

**University of Waterloo**  
**Board of Governors**  
**BUILDING & PROPERTIES COMMITTEE**  
**Notice of Meeting**

**Date:** Wednesday 12 May 2021

**Time:** 1:00-3:00 p.m.

**Place:** via MS Teams

\*material attached

\*\*material to be distributed

**Action**

**OPEN SESSION**

- |  |             |
|--|-------------|
| 1. Declaration of Conflicts of Interest  | Declaration |
| 2. Minutes of the 10 March 2021 Meeting* [George]  | Decision    |
| 3. Business Arising from the Minutes   | Information |
| 4. Capital Financing Commitments and Construction Status [Huber]<br>(a) Building & Properties Finance Summary – May 2021*<br>(b) Construction Status Report – May 2021*<br>(c) Capital Financing Commitments – April 30, 2020* | Information |
| 5. Math4 – Appointment of Architects** [Huber]   | Decision    |
| 6. Environmental Sustainability Practices in the Context of Campus Planning and Development* [Huber]   | Information |
| 7. Maintenance Program and Energy Conservation Efforts* [Huber]  | Information |
| 8. Execution Against the Work Plan* [George]   | Information |
| 9. Other Business  | Information |
| 10. Proceed into Confidential Session  | Information |

Next Meeting: Wednesday 29 September 2021, 1:00-3:00 p.m., via MS Teams

5 May 2021

Alice Raynard  
Associate University Secretary

**University of Waterloo**  
**Board of Governors**  
**BUILDING & PROPERTIES COMMITTEE**  
**Minutes of the 10 March 2021 Meeting**  
**[in agenda order]**

**Attendees:** Peter Barr, Murray Gamble, Martha George (chair), Alice Raynard (secretary), Max Salman, James Schlegel, Abbie Simpson

**Administration:** Mike Ditty, Stepanka Elias, Feridun Hamdullahpur, Dennis Huber, Rob Hunsperger, Robert Lemieux, James W. E. Rush, Stan Woo

**Regrets:** Jennifer Kieffer (administration)

**Organization of Meeting:** Martha George took the chair and Alice Raynard acted as secretary. The chair welcomed members to the meeting. The agenda was approved by consensus as circulated. The secretary advised that quorum was present.

**OPEN SESSION**

**1. DECLARATION OF CONFLICTS OF INTEREST**

No conflicts of interest were declared.

**2. MINUTES OF THE 13 JANUARY 2021 MEETING**

A motion was heard to approve the minutes of the meeting as distributed. Gamble and Barr. Carried.

**3. BUSINESS ARISING FROM THE MINUTES**

There was no business arising.

**4. RESOLUTION BY ELECTRONIC VOTE**

**a. Selection of Design Team – Joseph Street Warehouse Renovation.**

This item was provided for information. The resolution related to this item was approved on 15 February 2021 (George and Gamble. Carried).

Members discussed the selection process by which the President's Advisory Committee on Design (PACOD) recommended the appointment of the architect firm to the President, who recommended the appointment to the Committee. Members discussed PACOD's membership and the President proposed to look into updating its membership.

**5. CAPITAL FINANCING COMMITMENTS AND CONSTRUCTION STATUS**

**a. Building & Properties Finance Summary – March 2021**

**b. Construction Status Report – March 2021**

**c. Capital Financing Commitments – 30 April 2020**

Items were received for information. Huber noted the low number of remaining projects and partial occupancy in April of SLC-PAC, with limited exposure.

**6. WATERLOO EYE INSTITUTE PROJECT**

Rush and Lemieux provided an overview of the planning of this project, its necessity to carry out impactful research and its connection with another centre in Hong Kong, as well as the development of an ambulatory surgical suite. Fundraising activities must be maintained in order to be at least 50% of the budget. Members discussed what constituted sufficient funding and requested that the motion be amended to reflect the funding plan (underlined = addition):

That the Building & Properties Committee recommend to the Board of Governors a \$45.25 million total project budget for the Waterloo Eye Institute and appoint HOK architects as prime consultant. The proposed building addition and renovation to the existing Optometry building on Columbia Street will extend eastward between the current patient entrance and loading dock. The clinic modernization plan includes a new eye surgery centre, expanded optical services, state of the art biomedical sciences infrastructure with a goal to provide seamless integration for the full continuum of eye and vision care. Proceeding to tender is

contingent on (i) securing 50% of the funding and (ii) developing a plan to raise the balance of the project costs.

Murray and Schlegel. Carried.

**7. EXECUTION AGAINST THE WORK PLAN**

Raynard indicated the committee was on track.

**8. OTHER BUSINESS**

There was no other business.

**9. PROCEED INTO CONFIDENTIAL SESSION**

The committee convened in confidential session.

The committee is scheduled to meet on Wednesday 12 May 2021, 1:00-3:00 p.m. via Teams.

3 May 2021

Alice Raynard  
Associate University Secretary

**Report to the Building & Properties Committee**  
**Capital Financing Commitments**  
May 2021

The Building & Properties Committee (B&P) reviews the summary of Capital Financing Commitments at each meeting.

Highlights during 2020/21:

- The University has repaid \$4.0 million of internal debt related to the acquisition of the 5 BlackBerry buildings
- The University has contributed \$1 million of operating funds to the SLC/PAC project
- \$10 million in donations were received and applied against the Science Teaching Complex
- Scheduled principal and interest payments were made by applying approved student fees for the Health Services addition
- The University has repaid \$4.9 million of internal debt related to the Engineering buildings (\$3.8m from the Faculty of Engineering and \$1.1m from a central University contribution)

Summary:

- The University remains well within its approved policy limits and below the 4.0% of annual gross revenue maximum for principal and interest payments
- The financing position for each project as of April 30, 2020 is attached

Dennis Huber

**Construction Status Report**  
**May-21**  
 \$000s

Projects	Original Budget	Current Approved Budget	Procurement Method	Contractor	percent complete	Original Schedule	Estimated Completion	Risks/Status
<u>In-Progress</u>								
SLC/PAC Addition	34,000	41,000	lump sum	Bondfield	98%	2018/19	Spring 2021	- September occupancy was achieved for the food court area - building occupancy planned for May - completion (including deficiencies & climbing wall) planned for June  <i>No liens against the project.</i>
	<u>34,000</u>	<u>41,000</u>						

Projects	Original Budget	Current Approved Budget	Procurement Method	Contractor	percent complete	Original Schedule	Estimated Completion	Risks/Status
<u>In-Progress</u>								
Aquatic Animal Lab Upgrade (B1)	3,836	4,900	stipulated sum (CCDC2-2008)	RossClair	~99.9%	2020	June 2021	Project substantially complete. Occupancy still delayed due to deficiencies Chief Veterinary Inspector has reviewed and approved project Base building deferred maintenance initiated change orders, delays Still resolving underground sanitary blockage. Completing air balancing/commissioning Negotiated additional consultant fees attributable to ongoing delays  Anticipated Total Project Costs incl. 3.41% HST: increased to within \$10K of \$5M threshold
	<u>3,836</u>	<u>4,900</u>						

Projects	Original Budget	Current Approved Budget	Procurement Method	Contractor	percent complete	Original Schedule	Actual Completion	Risks/Status
<u>In-Progress</u>								
Third Hydro Feed	4,170	4,220	stipulated sum (CCDC2-2008)	Sutherland Schultz (\$3.326M)	35%	Sep-21		The budget has increased by \$50K to \$4.22M based on tendered project cost The shop drawings have been reviewed with delivery of most of the equipment in July The Primary feeder cable is currently onsite and being pulled into the tunnel The duct bank from CPH to our vaults has been completed  Ring Road will be closed at the corner adjacent CPH for the next four weeks to connect the underground duct bank to WNH's vaults on the southeast side of Ring Road On Budget and on schedule with final completion anticipated prior to September 2021
	<u>4,170</u>	<u>4,220</u>						

Projects	Original Budget	Current Approved Budget	Procurement Method	Contractor	percent complete	Original Schedule	Actual Completion	Risks/Status
<u>In-Progress</u>								
Earth Science Chemistry (ESC) Third Floor Renovations	17,500	17,500	TBA	TBA	3%	2022		Schematic Design due June 1 with Cost Estimate expected mid-June 2021 Originally scheduled demolition of third floor interior has been cancelled due to unpredictable market conditions* Estimated Construction: Jan 2022 to Jan 2023 * Cost consultants and general industry data is reporting extreme volatility in market conditions - creating cost escalation risk and bid price unpredictability
	<u>17,500</u>	<u>17,500</u>						

Projects	Original Budget	Current Approved Budget	Procurement Method	Contractor	percent complete	Original Schedule	Actual Completion	Risks/Status
<u>In-Progress</u>								
Health Innovation Arena 280 Joseph Street Kitchener	30,000	30,000	TBA		3%	2023		Programming and visioning 90% complete with Velocity Stakeholders Exterior concept underway and schematic design floor plan nearly complete - due June 2021 Renderings for Fundraising/Advancement scheduled for June 2021 Meeting with City of Kitchener RE: Site Plan review and Small Business Centre review scheduled for May. Environmental Assessment Phase 1 complete, Phase 2 in progress
	<u>30,000</u>	<u>30,000</u>						

Projects	Original Budget	Current Approved Budget	Procurement Method	Contractor	percent complete	Original Schedule	Actual Completion	Risks/Status
<u>In-Progress</u>								
Math 4	90,000	90,000	TBA		1%	2023		Evaluation team shortlisted 4 consultant teams to participate in Request for Proposal (RFP) and interview President's Advisory Committee on Design (PACOD) to conduct interviews May 6/10 Additional emphasis placed on cost control experience for bidding consultants recognizing above noted market conditions (COVID-10, Texas storm and other supply chain disruptions)
	<u>90,000</u>	<u>90,000</u>						

Projects	Original Budget	Current Approved Budget	Procurement Method	Contractor	percent complete	Original Schedule	Actual Completion	Risks/Status
<u>In-Progress</u>								
Optometry - Waterloo Eye Institute	45,250	45,250	TBA		12%	2023		Project approved at April 6, 2021 Board of Governors Meeting  Finalizing consultant contract to re-engage design process Design development to commence mid-May. Fundraising efforts to continue based on renderings generated to date.
	<u>45,250</u>	<u>45,250</u>						

University of Waterloo  
 Capital Financing Commitments  
 April 2020  
 (\$000s)

Capital Project	Externally Financed	Lease-Back Financing	Currently Internally Financed	Estimated Amortization Period	Total to be Paid (External, Lease-Back and Internal Financing)	Comments	
<b>Completed</b>							
Residence - UWP and MKV			12,687	7 years		Recovery through student residence fees	
Residence - Columbia Lake Village Townhouses		22,000		33 years		Minimum \$7.4 million lease commitments; recovery through student residence fees	
Engineering 7			28,207			Pledges of approximately \$33 million against these Engineering buildings, committed operating funding of \$2.29m, faculty operating funds	
Other Engineering (including 5, 6, and DWE)			10,734				
Health Services Addition/Renovations			3,069	5 years		Compulsory undergrad and grad student fees; donations	
Blackberry Buildings (5)			6,899	3 years		Operating funds	
Science Expansion Building			10,005			\$10 million in pledges (\$10m received in F2021)	
Applied Health Sciences Addition			9,200			Faculty operating funds; donations	
Student Residence - New UWP Building			26,243	< 15 years		Residence fees	
North Campus Field House			16,803	10 years		16.5M from operating funds	
Completed Total	-	22,000	123,847		145,847		
<b>Funding Status</b>							
	Planned Completion Date	Total Budget	Fundng On-hand	Committed Future Funding	Currently Unfunded	Total to be Paid (Future Funding + Currently Unfunded)	
<b>In-Progress</b>							
Student Life Centre and PAC Addition	2020	41,000	2,070	38,930	-	\$24 million compulsory undergrad and grad student fees; \$17 million operating funds	
In-Progress Total		41,000	2,070	38,930	-	38,930	
					Total to be paid	184,777	Debt policy: Annual P&I < 4% of annual gross revenue (currently approximately \$46m) Required annual P&I payments to service this debt < 4% of annual gross revenue

The Energy & Climate Working Group developed the following guidelines for new construction projects.

The goal is for new capital projects to achieve zero-carbon performance but where it is not immediately possible, design criteria will be based on achieving net-zero-ready buildings.

These guidelines have been applied to projects which began the design process as of January 1, 2021 and will continue to be refined with experience and as technologies improve.

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## **NET NEUTRAL BUILDING GUIDELINE**

### **1. Purpose**

This guideline ensures that newly constructed buildings at the University of Waterloo meet the highest standards of efficiency, prioritizes low-carbon development in support of institutional emissions reduction goals, delivers comfortable and high-quality environment for members of the University community, and optimizes the life cycle cost and management of infrastructure.

### **2. Related Policies, Procedures, and Guidelines**

- Policy 53: Environmental Sustainability
- *Life cycle costing guideline (in development)*
- *Carbon offset guideline (in development)*

### **3. Scope**

This guideline applies to all new building construction projects which are prior to the *Construction Documentation* phase as of January 1, 2021.

The requirements herein should be interpreted in parallel to any and all other technical and performance requirements as specified by the University of Waterloo, including but not limited to regulatory and code compliance. Should any discrepancy exist between this document and national, provincial, and municipal regulatory compliance, regulatory compliance shall have authority.

For clarity, major renovations to existing buildings will be guided by separate technical criteria, which shall be forthcoming as either a standalone guideline or as a clear amendment to scope within this guideline, but which shall follow the same principles.

### **4. Accountability**

#### **Plant Operations:**

- Oversee implementation of the guideline with project clients and track compliance on all new construction projects.
- Integrate requirements into bid documents and other relevant documentation.

- Review and update the guideline on a periodic basis or as required by regulatory changes, and at minimum on five-year intervals, liaising with relevant stakeholders as necessary.

**Sustainability Office:**

- Support review of the guideline as necessary, including through research and data collection for benchmarking of indicators and approach.
- Report on implementation.
- Assist with project-specific decision-making if requested by Plant Operations.

**Project Clients:** Integrate requirements of the guideline into project planning.

**Design and construction agents:** Abide by requirements as specified in bid and contract documentation.

## 5. General Principles

All new building projects shall integrate the following design principles throughout the lifecycle of the project, through design development, construction, and use of the building, with further information provided in the Performance Criteria:

**5.1 Passive design:** Architectural approach for buildings should utilize passive design principles to achieve energy targets, including but not limited to building orientation, high-performance building enclosures, airtightness, appropriate thermal massing, optimization of daylight, minimization of thermal bridging, and heat/energy recovery ventilation. Wherever possible, these principles should be prioritized over intensive mechanical and electrical systems to minimize long-term maintenance and maximize carbon reductions.

**5.2 Life cycle assessment:** Pursuant to Policy 53, all newly constructed buildings will complete life cycle assessments of greenhouse gas emissions and total cost of ownership at multiple stages of the design process.

**5.3 Net zero carbon:** In support of the University’s carbon reduction goals, all new construction will target net-zero carbon, as defined in the technical criteria below. Reliance on natural gas and steam should be minimized or eliminated wherever possible, with preference for electric powered heat pumps wherever possible. Where zero-carbon performance is not immediately possible, emphasis should still be placed on net-zero-ready design to be bridged with the Greenhouse Gas Emissions Balance formula as defined in Section 6.5.

**5.4 High-quality spaces:** In the pursuit of energy efficiency and carbon performance, buildings should also emphasize functional viability for Waterloo’s academic mission, and high-quality spaces that support community wellbeing, including mental health and wellness promotion, accessible and inclusive design, thermal comfort, noise, indoor air quality, and natural lighting.

**5.5 Holism:** Waterloo will continue to integrate multi-attribute dimensions of environmental impact of buildings into design, for example waste reduction, sustainable transportation, water use reduction, recycled and low-impact materials, and protection of ecosystems.



**5.6 Flexibility:** Except where ensuring compatibility with existing systems and processes, Waterloo will leave flexibility in prescriptive technical standards to enable innovation in design and respond to changing technologies and market conditions. Similarly, the performance criteria should provide pathways for all building types to meet this standard.

**5.7 Resiliency:** Waterloo will support building resiliency, maintaining some functionality during utility disruption and minimizing impact of outdoor temperature extremes on indoor thermal comfort, which are expected to increase over time.

## 6. Performance Criteria

<i>All metrics listed are per-year except 6.6</i>	Class/academic	Office/admin	Wet Lab	Dry Lab	Residence	Services/retail	Athletics	Base AVG UW ('19)
6.1 Energy Use Intensity (EUI) (kWh/m <sup>2</sup> )	70	70	345	170	70	90	70	~407
6.2 Thermal Energy Demand Intensity-heat (TEDI <sub>h</sub> ) (kWh/m <sup>2</sup> )	35	35	85	20	25	25	35	~185 – 250 (estimated)
6.3 Thermal Energy Demand Intensity – cool (TEDI <sub>c</sub> ) (kWh/m <sup>2</sup> )	20	20	80	85	15	20	30	Unknown
6.4 Greenhouse Gas Intensity (GHGI) (kgCO <sub>2</sub> e/m <sup>2</sup> )	5	5	25	10	5	10	5	~51
6.5 Greenhouse Gas Emissions Balance*	Net zero carbon, as defined by: <i>Net CO<sub>2</sub>e = Scope 1 CO<sub>2</sub>e + Scope 2 CO<sub>2</sub>e – offset CO<sub>2</sub>e – exported green energy</i>							
6.6 Air tightness**	1.0 lps/m <sup>2</sup> @75 Pa							

*\*Note that this is calculated on an annualized basis, while effort should be made to align demand and minimize peaks. It should only include energy-based carbon and excludes embodied carbon.*

*\*\* Based on blower-door test to be modelled in early stages and confirmed on as-built with mechanical systems off*

*NOTE: For mixed-use buildings, aggregate building specification may be averaged proportionately according to NASM profiles mapped to the above building archetypes*

## 7. Specifications

In addition to the above, the following specifications shall be met:

**7.1 Embodied carbon:** Embodied carbon will be calculated for major architectural and structural components of buildings, including at minimum foundations, interior and exterior walls, roof, glazing, flooring and structural support. This calculation is not included in the Greenhouse Gas Emissions Balance formula unless CaGBC Zero Carbon certification is pursued. Decisions over materials and construction methods should attempt to reduce embodied carbon wherever possible (for example mass timber construction, recycled materials, more efficient steel processing, etc.).

**7.2 Certification:** As per above, new buildings should follow passive design principles. Certification to Passive House, CaGBC Zero Carbon, or other relevant standard can be considered at the request of the internal project client, but are not mandatory. Pursuit of certifications should be determined prior to or during the Schematic Design phase.

**7.3 District energy:** Buildings should prioritize electric heat pumps in design, and those constructed on the South Campus will be designed with backup connection to the Central Plant district energy system. Hot water, 40°C, should be used as the main heating medium for backup or peak connected supply, converted from steam supplied by the Central Plant near the building entry.

Where heat pumps are not feasible, the design team will work with Plant Operations to use assumptions for future Central Plant efficiencies and carbon intensities in meeting the performance targets set out in Section 6, to become “net neutral ready”. This will be navigated on a case-by-case basis but should remain consistent with the general principles and performance targets included above.

**7.4 Energy Recovery:** Energy recovery systems, including heat pumps, will be included in the design of all newly constructed buildings.

**7.5 Energy modelling:** Energy modelling as defined in Supplementary Bulletin 10 (SB-10) of the Ontario Building Code is not an accepted compliance path. Thermal bridging should be accounted for in conformance with NECB 2017 clause 3.1.1.7. Thermal bridging should be modelled and calculated to determine effective R-value, not nominal, and the whole-building enclosure R-value should not be lower than R12.5 inclusive of thermal bridging. Energy models should be integrated at the Schematic Design (SD), Design Development (DD), Construction Documentation (CD), and As-Built stages to ensure consistent approach and account for project changes. These should include, at minimum, and in addition to any information required for code compliance:

- Core metrics pursuant to the above performance criteria: EUI, TEDI heat/cool, GHGI.
- Table of end-use energy consumption and fuel sources
- Effective performance of building enclosure elements accounting for thermal bridging
- Hourly thermal demand, including identification of peak demand and annual demand
- Output and performance specifications for on-site renewable energy
- Air tightness
- Completion of Greenhouse Gas Emissions Balance formula as defined in 6.5

Modelling is to be inclusive of all building loads, including lab equipment in designated laboratory spaces. Assumptions for energy consumption of all equipment should be clearly stated. Highly specialized equipment may be discounted from the performance criteria only with written approval of Plant Operations on a case-by-case basis, while maintaining the purpose and principles of this guideline.

**7.6 Life cycle costs:** Life cycle cost (LCC) will be evaluated for full building construction, maintenance, utilities, renewal, and replacement over a 25 year life-span. For example, utilizing the *ISO 15686-5* as well as *CAN-CSA S478* guideline. The LCC should be established and tracked at all stages of the design process alongside the building energy model, including SD, DD, CD, and As-Built stages, or as specified further by Plant Operations depending on the nature of procurement.

- 7.7 **Life cycle impact:** Life cycle assessment (LCA) of greenhouse gas emissions will be evaluated over a 25 year lifespan, including embodied and operational carbon using emission factors and forecasts provided by the University of Waterloo, unless otherwise specified.
- 7.8 **Utility metering:** All new buildings should be metered with ability to collect, at least, hourly interval data for domestic water, steam/hot water, chilled water, natural gas, and electrical power. At minimum, the whole-building is to be metered by connection to the University's energy management information system. Wherever practical, major building subsystems, meaningful zone areas, or heavy laboratories should be sub-metered.
- 7.9 **Maintenance and capital plan:** A maintenance and infrastructure renewal plan will be developed by a specialized consultant with strong expertise in the area. The plan is to be consistent with the life cycle costing exercise utilized during design and include annual cost estimates for maintenance and renewal of the building for the first 25 years of its life. The plan should include replacement schedules of major building equipment and components, as well as recommended maintenance schedules & strategies.
- 7.10 **Commissioning:** All buildings will integrate commissioning throughout the design process and through early operation of the building to strengthen quality assurance, identify deficiencies, ensure performance matches design intent (including a minimum year 1 vs design comparison), and properly train operators on building systems. The commissioning agent (for mechanical, electrical, and envelope systems) shall be independent of the design and construction agent.
- 7.11 **Indoor Air Quality Monitoring:** Sensors for the monitoring of indoor air quality should be included for all new buildings and connected where appropriate to ventilation systems to ensure safe, fresh air while maintaining efficiency.

## 8. Process

The following generalized process should be followed throughout the design life cycle to ensure compliance with the above requirements. Flexibility should be followed at the discretion of Plant Operations and with consideration for each project's unique circumstances, but with clear outputs at each phase:

<b>Design Phase</b>	<b>Activity</b>	<b>Output</b>
Project Initiation	<ul style="list-style-type: none"> <li>- Needs assessment</li> <li>- Development of NASM estimates and calculation of weighted performance targets</li> </ul>	<ul style="list-style-type: none"> <li>- Project charter and building-specific performance targets</li> </ul>
Schematic Design	<ul style="list-style-type: none"> <li>- Decision on pursuit of third-party certification*</li> <li>- Preliminary building design and confirmation of key criteria and specifications, including thermal bridging analysis to feed into energy model</li> <li>- Initiate commissioning plan</li> </ul>	<ul style="list-style-type: none"> <li>- Preliminary energy model with required outputs</li> <li>- Preliminary LCC/LCA with required outputs</li> <li>- Commissioning plan</li> </ul>
Design Development	<ul style="list-style-type: none"> <li>- Refine building design to address performance gaps and account for any scope changes or modifications from SD stage</li> <li>- Commissioning agent to continue design review</li> <li>- Develop long term maintenance and renewal plan along with funding identification</li> </ul>	<ul style="list-style-type: none"> <li>- Refined energy model</li> <li>- Refined LCC/LCA</li> <li>- Updated commissioning plan</li> <li>- Determine if sufficient resources are available to maintain new building designs at optimum condition</li> </ul>
Construction Documentation	<ul style="list-style-type: none"> <li>- Ensure all performance requirements are integrated into construction drawings and specifications</li> <li>- Continue commissioning plan</li> </ul>	<ul style="list-style-type: none"> <li>- Finalized energy model</li> <li>- Finalized LCC/LCA</li> </ul>
Construction	<ul style="list-style-type: none"> <li>- Tracking any changes throughout construction project and monitoring compliance with design intent</li> <li>- Commissioning agent to continue monitoring of project progress</li> <li>- Air tightness test</li> </ul>	<ul style="list-style-type: none"> <li>- High quality construction</li> <li>- Delivery on time and on budget</li> </ul>
Handover and occupancy	<ul style="list-style-type: none"> <li>- Training operating staff</li> <li>- Finalization of all performance specifications</li> <li>- Hand-over commissioning</li> </ul>	<ul style="list-style-type: none"> <li>- As-built energy model</li> <li>- As-built LCC/LCA</li> <li>- Maintenance and capital plan</li> <li>- Ability to monitor operation of the building during warranty period</li> <li>- Ability to utilize all energy saving elements in the project</li> </ul>
Operation	<ul style="list-style-type: none"> <li>- Implementation of maintenance plan and capital plan</li> <li>- Procurement of voluntary offsets/RECs as necessary (TBC)</li> <li>- Utilize maintenance and infrastructure renewal plan &amp; funding to maintain building at optimum condition</li> </ul>	<ul style="list-style-type: none"> <li>- One-year comparison to performance specifications and design intent</li> <li>- Offset/REC credits integrated into annual carbon inventory (TBC)</li> <li>- Support long term resiliency of UW infrastructure and reliable support to teaching and research</li> </ul>

*\*If third-party certification is intended, supplementary requirements and specifications should be integrated as required by the third-party certification body.*

## 9. Continuous Improvement

Waterloo shall review this guideline on a regular basis to enable continuous improvement of the framework, calibrations of the targets, identification of gaps or inconsistencies, and clarification and streamlining of process.

This shall occur after each new building has been completed to iteratively incorporate lessons learned, and at minimum every 2 years to account for code and other regulatory, market, and technology changes.

## 10. Terms & Definitions

**ASHRAE 90.1** – Prescriptive compliance standard for energy in buildings except for low-rise residential buildings

**CAN-CSA S478 Durability in buildings** – is a guideline of the Canadian Standards Association which provides criteria and requirements for construction of a durable building and for quality management program.

**CO<sub>2</sub>e** – “Carbon dioxide equivalent” is a standardized metric for calculation of greenhouse gas emissions normalized to carbon dioxide

**EUI** – “Energy Use Intensity” is a metric of how much energy is consumed in a given building per year, normalized by area (for example 100 kilowatt hours per square metre per year)

**GHG** – “Greenhouse gas” are gases that trap heat in the atmosphere and are identified as the main cause of climate change, in this report primarily referring to carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) from combustion, but may also refer to refrigerants and other process emissions

**GHGi** – “greenhouse gas intensity” refers to the GHG footprint of a building, measured in kg per square metre per year

**ISO 15686-5** - Building and constructed assets – Service life planning: Life Cycle Costs is a standard compiled by the International Standard Association to guide the calculation of life cycle costing for buildings.

**LCC/LCA** – “Life cycle costing”/ “life cycle assessment” refers to the process of identifying costs and environmental impacts over the full life of a physical product or piece of infrastructure, from harvesting raw materials through manufacturing, use, and disposal. LCC herein references the total cost of ownership to Waterloo over a defined timeframe, and LCA focuses primarily on greenhouse gas emissions.

**LEED** – “Leadership for Energy and Environmental Design” is a prominent standard for green buildings developed by the Canada Green Building Council

**Offsets/RECs** – Refers to carbon credits and renewable energy credits purchased through a voluntary market mechanism from a registered and credible third-party to “net” the GHG balance equation in Section 6 to zero or less. Guidance on specifications for this will be defined in the *Carbon Offsets Guideline*.

**Scope 1/2/3 emissions** – Refers to direct, indirect energy, and indirect other/upstream/downstream emission sources respectively as defined by the Greenhouse Gas Protocol

**TEDI** – “Thermal Energy Demand Intensity” is a measurement of the amount of energy needed to heat a building appropriately over the course of the year, normalized by floor area

**Report to the Building & Properties Committee**  
**Energy Conservation Efforts**  
May 12, 2021

**Summary:**

- Annual total electricity expense approx. \$16m (~1.5% of total annual expenses)
- Annual total natural gas expense approx. \$3.8m (~0.4% of total annual expenses)
- Based on the standard greenhouse gas emissions reporting under Ontario Regulation 397-11 (2011-2016) by the U6 (research intensive universities in Ontario), the University of Waterloo is below the U6 average and third lowest within the Province
- A 2020 energy audit undertaken on 64 individual university buildings identified:
  - \$1m of energy conservation projects with <5-year simple payback
    - i.e., Steam traps; fan optimization; HVAC upgrades
  - \$3m of energy conservation projects with a 5–10-year simple payback
    - i.e., controls optimization; HVAC controls
- Multi-year \$875k LED lighting retrofit currently underway; 65% complete
- Multi-year steam trap retrofit program currently underway

Vice-President,  
Administration & Finance

University of Waterloo  
Board of Governors  
**BUILDING & PROPERTIES COMMITTEE**  
Work Plan Execution

Task	Frequency	19/01/2018	09/03/2018	18/05/2018	12/10/2018	18/01/2019	08/03/2019	15/05/2019	02/10/2019	15/01/2020	<i>canceled</i>	<i>canceled</i>	30/09/2020	13/01/2021	10/03/2021	05/12/2021
											3.4.2020	13/05/2020				
Campus Master Plan (as needed)	annual			•						•				•		
Capital financing commitments and construction status	each meeting	•	•	•	•	•	•	•	•	•			•	•	•	•
Committee self-assessment survey results	annual		•		•		•		•				•		•	
Environmental sustainability practices	annual			•					•							•
Maintenance program and energy conservation efforts	annual								•							•
Orientation/tour of campus	as required			•				•								•
Development projects five-year plan			•													
Committee terms of reference	annual	•				•			•				•			
Statutory compliance	annual	•				•				•				•		
University of Waterloo real estate holdings	annual	•				•				•				•		
Committee work plan/special topics; orientation/briefing requirements	annual	•				•				•			•			