Appendix G: Summary of Energy Evolution Projects (2020-2025)

Appendix G summarizes 20 projects to be undertaken over the next five years (2020-2025) to accelerate action and investment towards achieving the 100% scenario. It should be read in conjunction with Appendix F: Project Overviews. Most of the projects are to be led by the municipality and are to be undertaken in collaboration with community partners. Where applicable, projects will go through the standard City project management process. Proposed projects are contingent on future Standing Committee and Council approval, where required, and future staff and budget (capital and operating) pressures. Standing Committees include:

- Agricultural and Rural Affairs Committee (ARAC)
- Planning Committee (PC)
- Finance and Economic Development Committee (FEDCO)
- Standing Committee on Environmental Protection, Water, and Waste Management (SCEPWWM)
- Transportation Committee (TC)
- Transit Commission (Transit)

Realizing this action and investment is not without risks. These risks may include:

- Insufficient financial support from different levels of government and the private sector to meet the budgetary and staffing needs of the Action and Investment Plan and beyond;
- Higher capital and operating costs, as well as lower than expected saving and revenues, beyond what's currently estimated for project implementation and municipal operations;
- Regulatory barriers and compliance issues that impede the municipality from action and innovation, either by impeding the municipality directly through its own operations or impeding how the municipality can enact change in the community;
- Lack of uptake or buy-in from residents, businesses, industry or the municipality that impacts the viability of a new program or new standard;
- Diverging interpretations between stakeholders on how best to achieve the 100% scenario;
- Competing Council priorities or processes associated with other projects across the corporation;
- Competing departmental priorities including current operational mandates of impacted services, and how their mandates will need to change in order to work to achieve the emissions reductions in Energy Evolution;
- Lack of alignment between what the Energy Evolution model calls for and recommendations that come forward for plans and strategies that directly relate to Energy Evolution. Note that although it is expected that the range of options evaluated will include one or more scenarios that achieve the GHG reductions required in the 100% scenario, those scenario(s) may not ultimately be recommended;
- Aggressive implementation timelines which may not account for typical City processes including capital budget approval, Long-Range Financial Plan, planning, consultation, approvals, design, construction, and commissioning or account for provincial or federal approval processes that are out of the City's control;
- Changes in behavior, policy, and best practices related to COVID-19.

Additionally, at the time of the writing of the strategy, multiple City plans and strategies were in the process of being developed or updated that directly relate to Energy Evolution including the new Official Plan, the Transportation Master Plan, the Solid Waste Master Plan, the Alternative Energy Transit Program, and the Municipal Green Fleet Plan. It is understood that these plans will complete their own options analysis to achieve each respective plan's goals and targets and that the outcomes may differ than what has been identified in the strategy. It is expected that the range of options evaluated will include one or more scenarios that achieve the GHG reductions required in the 100% scenario, although those scenario(s) may not ultimately be recommended.

Additional Notes:

1. This summary of actions and investments provides an overview of what it will take to achieve the GHG emission reduction targets. However, the strategy remains largely underfunded and under resourced. Realizing Energy Evolution's vision will require concerted efforts and collaboration across the corporation and all sectors of the community.
2. Over the next 10 years, annual community-wide capital costs are higher up-front as investments in buildings, vehicles, energy-related equipment and renewables are made that will lead to long-term savings. Starting in 2032, there is a projected net financial benefit to society when the net annual savings and revenues exceed the annual investments.
3. The return on investment assumes that the funds will be borrowed at 4% interest rates with amortization periods approximately the useful life of the asset.
4. Some projects may require further financial analysis, particularly to capture operation and maintenance costs.
5. The Cumulative GHG Reduction Requirements identifies the percentage and associated kilotonnes of carbon dioxide equivalent (kt CO2e) required by 2025 in order to achieve the 100% scenario. It does not represent the percentage and associated kt CO2e required over the next 30 years.
6. As part of the annual Climate Change Master Plan update, staff will report on progress towards achieving the project milestones; GHG emissions will be tracked through the annual GHG emissions inventories. Dates associated with the project milestones are estimates based on the best information available at the time. Milestones and associated dates are subject to change as projects evolve and in relation to other corporate priorities.

Sector: Land Use

Total Estimated Investments: Enabler
Total Estimated Net Profits: Enabler
Total Estimated Cumulative GHG Reduction Requirements: Enabler

Project Description	Lead (City / Community)	Timeline (2020-2025)					Standing Committee
		Total Projected Investment ($ in billions)	Total Projected Net Return ($ in billions)	Project Metrics	Cumulative GHG Reduction Requirements	Estimated Project Milestones	
Integration of energy and climate mitigation policies in the new Official Plan and supporting master plans to address multiple challenges being faced by the city over the next 25 years, climate change being one of the most critical. The Official Plan and supporting master plans will be guided by the Climate Change Master Plan with Council approved targets to reduce GHGs by 2050.	City	Enabler	Enabler	Energy and climate mitigation policies embedded in the new Official Plan and supporting master plans	Enabler	• Q4 2020: Draft Official Plan released • Q4 2021: Council adoption • Q1 2022: Ministry approval	Joint PC and ARAC

Sector: Buildings

Total Estimated Investments: $3.39 billion
Total Estimated Net Profits: -$0.40 billion
Total Estimated Cumulative GHG Reduction Requirements: 560 kt CO2e

Project Description	Lead (City / Community)	Timeline (2020-2025)					Standing Commitee
		Total Projected Investment ($ in billions)	Total Projected Net Return ($ in billions)	Project Metrics	Cumulative GHG Reduction Requirements	Estimated Project Milestones	
Residential Building Retrofit Accelerator Program to accelerate small residential building retrofits through marketing, information and financial mechanisms.	City & Community	$1.44	-$0.2	• 17% of existing residential buildings renovated or replaced • 20% of existing residential buildings transition to heat pumps • 10% of domestic hot water heating transitions to non-emitting sources	22% (222 kt CO2e)	• 2020: Decision on Federation of Canadian Municipalities funding for the Better Homes Loan Program. • 2021: If successful, launch the Better Homes Loan Program and retrofit education campaign • 2021: Explore an efficiency utility. Develop a bulk heat pump program. Advocate for authorities necessary for this project • 2022: Develop a retrofit portal and energy labeling tool. • 2023: Develop renovation standard, as municipal authority allows	SCEPWWM
Commercial Building Retrofit Accelerator Program to accelerate multi-unit residential, commercial, industrial, and institutional building retrofits through marketing, information and financial mechanisms	City & Community	$0.45	-$0.09	• 15% of existing commercial buildings renovated or replaced • 20% of existing commercial buildings transition to heat pumps • 10% of domestic hot water heating transition to non-emitting sources	18% (175 kt CO2e)	• 2020-2021: Develop a strategy for commercial retrofits with stakeholder consultation • 2021-2023: Increase uptake of benchmarking and transparency • 2021: Launch marketing and education programs • 2022: Launch programs for accelerating retrofits • 2025: Launch energy retrofit standard	SCEPWWM
Building Retrofits through Local Improvement Charge Program to accelerate and finance deep energy retrofits of buildings through the local improvement charge mechanism.	City	Embedded within the residential and commercial retrofits accelerator programs				• 2020: Program designed, capitalized, and partners confirmed; decision on Federation of Canadian Municipalities funding for the Better Homes Loan Program • 2021: Pilot handful of neighbourhoods while leaving the program open to all residents. Recoup admin costs through financing and admin fee. • 2022: Develop and launch commercial building Local Improvement Charge (LIC) Program. • 2022: Recapitalize. Scale up to retrofit 15,000 homes and 900,000m^2 of commercial space retrofitted per year (not	FEDCO

Project Description	Lead (City / Community)	Timeline (2020-2025)					Standing Commitee
		Total Projected Investment ($ in billions)	Total Projected Net Return ($ in billions)	Project Metrics	Cumulative GHG Reduction Requirements	Estimated Project Milestones	
						all expected to use the LIC program but will be encouraged to use the online retrofit portal for tracking).	
Energy Community Improvement Plans to incentivize superior energy performance and deep energy retrofits using tax grants.	City	Embedded within the residential and commercial retrofits accelerator programs				• 2021: Retrofit accelerator roadmap • 2022: Draft policy and program • 2023: Policy reviewed and approved by council • 2023: Enabling by-laws enacted by Council	Joint PC and ARAC
Community Building Heating Strategy to address infrastructure and utility requirements for new ways of heating buildings.	City & Community	$0.52	-$0.48	30% drop in GHG intensity of federal district energy system	9% (92 kt CO2e)	• 2021: Engage with industry and consultant to develop roadmap for Community Building Heating Strategy • 2022 and beyond: Implementation of the strategy	SCEPWWM
High-Performance Development Standard to improve building design and construction across the community and support an industry-wide transition of new buildings to net zero emissions.	City	$0.76	-$0.08	Ramping towards all new buildings being net zero energy by 2030	6% (59 kt CO2e)	• 2020: Draft High-Performance Development Standard metrics; consult with industry • Q4 2021: Program comes into effect in line with the new Official Plan • 2025: Adopt 2nd Tier performance	Joint PC and ARAC

Project Description	Lead (City / Community)	Timeline (2020-2025)					Standing Commitee
		Total Projected Investment ($ in billions)	Total Projected Net Return ($ in billions)	Project Metrics	Cumulative GHG Reduction Requirements	Estimated Project Milestones	
Municipal Buildings Renewal and Retrofit Program to achieve higher building energy performance improvements in City owned buildings.	City	$0.22	-$0.009	Ramping towards having 27% of municipal buildings net zero by 2030	1% (12 kt CO2e)	• 2020: Establish a working group, develop criteria to prioritize deep building retrofits and apply it to the asset list of buildings and establish a preliminary schedule to direct deep building retrofits • 2021: Set standards and guidelines for deep building retrofit and complete first City building deep retrofit • 2022: As funding permits, conduct deep retrofits on up to two more City buildings • 2023: Complete a performance review of the first buildings retrofitted and adjust actions as required	SCEPWWM
Update Municipal Green Building Policy to align with corporate GHG reduction targets	City	Embedded within the Municipal Buildings Renovation and Retrofit Program				• 2020: Where possible influence upcoming and ongoing projects with these new criteria, complete policy impact analysis • 2021: Propose new policy and if approved, new green building policy would begin to transition into effect • 2025: Net zero emissions required for all new city facilities	SCEPWWM

Sector: Transportation

Total Estimated Investments: $3.29 billion
Total Estimated Net Profit: -$0.23 billion
Total Estimated Cumulative GHG Reduction Requirements: 218 kt CO2e

Project Description	Lead (City / Community)	Timeline (2020-2025)					Standing Committee
		Total Projected Investment ($ in billions)	Total Projected Net Return ($ in billions)	Project Metrics	Cumulative GHG Reduction Requirements	Estimated Project Milestones	
Personal Vehicles Electrification Strategy to enable and encourage personal electric vehicle adoption.	City & Community	$0.27	-$0.01	7% of personal vehicle sales are EVs in 2025	5% (49 kt CO2e)	• 2020 onwards: City participates in advocacy and monitors adequacy of local public charging. • 2020 to 2023: City to apply for expected EV funding programs undertaken by Natural Resources Canada and others • 2021: Update the Corporate Electric Vehicle Charging Station Policy; develop a City public charging infrastructure and building retrofit charging plan	SCEPWWM

Project Description	Lead (City / Community)	Total Projected Investment ($ in billions)	Total Projected Net Return ($ in billions)	Timeline (2020-2025) Project Metrics	Cumulative GHG Reduction Requirements	Estimated Project Milestones	Standing Committee
Zero Emissions Commercial Vehicles Strategy to enable and encourage commercial electric vehicle adoption.	City & Community	$0.08	$0.07	18% of commercial fleet is electric by 2025	6% (63 kt CO2e)	• Q1 2021: Consult with commercial fleets and support advocacy • 2022: Report on encouraging electrification of light-duty fleets • 2022: Summary report with recommendations on zero emission commercial vehicles	SCEPWWM
Municipal Green Fleet Plan Update to consider corporate greenhouse gas reduction targets.	City	TBD	TBD	Progress towards the 2030 target	<1% (<10 kt CO2e)	• 2021: Update of the Municipal Green Fleet Plan • To be determined	TC
Alternative Energy Sources for Transit Program to build a 100% zero emissions Concept Transit Network by 2030.	City	$2.61	-$0.26	48% of OC Transpo's passenger fleet is zero emission by 2025	6% (63 kt CO2e)	• 2020: TMP Update environmental scan completed • 2021: TSD study of alternative energy sources for transit fleet options to feed into the Fleet Strategy update; Alternative Energy Transit Project to be completed • Fall 2023: Transportation Master Plan Update completed	Transit
Transportation Mode Shift to reduce the reliance on personal vehicles in favour of sustainable modes including public transit, walking, cycling and carpooling.	City	$0.34	-$0.04	Steady progress towards the 2030 mode share targets	3% (33 kt CO2e)	• Fall 2023: Transportation Master Plan Update completed	TC

Sector: Waste and Renewable Natural Gas

Total Estimated Investments: $0.024 billion
Total Estimated Net Profits: -$0.022 billion
Total Estimated Cumulative GHG Reduction Requirements: 195 kt CO2e

Project Description	Lead (City / Community)	Total Projected Investment ($ in billions)	Total Projected Net Return ($ in billions)	Timeline (2020-2025) Project Metrics	Cumulative GHG Reduction Requirements	Estimated Project Milestones	Standing Committee
Organics Resource Recovery Strategy to reduce emissions associated with managing waste and enable energy from waste.	City & Community	$0.00	$0.009	Significant increase in organics diversion starting in 2023	7% (73 kt CO2e)	• 2022: Complete a baseline assessment of the industrial, commercial and institutional waste in Ottawa with a view to reducing amounts generated and recovering organics from this stream • 2022: Solid Waste Master Plan completed	SCEPWWM

Project Description	Lead (City / Community)	Total Projected Investment ($ in billions)	Total Projected Net Return ($ in billions)	Timeline (2020-2025) Project Metrics	Cumulative GHG Reduction Requirements	Estimated Project Milestones	Standing Committee
Renewable Natural Gas Strategy to supply GHG neutral gas to the community.	City	$0.024	-$0.03	Initial RNG production in the community starting in 2022	12% (122 kt CO2e)	• 2020-2022: Identify key issues and opportunities; complete Biogas Optimization Study, Solid Waste Master Plan and ROPEC Site Master Plan; assess interest in Renewable Natural Gas (RNG) from the agricultural community and private landfills; look for opportunities to expedite RNG projects; look for way to minimize the release of fugitive or other waste related emissions • 2022-2025: Develop a Renewable Natural Gas Strategy and implement plans	SCEPWWM; ARAC

Sector: Electricity

Total Estimated Investments: $0.55 billion
Total Estimated Net Profits: $0.055 billion
Total Estimated Cumulative GHG Reduction Requirements: 71 kt CO2e

Project Description	Lead (City / Community)	Total Projected Investment ($ in billions)	Total Projected Net Return ($ in billions)	Timeline (2020-2025) Project Metrics	Cumulative GHG Reduction Requirements	Estimated Project Milestones	Standing Committee
Electricity Resource Strategy to develop local or regional renewable electricity supplies.	City	$0.55	$0.055	<u>Install</u>: • 150 MW Solar • 20 MW Wind • 20 MW Hydro • 20 MW Electricity Storage	7% total, comprised of: • Solar: 57 kt CO2e • Wind: 4 kt CO2e • Hydro: 10 kt CO2e	• 2020: Provide input to and comment on the Hydro Ottawa five-year direction plan to align it with Energy Evolution targets • 2020 onwards: Remain active in planning at the Independent Electricity System Operator and the Ontario Energy Board • 2021: Establish a stakeholder working group to evaluate distributed generation and storage options and encourage private and community investment • 2021 onwards: Implement additional smart grid showcases in several parts of the City • 2020-22: Install power to thermal at City facilities which have access to low cost wholesale priced power	SCEPWWM

Enabling Projects and On-Going Engagement

Total Estimated Investments: Enabler
Total Estimated Net Profits: Enabler
Total Estimated Cumulative GHG Reduction Requirements: Enabler

Project Description	Lead (City / Community)	Total Projected Investment ($ in billions)	Total Projected Net Return ($ in billions)	Timeline (2020-2025) Project Metrics	Cumulative GHG Reduction Requirements	Estimated Project Milestones	Standing Committee
Climate Ambassadors Network to engage commercial and institutional champions to meet long term GHG reduction targets.	City & Community	Enabler	Enabler	• Reduced barriers to implementation • Increased funding to support implementation	Enabler	• 2021 Q1: Identify and determine level of interest from large energy consumers and employers • 2021 Q1: Review Ethical Purchasing Policy to support network objectives • 2021 Q2: Develop network activities and programs • 2021 Q3: Launch network and initial activities • 2022: Participants publish GHG reduction targets and carbon budgets and implement significant carbon reduction activities • 2023: If successful, expand network to include small medium enterprises	SCEPWWM
Climate Change Education and Outreach Program to engage the public in collective private action to meet long term GHG reduction targets.	City & Community	Enabler	Enabler	• Increased awareness and action	Enabler	• 2020 Develop program materials and engage community partners, launch campaign • 2021: Expand campaigns; monitor effectiveness • 2021: Presentations to support on-going alignment of priorities, workplans, and budgets to internal and external stakeholders • 2022: Adjust as necessary for effectiveness	SCEPWWM
Fund the Evolution to further assess potential sources of municipal funding.	City	Enabler	Enabler	• Increased funding to support implementation	Enabler	• 2021: Consult on potential revenue sources advocate for mechanisms not in City's control, if required and provide input into Long Range Financial Plan and bylaws as opportunities arise • 2022: Begin to implement revenue and funding mechanisms per council direction • 2023: Measure success and continue to pursue revenue and funding opportunities	FEDCO