

# Junction East

## Net Zero & Sustainable Design Feasibility Study Summary Presentation

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# Feasibility Study Process

- Fluent Group was engaged early in the design process to develop potential strategies, technologies, and measures to enhance Junction East's energy and sustainability performance
- The study included energy modeling of various design scenarios ranging from "code compliant" to "net zero energy"
- The study also included a sustainable design analysis using the LEED green building rating system as an assessment tool
- The project received funding approval from the Federation of Canadian Municipalities (FCM), covering 50% of study costs
- The report reflects a snapshot of the design and costing

# Public Engagement

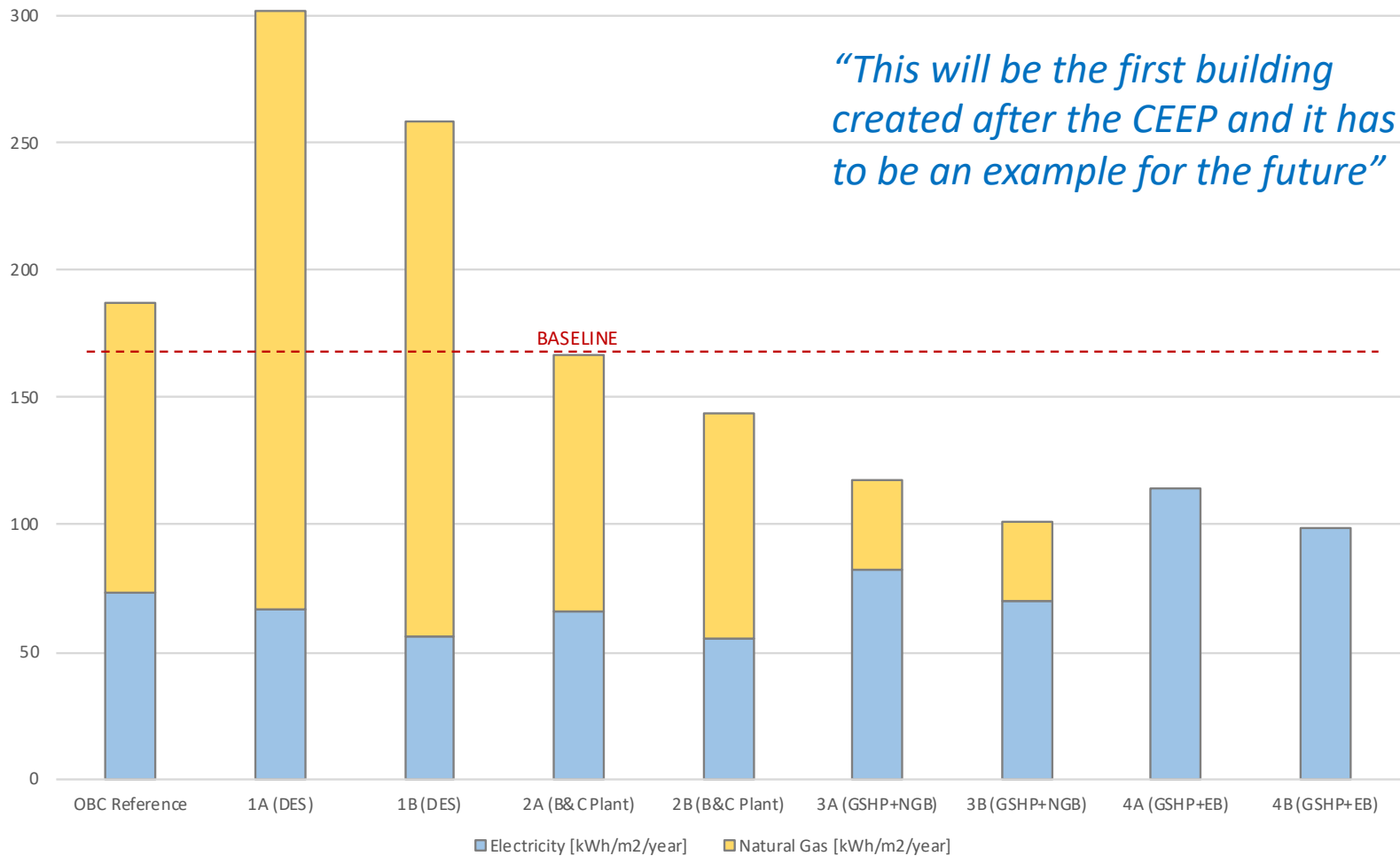
- Interactive workshops were held at various stages of the project to engage the public and stakeholders
- Commentary emphasized energy performance, GHG emissions, and water performance – with focus on CGS being a leader
- Aligning this project with the current and future climate goals outlined in the CEEP was considered most important
- Estimating the investment required to achieve various levels of performance was noted as essential for decision making
- While climate goals were a top priority, there is strong support for pursuing and achieving holistic sustainability (i.e. LEED)
- Workshop feedback directly influenced the study direction and conclusions

# ENERGY PERFORMANCE

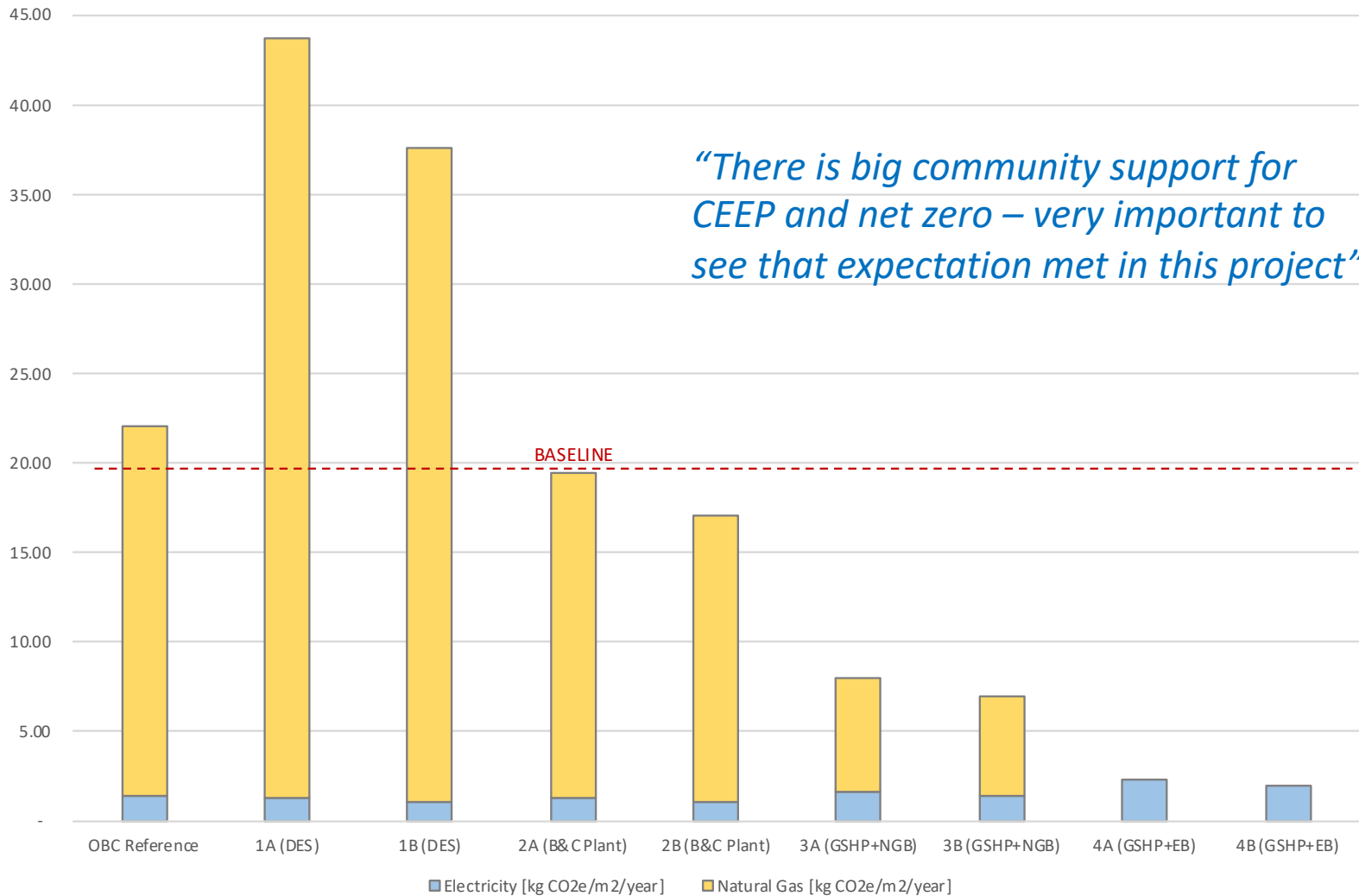
# Energy Scenarios

Scenario	Walls	Roofs	Windows	Lighting Power Density	Mechanical Plant
1A	R-25	R-40	Double	100% of SB-10	District Energy System (DES)
1B	R-30	R-50	Triple	70% of SB-10	
2A	R-25	R-40	Double	100% of SB-10	High Performance Natural Gas Boiler & Electric Chiller (B&C Plant)
2B	R-30	R-50	Triple	70% of SB-10	
3A	R-25	R-40	Double	100% of SB-10	Ground Source Heat Pump + Natural Gas Boiler (GSHP+NGB)
3B	R-30	R-50	Triple	70% of SB-10	
4A	R-25	R-40	Double	100% of SB-10	Ground Source Heat Pump + Electric Boiler (GSHP+EB)
4B	R-30	R-50	Triple	70% of SB-10	

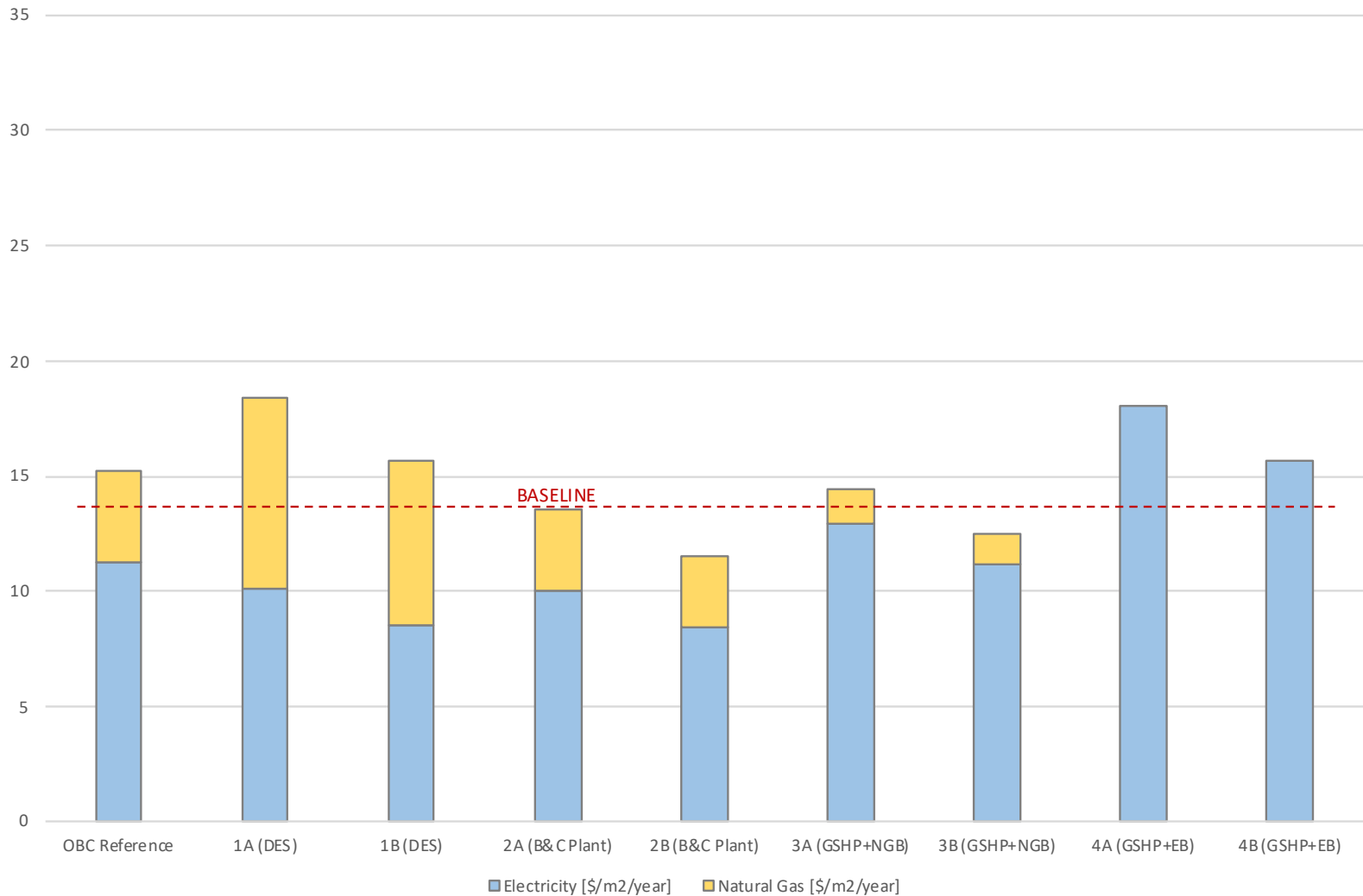
# Total Energy Use Intensity [kWh/m<sup>2</sup>/year]



# Total GHG Emissions Intensity [kg CO<sub>2</sub>e/m<sup>2</sup>/year]

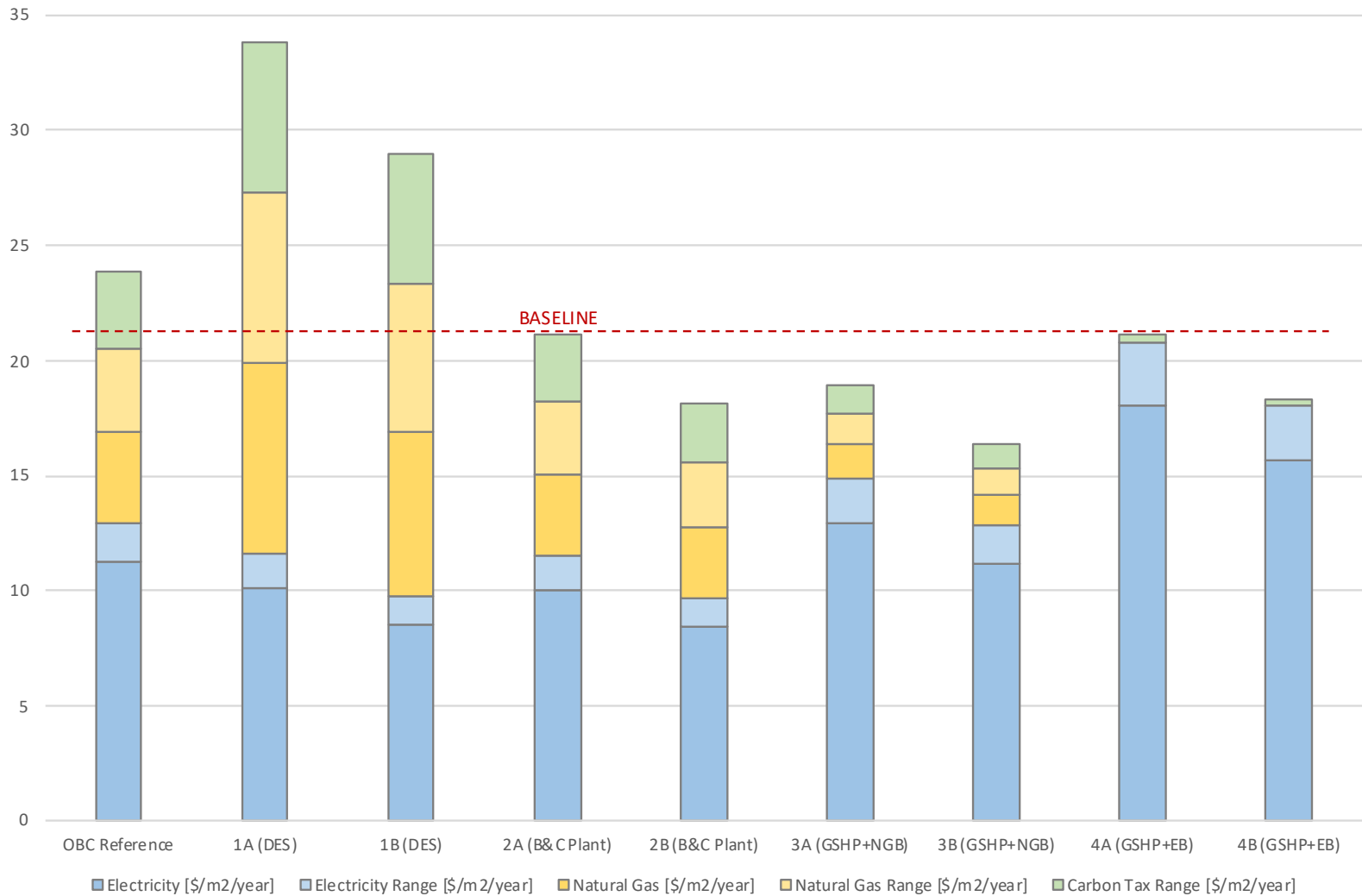


# Present Day - Total Energy Cost Intensity [\$/m<sup>2</sup>/year]





# Future Trends - Total Energy Cost Intensity [\$/m<sup>2</sup>/year]



# Energy Performance Synopsis

- Scenario 4A: ENERGY ↓ 31%, GHG ↓ 88% (cost ~\$1.385M)
- Scenario 4B: ENERGY ↓ 41%, GHG ↓ 90%. (cost ~\$3.865M)
- It is very difficult to justify these upgrades on a purely financial basis (i.e. electricity vs. low natural gas prices)
- However, they are the best options available to significantly reduce energy use and most importantly GHG emissions
- Is the City willing to pursue these upgrades for other reasons? (e.g. City Council's Climate Emergency Declaration, CEEP, etc.)

Note: Savings calculated relative to 'baseline design scenario'.

# Net Zero Energy Synopsis

- To achieve Net Zero Energy, based on Scenario 4B:
  - 974 kWp of solar photovoltaics (PV) would be needed (7,800 m<sup>2</sup> of roof area)
  - Capital cost of PV system ~\$4.5M+
- This means the project would need a total roof area of over 2.5 times the level one floor plate area
- The only pathway to Net Zero Energy would be to redesign the building/roof geometry to maximize the PV area on the building and use site area + adjacent building roof areas
- On the 4th floor roof, could fit enough PV to offset 15% - 18% of total annual energy use (capital cost of <\$1M)

# Net Zero Carbon Synopsis

- This is a much more realistic goal for this project!
- It aligns perfectly with CEEP – focus is on GHG emissions!
- Start with Scenario 4B, add PV to offset 15% - 18% of energy use and meet the other requirements of Zero Carbon Building standard
- Capital cost of ~\$5.225M
- This would demonstrate bold municipal leadership in the increasingly urgent struggle with global climate change

*“The building should sequester as much carbon as possible and all heating should be carbon-free”*

# NON-ENERGY PERFORMANCE

*“Spaces friendly to everyone all while being environmentally/ecologically sustainable”*

# Sustainability Features

- The study included expanding the sustainable design scope to include many other best practices, such as:
  - **SITE** (e.g. reduce irrigation water use by 50%, minimize light pollution, add bicycle infrastructure, minimize urban heat island effects, etc.)
  - **WATER** (e.g. reduce indoor water use by 30%, install water meters, etc.)
  - **ENERGY** (e.g. engage a commissioning agent for mechanical/electrical systems to help ensure performance is achieved, purchase offsets, etc.)
  - **MATERIALS** (e.g. reduce construction waste, select materials with lower ecological impacts, select materials with lower embodied GHG, etc.)
  - **INDOOR ENVIRONMENTAL QUALITY** (e.g. improve ventilation air filtration, select low-emitting materials, conduct indoor air quality testing, survey occupants to address comfort issues, etc.)

# LEED® Certification

- Adding LEED Certification (at a Silver level of performance) would be relatively easy if the building is already pursuing Zero Carbon Building Design and Performance
- This would achieve broader, more comprehensive sustainability goals such as protecting local ecosystems, selecting sustainable construction materials, and improving the quality of indoor spaces
- Incremental cost of ~\$0.9M for Silver (~\$1.4M for Gold)
- LEED remains the global standard in green buildings and ensures an enhanced level of environmental performance while demonstrating municipal leadership

# Recommendations

- Design for energy scenario 4B, including:
  - Enhanced thermal envelope
  - Ground source heat pump system with electric boiler
  - High performance lighting
  - Low flow (but effective and durable) water fixtures
- Include a 175 kWp rooftop solar photovoltaic system



# Recommendations cont'd

- Pursue the Canada Green Building Council's Zero Carbon Building standard to align with the CEEP
- Pursue LEED Certification (at a Silver level) to complement ZCB Certification and round out the sustainable design strategy
- Total estimated incremental cost of ~\$6.1M

*“Junction East should say to the world:  
We are walking the talk”*

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