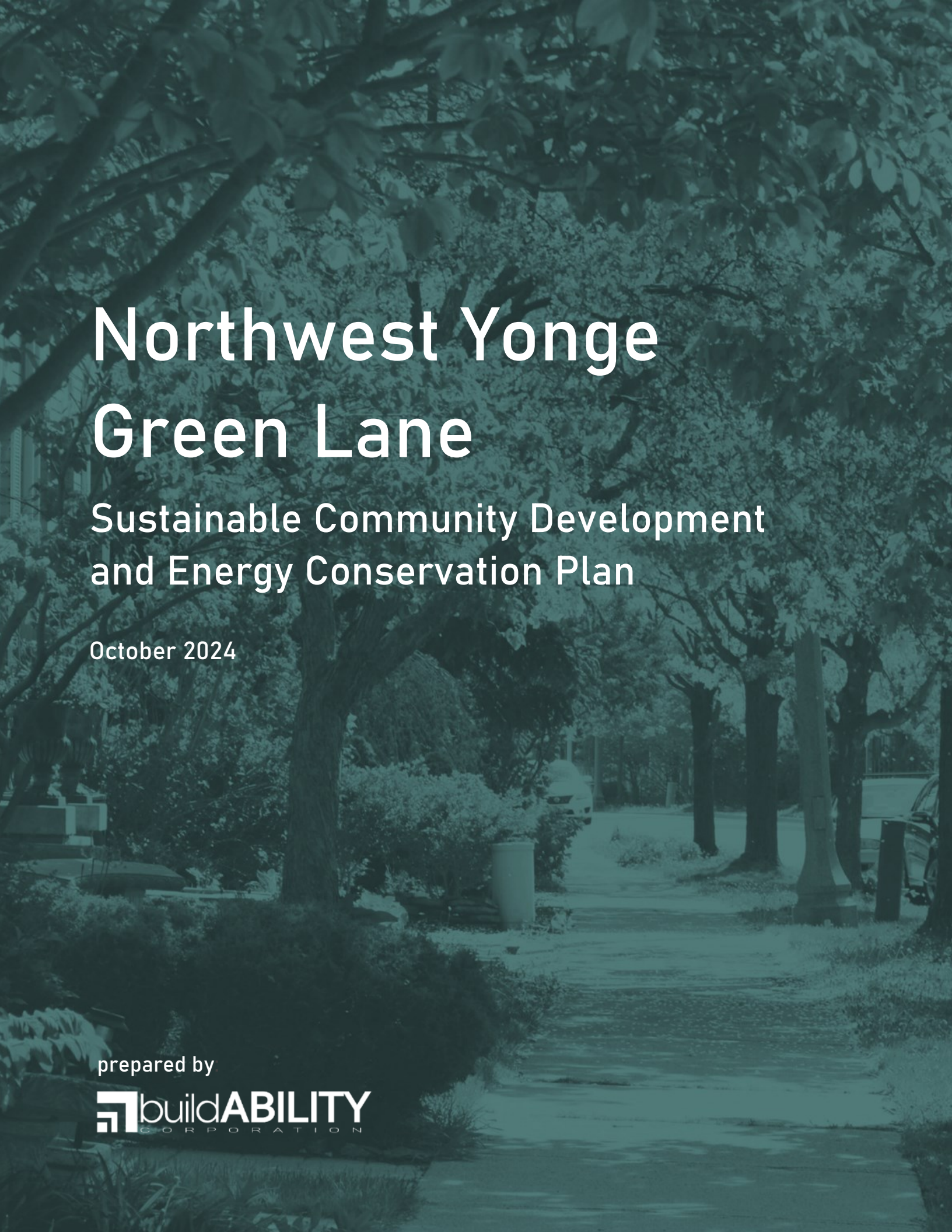

Northwest Yonge Green Lane

Sustainable Community Development and Energy Conservation Plan

October 2024

prepared by

buildABILITY CORPORATION

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1. Introduction

This Sustainable Community Development and Energy Conservation Plan (the "Plan") has been prepared in support of a Community Design Plan (CDP) for the Northwest Yonge Green Lane development (the "proposed development") in the Town of East Gwillimbury. The Plan demonstrates how the community will be designed to meet the Town of East Gwillimbury and York Region's vision of sustainable communities.

1.1 What is a Sustainable Community Development and Energy Conservation Plan?

The Sustainable Community Development and Energy Conservation (SCDECP) establishes a vision, objectives, and recommendations to create a complete and sustainable community in the Northwest Yonge Green Lane Secondary Plan Area.

Policy 4.2.14 in the York Region Official Plan 2022 identifies "that secondary plans and planning applications in New Community Areas shall demonstrate how development conforms to local municipal community energy plans, or alternatively includes an area-specific energy plan."[1]

This plan outlines a pathway for the proposed development to align with the Town of East Gwillimbury's Community Energy Plan (2009). It emphasizes the development of energy-efficient homes and buildings, the creation of mixed-use neighborhoods, and the promotion of active transportation.

The SCDECP is structured into five sections. Part 1 outlines the background and policy context influencing the Plan. Part 2 describes the vision and guiding principles. Parts 3,4, and 5 focus on the areas of impact; (1) Energy Efficiency and Carbon Emissions Reduction, (2) Renewable Energy Generation, and (3) Active Transportation.

1.1.1 Rationale for a Sustainable Development

A sustainable development is defined as one that "meets the needs of the present without compromising the ability of future generations to meet their own needs".[2] This entails improving public health and overall quality of life by maximizing energy conservation/efficiency, reducing the consumption of non-renewable resources, and promoting active transportation.

In Ontario, buildings, and the energy they consume, account for 25% of the province's total GHG emissions, and the volume is rising due to population and economic growth.[3] This presents an opportunity in the new home construction sector to build sustainable and energy efficient communities that limit contributions to enhanced net GHG emissions.

Furthermore, energy-efficient communities offer several benefits to homeowners, including enhanced indoor home comfort, reduced energy bills, and resilience against rising energy costs.

1.2 Location & Description of the Lands

The proposed development is located in the northwest quadrant of the Yonge Street and Green Lane West intersection in the Town of East Gwillimbury. It is bounded by vacant lands to the north and west, Green Lane West to the south, and Yonge Street to the east (see Figure 1). It is part of the Green Lane Secondary Plan Area (see Figure 2).

Currently, the subject lands are primarily farmland. The total area of the CDP is approximately 117 hectares, including 103 hectares of Settlement Area, 12 hectares of Whitebelt Area, and 2 hectares of Greenbelt SWM Pond Area.

Figure 1. Location of subject lands.

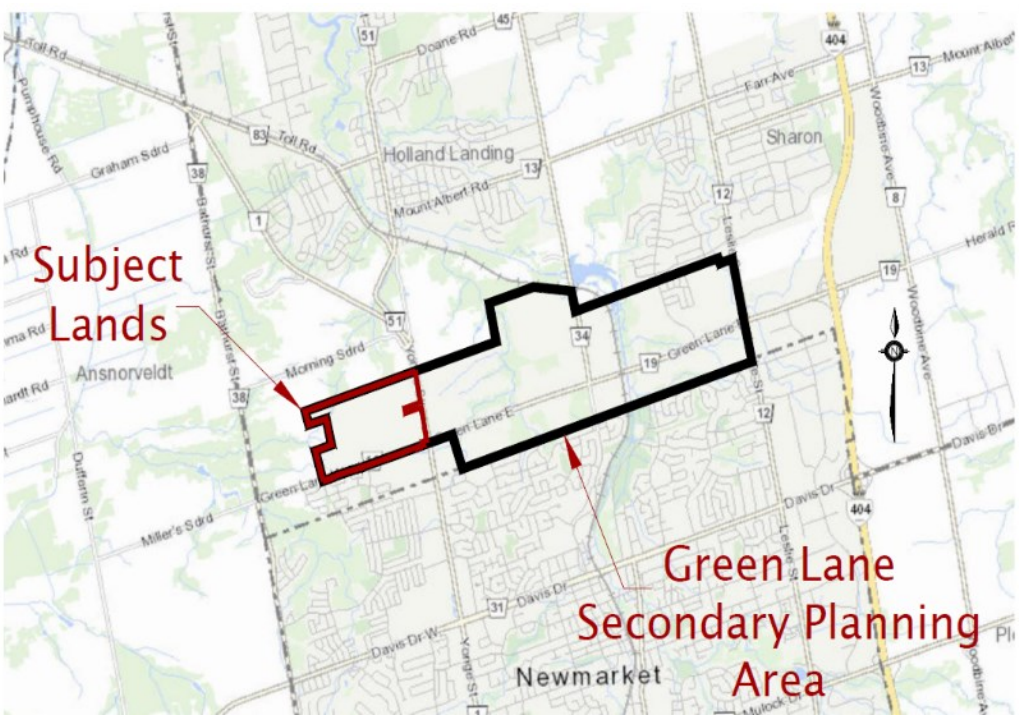

Figure 2. Subject lands within the Green Lane Secondary Planning Area.
Source: Jones Consulting.

1.3 Policy Context

The Plan aligns with, and reflects, the common goals, policies and recommendations described in local, regional and provincial planning policies.

1.3.1 Town of East Gwillimbury Plans

Town of East Gwillimbury Community Energy Plan (2009)

The Plan's main objective is to demonstrate alignment to the goals and recommendations described in the Town-wide Community Energy Plan (CEP). Ultimately, the CEP serves as a framework to "provide the Town with greater security of energy supply to residents and businesses, make the Town more resilient and better able to absorb future fluctuations in energy supply and pricing, and differentiate East Gwillimbury within the Greater Toronto Area as a preferred location for investment."[4]

The goals of the CEP are as follows:

1. The Community Energy Plan (CEP) aims to ensure East Gwillimbury energy use and energy services will make it the most attractive Canadian community in which to live, work, play, learn and invest.
2. To ensure that its impact on the environment will always meet, or be, global best practice.
3. Energy services in East Gwillimbury will be both highly reliable and consistently lower cost than in comparable communities in Canada.
4. The carbon footprint of each inhabitant be 6 metric tonnes, substantially less than the 13.0 metric tonnes it would have been following business-as-usual
5. By 2051, the goal is to reduce this to 4 metric tonnes per capita, a level rivaling the best cities in the world.

The goals will be achieved through the CEP's recommendations, including but not limited to:

1. **Efficient Homes:** The Town already requires all new homes to meet Canadian Energy Star levels.
    a. Recommendation: All new home construction will be 1% more efficient on average for every year after 2010, at least until 2031.
    b. Recommendation: The energy use in homes by 2031 will be at least half than would be expected under business-as-usual.
2. **Efficient Buildings:** Retail, commercial and institutional new buildings are already expected to meet or exceed the energy specific requirements of the Canada Green Building Council Leadership in Energy and Environmental Design Silver rating.
    a. Recommendation: All new non-residential construction will be 0.75% more efficient on average for every year from 2010.
3. **Efficient Transportation:** Over 30% of the Town's energy use is from transportation.

a. Recommendation: Create denser, mixed use walkable neighbourhoods that encourage walking, cycling, and smaller cars, supported by parking and other incentives for more efficient cars and two-wheelers. In future, this could include suitable infrastructure to support electric vehicles.

This Plan will prioritize the three key areas mentioned above, focusing on energy efficiency and GHG emissions applicable to the proposed development.

Town of East Gwillimbury Official Plan (2018)

The East Gwillimbury Official Plan (OP) establishes a vision for the Town to develop complete, healthy and sustainable communities that will provide opportunities for residents at all life stages to live, work, play and learn. The EGOP highlights the Town's commitment in promoting innovative sustainable development and energy conservation policies, aimed to reduce greenhouse gas emissions. It ensures that all new development adhere to sustainable development practices.

Thinking Green Development Standards Program (2018)

The Thinking Green Development Standards Program (TGDS) is a set of measures to evaluate the sustainable performance of new developments in East Gwillimbury. Supporting the objectives of the Town's Strategic Plan (2015-2018), the CEP, the EGOP, and the York Region Official Plan, the program promotes the protection and enhancement of the natural environment, conservation of energy and water, and designing for complete and connected communities.

The program targets are applicable to Draft Plan of Subdivision and Site Plan applications, which requires that applications must meet all Level 1 targets, in addition to either two Level 2 targets or one Level 3 targets under each theme. This Plan is developed to support the submission of a Community Design Plan. The targets in the TGDS will be addressed in subsequent applications within the Development.

1.3.2 Regional Plans

York Region Official Plan (2022)

The York Region Official Plan (YROP) sets the guidelines for the development of new communities in York Region, and presents a co-ordinated and integrated approach to growth management and infrastructure delivery. It includes population and employment growth forecasts and targets, and regional requirements for managing growth, including minimum densities, intensification targets, phasing of growth, and identification of additional lands for urban development. The YROP provides for growth in York Region to a population of 2.02 million people and 990,000 jobs by 2051.[5] The Development will provide opportunity to accommodate a portion of these new residents to East Gwillimbury.

The YROP places a strong emphasis on sustainable and resilient communities. The built form contributes in supporting York Region's sustainability vision, by incorporating building technologies, renewable alternative energy options and climate change mitigation.[6] The YROP encourages new developments to achieve water efficiency and conservation targets that exceed the OBC requirements.[7] It also encourages York Region and local municipalities to implement sustainable development programs to achieve:

1. Climate change mitigation and adaptation;
2. Energy efficiency and water conservation levels beyond the Ontario Building Code;
3. Mitigation of heat island effects, including but not limited to green/white roofs, light coloured paving material, locating trees or other landscaping to provide shading;
4. Increases in the use of renewable energy;
5. Low impact development and green infrastructure;
6. Dark sky or light pollution abatement;
7. Reduction of construction waste;
8. Recycling and adaptive reuse of construction materials;
9. Enhanced indoor air quality; and
10. Other sustainability measures.[8]

York Region Climate Change Action Plan (2022)

In response to the accelerated pace of warming and projected catastrophic climate change impacts, York Region recognized the need to address climate mitigation and adaptation through the implementation the York Region Climate Change Action Plan, 2022 (YR CCAP). The plan aims to achieve the following outcomes:

1. Reduce Greenhouse gas emissions with a long-term goal of becoming a net-zero Region by 2050.
2. Increase resilience and capacity of the Region to withstand and respond to current and future climate events.[9]

York Region Transportation Master Plan (2022)

The York Region Transportation Master Plan (YRTMP) sets out the infrastructure and policy requirements to enable the Region to build and maintain additional transit infrastructure, roads infrastructure and a system of sidewalks and trains to further enable active transportation. The YRTMP provides a 30-year outlook support growth, highlighting four areas of focus: Economic Vitality, Good Government, Healthy Communities and Sustainable Environment. Specific policies within the TMP, as

they relate to mobility networks, active transportation, energy use, and carbon emissions will be described in this section.

1.3.3 Provincial Plans

Provincial Planning Statement (2024)

The Provincial Planning Statement (PPS), effective October 20, 2024, replaces the Provincial Policy Statement, 2020, and A Place to Grow: Growth Plan for the Greater Golden Horseshoe, consolidating both into a single land use policy document. Policy 2.9 requires planning authorities to plan to reduce GHG emissions and prepare for the impacts of a changing climate. Approaches that could be taken include, supporting the achievement of compact, transit-supportive, and complete communities; promoting energy conversation and efficiency; encouraging green infrastructure, low-impact development, and active transportation; and building community resilience to the impacts of a chaging climate.[10]

Ontario Climate Change Strategy

The Ontario Climate Change Strategy sets out the transformative change required to reduce GHG emissions by 80 per cent below 1990 levels by 2050.[14] It focuses on five areas of transformation: A prosperous low-carbon economy with world-leading innovation, science and technology, government collaboration and leadership, a resource-efficient, high-productivity society, reducing greenhouse gas emissions across sector, and adapting and thriving in a changing climate.

2. The Vision

The vision for the Northwest Yonge Green Lane community is to create a complete, vibrant, and sustainable community with a reliable, secure, and efficient energy future. The proposed development will be planned and developed with energy efficiency and sustainability in mind, featuring the use of energy-efficient technologies and exploring opportunities for on-site renewable energy generation. The community will encourage active transportation to enhance public health and foster a more connected and engaged lifestyle for its residents.

2.1 Guiding Principles

The Sustainable Community Development and Energy Conservation Plan is founded on the objectives of a sustainable community as described in the East Gwillimbury Official Plan. The guiding principles of this Plan is as follows:

1. Reduce the per-capita consumption of energy, water, land and other non-renewable resources;
2. Promote a compact urban form and develop an energy-efficient mix of land uses to provide liveable, healthy communities;
3. Develop policies and programs designed to achieve a target reduction of two-thirds of greenhouse gas emissions per capita by 2031;
4. Promote cost-effective energy conservation, energy distribution and alternative energy supply sources and other approaches that result in significantly lower levels of per-capita energy use and associated greenhouse gas emissions
5. Maximize opportunities for the use of active transportation and energy efficient modes of travel and reduce energy consumption for motor vehicles within the Town;
6. Encourage efficient site planning design and construction techniques that minimize space heating and cooling energy consumption.[15]

The implementation of sustainability community measures, including those that improve energy efficiency and carbon emissions, need to be considered in light of affordability constraints that confront homebuyers in York Region.

2.2 Areas of Impact

The objectives of the Northwest Yonge Green Lane SCDECP were informed by and aligned with the recommendations of the CEP. This Plan will focus on the following areas of impact:

1. Energy Efficiency and Carbon Emissions Reduction

New developments and buildings will aim to reduce water, waste and energy use by maximizing opportunities for water conservation, improving on building energy efficiency and minimizing GHG emission and consumption of non-renewable resources.

This Plan addresses energy use and carbon emissions through energy modelling. The models represent various scenarios to establish effective and viable reduction targets for the proposed development, based on the Town's CEP.

2. Renewable Energy Generation

This Plan will explore opportunities for on-site renewable energy generation, such as solar, ground-source heat pump, and district energy systems that can scale with the growth of the proposed development and surrounding area over time. As outlined in the Town's OP, both individual and large-scale renewable energy generating systems are encouraged in new developments. On-site renewable energy not only reduces carbon emissions from energy production but also improves access to reliable sources of energy and reduce exposure to energy price volatility.

3. Mobility and Active Transportation

A sustainable community is one that reduces car dependency, facilitates active transportation, and supports public transit. Emphasis on mobility not only reduces energy use and GHG emissions, but also contributes to improved public health and quality of life. This section will refer to the Northwest Quadrant of Yonge Street and Green Lane Secondary Plan Area, East Gwillimbury, Transportation Assessment by Paradigm.

3. Energy Efficiency and Carbon Emissions Reduction

Both the Town's OP and the York Region's OP promote sustainable buildings that reduce energy use and GHG emissions. This section explores how the proposed development will advance local and regional policies on energy-efficient buildings, as well as meet the CEP's recommendations.

3.1 Efficient Homes

For new home construction, the CEP provides the following recommendation:

> **All new home construction will be 1% more efficient on average for every year after 2010, at least until 2031.**[16]

As of 2024, when this Plan is written, all new home construction within the proposed development will aim to be at least **14%** more efficient than the 2010 baseline.

Energy use and emissions modelling of various energy scenarios was completed as part of this investigation. These scenarios primarily serve two purposes; (1) to demonstrate alignment with the Town CEP recommendations for improved efficiencies over the established baseline, and (2) to identify effective and feasible reduction targets for the proposed development. The following scenarios were analyzed:

1. Scenario 1A - 2006 Ontario Building Code (in effect in 2010), SB-12 Compliance Package J
2. Scenario 1B - 2024 Ontario Building Code, SB-12 Compliance Package A1
3. Scenario 2A - 2010 Energy Star compliance (v 4.0)
4. Scenario 2B - 2024 Energy Star compliance (v 17.1)

Each scenario includes varying levels of building envelope, windows performance, mechanicals measures. The parameters of building construction and technologies of each scenario are outlined in Appendix B.

The four scenarios were developed to establish a potential energy conservation target. Scenario 1A is measured against Scenario 1B, comparing the Business-As-Usual (BAU) scenarios if the development is built to the Ontario Building Code minimum. Scenario 2A is compared against Scenario 2B, as the Energy Star compliance scenarios between 2010 and 2024 specifications. Energy Star labelling is a potential option to meet the minimum energy efficiency requirement for grade-related homes in new developments as prescribed by the Town's Thinking Green Development Standards.

3.1.1 Grade-related Housing Archetypes

Three housing archetypes were modeled based on preliminary drawings provided by the development's builder: singles, townhomes, and back-to-back towns. The unit counts are provided in Table 1.

Table 1. Unit count of grade-related housing archetypes within the CDP.

Grade-related Unit Breakdown					
Singles	Townhomes*		Back-to-Back Towns*		Total
552	989		704		2,245
-	Mid-unit	End-unit	Mid-unit	End-unit	-
552	594	395	422	282	2,245

*Townhomes and back-to-back towns are subcategorized into mid units and end units. Typically, within a block, there are six mid units situated between four end units. Based on a 3:2 ratio, the unit breakdown was calculated.

3.1.2 Building Performance

Ontario Building Code Scenarios (1A and 1B)

The 2006 Ontario Building Code (OBC) was the regulation in effect in the home construction industry in 2010. At the time this report is written, the 2024 OBC had been published and will take effect in January 1, 2025, which will likely be the Code in effect when the development builds out. The Supplementary Standard SB-12 is the energy efficiency requirements for housing in both the 2006 and 2024 OBCs. Scenario 1A demonstrates compliance with the 2006 OBC Package J, and Scenario 1B demonstrates compliance with the 2024 OBC Package A1.

Compared to the 2010 OBC, the 2024 OBC includes various energy efficiency improvements, including more insulation in the above and below grade walls, higher annualized fuel utilization efficiency (AFUE) for space heating equipment, and higher-performing heat and energy recovery ventilators (HRV/ERV). To ensure modeling consistency, both scenarios employed an air tightness target of 3.0 air changes per hour (ACH) for detached homes and 3.5 ACH for attached homes (see more details Appendix B).

If all grade-related homes within the CDP were built to the OBC minimum, their performance in 2010 and 2024 is shown in Tables 2 and 3.

Table 2. Annual energy consumption and carbon emissions of Scenario 1A (OBC 2010 Baseline).*

Scenario 1A (2010 OBC Baseline)					
	Singles	Townhomes (end unit)	Townhomes (mid unit)	B2B Towns (end unit)	B2B Towns (mid unit)
Number of units	552	395	594	282	422
Energy consumption per unit					
Energy Consumption (GJ)	143	121	112	116	85
Carbon Emissions per unit					
GHG Emissions (tonnes of CO_2)	11.2	9.90	9.62	9.99	8.20
Total energy consumption					
Total Energy Consumption (GJ)	78,800	47,700	66,500	32,600	36,000
% of total	30%	18%	25%	12%	14%
Total carbon emissions					
Total GHG emissions (tonnes of CO_2)	6170	3910	5710	2820	3460
% of total	28%	18%	26%	13%	16%
Total overall consumption and emissions					
Total energy consumption	262 TJ (117 GJ per unit on average)				
Total carbon emissions (tonnes of CO_2)	22,100 (9.8 per unit on average)				

*All numbers have been rounded to three significant figures.

Table 3. Annual energy consumption and carbon emissions of Scenario 1B (2024 OBC).*

Scenario 1B (2024 OBC)					
	Singles	Townhomes (end unit)	Townhomes (mid unit)	B2B Towns (end unit)	B2B Towns (mid unit)
Number of units	552	395	594	282	422
Energy consumption per unit					
Energy Consumption (GJ)	129	110	102	105	78
Carbon Emissions per unit					
GHG Emissions (tonnes of CO_2)	10.5	9.43	9.16	9.52	7.88
Total energy consumption					
Total Energy Consumption (GJ)	71,100	43,600	60,500	29,600	33,000
% of total	27%	17%	23%	11%	13%
Total carbon emissions					
Total GHG emissions (tonnes of CO_2)	5800	3730	5440	2690	3330
% of total	26%	17%	25%	12%	15%
Total overall consumption and emissions					
Total energy consumption	238 TJ (106 GJ per unit on average)				
Total carbon emissions (tonnes of CO_2)	21,000 (9.4 per unit on average)				

*All numbers have been rounded to three significant figures.

Table 4. BAU energy consumption and carbon emissions comparison (Scenario 1A and 1B)

Total overall consumption			
	OBC 2010	OBC 2024	Difference
Total energy consumption (TJ)	262	238	-9%
Total carbon emissions (tonnes of CO_2)	22,100	21000	-5%

Table 4 suggests that grade-related homes built to meet the 2024 OBC minimum do not meet the CEP's recommended 14% improvement in energy efficiency compared to the 2010 OBC baseline.

Energy Star Compliance Scenarios (2A and 2B)

Energy Star certified homes are homes that are typically 20% more energy efficiency than a typical home built to the OBC minimum.[17] It features Energy Star certified appliances, higher insulation levels and additional air-sealing to improve the overall energy use and comfort of a home. To get a home Energy Star certified, the home must follow prescriptive or performance compliance packages as described by the current Energy Star for New Homes (ESNH) Technical Specifications. Once the home is built, it is evaluated, inspected, and labelled by a third-party energy advisor.

EnerQuality's ESNH version 4.0 was the technical specification in effect in 2010 (see Appendix C). At the time this Plan is written, the current ESNH specifications is version 17.1. If a more updated version is available when the homes are constructed, it can be assumed that they will use the latest specifications, achieving even greater energy efficiency.

Compared to the 2010 ESNH, the 2024 ESNH features several upgrades, such more insulation in ceiling with and without attic space, higher AFUE rating for space heating equipment, more efficient domestic hot water heater, and higher-performing HRV/ERV (see more details Appendix B).

The performance of grade-related homes within the Development, if all homes were built to the ESNH requirements in 2010 and 2024 are described in Table 5 and 6.

Table 5. Annual energy consumption and carbon emissions of Scenario 2A (2010 Energy Star Baseline).*

Scenario 2A (2010 Energy Star Baseline)					
	Singles	Townhomes (end unit)	Townhomes (mid unit)	B2B Towns (end unit)	B2B Towns (mid unit)
Number of units	552	395	594	282	422
Energy consumption per unit					
Energy Consumption (GJ)	128	118	99.5	107	79.9
Carbon Emissions per unit					
GHG Emissions (tonnes of CO_2)	9.59	8.67	7.73	8.12	6.71
Total energy consumption					
Total Energy Consumption (GJ)	70,700	46,600	59,100	30,300	33,700
% of total	29%	19%	25%	13%	14%
Total carbon emissions					
Total GHG emissions (tonnes of CO_2)	5,290	3,430	4,590	2,290	2,830
% of total	29%	19%	25%	12%	15%
Total overall consumption and emissions					
Total energy consumption	240 TJ (108 GJ per unit on average)				
Total carbon emissions (tonnes of CO_2)	18,400 (8.3 per unit on average)				

*All numbers have been rounded to three significant figures.

Table 6. Annual energy consumption and carbon emissions of Scenario 1B (2024 OBC).*

Scenario 2B (2024 Energy Star)					
	Singles	Townhomes (end unit)	Townhomes (mid unit)	B2B Towns (end unit)	B2B Towns (mid unit)
Number of units	552	395	594	282	422
Energy consumption per unit					
Energy Consumption (GJ)	105	91.6	80.4	81.5	61.8
Carbon Emissions per unit					
GHG Emissions (tonnes of CO_2)	7.48	6.69	6.12	6.17	61.8
Total energy consumption					
Total Energy Consumption (GJ)	58,100	36,200	47,800	23,000	26,100
% of total	24%	15%	20%	10%	11%
Total carbon emissions					
Total GHG emissions (tonnes of CO_2)	4,130	2,640	3,640	1,740	2,170
% of total	22%	14%	20%	9%	12%
Total overall consumption and emissions					
Total energy consumption	191 TJ (85 GJ per unit on average)				
Total carbon emissions (tonnes of CO_2)	14,300 (6.4 per unit on average)				

*All numbers have been rounded to three significant figures.

Table 7. Energy consumption and carbon emissions comparison (Scenario 2A and 2B)

Total overall consumption			
	ESNH 2010	ESNH 2024	Difference
Total energy consumption (TJ)	240	191	-20%
Total carbon emissions (tonnes of CO_2)	18,400	14,300	-22%

Table 7 suggests that grade-related houses built to the 2024 ESNH will meet and exceed the CEP recommended 14% improvement in efficiency over the 2010 ESNH baseline.

The current Thinking Green Development Standards require all grade-related homes to achieve Energy Star certification as part of its minimum Level 1 targets. Therefore, if all grade-related homes in the proposed development are built to achieve the 2024 ESNH standards, the development will meet both the CEP's recommendation and the TGDS minimum.

Comparison

Homes in the proposed development will meet at least OBC 2024 energy efficiency minimum requirements. Incremental improvements can be made through the implementation of more efficient measures and technologies to achieve ESNH 2024. Table 10 outlines the incremental reductions in energy consumption and carbon emissions across all the various scenarios.

Table 10. Performance comparison of Scenarios 1A, 1B, and 2B.

Comparison of Scenarios 1A, 1B, 2B			
	1A	1B	2B
	OBC 2010 (baseline)	OBC 2024	ESNH 2024
Annual energy consumption (TJ)	262	238 (-9%)	191 (-27%)
Annual GHG emissions (tonnes of CO_2)	22,100	21,000 (-5%)	14,300 (-35%)

*Cost for a single detached house.

Table 10 suggests that, while OBC 2024 compliance shows improvements, it falls short of the recommended 14% energy efficiency improvement target outlined in the CEP. Considering cost-effectiveness, it is recommended that grade-related homes in the proposed development be constructed to the Energy Star for New Homes 2024 (v17.1) specifications. If all grade-related homes are designed and built to ESNH 2024 standards, the community's annual energy consumption would decrease by 27% and GHG emissions by 35% compared to the 2010 OBC baseline.

Recommendation

Grade-related houses built to the 2024 ESNH will meet and exceed the CEP recommended 14% improvement in efficiency over the 2010 OBC baseline providing a 27% improvement in energy consumption.

3.2 Efficient Buildings

For new non-residential buildings, the CEP provides the following recommendation:

> **All new non-residential construction will be 0.75% more efficient on average for every year from 2010.**[18]

It was assumed that this recommendation also applies to mixed-use and high-rise residential buildings. As of 2024, when this Plan is written, commercial, high-density residential, and mixed-use buildings within the proposed development will aim to be at least **10.5%** more efficient than the 2010 baseline.

Energy modelling of the CDP's building archetypes was used to establish effective and viable reduction targets and to demonstrate CEP's alignment. The following scenarios were analyzed:

1. Scenario 5A – 2010 OBC, SB-10 (Model National Energy Code of Canada for Buildings 1997)
2. Scenario 5B – 2024 OBC, SB-10 (National Energy Code of Canada for Buildings 2015)

3.2.1 Building Archetypes

This section refers to the mid and high-rise buildings to the east of the proposed development. The buildings were categorized into four archetypes; office/retail, mixed-use residential, high-density residential, and retirement/hotel. The Ground Floor Area (GFA) of each archetype is provided in Table 11.

Table 11. GFA of large buildings.

Commercial and Mixed-use Buildings GFA (SQFT)				
Office/Retail	Mixed-use residential	High-density residential	Retirement/Hotel	Total
1,533,500*	1,501,500*	400,000	240,400	3,675,400

*See GFA assumptions in Appendix A

3.2.2 Building Performance

Ontario Building Code Scenarios (5A and 5B)

In large buildings, space heating accounts for over 50% of the building's total energy use (see Figure 3).[19]

The Model National Energy Code of Canada for Buildings (1997) was the energy code in effect in 2010, this will serve as the baseline. Large buildings in the proposed development will be built to the 2024 OBC minimum, meeting the required energy code as outlined in SB-10.

The 2024 OBC requires heating equipment with significantly higher efficiency compared to the 2010 OBC baseline. This improvement leads to a notable reduction in the building's Total Energy Use Intensity (TEUI) and Greenhouse Gas Intensity (GHGI).

The performance of large buildings within the proposed, if all buildings were built to the OBC minimum in 2010 and 2024 are described in Tables 12 and 13.

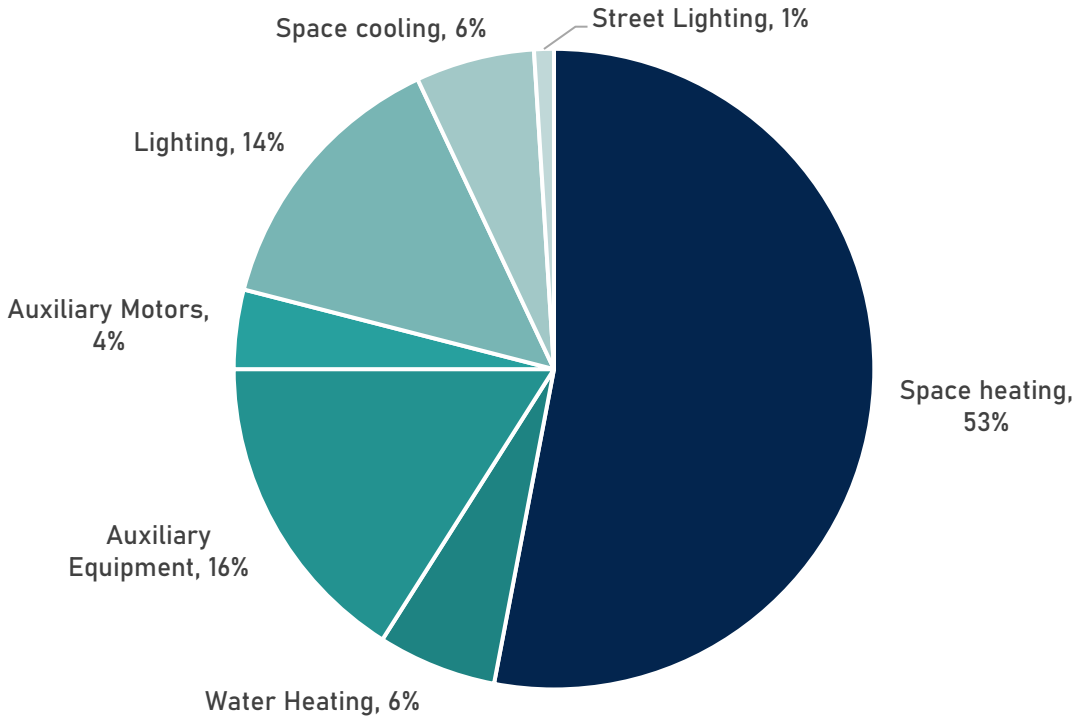

Figure 3. Distribution of commercial/institutional energy use by end use, 2018. Source: NRCan.[20]

Table 12. Annual energy consumption and carbon emissions of Scenario 5A (2010 OBC – large buildings).*

Scenario 5A (2010 OBC Baseline – large buildings)				
	Office/Retail	Mixed-use residential	High-density residential	Retirement/ Hotel
GFA (sqft)	1,533,500	1,501,500	400,000	240,400
GFA (m^2)	142,470	139,490	37,160	22,330
Energy per m^2				
Energy Consumption (GJ)	587	287	295	327
Carbon Emissions per m^2				
GHG Emissions (tonnes of CO_2)	72.4	32.7	33.4	36.7
Total energy consumption				
Total Energy Consumption (kWh x000)	83,600	40,000	11,000	7,300
Total Energy Consumption (TJ)	301	143	39.5	26.3
% of total	59%	28%	8%	5%
Total carbon emissions				
Total GHG emissions (kg of CO_2)	10,300,000	4,560,000	1,240,000	821,000
Total GHG emissions (tonnes of CO_2)	11,400	5,030	1,370	905
% of total	61%	27%	7%	5%
Total overall consumption and emissions				
Total energy consumption (TJ)	511			
Total carbon emissions (tonnes of CO_2)	18,700			

*All numbers have been rounded to three significant figures.

Table 13. Annual energy consumption and carbon emissions of Scenario 5B (2024 OBC – large buildings).

Scenario 5A (2024 OBC – large buildings)				
s	Office/Retail	Mixed-use residential	High-density residential	Retirement/ Hotel
GFA (sqft)	1,533,500	1,501,500	400,000	240,400
GFA (m^2)	142,470	139,490	37,160	22,335
Energy per m^2				
Energy Consumption (GJ)	402	204	208	235
Carbon Emissions per m^2				
GHG Emissions (kg of CO_2)	48.7	21.8	22.3	26
Total energy consumption				
Total Energy Consumption (kWh)	57,300,000	28,400,000	7,730,000	5,248,470
Total Energy Consumption (TJ)	206	102.3	27.8	18.9
% of total	58%	29%	8%	5%
Total carbon emissions				
Total GHG emissions (kg of CO_2)	6,930,000	3,050,000	830,000	580,681
Total GHG emissions (tonnes of CO_2)	7,640	3,360	911	640
% of total	61%	27%	7%	5%
Total overall consumption and emissions				
Total energy consumption (TJ)	355			
Total carbon emissions (tonnes of CO_2)	12,600			

Table 14. Scenarios 5A and 5B comparison.

Total overall consumption			
	OBC 2010	OBC 2024	Difference
Total energy consumption (TJ)	511	355	-30%
Total carbon emissions (tonnes of CO_2)	18,700	12,600	-33%

Table 14 suggests that commercial, high-density residential, mixed-use buildings built to meet the 2024 OBC SB-10 energy efficiency minimum will meet and surpass the CEP recommendation. While the CEP recommends achieving 10.5% better efficiency than the 2010 baseline, large buildings in the proposed development targets a 30% improvement in energy efficiency.

Recommendation

Buildings constructed to the 2024 OBC will meet and exceed the CEP recommended 10.5% improvement in efficiency over the 2010 OBC baseline providing a 30% improvement in energy consumption.

3.3 Future Overall Community Performance

Using the energy estimates gathered from the energy modeling, this section consolidates the projected total energy consumption across the community. For this exercise, we will assume that all grade-related homes will be built to meet the recommended Energy Star for New Homes v17.1 standard, while large buildings will meet to the OBC 2024 SB-10 energy efficiency minimum.

In addition, the CDP includes two elementary schools occupying approximately 4.9 hectares of land. To estimate the community's overall energy consumption, assumptions were made regarding the energy use of these schools (see Appendix A).

The future overall community performance is detailed in Table 15.

Table 15. Future overall community performance where grade-related houses are built to ESNH 2024 and large buildings to OBC 2024.

Type of Buildings	Compliance	Energy Consumption (TJ)	% of Total	GHG emissions (tonnes of CO_2)	% of Total
Grade-related houses	ESNH 2024	191	35%	14,300	53%
Large Buildings	OBC 2024	355	65%	12,600	46%
Schools	-	4.6	1%	178	1%
Total		551	100%	27,000	100%

Compared to the community's performance with buildings constructed to the OBC 2010 minimum, implementing energy efficiency measures leads to a 29% reduction in annual energy use and a 34% decrease in annual GHG emissions (see Figure 4).

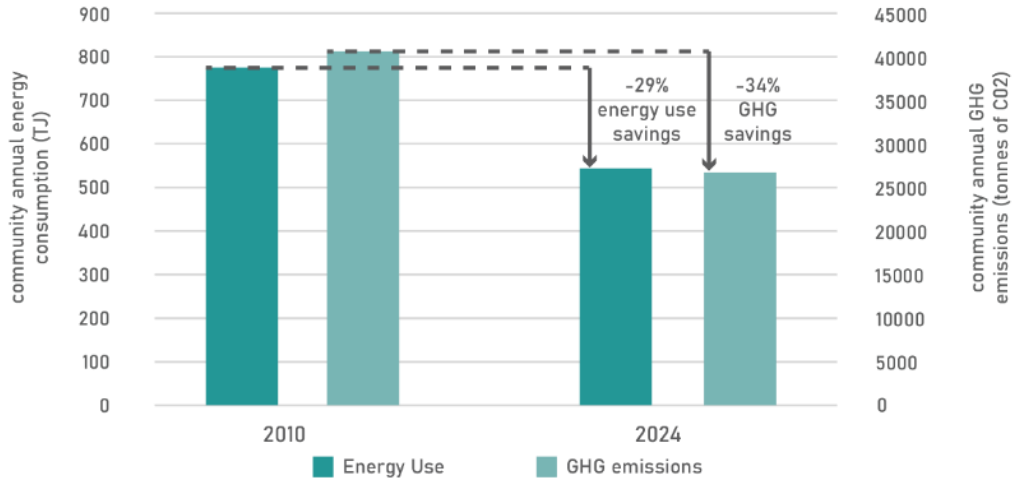

Figure 4. Community-wide annual energy use and GHG emissions reductions from the 2010 baseline.

GHG emissions

For GHG emissions, the CEP sets out a target as follows:

> **Reduce GHG emissions from approximately 13 tonnes per capita (based on business-as-usual) to 6 tonnes per capita by 2031 (and ultimately 4 tonnes per capita by 2051).**[21]

This represents a 54% reduction from the BAU scenario by 2031. In 2024, through interpolation, this target corresponds to a 36% reduction from the BAU case. Within the proposed development, GHG emissions from buildings are estimated to decrease by 34% from the 2010 baseline in 2024, closely aligning with the CEP's target.

As we continue to adopt advancing technologies and implement additional strategies, such as on-site renewable energy generation (e.g., solar panels), the community is on course to meet the CEP's target by 2031 and 2051. In addition, significant efforts are being made to reduce GHG emissions in the transportation sector (refer to Section 5 for detailed discussion). This includes promoting active modes of transportation such as improving public transit systems, developing infrastructure for cycling and walking, as well as encouraging the use of electric vehicles. Together, these measures will ensure substantial progress toward the CEP's targets.

Recommendation

Grade-related houses built to the 2024 ESNH and large buildings built to the 2024 OBC will be on course to meet the CEP recommended 54% reduction in carbon emissions by 2031. In 2024, the proposed development is estimated to achieve a 34% reduction in carbon emissions over the 2010 baseline.

3.4 Next steps

3.4.1 Thinking Green Development Standards

The Thinking Green Development Standards is a Town-initiated program to evaluate the sustainable performance of new developments within East Gwillimbury. Categorized into three themes—Protection and Enhancement of the Natural Environment, Conservation of Energy and Water, Designing for Complete and Connected Communities—the TGDS provides a set of measures that the proposed development will be required to satisfy at subsequent planning stages, at the Draft Plan of Subdivision and Site Plan applications submitted to the Town under the Planning Act.

The TGDS Level 1 targets are minimum required measures that the proposed development will need to implement. In addition, the development will be required to choose either two Level 2 or one Level 3 prescribed targets under each theme. The TGDS also provides flexibility for developments to propose site-specific/custom aspirational targets, subject to the discretion of the Town.

Some of the minimum targets that will need to be considered moving forward include:

- **Grade-related (3 storeys or less) residential development** achieves Energy Star® certification OR a rating of 83 or more when evaluated in accordance with Natural Resources Canada's EnerGuide Rating: 0-100 Scale OR equivalent, as demonstrated by a qualified professional.
- **Grade-related (3 storeys or less) residential development**: all water consuming fixtures listed below are high-efficiency WaterSense® labeled OR meet the following maximum flow requirements, whichever is more restrictive:
    - high efficiency toilets (max. flow of 4.0 L/flush OR 3/6 L/flush siphonic dual flush toilets)
    - low flow lavatory faucets (max. flow of 5.7 L/min)
    - In addition, all dwelling units are equipped with an on-demand hot water delivery system to a bathroom located on the highest/top floor of the dwelling unit. The system will be in the "normally off" condition until activated by the homeowner. Once the hot water has completed its circuit, the system pump will shut off. This is not a tankless hot water system.
- **Grade-related (3 storeys or less) residential development** is designed to be solar ready.
- **Grade-related (3 storeys or less) residential development**: Each house includes a separate, non-potable watering system with a minimum capacity of 180L for irrigation purposes provided in a location approved by and to the satisfaction of the Town.
- **Grade related (3 storeys or less) residential development**: a minimum of one (1) vehicle parking space per unit provided in a garage, carport, or driveway is designed to permit the future installation of electric vehicle supply equipment.

3.4.2 Monitoring and Verification

It is recommended that a monitoring program be established to evaluate the success and effectiveness of energy efficiency measures put forward in this Plan. It is expected that pre-occupancy monitoring and verification will be the responsibility of the landowners and/or builders.

Post-occupancy data of building performance could be collected through utility bills; however, this will not be readily available for landowners and builders. A preoccupancy energy and emissions model for Northwest Yonge Green Lane community based on the measures adopted, could be conducted as a separate exercise as additional verification at the request of the municipality.

4. Renewable Energy Generation

In addition to improved energy efficiency and GHG reduction measures, the proposed development could consider alternative energy solutions that can provide on-site renewable electricity or thermal energy to the community and potentially the surrounding area. The Town's OP outlines that new buildings are encouraged to include renewable energy sources (policy 2.4.15).[22] This section addresses how alternative energy solutions, such as district energy network, solar and geothermal, could be investigated to supply energy to the proposed development. With its own advantages and disadvantages, the energy solutions will require further feasibility analyses as the community builds out.

4.1 Solar

Low-rise homes may benefit from solar PV technologies. Due to large roof areas, the energy benefits may offset a good portion of the home's energy consumption. High-rise on the other hand, have little roof space and high energy use. If solar energy were to be implemented in the community, installation of solar photovoltaic (PV) on low-rise homes could be prioritized.

The Town's OP outlines that new developments shall be designed to maximise solar gains and be constructed in a manner that facilitates future solar installations (policy 2.4.13).[23] A solar-ready home is one that is built to allow for the installation of a future solar PV system. Under NRCan's guidelines, it includes design considerations for roof space, solar PV conduits, plumbing connections to a hot water heater, an electrical outlet, mechanical room floor space and mechanical / electrical room wall space.[24] Figure 5 illustrates an example of a solar ready home constructed with conduit that run from the attic space or roof location straight to an accessible location in the mechanical room.

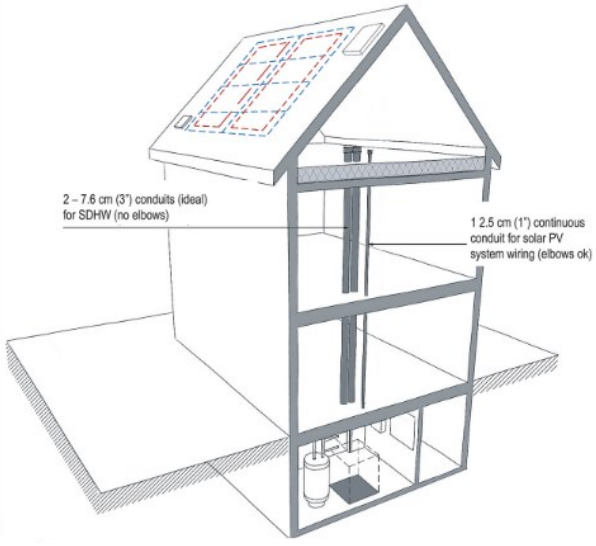

Figure 5. Solar ready house with PV conduit running from the roof space to the mechanical room. Source: NRCan.

At subsequent planning stages, the proposed development will need to address the Town's Thinking Green Development Standards, which requires that grade-related residential houses are designed to be solar ready.[25]

In addition, it is important to understand the implications of connecting solar energy generated to the local electricity distribution system. It is up to the discretion of the electricity distribution company to approve any connection from renewable resources of the home to the distribution system pertaining to homeowners who wish to participate in a net-metering program.

Recommendation

Grade-related homes within the proposed development will be designed with solar-readiness in mind. This includes design considerations for roof space, provisions for solar PV conduits, plumbing connections to a hot water heater, dedicated electrical outlets, designated spaces for future equipment.

4.2 Ground-source Heat Pump

Ground-source heat pumps (GSHP), or also known as geo-exchange heat pumps, are electric heat pumps that transfer heat between the building and the ground, which maintains a constant temperature of around 10 degrees Celsius year-round. In Ontario, residential homes benefit from electric heat pumps as they are among the most cost-effective and climate-aligned technologies available for space and water heating.[26]

In the context of the Northwest Yonge Green Lane CDP, installing GSHPs in each low-rise unit is impractical due to the community's scale. A more viable option is to install GSHP systems underneath the high-density residential buildings along Yonge Street to supply the building's energy. A study by Urban Equation suggests that GSHPs in multi-unit residential buildings (MURB) can achieve a 33% reduction in annual energy use and a 47% decrease in GHG emissions compared to conventional 2-pipe fan coil unit HVAC systems (see Figure 6).[27] Implementing GSHPs in the high-density residential buildings in the CDP will result in improved performance than the Scenario modeled in Section 3.2. A feasibility study is required to determine heating and cooling loads of the building(s), evaluate if a GSHP is a good fit, and explore ownership structures.

One of the main advantages of GSHPs is their high efficiency throughout the year and lower lifetime costs compared to conventional gas systems or air source heat pumps, despite their higher initial upfront costs.[28] Engaging with a third-party to own and operate GSHPs in large buildings can help lower capital costs.

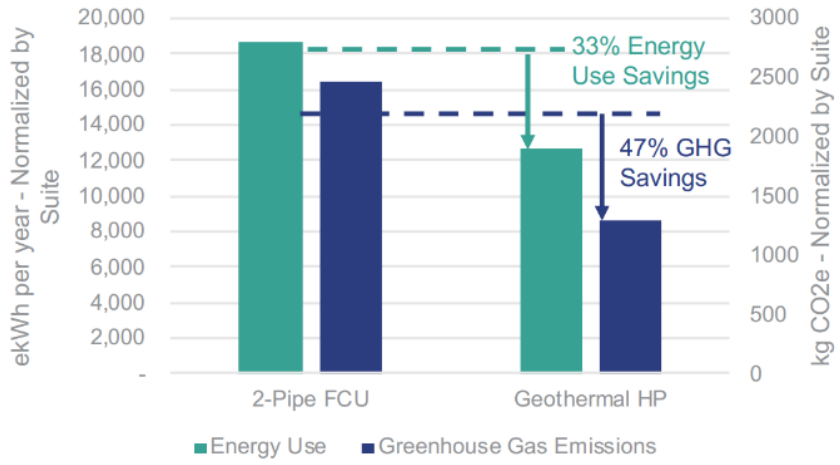

Figure 6. Energy and GHG emissions reductions from Ground-source Heat Pump. Source: Urban Equation.

4.3 District Energy

When talking about carbon emissions, it is important to address space heating and domestic water heating. In 2015, 86% of carbon emissions from residential end-uses were attributed to space and water heating. In the commercial-institutional sector, this figure was 68%. A District Energy (DE) system, which consists of a network of pipes distributing thermal energy to multiple buildings within a community, sources this energy from a centralized heating and cooling center.

The main advantage of a DE system is its ability to deliver thermal energy services with greater efficiencies and lower emissions than individual furnaces, boilers, electric baseboards, and natural gas water heaters. It can be cost effective due to economies of scale. Additionally, the DE system can take advantage of load diversification.[29] It refers to the different daily energy demand patterns of residential and commercial uses in the proposed development (see Figure 7). Given the mix and density of residential to the west and commercial to the east of the CDP, overall peak demand is flattened. This allows for reduced size of infrastructure required to service the community and its buildings. For example, Lonsdale Energy Corporation system in the City of North Vancouver, is operated with a fraction of the boiler capacity that would have been required if each building was installed with its own conventional boiler system.[30]

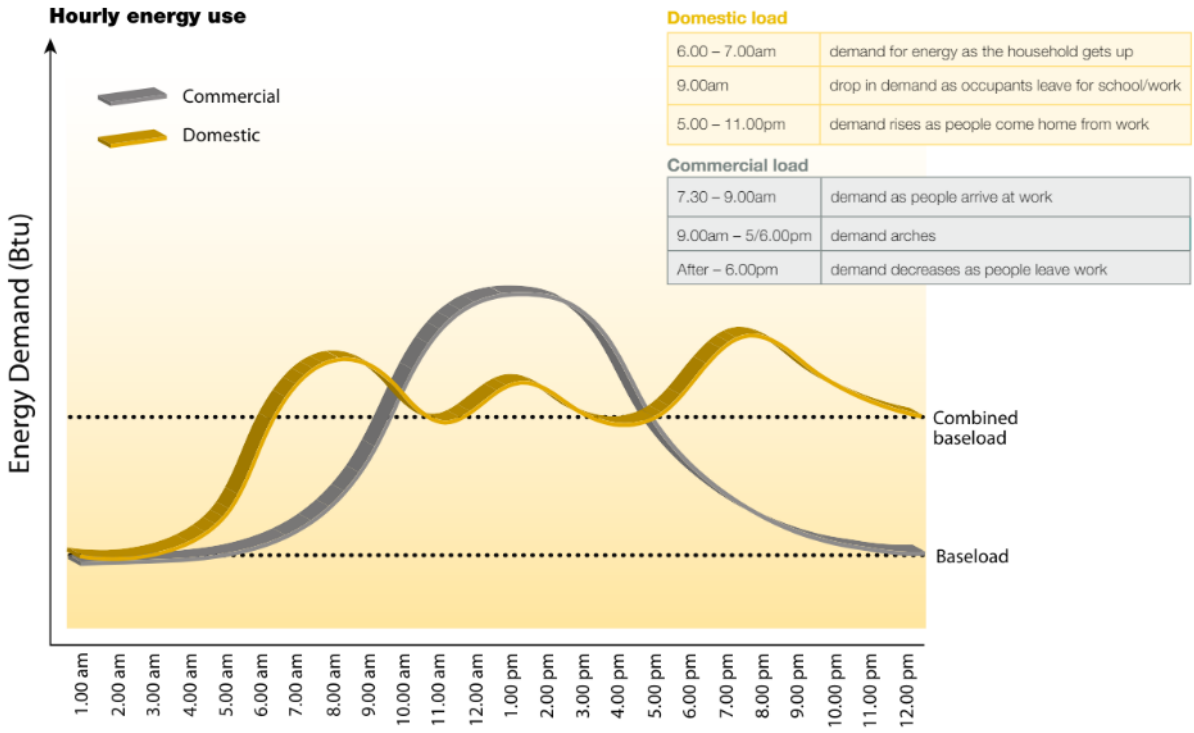

Figure 7. Load diversification in a mixed-use community showing commercial and domestic load profile and how they complement each other. Source: International District Energy Association.[31]

A district energy system is not unfamiliar in York Region. The Markham District Energy (MDE) in the City of Markham has been operational since 2000 and has proven successful in providing district cooling and heating, and domestic hot water to over 13 million square feet of buildings in the city centre.[32] In 2022, MDE's efficient heating systems avoided the burning of over 7.0 million m^3 of natural gas.[33]

A DE system requires land space for a centralized heating plant. Given the current CDP, there is limited space for a plant to be built within the boundaries of the proposed development. Further, the typical load density that makes district energy a viable option does not exist on this site. The density of the built form is not believed to cost-effectively support a District Energy company and its network.

5. Mobility and Active Transportation

The transportation sector accounts for most of Ontario's GHG emissions. In 2022, the transportation sector accounts for over half of York Region's emissions, surpassing the buildings sector at 53 per cent (see Figure 8).[34] The CDP will seek to achieve compact communities that minimize the need for motorized transportation, reducing vehicular-produced GHG emissions.

The proposed development will be designed to support safe, efficient, and active transportation. This section is informed by the Transportation Impact Study by Paradigm.

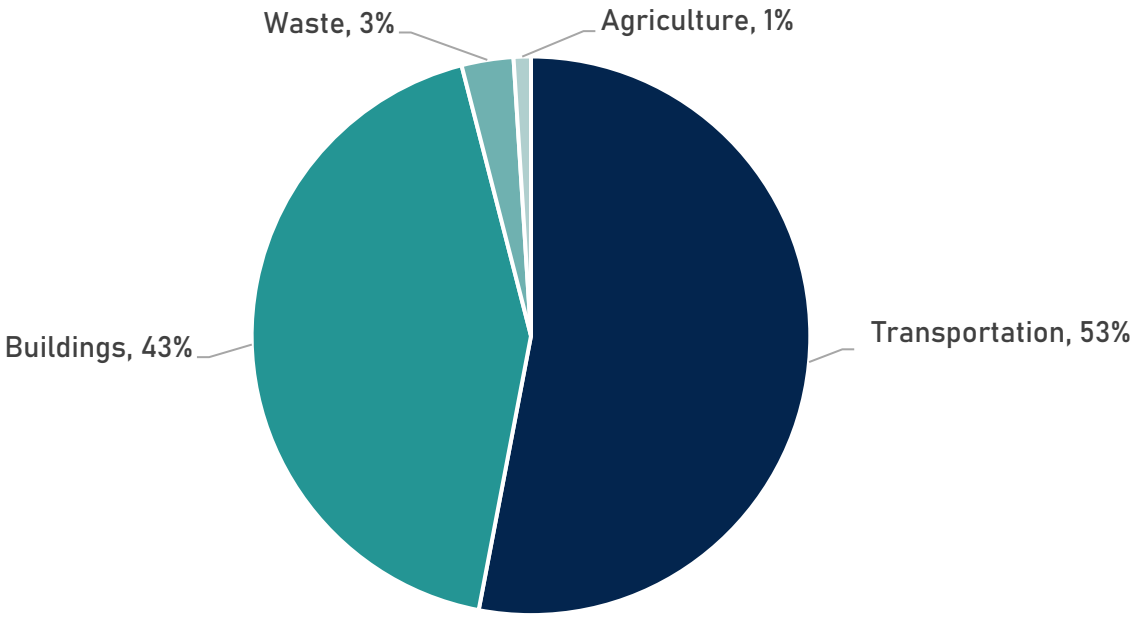

Figure 8. York Region 2022 Emissions by Sector. Source: The Atmospheric Fund (TAF).[35]

5.1 Efficient Transportation

On Efficient Transportation, the CEP provides the following recommendation:

> **Create denser, mixed use walkable neighborhoods that encourage walking, cycling and smaller cars, supported by parking and other incentives for more efficient cars and two-wheelers.**[36]

5.1.1 Dense and mixed-use walkable neighborhood

The CDP addresses the CEP's recommendation by providing a mix of uses within the community to encourage walking and cycling, and reduce auto dependency. Residents will be within walking distances to planned amenities, including a park near the elementary schools and commercial facilities located to the east of the community.

The CDP strategically concentrates high-density residential and commercial uses at the intersection of Yonge Street and Green Lane West, which are major transportation corridors to optimize access to transit and commercial services. In addition, residents will be within walking distances to planned public transit systems, including bus stops along the proposed East-West Major Collector and along Green Lane between Yonge Street and East Gwillimbury GO Station.

5.1.2 Active Transportation

The York Region Transportation Plan (YRTP) describes that "active transportation, such as walking and cycling, should be an option for everyone". The Northwest Quadrant of Yonge Street and Green Lane Secondary Plan Area Transportation Impact Study (2024) by Paradigm outlines the following:

> **Active Transportation Impact**: The proposed NW Secondary Plan Area is forecast to generate 10 AM and 0 PM cycling trips, and 195 AM and 75 PM walking trips. With planned future cycling facilities to be implemented along Bathurst Street, Yonge Street, and Green Lane (east of Yonge Street), and accompanying active transportation infrastructure for the new east-west collector and internal minor collector roadways, it is anticipated the forecast active transportation trips would be accommodated by the proposed active transportation infrastructure.

Furthermore, the East-West Road Corridor Environmental Assessment (EA) by AECOM in 2015 proposes a future collector road that will connect the proposed development to other parts of Town. A 1.5-meter sidewalk and a 1.5-meter on-street bike lane are proposed on both sides of the road and connections to transit stops will also be considered.[37] Several transit improvements are planned in proximity to the proposed development, including a future VIVA Bus Rapid Transit system along Yonge Street, south of

Green Lane. Future cycling facilities are also recommended along Bathurst Street, Yonge Street, and Green Lane East as presented in the YRTP. The proposed infrastructure will enhance active and safe transportation for residents in the community, encouraging walking, cycling, and the use of transit.

5.1.3 Support Use of Electric Vehicles

For trips that can't be taken by cycling, walking or taking transit, switching from fossil-fuel power vehicles to electric vehicles is important pathway to reduce GHG emissions. The CDP will aim to support the use of electric vehicles, as the Town's OP requires new buildings with internal parking to contain electric vehicle charging stations or be pre-wired to allow for future incorporation of EV charging stations (Policy 2.4.19).

Furthermore, as a Level 1 minimum, the TGDS requires for all grade-related homes, that a minimum of one vehicle parking space per principal unit is designed to permit the future installation of electric vehicle supply equipment (EVSE). For Level 2, a minimum of one parking space is provided with electric vehicle supply equipment.

Recommendation

Grade-related homes within the proposed development will be designed to permit the future installation of electric vehicle supply equipment.

6. Conclusion and Recommendations

The Northwest Yonge Green Lane community can reduce its energy use and GHG emissions by implementing energy efficient technologies and measures across all buildings within the proposed development. Energy modelling has shown that grade-related homes built to achieve the 2024 Energy Star certification not only achieve but exceed the CEP's recommended 14% improvement in efficiency over the 2010 baseline.

For large buildings, building to the OBC 2024 SB-10 energy efficiency minimum meets and exceed the CEP's recommendation that is to build 10.5% better efficiency than the 2010 baseline.

On-site renewable energy generation, such as solar, ground-source heat pumps, and district energy systems, are solutions that the proposed development can explore. Renewable resources not only decrease carbon emissions from energy production but also improves access to reliable energy sources and minimizes vulnerability to energy price fluctuations.

The CEP's recommendations for efficient transportation emphasize the creation of denser, mixed-use, walkable neighborhoods. By strategically placing high-density residential and commercial areas near major transit corridors and enhancing infrastructure for walking and cycling, the community can encourage more sustainable modes of transport. Additionally, the support for electric vehicles through the accommodations for charging infrastructure in new developments can help support reductions in GHG emissions. Together, these measures will foster a more sustainable, efficient, and accessible transportation network within the community.

The following **recommendations** are proposed:

1. **Grade-Related Homes:** Construct grade-related homes to meet Energy Star for New Homes (v17.1) standards in order to meet the CEP's energy efficiency and carbon reductions targets.
2. **Large Buildings**: Construct large buildings, including commercial, high-density residential, and mixed-use structures, to comply with the 2024 OBC SB-10 energy efficiency requirements, standards in order to meet the CEP's energy efficiency and carbon reductions targets.
3. **Solar Ready Homes:** Design grade-related homes to be solar ready to permit the future installation of solar PV.
4. **EVSE Ready Homes:** Design grade-related homes to permit the future installation of electric vehicle supply equipment.

Appendices

Appendix A – Modelling Methodologies and Assumptions

Appendix B – Matrices of Measures

Appendix C – Energy Star for New Homes Technical Specifications (ver. 4.0)

Appendix D – HOT2000 Energy Modelling Report

Appendix A – Modelling Methodologies and Assumptions

Modelling Grade-related Homes

Scenarios 1 to 4 were modelled using Natural Resource Canada's HOT2000 energy/emissions simulation software. The modelling team was provided preliminary drawings of detached homes and townhomes by the builder to achieve greater modelling accuracy. Grade-related homes are categorized into 5 archetypes. Namely, detached, mid-unit townhome, end-unit townhome, mid-unit back-to-back townhome, and end-unit back-to-back townhome. Modelling each permutation, there were a total of 20 energy modelling.

Each scenario consists of various combinations of energy efficiency measures, each with different levels of effectiveness.

Modelling Large Buildings

Scenarios 5 and 6 were modelled using eQuest, an energy/emissions simulation software for large buildings. Large buildings in the CDP are categorized into 4 archetypes: residential, mixed-use residential, retirement/hotel, and office/retail.

For the 2010 baseline model, the 2010 OBC SB-10 building standard and the MNECB 1997 were applied. For the proposed model, the 2015 OBC SB-10 building standard and the NECB 2015 were applied. In both models, fan coil systems were used for HVAC. The conditioned space area are as follows:

- Office/Retail: 3,535 sq. m
- Mixed-Use Residential: 22,297 sq. m
- Residential: 18,581 sq. m
- Retirement/Hotel: 16,453 sq. m

Assumptions

1. Ground Floor Area (GFA)

The GFA of buildings were assumed as follows:

Rice Group lands– GFA of the buildings were assumed to be as the square footage delineated on the Community Design Plan provided by Jones Consulting Inc.

Northmarket Holdings Inc. lands – GFA of the buildings were calculated by measuring the building area as depicted on the CDP on AutoCAD. Then the area was then multiplied by the number of storeys indicated on the CDP.

Beechway Developments Inc. lands– The GFA the mixed-use residential was calculated based on the unit count of 1290 residential units, as indicated on the CDP. The unit assumptions were based on an existing technical study—ENERGY STAR® Multifamily High Rise Standard version 1.0 (2021) by Purpose—of a high-rise with 150 suites and a building area of 121,944 square feet. Through interpolation, it was assumed that the GFA of the mixed-use residential is 1,501,500 square feet.

2. Unit Counts

Unit counts for detached homes, townhomes, and apartments are provided in the Community Design Plan. For modelling purposes, townhomes and back-to-back towns are subcategorized into mid units and end units as they. Typically, within a block, there are six mid units situated between four end units. Based on a 3:2 ratio, the unit breakdown was calculated.

3. School Energy Consumption

Annual consumption data was obtained through public records from York Region School Board. This data was used to estimate an average consumption for elementary and high school buildings. The annual electricity consumption and annual greenhouse gas consumption per school building was provided in the data collected, this data was then averaged to obtain an average consumption amount for an elementary school and for a secondary school. The space heating energy consumption data was obtained by looking at gas consumption data provided by the schools and converting the gas consumption (m^3) to ekwh. This was done by converting the m^3 of gas into GJ and then from GJ to kwh. This amount was assumed to be the average space heating consumption and the values were averaged to obtain an average for the elementary school and secondary school.

Appendix B – Grade-related Home Scenario Specifications

Grade-related Home Scenario Specifications

	OBC 2010	OBC 2024	ESNH 2024
BUILDING ENVELOPE			
Ceiling without Attic Space	R31	R31	R40
Exposed Floor	R31	R31	R31
Above Grade Walls	2x6 @ 16" O.C. R22 Batt	2x6 @ 16" O.C. R22 Batt	2x6 @ 16" O.C. R22 Batt + R5 (1" XPS)
Basement Walls Below Grade (B.G.)	R12 ci	R20 CI	R20 CI
WINDOWS & DOORS			
Windows /Sliding Glass Doors	U-1.8	U-1.6	Energy Star Certified
Doors	OBC 3.97	OBC 3.97	Energy Star Certified
MECHANICALS			
Space Heating Equipment	94% AFUE	96% AFUE	96% AFUE ENERGY STAR Furnace
Space Cooling Equipment	13 SEER	13 SEER	13 SEER
HRV/ERV Efficiency	60% SRE	75% SRE	75% SRE
Domestic HWH (Thermal Eff. Or EF)	0.67 EF Instantaneous	0.8 EF Instantaneous	Instantaneous condensing min. UEF 0.95
OTHERS			
Lighting	N/A	N/A	100% ENERGY STAR Certified Lights
Exhaust Fans	N/A	N/A	ENERGY STAR Certified
Airtightness (ACH)	3.0	3.0	3.0
Drain Water Heat Recovery	N/A	N/A	N/A
Electrical Savings	N/A	N/A	N/A

Appendix C – EnerQuality's Energy Star for New Homes Technical Specifications (ver. 4.0 Updated September 2009)

EnerQuality's ENERGY STAR® for New Homes Technical Specifications

Version 4.0 (Updated September 2009)

Acknowledgement

EnerQuality wishes to thank the members of the Technical Steering Committee, with the support of Natural Resources Canada (NRCan), for developing this document.

Contact Information

For enquiries about EnerQuality's ENERGY STAR® for New Homes Technical Specifications, please contact:

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Table of Contents

1. Overview

1.1. Scope

1.1.1. General

(1) All ENERGY STAR®[1] qualified new homes certified through EnerQuality are required to comply with the most recent version of these ENERGY STAR for New Homes Technical Specifications.
(2) This document describes EnerQuality's ENERGY STAR for New Homes Technical specifications Version 4.0. It is effective February 1, 2009 and applies to all homes enrolled through EnerQuality in Ontario after February 1, 2009.
(3) However, a house may be enrolled under Version 3.0 until March 31, 2009 if the builder is able to demonstrate that one of the following exists for the house:
    a. A building permit for the house has been issued prior to March 31, 2009
    b. Substantially complete designs for the house have been developed and enrolled with EnerQuality by March 31, 2009 and NRCan's written approval has been obtained by EnerQuality prior to April 30, 2009
    c. A contract has been signed between the builder and a home owner prior to March 31, 2009
(4) Where a house was enrolled prior to February 1, 2009, the applicable version of EnerQuality's ENERGY STAR for New Homes Technical Specifications Version 1.0, 2.0 or 3.0 may be used to certify the house. In all cases, unless written approval is obtained from NRCan, any homes enrolled under a version older than Version 4.0 must be labeled by:
    a. March 31, 2009, for Version 1.0 and 2.0
    b. December 31, 2011, for Version 3.0
(5) All ENERGY STAR qualified new homes are required to comply with all applicable legislation and regulations.
(6) Where these Technical Specifications are less than the requirements of the Ontario Building Code (OBC) 2006, or its amendments January 2009, the requirements of the most recent Code shall govern.
(7) Sections marked under "reserved" will be provided as addenda at a later date.

1.1.2. Eligible Housing Types

(1) Except as provided in clause 1.1.2.(2) and 1.1.2.(3), the Builder Option Packages apply to low-rise, residential types regulated by the OBC, Part 9 regardless of building orientation, distribution of windows, building size and eligible heating system type. This includes all forms of single detached, attached units, and various factory built homes including modular, panelized, SIP's, and ICF houses that require a foundation and some site assembly.
(2) The Builder Option Packages do not apply to manufactured homes with a chassis, residential units in buildings of more than three floors in height above grade.
(3) Currently, the Builder Option Packages do not apply to stacked units, electrically heated homes, or homes with walk-out basements or slab-on-grade foundations; however, these houses may comply under alternate compliance measures (see Subsection 1.1.4.)

1.1.3. Compliance by Builder Option Package

(1) Minimum prescriptive building design specifications are provided in Section 2 Core Builder Option Package (BOP) for compliance within the Toronto, Simcoe, London, Windsor, Ottawa, Kingston, and Muskoka Climate Zones in Ontario (see Appendix 1.)
(2) Alternate Builder Option Packages and trade-offs are described in Section 4, which provide compliance choices for the builder.
(3) Each Builder Option Package and the optional trade-offs have been pre-determined to meet or exceed the performance specifications of ENERGY STAR for New Homes.
(4) Compliance with the Builder Option Packages requires no HOT2000[2] software modeling.

[1] The ENERGY STAR mark is administered and promoted in Canada by Natural Resources Canada. Used with Permission.

1.1.4. Alternate Compliance

(1) An evaluation of a house using the EnerGuide Rating System[3] may be used to determine compliance for a package of features that is not described by the Builder Option Package and trade-offs (see Section 4). EnerGuide ratings must be calculated using the January 2005 version of NRCan's administrative and technical guidelines and version 9.34c of HOT2000.
(2) Trade-offs not described in Section 4 must be treated as a Custom Builder Option Package.
(3) Custom Builder Option Package(s) must conform to Section 5 and be submitted to EnerQuality for approval by Natural Resources Canada, as per the "Protocol for Validating ENERGY STAR® for New Homes Builder Option Packages (BOPs)," (January 1, 2009).

1.1.5. Administrative Procedures

(1) These administrative procedures comply with the most current version of EnerQuality's ENERGY STAR for New Homes Administrative Procedures.
(2) The builder must hold a valid ENERGY STAR Builder Participant Administrative Arrangement with NRCan and be trained and certified according to the latest version of EnerQuality's ENERGY STAR for New Homes Administrative Procedures.
(3) Certified Energy Evaluators (evaluators) must hold a valid ENERGY STAR Participant Administrative Arrangement with NRCan and be trained and certified by EnerQuality. A current list of evaluators is available from EnerQuality.

1.2. Inspection Protocol

1.2.1. General

(1) Inspection and certification of homes may only be conducted by a third party evaluator certified by EnerQuality. All homes enrolled with EnerQuality to be ENERGY STAR qualified are required to be inspected during construction by an evaluator to confirm compliance with these technical specifications either by the Single Unit Inspection Method or by Sampling Inspection Method as described in EnerQuality's ENERGY STAR for New Homes Administrative Procedures.

1.2.2. Inspection of Modular Homes

(1) In-plant sampling may be arranged for manufacturers of modular homes for those items that cannot be inspected on site. In-plant inspection sampling will be performed upon the first production house manufactured to a new Builder Option Package and then upon a sample rate as may be agreed between the evaluator and the manufacturer.
(2) Factory-built modular homes must receive the second (final) on-site inspection via the Single Unit Inspection Method.

[2] HOT 2000 is a registered trademark of Natural Resources Canada and is used with permission.
[3] EnerGuide Rating System is a trademark of Natural Resources Canada.

2. Core Builder Option Package

Table 2.1 Core Builder Option Package

Element	*Minimum Requirement (Toronto, Simcoe, London, Windsor, Ottawa, Kingston, Muskoka Climate Zones)*	*See Section #*
Windows, Sliding Glass Doors and Skylights	ENERGY STAR qualified windows Canada Zone B	3.2.1
Window Area	≤ 13% of above grade boundary wall area(1)	3.2.1
Exterior Doors	ENERGY STAR qualified door	3.2.2
Heated Ceiling w/ attic	Detached Homes: Toronto, Simcoe, London, Windsor: R40 Ottawa, Kingston, Muskoka: R50 Attached Homes: R40	3.3.1
Heated Ceiling w/o attic	R31	3.3.2
Exterior Walls	R19+5 (1,2)	3.4, 4.2
Exposed Floors	R31	3.5
Basement Walls	full height, R12 (1)	3.6
House Air Leakage	Detached Homes: Air Leakage test: Less than 0.2 cfm50/ft^2 Attached Homes: Air Leakage test: Less than 0.286 cfm50/ft^2	3.7
Ventilation	Detached homes: HRV with min. sensible recovery efficiency of 60% at 0°C(1) Attached Homes: Exhaust Fan without heat recovery Plus: Forced air distribution is required to be interconnected with the operation of the principal exhaust fan or HRV.	3.8.3 3.8.2
Space Heating	Fuel: ENERGY STAR qualified equipment Electrical: Reserved Ottawa, Kingston, and Muskoka: Minimum AFUE of 92%	3.9.1
Ducts	All ducts are to be located within the heated boundary. All supply trunks, supply branch take-offs, return trunks, and lined joists are to be sealed.	3.9.3
Water Heating	Fuel: ENERGY STAR qualified equipment, or equivalent (4) Electrical: Minimum EF 0.92	3.10
Electrical Savings	Detached Homes: A minimum credit of 400 kWh/year Attached Homes: A minimum credit of 245 kWh/year	3.11
ENERGY STAR Qualified Products	When ENERGY STAR technical specifications exist in Canada for any given product that is sold with the home, including but not limited to appliances, windows, space and water heating equipment, ventilation fans and space cooling equipment, the product must be ENERGY STAR qualified.(5),(6)	3.9.1 3.11.1

(1) Alternate Builder Option Packages and trade-offs are described in these technical specifications which permit the builder to choose other exterior walls, ventilation, basement walls, window areas and heating equipment.
(2) Thermal resistances in this table are minimum nominal values that are contained in standard wood framing members and exclude the resistance of any other non-insulating layer in the assembly. A "+" designates insulation that is applied continuously over framing or solid walls without thermal bridging by wood or metal members. R19 is the nominal thermal resistance of R20 batts which are compressed to fit in a 2x6 cavity.
(3) Assemblies which provide the equivalent effective thermal resistance are listed in Section 3 for each major element of this table. The determination of effective thermal resistances with framing members is described in Section 5.3.
(4) Equivalency will be determined on a case-by-case basis.
(5) Go to www.energystar.gc.ca to see a current and complete list of product categories in Canada.
(6) Where noted in these technical specifications, some exceptions to these requirements are permissible. Other exceptions are permissible with written permission from NRCan.

3. Guidelines for Builder Option Packages

3.1. General

3.1.1. Scope and Application

(1) The guidelines described in this section define the scope and application of the Builder Option Package as provided in Section 2.

3.2. Windows, Doors, and Skylights

3.2.1. Windows, Sliding Glass Doors and Skylights

(1) All windows, sliding glass doors and skylights are required to be ENERGY STAR® qualified for the climate zone in which they are installed according to Table 3.2.1 below.[4]

(2) In order to be ENERGY STAR qualified, the product model must be listed on the NRCan website. Windows and sliding glass doors comply either by U-value and/or by Energy Rating (ER). Skylights comply by their U value only. Table 3.2.1 below summarizes these requirements by climate zone.

(3) When an ENERGY STAR qualified window is not available for installation in a basement, then the window must be at least double glazed with low-e glass, an inert gas fill, and have an insulated spacer. If the frame or sash is made from metal, then they must be thermally broken.

(4) The total area of all windows, sliding glass doors and skylights is limited to 13% of the boundary wall area.

(5) The boundary wall area is measured on the basis of exterior wall dimensions and includes all perimeter boundary walls and floor rims extending from grade to the ceiling of the uppermost floor level. For purposes of determining the percentage window area the boundary wall area includes walls which are common to another heated unit.

(6) The area of windows may be increased from 13% to 16% of the boundary wall area if any of the following trade-offs are applied, providing the trade-off is not applied as a trade-off for other elements of the alternate Builder Option Packages in Section 4:

(a) Windows that qualify for ENERGY STAR Zone C are substituted, ***or,***

(b) An HRV with a minimum sensible recovery efficiency of not less than 67% at 0°C is installed.

Table 3.2.1
Summary of Requirements for Windows, Doors and Skylights

Zone	*Degree Days Celsius*	*U-Value Compliance Minimum(1) W/m^2 ($Btu/h.ft^2.°F$)*	*ER Compliance Maximum(1)*		*Skylights U-Value W/m^2 ($Btu/h.ft^2.°F$)*
			ERop / ERfix 2004 Standard	*ERop / ERfix 1998 Standard*	
A	<3500	2.0 (0.35)	17 / 27	(-16 / -6)	3.10 (0.54)
B	3500-5000	1.8 (0.32)	21 / 31	(-12 / -2)	2.80 (0.50)
C	5001-8000	1.6 (0.28)	25 / 35	(-8 / +2)	2.60 (0.46)
D	>8000	1.4 (0.25)	29 / 39	(-5 / +5)	2.38 (0.42)
1. Refer to www.energystar.gc.ca for detail of the technical criteria and listings of approved products.					

3.2.2. Exterior Hinged Doors

(1) Exterior hinged doors (this includes the door slab, frame and any glazing) are required to be ENERGY STAR qualified for the climate zone in which they are installed. If ENERGY STAR qualified sidelights and transoms are available, they must be used.

(2) A maximum of one non-ENERGY STAR qualified hinged door system is permitted per house.

(3) Doors to cold cellars do not need to be ENERGY STAR qualified, but must be insulated core exterior doors with installed weather stripping.

[4] Locations and their heating degree day values are available on the NRCan website. Note that the zone boundary between Zone B and Zone C is normally 5500 HDD; however, for ENERGY STAR for New Homes in Ontario, NRCan has approved a division at 5000 HDD to match the division of the province under the Ontario Building Code.

3.3. Heated Ceiling Assemblies

3.3.1. Ceilings With Accessible Attics

(1) The minimum nominal thermal resistance for ceilings with accessible attics is R40 for detached homes in Toronto, Simcoe, London, and Windsor Climate Zones, and R50 for detached homes in Ottawa, Muskoka, and Kingston Climate Zones. The minimum nominal thermal resistance is R40 for attached homes in Toronto, Simcoe, London, Windsor, Ottawa, Muskoka, and Kingston Climate Zones. Tables 3.3.1.A and 3.3.1.B list the minimum depth of common attic insulation products to provide the required nominal resistances.

Table 3.3.1.A
Equivalent Ceiling w/ Attic Insulation for Nominal R40
(Toronto, Simcoe, London, Windsor Climate Zones)

Any attic insulation product which provides a minimum nominal resistance of R40, for example:
11.4" high density mineral fibre batt
11.1" blown cellulose fibre (settled)
12.1" blown mineral fibre (settled)

Table 3.3.1.B
Equivalent Ceiling w/ Attic Insulation for Nominal R50
(Ottawa, Muskoka, Kingston Climate Zones)

Any attic insulation product or combination of products which provides a minimum nominal resistance of R50, for example:
13.9" blown cellulose fibre (settled)
18.8" blown mineral fibre (settled)
3.5" half-pound sprayed polyurethane foam (SPF) and 10.25" of blown cellulose fibre (settled)

3.3.2. Ceilings Without Accessible Attics

(1) For ceilings without accessible attics, the minimum nominal resistance value is R31 in standard 2x10 wood framing. Other assemblies which provide an equivalent effective resistance are described in Table 3.3.2.

Table 3.3.2
Equivalent Heated Ceiling Assemblies w/o Attic for R31

Any roof exceeding these specifications, or any roof with an effective resistance equal or greater than R26.5, or as calculated for the roof with R31 batts below.
standard wood 2x10 @ 16" o.c. with R31 batts,
wood I-joist, 9.5" @ 16" o.c. with R28 batts,

3.4. Main Wall Assemblies

3.4.1. General

(1) Sample equivalent wall assemblies for the core Builder Option Package requirements of Section 2 are provided in Table 3.4.1.
(2) Sample equivalent wall assemblies which are permitted as Trade-Off Main Walls as per Section 4 Alternate Builder Option Packages, are provided in Table 3.4.2.
(3) Wood framing in the tables is described in terms of the stud spacing and as either standard or advanced. A description of standard and advanced framing area percentages is reviewed in Table 5.3.1.

Table 3.4.1
Equivalent Main Wall Assemblies for R19+5

Any wall exceeding these specifications, or any wall with an effective resistance equal or greater than of R21.3, or, as calculated for the wall with R19 batt + R5 ins. bd. below.
standard wood 2x6 @ 16" o.c. with R19 batts, + R5 insulating board
standard wood 2x6 @ 16" o.c. with R22 batts, + R3.8 insulating board
standard wood 2x4 @ 16" o.c. with R12 batts, + R10 insulating board
standard wood 2x4 @ 16" o.c. with R14 batts, + R9 insulating board
ICF walls providing effective thermal resistance of not less than R21.3
standard wood 2x6 @ 16" o.c. with half-pound SPF + R5 insulating board

3.4.2. Trade-Offs for Main Walls

Table 3.4.2
Trade-Offs for Main Walls

Substitute any of the following as permitted by the Alternate Builder Option Packages, Section 4.2
Any wall exceeding these specifications or any wall with an effective resistance equal or greater than of R17.3 or as calculated below.
standard wood 2x6 @ 16" o.c. with R22 batts
standard wood 2x6 @ 16" o.c. with R19 batt, + R1.5 fibre board
standard wood 2x4 @ 16" o.c. with R12 batt, + R7 ins. Board

3.5. Exposed Floors

3.5.1. Minimum Nominal Resistance

(1) For exposed floors the minimum nominal resistance value is R31 in standard 2x10 wood framing. Other assemblies which provide an equivalent effective resistance are described in Table 3.5.1.

Table 3.5.1
Equivalent Exposed Floor Assemblies for Nominal R31

Any floor assembly with an effective thermal resistance of not less than R29.
5/8" OSB subfloor, standard wood 2x10 @ 16" o.c. with nominal R31 insulation
5/8" OSB subfloor, wood I-joist, 9.5" @ 16" o.c. with nominal R28 insulation
5/8" OSB subfloor, standard wood 2x8 @ 16" o.c. with R21.5 insulation + R7.5 insulating board
5/8" OSB subfloor, standard wood 2x10 @ 16" o.c. with 8.37" half-pound SPF
5/8" OSB subfloor, wood I-joist, 9.5" @ 16" o.c. with 8.4" half-pound SPF

3.6. Basement Wall Assemblies

3.6.1. General

(1) All enclosed crawlspaces in contact with the ground are required to be conditioned and the same insulation requirements apply to crawlspaces as for basements.
(2) These requirements apply to basement walls which extend on average no more than 2 ft. above grade. Where a basement wall extends more than 4 ft. above grade the requirements of Main Wall Assemblies in Section 3.4 apply.

(3) Full height insulation is intended to cover the entire area of the basement wall. A small gap of 6" or less is permitted between the bottom edge of basement insulation and the floor where the there is no insulation on the exterior side of the wall and the basement slab is more than 4 ft. below grade. Where the floor of a shallow basement is less than 4 ft. below grade and there is no insulation on the exterior side of the wall, insulation on the interior side shall extend to the basement floor without a gap.
(4) A table of equivalent full height basement wall assemblies for the Builder Option Packages is provided in Table 3.6.1.
(5) Alternate basement wall assemblies which permit the builder to lift interior-side insulation above the floor are described in Table 3.6.2.

Table 3.6.1
Full Height Basement Wall Assemblies for R12

Any basement wall assembly that extends full height with an effective thermal resistance greater than R12 in 2x4 wood framing @ 16" o.c. excluding the resistance of air films and concrete.
R12 insulating board applied inside (with gypsum board finish), or exterior side.
wood 2x4 @ 16" o.c. w/ R12 batts
R12 roll blankets

3.6.2. Basement Walls with Raised Interior Insulation

Table 3.6.2
Basement Walls with Raised Interior Insulation

Any interior side basement wall insulation compliant with Table 3.6.1, applied to the top 4 ft. of the wall, and not less than 2 ft. below grade, raised approximately 46" above floor, ***and,***
Insulation board of minimum R4 applied to the exterior side, extending from grade to footing, with an average overlap with the interior side insulation of not less than 2'-0".

3.7. Whole House Air Leakage

3.7.1. General

(1) All ENERGY STAR® qualified new homes qualified under this technical specification must meet a Normalized Leakage Rate (NLR) of not more than 0.2 cfm50/ft^2 (1.0 L/s50/m^2). The NLR is calculated as the total leakage rate at 50 Pa divided by the total boundary area, where the total leakage at 50 Pa is determined by application of the flow coefficient and exponent derived by CAN/CGSB 149.10. The NLR target may be used to determine a total target leakage rate for an air leakage test by multiplication with the total boundary area.
(2) The Normalized Leakage Area (NLA) is an alternate compliance measure and is to be less than 2.0 in^2/100 ft^2 (1.4 cm^2/m^2) of the heated boundary area, where the leakage area is determined by CAN/CGSB 149.10 at 10 Pa. The total heated boundary area is determined as the total area of all the wall, roof and floor components which enclose the heated space and includes those walls, roofs and floors which are heated and which are common with adjacent units. The boundary wall area is determined using the exterior dimensions of exterior walls and walls common to other units.
(3) In the case of attached residential units, whether row or semi, the maximum NLR is 0.286 cfm50/ft^2 (1.43 L/s50/m^2), or the maximum NLA is 2.86 in^2/100 ft^2 (2.0 cm^2/m^2).
(4) The testing of attached units is to be done on an individual unit basis and does not require access to and simultaneous measurement of adjacent units.

3.8. Mechanical Ventilation and Ventilation Distribution

3.8.1. General

(1) A principal exhaust fan is required with a minimum ventilation capacity as described in the OBC 9.32.
(2) Additional requirements to those of the OBC are described for principal exhaust fans without heat recovery, for heat recovery ventilators and for the ventilation distribution system.

3.8.2. Principal Exhaust Fans Without Heat Recovery

(1) A principal exhaust fan without heat recovery may be used in attached forms of ENERGY STAR qualified new homes.
(2) A principal exhaust fan without heat recovery may also be used in detached homes with certain alternate Builder Option Packages which are described in Section 4.
(3) The principal exhaust fan must be rated at or less than 1.5 sones by data published by HVI and to be ENERGY STAR qualified.

3.8.3. Heat Recovery Ventilators (HRVs)

(1) An HRV is required to be installed as the principal exhaust fan in single detached unless a principal exhaust fan without heat recovery is selected as part of an alternative Builder Option Package in Section 4.
(2) Although it is recommended that an HRV be installed in ENERGY STAR qualified new homes, an HRV is not required in attached units.
(3) An HRV is required to be installed such that the supply and exhaust flows are measured and balanced within 10% by a technician qualified by the manufacturer, or by HRAI, and a label is required to be attached to the HRV indicating the installing company and the measured flow rates.
(4) An HRV is required to have a minimum sensible recovery efficiency of not less than 60% at 0˚C @30L/s, as determined by data published by HVI.
(5) ERVs are considered equivalent to HRVs.
(6) In 2010, an ENERGY STAR category will be launched in Canada for HRVs by NRCan. At that time, as with the release of any new ENERGY STAR product category in Canada, ENERGY STAR qualified HRVs will be required in ENERGY STAR qualified new homes whenever an HRV is sold in an ENERGY STAR qualified new home.

3.8.4. Ventilation Distribution System

(1) The principal exhaust fan control is required to be interconnected with a forced air distribution system such that switching on the principal exhaust fan operates the forced air system. This may require installation of a 110/24 Volt relay to activate the G line leading from the thermostat to the furnace. HRV's may have a relay incorporated in their control board for this purpose.
(2) A ventilation distribution system is required to distribute the ventilation air of the principal exhaust fan throughout the house. The ventilation distribution may use a central forced air system or a dedicated, fully-ducted supply and return system, which is in compliance with Section 9.32 of the OBC (bedrooms, living area and any floor without either). A dedicated, branched ventilation supply and/or exhaust system is required only if the house has radiant heating. Distribution from/to an HRV may otherwise be simplified and connected directly to the furnace return.
(3) Ventilation fans, including but not limited to the principle exhaust fan and bathroom fans, must be ENERGY STAR qualified.

3.9. Space Heating & Cooling Systems

3.9.1. Eligible Equipment

(1) Table 3.9.1 lists the eligible space heating systems which may be used.
(2) Additional requirements apply for buildings constructed in the Ottawa, Kingston and Muskoka Climate Zones.

(3) Where the builder chooses not to use ENERGY STAR qualified space heating equipment, the use of a condensing domestic hot water (DHW) heater that is also the unit's source of space heating is permissible.
(4) Oversized heating equipment is not encouraged. However, in the case of oil heating equipment, where properly sized ENERGY STAR qualified oil heating equipment is not available, oversized equipment (the next ENERGY STAR qualified size available) is permissible.
(5) Non-ENERGY STAR qualified heating equipment that is tested and meets the CSA P.10-07 Standard: Performance of Integrated Mechanical Systems for Residential Heating and Ventilation is acceptable.

Table 3.9.1
Requirements for Heating and Cooling Equipment

Fuel	*Equipment*	*Requirement*
All	Thermostats	ENERGY STAR qualified(1) thermostats.
Natural Gas / Propane	Furnace (Toronto, Simcoe, London, Windsor)	ENERGY STAR qualified(1) furnace with minimum AFUE of 90%.
	(Ottawa, Kingston, Muskoka)	ENERGY STAR qualified(1) furnace with minimum AFUE of 92%.
	Hydronic / Combination	ENERGY STAR qualified(1) boiler with minimum AFUE of 85% or a condensing hot water heater.
	Fireplace	Direct vent gas fireplace with spark ignition.
Oil	Furnace	Furnace with minimum AFUE of 85%.(1)
	Hydronic / Combination	ENERGY STAR qualified(1) boiler with minimum AFUE of 85%.
Electricity	Resistance Heating Air Source Heat Pump	See special requirements for electric heating in Subsection 3.9.4 ENERGY STAR qualified(1) split system air source heat pump equipment with minimum HSPF (zone V) of 7.1 and SEER of 14.5
	Ground Source Heat Pump	ENERGY STAR qualified(1) GSHP Direct Expansion – minimum 15 EER / 3.5 COP Closed Loop – minimum 14.1 EER / 3.3 COP
Cooling(3)	Split System AC	ENERGY STAR qualified cooling system with minimum 14.5 SEER, EER 12.0
	Single Package AC	ENERGY STAR qualified with minimum 14.0 SEER, EER 11.0
Wood	Fireplace / Stove	Certified by EPA, 40 CFR Part 60 or equivalent. Plus: HRV, CO detector per OBC 9.32.3.8

1. Equipment is required to be ENERGY STAR qualified in Canada as listed on NRCan's website.
2. Reserved
3. ENERGY STAR qualified cooling equipment is required where a cooling system has been sold with the home. Please note the system must include all parts of the system which were qualified together to meet these SEER ratings in order to be eligible.

3.9.2. Combustion Venting

(1) All combustion exhaust systems in furnaces, boilers, water heaters and gas fireplaces are required to be non-spillage susceptible with direct venting or power venting.
(2) Where a combustion air supply duct is provided that terminates in conditioned space, it shall be equipped with an approved device to control unintended air leakage when air is not required for combustion. This requirement is intended to apply on an individual appliance basis and the same combustion air supply and damper system may not be shared and controlled by two or more heating appliances.

3.9.3. Ducts

(1) All ducts for heating, ventilation and air conditioning distribution must be located within the heated boundary.
(2) All main trunk ducts for the supply and return of air distribution systems, and all branch take-offs and joist lined returns on the same floor level as the main trunk ducts are required to be sealed with foil tape or mastic sealant such that no significant leakage points are observable by visual inspection.
(3) HRV connections to the outdoor vent hoods must be sealed and insulated.

3.9.4. Builder Option Packages with Electric Space Heating

(1) Reserved.

3.10. Water Heaters

3.10.1. General

(1) All combustion heating equipment for boilers and water heaters used for DHW must be ENERGY STAR qualified and be direct vented or power vented. [5]
(2) Gas water heaters with a nominal input of 75,000 Btu/h or less must be ENERGY STAR® qualified.
(3) Gas water heaters with a nominal input of over 75,000 Btu/h must be condensing.
(4) Electric resistance water heaters are permitted but require improved performance, represented by a minimum energy factor (EF) of 0.92.[6]
(5) Heat pumps and solar water heaters must be ENERGY STAR qualified.

3.10.2. Drainwater Heat Recovery (DWHR)

(1) Drainwater Heat Recovery (DWHR) technology has demonstrated a significant potential to reduce energy use and peak loads for water heating and is eligible for credits using one of the two options below:
    (a) Under Section 3.11 Electrical and Appliances Savings Requirements; or,
    (b) Under part of alternate compliance as described in Section 5.1. See NRCan's revised ERS Electrical Credits document.
(2) The product must be labeled: "Approved for Potable Water". The product must be certified by a Canadian licensed certification company such as ULC, CSA, ETL, etc.
(3) The product must be tested for heat exchange effectiveness at 9.5 lpm flow using hot water drain at 41.0˚C and entering water supply no greater than 9.5˚C.
(4) The product must be installed according to the manufacturer's instructions.
(5) All installed DWHR systems must be on NRCan's list of approved systems.

3.11. Electricity & Appliances Savings Requirements

3.11.1. General

(1) A minimum electricity and appliances savings target is required for each detached home of 400 kWh, and each attached home of 245 kWh, regardless of finished floor area.
(2) Table 3.11.1 lists the electricity and appliance choices and credits.
(3) Items selected elsewhere for trade-offs and alternate Builder Option Packages may not also be selected for the electricity and savings credits.

[5] NRCan permits the use of DHW equipment that has not yet been labelled but that meets the 0.62 EF requirement of that product category until December 31, 2009.
[6] Refer to http://www.ahridirectory.org/ahridirectory/pages/home.aspx for a listing of permissible equipment. Note that the list at this website does not include all Canadian equipment.

Table 3.11.1
Electricity & Appliance Savings Credits

Technology	*Eligibility*	*Credit*
Ventilation Distribution	o HRV coupled with forced air distribution, air handler or high efficiency (AFUE rating of 85% or higher) furnace (natural gas, oil, or propane fuel fired appliances only) with ECM™	o 407 kWh
	o Dedicated fully-ducted supply and exhaust ventilation system with an HRV or balanced fans, with forced air system high efficiency (AFUE rating of 85% or higher) furnace (natural gas, oil, or propane fuel fired appliances only)	o 581 kWh
Lighting	o Compact fluorescent lighting (CFL) installed in 75% of fixtures o CFLs installed in all fixtures within the kitchen, main hallway and living/family room o CFLs installed in entire house	o 245 kWh o 245 kWh o 550 kWh
Clothes Washer	o ENERGY STAR qualified washer	o 240 kWh
Refrigerator	o ENERGY STAR qualified refrigerator	o 70 kWh
Dishwasher	o ENERGY STAR qualified dishwasher	o 100 kWh
Drainwater Heat Recovery[7]	DHR unit of minimum 48" length o Installed on vertical stacks serving two or more showers o Installed on vertical stack serving one shower	 o 1200 kWh o 600 kWh

4. Alternate Builder Option Packages and Trade-Offs

4.1. General

(1) Alternate Builder Option Packages are described which permit the builder to choose different specifications which have been pre-determined to meet EnerGuide 80 compliance.
(2) The alternate Builder Option Packages are described only in terms of the specifications which are changed from those in the Core Building Package described in Section 2.
(3) Any item not described in the Alternate Building Packages is required to comply with those in the Core Building Package.
(4) Options in the Alternative Building Packages may not be applied twice for other trade-offs listed elsewhere in this document.
(5) Alternative Building Packages are assigned a mnemonic in terms of:
    - Climate zones: l – Toronto/Simcoe/London/Windsor, o – Ottawa/Muskoka/Kingston
    - Attachment: d– single detached, a – attached
    - Trade-Off: xw- exterior wall, px – principal exhaust fan w/o heat recovery, xwpx – both exterior wall and principal exhaust fan w/o heat recovery.
    - Sequence number

[7] Credits may only be applied for DWHR units described in NRCan's approved list of eligible equipment. Contact EnerQuality for the complete listing.

4.2. Single Detached Homes

4.2.1. Exterior Wall Trade-Offs

(Toronto, Simcoe, London, Windsor Climate Zones)

ABP ld-xw-1

- Any Trade-Off Main Wall assembly as per Subsection 3.4.2., ***and,***
- ***Any one of:*** Water heater with minimum EF of 0.80, ***or***, condensing hot water heater, ***or,*** an additional 700 kWh electrical savings credits as per NRCan's EnerGuide electrical credits document only

ABP ld-xw-2

- Any Trade-Off Main Wall assembly as per Subsection 3.4.2., ***and,***
- HRV with minimum sensible recovery efficiency of 75% at 0°C @ 30 L/s, ***and,***
- ***Any one of:*** Basement walls with R19 full height or equivalent, ***or,*** furnace with minimum AFUE of 95%

4.2.2. Exterior Wall Trade-Offs

(Ottawa, Muskoka, Kingston Climate Zones)

ABP od-xw-1

- Any Trade-Off Main Wall assembly as per Subsection 3.4.2., ***and,***
- Condensing hot water heater, ***or,*** water heater with minimum EF 0.82

ABP od-xw-2

- Any Trade-Off Main Wall assembly as per Subsection 3.4.2., ***and,***
- HRV with minimum sensible recovery efficiency of 75% at 0°C @ 30 L/s, ***and,***
- ***Any one of:*** Basement walls with R19 full height or equivalent

4.2.3. HRV Trade-Offs

(Toronto, Simcoe, London, Windsor Climate Zones)

ABP ld-px-1

- Principal exhaust fan without heat recovery, ***and,***
- Condensing hot water heater, ***and,***
- Basement walls with R19 full height or equivalent, ***or***, furnace with minimum AFUE of 96%

ABP ld-px-2

- Principal exhaust fan without heat recovery, ***and,***
- Basement walls compliant with R19 full height or equivalent, ***and,***
- Condensing hot water heater, ***and,***
- ***Any one of:*** R50 attic insulation, ***or,*** furnace with minimum AFUE of 92%

ABP ld-px-3

- Principal exhaust fan without heat recovery, ***and,***
- Hot water heater with minimum EF of 0.80, ***and,***
- Minimum 48" DHR serving one shower

5. Compliance Alternatives

5.1. Performance Compliance with EnerGuide Rating

5.1.1. Non-Electrically Heated Homes

(1) An EnerGuide rating and HOT2000™ modeling software may be used to assess individual house models for compliance. The analysis is required to be performed by a Certified Energy Evaluator certified by EnerQuality.

(2) The analysis is limited to the specific house model that is rated. It is best suited to facilitate compliance of homes which are not well covered by the Builder Option Packages. These include homes with larger window areas, small attached units or homes with low rates of air leakage. It is also intended to facilitate an entry point for builders with existing EnerGuide ratings who are in transition to Builder Option Packages to build ENERGY STAR qualified new homes. A final inspection is required on each house and this evaluation must comply with the on-site inspection procedures as outlined in NRCan's EnerGuide program documents, specifically the energy advisor manual.

(3) All one-off evaluations are to be run using version 9.34c of the HOT2000 software in EnerGuide mode using the as-built specifications of the building.

(4) Table 5.1.1 summarizes the minimum requirements by element for alternate compliance by EnerGuide rating for fuel heated homes; for electrically heated homes see 5.1.2. An EnerGuide rated new home must also meet requirements for air leakage, duct sealing, ventilation interconnect and electrical and appliance savings that are not accounted in the rating, as noted for these technical specifications.

(5) An input to HOT2000 for air leakage based upon the as tested ACH50 format may be developed from the Normalized Leakage Rate (NLR) in Table 5.1.1.
ACH50 = (hour conversion x NLR x total boundary area) / total volume

(6) A credit for electricity and appliances savings may be entered under Base Loads / Energy Credits. The quantity of the eligible electrical savings credit is established as per Section 3.11 of these specifications and must comply with NRCan's guidelines on the use of the electrical credits.

(7) A summary of the EnerGuide rated package is required as an attachment to the final inspection checklist.

(8) The house must undergo a final as-built evaluation to verify compliance.

Table 5.1.1
Minimum Requirements for Performance Compliance

Element	*Minimum Requirement*
Minimum EnerGuide Rating	80 for all detached and attached housing types
Windows	ENERGY STAR qualified windows (see Table 3.2.1)
Insulation in Ceilings, Main Walls and Floors	Ontario Building Code 12.2.3.1.
Basement Insulation	Full height, nominal R12
Air Tightness	As per Subsection 3.7.1. Detached: max. NLR of 0.2 cfm50/ft2 (1.0 L/s50/m2) Attached: max. NLR of 0.286 cfm50/ft2 (1.43 L/s50/m2)
Ventilation	Principal and Total Ventilation capacities as per Section 3.8 of these specifications.
Heating	Minimum efficiencies as per Section 3.9.
Hot Water	Minimum efficiencies as per Section 3.10.
Duct Sealing	Required as per Subsection 3.9.3.
Ventilation Interconnect	Required as per Subsection 3.8.4.
Electrical & Appliances Savings	Required as per Section 3.11.

5.1.2. Electrically Heated Homes

(1) A minimum EnerGuide rating of 80 is required for all types of electrically heated homes and they must meet the ENERGY STAR branding requirements noted throughout this document.

5.2. Development of Trade-offs and Custom Builder Option Packages

(1) Trade-offs not described in Section 4 may be acceptable provided a request is submitted to EnerQuality together with documentation that demonstrates compliance to NRCan's Protocol for Validating ENERGY STAR® for New Homes Builder Option Packages (BOPs).
(2) Custom Builder Option Packages may be acceptable provided a request is submitted to EnerQuality together with documentation which demonstrates that individual house models simulated with HOT2000 v9.34c software achieves an EnerGuide rating of 80 in every as-built configuration.
(3) In the case of either single detached or attached homes, the total window area is required to be a maximum of 13% of the above grade boundary wall area.
(4) Alternative specifications may be used subject to submission of a justification and approval by EnerQuality.

5.3. Effective Thermal Resistances of Assemblies

5.3.1. General

(1) The assessment of equivalent and trade-off assemblies require the determination of effective resistance values that meet or exceed those provided in the tables in Section 3.
(2) The determination of effective thermal resistances of assemblies must account for the effect of framing members in the insulation layers of the assembly using methods specified by ASHRAE 2001 Fundamentals, or Model National Energy Code Houses (MNECH) 1997. Framing area percentages are provided in Table 5.3.1 below, which are to be used when the calculation of the effective thermal resistances is undertaken by an ENERGY STAR for New Homes certified energy advisor or builder.
(3) Framing percentage areas are reduced by increasing stud or joist spacing. In addition, wall framing percentages may be reduced a further 4% by advanced wall framing methods which reduce the quantity of framing lumber independent of stud spacing. For example, a standard wood frame wall at 19.2" centers may be reduced from 21.5% of the wall area to 17.5% by use of advanced wall framing. Advanced wall framing methods may include any combination of the reduction of backing for straightening of studs and finish attachment, the reduction of posts in walls under point loads, the replacement of steel posts with wood posts, the reduction of jack studs under lintels and sills plates at openings, the relocation of lintels in walls to rim joists, and the replacement of lintels with framed panels. Top plates may also be reduced to a single plate by use of stacked stud and joist assemblies, but this is not necessary to achieve 4% reductions. The framing percentage area is also reduced by use of I-joists, raised heel trusses and in basement wall framing.
(4) Alternatively, the resistances of equivalent and trade-off assemblies may be assessed by use of HOT2000 software.
(5) All normal air films and finishes are included in the assembly except as described here. In the case of exposed floors the interior finish is limited to 5/8" OSB sub-floor and the exterior, to gypsum board. In the case of vented heated ceilings, finishes and structure on the exterior side are excluded.
(6) In the case of basement wall assemblies, the effective resistance is assessed as that added to concrete without the resistance of air films or concrete structure, but may include enclosed air spaces, if any. Gypsum board is included where it is a required element of the assembly.

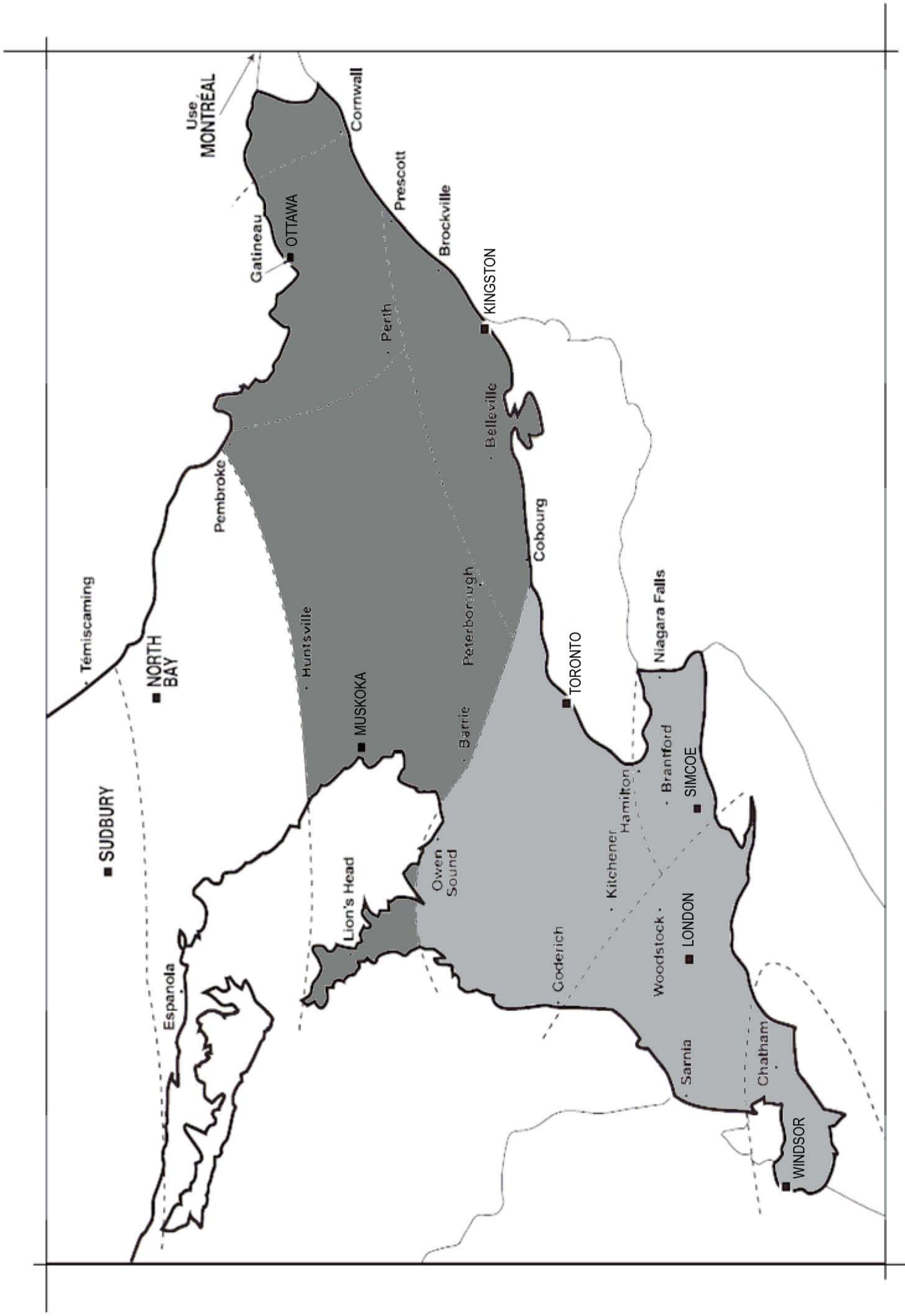
(7) Where two or more assemblies of the same component are present in a home, an area based averaging may be used to determine the overall resistance of that component using the following formula: $R_{avg} = a_{tot} / (a_1/r_1 + a_2/r_2 \ldots + a_n/r_n)$, where a_{tot} is the total area of assemblies 1 to n, a_1 is the area of assembly one, r_1 is the resistance of assembly one, and so forth to assembly n. Normally only two or three different assemblies are involved in averaging.

Table 5.3.1
Percentage Framing Areas for Use in Determining Effective Thermal Resistances

Framing System	**Percentage Area**
Standard wood frame wall @ 16" o.c.	23%
Standard wood frame wall @ 19.2" o.c.	21.5%
Standard wood frame wall @ 24" o.c.	20%
Advanced wood frame wall w/ double top plate	wall framing percentage by centre above less 4%.
Basement wood frame wall inside concrete	wall framing percentage by centre above less 7%
SIPS walls @ 48" o.c	10%
Standard lumber joist floor @ 16" o.c.	13%
Standard lumber joist floor @ 24" o.c.	10%
I-joist floors	joist framing percentage by centre above less 4%
Standard roof trusses @ 16" o.c.	14%
Standard roof trusses @ 24" o.c.	11%
Raised Heel roof trusses @ 16" o.c.	10%
Raised Heel roof trusses @ 24" o.c.	7%
Conventional rafter/joist roof framing @ 16" o.c.	13%
Conventional rafter/joist roof framing @ 24" o.c.	10%
I-joist rafters	rafter framing percentage by centre above less 4%
SIPS roofs @ 48" o.c	6%

Map 4

Southern Ontario



1. Kingston
2. London
3. Muskoka
4. North Bay
5. Ottawa
6. Simcoe
7. Sudbury
8. Toronto
9. Windsor

Appendix D – HOT2000 Energy Modelling Report

HOT2000 Energy modelling report for a detached home with 2024 Energy Star v17.1 compliance is attached in the following pages.

HOT2000
Natural Resources CANADA
Version 9.34c

File: Detached Model - ESNH (2024).HSE
Application Type: EnerGuide for New Houses

User Weather File:

Weather Data for ,

Builder Code:

Data Entry by: Hiruni
Date of entry: 2024-07-17
Company:

Client name: ,
Street address: Detached Model

City: **Region:** Ontario
Postal code: **Telephone:**

GENERAL HOUSE CHARACTERISTICS

House type: Single Detached
Number of storeys: Two storeys
Plan shape: Rectangular
Front orientation: South
Year House Built: 2024
Wall colour: Default **Absorptivity:** 0.40
Roof colour: Medium brown **Absorptivity:** 0.84
Soil Condition: Normal conductivity (dry sand, loam, clay)
Water Table Level: Normal (7-10m/23-33ft)

House Thermal Mass Level: (A) Light, wood frame

Effective mass fraction 1.000

Occupants : 2 Adults for 50.0% of the time
2 Children for 50.0% of the time
0 Infants for 0.0% of the time

Sensible Internal Heat Gain From Occupants: 2.40 kWh/day

HOUSE TEMPERATURES

Heating Temperatures

Main Floor:	21.0 °C
Basement:	19.0 °C
TEMP. Rise from 21.0 °C:	2.8 °C

Basement is- Heated: YES **Cooled:** NO **Separate T/S:** NO
Fraction of internal gains released in basement : 0.150

Indoor design temperatures for equipment sizing

Heating:	22.0 °C
Cooling:	24.0 °C

WINDOW CHARACTERISTICS

Label	Location	#	Overhang Width (m)	Header Height (m)	Tilt deg	Curtain Factor	Shutter (RSI)
South							
Front01 - S01 DW	Door - Front	2	2.31	0.23	90.0	1.00	0.00
Front02 - S01	Wall 2.1 - Brk	1	0.58	1.88	90.0	1.00	0.00
Front02 - S02	Wall 2.2 - Sdg	1	0.58	1.45	90.0	1.00	0.00
Front02 - S03	Wall 2.2 - Sdg	1	0.58	0.63	90.0	1.00	0.00
Right01 - E01 DW	Door - Side	1	0.58	4.34	90.0	1.00	0.00
East							
Right00 - E01	Foundation - 1	3	0.58	5.54	90.0	1.00	0.00
Right01 - E02	Wall 1.1 - Brk	2	0.58	3.45	90.0	1.00	0.00
Right02 - E01	Wall 2.1 - Brk	1	0.58	1.40	90.0	1.00	0.00
Right02 - E02	Wall 2.1 - Brk	2	0.58	0.48	90.0	1.00	0.00
Right02 - E03	Wall 2.1 - Brk	1	0.58	0.48	90.0	1.00	0.00
North							
Back00 - N01	Foundation - 1	1	0.58	5.54	90.0	1.00	0.00
Back01 - N01	Wall 1.1 - Brk	1	0.58	3.45	90.0	1.00	0.00
Back01 - N02 PD	Wall 1.1 - Brk	1	0.58	3.48	90.0	1.00	0.00
Back02 - N01	Wall 2.1 - Brk	1	0.58	0.48	90.0	1.00	0.00
Back02 - N02	Wall 2.1 - Brk	1	0.58	0.48	90.0	1.00	0.00
West							
Left01 - W01	Wall 1.1 - Brk	2	0.58	3.48	90.0	1.00	0.00

Label	Type	#	Window Width (m)	Window Height (m)	Total Area (m^2)	Window RSI	SHGC
South							
Front01 - S01 DW	U1.4	2	0.58	1.40	1.63	0.714	0.1904
Front02 - S01	U1.4	1	1.52	1.78	2.71	0.714	0.2241
Front02 - S02	U1.4	1	1.22	1.65	2.01	0.714	0.2183
Front02 - S03	U1.4	1	0.61	0.61	0.37	0.714	0.1700
Right01 - E01 DW	U1.4	1	0.58	1.40	0.82	0.714	0.1904
East							

Right00 - E01	WndW	3	0.76	0.25	0.58	0.323	0.4742
Right01 - E02	U1.4	2	1.22	1.68	4.09	0.714	0.2185
Right02 - E01	U1.4	1	0.61	1.52	0.93	0.714	0.1939
Right02 - E02	U1.4	2	0.61	1.22	1.49	0.714	0.1899
Right02 - E03	U1.4	1	1.22	1.22	1.49	0.714	0.2124
North							
Back00 - N01	U1.4	1	0.76	0.25	0.19	0.714	0.1194
Back01 - N01	U1.4	1	2.29	1.68	3.83	0.714	0.2294
Back01 - N02 PD	U1.4	1	1.83	2.13	3.90	0.714	0.2299
Back02 - N01	U1.4	1	1.22	1.22	1.49	0.714	0.2124
Back02 - N02	U1.4	1	1.83	1.22	2.23	0.714	0.2199
West							
Left01 - W01	U1.4	2	0.61	1.37	1.67	0.714	0.1921

WINDOW CODE SCHEDULE

Name	Internal Code	Description (Glazings, Coatings, Fill, Spacer, Type, Frame)
WndW	200002	Double/double with 1 coat, Clear, 13 mm Air, Metal, Picture, Wood, ER* = -16.87, Eff. RSI= 0.36

* Window Standard Energy Rating estimated for assumed dimensions, and Air tightness type: CSA - A1; Leakage rate = 2.790 m^3/hr/m

USER-DEFINED WINDOW CODES SCHEDULE

Code	Description	Window Type
0U1.4	U1.40-ER29-(SHGC@0.26)	Picture

USER-DEFINED WINDOW CODES: DATA

Code	RSI - Centre of Glass	RSI - Edge of Glass	RSI - Frame	Frame Ht mm	Centre of Glass SHGC
0U1.4	**0.714**	**0.714**	**0.714**	**63.5**	**0.260**

BUILDING PARAMETER DETAILS

CEILING COMPONENTS

	Construction Type	Code Type	Roof Slope	Heel Ht.(m)	Section Area (m^2)	R. Value (RSI)
Ceiling - Attic	Attic/gable	R60	7.5/12	0.13	113.80	8.09
Ceiling - Cath.	Cathedral	R31 Batt	6.0/12	0.13	3.38	4.91
Ceiling - Flat	Flat	R31 Flat	0.0/12	0.13	1.39	4.17

CEILING CODE SCHEDULE

Name	Internal Code	Description (Structure, typ/size, Spacing, Insull, 2, Int., Sheathing, Exterior, Studs)
R31 Batt	2233L01000	Wood frame, 38x235 mm (2x10 in), 600 mm (24 in), N/A, None, 12 mm (0.5 in) gypsum board, N/A, N/A, N/A

MAIN WALL COMPONENTS

Label	Lintel Type	Fac. Dir	Number of Corn.	Number of Inter.	Height (m)	Perim. (m)	Area (m^2)	R. Value (RSI)
Wall 1.1 - Brk Type: 22+5Brk	101	N/A	20	4	2.77	39.49	109.30	3.92
Wall 1.2 - GRG Type: R22+5Dry	101	N/A	5	1	2.77	9.16	25.35	3.78
Wall 2.1 - Brk Type: 22+5Brk	101	N/A	12	10	2.46	43.51	107.16	4.04
Wall 2.2 - Sdg Type: 22+5Sdg	101	N/A	12	10	2.46	4.67	11.51	2.69
Header 2.1 - Brk Type: R22+5Brk		N/A	4	4	0.25	35.05	8.87	5.09

WALL CODE SCHEDULE

Name	Internal Code	Description (Structure, typ/size, Spacing, Insull, 2, Int., Sheathing, Exterior, Studs)
22+5Brk	12114B0241	Wood frame, 38x140 mm (2x6 in), 400 mm (16 in), RSI 3.87 (R 22) batt, N/A, None, Waferboard/OSB 11.1 mm (7/16 in), Brick, 3 studs
22+5Sdg	12114B0221	Wood frame, 38x140 mm (2x6 in), 400 mm (16 in), RSI 3.87 (R 22) batt, N/A, None, Waferboard/OSB 11.1 mm (7/16 in), Hollow metal/vinyl cladding, 3 studs
R22+5Brk	18004B0040	Floor header, N/A, N/A, RSI 3.87 (R 22) batt, N/A, N/A, None, Brick, N/A

EXPOSED FLOORS

Label	Floor Code Type	Area (m^2)	R. Value (RSI)
Exp.Floor - EUS	31	21.85	5.41
Exp.Floor - NEUS	31	1.56	5.45

EXPOSED FLOOR SCHEDULE

Name	Internal Code	Description (Structure, typ/size, Spacing, Insull, 2, Int., Sheathing, Exterior, Studs)
31		N/A, N/A, N/A, N/A, N/A, N/A, N/A, N/A, N/A

DOORS

Label	Type	Height (m)	Width (m)	Gross Area (m^2)	R. Value (RSI)
Door - Front Loc: Wall 1.1 - Brk	Steel polyurethane core	2.13	1.73	3.69	1.14
Door - GRG Loc: Wall 1.2 - GRG	Steel polyurethane core	2.13	0.91	1.95	1.14
Door - Side Loc: Wall 1.1 - Brk	Steel polyurethane core	2.13	0.91	1.95	1.14

USER-DEFINED STRUCTURE CODES SCHEDULE

Name	Description
11R22+5Dry	
11R22+5GRG	
21R60	2x4attic truss/R60 blown cel.
21R31 Flat	test of a flat ceiling type

FOUNDATIONS

Foundation Name: Foundation - 1
Foundation Type: Basement
Data Type: Library

Volume: 217.8 m^3
Opening to Main Floor: 1.56 m^2

Total Wall Height: 2.34 m
Depth Below Grade: 2.18 m

Non-Rectangular
Floor Perimeter: 46.28 m
Floor Area: 93.16 m^2

Interior wall type: R14+10U
Exterior wall type: User specified
Number of corners : 1
Lintel type: LL1
Added to slab type : User specified
Floors Above Found.: 2x12

R-value: 3.90 RSI
R-Value: 0.00 RSI

R-Value: 0.00 RSI
R-Value: 1.01 RSI

Exposed areas for: Foundation - 1
Exposed Perimeter: 46.28 m

Configuration: BCCB_4
- concrete walls and floor

- interior surface of wall insulated over full-height
- exterior surface of wall insulated over full-height
- sub-surface of floor slab fully insulated but no insulation under footings
- thermal-break between walls and floor slab
- any first storey construction type

FOUNDATION CODE SCHEDULE

Interior Wall

Name	Code	Description (Fram., Spac., Studs, Ins/fram., Xtra ins, Int)
R14+10U	2112B0	38x89 mm (2x4 in) wood, 400 mm (16 in), 3 studs, RSI 2.1 (R 12) batt, N/A, None

Floors Above Foundation

Name	Internal Code	Description (Structure, typ/size, Spacing, Insul1, 2, Int., Sheathing, Exterior, Drop Framing)
2x12	4241008300	Wood frame, 38x286 mm (2x12 in), 400 mm (16 in), None, None, Carpet & underpad, Waferboard/OSB 15.9 mm (5/8 in), None, No

BASEMENT FLOOR HEADER COMPONENTS

Label	Lintel Type	Fac. Dir	Number of Corn.	Number of Inter.	Height (m)	Perim. (m)	Area (m^2)	R. Value (RSI)
Fnd.Header - Brk Type: R22+5Brk	N/A	N/A	4	4	0.25	34.27	8.67	5.09
Fnd.Header - GRG Type: R22+5GRG	N/A	N/A	4	4	0.25	9.16	2.32	4.70

Basement Floor Header Code Schedule

Name	Internal Code	Description (Structure, typ/size, Spacing, Insul1, 2, Int., Sheathing, Exterior, Studs)
R22+5Brk	18004B0040	Floor header, N/A, N/A, RSI 3.87 (R 22) batt, N/A, None, None, Tile-linoleum, No
R22+5GRG	11R22+5GRG	N/A, N/A, 487 mm (19 in), RSI 2.1 (R 12) batt, N/A, Gypsum + Tile-linoleum, N/A, N/A, N/A

Lintel Code Schedule

Name	Code	Description (Type, Material, Insulation)
R22+5GRG	101	Double, Wood, Same as wall framing cavity
R22+5GRG	101	Double, Wood, Same as wall framing cavity
R22+5GRG	101	Double, Wood, Same as wall framing cavity
LL1	101	Double, Wood, Same as wall framing cavity

ROOF CAVITY INPUTS

Gable Ends		**Total Area:**	23.71 m^2
Sheathing Material	Plywood/Part. bd 9.5 mm (3/8 in)		0.08 RSI
Exterior Material:	Hollow metal/vinyl cladding		0.11 RSI
Sloped Roof		**Total Area:**	134.20 m^2
Sheathing Material	Plywood/Part. bd 12.7 mm (1/2 in)		0.11 RSI
Exterior Material:	Asphalt shingles		0.08 RSI
Total Cavity Volume:	154.9 m^3	**Ventilation Rate:**	0.50 ACH/hr

BUILDING ASSEMBLY DETAILS

Label	Construction Code	Nominal (RSI)	System (RSI)	Effective (RSI)
CEILING COMPONENTS				
Ceiling - Attic	R60	10.56	10.64	8.09
Ceiling - Cath.	R31 Batt	5.46	4.91	4.91
Ceiling - Flat	R31 Flat	5.46	4.17	4.17
MAIN WALL COMPONENTS				
Wall 1.1 - Brk	22+5Brk	4.75	3.92	3.92
Wall 1.2 - GRG	R22+5Dry	4.74	3.78	3.78
Wall 2.1 - Brk	22+5Brk	4.75	4.04	4.04
Wall 2.2 - Sdg	22+5Sdg	4.75	2.67	2.69
Header 2.1 - Brk	R22+5Brk	4.78	5.09	5.09
FLOORS ABOVE BASEMENTS				
Foundation - 1	2x12	0.00	1.01	1.01

BUILDING PARAMETERS SUMMARY

ZONE 1 : Above Grade

Component	Area m^2 Gross	Area m^2 Net	Effective (RSI)	Heat Loss MJ	% Annual Heat Loss
Ceiling	118.57	118.57	7.86	4953.31	5.67
Main Walls	262.18	228.39	3.92	23654.53	27.10
Doors	7.59	5.14	1.14	1967.83	2.25
Exposed floors	23.41	23.41	5.41	1727.19	1.98
South Windows	7.54	7.54	0.71	4607.57	5.28
East Windows	7.99	7.99	0.71	4880.69	5.59
North Windows	11.45	11.45	0.71	6994.71	8.01
West Windows	1.67	1.67	0.71	1021.54	1.17
		ZONE 1 Totals:		**49807.38**	**57.06**

INTER-ZONE Heat Transfer : Floors Above Basement

Area m^2 Gross	Area m^2 Net	Effective (RSI)	Heat Loss MJ
93.16	93.16	1.008	7539.43

ZONE 2 : Basement

Component	Area m^2 Gross	Area m^2 Net	Effective (RSI)	Heat Loss MJ	% Annual Heat Loss
Walls above grade	7.33	6.56	-	1560.20	1.79
East windows	0.58	0.58	0.32	706.51	0.81
North windows	0.19	0.19	0.71	106.50	0.12
Basement floor header	10.99	10.99	5.00	2036.97	2.33
Below grade foundation	194.01	194.01	-	11674.73	13.37
		ZONE 2 Totals:		**16084.91**	**18.43**

Ventilation

House Volume	Air Change	Heat Loss MJ	% Annual Heat Loss

	812.60 m^3	0.205 ACH	21397.582	24.51

AIR LEAKAGE AND VENTILATION

Building Envelope Surface Area: 616.50 m^2

Air Leakage Test Results at 50 Pa.(0.2 in H_2O) = 2.50 ACH

Equivalent Leakage Area @ 10 Pa = 758.70 cm2

Terrain Description	**Height**	**m**
@ Weather Station : Open flat terrain, grass	Anemometer	10.0
@ Building site : Suburban, forest	Bldg. Eaves	7.1

Local Shielding: **Walls:** Heavy
Flue : Light

Leakage Fractions- **Ceiling:** 0.200 **Walls:** 0.650 **Floors:** 0.150

Normalized Leakage Area @ 10 Pa: 1.2306 cm^2/m^2
Estimated Airflow to cause a 5 Pa Pressure Difference: 121 L/s
Estimated Airflow to cause a 10 Pa Pressure Difference: 190 L/s

F326 VENTILATION REQUIREMENTS

Kitchen, Living Room, Dining Room	3 rooms @ 5.0 L/s: 15.0 L/s
Utility Room	1 rooms @ 5.0 L/s: 5.0 L/s
Bedroom	1 rooms @ 10.0 L/s: 10.0 L/s
Bedroom	1 rooms @ 5.0 L/s: 5.0 L/s
Bathroom	1 rooms @ 5.0 L/s: 5.0 L/s
Basement Rooms	: 10.0 L/s

CENTRAL VENTILATION SYSTEM

System Type: HRV
Manufacturer:
Model Number:

Fan and Preheater Power at 0.0 °C:	85 Watts
Fan and Preheater Power at -25.0 °C:	85 Watts
Preheater Capacity:	0 Watts
Sensible Heat Recovery Efficiency at 0.0 °C	75%
Sensible Heat Recovery Efficiency at -25.0 °C	65%
Total Heat Recovery Efficency in Cooling Mode	25%
Low Temperature Ventilation Reduction:	0%
Low Temperature Ventilation Reduction: Airflow Adjustment	(0%)

Vented combustion appliance depressurization limit: 5.00 Pa.

Ventilation Supply Duct

Location:	Main floor	**Type:**	Flexible
Length:	1.5 m	**Diameter:**	152.4 mm

Insulation:	0.7 RSI	**Sealing Characteristics:**	Sealed

Ventilation Exhaust Duct

Location:	Main floor	**Type:**	Flexible
Length:	1.5 m	**Diameter:**	152.4 mm
Insulation:	0.7 RSI	**Sealing Characteristics:**	Sealed

Operating schedule for

Month	% of Time	Added Vent. Rate (L/s)	Month	% of Time	Added Vent. Rate (L/s)
Jan	55.95	23.91	Jul	0.00	0.00
Feb	58.92	25.18	Aug	0.00	0.00
Mar	69.83	29.84	Sep	0.00	0.00
Apr	85.97	36.74	Oct	100.00	42.73
May	0.00	0.00	Nov	81.39	34.78
Jun	0.00	0.00	Dec	65.32	27.91

AIR LEAKAGE AND VENTILATION SUMMARY

F326 Required continous ventilation:	50.000 L/s (0.22 ACH)
Central Ventilation Supply Rate ():	42.731 L/s (0.19 ACH)
Total house ventilation is Balanced	
Gross Air Leakage and Ventilation Energy Load:	31513.686 MJ
Seasonal Heat Recovery Ventilator Efficiency:	73.833 %
Estimated Ventilation Electrical Load: Heating Hours:	1156.821 MJ
Estimated Ventilation Electrical Load: Non-Heating Hours:	2.078 MJ
Net Air Leakage and Ventilation Load:	21975.994 MJ

SPACE HEATING SYSTEM

Primary Heating Fuel: Natural Gas
Equipment: Condensing furnace/boiler
Manufacturer:
Model:
Calculated* Output Capacity: 10.50 kW
* Design Heat loss X 1.00 + 0.5 kW

AFUE: 96.00
Steady State Efficiency: 97.12
Fan Mode: Auto
Low Speed Fan Power: 0 watts
High Speed Fan Power: 126 watts

DOMESTIC WATER HEATING SYSTEM

Primary Water Heating Fuel: Natural gas
Water Heating Equipment: Condensing
Energy Factor: 0.90
Manufactuer:
Model:

Tank Capacity = 189.12 Litres
Tank Loacation: Basement
Pilot Energy = 0.00 MJ/day
Tank Blanket Insulation 0.00 RSI
Flue Diameter 0.00 mm

ANNUAL SPACE HEATING SUMMARY

Design Heat Loss at -17.20 °C (12.71 Watts / m3): 10328.74 Watts
Including credit for HRV (0.00 Watts / m3): 0.00
Gross Space Heat Loss: 87289.87 MJ

Gross Space Heating Load: 85105.19 MJ
Usable Internal Gains: 23180.30 MJ
Usable Internal Gains Fraction: 26.56 %
Usable Solar Gains: 7898.72 MJ
Usable Solar Gains Fraction: 9.05 %
Auxilary Energy Required: 54026.17 MJ

Space Heating System Load: 54026.17 MJ
Furnace/Boiler Seasonal efficiency: 97.22 %
Furnace/Boiler Annual Energy Consumption: 54934.50 MJ

ANNUAL DOMESTIC WATER HEATING SUMMARY

Daily Hot Water Consumption:	225.00 Litres
Hot Water Temperature:	55.00 °C
Estimated Domestic Water Heating Load:	15341.32 MJ
Primary Domestic Water Heating Energy Consumption:	17047.52 MJ
Primary System Seasonal Efficiency:	89.99%

BASE LOADS SUMMARY

	kwh/day	Annual kWh
Interior Lighting	3.00	1095.00
Appliances	14.00	5110.00
Other	3.00	1095.00
Exterior Use	4.00	1460.00
HVAC Fans		
HRV/Exhaust	0.88	321.92
Space Heating	0.49	177.36
Space Cooling	0.00	0.00
Total Average Electrical Load	25.37	9259.28

EnerGuide Energy Credits

Ventilation system	
Other Credits 1	1750 kWh
Total	2157 kWh

FAN OPERATION SUMMARY (kWh)

Hours	HRV/Exhaust Fans	Space Heating	Space Cooling
Heating	321.34	177.36	0.00
Neither	0.58	0.00	0.00
Cooling	0.00	0.00	0.00
Total	321.92	177.36	0.00

ENERGUIDE FOR HOUSES ENERGY CONSUMPTION SUMMARY REPORT

Estimated Annual Space Heating Energy Consumption	= 55694.26 MJ	= 15470.63 kWh
Ventilator Electrical Consumption: Heating Hours	= 1156.82 MJ	= 321.34 kWh
Estimated Annual DHW Heating Energy Consumption	= 17047.52 MJ	= 4735.42 kWh
ESTIMATED ANNUAL SPACE + DHW ENERGY CONSUMPTION	= 73898.60 MJ	= 20527.39 kWh
ENERGUIDE RATING (0 to 100)	83	
EnerGuide Required Ventilation Capacity	42.73 L/s	

Estimated Greenhouse Gas Emissions 7.48 tonnes/year

ESTIMATED ANNUAL FUEL CONSUMPTION SUMMARY

Fuel	Space Heating	Space Cooling	DHW Heating	Appliance	Total
Natural Gas (m3)	1477.65	0.00	457.54	0.00	1935.19
Electricity (kWh)	498.70	0.00	0.00	8760.58	9259.28

ESTIMATED ANNUAL FUEL CONSUMPTION COSTS

Fuel Costs Library = C:\H2KEGH~2\StdLibs\fuelLib.flc

RATE	Electricity (Ottawa97)	Natural Gas (Ottawa97)	Oil (Ottawa97)	Propane (Ottawa97)	Wood (Sth Ont)	Total
$	859.10	519.80	0.00	0.00	0.00	1378.90

MONTHLY ENERGY PROFILE

Month	Energy Load (MJ)	Internal Gains (MJ)	Solar Gains (MJ)	Aux. Energy (MJ)	HRV Eff. %
Jan	15128.321	2422.087	823.286	11882.948	73.421
Feb	13255.362	2181.630	978.661	10095.072	73.535
Mar	11823.686	2422.558	1263.144	8137.985	73.884
Apr	7681.039	2362.900	1124.951	4193.188	73.992
May	4477.473	2461.673	1078.391	937.409	0.000
Jun	1318.221	1192.924	125.298	0.000	0.000
Jul	475.136	474.078	1.059	0.000	0.000
Aug	693.357	681.974	11.383	0.000	0.000
Sep	2181.576	1659.318	522.258	0.000	0.000
Oct	5916.875	2492.867	849.932	2574.076	74.025
Nov	8946.252	2387.302	500.934	6058.016	73.974
Dec	13207.885	2440.987	619.422	10147.476	73.725
Ann	85105.180	23180.297	7898.717	54026.168	73.833

FOUNDATION ENERGY PROFILE

			Heat Loss (MJ)		
Month	Crawl Space	Slab	Basement	Walkout	Total
Jan	0.000	0.000	759.069	0.000	759.069
Feb	0.000	0.000	644.546	0.000	644.546
Mar	0.000	0.000	519.588	0.000	519.588
Apr	0.000	0.000	267.728	0.000	267.728
May	0.000	0.000	59.845	0.000	59.845
Jun	0.000	0.000	0.000	0.000	0.000
Jul	0.000	0.000	0.000	0.000	0.000
Aug	0.000	0.000	0.000	0.000	0.000
Sep	0.000	0.000	0.000	0.000	0.000
Oct	0.000	0.000	164.336	0.000	164.336
Nov	0.000	0.000	386.770	0.000	386.770
Dec	0.000	0.000	647.867	0.000	647.867
Ann	0.000	0.000	3449.749	0.000	3449.749

FOUNDATION TEMPERATURES & VENTILATION PROFILE

	Temperature (Deg °C)			Air Change Rate		Heat Loss
Month	Crawl Space	Basement	Walkout	Natural	Total	(MJ
Jan	0.000	19.065	0.000	0.194	0.300	4351.325
Feb	0.000	18.918	0.000	0.188	0.300	3749.351
Mar	0.000	18.944	0.000	0.168	0.300	3120.855
Apr	0.000	19.160	0.000	0.137	0.300	1760.613
May	0.000	19.579	0.000	0.100	0.100	704.585
Jun	0.000	20.353	0.000	0.069	0.069	186.751
Jul	0.000	21.427	0.000	0.056	0.056	75.279
Aug	0.000	21.329	0.000	0.058	0.058	112.083

Sep	0.000	20.465	0.000	0.078	0.078	352.834
Oct	0.000	20.035	0.000	0.111	0.300	1213.445
Nov	0.000	19.707	0.000	0.146	0.300	2151.061
Dec	0.000	19.353	0.000	0.176	0.300	3619.401
Ann	0.000	19.868	0.000	0.123	0.205	21397.582

SPACE HEATING SYSTEM PERFORMANCE

Month	Space Heating Load (MJ)	Furnace Input (MJ)	Pilot Light (MJ)	Indoor Fans (MJ)	Heat Pump Input (MJ)	Total Input (MJ)	System Cop
Jan	11882.948	12084.911	0.000	140.464	0.000	12225.374	0.972
Feb	10095.074	10266.330	0.000	119.326	0.000	10385.657	0.972
Mar	8137.985	8274.420	0.000	96.174	0.000	8370.595	0.972
Apr	4193.187	4264.272	0.000	49.564	0.000	4313.836	0.972
May	937.409	953.811	0.000	11.086	0.000	964.898	0.972
Jun	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Jul	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aug	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sep	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Oct	2574.076	2613.441	0.000	30.376	0.000	2643.817	0.974
Nov	6058.016	6158.247	0.000	71.578	0.000	6229.825	0.972
Dec	10147.476	10319.073	0.000	119.939	0.000	10439.012	0.972
Ann	54026.168	54934.508	0.000	638.508	0.000	55573.016	0.972

MONTHLY ESTIMATED ENERGY CONSUMPTION BY DEVICE (MJ)

	Space Heating		DHW Heating		Lights &	HRV &	Air
Month	Primary	Secondary	Primary	Secondary	Appliances	FANS	Conditioner
Jan	12084.9	19.5	1599.5	0.0	2678.4	268.5	0.0
Feb	10266.3	17.6	1466.3	0.0	2419.2	241.1	0.0
Mar	8274.4	19.5	1600.1	0.0	2678.4	256.0	0.0
Apr	4264.3	7.5	1486.2	0.0	2592.0	240.0	0.0
May	953.8	0.0	1447.3	0.0	2678.4	11.1	0.0
Jun	0.0	0.0	1319.4	0.0	2592.0	0.0	0.0
Jul	0.0	0.0	1300.0	0.0	2678.4	0.0	0.0
Aug	0.0	0.0	1276.8	0.0	2678.4	0.0	0.0
Sep	0.0	0.0	1258.1	0.0	2592.0	0.0	0.0
Oct	2613.4	18.6	1358.7	0.0	2678.4	259.3	0.0
Nov	6158.2	18.9	1400.1	0.0	2592.0	251.9	0.0
Dec	10319.1	19.5	1534.9	0.0	2678.4	269.5	0.0
Ann	54934.5	121.2	17047.5	0.0	31536.0	1797.4	0.0

ESTIMATED FUEL COSTS (Dollars)

Month	Electricity	Natural Gas	Oil	Propane	Wood	Total
Jan	74.89	87.68	0.00	0.00	0.00	162.57
Feb	69.30	76.50	0.00	0.00	0.00	145.80
Mar	74.65	65.87	0.00	0.00	0.00	140.52
Apr	72.65	42.13	0.00	0.00	0.00	114.78
May	69.87	22.48	0.00	0.00	0.00	92.35
Jun	67.97	16.05	0.00	0.00	0.00	84.02
Jul	69.65	15.94	0.00	0.00	0.00	85.59
Aug	69.65	15.80	0.00	0.00	0.00	85.45
Sep	67.97	15.69	0.00	0.00	0.00	83.66
Oct	74.71	31.84	0.00	0.00	0.00	106.55
Nov	72.88	52.61	0.00	0.00	0.00	125.49
Dec	74.91	77.20	0.00	0.00	0.00	152.11
Ann	859.10	519.80	0.00	0.00	0.00	1378.90

The calculated heat losses and energy consumptions are only estimates, based upon the data entered and assumptions within the program. Actual energy consumption and heat losses will be influenced by construction practices, localized weather, equipment characteristics and the lifestyle of the occupants.

Endnotes

[1] York Region, *Official Plan*, (June 2023), p 69
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[4] Town of East Gwillimbury, *Community Energy Plan,* (2009)
[5] York Region, *Official Plan*, (June 2023), p 12
[6] Ibid, p 22
[7] Ibid, p 22
[8] Ibid, p 24
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[10] Ministry of Municipal Affairs and Housing, *Provincial Planning Statement,* (2024), p 15
[14] Ontario, *Ontario's Climate Change Strategy,* p 12
[15] Town of East Gwillimbury, *Official Plan*, (October 2018), p 11
[16] Town of East Gwillimbury, *Community Energy Plan,* (2009), Appendix 1
[17] Natural Resources Canada, "ENERGY STAR® Certified Homes," Accessed July 29 2024 https://natural-resources.canada.ca/energy-efficiency/energy-star-canada/energy-star-for-new-homes/energy-starr-certified-homes/5057
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[27] Sustainability Buildings Canada, *Geothermal for Multi-Unit Residential Buildings,* (January 2020), p ii
[28] Ontario Clean Air Alliance Research, *An Analysis of the Financial and Climate Benefits of Using Ground-source Heat Pumps to Electrify Ontario's Gas-heated Homes,* (November 2022) p 5
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[33] Ibid.
[34] The Atmospheric Fund, "Carbon Emissions Inventory Report 2022", Accessed July 31 2024 https://carbon.taf.ca/regions/york
[35] Ibid.

[36] Town of East Gwillimbury, *Community Energy Plan,* (2009), Appendix 1
[37] AECOM, *East-West Road Corridor Environmental Assessment Environmental Study Report Part 1 – Main Report,* (May 2015), p iv