Gerald R. (Jerry) Genge,
P.Eng., C.Eng., BDS, BSSO, Q.Med.,
C.Arb., President
Pretium GRG Inc.

In Front of Climate Change

It would be trite to say climate change [CC] is perceived differently around the world, but it's true … and while some political leaders may be deniers of convenience and some in the global manufacturing market may be willfully blind to the effects of greenhouse gases [GHG] and particularly CO_2, the climate data is pretty clear. CC is happening and Environment and Climate Change Canada [ECCC] is actively updating climate data in building codes to allow designers to have the most up-to-date data for their designs. ECCC hasn't yet settled on what the future climate will look like – it doesn't have a time machine. But ECCC, along with collaborators worldwide that comprise the Intergovernmental Panel on Climate Change (IPCC), have collected data since 1880 and concluded that we're likely to miss the 2°C by 2100 Paris Accord target unless some serious changes are made to CO_2 intensive industry.

Basically, temperature is the proverbial canary in the mine. As temperature changes, rain, snow, wind and all the other effects also change. The results of IPCC Predictive Models in Figure 1 show colour bands from blue (good) to red (bad) with CO_2 measured in gigatonnes. The heavier RCP lines really just mean "Representative Concentration Pathway" which I take as climatologist lingo for "average".

The large fan of colours shows the potential global temperature increase from today onward. As the graph says, only under the absolute best of scenarios will we meet the Paris target of 2°C increase and GHG emissions will decrease.

Impact for Condos

But as a manager of a condo, what does a 2°C limit mean to you? You aren't burning enough fossil fuel to make any sort of dent in the outcome. Sure, as responsible people, you could source low GHG producers for materials and hire only trades and consultants that are sensitive to climate change requirements and some day you may have to do that, but I'd like to share some more immediate trends you need to be aware of and really should act on. These are based on predictive models for Canada should the temperature continue to increase and, since an increase in GHG anywhere in the world affects temperature everywhere in the world, you may wish to take note of some of these predictions.

Temperature and Precipitation: Warming will be greater in winter at 3°C to 7°C and 1.5°C to 2.5°C in summer. This winter warming will increase snowfall. With less ice over Hudson's Bay, the weather in Eastern Canada could be heavily affected making 1 in 20-year heat and cold events become 1 in 10-year events and 1 in 10-year events as frequent as 1 in 5-year events.

How do you think that would affect air conditioning, grounds maintenance, building sealants, roofing materials, and pavements? Materials' decay rate will increase; power supply from increased reliance on air conditioning will be strained; and equipment and material maintenance costs will increase. Snow accumulation and snow load due to rain on snow will increase. That means a need for snow storage, snow gates on elevated garages, possibly even structural modification to roofs to handle snow loads.

Wind and Wind-Driven Rain: Because wind is caused by differences in temperature, increased temperature will affect wind. The models are less precise for wind because there is less data available. Nonetheless, it is expected that gusts will be more frequent with more gusts over 70 km/h and twice as many gusts over 90 km/h. That means higher wind loads on buildings, and greater wind-related damage. An Australian insurance agency's research noted that an increase of 25% in gust strength could result in a 650% increase in damage claims. How's that for living on the edge?

Building Code Changes are Coming: On the positive front, the National Building Code is now considering CC as a changing load and it will be shifting its rear-view mirror approach to design using historic loads on buildings to a forward-looking approach. In addition, the Canadian Standards Association is developing building and component design standards that address climate change and the maintenance needed to preserve resilience to deterioration and changing climate loads.

In the past, and particularly as applied to condominiums, builders and their designers have applied the old code philosophy, which assumes building durability is handled by product quality, which in turn is handled by industry standards such as CSA standards. It won't be long before designers are also required to develop repair and replacement strategies in concert with the design to address how easily building components can adapt to changing CC loads and the adaptive capacity or built-in ability to accommodate climate change loads.

But what about the many thousands of condominium buildings occupied now? How would those adapt to changing climate over the next 20, 40 or 80 years?

Figure 1: ECCC Model of GHG to 2100

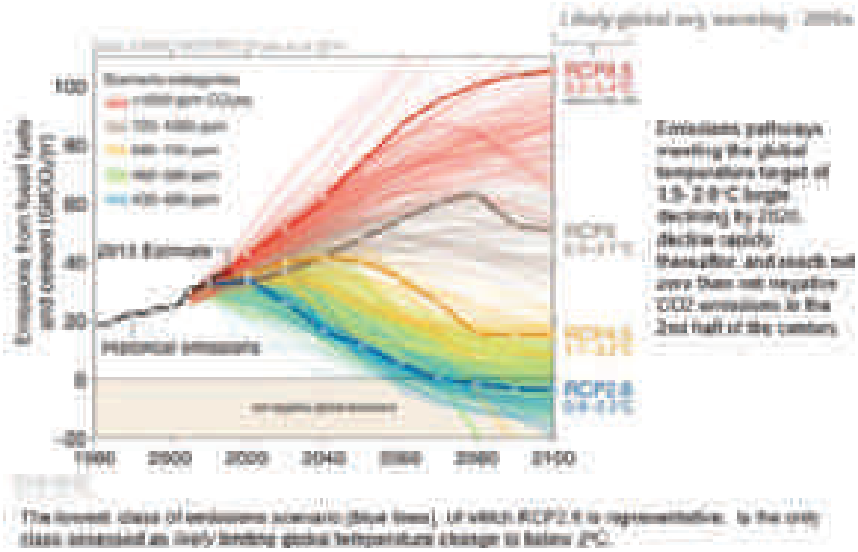
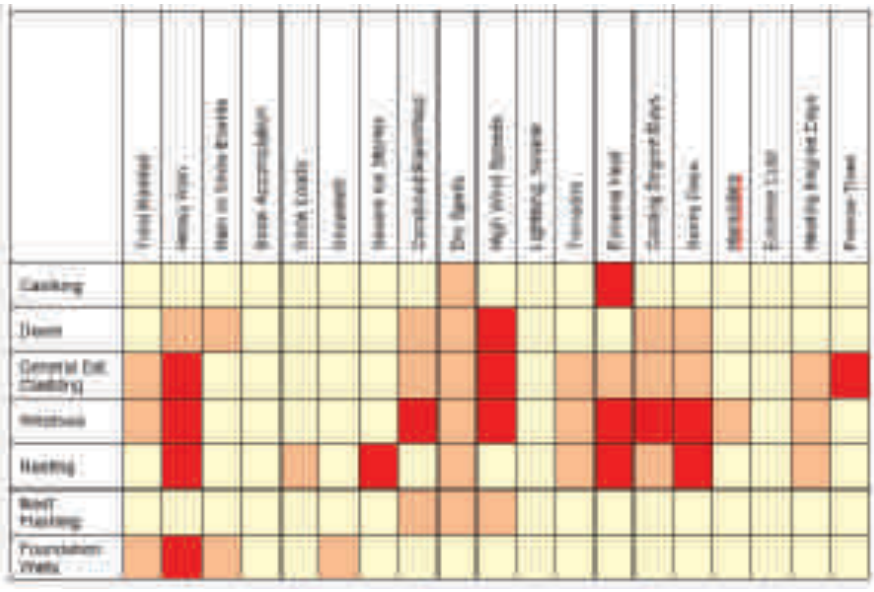


Figure 2: Partial Summary of Risk Analysis on an Existing Highrise Building



In a 2012 "vulnerability" study by GRG Building Consultants Inc. on an older highrise, some existing building components were found to be at risk due to climate change. A small portion of the list of building components is given in Figure 2 along with a colour-coded reflection of vulnerability. In that risk assessment, yellow means low vulnerability; red means high vulnerability; and orange was to be monitored. The vulnerability was based on a detailed survey of the building components combined with a likelihood of an impactful weather event happening and the significance of the event on the building component. While each building may differ, this study was one of the first on an existing residential building. More are anticipated and may become the norm, perhaps replacing the previous, less technical reserve fund study or at least as a report. Regulations will likely be slow to catch up to the need for better analysis of how condominiums will need to respond to climate change. The wise corporation will be out in front of the climate change issue and thereby be better prepared to address these changing needs. ■

Gerald R. (Jerry) Genge, P.Eng., C.Eng., BDS, BSSO, Q.Med., C.Arb. is president of Pretium GRG Inc. and has over 40 years' experience in building assessment, design, and future repair planning. He can be reached at 1(800) 838-8183. Pretiumgrg.com