

The Deep Retrofit Challenge (DRC)

Date: April 8, 2022

To: Infrastructure and Environment Committee

From: James Nowlan, Executive Director, Environment & Energy

Wards: All

REASON FOR CONFIDENTIAL INFORMATION

The attachment to this report contains information explicitly supplied in confidence to the City of Toronto by the Government of Canada.

SUMMARY

This report provides City Council with an update of the City's new Deep Retrofit Challenge (DRC) and the receipt of federal funding to support this new program.

The City has secured financial support from the federal government to support deep energy retrofits resulting in significant emissions reductions in buildings that undergo a deep retrofit. Almost all buildings within Toronto are required to undergo deep energy retrofits to achieve the City's net zero greenhouse gas emissions climate target. The definition of a deep energy retrofit is a major renovation project in which the building energy usage has been reduced by at least 50% - although additional savings may be required to reach Toronto's emissions target. The total amount of funding is currently confidential pending federal announcement – details are provided in Confidential Attachment 1.

A new City program, the Deep Retrofit Challenge (DRC), was developed to enable demonstration projects that will accelerate the deployment of high efficiency retrofits of buildings in Toronto. The program is expected to open for applications in Q2 2022. Almost all buildings within Toronto will need to undergo deep energy retrofits to achieve the City's net zero climate target. It is important to note that many newly constructed buildings, even those that meet the Toronto Green Standard (TGS), will need to undergo major retrofits to convert heating systems from fossil fuels to electricity (at least those buildings before TGS V4 Tier 3 "Near Zero Emissions" applies in 2028). The DRC is expected to act as a catalyst for early voluntary compliance with actions identified in the City's Net Zero Existing Buildings Strategy and help drive adoption of Toronto's net zero by 2040 goal.

The DRC is a competition style program that will support a number of retrofit projects to significantly reduce greenhouse gas emissions in the multi-unit residential building and mid-tier commercial building sectors and serve as a demonstration of next generation retrofits to accelerate market adoption. Participants will collaborate and compete with the highest performing projects receiving awards based on measured emissions reduction performance. The DRC will award grant funding to selected participants to help offset the cost of performing a deep retrofit of their buildings, with portions allocated for design, construction and confirmed emissions performance. Additional details of eligibility will be released with the program.

DRC participants will be required to share data on project budget, design and emissions & energy data. Program data shall be open-sourced, to allow others to benefit from the approach taken and provide clear evidence of benefits achieved by the deep retrofit projects. The DRC participants are expected to participate in the initial cohort of volunteers for actions 1-3 of the City Net Zero Existing Buildings Strategy as these are actualized into City programs. These actions include:

1. Annual emissions (and energy) performance reporting, public disclosure and labelling
2. Greenhouse gas emissions performance target
3. Performing energy and emissions audits and tune-ups (at regular intervals)

Project selection is slated to occur in Q4 2022 with participants completing incremental design activities in 2023. Participants will have until Q1 2025 to complete construction of the deep retrofits. Measurement and verification of project performance will follow with planned program windup in Q2 2026.

Participants will be encouraged to apply to existing City programs such as Energy Retrofit Loan (ERL) to assist in funding the projects. The City will provide an in-kind contribution in the form of staff time to administer and promote the program, as well as supporting knowledge transfer and recognition of these transformational projects.

RECOMMENDATIONS

The Executive Director, Environment & Energy recommends that:

1. City Council authorize the public release of Confidential Attachment 1 following the expected announcement of funding for the Deep Retrofit Challenge by Canada's Federal Government

FINANCIAL IMPACT

The City of Toronto has secured financial support from the federal government, in the form of a non-repayable grant, to enable a number of deep energy retrofits of buildings across Toronto. Funding will be delivered through the City's new Deep Retrofit

Challenge (DRC) program. The total amount of funding is currently confidential pending federal announcement.

Capital Funding Impact:

The Deep Retrofit Challenge will be added as a new capital project to the Capital Budget and Plan of the Environment and Energy Division as part of the 2023 Budget Process fully funded by the federal grant.

Operating Impact:

No incremental operating budget requirements are anticipated as currently budgeted resources will be leveraged to provide program administration and support knowledge dissemination as program delivery actions shall support the Net Zero Existing Buildings Strategy.

The Chief Financial Officer and Treasurer has reviewed this report and agrees with the financial impact information.

DECISION HISTORY

On December 15, 2021, City Council adopted TransformTO - Critical Steps for Net Zero by 2040, endorsing accelerated community-wide greenhouse gas reduction targets including net zero greenhouse gas emissions by 2040 and mechanisms to further encourage deep retrofits of existing buildings and reduce the use of natural gas in buildings.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2021.IE26.16>

At its July 14, 15 and 16, 2021 meeting, City Council adopted the Net Zero Existing Buildings Strategy which introduces voluntary programs and policy in the near term, followed by a transition to mandatory requirements in the medium to long-term to support existing buildings, including multi-unit residential building and mid-tier commercial building, achieving net zero emissions by 2050.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2021.IE23.1>

In October 2019 City Council declared a climate emergency for the purpose of deepening a commitment to climate action and endorsed a net zero greenhouse gas emission target in line with keeping temperature rise below 1.5 degrees Celsius with a commitment to identify opportunities to invest in and accelerate emission reductions areas identified in TransformTO, such as building retrofits.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.MM10.3>

On July 4, 2017, City Council unanimously adopted TransformTO: Climate Action for a Healthy, Equitable and Prosperous Toronto. TransformTO is the City's climate action strategy to meet Council's long-term, GHG-reduction target while creating an equitable, healthy, prosperous and resilient Toronto that benefits all.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.PE19.4>

On December 13, 2016, City Council adopted the first short-term implementation plan for TransformTO. It set out actions to be taken by the City over 2017-20 to address climate change.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.PE15.1>

COMMENTS

Almost all buildings within Toronto are required to undergo deep energy retrofits to achieve the City's net zero greenhouse gas emissions climate target. The definition of a deep energy retrofit is a major renovation project in which the building energy usage has been reduced by at least 50% - although additional savings may be required to reach Toronto's emissions target. To illustrate this gap, the City's Net Zero Existing Buildings Strategy contemplates a higher reduction resulting in over 80% emissions reduction is possible to reach.

The largest building emissions reductions will come from fuel switching heating systems off of natural gas by moving to electric heat pumps as well as making necessary improvements to the building envelope (insulation, windows, air sealing, etc.), although other building systems improvements also contribute to the overall deep retrofit. To achieve the City's net zero greenhouse gas emission climate target almost all buildings, old and new, will need to fuel switch. Most buildings will need envelope upgrades, although some of the newest, highest performance buildings may already have high-performance envelopes and will only require fuel switching.

As outlined in the TransformTO Net Zero Strategy and the Net Zero Existing Buildings Strategy, electrification is the critical pathway to net zero emissions as electricity from low-carbon sources is the only energy source with the potential for minimal emissions. Ontario's electricity system is currently relatively low-emissions, and although emissions from the electricity system will increase over the next decade, electricity system emissions will remain significantly below those of fossil fuels. There is also potential to reverse this course with provincial investment in low carbon electricity generation. Most critically, the overall energy reduction from fuel switching building heating systems to heat pumps is enormous – as air-source heat pumps are typically at least three times more efficient than the most efficient gas-fired heating systems and ground-source heat pumps are even more efficient.

Buildings may also require envelope (insulation, windows, air sealing, etc.) improvements to reduce overall building thermal energy requirements in order to limit heating equipment size, thus lowering equipment capital cost and lowering operating energy costs. Building envelope improvements also serve to limit electricity peak demand on the coldest days thus limiting investment required for future electricity system infrastructure expansion.

The Deep Retrofit Challenge (DRC) is expected to act as a catalyst for early voluntary compliance with the City's Net Zero Existing Buildings Strategy actions, and demonstrate the potential retrofit pathways (described in the Strategy) that will be needed to achieve emissions performance requirements.

The DRC is a competition style program that will support a number of retrofit projects to significantly reduce greenhouse gas emissions in the multi-unit residential building and mid-tier commercial building sectors and serve as a demonstration of next generation retrofits to accelerate market adoption. Participants will collaborate and compete with the highest performing projects receiving awards based on measured emissions reduction performance. The DRC will award grant funding to selected participants to help offset the cost of performing a deep retrofit of their buildings, with portions allocated for design, construction and confirmed emissions performance. Additional details of eligibility will be released with the program.

Toronto needs these local examples – as well as many more – to demonstrate the achievability and co-benefits of deep energy retrofits, help all buildings owners understand the steps on the pathway to net zero, and to promote community wide knowledge of deep retrofits. With 18 years between now and 2040, extensive action is needed immediately to support climate leaders and encourage a faster transition.

Project selection is slated to occur in Q4 2022 with participants completing incremental design activities in 2023. Participants will have until Q1 2025 to complete construction of the deep retrofits. Measurement and verification of project performance will follow with planned program windup in Q2 2026.

DRC participants will be required to contribute matching funds toward incremental design and construction costs, with the DRC contribution limited to a maximum of 25% of eligible project costs or up to \$500,000, depending on project gross floor area. Deep retrofits of buildings are expensive and do not have a simple payback over their lifecycle – as such action requires a catalyst and co-benefits need to be considered in payback calculations.

The Net Zero Existing Buildings Strategy contemplated incremental retrofit costs per unit area to reach the highest emissions reductions possible for existing buildings and compared the cost with business-as-planned retrofits between now and 2050. As an example, applying these costs to an archetypal 66-unit multi-residential building, the building would undergo approximately \$3M in business-as-planned retrofits between now and 2050, with additional investment in the range of \$3M required to implement a full deep retrofit. Performing all \$6M work now as part of a comprehensive deep retrofit front loads the full cost and because some building systems are replaced before they reach end of life an additional burden is made on the cash flow of the buildings.

Support and resources must be provided to make retrofits easier and more affordable to help offset this burden (this is a key component of the Net Zero Existing Building Strategy, please see Action 4).

Participants will also be encouraged to apply to existing City programs such as the Energy Retrofit Loan (ERL) program to assist funding the projects, although potential assistance is limited as the loan amount is based on energy cost savings and it is expected participants will still require significant additional funds.

DRC participants will be required to share data on project budget, design and emissions & energy data. Program data shall be open-sourced, to allow others to benefit from the

approach taken and provide clear evidence of benefits achieved by the deep retrofit projects. The DRC participants are also expected to participate in the initial cohort of volunteers for actions 1-3 of the City Net Zero Existing Buildings Strategy as these are actualized into City programs. These actions include:

1. Annual emissions (and energy) performance reporting, public disclosure and labelling
2. Greenhouse gas emissions performance targets
3. Performing energy and emissions audits and tune-ups (at regular intervals)

A comprehensive knowledge dissemination plan is integral to the DRC program and aligns with planned actions stemming from the Net Zero Existing Buildings Strategy and the City's recently adopted Net Zero by 2040 target. Case studies and technical reports on specific projects will be developed as part of the DRC program, and data on project energy and emissions, designs, and retrofit costs will be made public to accelerate uptake of deep energy retrofits. The City will also provide an in-kind contribution in the form of staff time to administer and promote the program, as well as supporting knowledge transfer and recognition of these transformational projects.

While planned knowledge transfer activities will provide program learnings to the public a significant opportunity exists to expand communications over the course of the program to grow community knowledge of deep retrofits and encourage additional buildings to start transformative projects.

Although the DRC will only directly support a limited number of projects with funding, the data gathered and momentum built is expected to spur other deep retrofit projects across the City. Case studies and technical reports will outline findings from the deep retrofits helping to lay out clear pathways for other buildings to follow, providing much needed direction. A campaign promoting the positive outcomes of deep retrofits, including co-benefits, will help to instill community knowledge of potential action and dispel old prejudices. Several not-for-profits are working with the City on the DRC to extend the reach of promotional activities through their networks and the open data the program provides will enable additional analysis by third-parties. Additionally, there is an opportunity to incorporate the excitement of cutting edge retrofits and grant funding into any comprehensive promotion of the City's net zero strategies.

It is estimated the DRC will enable greenhouse gas emissions reductions of approximately 1,750 tonnes CO₂/year starting from the completion of participating building retrofits, with the opportunity to influence further greenhouse gas emissions reductions through wider adoption of deep retrofits.

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SIGNATURE

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ATTACHMENTS

Confidential Attachment 1 – Details of funding for the Deep Retrofit Challenge