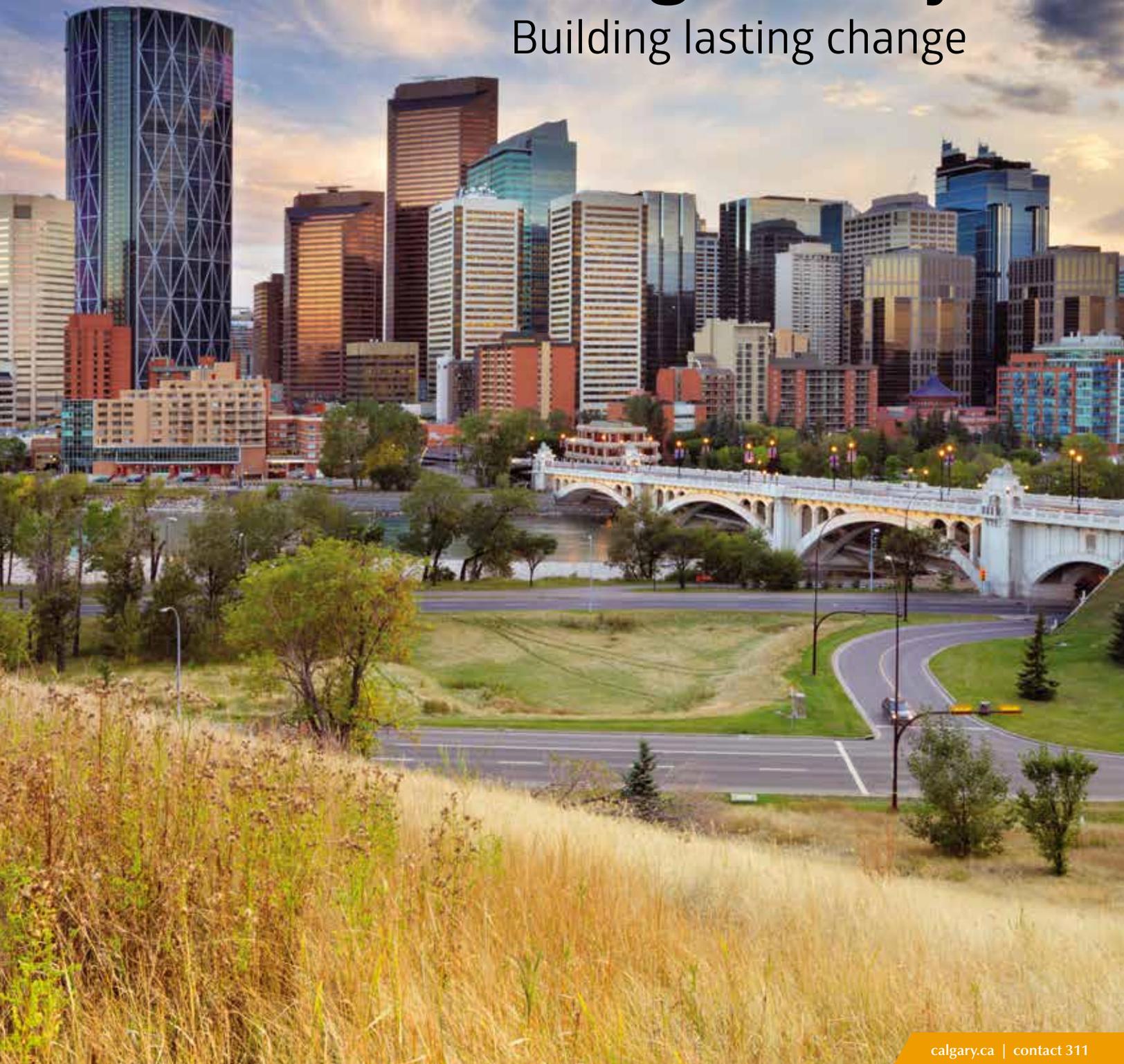


2013

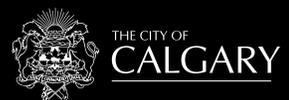
Sustainable Building Policy

Building lasting change



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Onward/ The City will continue to utilize innovative and efficient sustainability practices for infrastructure and buildings.





Telus Spark has been certified LEED Gold by The Canada Green Building Council. The project was constructed to replace the old Telus World of Science.

Executive summary

The 2013 Sustainable Building Policy (the Policy) annual report provides a status update on The City of Calgary's progress towards sustainable building objectives. This report highlights key annual achievements and outlines the future objectives to encourage the longer-term sustainability of City-owned and funded infrastructure.

In 2013 and early 2014, The City achieved eight additional Leadership in Energy and Environmental Design (LEED®) certifications. The certified buildings for 2013 and early 2014 are:

City owned

- Saddleridge Multi-Services Centre (LEED New Construction, Silver)
- Apparatus Repair & Maintenance Facility (LEED New Construction, Gold)
- Manchester Central Stores (LEED New Construction, Silver)
- South Calgary Emergency Response Station (LEED New Construction, Gold)

Civic partners

- Flames Community Arenas Expansion (formerly Centennial Arena) (LEED Major Renovation, Certified)
- South Fish Creek Major Expansion (LEED Major Renovation, Certified)
- Westside Recreation Centre Expansion (LEED Major Renovation, Silver)¹
- TELUS Spark (LEED New Construction, Gold)

Since the approval of the Policy in 2004, The City of Calgary and its civic partners have achieved 23 LEED certified buildings and one Built Green® certification. In addition to the certification of buildings, The City continues to champion the incorporation of best practices into new construction and renovations by applying lessons learned from certified buildings and by referencing design guidelines developed and maintained by City Administration.

¹ Projects exceeded policy target of LEED Certified for major renovations.

The City of Calgary is committed to providing the leadership to conserve, protect, improve and sustain the environment for the benefit of Calgarians. The City will develop sustainable buildings that will enhance the indoor and outdoor environment, reduce the impact on natural resources and provide long term savings to the citizens of Calgary.

A cost/benefit analysis of achieving LEED Gold over LEED Silver certification in new construction projects was completed in 2013. This work concluded that the Policy target of LEED Gold (as established in 2008) provides value in terms of triple bottom line benefits in return for incremental expenditures in comparison to the previous LEED Silver target.

In 2013, the Sustainable Buildings Partnership Program achieved triple bottom line benefits including: savings in energy and operating costs through retrofits at City facilities and new supply opportunities, improvements in customer safety through an intensive LED lighting program at Calgary Transit LRT stations, and improvements in indoor environmental quality for tenants of affordable housing.

The Policy will continue to be reviewed and updated into the future while considering alternative rating systems, such as LEED Canada for Homes, as well as new and emerging ratings systems including LEED Version 4. With energy related costs and impacts an increasingly prevalent issue, the future will also focus on the development of energy management strategies and plans. These bodies of work will provide decision makers with greater direction on energy supply, conservation, and efficiency options that will yield the greatest return on investment. The future focus will ensure the Policy best addresses the diversity of The City's building projects and that The City is enabled to achieve longer-term sustainability goals, as identified in the 2020 Sustainability Direction and imagineCalgary.



Solar power generation at South Calgary Fire Station No. 5.

What is a sustainable building?

Buildings serve a variety of purposes: they provide places of business, learning, healing and social gathering, and enable the activities of society. Buildings reflect the creativity of humanity and can serve as inspiration. They reflect the spirit and values of the society that constructs them and document the changes in that society over time. From a building science perspective, the primary purpose of buildings is as a separator from the exterior environment. Sustainable building merges environmentally responsible practices into one discipline that considers the environmental, economic and social impacts of a built project over its lifecycle. Sustainable design encompasses the following broad topics:

- Appropriate management of land.
- Efficient management of energy and water resources.
- Management of material resources and waste.
- Protection of indoor and outdoor environmental quality.
- Reinforcement of natural systems through an integrated design approach.

Introduction

Infrastructure & Information Services is responsible for reporting to the Standing Policy Committee on Utilities and Corporate Services regarding how well City facilities meet the goal of sustainability.

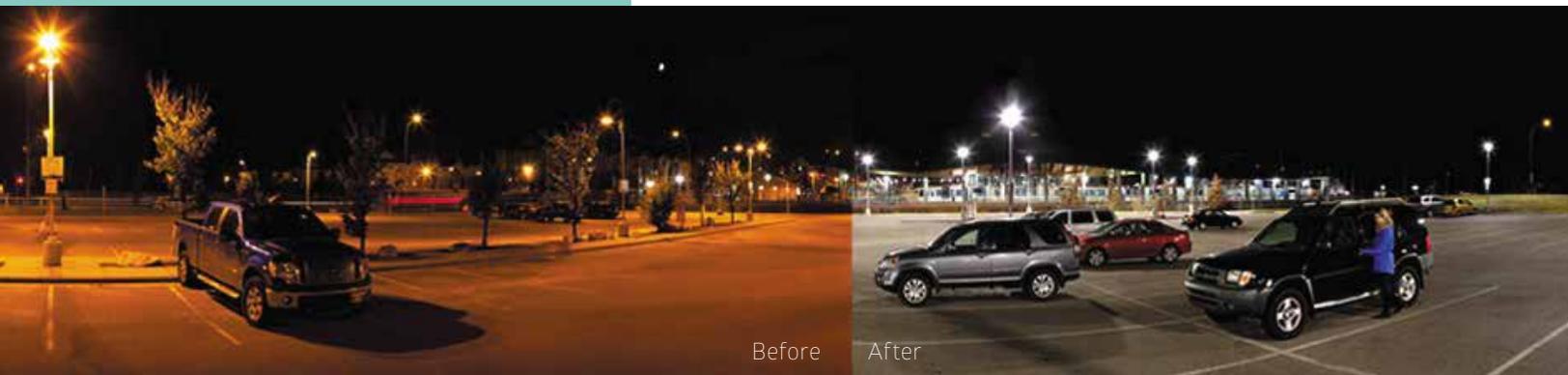
The purpose of the Policy is to ensure that facility planning, design, construction, management, renovation, operation, and demolition is carried out in a sustainable manner. Building projects owned or funded by The City of Calgary should be delivered in a way that balances the triple bottom line. This means that in addition to reducing environmental impacts, projects should demonstrate fiscal responsibility. They should also provide healthy built environments for the citizens, visitors, and employees who access services or regularly occupy these facilities.

Calgary's Sustainable Building Policy was the first Canadian municipal green building policy. When first approved by Council in 2004, the Policy applied only to new construction projects greater than 500 m², establishing a green building rating system certification target of Leadership in Energy and Environmental Design (LEED®) Silver, a rating system which evaluates environmental performance from a whole-building perspective. In 2008, the Policy was amended and new targets were set for occupied buildings:

- LEED Gold for new construction projects.
- LEED Certified for major renovation projects or LEED Silver for commercial interior renovation projects.
- Built Green® Silver for affordable housing projects (Built Green is a third-party certification program for homes, high density projects, and renovations; the target was initiated as a pilot project and is currently under review).

Minor renovation projects, unoccupied building projects, projects less than 500 m² in area, and non-building infrastructure projects such as roads and transit stations are not required to meet a certification target but should implement sustainable building best practices as appropriate. As stated in the Policy, where cost and schedule issues arise, the General Manager of Corporate Services has authority to adjust the targets.

Helping you see and be seen, LED lighting upgrades at Calgary Transit stations.



The Policy aligns and supports The City of Calgary's high-level strategic policies and direction setting documents. These include the Municipal Development Plan, Environmental Policy, Triple Bottom Line Policy and Framework, Climate Change Initiatives, 80/20 by 2020 Waste Diversion Goal, Water Efficiency Plan and 30-in-30 goal, alternative transportation requirements within the Land Use Bylaw, and Sustainable Environmental and Ethical Procurement Policy.

The Sustainable Buildings Partnership Program, managed by Infrastructure & Information Services, was developed to advance the Policy. The Sustainable Building Partnership Program was collaboratively developed with input from key stakeholders across business units. It focuses on identifying and implementing upgrades to improve the operational efficiencies of existing City-owned infrastructure and their triple bottom line performance. Planning for the Sustainable Buildings Partnership Program began in 2008 with funding from the Municipal Sustainability Initiative confirmed in 2009. Infrastructure & Information Services is responsible for implementation of the Sustainable Buildings Partnership Program which began in 2010 and is anticipated to continue through 2018.

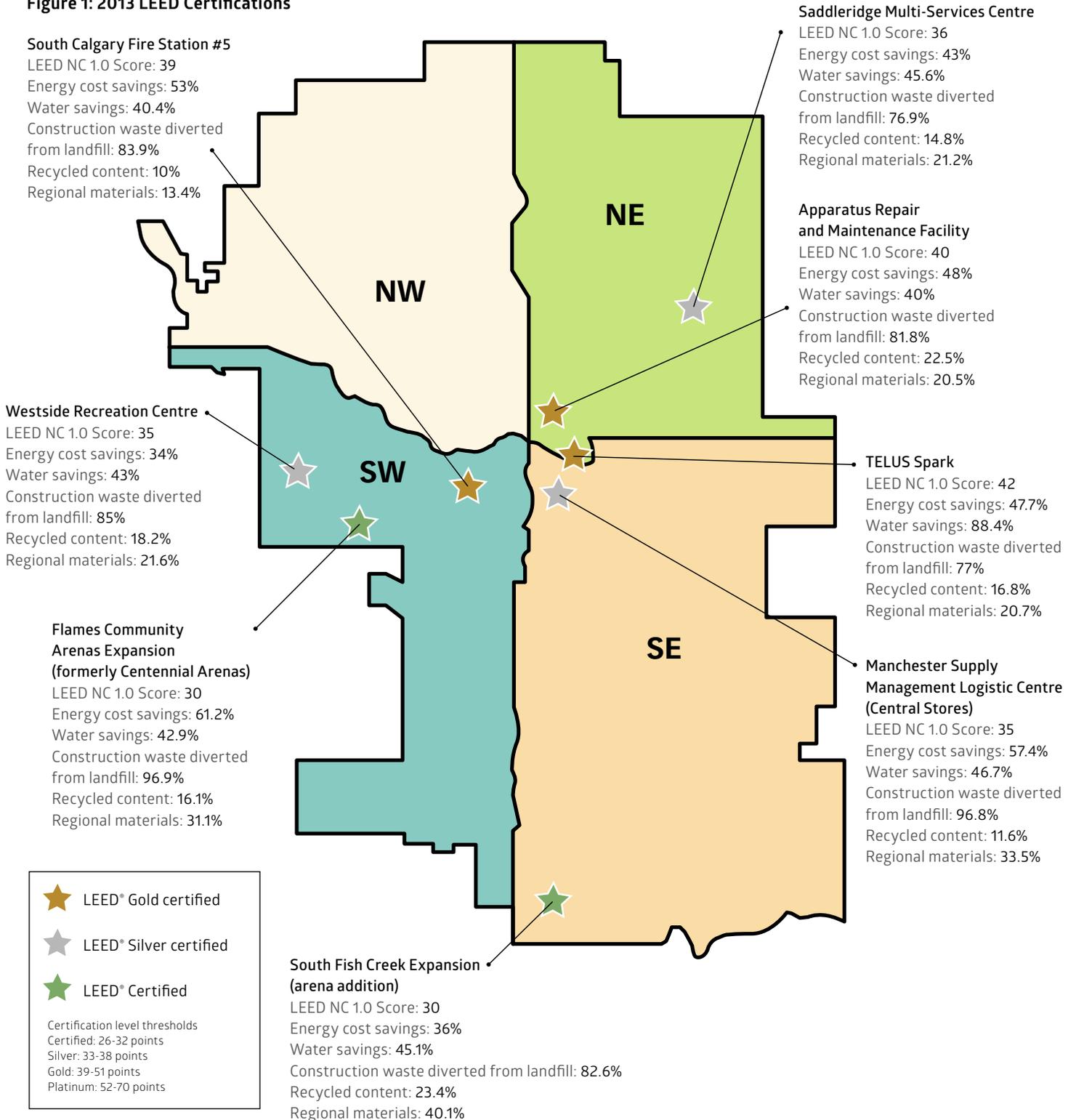
Making the places we play safer and more efficient, Village Square lighting upgrade.



New construction and major renovation project achievements

In 2013 and early 2014, The City achieved eight additional Leadership in Energy and Environmental Design (LEED®) certifications. These facilities, their locations and highlights of the energy and environmental benefits achieved are illustrated in Figure 1 below.

Figure 1: 2013 LEED Certifications



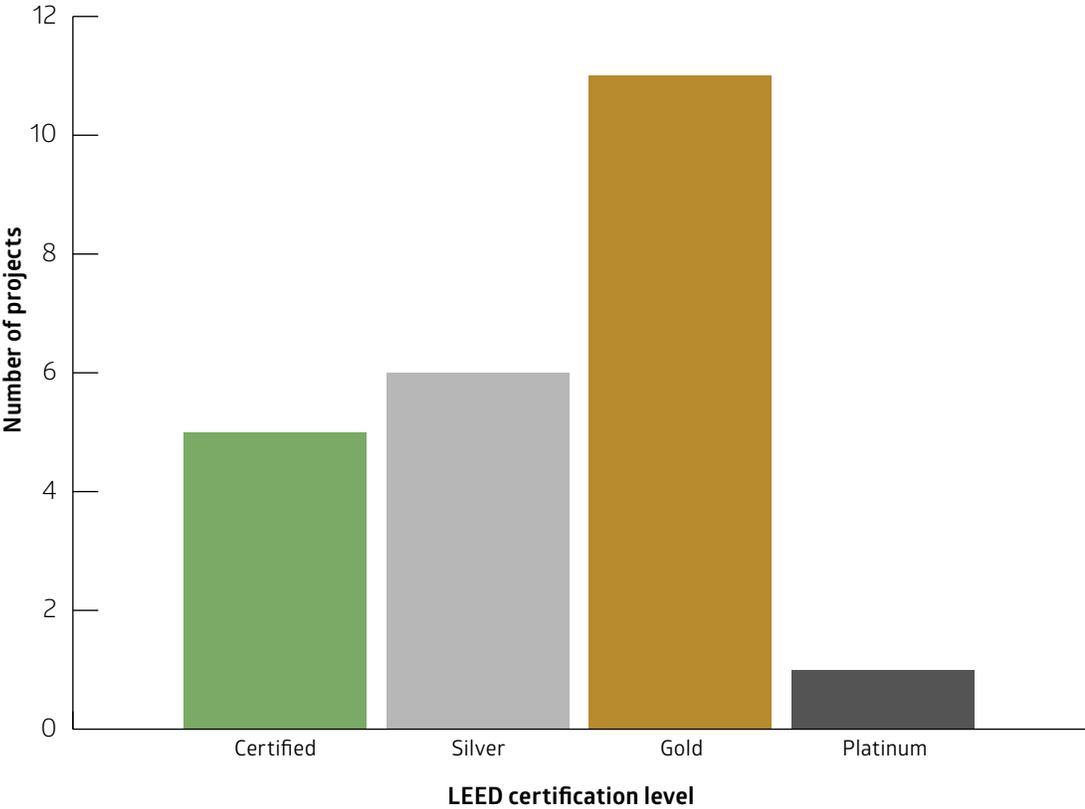
City business units delivering sustainable buildings

- Animal & Bylaw Services
- Calgary Fire Department
- Calgary Police Services
- Calgary Transit
- Community & Neighbourhood Services
- Corporate Properties & Buildings
- Office of Land Servicing & Housing
- Parks
- Recreation
- Roads
- Waste & Recycling Services
- Water Resources
- Water Services

Since the approval of the Policy in 2004, The City of Calgary and civic partners have achieved 23 LEED certified buildings and one Built Green® certification. In addition to the certification of buildings, The City continues to champion the incorporation of best practices into new construction and renovations by applying lessons learned from certified buildings and by referencing design guidelines developed and maintained by City Administration. There are 32 additional City-owned or City-funded projects targeting LEED® certification which are currently in various stages of planning, design, and construction. The City of Calgary is working towards achieving the levels of certification appropriate to each project.

Of The City's 23 LEED certifications, 21 are certified in LEED New Construction and Major Renovation and two are certified in LEED Commercial Interiors. Figure 2 illustrates the achieved score of the 23 LEED certified projects. It shows the number of buildings certified LEED Certified, Silver, Gold and Platinum. All certified projects must achieve the required prerequisites and select optional sustainability actions to achieve points.

Figure 2: Number of achieved LEED certifications for City-owned or City-funded projects



Saddleridge Multi-Services Centre

New construction project, achieved LEED New Construction v1.0 SILVER
Met Sustainable Building Policy requirement

Operator: Calgary Police Service

Occupants: Calgary Police Service and
Calgary Fire Department

Facility background: The Saddleridge Multi-Services Centre is a 5,200 m² four vehicle bay facility constructed to service the communities of Martindale, Saddleridge and Taradale. The facility houses four platoons of six staff each, bringing the total employee count to 24.

Key sustainability highlights:

- Two high efficiency condensing boilers
- Insulated ductwork, heating water piping, refrigerant piping and domestic hot and cold water piping
- High efficiency gas-fired hot water heater with domestic hot water recirculation



- Occupancy sensor controlled lighting in certain areas
- Cistern for rainwater collection

Significant energy savings²:

- Fans – 76%
- Space cooling – 51%
- Space heating – 41%



Manchester Supply Management Logistic Centre

New construction project, achieved LEED New Construction v1.0 SILVER
Met Sustainable Building Policy requirement

Operator: Corporate Properties & Buildings

Occupants: Finance & Supply
(primary occupant)

Facility background: The 3,700 m² facility is a multi-function warehouse that has increased operational efficiency by consolidating three existing warehouses and an investment recovery/surplus sales facility into a single location. The warehouse has established a centralized distribution centre for supply inventory for all City of Calgary business units, surrounding municipalities, provincial services, and surplus sales to the public. Currently

the facility houses 35 employees and has approximately 100-150 daily users.

Key sustainability highlights:

- Three high efficiency condensing boilers
- High efficiency natural gas water heater
- Heat recovery ventilation
- Bioswale to capture and filter precipitation runoff
- Installation of daylight tubes

Significant energy savings²:

- Space cooling – 73%
- Fans – 69%
- Lighting – 61%

² In comparison to reference building specified in energy model.

Flames Community Arenas Expansion (formerly Centennial Arenas)

Major renovation project, achieved LEED New Construction v1.0 CERTIFIED
Met Sustainable Building Policy requirement

Operator: South West Arena Society

Funded jointly by: The City of Calgary, The Province of Alberta, The Government of Canada, South West Arena Society, the Calgary Flames, the Flames Foundation for Life and the community.

Facility background: Flames Community Arenas (formerly Centennial Arenas) is a community recreation centre. The expansion project added a new ice rink with change rooms to the existing twin arena to accommodate

a high demand for ice. The complex now houses 20 employees. Seating is available for up to 250 spectators and the 4,512 m² addition increased the total facility size to 11,194 m².

Key sustainability highlights:

- Three high efficiency condensing boilers
- High efficiency natural gas water heater
- Heat recovery ventilation
- Bioswale to capture and filter precipitation runoff
- Installation of daylight tubes

Significant energy savings:

- Space cooling – 73%
- Fans – 69%
- Lighting – 61%



Westside Recreation Centre Expansion

Major renovation project, achieved LEED New Construction v1.0 Silver
Exceeded Sustainable Building Policy requirement

Operator: Westside Regional Recreation Society

Funded jointly by: The City of Calgary, The Province of Alberta, Westside Regional Recreation Society, the Government of Canada's Economic Action Plan and the community.

Facility background: The Westside Recreation Centre expansion project involved the addition of new gyms, studio, multi-purpose rooms, change rooms and administrative areas. The total size of the addition was 4,763 m². The facility places a high emphasis on youth programs and has roughly one million visitors annually.

Key sustainability highlights:

- Durable building materials selected for the building envelope
- Heat recovery ventilation
- T5HO lighting in the new youth gym and gymnasium
- 91 per cent of the wood used in the renovation was Forest Stewardship Council certified (roughly \$300,000 worth)
- Light tubes provide natural day lighting

Significant energy savings:

- Pumps – 90%
- Fans – 55%
- Service water heating – 39%



Apparatus Repair and Maintenance Facility

New construction project, achieved LEED New Construction v1.0 GOLD
Exceeded Sustainable Building Policy requirement

Operator: Calgary Fire Department

Occupants: Calgary Fire Department

Facility background: This 6,118 m² facility consists of nine double service vehicle maintenance bays, a training facility, and administrative offices for the Calgary Fire Department. The facility has ten in-ground hoists or lifts with safety lock systems, four bays within ground pits, and four double bays with overhead cranes to facilitate tasks such as aerial engine work or the removal of water tanks.



Key sustainability highlights:

- Raised sections of roof to capture natural daylight
- All rainwater from site is filtered before entering storm water system

- Durable building envelope materials selected
- CO2 sensors to monitor ventilation requirements
- Separate exhaust for areas where contaminants will be present

Significant energy savings:

- Space heating – 92%
- Space cooling – 52%
- Lighting – 25%
- Pumps – 25%

South Fish Creek Expansion (arena addition)

Major renovation project, achieved LEED New Construction v1.0 CERTIFIED
Met Sustainable Building Policy requirement

Operator: South Fish Creek Recreation Association

Funded jointly by: The City of Calgary, The Province of Alberta, The Government of Canada, and the community

Facility background: This 9,620 m² addition involved a twin arena expansion with 10 new dressing rooms, five meeting/multi-purpose rooms, tenant spaces and centralized office spaces.

The facility now houses 29 employees and has approximately 650,000 visitors annually.

Key sustainability highlights:

- Heat reclaim wheel on air handling unit
- Occupancy and daylight sensors for lighting controls
- Full cut-off exterior light fixtures to limit light pollution
- Xeriscaping to eliminate the need for irrigation
- Two high efficiency condensing boilers

Significant energy savings:

- Lighting – 49%
- Service water heating – 42%
- Space heating – 35%



South Calgary Fire Station No. 5

New construction project, achieved LEED New Construction v1.0 GOLD
Met Sustainable Building Policy requirement

Operator: Calgary Fire Department

Facility background: South Calgary Fire Station No. 5 was constructed to replace the original Fire Station No. 5 which, having been constructed in 1952, was the oldest operational fire hall in Calgary at the time. The new 1,360 m², three bay fire station houses four platoons of four staff, for a total of 16 employees. This fire station serves the communities of Altadore, Bankview, Elbow Park, Richmond, Scarboro, South Calgary and Upper Mount Royal.

Key Sustainability highlights:

- Cistern for rainwater collection
- Solar thermal panels to heat water for the building and photovoltaic panels produce electricity



- Two variable speed pumps for water heating system
- Insulated ductwork, heating water piping, refrigerant piping, and domestic hot and cold water piping
- Occupancy and daylight sensors for lighting controls

Significant energy savings:

- Pumps – 97%
- Space heating by natural gas – 73%
- Space cooling – 66%

TELUS Spark

New construction, achieved LEED New Construction v1.0 GOLD
Met Sustainable Building Policy requirement

Operator: TELUS Spark

Facility background: TELUS Spark was constructed to replace the old TELUS World of Science. The 14,230 m² facility was constructed on a 15 acre property and has approximately 380,000 visitors annually. The building contains a

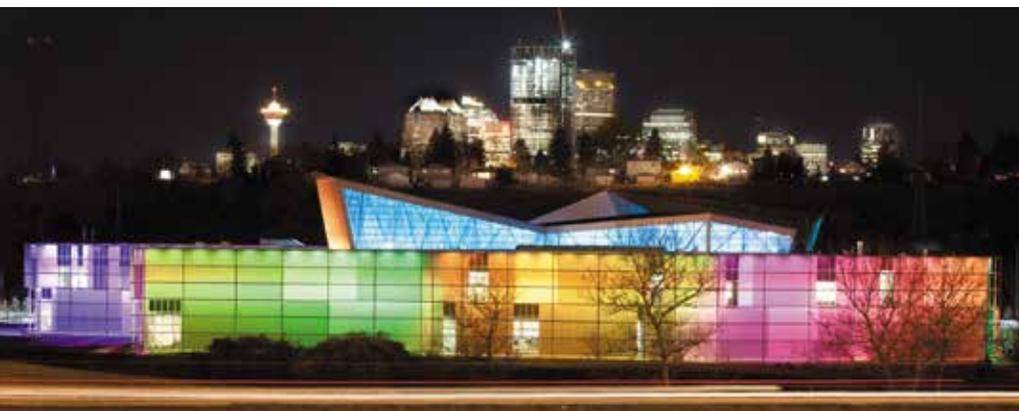
Creative Kid's Museum, a 245 seat dome theatre, a feature gallery for touring exhibits, The Science Presentation Theatre, The Werklund Foundation Learning and Leadership Centre, four acres of outdoor exhibit space, and four themed exhibit galleries.

Key sustainability highlights:

- Remediated brownfield site
- Complex building and rainwater harvesting system which uses the collected water for irrigation and flushing water closets and urinals
- Radiant heating panels and radiant slabs
- Measurement and verification systems to monitor buildings performance
- Occupancy and daylight sensors for lighting controls

Significant energy savings:

- Lighting – 65%
- Space heating – 54%
- Fans – 30%



Sustainable Buildings Partnership Program achievements

The Sustainable Buildings Partnership Program identifies and implements opportunities to improve the operational efficiency of existing City infrastructure and delivers projects showcasing new methods and technologies at office, recreational, industrial, maintenance, storage and special-purpose buildings, as well as parking lots and even roadways.

Sponsored and managed by The City's Engineering & Energy Services division of Infrastructure & Information Services, the

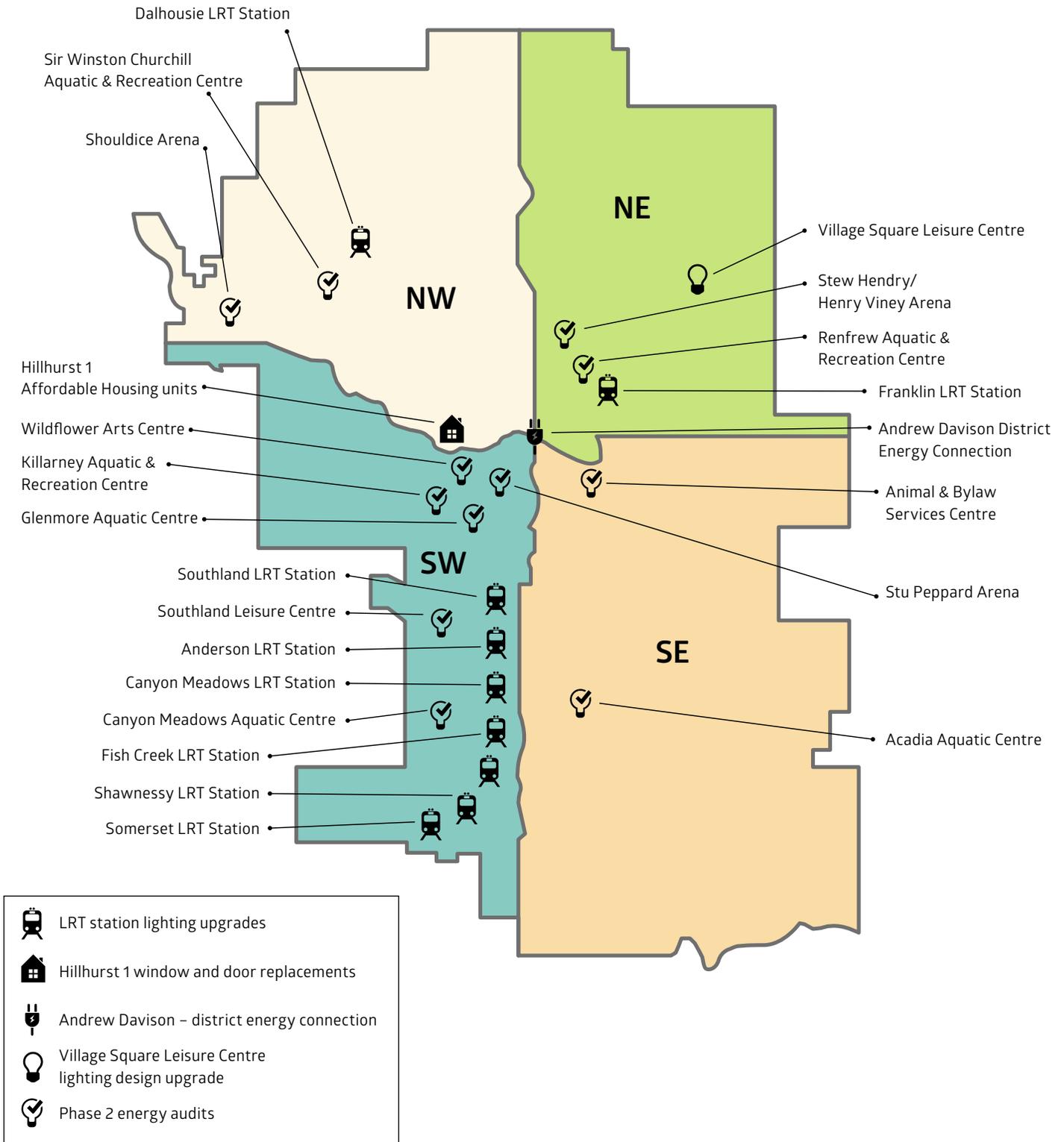
Sustainable Buildings Partnership Program received nearly \$19 million in funding from the Alberta Government's Municipal Sustainability Initiative. Since 2010, the Program has been delivered in partnership with multiple City business units who collaboratively plan and deliver diverse projects, measure triple-bottom-line performance, and share the results of lessons learned on each project. The Sustainable Buildings Partnership Program consists of projects in three focus areas as shown in the following table. Projects include:

Program focus areas	Sample projects funded by Sustainable Buildings Partnership Program
<p>Identifying opportunities Assessing the current state of facilities, establishing a baseline for future benchmarking, and identifying opportunities for improvement.</p>	<ul style="list-style-type: none"> • Energy audits • Office waste assessments • Energy and water sub-metering • Energy information system • Wind and solar resource assessment
<p>Piloting innovative technology Demonstrating alternate energy sources or technologies that improve resource conservation.</p>	<ul style="list-style-type: none"> • Solar powered system for mobile crew trailers • De-Ox and IceMax ice making system for arena • Vegetated green roof • Solar thermal water heating • Solar photovoltaic (PV) panels • Continuous energy optimization pilot
<p>Encouraging use of efficient technology Taking action on opportunities identified by audits and successful pilot projects.</p>	<ul style="list-style-type: none"> • Energy audit implementations • Major lighting upgrades to T5HO and/or LED • Lighting and ventilation control systems • Building envelope improvements • Central irrigation controls • Talisman Centre roofing reuse • District Energy interconnections • Combined heat and power generation systems

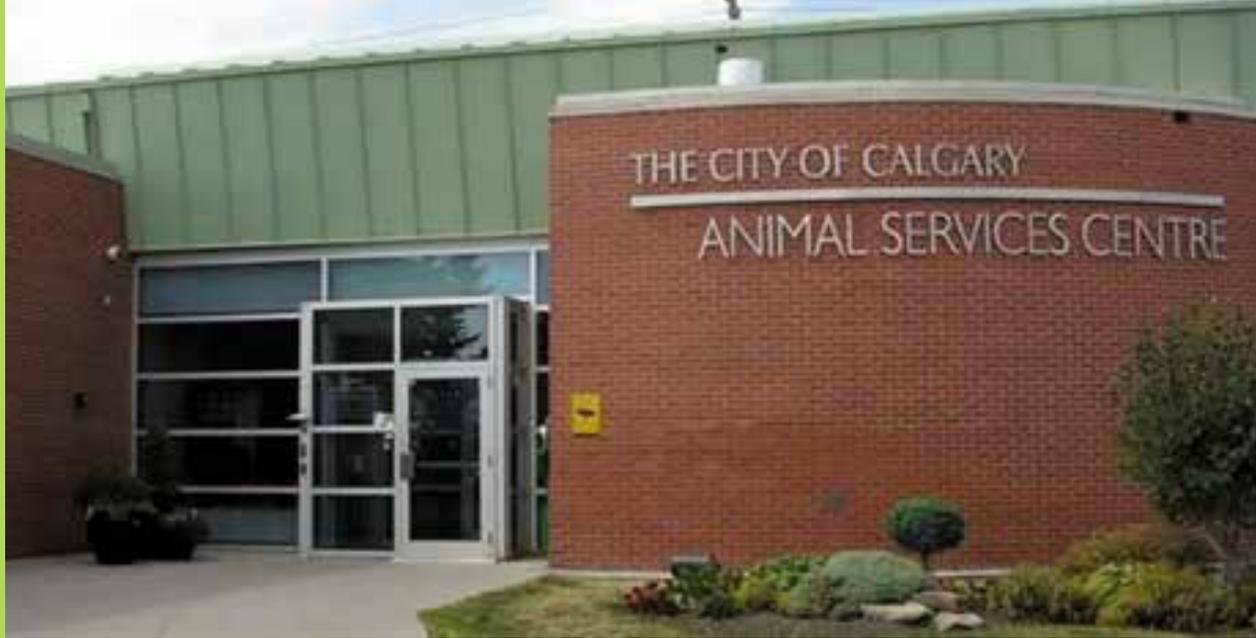
Energy audits

In 2013, the Sustainable Buildings Partnership Program delivered triple bottom line benefits through strategic investments in improving the long-term sustainability of City-owned infrastructure. Figure 4 illustrates the locations of energy audits, facility, and lighting upgrades.

Figure 4: 2013 Sustainable Building Partnership Program achievements



Upgrades at the Animal Services Centre are underway, thanks to opportunities identified through an energy audit.



Energy audits

An energy audit is an assessment of a building's historical energy usage and the current performance of the building with regards to energy consumption. The audit identifies opportunities to effectively reduce energy use. There are three levels of audits: level 1 – walk through analysis, level 2 – a building energy survey and analysis of energy consuming equipment, and level 3 – a detailed analysis of capital intensive modifications. The Sustainable Buildings Partnership Program used funds from the Municipal Sustainability Initiative to provide a one-time funding opportunity to conduct a limited number of energy audits. There is no funding in place beyond 2013 to develop an energy audit program.

The completion of 12 Phase 2 energy audits and alternative energy studies at recreation centres

identified over \$700,000 in potential savings, in addition to the reduction of greenhouse gas emissions and the improvement of indoor environmental quality for patrons and staff. Selected upgrades are being reviewed and implemented based on available funds, including upgrades at multiple recreation centres and the Animal Services Centre. To date, these audits have increased the level of awareness among facility operators around energy use and conservation methods.

Lighting upgrades

Lighting upgrades were identified as a significant opportunity to reduce electricity consumption through energy audits and pilot projects. These projects improve the ability for people to see and to be seen. The Sustainable Building Partnership Program, in collaboration

LRT station parking lot before and after LED lighting upgrade.



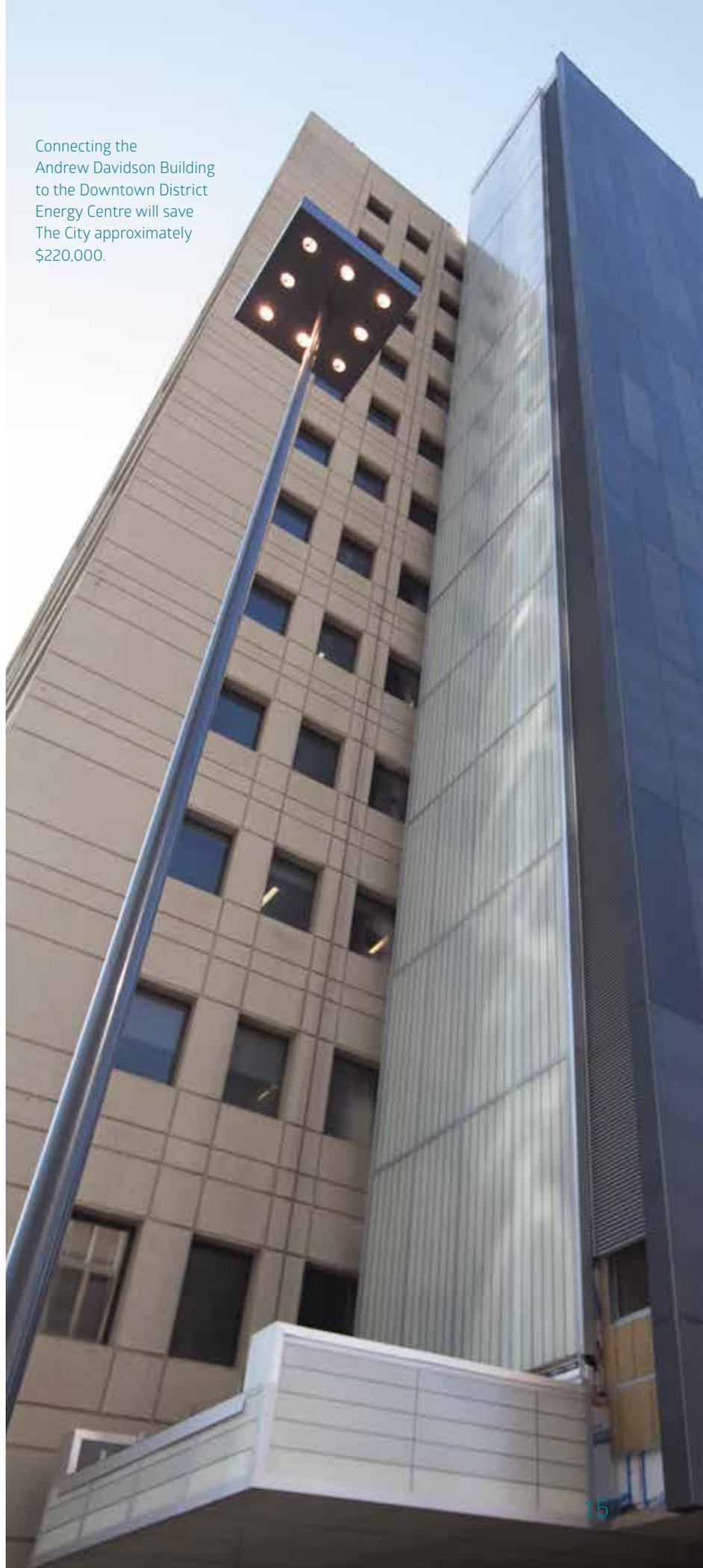
with Calgary Transit and Recreation, delivered lighting upgrades at nine additional Light Rail Transit (LRT) station parking lots and the Village Square Leisure Centre. The LRT station upgrades reduced light pollution and increased uniformity by appropriately directing lighting and filling in dark spots to meet the average lighting levels specified by the Illuminating Engineers Society of North America for parking lot lighting. Transit lighting upgrades completed in 2013 will potentially save Calgary Transit up to \$200,000 annually in electricity and maintenance costs, while upgrades at the Village Square Leisure Centre are estimated to save Recreation up to \$95,000 per year.

As a result of the success of these projects, the Sustainable Buildings Partnership Program is funding additional phases of lighting upgrades at seven additional locations for Calgary Transit and at the Southland Leisure Centre for Recreation. This is in addition to significant lighting upgrades with Corporate Properties & Buildings, Parks, and Water Services. Infrastructure & Information Management has also been actively sharing lessons learned and reviewing the scope of the LED Streetlighting Design Guidelines with the Roads business unit, in preparation for extended LED street light trials. In addition, Infrastructure & Information Services is issuing "Recommended Best Practices for Specifying LED Luminaires" based on lessons learned and past experience.

District Energy connections

Situated on the southwest corner of Fourth Street and Ninth Avenue, the Downtown District Energy Centre is capable of supplying heat for up to 6 million square feet of new and existing residential and commercial properties. District energy systems are more efficient, have fewer emissions and are more cost-effective than conventional heating systems. Underground hot water pipes connect to a heat exchange interface between the piping system and the customer's heating system,

Connecting the Andrew Davidson Building to the Downtown District Energy Centre will save The City approximately \$220,000.



creating a closed-loop system that takes up much less space in the building and is more energy efficient than traditional commercial boilers. The City of Calgary Municipal Building was the facility's first customer, signing on in 2010. The Sustainable Buildings Partnership Program supported the connection of the Andrew Davidson Building, a major renovation located on Sixth Avenue at First Street S.E., thereby eliminating the need for boilers to produce hot water. Energy transfer stations need only five per cent of the space a conventional boiler room system requires, freeing up valuable square footage. Connecting Andrew Davidson to the Downtown District Energy Centre is estimated to save The City up to \$220,000 in heating costs over the span of the contract.

Window and door replacements at Hillhurst 1 will save The City 30 to 40 per cent in heating costs and provide a more comfortable living space for residents.

Affordable Housing upgrades

This project replaced the original 198 windows and 75 patio doors in Hillhurst 1. Constructed in 1973, Hillhurst 1 is an 8-storey residential building owned by The City and managed by Calgary Housing Company. These relatively simple energy conservation methods are estimated to increase energy efficiency leading to approximately 30 to 40 per cent reduction in natural gas use and associated green house gas emissions. Also, this project will significantly improve the indoor environmental quality for tenants by addressing drafts and sound from a busy road.



Preparing for the future

To ensure the Policy continues to reflect the application of industry-leading certification programs, best practices, and shows triple bottom line benefits, the Policy will continue to be reviewed and updated in light of emerging certification standards like LEED Version 4 and LEED for Homes. Effective October 2016, all new projects must register under LEED Version 4. The proposed policy review will ensure The City is prepared for the transition to a new and potentially more rigorous standard.

As The City is better enabled to monitor the energy and environmental performance of buildings through Infrastructure & Information Services' Corporate Energy Information System, opportunities to optimize performance by implementing continuous monitoring and verification programs will be evaluated. This will ensure the Policy best addresses the diversity of The City's building projects and continues to support the achievement of long-term sustainability goals.

Infrastructure & Information Services is consulting with Calgary businesses to develop strategies and plans to address the city's growing demand for energy. These bodies of work will help guide decision-making on energy supply, conservation and efficiency investments into the future. This work will also encourage maximizing the return on investment in addressing the longer-term sustainability targets specified in imagineCalgary and the 2020 Sustainability Direction.

Andrew Davidson building connected to District Energy in 2013. Major renovations in the building are targeted to achieve a LEED Silver certification for Commercial Interiors.

