



SCHEDULE E

Completion Report for Studies

GMF number	No.: 16029
Name of lead applicant (municipality or other partner)	City of Ottawa
Name, title, full address, phone, fax and e-mail address of lead technical contact for this study	Mike Fletcher, Project Manager, Climate Change and Resiliency Unit, Planning, Infrastructure and Economic Development Department, 110 Laurier Avenue West - 4th Floor, Ottawa, ON K1P 1J1 T. 613.580.2424 x29201 C. 613-880-3688 mike.fletcher@ottawa.ca
Date of the report	Dec 3, 2020

1. Introduction

- a) *Who was involved in doing the Feasibility Study, and what are their affiliations? Please include name, title and contact information. Those involved could include municipal staff, engineers and other consultants, a representative from a non-governmental organization, and others.*

Core Team, Climate Change and resiliency Unit at the City of Ottawa:

- Andrea Flowers, Section Manager
- Jen Brown, Project lead
- Mike Fletcher, Project Manager
- Janice Ashworth, Project Manager
- Rebecca Hegan, Project Manager
- Melissa Jort-Conway, Planner
- Emma Langham, Communication Coordinator

Consulting Team:

- Sustainable Solutions Group
- whatIf? Technologies Inc

Senior Management, Planning, Infrastructure, and Economic Development:

- Steve Willis, General manager
- Don Herweyer, Director of Economic Development
- Alain Miguelez, Manager Planning

Council Sponsor's Group:

- Councillor Scott Moffatt, Chair of the Standing Committee on Environmental Protection, Water and Waste Management (SCEPWWM), as the representative of SCEPWWM;
- Councillor Laura Dudas as the representative of the Planning Committee;

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- Councillor Mathieu Fleury as the representative of the Transportation Committee;
- Councillor Jenna Sudds as the representative of the Transit Commission;
- Councillor Theresa Kavanagh as the representative of the Ottawa Board of Health;
- Councillor Shawn Menard, Councillor Liaison for the Environmental Stewardship Advisory Committee.

City Stakeholders:

Mayor's Office • City Manager's Office • City Departments o Financial Services o Innovative Client Services September o Planning, Infrastructure and Economic Development o Public Works and Environmental Services o Recreation, Cultural and Facility Services o Transportation Services • Ottawa Public Health

Community Sounding Board Members

Arborus Consulting • Association of Energy Engineers – Eastern Canada Conference • Aspen Solar Management • Atmospheric Energy Systems • BGIS • Building Owners and Managers Association • Bullfrog Power • Burritts Rapids Renewable Energy Association • Canada Green Building Council • Canadian Association for Renewable Energies • Canadian Biogas Association • Canadian Geoechange Coalition • Canada Science and Technology Museum Corporation • Canadian Urban Transit Research and Innovation Consortium • CanmetENERGY • Carbon Impact Consultants • Carleton University • Centretown Citizens Ottawa Corporation • Chamber of Commerce • CH Four Biogas • City of Ottawa (various departments and branches) • City of Hamilton (Office of Energy Departments) • City of Markham (Solid Waste) • City of Toronto (Planning Department) • Clean Air Partnership • Clean Energy Canada • Community Associations for Environmental Sustainability • Communauto • Domicile Development Inc. • Eastern Ontario Landlords Organization • EcoGen Energy Inc. • Ecology Ottawa • Econogics Inc. • EDF Renewable Energies • Electric Vehicle Council of Ottawa • Enbridge Gas Distribution Inc. • Energy Ottawa • Envari • Envirocentre • Enwave • Federation of Canadian Municipalities • FVB Energy Inc. • GHD Limited • Gloucester Housing Corporation • Greater Ottawa Home Builders' Association • Green Communities Canada • Healthy Transportation Coalition • Hydraulic Energy and Renewable Energy Technologies • Hydro One • Hydro Ottawa • Independent Electricity System Operator • Innovative Hydro Controls • Invest Ottawa • iSolara Solar Power • JAZZ Solar Solutions • JJ McNeil Commercial Inc • J. Michael Wiggin Consulting • JL Richards • Ken Church Consulting • Leidos Canada • Lumos Energy • Master Group • Minto Group • National Capital Commission • National Research Council • Natural Resources Canada • Norsun Energy • Nova Bus • Ontario Biogas Association • Ontario Ministry of Agriculture, Food and Rural Affairs • Ontario Energy Board • Ottawa Carleton District School Board • Ottawa Centre EcoDistrict • Ottawa Climate Action Fund • Ottawa Community Foundation • Ottawa Community Housing • Ottawa Gatineau Hotel Association • Ottawa Macdonald Cartier International Airport • Ottawa Renewable Energy Cooperative • Ottawa Regional Society of Architects • Ottawa Student Transportation Authority • Passive House Canada • Peak Power Energy • Plug 'N Drive • Pollution Probe • Public Services and Procurement Canada • QUEST • Regional Group • RND Construction • Rightwheel Inc • Smarter Shift • Sustainability Solutions Group • Transport Canada • Treasury Board of Canada • Tucker House Treasury Board of Canada • University of Ottawa • VRTUCAR • Wastewatch Ottawa • Windmill Development Group Ltd • WSP • ZEBx • Zibi

2. The Feasibility Study

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- a) *Describe the process that you undertook to make this feasibility study a reality, from concept, to council approval, to RFP, to final deliverable.*

Energy Evolution was originally conceived of in 2014 by the previous Chair of the Environment Committee, David Chernushenko. The process started with a series of stakeholder consultations and the creation of technical working groups. The name, Energy Evolution, was coined by one of these working groups.

The creation of the strategy was undertaken in two phases. Work describing our desired energy transition was initially centred around transition pathways and seven pathway studies were undertaken in each phase. A pathway study examines an area where energy is either consumed or produced and looks for changes that align with the transition strategy. For example, vehicle electrification both reduces the energy consumed when compared to gas vehicles and switches the fuel source to electricity, which is more easily procured from renewable sources. In the case of production, renewable energy production was examined for electricity (solar, wind, hydro) as well as renewable natural gas and geothermal for heating.

Phase 1

In phase 1, we retained the assistance of Leidos as consultants to produce six pathway studies. One pathway study, electrification of cars and light trucks, was completed internally. Once the pathway studies were completed and reviewed, a number of technical workshops involving internal and external stakeholders were held. These workshops allowed for expert input to Energy Evolution and allowed for the community to start to consider how they might contribute to implementation. From the work on phase one, an action list was created so that some Energy Evolution projects could start while the second phase of Energy Evolution was taking place.

Phase 2

In phase 2 we retained the assistance of Sustainable Solutions Group as consultants to produce seven pathways studies, which again were vetted through a series of technical workshops with local experts. Next, the consultant produced an integrated model of changes required to meet the GHG reduction target along with a data, methods, and assumptions paper explaining the methodology of the model's development. The initial 80% GHG reduction model was built from the phase 1 and phase 2 pathway studies. In addition to the model and supporting assumptions paper, a business as planned scenario, a co-benefits paper, and a technical report were produced by the consultants.

An unplanned event occurred during phase 2 - the Ottawa City Council declared a climate emergency in April 2019. The largest ramification of this decision was a direction to examine changes required to change the 2050 GHG reduction target from 80% to 100%, which was confirmed in January 2020 through the approval of the Climate Change Master Plan. At the time of this motion passing, modeling was complete on the 80% model. The consultant had their contract extended to re-model required actions under a 100% GHG reduction scenario. The work on the 100% scenario was more difficult than the work on the 80% scenario as more measures, including measures not foreseen in the pathway documents had to be researched and included in the work to generate a 100% GHG reduction scenario.

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In December 2019 and January 2020, a partial progress report went to Environment Committee and Council respectively. It recommended embracing the 100% reduction scenario and was approved by Council. On the bases of this council direction, City staff continued internal and external consultation and started work on final documents. A strategy document and 20 project overviews were brought to Council in October 2020. The 20 project overviews detailed how implementation will proceed in key areas of Energy Evolution.

b) What were the objectives of the Feasibility Study (what was it seeking to determine)?

The Energy Evolution Strategy was undertaken to chart a pathway to achieving Council's GHG reduction targets, both for the municipality and the corporation, at annual intervals between 2020 and 2050. It identified the key actions, the costs, the net returns to society, and the co-benefits from achieving the GHG targets. It identified the short term priorities and opportunities as well as the mid and long term requirements to meeting the GHG reduction targets.

c) What approach (or methodology) was used in the Feasibility Study to meet these objectives?

An integrated model, City Insight, developed by Sustainability Solutions Group (SSG) and whatIf? Technologies Inc. (whatIf?), was used to build a geospatial model of Ottawa. It is an integrated, multi-fuel, multi-sector, spatially-disaggregated energy systems, emissions and finance model for cities. The model enables bottom-up accounting for energy supply and demand, including renewable resources, conventional fuels, energy consuming technology stocks (e.g. vehicles, appliances, dwellings, buildings) and all intermediate energy flows (e.g. electricity and heat).

With federal and municipal datasets, the model was populated to map out all of the emissions-producing activities in the City. The modeling protocol followed the Global Protocol for Community-Wide GHGs standards for emissions modeling. Scope 1 and 2 emissions were included in the model and a baseline year of 2016 was selected.

d) Please describe any public consultations conducted as part of the Feasibility Study and their impact on the Study.

Stakeholder consultations started in 2014 when the first sounding board meetings were held and the technical working groups were formed. These consultations continued over the course of the next 6 years, in both plenary formats and in smaller breakout meetings. A few public information sessions were held on the topic, both in person and via webinar. Finally, online surveys were completed asking for public and stakeholder input on some of the relevant aspects of the Strategy and priority projects.

3. Feasibility Study Findings and Recommendations

a) What were the environmental findings related to the options explored in the Feasibility Study? Please provide quantitative results and summary tables of these results (or the page numbers from the Feasibility Study report).

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The Energy Evolution Study first developed a model of the GHG reductions from each sector that would be needed to achieve the targets set by Council and the federal commitments under the Paris Agreement – page 13, Figure 3.

With this “carbon budget”, the interim targets for the community and the corporation could be established – page 11, Figures 1 and 2

Next, the strategy identified the 35 actions that would be required to achieving these reductions – Appendix E

Next, the Cost Catalogue was created – Appendix H

With the cost catalogue, the financial implications of these 35 actions was modeled – Page 71-79

Finally, the 20 project overviews were created as an initial implementation strategy to achieving the GHG reductions – Appendix F

- b) *What were the financial findings related to the options explored in the Feasibility Study (for example, results of a cost-benefit analysis, financial savings identified, and so on)? Please provide quantitative results and summary tables of these results (or the page numbers from the Feasibility Study report).*

The study found that the cost to society as a whole would be \$31.8B over the next 30 years, which would result in a net return to society of \$12.4B over the life of the assets (page 76, Table 20). These cost-benefit analyses were provided per sector (page 78, Table 22) and per project (page 81, Table 23 for municipal projects and page 87, Table 24 for community projects).

- c) *Based on the environmental and financial findings above, what does the Feasibility Study recommend?*

The final recommendations of the Energy Evolution Strategy were to:

1. Receive the final report for Energy Evolution: Ottawa’s Community Energy Transition Strategy and supporting documents.
2. Receive the list of projects, to be more developed by staff and brought before Standing Committee and Council for approval, where required;
3. Direct staff leading new or updates to City plans, strategies and policies to take into consideration the energy emissions model and the City’s greenhouse gas reduction targets in the development of such plans, strategies and policies.
4. Approve that the 2019 Hydro Ottawa dividend surplus of \$2.6M be used to fund the proposed spending plan.

4. Lead Applicant’s Next Steps

- a) *Taking the Feasibility Study’s recommendations into account, what next steps do you as the municipality plan to take? What potential benefits or internal municipal improvements would result from these next steps?*

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The municipality is taking many steps following the approval of the Energy Evolution Strategy. Some of these steps are:

- Incorporating the GHG reduction goals into ongoing Mater Plans and Long Range Financial Plans;
- Continuing the implementation of the priority actions from Phase 1;
- Commencing implementation of the priority projects from Phase 2;
- Convening stakeholder groups to guide and support this implementation;
- Seeking additional funds where possible to leverage funds available;
- Launching a public education campaign and working with key stakeholders to do so;
- Exploring additional financial mechanisms to fund Energy Evolution.

5. *Lessons Learned*

In answering the questions in this section, please consider all aspects of undertaking the Study — from the initial planning through each essential task until the Final Study was prepared.

- a) *What would you recommend to other municipalities interested in doing a similar Feasibility Study? What would you do differently if you were to do this again?*

We have had several important learnings regarding key aspects of the project. These relate to basic requirements of the project, lessons about engagement, and support for the project and staff roles.

Some of the key documents developed for the project give Energy Evolution its foundational credibility. The approach of building required GHG reductions from pathway studies grounded in the local community give legitimacy to the process of the study and ultimately its credibility. This is further supported by building the model mostly from actions which the pathway studies deemed achievable (but not necessarily easy) in the context of Ottawa. The model itself is an indispensable tool. As we are asking various groups to take vigorous and very extensive measures, the model is the foundational, data driven document which can be referred to explain why these measures are required.

During the engagement and socializing our work, getting the attention of other groups, both internal and external to the City, has been a challenge. Interest appeared to ramp up as it became apparent that Energy Evolution would have impacts in areas for which they are responsible. A general increase and concern about the climate crisis during the study project period may have also contributed to the seriousness with which the project was taken in the final period. These had the effect of backloading much of the engagement as the project was driving to completion.

If we were planning this project again, we would staff more heavily at the early part of the project and work harder, earlier to communicate the breadth of changes and actions required by everyone.

- b) *What barriers or challenges (if any) did you encounter in doing this Feasibility Study? How did you overcome them?*

An interesting barrier has been the fact that other City of Ottawa departments are developing plans in rough concurrence with Energy Evolution. The main examples are the Official Plan, the Solid Waste

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Master Plan, the Transportation Master Plan, and the Long Range Financial Plan. Each of these plans have had their own objectives and each of them have implications for Energy Evolution.

The solution to this challenge has been to work hard on integration. In the case of integration with the Official Plan, a land use planner, as well as a specialist from Ottawa public health were brought into the Energy Evolution team. In the case of the interface on the Transportation Master Plan, SSG consulting were teamed up with transportation planners (particularly in modelling) to ensure that the Energy Evolution Strategy aligned with key directions foreseen in transportation planning. Finally, integration with the Solid Waste Master Plan is being managed by having members of the Energy Evolution Team participate in the development of this plan.

6. Knowledge Sharing

- a) *Is there a website where more information about the Feasibility Study can be found? If so, please provide the relevant URL.*

<https://ottawa.ca/en/living-ottawa/environment/climate-change-and-energy/energy-evolution>

- b) *In addition to the Feasibility Study results, has your Feasibility Study led to other activities that could be of interest to another municipality (for example, a new policy for sustainable community development, a series of model by-laws, the design of a new operating practice, a manual on public consultation or a measurement tool to assess progress in moving toward greater sustainability)? If so, please list these outcomes, and include copies of the relevant documents (or website links).*

The Energy Evolution Strategy has initiated a number of follow-on projects including:

- high performance development standards;
- building energy mapping and modeling;
- community improvement plans for energy performance;
- local improvement charges for financing retrofits;
- community heating strategies including sewer heat capture and geothermal opportunities;
- district energy strategies;
- renewable natural gas and power to gas assessments including a biogas optimization study;
- electric vehicle strategies including public chargers;
- transportation mode shift strategies including a parking analysis;
- renewable electricity promotion including a wind and solar potential study;
- revenue generation opportunities analysis;
- advocacy strategies; and
- public awareness campaigns.

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