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CAT TALES

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Institute for Catastrophic Loss Reduction

Building resilient communities

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ICLR Board of Directors

ICLR and partners release new PIEVC High Level Screening Guide

The PIEVC Program is pleased to announce the release of a new, supplemental version of the PIEVC Protocol: The PIEVC High Level Screening Guide (HLSG).

The PIEVC HLSG was developed in response to PIEVC Protocol user requests for an expedited, screening-level version of the full PIEVC Protocol. The PIEVC HLSG is designed to help provide a high-level assessment of the potential risks posed by climate change to infrastructure and related elements. The PIEVC HLSG process is written such that information can be obtained from readily available sources and based on a high degree of professional and engineering judgment. The PIEVC HLSG process may also be the initial screening step before other processes, or further detailed assessment.

Compared to most PIEVC Protocol assessments, PIEVC HLSG assessments:

- Use a smaller number of elements to define an infrastructure system or portfolio.
- Use climate analyses and projections from readily available sources.
- Require considerably less effort and time.
- Enable the grouping of assets by class or "like" conditions for more rapid risk screening.

The PIEVC HLSG author team was led by Jeff O'Driscoll (Associated Engineering), and supported by engineering expertise from Nodelcorp, climate science expertise from Stantec, as well as climate vulnerability experts from the Climate Risk Institute. An Advisory Committee >

of national and international climate change and infrastructure experts was formed to undertake an iterative, critical review process to strengthen the HLSG.

Climate risk assessments are a crucial component to guide, design and operate infrastructure and systems that are resilient to the effects of extreme weather and our changing climate. Climate risk assessment is a process of identifying how assets respond to and recover from the effects of a variety of hazards attributed to climate impacts. Many governments and organizations are using or requiring climate risk assessment to inform adaptation action.

The PIEVC HLSG process is an approach for undertaking vulnerability, risk, and resilience assessments. It is flexible enough to be applied to full assets or systems, to a single element of infrastructure, or to an entire portfolio of numerous assets. PIEVC HLSG assessments result in the characterization and ranking of climate risk scenarios and the identification of those scenarios of highest priority for adaptation planning or more comprehensive analysis.

The PIEVC HLSG process requires an understanding of the elements under assessment; life of the elements in terms of timescale of the assessment; risk assessment principles; climate science, climate hazards and climate change principles; the consequence of the interaction of elements under assessment and climate, and; options for developing risk actions and adaptation strategies, which may include deeper climate risk assessments.

Engagement with subject matter experts and stakeholders with local knowledge is a constant theme throughout the PIEVC HLSG Process. Each step of the assessment process requires a different mix of skills and personnel depending on locations and asset categories specific to single asset(s) or Portfolios. While the level of engagement is dictated by the objectives of each assessment, this PIEVC HLSG Process offers a suggested listing of possible assessment team participants. This is outlined within each section and also on the Application Map that serves as the roadmap to take users through the guide.

The PIEVC Program is owned and operated through a partnership consisting of the Institute for Catastrophic Loss Reduction (ICLR), the Climate Risk Institute (CRI) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. The PIEVC HLSG process is used internationally, to support many of the same types of application as indicated for Canadian practitioners.

Visit www.pievc.ca to access the PIEVC High Level Screening Guide.

We can design new buildings to survive disasters. But we don't.

Dr. Keith Porter, PE PhD
Chief Engineer, Institute for Catastrophic Loss Reduction

On December 10, 2021, an EF-4 tornado cut an unusually long (270-km) path through western Kentucky, killing 58 people. The damage led an esteemed engineering colleague, Prof. David O. Prevatt of the University of Florida, to write a *Washington Post* perspective article reminding Americans that new buildings in tornado country are not tornado proof, but that they could have been. I argue here that much the same is true in Canada, for tornadoes and other natural hazards as well.

Let's start with tornadoes. For over a century, engineers have known how to make new buildings better resist tornadoes without turning them into the proverbial bunkers that people commonly but erroneously assume resilient construction would require.

For just one recent piece of supporting evidence, consider the community of Moore, Oklahoma. After suffering three fatal tornadoes within 15 years, city officials decided that if national model building codes were not going to protect them, they would do it themselves. They formulated and enacted a local ordinance to protect new construction from all but the most severe tornadoes. It even protects most of the area affected by the biggest tornadoes.

The provisions added on the order of 1% to the construction cost of new housing in Moore. Despite concerns about the housing market, the city saw no increase in market prices or drop in development. Research by ICLR and Austin College found that prices and development kept the same gradual upward pace as before the ordinance.

Much the same is true for earthquakes. We could design resilient buildings but don't. In the late 1950s, one of the founders of earthquake engineering in the United States argued that we could not design new construction to resist all earthquakes without damage. He framed a false dichotomy: either choose the impossible option of perfectly earthquake-proof buildings or least-cost design to

tolerate maximum damage short of collapse. There was a middle road that we chose to ignore: resilient construction that balances up-front cost with long-term risk reduction.

One can say much the same things about flood and hurricane resistance.

Must we accept the false dichotomy of prohibitively costly disaster-proof buildings or least-cost disposable ones? Several world-renowned colleagues and I recently studied this problem for the US Federal Emergency Management Agency and six other agencies and nonprofits. We found, and the government agreed, that designing for the middle ground would make new buildings cost 1% more initially, but would avoid future losses four or more times greater.

We were using long-established, well-accepted principles of engineering economics. Which means that engineers and code writers could have been using these ideas decades ago. We could have been designing buildings to better resist earthquakes, floods, wildfires, and other perils. The buildings in which we live and work now, and that are costing us so much in disaster losses, could have been much better than they are.

Had it taken that middle road earlier, the United States would not be suffering from the current level of loss. It loses an average of US $100 billion per year to floods, hurricanes, and other disasters. That's about 8% of the US $1.3 trillion put in place annually in new construction. Or in other words, disasters are now erasing about 1 month of construction cost per year of new construction. What is more seriously worrisome, those losses grow 6% per year, 10 times faster than the population.

Imagine those costs as payments on a large and growing disaster liability, like your credit card bill when you buy more than you pay off every month. Our study found a US disaster liability – its credit card bill for disasters – totaling over US $2 trillion, probably much higher.

Canadian construction resembles US construction, so scaling by population, Canada's unknown disaster liability probably exceeds $250 billion. That liability will inevitably but unpredictably come due in episodes of multi-billion-dollar catastrophes.

How did this happen? A clue can be found in the stated performance objectives of Canadian and US codes. In both countries, we design safe buildings as affordably as possible, with no consideration of long-term ownership cost. Decades ago, we decided to build cheaply (in terms of initial costs), not efficiently (in terms of society's long-term ownership costs). When code-writing bodies consider code-change requests, they tend to consider the cost of the change, but fail to estimate the benefits. That is like buying a car with the lowest sticker price even if you pay much more for maintenance and repairs. If we always considered both costs *and* benefits for every code change request on an apples-to-apples basis, we might have had better buildings than we do now.

There is plenty of precedent for better buildings. After the catastrophe of Hurricane Andrew in 1992, Florida leapt ahead of US building codes with much stricter requirements. The Insurance Institute for Business and Home Safety has developed a voluntary standard called FORTIFIED that not only avoids future losses but appears to more than pay for itself in higher resale value. Some institutional building owners have opted to build new California buildings 50% stronger and stiffer than the code requires.

The past does not doom the future. We can still reverse Canada's large and growing disaster liability by changing our code objectives. Doing so might involve something like these three changes:

(1) Enact a building code objective to minimize society's total ownership cost of new construction. The Canadian Commission on Building and Fire Codes could agree and formalize such a guiding principle in Division A, Part 2 of the National Building Code. The principle might require that code provisions account for all costs: both up-front property construction costs, as well as future repair costs, health, life safety, economic impacts from loss of functionality, environmental impacts including embodied carbon and energy use, and any other tangible impacts whose monetary value one can reasonably estimate. Code changes would balance higher up-front costs with reduced losses that resilient buildings would provide.

(2) Implement this policy with requirements that at least some code-change requests be accompanied by estimates of their costs and benefits, perhaps following some standardized benefit-cost-analysis method.

(3) For this change to make a difference, a third change would be required: Code committees would have to be constrained somehow in their freedom to reject cost-effective code-change requests.

These changes will not reverse Canada's large and growing catastrophe liability quickly. But they would do so eventually. In the face of a growing climate crisis and an ever-increasing disaster liability, Canada can rethink the false economy of least-first-cost construction. We have all the data and technology we need to make our buildings cost less to own in the long run. With a wiser building code, we can have better, more resilient buildings for ourselves, our neighbors, our descendants, and all future Canadians.

Pandemics and prolonged protests can be planned for. Authorities need to stop pretending otherwise

By Glenn McGillivray, Managing Director, ICLR

At an emergency meeting of the Ottawa Police Services Board on Saturday, February 5, Chief Peter Sloly lamented that no police force in the country could have been prepared for the protest currently under way in the nation's capital.

Said Chief Sloly: "A police service under the *Police Services Act* was never created, the legislation supporting the *Police Services Act* was never contemplated, the oath of office that I and my officers swore was never intended to deal with a city under siege, a threat to our democracy, a nationwide insurrection driven by madness."

The message that the Ottawa police service was not only not prepared, but that no police service could possibly have been – and that there was "no concrete plan" to deal with the protest – wasn't exactly comforting to citizens of Ottawa, or to other concerned Canadians.

But in the world of disaster and emergency management we hear such messages all the time.

It is more or less a universal experience that when authorities fumble in their responsibility to plan for and protect us from events such as disasters caused by natural or technical hazards, pandemics such as COVID-19, or the protests in Ottawa, they tend to pump up the situation to make it something so extreme that no one could have seen it coming.

This is what I call "exceptionalizing" an event: making it legend or mythical, something that could not have been expected or planned for. This lets our leaders off the hook for not being ready.

Education sector workers vaccinated against COVID-19
Photo by Ehécatl Cabrera

Now, sometimes the powers that be aren't exaggerating. The terrorist attacks of Sept. 11, 2001, or the Halifax Explosion of 1917 are often held up in disaster literature as genuine examples of extraordinary events that were truly difficult to foresee.

But all too often, everything else gets lumped into this category as well – almost always to help those who failed to plan and prepare cover their tracks.

So officials give natural hazard events mythical names and anthropomorphize (assign humanlike qualities to) or zoomorphize (assign animallike qualities to) them. Hence, they called the May, 2016, wildfire in Fort McMurray, Alta., and the Dec. 10, 2021, tornado in Kentucky, "the Beast." Names of disasters often start with "the Great" (the Great Ice Storm of 1998, the Great Cyclone of 1896 or the Great Mississippi Flood of 1927). They named 2012's Hurricane Sandy "Superstorm Sandy." The list goes on.

They improperly label events such as the COVID-19 pandemic as a Black Swan, a term reserved for the most unique of the unique.

We hear words and phrases such as, "Nobody could have seen this coming," and, "It was just too big, even if we had done something, it wouldn't have made a difference." In the case of natural hazards, blame gets pushed over to God or to Mother Nature. In the case of technical events, such as plane crashes or pipeline spills, blame get shifted to human error or terrorism.

Our leaders then get to wash their hands.

But when we carefully dissect an event (usually after the fact), we understand that plenty could have been done to foresee it and put measures into place to prevent it from happening or – at the very least – to minimize the impact.

In the case of the prolonged protest in Ottawa, we can see that it was not caused by a sudden large earthquake on a previously unknown fault line. This was a wildfire that started 10 ridges over, and actions could have been taken to keep the fire out of town.

This past weekend, hundreds of trucks and large crowds of protesters descended on downtown Toronto. But things were different there. The city protected "hospital row" – an area downtown that is home to several hospitals – by blocking off streets ahead of time. From the get-go, the ground rules were laid out and there was a large police presence. Protesters remained for a time, but were largely gone by Sunday.

Perhaps the Toronto Police Service simply learned from Ottawa Police and took another approach.

But more likely than not, they had a plan.

This article originally appeared in the Globe and Mail on February 8, 2022

New study:

Enhancing the acceptability of buyouts for climate change adaptation

In January, ICLR published a new report titled *'Enhancing the acceptability of buyouts for climate change adaptation: Exploring a social license approach for Erie Shore Drive, Ontario'* by Sara Bohnert and Brent Doberstein, University of Waterloo, Faculty of Environment.

Managed retreat is increasingly recognized as a permanent, cost-effective solution to address flooding and erosion.

While managed retreat takes many forms, buyouts are a core strategy for reducing risk. Unfortunately, buyouts are also often controversial. In Canada especially, they are often reactionary, have low uptake, and may suffer from a lack of trust between stakeholders. As a result, a growing body of literature seeks to understand factors which influence residents' willingness to participate in buyout programs. Yet, there are few practical strategies which buyout coordinators can use to improve public perception or participation rates.

This paper applies the concept of social license, or the ongoing public approval of a project, to identify strategies which may assist coordinators in improving buyout acceptance. Factors which impact social acceptance were drawn from managed retreat and coastal adaptation literature, and then combined and contrasted with key informant interviews from Erie Shore Drive, a particularly flood-prone region of Chatham-Kent, Ontario.

The results indicate that proactive and transparent engagement, attention to case-specific context, identification of co-benefits and clear rationale for decision making create a transparent and accountable process in which the benefits and costs of buyouts are better understood by the community. Although no buyout has yet occurred in Chatham-Kent, these results re-emphasize the importance of proactive and meaningful engagement with the public during conceptual development, design and implementation of coastal adaptation projects. Furthermore, these results indicate a need for longer planning horizons, continued hazard identification and acknowledgement of climate change in Ontario's provincial planning guidance.

The paper can be downloaded at www.iclr.org.

Institute for Catastrophic Loss Reduction

Mission

To reduce the loss of life and property caused by severe weather and earthquakes through the identification and support of sustained actions that improve society's capacity to adapt to, anticipate, mitigate, withstand and recover from natural disasters.

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