# Community Energy Plan

Terms of Reference

## 1. Description

### 1.1 Policy Context

The purpose of a Community Energy Plan (CEP) is to support the transition to a low carbon future. A CEP is a key component in the design of a new community by using analysis to develop strategies that reduce energy consumption and carbon emissions, and considers energy resiliency. The CEP process is important because it supports a path for communities to be equipped with the infrastructure necessary to move toward zero emissions and to enable solutions that are only available if planned on community scale. This is closely linked but distinct from the requirements in the *Ontario Building Code* which speak to individual building's specific requirements.

CEPs are nested to align with the City's planning policy framework, with increasing specificity, as shown in Figure 1.

- Energy Evolution, Ottawa's Community Energy Transition Strategy (also referred to as the Energy Evolution Strategy) is Ottawa's municipal-scale CEP for energy use and carbon emissions across all sectors of the community. Energy Evolution was approved by City Council in January 2020.
- CEPs for new greenfield communities on urban expansion lands as well as within redevelopment areas are carried out as part of community design plans and Official Plan Amendments for Local Plans (including both secondary plans and area-specific policies, whichever applies).
- The land use, design and energy plans developed in support of new plans of subdivision will assess the energy and infrastructure with more detailed plans for individual communities.

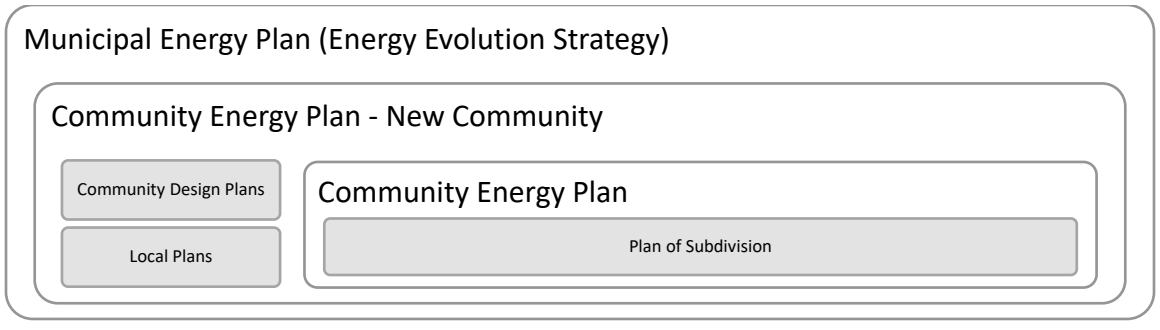


*Figure 1 Nesting of Community Energy Plans*

The Official Plan is guided by the information outlined in the Climate Change Master Plan, the Energy Evolution Strategy and the Climate Projections for the National Capital Region.

High Performance Development Standard (HPDS)

The HPDS is a collection of voluntary and required standards that raise the performance of new building projects to achieve sustainable and resilient design. The Official Plan defines "sustainable and resilient design" as: *"Principles in site and building design to protect against the depletion of critical resources like energy, water, land, and raw materials, reduce greenhouse gas emissions, prevent environmental degradation throughout its life cycle, and create built environments that are livable and comfortable while being safe and resilient to the impacts of a changing climate"*.

CEPs address energy efficiency and energy supply in the design of new communities, specifically in the design of new plans of subdivisions and local plans. Projects are to submit a CEP Report or CEP Brief (as applicable) demonstrating a proposed approach to energy. This approach must demonstrate performance in line with the HPDS Building Energy Efficiency metric. The HPDS has multiple tiers of performance. Tier 1 is the mandatory minimum performance threshold for all projects. Tier 2 is the voluntary higher level energy performance threshold, which is encouraged for projects.

Energy use and carbon emissions are impacted by both land use planning decisions as well as specific criteria set out in the *Ontario Building Code*. Building energy thresholds in the HPDS are proven through a CEP in the case of a local plan or plan of subdivision. When developing a CEP, building designs will not be detailed enough to address all the energy efficiency strategies proposed. This is why the CEP will include a section addressing how the applicant proposes to implement and monitor the CEP's strategies and targets.

The CEP process helps to ensure communities are equipped with the infrastructure necessary to move toward near zero emissions. The CEP helps to identify solutions that are only available if planned at the community scale. For example, district energy as an efficient and cost-effective solution must be planned and accounted for at the community scale. The community scale is useful in addressing challenges such as the limitations on the electrical grid's capacity to accommodate renewable energy from new homes in a specific area.

**Climate Projections for the National Capital Region**

The Climate Projections for the National Capital Region study was developed in partnership with the National Capital Commission and Environment and Climate Change Canada. It used advanced climate science modeling to predict changes in temperature, precipitation, wind and extreme weather until the year 2100. This data can

help Ottawa prepare for the changing climate by considering these anticipated changes in design, construction and operational decisions.

### 1.2 Objectives

Informed by the City's policy directions on climate change, CEPs will seek to identify on-site and off-site measures to be undertaken by a developer, utility or other partners, to align the energy systems with City goals as the development is built. CEPs support the City's goal of reducing greenhouse gases (GHGs) and responding to current and future effects of climate change as expressed in the Official Plan and Climate Change Master Plan by:

- Evaluating the consistency of a proposed development's energy characteristics with City climate change goals and policies;
- Enable early consideration of energy efficient, resilient, and low carbon strategies with near net zero emissions being the ultimate objective;
- Encouraging negotiations between stakeholders about the planning and budgeting for utility network and other energy system modifications, upgrades and servicing;
- Facilitating the implementation of preferred energy targets and measures as a condition of plan approval

A CEP does not intend to predict actual energy use of the community. A CEP provides either a quantitative understanding of the expected energy needs of a proposed development site using estimates to evaluate options on how to mitigate negative impacts, or by a commitment to a prescriptive energy pathway.

## 2. Preparation:

The City of Ottawa encourages collaboration amongst stakeholders and development partners. CEPs may follow either a performance or prescriptive pathway for setting the direction for energy use in communities. The main steps for each path are outlined below.

*Table 1 CEP Pathway Options*

| Performance Pathway | Prescriptive Pathway |
|---|---|
| • Assess the energy needs of the community and the impacts of the development in response to climate change,<br>• Review energy consumption and carbon emission mitigation options and strategies (see Appendix C)<br>• Be submitted to the municipality for approval,<br>• Be monitored through its implementation with reporting back to the City as part of the local plan approval, and by way of a legal agreement with the City for plans of subdivision. | • Select prescriptive option for the buildings in the community to follow (see Appendix A),<br>• Be submitted to the municipality for approval,<br>• Be monitored through its implementation with reporting back to the City as part of the local plan approval, and by way of a legal agreement with the City for plans of subdivision. |

## 3. When Required?

There are two types of Community Energy Plans (CEP): A CEP Report and a CEP Brief. The decision tree in Figure 2 is provided to help applicants determine if a report is required.

1. A CEP Report, prepared in accordance with this Terms of Reference, is required to be submitted as part of a complete application or as a condition of draft approval for:
    a. An area of the city being reviewed as part of a Community Design Plan or as part of a new or amended local plan, as described in Section 12 of the Official Plan; or
    b. A draft plan of subdivision application within an existing approved Community Design Plan or Secondary Plan area but without an approved CEP.
2. A CEP Brief, prepared in accordance with this Terms of Reference, may be submitted in lieu of a CEP Report as part of a complete application or as a condition of draft approval under the following conditions:
    a. A draft plan of subdivision application is within an existing approved Secondary Plan area with an approved CEP.

In such cases, a complete energy analysis is not required. The CEP Brief shall summarize the strategy for the development, how it aligns with the approved community design plan or secondary plan, and the approved CEP. When the development moves to the detailed engineering stage, if the project doesn't completely align with the existing approved CEP, equivalency must be demonstrated and approval from the CEP working group provided to ensure changes don't conflict with or adversely impact the implementation of the existing approved CEP by other landowners or partners. A detailed report outlining this is required.

b. A draft plan of subdivision application of less than 100 homes (for residential development) or sites less than 4 hectares (for mixed use or commercial developments).

c. A project pursuing a prescriptive pathway for energy performance, see Appendix A.

3. Where a complete CEP Report or CEP Brief is not submitted as part of a complete application, plan of subdivision projects shall submit a letter in lieu of a Report or Brief, which identifies the following project elements;

    - Project partners, joint working group and key stakeholders;
    - Qualified professional completing the CEP Report or CEP Brief;
    - Proposed CEP Report or CEP Brief compliance pathway, prescriptive or a complete plan;
    - Intended target level of performance for the community.

    This information is considered to be preliminary and to the best information available, which will be subject to revision and validation through submission of a CEP or equivalent certification and labelling program as a condition of approval. The completed CEP Report or CEP Brief will be required as a condition of draft approval.

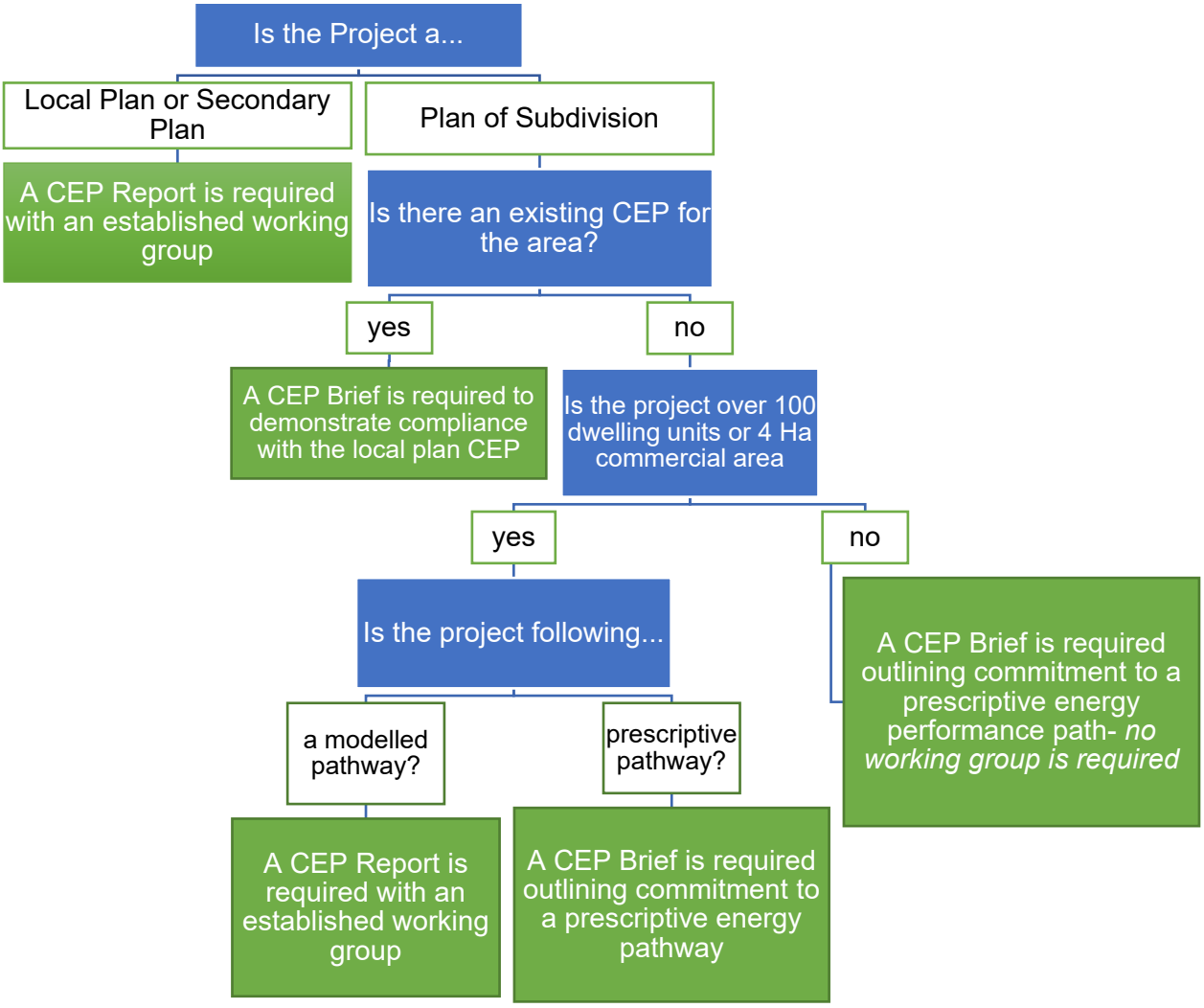


*Figure 2 CEP Report vs. Brief Decision Tree*

## 4. Contents

A Community Energy Plan (CEP) should include the content below and any other applicable items identified following the pre-application consultation meeting. Failure to satisfy these components may result in deeming the application incomplete or denial of clearing conditions. Where the information has been provided in an accompanying submission document, the CEP may reference the associated document to eliminate redundancies.

The table below outlines the contents of a CEP Report or Brief. Further details on each of the sections is provided after the table.

*Table 2 CEP Report vs. Brief Contents*

| Section | | CEP Report Required? (Yes/No) | CEP Brief Required? (Yes/No) |
|---|---|---|---|
| 4.1 Description of Development | | Yes | Yes |
| 4.2 Existing Context | | Yes | Yes |
| 4.3 Objectives | | Yes | Yes |
| 4.4 Partners | | Yes | No |
| 4.5 Data Sources and Methodology | | Yes | Required unless project is committing to a prescriptive pathway |
| 4.6 Consultations and Joint Working Group | | Yes | No |
| 4.7 Energy Use and Carbon Emissions | Proposed Scenario | Yes | Yes |
| | Analysis: Emission Targets and Scenarios | Yes | No |
| | Analysis: Energy Resiliency | Yes | Required unless project is committing to a prescriptive pathway |
| | Implementation Measurement and Monitoring | Yes | Yes |

## 4.1 Description of Proposed Development

Prepare a description of the proposed development, including:

- Existing land uses or permitted use provisions in the Official Plan, Zoning By-law, etc;
- Land uses and relevant planning regulations to be used in the analysis;
- Location of proposed buildings and size (including number of units if known);
- Planned phasing of development;
- Estimated dates of occupancy

## 4.2. Existing Context

This section will form the baseline for the CEP. It will include a review of the existing context of the site and surrounding area such as:

- Landforms and uses
- Road and street network
- Transit network
- Bicycle and pedestrian network
- Energy network and local energy resources
- Existing energy use and GHG Emissions

Projects should consider neighbouring existing properties to maximize opportunities to connect transit and low carbon energy networks and resources. It is recognized that these opportunities could be constrained by the site context.

## 4.3. Objectives

Identify the overall objective of the CEP. This should be informed by and include a summary of consultations, background analysis and policy context as applicable. This section will include a description of applicable sustainability goals, policies and targets as outlined in Provincial and Municipal policy documents. If applicable, the applicant's corporate, and utility policies and targets should be included.

## 4.4. Partners

This section will name the project partners as it relates to the development. This may include developers, builder / construction partners, and consultants such as, engineers, architects, planners and energy advisors.

## 4.5. Data sources and methodology

All projects are to use verified sources for assumptions. Provide data sources and assumptions. Standard references include:

- Emission factors for Part 9 and Part 3 buildings referenced in the Ontario Building Code SB-10 Table 1.1.2.2 $CO_2e$ Emission Factors.
- Weather files / assumptions projects to referenced in the Ontario Building Code local weather data.
- With regard to climate resiliency, reference the City of Ottawa's climate projections for 2100 as the basis for the analysis.

## 4.6. Consultations & Joint Working Group

This section will summarize the industry and public consultations which were completed that helped inform the development of the CEP and other project plans as part of the standard consultation process as applicable. It is recommended that energy targets be included as a discussion topic as part of planned public consultation activities.

At a minimum, projects shall provide the opportunity for local utilities, including district energy providers the option to participate in a CEP Joint Working Group. If such groups do not participate, the CEP shall identify that the opportunity was provided.

Relevant stakeholders to consider include but are not limited to the following:

- Utilities: Through consultation with the utilities, identify grid constraints (if any) that might limit the deployment of electric vehicles (EVs), on-site renewables, or any other strategies.
- District energy providers: Document consultations with district energy providers with respect to draft plan-scale low carbon district energy systems employing, for instance, ambient loops;
- Low-emission technology providers: Document consultations with technology providers that would be part of a near zero emissions strategy. For example, cold climate heat pump (CCHP) manufacturers, high-performance window manufacturers, exterior insulation manufacturers etc.;
- Adjacent or nearby property owners that may provide waste heat opportunities from their lands;
- Conservation Authorities may support with identification of climate risks and propose solutions to improve the resiliency of the site design against threats such as flooding.

The purpose of the Joint Working Group is to consider infrastructure issues associated with fuel switching, microgrids, community / local energy storage, electric vehicles, and district energy, and waste heat capture opportunities. The working group will identify:

- Objectives taking into consideration energy targets or certification to be achieved, emissions objectives and resiliency objectives;
- Measures being considered and their energy emissions reductions
- Utility infrastructure requirements

## 4.7. Energy Use and Carbon Emissions

This section will supply the details of energy use and carbon emissions in the new community. It includes three parts; 1) proposed scenario, 2) analysis, and 3) implementation measurement and monitoring. The level of detail in this section will be

dependent on the stage in planning the project is in. Estimations for energy and emissions should be based on planned building archetypes for the community. Exact building designs are not required.

Should a project not wish to complete performance path, an option to commit to prescriptive building level targets exists. The prescriptive options are provided in Appendix A. In this case, the CEP may skip the analysis section and only complete the proposed scenario and implementation sections.

### i. Proposed Scenario

This section will:

- Describe the proposed targets for the community
- Identify the mitigation and resiliency strategies to achieve the Proposed Scenario
- Describe how the proposed scenario aligns with the Energy Evolution Strategy's emissions targets (i.e. the Municipal Energy Plan) as described in Section 5.

The proposed scenario should consider servicing limitations such as available capacity, rules, and requirements. The project's utility servicing capacity and plans should be reflected in the proposed scenario. At this stage it is understood that many of the building design specifics will not be finalized, the plan should reflect this limitation but may set out design targets for the buildings, where possible and applicable.

### ii. Analysis

This section is where projects will explore energy use and emission scenarios as well as risks and opportunities.

Energy and emissions associated with new community development come primarily from buildings and transportation. Emissions are influenced by four principal areas:

1. Community Infrastructure – including:
    a. Energy Sources
    b. Transportation Network
    c. Passive Energy strategies incorporated into street network designs
2. Building design
3. Occupant behavior during use and operations of the building
4. Embedded and Embodied Carbon- carbon emissions and sequestration associated with construction materials.

While the focus of the analysis section will be on community infrastructure and building design, some consideration of occupant behavior and embedded and embodied carbon is recommended. Occupant behavior is outside the builder's control but should still be taken into consideration as part of the plan. In general, simple design solutions are encouraged to minimize the need for specialized knowledge in order to operate and maintain all buildings and, in particular, homes. In addition, there may be design solutions which can influence occupant behavior that the plan can choose to incorporate or address.

Embodied carbon is recognized as a large opportunity for addressing emissions in new subdivisions but may be more difficult to quantify through modeling. Embodied carbon analysis should only be provided if it is selected as a mitigation strategy.

The energy analysis will look at both energy and emission scenarios to mitigate impacts of climate change, as well as energy resiliency strategies.

### a. Energy and Carbon Emission Targets and Scenarios

Projects must compare the proposed scenario to three reference scenarios that are informed by the Energy Evolution Strategy model data (see Resources / Background). The Energy Evolution Strategy model compares a Business as Planned (BAP) scenario with a target scenario to eliminate community emissions by 2050. The BAP scenario illustrates the anticipated energy use and emissions in Ottawa if no additional policies, actions, or strategies are implemented beyond those already planned or underway as of 2020, which was when Energy Evolution was completed.

Project proponents must identify how their proposed scenario aligns or compares to the following three reference scenarios. Tier 2 projects must demonstrate performance equal to or higher than Scenario 2. Details below provide guidance to inform the reference models:

**Scenario 1: A Business As Planned (BAP) Scenario**

The BAP Scenario estimates 1,175kg equivalent annual $CO_2$ emissions added for every new home. Household energy for Ottawa's baseline year 2016 is estimated at 105.56GJ / household declining down to 65.93 GJ / household by 2050.

**Scenario 2: 50% Emissions Reduction Scenario**

The Energy Evolution Strategy Model to 2050 reduces emissions 50% from the BAP scenario to 587kg equivalent annual $CO_2$ emissions per new home between 2020 and 2030.

**Scenario 3: Near Zero Emissions Scenario**

The Energy Evolution Strategy target scenario calls for near zero emissions for every new home built after 2030. Household energy use in this scenario is expected to reduce to 23.43 GJ / household in the target scenario, this consumption is offset by local renewable energy generation to achieve near zero emissions.

### b. Energy Resiliency

Evaluate the project's energy system's risks to future climate conditions including:

- Increasing temperature, precipitation and extreme events
- location of energy infrastructure with respect to flood risk areas
- considerations for change in peaks, and types of demand due to a changing climate

### iii. Implementation Measurement and Monitoring

This section will address implementation, measurement, and construction monitoring of the CEP. While post occupancy monitoring is recommended, it may not be feasible for all projects. It is important though to consider implementation and monitoring through the construction stages. This section will outline how consistency with the CEP will be evaluated on the building level. How this is done will vary depending on the proposed targets, and ownership business model for the project. Possible strategies to consider include:

- Commitment to complete energy models to verify consistency with proposed targets;
- Commitment to a prescriptive list of measures that are evaluated through a sample energy model or other means;

- Conditions within agreements of purchase and sale is an optional tool that could be deployed in cases where the builder and land developer are distinct entities.
- Where a district energy system, or partnership with another utility is planned, considerations around roles, responsibilities and phasing should be addressed;
- Where possible, operational monitoring of community level energy consumption is encouraged through agreements with utility providers to report on aggregate energy consumption of the community.
- Construction monitoring and implementation are not required to be reported back to the City but, would be helpful in tracking the impacts of CEPs.

## 5. Evaluation Criteria

The Community Energy Plan (CEP) will be evaluated by the net increase in community emissions associated with the proposed development, to be summarized as follows:

1. How the proposed community energy demands, and associated emissions compare to the City's climate target scenario, or aligns to the prescriptive pathways in Appendix A. Energy Evolution lays out energy intensities for new homes and buildings in a business as planned and a target scenario These energy intensities are provided in the table in Appendix B.

2. The extent to which active transportation and transit (mode shares) have been maximized. The Energy Evolution Strategy aims to see:
    a. 24-hr mode shares by 2030 auto: 58% transit: 20% walk: 14% bike: 8%
    b. 24-hr mode shares by 2050 auto: 55% transit: 19% walk: 15% bike: 11%
3. Amount of on-site generation and district energy options including but not limited to solar, wind, water, biomass, and geothermal energy. Energy Evolution Strategy aims to see:
    a. 1060 MW residential solar power generation by 2050 for new residential buildings, this translates to about 15 panels per new home
    b. An estimated 740MW commercial solar power generation by 2050.
    c. 23,394 homes served by DE by 2050 and 8,091,053 square metres of non-residential floorspace served by DE by 2050
    d. District energy is understood to have high potential in areas with heating energy demand density of 113 MJ / ha or higher. This target energy density may vary due to site efficiencies or limitations.

e. See Appendix B for Thermal Energy Demand Intensity (TEDI), Total Energy Use Intensity (TEUI) and Greenhouse Gas Intensity (GHGI) targets.

4. The project's implementation and monitoring strategies are robust and achievable.
5. In general, off-site strategies such as renewable energy credits are not expected to form part of the project's CEP. If a case can be made for inclusion of offsite strategies, it may be considered.

## 6. Roles and Responsibilities / Qualifications

The CEP should be signed by a licensed professional engineer, a licensed architect, a full member of the Canadian Institute of Planners, a certified energy advisor, or other qualified professional with supporting description demonstrating experience / expertise with the applicable work (e.g. a minimum of three years in modelling energy use and greenhouse gas emissions in buildings and communities).

## 7. Submission Requirements:

Final Digital Copies will include the following as applicable:

- CEP Report

OR

- CEP Brief

## 8. Resources / Background

**Reference Materials**

1. The Energy Evolution, Ottawa's Community Energy Transition Strategy and supporting documents can be found here including Energy Evolution Technical Report (the Municipal Energy Plan).
2. Climate Projections for the National Capital Region, Executive Summary, June 2020.
3. Ontario Building Code

**Related Studies**

1. Wastewater Energy Transfer Survey

   Thermal energy from the wastewater system can be used as a zero carbon energy source for heating and cooling buildings. The City is undertaking a wastewater energy transfer survey to inform opportunities for thermal energy capture that may be used for useful purposes such as district or building heating and cooling. When

this survey is available this document will be updated with a link as this may be a helpful resource for projects looking for available thermal energy resources.

2. Geothermal Potential Survey

   Geothermal energy can be used as a zero carbon energy source for heating and cooling buildings. The City is undertaking a geothermal potential survey to inform opportunities for geothermal energy for purposes such as district or building heating and cooling. Early results suggest that the western half of the municipality, west of the Carlsbad Formation, provide the most likely opportunities for geothermal energy applications.

## 9. Contact

Please contact hpds@ottawa.ca for further information about meeting the High Performance Development Standard energy performance measures, or the contents of Community Energy Plan submissions.

## 10. Definitions

**Building articulation:** the layout or pattern, expression and material character of building elements, including walls, doors, roofs, windows, and decorative elements such as cornices and belt courses.

**Building envelope:** the building elements separating interior space from the outdoors such as exterior walls, windows, and roof.

**Building orientation:** the cardinal (north south east west) direction of a building

**Business as Planned (BAP):** description of a scenario assuming no change to current path or behavior

**Canadian Home Builders Association Net Zero Energy or Net Zero Energy Ready:** home labelling program for homes that are designed to produce as much energy as they consume

**Carbon sequestration:** A method of capturing and storing $CO_2$ so that it is not released into the atmosphere, thereby reducing Green House Gas emissions. The $CO_2$ is compressed into a transportable form, moved by pipeline or tanker, and stored in some medium, such as a deep geological formation.

**Community Energy Plan (CEP):** A plan that identifies pathways and sets objectives and targets on energy and greenhouse gas emissions in support of sustainable and resilient design at the new community scale of development. This may include building energy use and source, wastewater, solid waste and transportation design solutions.

**District Energy:** District energy is the production and supply of thermal energy.

**Electric Vehicles (EV):** are powered by motors that draw electricity from on-board storage batteries. Electric vehicles are plugged-in to be recharged.

**Embodied carbon:** is the carbon dioxide ($CO_2$) emissions associated with materials and construction processes throughout the whole lifecycle of a building or infrastructure

**Energy Evolution, Ottawa's Community Energy Transition Strategy Strategy (also referred to as Energy Evolution Strategy):** is Ottawa's municipal-scale CEP for energy use and carbon emissions across all sectors of the community

**Energy Use Intensity (EUI):** energy use for a building divided by the gross floor area

**Energy Star for New Homes:** a home certification program targeting 20 precent energy improvement over local building code

**Generation (electricity):** The process of producing electric energy by transforming other forms of energy. Also, the amount of energy produced.

**Geothermal energy:** The use of geothermal heat from the earth's molten core to generate electricity. Also used to describe ground-source heating and cooling (also known as geo-exchange or ground-source heat pump).

**Greenhouse gas (GHG):** A gas such as carbon dioxide, methane, or nitrogen oxide, which actively contributes to the atmospheric greenhouse effect. Greenhouse gases also include gases generated through industrial processes, such as hydroflurocarbons, perflurocarbons and sulphur hexafluoride.

**Greenhouse Gas Intensity (GHGI):** Greenhouse gas emissions associated with the energy to operate a building divided by the gross floor area

**Grid-scale battery storage:** A type of energy storage system that collects energy from the electrical grid or a power plant using electrochemical cells, then discharges energy to provide electricity or other grid services when needed.

**Gross Floor Area (GFA):** The total area of each floor whether located above, at or below grade, measured from the interiors of outside walls and including floor area occupied by interior walls and floor area created by bay windows, with exclusions as outlined in Ottawa's Zoning By-law;

**High Performance Development Standard (HPDS):** Sets performance targets for new construction to improve air and water quality, reduce greenhouse gas emissions and enhance the natural environment. Some of these targets can be directly achieved by incorporating sustainable and resilient design features into the plans and drawings submitted as part of the site plan approval process.

**Low-carbon:** less carbon dioxide emissions

**Local Plan:** Volume 2 of the Official Plan, an includes secondary plans and area-specific polices that provide more detailed policies to guide growth and change in specific areas or neighbourhoods. Local plans adapt and implement the overall planning approach of the Official Plan but may deviate from specific policies to fit local contexts.

**Municipal Energy Plan (MEP):** A Community Energy Plan completed at the municipal scale. For the City of Ottawa this is the Energy Evolution Strategy.

**Net zero emissions:** Refers to the balance of emitting and removing GHGs from the atmosphere, such that the net effect is zero emissions

**One Planet Living Framework:** framework comprising ten simple principles and detailed goals and guidance, it's a highly flexible framework that is helping organizations around the world to achieve their vision of a brighter, better future living within the constraints of our planet's resources.

**Ontario Building Code (OBC):** The provincial law governing building construction practices

**Passive:** relating to or denoting heating systems that make use of incident sunlight as an energy source

**Passive House:** a building certification program with a focus on passive elements such as building insulation and orientation.

**Proponent:** a person or company who advocates a proposal, or project.

**Quantitative:** relating to a quality that is captured with numerical measurements

**Qualitative:** relating to a quality that cannot be measured numerically

**Renewable energy source:** an energy source that is renewed by natural processes and includes wind, water, biomass, biogas, biofuel, solar energy, geothermal energy and tidal forces.

**Renewable energy system:** means a system that generates electricity, heat and / or cooling from a renewable energy source.

**Renewable natural gas (RNG):** is natural gas that comes from renewable sources this could be comprised of either biogases refined to a quality that's acceptable for injection into the local pipeline grid or hydrogen or a mixture of the two.

**Resiliency:** refers to the capacity to adapt to changing climate conditions Secondary Plan

**Servicing:** the utility infrastructure supporting a development such as electricity, water or energy services.

**Thermal Energy Demand Intensity (TEDI):** energy required to heat and cool a building divided by the gross floor area

**Total Energy Use Intensity (TEUI):** energy required to operate a building divided by the gross floor area

**Solar orientation:** the cardinal (north south east west) placement of an object particularly as it relates to capturing solar energy or heat

**Waste heat:** Energy lost during the operation of a piece of equipment or machinery. Various processes, such as cogeneration or combined heat and power (CHP) exist to capture and reuse waste heat.

## Appendix A: Prescriptive Energy Path

Proponents may commit to **one or a combination** of the following building level energy performance pathways for the site low rise home archetypes and commit to following the HPDS Tier 1 minimum as required for any applicable commercial or multi unit residential buildings. Block plans may be excluded from Community Energy Plans pursuing the Prescriptive Energy Path option, as they will be assumed to fall under site plan control and subject to the High Performance Development Standard site plan requirements.

a) Total Energy Use Intensity (TEUI), Thermal Energy Demand Intensity (TEDI) and Greenhouse Gas Emission Intensity (GHGI) targets

| | **Tier 1** | | | **Tier 2** | | |
|---|---|---|---|---|---|---|
| | TEUI (kWh/m²/yr) | TEDI (kWh/m²/yr) | GHGI (kg $CO_2^e$/m²/yr) | TEUI (kWh/m²/yr) | TEDI (KWh/m²/yr) | GHGI (kg $CO_2^e$/m²/yr) |
| Residential units (≤6 Storeys) | 147 | 62 | 19 | 108 | 38 | 13 |

b) Commitment to pursue approved certification program
Tier 1: ENERGY STAR® for New Homes, equivalent or better.
Modeled performance with carbon emissions equivalent or less than to ENERGY STAR® for New Homes qualified home, with a commitment to airtightness testing and site inspection is considered an equivalent pathway.

Tier 2: Canadian Home Builders Association Net Zero Energy or Net Zero Energy Ready, Passive House, equivalent or better

Certification programs are to be the current version as of date of submission following programs defined transition requirements if the submission falls within a version transition period. Equivalent programs to be approved by City documentation demonstrating equivalency with respect to carbon emission performance, integrity and verification to be provided for review. Tier 1 projects may use certifications program approved under Tier 2 as these exceed the performance of Tier 1.

c) Commitment to including 2 of the following Energy Conservation Measure Packages[1]:

| Packages | Pick 2 |
|---|---|
| i. min ext. wall effective R-value 20 (R19+5ci nominal) | ☐ |
| ii. electric heat pump heating and cooling system | ☐ |
| iii. Airtightness target aligned with Energy Star Level 3 with agreement to complete verification testing | ☐ |
| iv. Energy Star ZONE3 windows AND R10 underslab insulation | ☐ |

[1] The energy conservation measure options are planned to be updated to align with the next iteration of the Ontario Building Code which is expected to include harmonization with the Model National Building Code 2020

## Appendix B: Performance Path *Energy Intensity Targets*

The following tables outline the estimated energy intensity target for different building archetypes based on a combination of resources including Energy Evolution Strategy projections and targets, historic modelling data, NRC research data and Toronto Green Standard. These are not prescriptive requirements for new communities, this is to serve as a reference to help inform how closely a new community's Community Energy Plan aligns with Energy Evolution Strategy. On-site solar energy production is included in the GHGI numbers but, not in the EUI.

### New Home and Commercial Building Energy Targets under Business as Planned Scenario

| Build Year | 2021 | | | 2025 | | | 2030+ | | |
|---|---|---|---|---|---|---|---|---|---|
| Dwelling Unit Type | EUI kWh/m² | TEDI kWh/m² | GHGI kgCO2e/m² | EUI kWh/m² | TEDI kWh/m² | GHGI kgCO2e/m² | EUI kWh/m² | TEDI kWh/m² | GHGI kgCO2e |
| Single Detached | 111 | 60 | 16 | 89 | 49 | 10 | 39 | 32 | 8 |
| Townhouse | 123 | 51 | 17 | 102 | 41 | 11 | 53 | 27 | 9 |
| Apartment <6storeys | 176 | 76 | 23 | 158 | 68 | 20 | 142 | 61 | 18 |

| Build Year: | 2021 | | | 2025 | | | 2030+ | | |
|---|---|---|---|---|---|---|---|---|---|
| Building Archetype | EUI kWh/m² | TEDI kWh/m² | GHGI kgCO2e/m² | EUI kWh/m² | TEDI kWh/m² | GHGI kgCO2e/m² | EUI kWh/m² | TEDI kWh/m² | GHGI kgCO2e/m² |
| MURB (≥ 4 Storeys) | 181 | 81 | 23 | 162 | 73 | 20 | 147 | 66 | 19 |
| Commercial Office | 186 | 81 | 23 | 167 | 73 | 20 | 151 | 66 | 19 |
| Commercial Retail | 181 | 71 | 24 | 162 | 64 | 22 | 146 | 57 | 19 |

## New Home and Commercial Building Energy Targets under Target Scenario

| Build Year / Dwelling Unit Type | 2021 | | | 2025 | | | 2030+ | | |
|---|---|---|---|---|---|---|---|---|---|
| | EUI kWh/m² | TEDI kWh/m² | GHGI kgCO2e/m² | EUI kWh/m² | TEDI kWh/m² | GHGI kgCO2e/m² | EUI kWh/m² | TEDI kWh/m² | GHGI kgCO2e/m² |
| Single Detached | 106 | 56 | 12 | 46 | 15 | 2.3 | 39 | 15 | 0.3 |
| Townhouse | 119 | 48 | 13 | 62 | 15 | 3.1 | 53 | 15 | 0.4 |
| Apartment <6storeys | 147 | 62 | 19 | 108 | 38 | 16 | 70 | 15 | 5 |

| Build Year: / Building Archetype | 2021 | | | 2025 | | | 2030+ | | |
|---|---|---|---|---|---|---|---|---|---|
| | EUI kWh/m² | TEDI kWh/m² | GHGI kgCO2e/m² | EUI kWh/m² | TEDI kWh/m² | GHGI kgCO2e/m² | EUI kWh/m² | TEDI kWh/m² | GHGI kgCO2e/m² |
| MURB (≥ 4 Storeys) | 142 | 52 | 19 | 108 | 33 | 13 | 75 | 15 | 5 |
| Commercial Office | 142 | 42 | 19 | 108 | 30 | 11 | 65 | 15 | 4 |
| Commercial Retail | 132 | 52 | 12 | 98 | 33 | 7 | 70 | 15 | 3 |

## Appendix C: Examples of Mitigation and Adaptation Strategies

Possible mitigation and adaptation strategies may include:

- Design walkable, connected communities
- Optimize Building and block configuration
- Optimize Solar Orientation and access
- Consider district energy and geothermal energy systems at the site level.
- Improve building envelope insulation and airtightness
- Adopt high-performance windows and other glazed areas
- Adopt passive approaches to cooling and heat mitigation ie; operable windows, shading, trees, reflective materials
- Adopt high-performance / near zero-emission heating and cooling system.
- Adopt efficient exterior lighting systems
- Improve Solar shading, such as extended rooftop overhangs or other external shading devices
- Adopt on-site renewable energy generation
- Adoption of Solar / PV-ready
- Adopt EV-ready measures
- Install EV charging stations for buildings and parking lots
- Consider electrical service capacity in relation to electric heating and cooling appliances, electric vehicle charging and renewable energy needs. For example, energy storage and upgraded electricity distribution.
- Adopt on-site back-up power
- Adopt on-site household waste management systems
- Opportunities to address carbon emissions through carbon sequestration Strategies in place to reduce high-carbon materials such as concrete, steel, masonry with low carbon choices such as (wood)

These strategies are provided as examples for reference only these are not required on each project.