

## Durham Region Roundtable on Climate Change – Land Needs Assessment Subcommittee – Advice and Recommendations

### Introduction

Durham Region's January 2020 climate emergency declaration calls for climate change to be considered a high priority in all decisions of Regional Council.<sup>1</sup> Following the declaration, Regional Council adopted an updated greenhouse gas (GHG) target of net zero by 2050, in alignment with the Federal Government's commitment under the Paris Agreement.<sup>2</sup>

Durham Region is undertaking a Growth Management Study (GMS) as part of Envision Durham, the Municipal Comprehensive Review of the Regional Official Plan. The GMS includes a Lands Needs Assessment to evaluate how to accommodate forecasted population and employment growth in the Region to 2051. Given the important link between urban form and climate mitigation and adaptation, the Durham Region Roundtable on Climate Change (DRRCC) formed a subcommittee to develop advice and recommendations for consideration. The DRRCC subcommittee urges Regional Council to strongly consider climate change mitigation and adaptation as part of its decision on a preferred land needs scenario. The DRRCC subcommittee recommends adoption of scenario 5 and has developed additional principles and recommendations as outlined in this memo to inform the Region's decision.

### Durham Region's Net Zero Pathway

Durham Region can only achieve net zero or near net zero GHG emissions through deep decarbonization and system transformation moving away from lower density and energy intensive forms of urban development. Deep decarbonization entails implementing three broad strategies:

1. Reducing energy consumption across all sectors, especially through compact and efficient urban development and supporting infrastructure (e.g. water, sewer, roads, energy).
2. Electrification of transportation and building heating energy use, Durham's two largest sources of GHG emissions, and switching to net zero sources of electricity and likely hydrogen.
3. Enhancing carbon sequestration in agricultural and natural heritage systems.

Integrated land use planning to achieve compact and efficient urban development – including co-location of higher residential and employment density, mixed land use, and transit-oriented development – is a critical element of Durham Region's path to net zero GHG emissions. Compact urban form with shortened distances between housing and jobs, and interventions that support modal shift from single-occupant vehicles towards walking, cycling, and low-emissions shared and public transportation, can dramatically reduce GHG emissions. Furthermore, higher urban density can also account for a significant reduction in total building energy use for heating and cooling. This is due to decreased size of dwelling units and efficiencies. Heat loss in buildings is also smaller due to more shared walls. In addition, more efficient heating & cooling technologies, such as district energy, can be deployed in dense urban environments. Finally, emissions embodied in construction materials tend to

---

<sup>1</sup> Durham Region (2020). *Durham Region Climate Change Emergency Declaration*. Available online: <https://www.durham.ca/en/living-here/resources/Documents/EnvironmentalStability/Regional-Council---Emergency-Declaration.pdf>

<sup>2</sup> Durham Region (2021). *2021 Climate Change Update and Corporate Climate Action Plan*. Available online: [https://icreate7.esolutionsgroup.ca/11111068\\_DurhamRegion/en/regional-government/resources/Documents/Council/Reports/2021-Committee-Reports/Finance-and-Administration/2021-A-3.pdf](https://icreate7.esolutionsgroup.ca/11111068_DurhamRegion/en/regional-government/resources/Documents/Council/Reports/2021-Committee-Reports/Finance-and-Administration/2021-A-3.pdf)

scale by home size, with single detached having the highest average carbon embodied in building materials per home, and semi-detached and town homes having significantly less.<sup>3</sup>

While density is generally regarded as desirable from an energy and material use perspective, the spatial form of urban development matters. For example, high-rise buildings (i.e. 15 storeys and above) can be associated with higher energy use per square metre than low-rise buildings of six storeys or less<sup>4</sup> due to higher heating and cooling needs (e.g. common glass walls, and taller buildings are exposed to more hours of direct sun). Mid-rise buildings, which can be more easily built using timber frame construction materials (up to 12 storeys under the 2020 National Building Code), may be optimum from a GHG emissions perspective. Such buildings store carbon in building materials, while also enabling GHG reduction benefits associated with denser urban form.

Urban green infrastructure – including urban forests and street trees, permeable surfaces, and green roofs, can mitigate climate change by storing carbon, while also providing a cooling effect that reduces energy demand. Green infrastructure provides co-benefits for climate adaptation, including reducing the urban heat island effect and heat stress, reducing stormwater runoff, improving air quality.

The long lifespan of urban infrastructure locks in behaviour and committed emissions. Urban infrastructure and urban form can enable socio-cultural and lifestyle changes that can significantly reduce carbon footprints. The Region can avoid higher future emissions through compact urban form, including strategic infill and densification, which will help enable modal shift and the electrification of urban energy demand.

### Conclusion - a Systems Approach

Getting to a 'net-zero' carbon economy in less than 30 years is a complex problem, likely the largest ever faced by humanity. While the technical solutions to decarbonize are largely ready, social and economic inertia continues to drive us away from the goal. New, more comprehensive and integrated approaches are necessary. A sustainable (low carbon) community requires new ways of building, mobility, and shared prosperity. These are not easy to bring about, but a compact urban form is a powerful driver for successful transformation.

**The DRRCC subcommittee recommends that scenario 5 be adopted by the Region as part of the LNA process.** The further the Region moves away from scenario 5, the more challenging and costly it will be to reduce emissions. Net zero GHG emissions will not be feasible without a shift to a higher density urban form in Durham Region. In addition, the sub-committee urges the Region and local area municipalities to consider the principles and recommendations outlined in the appendix of this memo in all future urban development decisions.

---

<sup>3</sup> Builders for Climate Action (2022). *Emissions of Materials Benchmark Assessment for Residential Construction*. Available online: [https://www.buildersforclimateaction.org/uploads/1/5/9/3/15931000/bfca\\_pbc-embarc\\_report-web-2.pdf](https://www.buildersforclimateaction.org/uploads/1/5/9/3/15931000/bfca_pbc-embarc_report-web-2.pdf)

<sup>4</sup> University College London (2017). *High-rise buildings much more energy intensive than low-rise*. Phys.org. Available online: <https://phys.org/news/2017-06-high-rise-energy-intensive-low-rise.html>

## Appendix – Principles and Recommendations to Consider in Urban Development Decision-making

### Principles:

1. **Be transparent about climate risks:** Risks such as increased flooding, storm damage and heatwaves, exacerbated by a changing climate, as well as technological and economic shifts, need to be better monitored and communicated. This is consistent with the Provincial Policy Statement under the Planning Act s. 3.1.7 which states that with regard to development “new hazards are not created, and existing hazards are not aggravated”. The Region should outline to new homeowners and renters, potential risks, such as flooding, rising temperatures, and volatile energy prices. Climate resilience is a key aspect of future buildings (siting and operation).
2. **Energy performance standards are critical:** Energy performance, e.g. lifetime use of buildings and embodied energy need to be design factors for new infrastructure, buildings, and retrofits of existing buildings and infrastructure. Energy performance standards should include consideration of embodied energy in building materials, operation of the building, and transportation to and from the building.
3. **Enhance the Region’s natural heritage system:** The Region’s tree canopy and broader natural heritage system should be preserved and where possible enlarged. This is consistent with the Provincial Policy Statement under the Planning Act s. 2.1.1 which states “natural features and areas shall be protected for the long term.” Tree canopy and natural heritage helps with air quality, water quality & quantity, carbon sequestration, attenuates urban noise, provides cooling (up to 30% reduction in heat load), and helps stabilize soil. Tree planting and support for reduced removal during development should be included within developer subdivisions plans.
4. **Preserve remaining farmland:** Arable lands should, to the extent practicable, be preserved for agriculture. This is consistent with the Provincial Policy Statement under the Planning Act s. 2.3 which states “prime agricultural areas shall be protected for the long term.” Agricultural systems in the Region store carbon on the landscape, create renewable energy opportunities (e.g. biogas, wind power), and have the potential to help with food security.
5. **Maintain and enhance permeable surfaces:** Permeable surfaces should be favoured, where practicable, in design. This will help address the issue of hard surfaces contributing to stormwater runoff and urban flood risk.
6. **Take a lifecycle cost approach to decision-making:** The transition to a net zero and climate resilient Region will be costly. However certain approaches will have lower lifecycle costs, and greater benefits, than others. As the Region considers its urban development strategy, evaluate the capital, operating and maintenance costs of Infrastructure, and work towards an optimal least cost decarbonization pathway for the Region. Ensuring a compact built form enables that.
7. **Jurisdictional Authorities:** The authority to effectively address the global issue of climate change, is vested in multiple different levels of government. The perceived lack of control cannot be an excuse to do nothing. In areas that the Region may not have direct control, it should exercise indirect control and influence.

### Moving forward, consideration of the following recommendations is warranted:

1. **Increase transparency on per person GHG data:** In partnership with other stakeholders, the Region should provide to residents and local businesses, per person GHG emissions (similar to Ontario’s ‘GridWatch’ but for all emissions). This value should be as timely and comprehensive as possible. Furthermore, disclosure of the ‘material footprint’ of a typical resident should be

provided, with comparators to global average, national targets, e.g. net-zero by 2050, and historical baselines. Values should be published and reported to Council at least annually.

2. **Enable road pricing:** The Region should request of the Premier of Ontario (with copy to AMO, FCM) that before 2035 all new vehicles using municipal roads in the Region be equipped with GPS devices to facilitate payment per kilometer travelled, with funds shared with municipalities. A province-wide review is required for data security and road-use payment allocations.
3. **Require home energy rating and disclosure:** All new homes sold in Durham should come with an 'energy guide' that outlines expected energy and emissions profiles and probable retrofits needed within 30 years to meet mitigation targets and respond to the 'climate emergency'.
4. **Enable higher energy and emissions performance through financial innovation:** Higher upfront costs associated with energy efficiency are recouped over time by the homeowner through lower monthly energy bills. The Region and partners should explore financial alternatives to enable upfront investment, such as local improvement charge or on bill financing mechanisms.
5. **Foster GTHA regional collaboration:** The Region of Durham should request the Regions of York, Peel, Halton and the Cities of Toronto and Hamilton to enact similar policies. Collectively the GTHA needs to shift from its current 13.5 tCO<sub>2</sub>e per person to less than 3 tCO<sub>2</sub>e per person by 2050 and find a way to offset the remaining emissions through carbon sequestration and/or carbon offsets.
6. Ensure municipalities make their **zoning by-laws** current and eliminate barriers to:
  - permit a mix of uses;
  - reduce standard parking requirements in intensification areas to improve efficiencies and reduce costs;
  - incorporate minimum standards for bicycle parking;
  - encourage shared use of parking areas by different users, and;
  - permit residential and mixed-use developments on commercial sites.
7. Encourage municipalities to enhance the climate change performance through **site plan approvals**, including:
  - Supporting greening of parking areas;
  - Enabling passive solar gain through building orientation;
  - Providing EV charging stations in commercial developments and within parking structures,
  - Requiring mandatory bicycle parking areas;
  - Implementing Transportation Demand Management measures as a condition of new development, including car sharing and shared use parking areas as opportunities arise.
  - Implementing measures to improve water quality and quantity using permeable pavers, rain gardens, etc.
  - Investigating opportunities for district-scale heating and cooling systems
8. Through **new building construction**: encourage timber frame construction, and climate resilient construction techniques;
9. Support **community greening** through measures such as:
  - Community gardens on existing publicly owned and underutilized sites;
  - Tree planting initiatives
  - Protecting natural heritage and agricultural systems

## Intervening in Urban Systems

Clear solutions for complex urban problems are hard to discern and social inertia continues to drive us away from the goal. New, more comprehensive approaches, are necessary. Systems analyst Donella Meadows proposed leverage points to intervene in a system. These can be adapted to urban systems as follows (in increasing order of impact):

### Monitoring and Adjusting

- xii. Targets and operating parameters. Metrics are typically well known by citizens but provide little ability to bring about behavioral change.
- xi. Urban resilience. The system's ability to stabilize and ameliorate potential shocks.
- x. Built structure. 'Lock-in' effects critical, as costs to change significantly higher than 'building it right' initially.
- ix. Lengths of delay, responsiveness. Time to build can have a significant impact, however often difficult to 'fast-track'.
- viii. Strength of feedback loops. The use of preventative medicine, 'full-cost' accounting, and emphasis on maintenance.
- vii. Gains from positive feedback loops. Can lead to unconstrained growth and increased inequality through 'over-heated' economy (self-reinforcing), e.g. nutrient loading in a lake and eutrophication.
- vi. Information flows. Better provision of information (timeliness, completeness). Increased accountability.

### Making the Rules

- v. Rules of the system. Who makes the rules (e.g. laws, regulations, standards), who enforces them (and how), and what is the mechanism to change the rules.
- iv. Ability to self-organize. Society's capacity to innovate and adapt to changing circumstances (and objectives), applied human creativity, ability to surpass system constraints.

### Collective Goals

- iii. Goals of the Region. Broad, system level goals such as survival, resilience, differentiation, evolution.
- ii. City (Region) paradigm. A shared idea (values) in the minds of citizens, e.g. Rousseau's social contract.
- i. Ability to transcend paradigms. Akin to enlightenment and self-actualization - going beyond challenging fundamental assumptions, into the realm of changing the constructs that fostered the original assumptions.