

Green Building and Operating Practices and Guidelines

The University of Alberta's commitment to sustainability is expressed throughout its institutional plans and guiding documents, including the *Institutional Access Plan*, the *University Plan - Dare to Deliver*, the *Capital Plan*, and the *Long Range Development Plan*. As well, in 2008, the University of Alberta created a *Sustainability Commitment and set of Guiding Principles*, which affirms its commitment and guides its actions.

Sustainability Commitment

"In alignment with its values, vision and mission, the University takes an integrated approach to sustainability that incorporates teaching and learning, research, outreach, and the operations that support them, as it builds one of the great universities for the public good. The University strives to manage all resources in harmony, recognizing the interconnectedness of ecological, social and economic systems".

Guiding Principles

Two of the five Guiding Principles are especially pertinent to the University of Alberta Green Building and Operating Practices and Guidelines.

Improvements in Operations and Practices

- Develop strategies and objectives that conserve resources, decrease the production of waste, minimize ecological footprints, and decrease greenhouse gas emissions.
- Provide practices aimed at sustainable supply chain management.
- Develop processes that support long-term ecological, socially, and fiscally responsible decision-making in activities, operations & practices.

Stewardship

- Protect the natural environment by enhancing local and global ecosystems and biodiversity for both present and future generations.
- Contribute to the protection of the Earth's environmental life-supporting systems by minimizing the pollution of air, water, and soil.
- Aim to enhance the global environment through balanced and positive social, economic, and ecological activities.

The design, operations and maintenance of campus buildings has a large impact on the sustainability of overall campus operations. This document comprises the core set of green building design, operations, and maintenance practices and guidelines adopted by the University of Alberta.

Sustainable Building Design Guidelines

It is the intention of the university to embody the principles of sustainable design in all its design and construction projects, whether new construction or renovations.

In general, the university's principles and goals are to construct and renovate facilities that are:

- Functional and meet the needs of users.
- Safe and reliable.
- Consistent with a highly satisfactory indoor environment.
- Institutional quality and provide a long building systems service life.
- Efficient and cost effective for operation and maintenance.
- Designed to provide low operating and maintenance costs for the life of the facility.
- Composed of environmentally friendly and recyclable materials.

Minimum LEED® Silver Standard or equivalent is required for all new buildings and major renovations that receive substantial provincial government funding, starting in 2008. The Green Globes rating system and guidelines are also used on other projects to rate and guide sustainable designs. Although not all projects at the university will be formally certified, all projects should endeavour to incorporate sustainable measures as identified by the LEED® and/or Green Globes Rating Systems.

Each project will undergo a thorough review by the university and the Design Team before arriving at a final decision. The project must be evaluated to ensure that design and construction practices being implemented significantly reduce or eliminate the negative impact of the project facility on the environment and its occupants in five broad categories:

- Surrounding environment
- Water use and efficiency
- Energy use and efficiency
- Materials, resources, and waste
- Indoor environment

Surrounding Environment

Reduced Impact

- Site planning should consider the incorporation of xeriscaping principles and stormwater management systems.
- Site planning should consider the incorporation of native plant species wherever feasible.

Accessibility

- Universal design should be used to provide features to enhance accessibility for all.

- Site planning must accommodate persons with mobility and sight impairment without the need of assistance on primary routes.
- Site planning must allow access universally regardless of ability, from the moment of entry to the university campus, into and through its buildings and lands.

Water Use and Efficiency

- Water and plumbing design should adhere to the University of Alberta *Mechanical Guidelines*.
- In brief, low flow fixtures should be used and motion sensors installed wherever feasible; lab facilities should have a dual riser system to allow for proper separation of potable water (drinking fountains and washrooms) and lab services water.

Energy Use and Efficiency

- Building design should use best practices for energy management; design should consider passive systems, heat recovery, high efficiency lighting, and harmonic correction.
- Facilities should be designed with energy conservation and occupant comfort in mind.

HVAC Systems

- Systems must meet or exceed the latest edition of ASHRAE 90.1 Guidelines on Energy and the latest edition of Model National Energy Code of Canada for Buildings.

Lighting

- Lighting choices must adhere to the University of Alberta *Lighting Design Guidelines and Standards*, which communicate recommended energy efficient lighting design practices and university expectations.
- In general, lighting choices should be efficient, meet designated luminary requirements, and be easy to operate and maintain.

Equipment

- Energy efficient equipment should be procured and installed.

Materials, Resources, and Waste

- Design should exercise a preference for materials that demonstrate a greater degree of responsibility to the environment.
- Life cycle costs should be optimized while ensuring long life for building components and elements.
- Green demolition techniques should be used when appropriate for removal, recycling, and reuse of building materials.

Indoor Environment

HVAC Systems

- Ventilation design must follow ASHRAE 62-2001 Standards, “Ventilation for Acceptable Indoor Air Quality”, and should allow for easily accessible equipment for inspection, cleaning and testing.

Laboratory air quality

- Fume hoods in research laboratories must comply with ANSI/AIHA Z9.5 Class A performance standards. Capture efficiency as installed and used must be at least 4AU0.1.

Building Operations and Maintenance

University of Alberta Facilities and Operations acts as a steward that develops, maintains and renews the buildings that house teaching, research and administration on our campuses. Facilities and Operations supports the university’s sustainability commitments by striving to provide efficient, healthy, and ecologically sound working and studying environments for all campus users.

Since December 2010, University of Alberta Facilities and Operations is committed to progressively certifying all campus buildings under BOMA Canada’s Go Green program BOMA BEST (Building Environmental Standards) for operations and maintenance. BOMA BEST certification will assess current practices and provide guidelines for ongoing improvement of the environmental performance and maintenance of our campus buildings.

The university’s Building Operations and Maintenance principles and guidelines are rooted in the same five broad categories as the Sustainable Building Design Practices and Guidelines.

Surrounding Environment

- A comprehensive landscape management plan strives to decrease maintenance and watering needs and will continue to pursue more sustainable practices wherever feasible.
- The ***Integrated Pest Management*** strategy promotes healthy growth of desired species and controls invasive pests while maintaining native wildlife and habitats.
- Composting and mulching programs reduce waste, decrease irrigation needs, and promote healthy growth of vegetation.

Water Use and Efficiency

- All buildings are metered for water usage.
- In the course of maintenance, upgrading, and retrofit activities, low flow fixtures are utilized and water reduction measures are taken.

- Efficient water use is encouraged and systems are in place for reporting any problems, such as leakages or broken fixtures.

Energy Use and Efficiency

- All buildings are metered and monitored for energy usage.
- Campus closures and associated shutdowns overnight and during holiday breaks result in environmental and financial savings.
- The university encourages efficient use of campus lighting by students and employees, including shutting off lights when rooms and/or buildings are not in use, during holidays, and so on.
- Effective use of the Building Automation System ensures provision of efficient and optimal operation of building heating, ventilating and air conditioning systems.

Energy Management Program

- The \$25,000,000 **Energy Management Program** (2005-2012) is expected to result in approximately \$3,500,000 in annual cost savings and reduce carbon dioxide emissions by 27,000 tonnes per year. Energy conservation projects have included lighting retrofits, mechanical system upgrades and variable speed drives. HVAC improvements have included:
 - Using variable volume air systems
 - Installing variable speed drives
 - Downsizing equipment for efficient energy usage
 - Upgrading and improving piping and ductwork insulation to prevent heat loss
 - Optimizing operational strategies
 - Commissioning of HVAC electrical and building systems
 - Installing heat exchangers within mechanical systems to reclaim waste heat

Next Generation Energy Management Program

- The \$35,000,000 **Next Generation Energy Management Program** will continue to realize significant reductions in energy use, steam consumption and greenhouse gas emissions; it will also focus on additional program and facility areas, including Ancillary services, water conservation, infrastructure renewal, renewable energy, and education and awareness.
- The Next Generation EMP is predicted to result in approximately \$3,800,000 in savings annually and CO₂ emissions reductions are anticipated to be on the order of 30,000 tonnes.

District Energy System

- The **District Energy System** located on North Campus provides approximately 30% of North Campus' energy needs.
- The Heating Plant has a capacity of 650 tonnes/hour steam.
 - A 13 MW back-pressure steam turbine generator tracks the North campus heating load so most power produced from this unit occurs during the winter months.

- A 26 MW condensing steam turbine operates when local power prices exceed the cost of on-site production.
- The Heating Plant uses natural gas boilers instead of coal to provide combined heat and power, so is less emissions-intensive.
- The two cooling plants on campus as well as a 60,000 ton-hour thermal energy storage system reduce costs and increase efficiency because of their close proximity to campus.
 - The original Cooling Plant (1983) has a capacity of 26,000 tons of cooling; in addition to its proximity to campus, the Cooling Plant increases efficiency by operating in free-cooling mode in the winter months to take advantage of the cold waters in the North Saskatchewan River.
 - The new Cooling Plant on Campus (CPOC) was completed in 2011 to provide an additional 10,000 tons of cooling capacity.

Building Re-commissioning Program

- The ***Building Re-commissioning Program*** assesses existing buildings' HVAC systems for proper operation, energy efficiency, thermal comfort, and indoor air quality performance.
- Issues identified through these building re-commissioning assessments are appropriately addressed through maintenance and system upgrade projects, in collaboration with Energy Management Program initiatives, to ensure and restore optimal performance.

Materials, Resources, and Waste

Waste Diversion

- Our goal is to increase the amount of waste diverted from the University of Alberta's North Campus to 50% by 2015.
- Facilities and Operations provides high quality recycling and waste collection operations on campus.
 - Full scale multi-stream recycling is available in most buildings on campus, and accepts mixed paper and cardboard, glass and light metals, plastics, and beverage containers.
- The university will strive to implement full scale composting on campus. This program has begun with pilot projects (ex. ARAMARK food service locations, the Students' Union building, and the ECV Graduate Residence) to assess the feasibility and ensure a successful program before widening its scope.
 - The university has a partnership with a local composting facility to return one tonne of compost for every tonne of organics processed from the university. This compost is used on campus in flower and shrub beds.
- Facilities and Operations will conduct annual waste audits to assess and find improvements in waste diversion on campus.
- Education and awareness initiatives aim to increase waste diversion and reduce the total amount of waste produced by all campus users.

- The maintains a central furnishing inventory to encourage the reuse of furniture on campus.

Materials and Resources

- In the course of maintenance, upgrading, and retrofit activities, the university exercises a preference for materials that demonstrate a greater degree of responsibility to the environment.
- Life cycle costs are optimized while ensuring long life for building components and elements.
- Green demolition techniques are be used when appropriate for removal, recycling, and reuse of building materials.

Environmental Health and Safety

- The university Environmental Health and Safety division runs a chemical reuse inventory to address surplus chemical accumulation on campus
- A comprehensive **Hazardous Waste Program** ensures proper handling and disposal of chemicals, radioisotopes, bio-hazardous waste and some recyclables such as paint and mercury.

Indoor Environment

General Comfort

- Operations and Maintenance ensures comfortable air temperatures.
- Facilities are monitored for occupant use and temperatures are adjusted to optimize comfort and energy efficiency.
- Facilities and Operations utilizes Direct Digital Control (DDC) Building Automation Systems to schedule the operation of systems, control and monitor HVAC systems, and provide space temperature setbacks.
- Occupants can provide feedback via the Quality Assurance call centre for follow up and resolution of any concerns identified.

Green Cleaning

- The **Cleaning For a Healthy U** green cleaning program focuses on reducing harmful VOC and airborne particles to ensure a clean and healthy work and study environment.
- The university is committed to sourcing and implementing industry best practices for all equipment and cleaning products.
 - Wherever a green option is available, cleaning products purchased must meet Environmental Choice (Canada) and/or Green Seal (USA) regulations.
 - Wherever a green option is available, cleaning equipment purchased must meet Green Guard (North America) regulations.

Air Quality

- All occupied building spaces are monitored using Direct Digital Control (DDC) systems to ensure proper ventilation.

- Ongoing HVAC improvements and retrofits maintain air quality standards and improve system efficiency.
- Our mechanical design guidelines and systems operation follow ASHRAE 62-2001 Standards, “Ventilation for Acceptable Indoor Air Quality.”
- High efficiency particulate HEPA-like filters are installed on all vacuums.