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## 3.8 Greenhouse Gas Production

### Apartment Towers are Large Producers of Greenhouse Gases

#### Overview

Apartment Towers are among the highest energy users of all housing types in the region, and are collectively responsible for a considerable volume of residential GHG emissions. In various studies, Apartment Towers have been found to be among Ontario's most energy intensive buildings, with data suggesting they require as much as 25 per cent more energy per square metre compared to a single detached house.\*

Based on the most recently available studies, the Community Energy Plan Report prepared by Arup for the City of Toronto's Tower Renewal Office, and the Tower Renewal Guidelines, prepared by the John H. Daniels Faculty of Architecture at the University of Toronto for Canada Mortgage and Housing Corporation, estimates for GHG production from Apartment Towers range from 5.3 to 5.8 tonnes per unit. In a similar study in the United Kingdom, annual GHG production for tower block flats ranged from 3.5 to 6.8 tonnes per year.\*\* If these ranges are aggregated across all Apartment Towers in the GGH, total GHGs for the operation of Apartment Towers would be between 2.0 to 2.2 million tonnes annually. This represents roughly six per cent of GHG's produced by all buildings in Ontario, with Apartment Towers in Toronto responsible for roughly 23 per cent of its residential GHG emissions.\*\*\*

It is important to note that these estimates are based solely on the energy used for building operation. They do not reflect total household energy use related to transportation and other factors. Therefore, actual GHG emissions attributable to Apartment Towers and their residents would be much higher than the estimate given here.

#### Note on GHG Figures

\*The recent studies discussed in this section have documented energy use from sample Apartment Towers ranging from 1.05 Gigajoules per square metre of floor space ( $\text{GJ}/\text{m}^2$ ) to  $1.4 \text{ GJ}/\text{m}^2$ , with some buildings as high as  $1.7 \text{ GJ}/\text{m}^2$ . Natural Resources Canada data places apartments developed between 1946 and 1969 at an average of  $1.25 \text{ GJ}/\text{m}^2$ , compared to single-family homes which average  $1.0 \text{ GJ}/\text{m}^2$ .

\*\* Road Map to 60% - Eco-Refurbishment of 1960s Flats - Energy Saving Trust, 2008.

#### Share of Toronto's GHGs

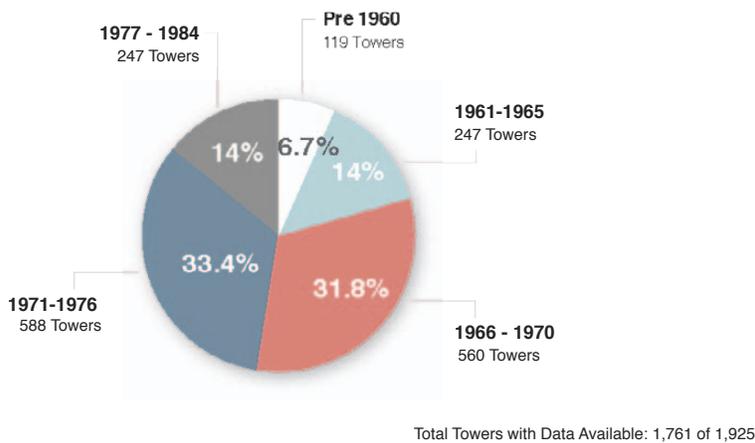
\*\*\*The City of Toronto's Power to Live Green Report (2009) estimates that Toronto's total GHG production as a result of natural gas and electricity usage is 14.7 megatonnes. Of this, 6.45 megatonnes, or 44 per cent, is from the residential sector. Based on this, we estimate that Toronto's Apartment Towers are responsible for approximately ten per cent of all GHGs related to natural gas and electricity usage and 23 per cent of residential GHGs produced by residential buildings in Toronto.



01

02

### Apartment Towers by Building Code Era (Development Period)



#### Building Code Era

While generally Apartment Towers from the study era perform poorly in terms of energy use, variables in construction methods over the duration of the housing boom (1945-1984) give buildings a range of energy performance attributes. Energy performance is highly related to the condition of the building envelope (among other variables), which would relate to the building code at the time of construction. As part of the analysis, Apartment Towers have been divided into building code eras in order to establish a framework for further analysis in which physical attributes can be attributed to these eras of construction, both related to building code regulations specifically, and trends in building construction more generally.

Building codes in effect during the period of construction of the target housing resource are as follows:

- 1953 National Building Code
- 1960 National Building Code
- 1965 National Building Code
- 1970 National Building Code
- 1976 Ontario Building Code
- 1984 Ontario Building Code

#### Solid Waste

Apartment Towers are significant producers of solid waste, with generally poor diversion rates in relation to municipal and provincial household averages. For example, organics diversion, such as the GreenBin program in Toronto, has yet to be introduced into most Apartment Towers.

The most recent study focusing on waste production and diversion rates in Apartment Towers was conducted by Genivar for the City of Toronto's Tower Renewal Office. This study indicates average waste generation per unit of 601 kg, with an average diversion rate of 12 per cent. Extrapolated across the region, at this diversion rate, over 200,000 tonnes of waste may go to landfill each year from Apartment Towers in the GGH.

#### Images

- 01) Containing hundreds of households, targeting Apartment Towers for green refurbishment may be a more efficient strategy for GHG reduction than individual detached houses.
- 02) Current waste management practices in Toronto's Apartment Towers typically result in lower than average diversion rates, significant GHG production as a result of transporting waste to landfill, and an impoverished physical environment.