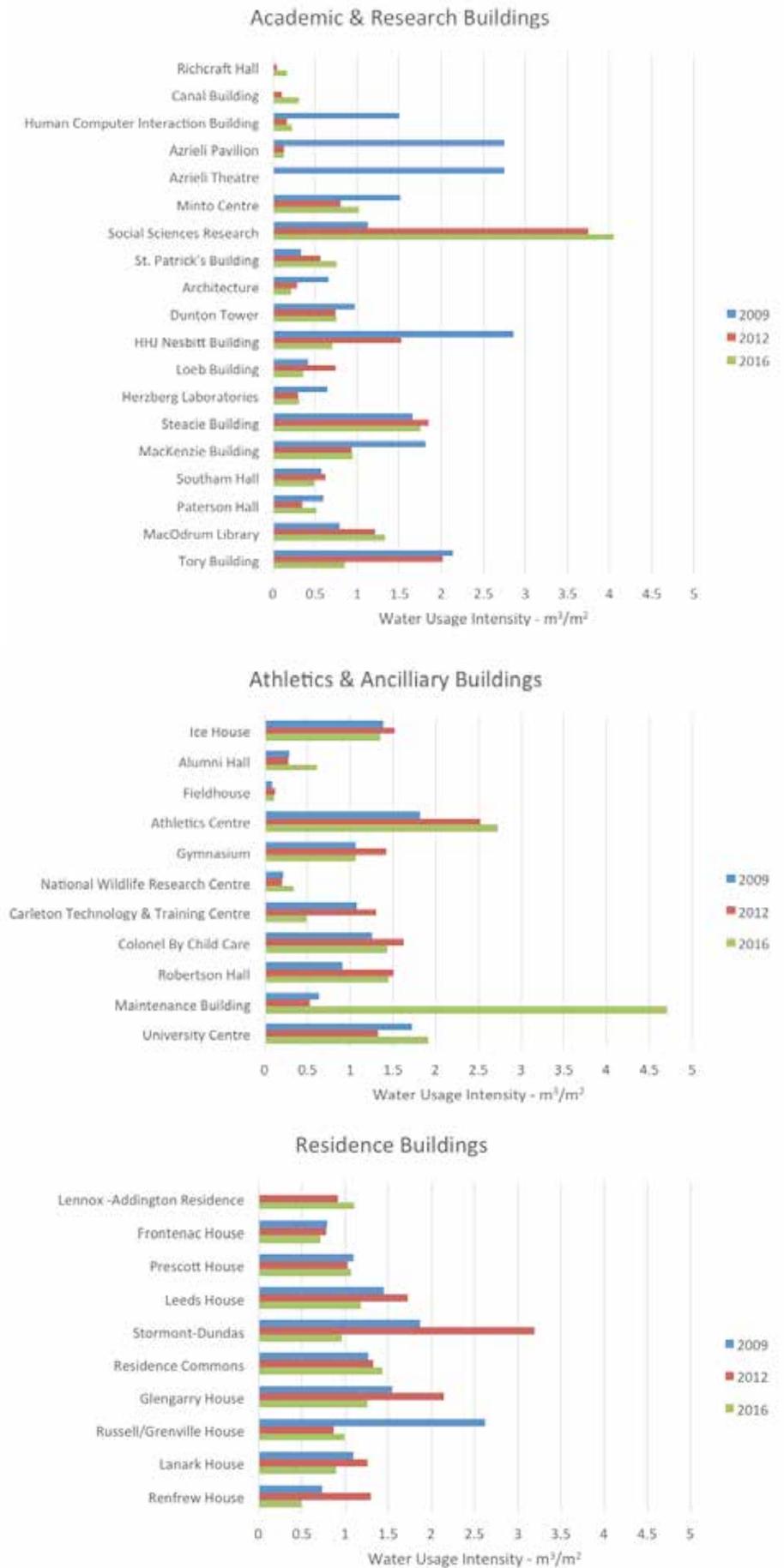


Table 3.10 – 2009 Building Energy and Water Use – Sub-meters

Bldg. Code #	Building Name	EXISTING USAGE			
		Electricity	Steam - MTHW	Natural Gas	Water
		kWh	MMBtu	m ³	m ³
1	Tory Building	2,141,450	3,069	20,803	27,414
2	MacOdrum Library	4,085,033	6,785	0	15,085
3	Paterson Hall	1,047,456	10,257	0	4,478
4	Southam Hall	1,468,491	6,875	0	5,324
5	Renfrew House	247,716	2,774	0	3,596
6	Lanark House	213,032	3,042	0	5,235
7	University Centre	3,321,228	8,073	71,175	28,406
8	Gymnasium	578,196	0	210,392	2,776
9	Physical Rec Centre	1,803,356	11,103	13,655	21,107
10	Mackenzie Building	4,520,439	13,307	66	31,763
11	Maintenance Building	1,117,560	3,881	3,019	2,580
12	Steacie Building	3,317,104	24,546	384	16,443
13	Herzberg Laboratories	3,133,139	8,136	0	9,121
14	Russell/Grenville House	562,955	9,606	0	23,347
15	Loeb Building	3,229,891	8,722	10,383	9,205
16	HHJ Nesbitt Biology	1,079,573	11,578	0	18,100
17	Robertson Hall	1,887,744	4,216	0	7,831
18	Glengarry House	1,495,861	7,041	0	22,232
19	Residence Commons	1,856,258	12,262	75,757	21,856
21	Dunton Tower	1,643,380	4,276	0	16,707
22	Architecture	776,703	5,915	5,830	5,645
23	St. Patrick's Building	1,077,700	1,994	48,057	2,400
24	Social Sciences Research	145,563	0	18,250	1,500
25	Life Sciences Research	1,184,022	5,761	0	5,000
26	Stormont-Dundas	1,123,563	5,214	0	20,479
27	Minto Centre	3,601,736	8,913	0	15,538
28	Colonel By Child Care	75,147	0	11,240	657
29	Carleton Technology	1,481,882	3,777	0	6,814
30	Leeds House	1,272,607	0	135,063	22,742
31	Azrieli Theatre	520,943	1,108	0	9,670
32	Azrieli Pavilion	1,036,309	1,557	0	12,673
33	National Wildlife Research Centre	2,226,052	3,079	0	1,168
34	Prescott House	1,243,890	4,324	7,757	13,773
35	Fieldhouse	90,875	0	13,011	384
36	Alumni Hall	1,115,376	1,892	0	1,009
37/38	Human Computer Int. & Visual	1,588,677	2,090	0	13,542
39	Ice House	2,312,785	0	296,135	12,910
40	Tennis Centre	258,325	0	168,951	1,500
41	Frontenac House	718,098	1,122	4,345	6,464
	2009 Total	60,600,115	206,295	1,114,273	446,474
	Actual consumption from 2009 bills	66,765,583	206,000	909,062	414,331
	% deviation Actual vs. Submetered	10.2%	-0.1%	-18.4%	-7.2%

Table 3.11 – 2012 Building Energy and Water Use – Sub-meters

Bldg. Code #	Building Name	EXISTING USAGE			
		Electricity	Steam - MTHW	Natural Gas	Water
		kWh	MMBtu	m ³	m ³
1	Tory Building	2,753,123	3,613	28,757	25,854
2	MacOdrum Library	2,750,652	5,846	0	22,943
3	Paterson Hall	672,855	6,528	0	2,567
4	Southam Hall	1,275,616	5,162	0	5,817
5	Renfrew House	255,607	2,524	0	6,344
6	Lanark House	208,350	1,649	0	6,021
7	University Centre	3,281,840	6,208	168,723	21,846
8	Gymnasium	251,157	0	64,993	3,712
9	Physical Rec Centre	1,572,976	8,380	14,797	29,258
10	Mackenzie Building	3,762,182	9,221	39	16,437
11	Maintenance Building	1,925,540	526	5,031	2,126
12	Steacie Building	2,989,160	19,148	259	18,389
13	Herzberg Laboratories	2,910,217	6,708	0	4,259
14	Russell/Grenville House	537,152	4,390	0	7,744
15	Loeb Building	3,720,466	9,749	8,237	16,524
16	HFJ Nesbitt Biology	732,153	8,683	0	9,640
17	Robertson Hall	2,927,808	4,153	0	13,056
18	Glengarry House	1,609,802	8,032	0	30,821
19	Residence Commons	1,372,519	16,383	99,337	22,751
21	Dunton Tower	1,882,556	3,804	0	12,834
22	Architecture	565,793	1,617	6,695	2,453
23	St. Patrick's Building	1,607,684	2,517	66,099	3,963
24	Social Sciences Research	141,927	0	24,273	10,658
25	Life Sciences Research	1,169,991	4,602	0	14,438
26	Stormont-Dundas	960,943	3,941	0	35,091
27	Minto Centre	3,646,516	1,543	0	8,229
28	Colonel By Child Care	72,710	0	14,964	855
29	Carleton Technology	1,323,426	3,231	0	8,308
30	Leeds House	1,283,503	0	162,773	27,167
31	Azrieli Theatre	419,737	584	0	10
32	Azrieli Pavilion	900,469	559	0	587
33	National Wildlife Research Centre	2,492,752	3,497	0	1,120
34	Prescott House	1,208,162	3,024	8,339	12,865
35	Fieldhouse	268,833	0	30,635	540
36	Alumni Hall	811,009	1,229	0	961
37/38	Human Computer Int. & Visual	1,825,421	2,124	0	1,528
39	Ice House	2,810,525	0	194,978	14,098
40	Tennis Centre	299,166	0	195,162	0
41	Frontenac House	667,700	2,633	1,765	6,407
42	Canal Building	1,779,784	9,367	0	1,020
43	River Building	776,977	1,668	0	851
44	New Residence	969,300	5,099	4,139	14,527
	2012 Total	63,394,055	177,941	1,099,995	444,621
	Actual consumption from 2012 bills	70,744,261	182,217	1,025,132	461,981
	% deviation Actual vs. Submetered	11.6%	2.4%	-6.8%	3.9%

Table 3.12 – 2016 Building Energy and Water Use – Sub-meters

Bldg. Code #	Building Name	EXISTING USAGE			
		Electricity	Steam - MTHW	Natural Gas	Water
		kWh	MMBtu	m3	m ³
1	Tory Building	2,708,000	4,194	18,998	10,891
2	MacOdrum Library	4,585,880	27,958	0	25,224
3	Paterson Hall	702,413	5,735	0	3,862
4	Southam Hall	994,168	3,226	0	4,532
5	Renfrew House	205,371	3,174	0	2,440
6	Lanark House	187,011	1,257	0	4,284
7	University Centre	3,028,813	7,239	69,996	31,486
8	Gymnasium	129,995	0	45,526	2,784
9	Physical Rec Centre	1,381,818	6,709	12,609	31,741
10	Mackenzie Building	3,659,449	11,614	9	16,514
11	Maintenance Building	2,963,200	2,250	11,931	19,171
12	Steacie Building	3,094,436	19,330	126	17,497
13	Herzberg Laboratories	2,576,406	6,279	0	4,365
14	Russell/Grenville House	554,755	4,803	0	8,871
15	Loeb Building	2,918,057	4,506	6,119	7,883
16	HHJ Nesbitt Biology	642,869	7,886	0	4,489
17	Robertson Hall	2,699,771	2,719	0	12,533
18	Glengarry House	1,578,087	4,627	0	18,133
19	Residence Commons	2,683,642	8,403	74,464	24,588
21	Dunton Tower	1,693,173	4,142	0	13,070
22	Architecture	516,245	1,888	5,656	1,879
23	St. Patrick's Building	1,353,865	2,158	17,965	5,273
24	Social Sciences Research	123,120	0	24,367	5,400
25	Life Sciences Research	1,170,536	5,437	0	4,426
26	Stormont-Dundas	928,827	4,767	0	10,586
27	Minto Centre	3,494,735	10,145	0	10,464
28	Colonel By Child Care	79,656	0	15,136	754
29	Carleton Technology	1,179,263	1,868	0	3,107
30	Leeds House	1,222,649	0	127,696	18,529
31	Azrieli Theatre	427,460	521	0	3
32	Azrieli Pavilion	834,382	1,341	0	597
33	National Wildlife Research Centre	2,714,832	3,834	0	1,868
34	Prescott House	1,165,871	3,929	3,424	13,437
35	Fieldhouse	297,031	0	15,800	458
36	Alumni Hall	1,410,461	1,416	11,332	2,138
37/38	Human Computer Int. & Visual	2,038,696	2,914	0	2,077
39	Ice House	3,246,544	0	136,579	12,579
40	Tennis Centre	313,602	0	166,835	0
41	Frontenac House	692,286	2,311	1,615	5,843
42	Canal Building	1,954,273	2,169	0	2,806
43	Richcraft Hall	2,884,868	7,220	0	2,920
44	Lennox Building	1,050,300	7,099	4,048	17,505
	HS Building	712,260	1,800	0	1,800
	OCTranspo	18,720	0	0	0
	Parking	556,518	0	0	0
	2016 Total	69,374,311	196,867	770,231	388,807
	Actual consumption from 2016 bills	70,636,276	178,839	1,025,132	425,796
	% deviation Actual vs. Submetered	0.1%	-9.2%	33.1%	9.5%

UTILITY DATA MANAGEMENT

Over the years, the university has made great progress monitoring, collecting and managing energy and water data for the entire campus and individual campus buildings. Since 2014, virtually all campus buildings are equipped with energy (electricity, steam, natural gas) and water sub-meters.

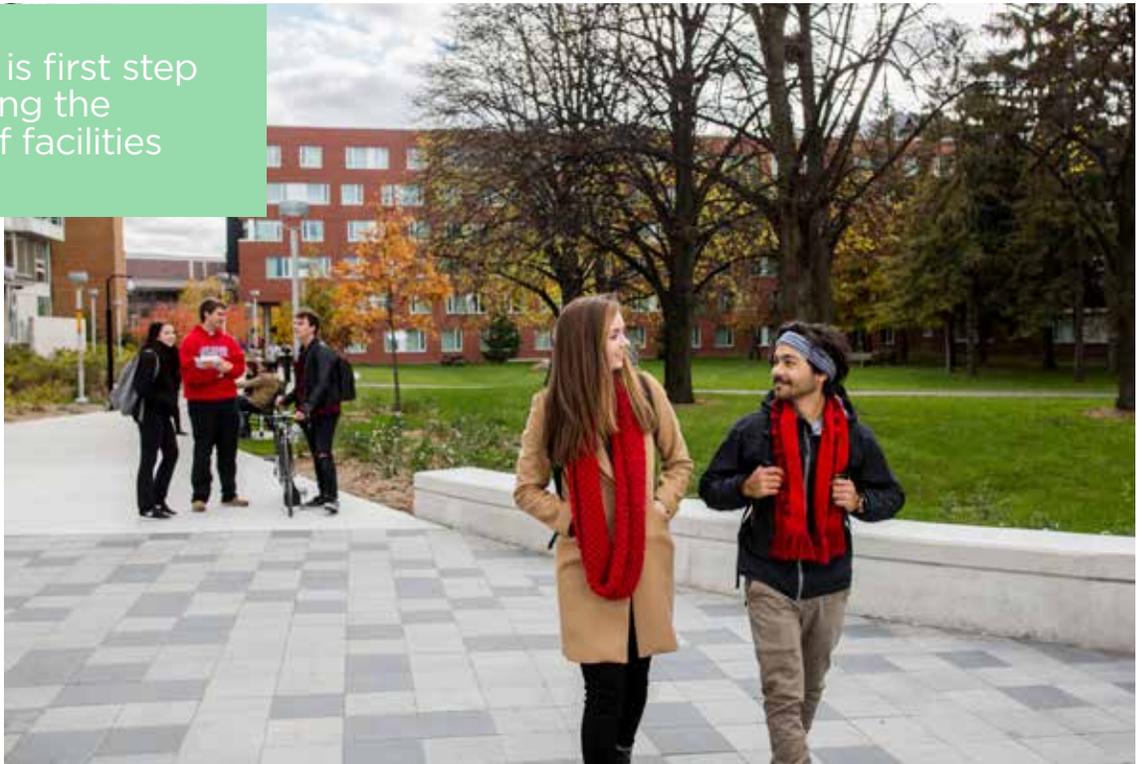
The data captured from both building sub-meters (electricity, steam, water) and individual building gas bills for each budget year is logged, managed and archived in spreadsheets for both “Ancillary” and “Non-Ancillary” facilities. The university has used this data to forecast energy budgets and facilitate utility cost-recovery from various tenants and/or departments. This data was also used for the building energy and water use summaries shown in Tables 3.10, 3.11 and 3.12.

Capturing building operating data is the first step toward improving the management of the university’s campus facilities. Analysis of this data and follow-up actions are foundational in driving operational excellence.

RECENT SUCCESS AND POTENTIAL OPPORTUNITIES

Carleton has successfully undertaken full building retrofits in the ongoing effort to reduce the overall energy consumption and greenhouse gas emissions. These retrofit projects leverage energy savings and provide the opportunity to complete additional renewal services in the effort to improve the built environment for faculty, students and staff as the campus continues to evolve.

Capturing data is first step toward improving the management of facilities



Specifically, in 2016 Carleton University completed major energy conservation projects at eight of its buildings. These projects will reduce the electrical consumption by over 930,000 kWh. The completed projects consisted of lighting upgrades replacing fluorescent fixtures with LED, the installation of variable speed drives on fans, the implementation of computer sleep-mode software.

Figure 3.13 Carleton Energy Full Building Retrofit Success and Potential

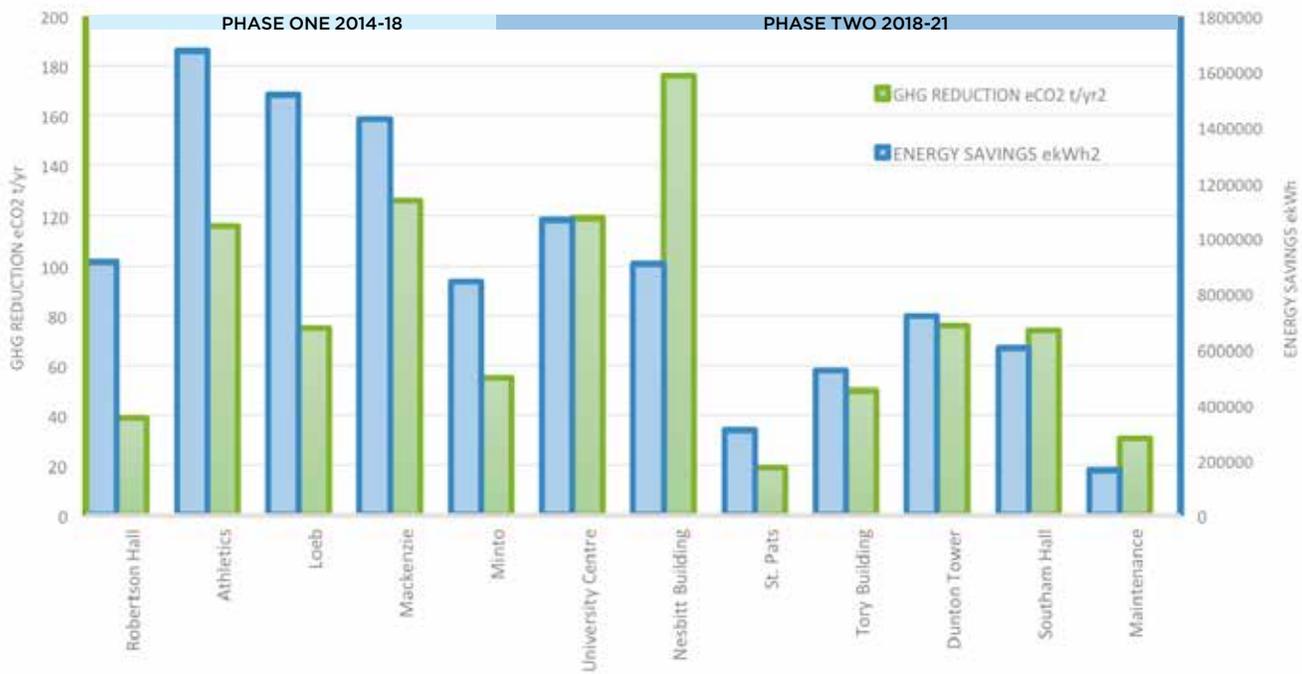


Photo: Doublespace Photography

CAMPUS MASTER PLAN AND FUTURE ENERGY REQUIREMENTS

OVERVIEW

This Energy Master Plan is intended to support the Campus Master Plan by providing a detailed analysis of campus historical energy and water use, as well as analyzing future utility requirements to satisfy physical development. The Energy Master Plan also identifies energy and water conservation opportunities in existing buildings to further reduce future energy requirements.

CAMPUS MASTER PLAN

The Campus Master Plan describes the future physical development of the campus. It addresses the location and size of the buildings and general use. This document, which is reviewed and updated every five years, does not provide a timeline for the campus development since it is understood that the progress of the planned development has many dependencies, including the availability of funding.

- Figure 4.1 shows the existing building stock and future development outlined in the Campus Master Plan.
- Figure 4.2 shows the campus key map with the new building statistics.

The current plan calls for construction of new buildings with a total floor area of 430,972 m². Under this plan, 42,921 m² of the existing building stock will be demolished and the net campus growth will be from 442,220 m² to 830,271 m²

Figure 4.1 - Carleton University Campus Master Site Plan



Figure 4.2 - Key Map for New Buildings Statistics



CAMPUS ENERGY BENCHMARKS

For the purpose of this analysis, the principles of energy benchmarking to predict future energy and water requirements for new facilities developed under the 2016 Campus Master Plan have been used.

Table 4.3 provides a summary of energy and water use benchmarks for the existing campus building stock organized by building type and based on 2016 data.

Average, maximum and minimum performance benchmarks were used to calculate energy and water use for the following building types:

- Academic
- Research
- Athletics
- Ancillary
- Residences

Table 4.3 - Energy Performance Benchmarks - Existing Building Stock

Building Name	Building Type	Area/ft ²
MacOdrum Library	Academic	204,177
Mackenzie Building	Academic	188,095
Loeb Building	Academic	238,375
Nesbitt Building	Academic	68,030
Dunton Tower	Academic	184,876
Architecture	Academic	92,723
St. Patrick's Building	Academic	75,490
Minto Centre	Academic	110,624
Azrieli Theatre	Academic	37,783
Azrieli Pavilion	Academic	49,516
Human Computer Int. & Visual	Academic	97,309
Paterson Hall	Academic	79,989
Southam Hall	Academic	99,526
Canal Building	Academic	96,609
Richcraft Hall	Academic	181,593
Tory Building	Academic / Admin	138,110
Academic Total		
Steacie Building	Research	107,104
Herzberg Laboratories	Research	152,562
Social Sciences Research	Research	14,370
Life Sciences Research	Research	25,296
Research Total		
Gymnasium	Athletics	28,159
Physical Rec Centre	Athletics	125,199
Fieldhouse	Athletics	47,998
Alumni Hall	Athletics	37,503
Ice House	Athletics	99,914
Tennis House	Athletics	36,006
Athletics Total		
University Centre	Ancillary / Academic / Admin	177,183
Robertson Hall	Administrative	93,208
Maintenance Building	Ancillary	43,832
Carleton Technology	Ancillary	68,515
Residence Commons	Ancillary	185,323
Colonel By Child Care	Ancillary	5,662
National Wildlife Research Centre	Ancillary / Academic	60,000
Ancillary Total		
Renfrew House	Residence	52,680
Lanark House	Residence	51,469
Russell / Grenville House	Residence	95,953
Glengarry House	Residence	154,715
Stormont-Dundas	Residence	118,192
Leeds House	Residence	169,139
Prescott House	Residence	135,005
Frontenac House	Residence	87,998
Lennox and Addington	Residence	170,000
Residence Total		

Table 4.3 - Energy Performance Benchmarks - Existing Building Stock - cont'd

EXISTING USAGE											
Electricity				Steam -MTHW		Natural Gas		Total BEPI	Water		
kWh	kW	kWh/ft ²	Wft ²	MMBtu	ek Wh/ft ²	m ³	EkWh/ft ²	EkWh/ft ²	m ³	l/ft ²	
4,585,880	1,002	22.46	4.91	27,958	8.39	0	0.00	30.85	25,224	124	
3,659,449	800	19.46	4.25	11,614	14.37	9	0.00	33.83	16,514	88	
2,918,057	638	12.24	2.68	4,506	11.99	6,119	0.36	24.59	7,883	33	
642,869	140	9.45	2.07	7,886	37.41	0	0.00	46.86	4,489	66	
1,693,173	370	9.16	2.00	4,142	6.03	0	0.00	15.19	13,070	71	
516,245	113	5.57	1.22	1,888	5.11	5,656	0.76	11.44	1,879	20	
1,353,865	296	17.93	3.92	2,158	9.77	17,965	9.19	36.90	5,273	70	
3,494,735	764	31.59	6.90	10,145	4.09	0	0.00	35.68	10,464	95	
427,460	93	11.31	2.47	521	4.53	0	0.00	15.84	3	0	
834,382	182	16.85	3.68	1,341	3.31	0	0.00	20.16	597	12	
2,038,696	446	20.95	4.58	2,914	6.40	0	0.00	27.35	2,077	21	
702,413	154	8.78	1.92	5,735	23.92	0	0.00	32.70	3,862	48	
994,168	217	9.99	2.18	3,226	15.20	0	0.00	25.19	4,532	46	
1,954,273	427	20.23	4.42	2,169	28.42	0	0.00	48.64	2,806	29	
2,884,868	630	15.89	3.47	7,220	2.69	0	0.00	18.58	2,920	16	
2,708,000	592	19.61	4.28	4,194	7.67	18,998	2.19	29.46	10,891	79	
Average		15.72	3.43	11.83		0.78		28.33	51		
Maximum		31.59	6.90	37.41		9.19		48.64	124		
Minimum		5.57	1.22	2.69		0.00		11.44	0		
3,094,436	676	28.89	6.31	19,330	52.40	126	0.003	81.32	17,497	163	
2,576,406	563	16.89	3.69	6,279	12.89	0	0.00	29.77	4,365	29	
123,120	27	8.57	1.87	0	0.00	24,367	17.74	26.30	5,400	376	
1,170,536	256	46.27	10.11	5,437	53.32	0	0.00	99.59	4,426	175	
Average		25.16	5.50	29.65		4.44		59.25	186		
Maximum		46.27	10.11	53.32		17.74		99.59	376		
Minimum		8.57	1.87	0.00		0.00		26.30	29		
129,995	28	4.62	1.01	0	0.00	45,526	24.23	28.85	2,784	99	
1,381,818	302	11.04	2.41	6,709	19.62	12,609	1.24	31.90	31,741	254	
297,031	65	6.19	1.35	0	0.00	15,800	6.70	12.89	458	10	
1,410,461	308	37.61	8.22	1,416	9.61	11,332	0.00	47.22	2,138	57	
3,246,544	709	32.49	7.10	0	0.00	136,579	20.49	52.98	12,579	126	
313,602	69	8.71	1.90	0	0.00	166,835	56.91	65.62	0	0	
Average		16.78	3.67	4.87		18.26		39.91	91		
Maximum		37.61	8.22	19.62		56.91		65.62	254		
Minimum		4.62	1.01	0.00		0.00		12.89	0		
3,028,813	662	17.09	3.74	7,239	10.27	69,996	10.00	37.76	31,486	178	
2,699,771	590	28.97	6.33	2,719	13.06	0	0.00	42.02	12,533	134	
2,963,200	648	67.60	14.77	2,250	3.51	11,931	1.21	73.32	19,171	437	
1,179,263	258	17.21	3.76	1,868	13.82	0	0.00	31.03	3,107	45	
2,683,642	586	14.48	3.16	8,403	25.91	74,464	5.63	46.02	24,588	133	
79,656	17	14.07	3.07	0	0.00	15,136	27.75	41.82	754	133	
2,714,832	593	45.25	9.89	3,834	17.08	0	0.00	62.33	1,868	31	
Average		29.24	6.39	11.95		6.37		47.56	156		
Maximum		67.60	14.77	25.91		27.75		72.32	437		
Minimum		14.07	3.07	0.00		0.00		31.03	31		
205,371	45	3.90	0.85	3,174	14.04	0	0.00	17.94	2,440	46	
187,011	41	3.63	0.79	1,257	9.39	0	0.00	13.02	4,248	83	
554,755	121	5.78	1.26	4,803	13.41	0	0.00	19.19	8,871	92	
1,578,087	345	10.20	2.23	4,627	15.22	0	0.00	25.42	18,133	117	
928,827	203	7.86	1.72	4,767	9.77	0	0.00	17.63	10,586	90	
1,222,649	267	7.23	1.58	0	0.00	127,696	10.10	17.33	18,529	110	
1,165,871	255	8.64	1.89	3,929	6.57	3,424	0.65	15.85	13,437	100	
692,286	151	7.87	1.72	2,311	8.77	1,615	0.21	16.85	5,843	66	
1,050,300	230	6.18	1.35	7,099	8.79	4,048	0.26	15.23	17,505	103	
Average		6.81	1.49	9.55		1.25		17.61	90		
Maximum		10.20	2.23	15.22		10.10		25.42	117		
Minimum		3.63	0.79	0.00		0.00		13.02	46		

FUTURE ENERGY AND WATER REQUIREMENTS

A number of existing campus buildings will be demolished to make way for new construction. Table 4.4 provides a summary of buildings planned for demolition, as well as 2016 energy and water consumption data. We expect that utilities removed will free up capacity on the existing campus energy and water infrastructure systems.

Average energy and water consumption benchmarks for each building type were used as a starting point for predicting the future energy and water requirements for the new buildings. Given the university's ongoing commitment to energy efficiency and environmental responsibility, this analysis assumes that all new buildings will be constructed to meet the most current construction standards, using high performance building materials, sustainable energy sources and high efficiency building technologies and equipment. The future energy use projections are based on the assumption that all new buildings will be designed and operated to achieve a minimum rating of 3 Green Globes as defined by the Green Building Initiative.

Table 4.4 – Buildings Planned for Removal under 2016 Campus Master Plan

Building Name	Area (ft ²)	Electricity		CHP Gas	Other Gas	Total Gas	Water
		kW	MWh	MMBtu	MMBtu	MMBtu	m ³
Social Sciences Research Bldg.	14,370	27	123	0	873	873	5,400
Paterson Hall	79,989	154	702	5,735	0	5,735	3,862
Life Sciences Research Bldg.	25,296	27	123	0	873	873	5,400
Daycare	5,662	17	80	0	542	542	754
Tennis Bubble	36,006	69	314	0	5,979	5,979	0
Parking Garage	256,857	358	557	0	0	0	0
Maintenance	43,370	648	2,963	2,250	428	2,678	19,171
Total to be removed	461,550	1,299	4,862	7,986	8,696	16,682	34,587

Table 4.5 shows the estimated energy and water reduction factors which have been used for this analysis. These factors are preliminary and may be adjusted in the future with advancements in high performance building materials and energy efficient equipment and building technologies.

Table 4.5 – Energy and Water Reduction Factors

Building type	Energy and Water Reduction Factors		
	Electricity	Thermal	Water
Academic	30%	40%	50%
Research	30%	40%	50%
Athletics	30%	40%	50%
Ancillary	30%	40%	50%
Residences	30%	40%	50%
Parking	50%		

Table 4.6 is a summary of the estimated annual energy and water consumption for the new buildings based on improved construction standards and energy performance.

Table 4.6 – Projected Energy and Water Consumption in New Buildings

Building type	Area (ft ²)	Electricity		Fuel MMBtu	Water m ³
		Peak kW	MWh		
Academic	674,798	1,622	7,424	24,890	17,230
Research	1,170,552	4,504	20,612	116,703	108,672
Athletics	169,154	434	1,986	11,444	7,680
Ancillary	857,130	3,834	17,543	45,921	66,848
Residences	620,981	647	2,960	19,608	27,848
Parking	1,106,281	771	1,198		
Total	4,598,896	11,813	51,723	218,566	228,279

Table 4.7 is a summary of the estimated annual energy and water consumption for the new and expanded Carleton University campus.

Table 4.7 – Projected Energy and Water Consumption for New Campus

	Area (ft ²)	Electricity		Fuel MMBtu	Water m ³
		Peak kW	MWh		
Existing buildings	4,768,256	14,141	70,636	332,673	425,796
Removed buildings	-461,550	-1,299	-4,862	-16,682	-34,587
New buildings	4,598,896	11,813	51,723	218,566	228,279
Projected campus total	8,905,602	24,654	117,498	534,558	619,488

EXISTING ENERGY AND WATER SYSTEMS INFRASTRUCTURE

The sheer magnitude of planned campus development will impact the existing energy and water systems infrastructure. A detailed analysis and condition assessment of the existing energy and water services is beyond the scope of this study. However, there is information that is useful to consider which is outlined below.

WATER SERVICE SYSTEM

Two 8-inch water lines from City of Ottawa in the meter chamber on Colonel By Drive are tied to the 16-inch water main serving the existing campus. Campus water consumption is expected to increase over 60% when the Campus Master Plan development is complete. It's expected that upgrades to the water distribution infrastructure will be required to serve the new facilities, with the new feed line serving the new residential and research campuses at the north end of the campus.



ENERGY CONSERVATION

OVERVIEW

Carleton conducted facility walk-through surveys to assess and identify energy and water conservation opportunities in the selected buildings.

ENERGY CONSERVATION OPPORTUNITIES

Based on analysis, we have identified six facilities as strong candidates for future ASHRAE Level 2 and/or Level 3 assessments and potential energy conservation projects. (in terms of magnitude).

Based on our preliminary assessment of the selected facilities, approximately 17% and 3% reduction of energy and water use respectively, is possible. Future assessments will further refine the savings and firm up the project costs to support the university's decision-making process.

- University Centre
- St. Patricks' Building
- HHJ Nesbitt
- Southam Hall
- Tory Building
- Dunton Tower

Table 5.1 provides a preliminary list of identified Energy Conservation Measures (ECMs) opportunities in the selected facilities.

Table 5.1 Preliminary list of identified Energy Conservation Measures (ECM)

Carleton University		TB - Tory Building	ML - MacOdrum Library	PA - Paterson Hall	SA - Southam Hall	ME - Mackenzie Building	MB - Maintenance Building	SC - Steacie Building	HP - Herzberg Laboratories	LA - Loeb Building	NB - H.H.J. Nesbitt Biology Building	RO - Robertson Hall	DT - Dunton Tower
ECM	Description	1	2	3	4	10	11	12	13	15	16	17	21
L	Lighting Measures												
L-01	Retrofit/Replace interior fluorescent fixtures to LED	x	x	x	x		x	x		x	x	x	x
L-02	Retrofit/Replace interior fluorescent high-bay fixtures to LED			x	x								
L-02	stairwell lighting control (all bldgs)	x	x	x	x	x	x	x	x	x	x	x	x
E	Electrical System Measures												
E-01	Install Vending Miser controllers on drink vending machines			x	x								
C	Control System Measures												
C-01	Install new DDC control system			x				x					x
C-02	Expand existing DDC control system	x		x			x	x			x		x
C-03	Integrate control systems using global head end	x	x	x			x	x			x		x
C-04	Re-commission and optimize controls for energy efficiency	x	x	x	x		x	x			x		x
C-05	Re-calibrate and tune control systems	x		x	x		x	x		x	x	x	x
C-06	Optimize fan system operation	x		x	x		x	x		x	x	x	x
C-07	Optimize unoccupied setback	x		x	x		x	x		x	x	x	x
C-08	Reset supply air temperature	x		x	x		x	x		x	x	x	x
C-09	Sequence heating, cooling and humidification	x		x	x		x	x			x		x
M	Mechanical System Measures												
M-01	Upgrade air handling systems	x	x	x	x		x	x			x		x
M-02	Install zone dampers and VSD's to match airflow with occupancy			x	x								x
M-03	lab space venturi valves								x		x		
M-04	Install variable exhaust system for kitchen cooking exhaust hood												
M-05	Install low leakage fresh air dampers			x	x				x				
M-06	Convert constant volume systems to variable air volume (VAV)			x	x				x				
M-07	Replace electric motors with high efficiency motors			x							x		x
M-08	Convert 100% fresh air system to mixed air												
M-09	Install outdoor air free cooling on AHU's												
M-10	Install AHU heat recovery (glycol/air to air/refrigerant/heat wheel)		x								x		
M-11	Monitor indoor air quality for demand controlled ventilation (CO2)			x	x				x				
M-12	Monitor CO2 levels to control room ventilation			x	x								
B	Building Envelope Measures												
B-01	Retrofit building envelope (caulking, seals & sweeps)			x	x			x	x	x		x	
W	Water Measures												
W-01	Install low flow plumbing fixtures												
W-02	Replace washing machines with front loading												

Table 5.1 Preliminary list of identified Energy Conservation Measures (ECM) - cont'd

Carleton University		AA - Architecture Building	SP - St. Patrick's Building	SR - Social Sciences Research Building	LS - Life Sciences Research Building	MC - Minto Centre	AT - Azrieli Theatre	AP - Azrieli Pavilion	HC/VS - Human Computer Interaction Bldg / Visualization & Simulation Building	CB - Canal Building	RB - River (Richcraft) Building	HS - Health Sciences	Renfrew
ECM	Description	22	23	24	25	27	31	32	37	42	43	100	5
L	Lighting Measures												
L-01	Retrofit/Replace interior fluorescent fixtures to LED	x	x	x			x	x		x	x		x
L-02	Retrofit/Replace interior fluorescent high-bay fixtures to LED	x					x						
L-02	stairwell lighting control (all bldgs)	x	x	x	x	x	x	x	x	x	x	x	x
E	Electrical System Measures												
E-01	Install Vending Miser controllers on drink vending machines						x	x					x
C	Control System Measures												
C-01	Install new DDC control system	x		x									x
C-02	Expand existing DDC control system	x	x	x									x
C-03	Integrate control systems using global head end	x	x	x			x	x					x
C-04	Re-commission and optimize controls for energy efficiency	x	x	x			x	x		x	x		x
C-05	Re-calibrate and tune control systems	x	x	x			x	x		x	x		x
C-06	Optimize fan system operation	x	x	x			x	x		x	x		x
C-07	Optimize unoccupied setback	x	x	x			x	x		x	x		x
C-08	Reset supply air temperature	x	x	x			x	x		x	x		x
C-09	Sequence heating, cooling and humidification	x	x	x			x	x		x	x		x
M	Mechanical System Measures												
M-01	Upgrade air handling systems	x	x										x
M-02	Install zone dampers and VSD's to match airflow with occupancy		x				x						x
M-03	lab space venturi valves												
M-04	Install variable exhaust system for kitchen cooking exhaust hood												
M-05	Install low leakage fresh air dampers	x					x	x					x
M-06	Convert constant volume systems to variable air volume (VAV)			x			x						x
M-07	Replace electric motors with high efficiency motors	x						x					x
M-08	Convert 100% fresh air system to mixed air												
M-09	Install outdoor air free cooling on AHU's			x			x						
M-10	Install AHU heat recovery (glycol/air to air/refrigerant/heat wheel)												
M-11	Monitor indoor air quality for demand controlled ventilation (CO2)	x		x			x	x					x
M-12	Monitor CO2 levels to control room ventilation	x		x			x	x					x
B	Building Envelope Measures												
B-01	Retrofit building envelope (caulking, seals & sweeps)	x		x			x	x	x				x
W	Water Measures												
W-01	Install low flow plumbing fixtures	x		x			x	x	x				x
W-02	Replace washing machines with front loading	x		x									

Table 5.1 Preliminary list of identified Energy Conservation Measures (ECM) - cont'd

Carleton University		Lanark	Russel-Grenville	Glengary	Stormont-Dundass	Leeds	Prescot	Frontenac	Lennox	Gymnasium	Athletics	FH - Fieldhouse	AH - Alumni Hall and Sports Centre
ECM	Description	6	14	18	26	30	34	41	44	8	9	35	36
L	Lighting Measures												
L-01	Retrofit/Replace interior fluorescent fixtures to LED	x	x			x	x	x	x	x		x	
L-02	Retrofit/Replace interior fluorescent high-bay fixtures to LED											x	
L-02	stairwell lighting control (all bldgs)	x	x	x	x	x	x	x	x	x	x	x	x
E	Electrical System Measures												
E-01	Install Vending Miser controllers on drink vending machines	x	x	x	x	x	x	x	x	x			
C	Control System Measures												
C-01	Install new DDC control system	x	x	x	x	x	x			x			
C-02	Expand existing DDC control system	x	x	x	x	x	x	x		x			
C-03	Integrate control systems using global head end	x	x	x	x	x	x	x		x			
C-04	Re-commission and optimize controls for energy efficiency	x	x	x	x	x	x	x	x	x		x	
C-05	Re-calibrate and tune control systems	x	x	x	x	x	x	x	x	x		x	
C-06	Optimize fan system operation	x	x	x	x	x	x	x	x	x		x	
C-07	Optimize unoccupied setback	x	x	x	x	x	x	x	x	x		x	
C-08	Reset supply air temperature	x	x	x	x	x	x	x	x	x		x	
C-09	Sequence heating, cooling and humidification	x	x	x	x	x	x	x	x	x		x	
M	Mechanical System Measures												
M-01	Upgrade air handling systems	x	x	x	x								
M-02	Install zone dampers and VSD's to match airflow with occupancy	x	x		x	x							
M-03	lab space venturi valves												
M-04	Install variable exhaust system for kitchen cooking exhaust hood												
M-05	Install low leakage fresh air dampers	x	x	x	x	x	x	x		x		x	
M-06	Convert constant volume systems to variable air volume (VAV)	x	x										
M-07	Replace electric motors with high efficiency motors	x	x		x	x		x				x	
M-08	Convert 100% fresh air system to mixed air		x										
M-09	Install outdoor air free cooling on AHU's		x	x		x				x		x	
M-10	Install AHU heat recovery (glycol/air to air/refrigerant/heat wheel)												
M-11	Monitor indoor air quality for demand controlled ventilation (CO2)	x	x	x	x	x	x	x		x		x	
M-12	Monitor CO2 levels to control room ventilation	x	x	x	x	x	x	x		x		x	
B	Building Envelope Measures												
B-01	Retrofit building envelope (caulking, seals & sweeps)			x	x	x	x	x	x			x	
W	Water Measures												
W-01	Install low flow plumbing fixtures					x	x	x				x	
W-02	Replace washing machines with front loading					x							

ENERGY MASTER PLAN

TOGETHER WE ARE BUILDING A SUSTAINABLE CAMPUS

ENERGY RETROFIT SAVINGS



2.6 Million

2.6 Million kWh Annual Electricity Reduction



2,004

2,004 Metric tons of CO² saved

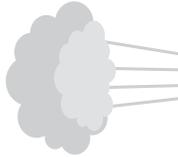
429



saving the equivalent annual greenhouse gas emissions from **429 cars**

4.2 Million

4.2 Million lb of steam saved



25,000 m³



Water reduction

BUILDING RENEWAL



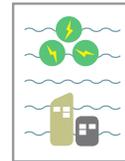
17%

17% projected energy savings from phase 2 of energy retrofits



5

5 building energy retrofits completed



7

7 building energy retrofits planned

ENERGY PROGRAMS

1 Co-generation plant



13 Projects funded through the Green Revolving Fund

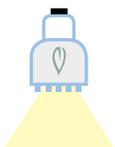


88%

88% projected campus floor area growth



9 Green Globe rated buildings on campus.



652,000 kWh LED replacement energy savings

25%

25% ESAT rating improvement in Athletics



Silver AASHE stars rating

DO YOU WANT TO LEARN MORE ABOUT
THE ENERGY PROJECTS AND INITIATIVES
FEATURED IN THIS PLAN OR ABOUT
CARLETON UNIVERSITY'S OTHER
SUSTAINABILITY PROGRAMS?

VISIT CARLETON.CA/SUSTAINABILITY OR
CONTACT US DIRECTLY FOR MORE DETAILS.

PREPARED MAY 2018

 FOLLOW US ON @CUSUSTAIN
 EMAIL SUSTAINABILITY@CARLETON.CA

 CARLETON UNIVERSITY
ENERGY AND SUSTAINABILITY
FACILITIES MANAGEMENT AND PLANNING
MAINTENANCE BUILDING, 1125 COLONEL BY DRIVE
OTTAWA, ON, K1S 5B6



Sustainability
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AGENDA ITEM

7.3

HERE *for* GOOD

UNIVERSITY ADVANCEMENT
REPORT TO BOARD OF GOVERNORS

CAMPAIGN PROGRESS

CAMPAIGN TOTAL: \$270,160,776

FISCAL YEAR:

Annual Giving: \$2,083,925

Major Giving: \$15,022,120

Transformational: \$24,252,242

TOTAL FISCAL: \$41,358,287

UPCOMING EVENTS

May 29:

Ottawa Leadership Luncheon ft. Bruce Linton

June 4:

Legacy Luncheon

June 11:

Men's Hockey Golf Tournament

June 12-15:

Spring Convocation

June 16:

Carleton University Alumni Association AGM

June 28:

CU Night at JazzFest

July 6:

Men's Basketball Golf Tournament

TRANSFORMATIONAL GIFTS

FULLBRIGHT CANADA - VISITING CHAIRS -
\$3,200,000

Entrepreneurship (Sprott School of Business)

Environmental Science (Faculty of Science)

Public Affairs in North America: Society, Policy, Media
(Faculty of Public Affairs)

Arts and Social Sciences in Canada and North America
(Faculty of Arts and Social Sciences)

ESTATE OF JOAN MARY MARLENE DE PENCIER -
\$2,800,000

Douglas Arthur de Pencier Bursaries

THE SLAIGHT FAMILY FOUNDATION - \$2,000,000

The Allan Slaight Chair for the Study of the Conjuring
Arts

CRABTREE FOUNDATION - \$2,000,000

Carleton University Concert Hall Fund

ELAINE KEILLOR - \$1,000,000

Elaine Keillor Endowment Fund in Support of the
Helmut Kallmann Chair in Canadian Music

GEOLOGIC SYSTEMS LTD. - \$647,350

Faculty of Science - GIK

BANK OF MONTREAL - \$500,000

Carleton University Concert Hall Fund

TROTTIER FAMILY FOUNDATION - \$350,000

Sustainable Energy Research Centre

IVEY FOUNDATION - \$350,000

Sustainable Energy Research Centre

CLEAN ECONOMY FUND - \$322,500

Sustainable Energy Research Centre

ESTATE OF MAATJE NIX - \$319,999

Maatje Nix Memorial Graduate Entrance Scholarship

HERE *for* GOOD

ADVANCEMENT HIGHLIGHTS IN 2017/18

At the close of Carleton's best-ever fiscal year for fundraising, we celebrate new milestones in the Collaborate Campaign and engagement with the community.

CAMPAIGN PROGRESS

In 2017/18, we raised more than \$41 million and reached the \$270 million mark towards our \$300 million campaign goal

1,813

Volunteers throughout Collaborate: The Carleton University Campaign

55

Newly established scholarships and bursaries to support students in financial need and to reward academic excellence

2,300

New supporters were welcomed to the Carleton community of donors this year

ENDOWMENT BUILDING

In this fiscal year, fundraising added more than \$8M to the endowment through gifts to the library, athletics, students services and awards, and the student experience Fund for Good

59

Community-led projects launched through FutureFunder.ca, Carleton's crowdfunding site that connects donors with causes that matter most to them

STUDENT SUPPORT

Support for students is a priority for Advancement. To help make the opportunity of higher education more accessible, 55 new awards were established this year. Student awards received \$5,443,546, while \$675,000 was raised for an endowed student academic experience fund. In addition, 137 alumni mentors were recruited to help students with their school-to-career transition. The Student Philanthropy Council also raised money at Convocation for the Student Emergency Fund.

LEADERSHIP GIVING

There was significant giving at the transformational level in 2017/18. Nine gifts totalling \$24M established new academic initiatives and interdisciplinary programs.

NEW CHAIRS

With the partnership of donors, 6 new academic chairs established this fiscal year will enable research and discovery in Canadian music, conjuring arts, and North American relations through Fulbright Canada

PLANNED GIVING

With a new proactive approach to legacy giving, we confirmed 63 new planned gifts totalling \$9.3M this fiscal year

\$2.4M

More than \$2.4 million was raised through Annual Giving donors — another record-breaking year for philanthropy at the grassroots level

ALUMNI & DONOR ENGAGEMENT

16,000+ members of the Carleton community attended engagement, recognition and fundraising events in Ottawa and around the globe

HERE FOR GOOD

Throughout the year, we engaged a broad community in celebrating and expanding Carleton's Here for Good ethos. This principle continues to define our path forward.

As we prepare for the start of a new chapter at Carleton University, we thank you, our volunteers and partners. Your vision and commitment strengthen our foundation and empower our students to change the world.

Together, we're Here for Good.