

Technical Standards and Safety Authority

Annual State of Public Safety Report

2017 Edition

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Summary

The Annual State of Public Safety Report (ASPR) provides information on Ontario's public safety sector, specifically in the delegated areas overseen by the Technical Standards and Safety Authority (TSSA). This year's ASPR provides the fifth year of the predictive measure 'risk of injury or fatality', to facilitate prediction of expected injury burden during the upcoming year. Trend analysis over a rolling five-year average is included. The metric is a valuable public policy tool as it enables cross-sector and cross-jurisdiction comparisons, as well as increasing the effective use of existing resources (with no increase in risk).

For at least the last four years fuel-related risks at private dwellings, and carbon monoxide exposure in multi-unit residences, are TSSA's highest (unacceptable) risk. Human factors on elevators in retirement and long-term care homes, and fuels in academic locations are also unacceptable risks (above the risk acceptability criteria). Fire in food service locations, and fuel in business units and retirement and long-term care homes are tolerable risks provided controls are in place (>50% of risk acceptability criteria). All technologies periodically inspected by TSSA are within acceptable risk levels.

Comments and Recommendations

TSSA's top sources of risk in 2017 are: CO in apartments and condominiums; fuels in private dwellings, academic locations, business units, and retirement and long-term care homes; human factors on elevators in retirement and long-term care homes, and; fire in food service locations. These are shared risks where TSSA is only one safety partner. TSSA's top risks could be presented in a disaggregated manner, with TSSA-mandated risk trends outlined relative to human behaviour, and other key safety partners.

TSSA deserves credit for addressing these complex risks, however the ASPR could provide clearer distinction on what risks fall solely within TSSA's mandate, and how these are linked (or not) to the overall, broader risk. The ASPR can also present a credible plan to address these risks, and notional outlines of various safety partner accountabilities. The ASPR's strength is its annual publication, allowing credible monitoring of trends. This can readily be adapted to monitor trends in broader multi-partner safety issues such as carbon monoxide poisoning and fuels.

The ASPR would benefit from a section outlining where TSSA's safety mandate is particularly shared with other safety partners. In the Sector Directors comments section reference could be made to the areas that are a shared mandate, e.g. elevator reliability, carbon monoxide poisoning in buildings. The ASPR could then track progress made in these shared initiatives.

The following comments and recommendations include updates of last year's CSRO review and recommendations (2016 ASPR).

- (i) Statutory Directors should continue to provide the status of regulatory underpinnings and their opinions on effectiveness and areas for enhancement, e.g. when was legislation last updated, is there a review process underway (if so, expected schedule), are there other jurisdictions that are particularly noteworthy. Where a Regulatory Renewal Initiative is underway much of this information would be gleaned through that process, however the ASPR gives Directors an opportunity to signal

trends and suggest legislative refinements and safety partner's activities within the sector. Statutory Directors may also want to use this section to signal potential areas for enhanced future integration as new administrative authorities and government-supported programs are announced, e.g. free home thermostats, licensing of home inspectors, education requirements to get a condominium manager licence. Some of the discussions by Directors in this year's ASPR are excellent.

- (ii) Nearly 5% of occurrences in mass transit locations (EM) involve intoxicated patrons (and the rate is increasing). The potential impact in this area from legalized marijuana may be high, and likely needs vigilance. This may be an issue in other areas such as elevators, ski lifts, and amusement devices.
- (iii) Five years of compliance data are presented in the ASPR; compliance ranges from a high of 98% (BPVs) to a low of 13% (EMs), with an aggregate 2013-2017 compliance rate of 35%. This year's ASPR includes cross-program compliance measures reflecting overall level of compliance across regulated sectors. This is a useful addition. Differentiation across baseline data is likely still warranted to better facilitate comparisons of Ontario's performance in specific sectors across jurisdictions, e.g. ED compliance in Ontario vs BC or New York State. The need to clearly connect compliance with risk continues – i.e. does 'non-compliant' indicate greater risk?
- (iv) Elevator reliability is a complex issue with facets exceeding TSSA's safety mandate however on EDs (and possibly escalators) a short discussion on risk of inoperability (availability) continues to be warranted. This is not strictly a risk metric of the existing inspection regime, however absence of elevator (escalator) service can pose serious risks that could be acknowledged. Similarly, for EDs a discussion on entrapment trends is warranted. These issues could be raised in a 'shared mandate' section of the ASPR.
- (v) The ED and EM contractor rating system as proposed in the 2015 ASPR remains an important advancement, as is the suggestion of a clear time-bound strategy for improving compliance levels. Several jurisdictions publish similar contractor information. The importance of information on ED contractors is increasing in light of growing entrapments and (possibly) maintenance backlogs. Licenced condominium managers may also be a good source of information. As part of 20/20, ideally no later than 1 January, 2019, this information should be developed for monitoring, publicizing (perhaps with international comparators), and setting compliance levels (and service). These compliance level targets may need to be differentiated by type and location of building.
- (vi) The risk of elevators in retirement and long-term care homes is increasing. Fuel risk in retirement and long-term care homes is also of concern (above the 50% of risk accessibility criteria). Perhaps an integrated approach is warranted, combining the two sectors, as well as other agencies. The 'special buildings pilot' might be expanded to bring in other safety partners.
- (vii) Information on disaggregated risk highlighting the heterogeneity of risks by location could be a useful addition, e.g. certain risks in Northern Ontario vs City of Toronto, relative to the Province overall. Larger cities may concentrate certain risks (and economies of scale in oversight may be possible). Remote communities may require unique and collective approaches to maintenance and regulation. Most risk data is

now disaggregated by populations. Disaggregating by location may be equally useful.

- (viii) TSSA may also wish to suggest a unique and combined approach to safety regulation for the Ring of Fire mining area. If the development goes ahead there may still be time to develop integrated approaches and combined inspections (integrating several Ministries and Agencies).
- (ix) Similar to the catalytic role that TSSA took in helping MGCS and the province of Ontario address elevator availability, a multi-sector, multi-agency review of schools and hospitals may be warranted (e.g. CO, energy efficiency, resilience; Annex 1).
- (x) A discussion on data availability and integrity continues to be useful, e.g. quality of data and trends on collection, compared to other Ontario agencies. This is especially the case in the fuels and elevating devices sectors.
- (xi) Similarly, initiatives like the special buildings pilot may be useful to emerging programs such as the City of Toronto's multi-residential buildings operating license regime, and initiatives for institutions with vulnerable populations.

Review of Specific Sectors

Several recommendations from last year remain (and where applicable are updated by TSSA in Summary Annex).

Boilers and Pressure Vessels (BPV)

- (i) The need for a target date remains for standardized orders and assessments in facilities overseen by both TSSA and those insured facilities not inspected by TSSA staff. How and when this might be harmonized with the National Board's violation tracking form, perhaps through revisions in TSSA 20/20, should be provided.
- (ii) The total (estimated) number of BPVs in Ontario could be provided, and the number inspected by insurance representatives that year. This would help highlight the role of TSSA's inspection regime relative to inspections by insurance agents.
- (iii) There may be merit in integrating inspections of BPVs in schools with fuels inspections and energy efficiency – retrofit programs (as suggested in the Environmental Commissioner of Ontario's review, 'the need for energy efficiency and modernization in schools').
- (iv) Continued comparison to the National Board's Violations Tracking KPI that started in 2017, should continue (TSSA compares favorably - ~98% to ~100% compliance)
 - Compliance rate (2013 – 2017): 98%
 - No observed trend in compliance rate (presumed similar rates of compliance for insured facilities)
 - In 2017 there were three reported occurrences (investigations completed)
 - MGCS and TSSA undertaking a review of relevant regulation (Reg 220/01) – planned target effective date of July 2018.

Operating (Power) Engineers (OE)

- (i) As quickly as practicable TSSA should publish the names of Operating Engineers licence holders, similar to Professional Engineers Ontario (perhaps this could proceed ahead of completion of TSSA 20/20).
 - 57% non-compliance rate (same as 2016)
 - No observed trend in compliance rate
 - Risk-based profile in Ontario shifted from medium to low risk
 - 3,314 plants and 12,571 operating engineers in Ontario (3,069 and 12,700 respectively in 2016)
 - 46 high-risk facilities (down from 120 in 2016)
 - MGCS and TSSA undertaking a review of relevant regulation (Reg 219/01) – expert panel meetings completed February 2017, public review of report expected late summer 2017, OE Risk Task Group should wrap up work by April 2018

Amusement Devices (AD)

- (i) Specific targeting of reduced risk on water slides, including continued public safety campaigns and sharing of incident information should continue (e.g. Canada Safety Council request and recent US incident). Plans to review root cause analysis data over the coming year should continue (results reported in next year's ASPR)
- (ii) Follow up efforts to make rides more accessible to persons with disabilities should continue. Progress with water slide accommodation recommendation is commendable.
- (iii) The presentation of each ride with two metrics is not clear, e.g. Coaster rides accounted for 14% and 38% of related observed injury burden. Perhaps this could be clarified (in following sectors as well) .
 - Approximately 2,276 permitted amusement devices in Ontario
 - 3,407 occurrences 2008 – 2017 (170 permanent and 3,061 non-permanent injuries)
 - Potential risk of injury or fatality 0.11 FE/mpy
 - 34% non-compliant (same as 2016; no demonstrable trend in compliance rate)
 - Increasing occurrences and injuries of approximately 7% per year
 - 95% of risk due to external factors (outside TSSA regulatory mandate, e.g. user behavior); 96% of all amusement occurrences due to human factors
 - Trips and falls account for nearly almost half of observed injury burden
 - Over the past 10 years injuries on waterslides make up 60% of observed injury burden
 - Increasing trends in number of occurrences and injuries reported over the last three years, likely attributable to better reporting

Elevating Devices (ED)

- (i) TSSA should make much of its elevator data readily available through website, e.g. licenses and inspection dates; perhaps as part of the Province of Ontario's 'Open Data' efforts [pending completion of 20/20].
- (ii) Identification and targeting the 'unacceptable risk' in retirement and long-term care homes (0.82 FE/mpy) is commendable. An ongoing program, perhaps in partnership with RHRA and/or ORCA, is warranted.

- (iii) A specific target date for publication of ED information (and scope of data publication) should be proposed by TSSA, consistent with ongoing TSSA 20/20 efforts. Applicability of this data (e.g. by hospitals, homes for the aged, public housing, schools, rental residential buildings, commercial, etc.) should be assessed.
 - (iv) Related to above, with 83% of associated injury burden taking place in rental locations, despite accounting for only 17% of elevators, a tailored information and education campaign may be practical (likely in partnership with local municipality).
 - (v) As soon as practicable, TSSA should post when elevators (and escalators) are ordered shut-down by TSSA (in the City of Toronto this might be part of the new multi-unit residential building licensing program). [pending 20/20]
 - (vi) Elevator entrapment incidences are typically compiled by local fire departments (and 911 calls). Strictly speaking, elevator entrapments are not under TSSA's mandate, however as entrapments present a potential safety risk (e.g. people trying to escape), and are a general reflection of the efficacy of overall maintenance, incidents should be tracked (and possibly posted), particularly in the Greater Toronto Area. Suggestions may emerge from the Deloitte review on how to collect and post this information – if not TSSA may propose a method.
 - (vii) TSSA and MGCS should ensure that mandatory courses required for licencing Condominium Managers include information on elevator maintenance standards, industry practices, and best-practices in service contracts.
 - (viii) The Director's concern with the continued downward trend of compliance is warranted and should be reflected in the ongoing stakeholder sector review (i.e. Deloitte study).
 - (ix) Elevator occurrences caused by damage due to water exposure accounted for 34% (an increase). How these occurrences might be impacted by climate change and efforts toward greater building resilience should be monitored.
- 56,236 elevators licensed in Ontario (an increase of 1000 from 2016)
 - 3,509 occurrences 2008 – 2017 (6 fatalities, 76 permanent and 1,317 non-permanent injuries)
 - Observed injury burden of approximately 0.04 FE/mpy
 - Unacceptable level of risk in retirement and long-term care homes of 0.82 FE/mpy (often due to levelling occurrences, largely attributed to improper maintenance)
 - Overall occurrences demonstrate an increasing trend of approximately 14% per year
 - Median compliance rate of 25% (decreasing by 2% per year)
 - 76% of estimated historical risk (last ten years) due to factors external to regulatory requirements (most external factor occurrences due to human factors)
 - Despite accounting for only 17% of door closing occurrences, 83% of associated observed injury took place in rental locations (similarly 16% of occurrences and 39% of injuries took place in condominiums, and 27% of door closing occurrences and 3% of injuries in office locations)
 - Decline in 'high-risk' devices
 - Damage due to water exposure accounted for 34% of occurrences
 - Potential risk of injury or fatality 0.48 FE/mpy
 - Passengers struck by closing doors main cause of injury (56% of observed injury)
 - Deloitte multi-stakeholder study on elevator availability now underway

See Annex 4: Elevator Entrapments

Escalators and Moving Walks (EM)

- (i) Continued focus at mass transit facilities is warranted. Occurrences are increasing 7% per year (5% involved intoxicated patrons – is there work underway on potential impact from legalized marijuana). Operating escalators in transit facilities are particularly important in emergency events.
 - (ii) Overall there remains a need for improved compliance rate (a summary of the time bound plan should be provided in the ASPR). This could be combined with a similar plan for elevators (following the Deloitte review).
 - (iii) The Director's messaging to industry to enhance level of compliance related to required maintenance is commendable.
- Over 2,200 installations regulated by TSSA in Ontario
 - 5,783 occurrences 2008 – 2017 (1 fatality, 41 permanent and 3,969 non-permanent injuries – increasing by 3% per year)
 - 13% compliance rate (no demonstrable trend)
 - 97% of risk may be caused by factors external to regulatory requirements
 - Predictive model estimates a risk of injury or fatality to Ontarians of 0.07 FE/mpy
 - Trips and falls account for over 90% of observed injury burden
 - Mass transportation locations account for nearly 60% of occurrences (increasing by 7% per year with 5% of these involving intoxicated patrons)
 - There are no high-risk devices, nearly 60% of all medium risk devices in mercantile locations

Ski Lifts (SL)

- (i) Addressing major non-compliance through complementary services such as Ski Instructors continues to provide benefits. With 97% of risk continuing to be due to factors external to the regulatory environment public education remains critical (perhaps in conjunction with other risks on the ski hill).
 - (ii) Continued partnership development with Canadian Ski Instructors Alliance, Association of Day Care Operators, and Chirp (Owl Kids) and Chickadee is important, especially with regard to understanding and influencing user behavior.
- 259 ski lifts in Ontario
 - 871 occurrences 2008 – 2017 (24 permanent and 712 non-permanent injuries)
 - 97% of estimated risk caused by factors external to regulatory requirements
 - External factors 48% falls, 30% physical impacts, 9% entanglement
 - No high-risk devices in Ontario (decline from 2016)
 - No discernible trend for occurrences, fatalities or injuries
 - 50% inspection non-compliance rate
 - Predictive model risk of injury or fatality to Ontarians of 0.02 FE/mpy

Fuels (FS)

- (i) Fuels continue to represent the largest risk center under TSSA's oversight, with 64% of the risk of injury or fatality attributable to non-compliance with the regulatory system (the highest by sector under TSSA oversight). The potential risk of injury or fatality is 1.76 FE/mpy (an 'unacceptable level'). Therefore, the fuels sector

- warrants continued focus for enhanced regulatory approaches, e.g. propane risk management systems.
- (ii) A long term strategy to address CO risk (across all sectors and facilities) remains. As a minimum, special buildings (especially schools and health-, long-term care facilities) and new building technologies (e.g. net zero energy homes) need to be included in the strategy. The strategy also needs to reflect that the largest source of risk at private dwellings continues to be CO release (e.g. an unacceptably high of 3.83 FE/mpy at apartments and condominiums). The November 2016 workshop was an excellent input to the strategy.¹ Support of the CO Collaborative Network appears to be a promising outcome.²
 - (iii) The CO strategy might take advantage of the new requirement that Home Inspectors are now licenced in Ontario (MGCS may be able to facilitate discussions with inspection programs to include potential CO release assessments, with input from TSSA). If the level of knowledge required to make an adequate CO release assessment is beyond the scope of a home inspection, revisions to the training or inspection process may be warranted (these may be the only options for – somewhat – qualified inspectors in the home). There may also be opportunity to review ways to reduce potential CO poisoning through installation of free home thermostats (carried out by trained installers, and combined with home energy audits – again, personnel in the home are rare, there may be potential synergies). Use of these personnel might be trialed on a pilot basis.³
 - (iv) Phase 2 of the Special Buildings Inspections Pilot to address schools is welcome. The review should include a focus on integrated support by various safety partners, and facilities upgrading, e.g. replacement of boilers and HVAC systems.⁴
 - (v) The success in introducing RBS for propane facilities is noted. Lessons learned could be applied to other fuels areas (and TSSA overall).
 - (vi) MGCS should ensure that through the recently enacted licencing requirements for Home Inspectors, (single family) home inspections include consideration of CO poisoning potential and assessment of common avenues of risk (as part of inspection process), or provide homeowners with alternate plan to address potential CO issues.
- Fuels represent the largest risk center under TSSA’s oversight
 - 7,371 occurrences 2008 – 2017 (47 fatalities, 135 permanent and 492 non-permanent injuries). 4,226 liquid fuel and 1,346 propane facilities.
 - Average injury burden of 0.35 FE/mpy and predictive estimate of risk of injury or fatality from fuel-fired appliances of 1.76 FE/mpy.
 - No demonstrable trend in occurrences or injuries
 - Largest source of risk continues to be CO release (estimated at 3.83 FE/mpy CO risks at apartments and 4.69 FE/mpy at private dwellings; well above international benchmark of 1.0 FE/mpy)

¹ The January, 2017 meeting between TSSA and Municipal Licensing & Standards and agreement to work together on revising the apartment building bylaw for rental buildings in Toronto is welcome (and likely precedent setting).

² Continued participation by TSSA in the CSA CO Focus Group remains practical.

³ The single largest cause of CO occurrences is inadequate maintenance, e.g. venting issues including blocked or broken venting and chimneys. Perhaps this aspect alone could be assessed by home inspectors and energy auditors.

⁴ TSSA partnering with OMC of the OASBO (maintenance arm of the school boards) is an excellent initiative. How the lack of maintenance in schools, and its contribution to CO risk, relates to other maintenance backlogs should be monitored, and communicated as necessary.

- Compliance rate 72% propane (8% of facilities high-risk) and 39% liquid fuels (3% of facilities high-risk)
- Dramatic increase in high and medium risk propane facilities with respect to last year attributable to harmonizing RBS calculations across programs (nearly 85% of all high risk facilities are cylinder filling stations)
- Vehicles colliding with gas supply equipment at business units accounted for 52% of upstream occurrences (an increasing trend of 17% per year).
- Majority of all vapour releases observed in academic institutions due to inadequate maintenance or poor installation
- TSSA planning multi-sector partnerships to: raise awareness of CO issues with global partners, managing risks at multi-residential location (including the City of Toronto), commercial building project, managing risks at institutions housing vulnerable populations (including partnering with the Operations, Maintenance and Construction (OMC) committee of the Ontario Association of School Board Officials

Emerging Issues in Fuels Safety

Continued from last year - Liquefied natural gas (LNG) for small plants; refueling and vehicles standards development; stated goal of Canada-US-Mexico fuels standards harmonization (despite current NAFTA re-negotiation); increasing incidence of carbon monoxide poisoning in residential buildings (where TSSA has limited regulatory capacity); implementing revisions to propane regulations; Special Buildings Inspections Pilot; closure of fuel stations, particularly in Northern Ontario; the Fuels sector in Ontario may provide a good platform for innovation and proactive management relative to North America wide programming,

Interest in fugitive emissions (leaks), especially those from natural gas pipelines and equipment, will grow. Natural gas (methane) has a global warming potential (GWP) more than 25-times CO₂. These emissions are of concern because of their potential to: (i) contribute to climate gases (growing concern); (ii) impact public health (growing area of research), and; (iii) potential for fire and explosion. On the other hand, natural gas is of growing value in the transportation sector where it can provide similar power levels to gasoline and diesel fuels with 30% less GHG emissions (and less particulate pollution and noise).

As efforts continue to make homes more energy efficient (e.g. net energy zero), the potential of CO poisoning may increase, as homes are actually more air-tight. Municipalities will need to ensure that final building inspections of new homes consider this (perhaps with advice from TSSA).

Most of the 'special buildings' defined targeted in the fuels sector pilot program are government managed (and financed) facilities, e.g. hospitals and schools, Therefore punitive fees and shutting down elevators and fuel systems, may target the wrong people. A comprehensive program with a consolidated, integrated maintenance program is likely the most effective way to enhance compliance in a cost-effective manner, while also meeting other ancillary facilities requirements. Local municipalities are also important safety partners, e.g. Fire Departments.

Upholstered and Stuffed Articles (USA)

- About 6,671 inspections conducted over the past five years
- Issued 96,224 orders with 154,131 articles 2013 – 2017
- Over past six years four incidents involving 5 people (contaminated fill material)
- Similar to last several years in 2017 the top compliance infraction was “Manufacturer not registered in Ontario”

Emerging Issues in Upholstered and Stuffed Articles

Mattresses by mail and other online purchases delivered directly to homes. Trade issues and online purchases. MGCS led review of sector proposes to apply regulation to bedding, mattresses and upholstered furniture only. All other articles will be exempt. Changes expected to take effect July 1, 2018.

Reviewing the Data

The ASPR and its fundamental underpinning through RIDM are based on probabilistic risk assessments from collected and inferred data. These evaluations are sufficiently robust to enable risk-based responses, e.g. shifting the timing of inspections in sectors such as licensed propane facilities. This can provide significant cost savings (without increasing risk) and help to focus inspections and regulations on areas of greater risk. As much of TSSA’s risk profiling is based on available and interpreted data, this information should be as public and readily accessible as possible.

Public trust is a key aspect of effective RIDM. This trust is largely based on public respect in data and its interpretation. The ASPR presents much of this data. As part of the ongoing TSSA 20/20 process efforts should continue to look for ways that this data could continue to be readily available with enhanced ‘user friendliness’.

Ontario Risks Outlook – 2017

Started in 2015 the Ontario Risks Outlook provides a consolidated snapshot of Ontario’s risk landscape. Risks are projections of future impacts of both injury burden and potential economic losses borne by Ontarians. The risks include regional downscaling of global risks from the World Economic Forum and ranking of Canada’s leading rates of disability-adjusted life years (DALYs) relative to comparator countries in 2010 (Institute for Health Metrics and Evaluation, 2015). WEF risk ratings are updated annually; Canada’s health metrics are not yet regularly updated.

The Health Metrics and Evaluation report provides ranking and relative quantification in terms of years of life lost to unintentional or intentional injury, such as self-harm, road injury, falls, and interpersonal violence. Costs of preventable injuries are quantified through Parachute Canada in collaboration with the Conference Board of Canada.

For comparative purposes the list includes the top five causes of injury in Ontario (direct and indirect impacts) and proposed top five regionally manifest large-scale risks (potential impacts).

This remains an informal attempt to compare two types of risk – personal injury and large-scale trends (macro issues). By using a common metric (burden of disease and financial costs) public policy initiatives can be designed to maximize potential risk mitigation benefits across sectors.

The mandate of TSSA within the broader Ontario risk landscape, provides ancillary economic benefits and relevant metrics outside the delegated sectors. Falls, for example, exact a very large economic burden on Ontario. TSSA's work on elevating devices, and the critical nature of user behavior, bears this out. Public safety messaging for elevators developed by TSSA may readily be adapted to other areas. Unintentional poisoning is another area with wide public messaging potential (see Annex 5).

Draft top Ontario's Risks Outlook – 2017

- Failure of climate change adaptation and mitigation – extreme weather events
- Failure of critical infrastructure – including cyber-attacks and data theft
- Falls
- Transport Incidents
- Self-harm
- Unintentional poisoning
- Water crises
- Conflict – including terrorism, collapse of governance, and weapons of mass destruction
- Spread of infectious disease
- Violence (personal)

References

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Annex 1: Continuing to look at schools and hospitals

[Updated from last year's review]

Academic institutions and hospitals pose a unique challenge to TSSA. The facilities, mainly overseen and funded through provincial ministries, are subject to several over-lapping, and at-times conflicting demands. For example, the 2016 report by the Environmental Commissioner of Ontario highlights the disproportionate energy use by schools and hospitals (Fig 4.2 from ECO Report). The highly variable energy efficiency of these buildings is also noted (Fig 4.3 from ECO Report).

In *Conservation: Let's Get Serious* the Environmental Commissioner specifically highlights the need for greater conservation efforts in Ontario schools and hospitals. These activities need to be consistent with TSSA's Special Buildings pilot, as well as efforts to reduce potential CO poisoning (often through building improvements and upkeep).

The Toronto District School Board, as an example, says roughly 200 of its 588 schools require "urgent" repairs such as leaking roofs and old boilers. The Board has a \$3.4-billion maintenance backlog with some 23,000 listed repair requirements. [Values from 2016]

Schools and hospitals are particularly important as sites of vulnerable populations, and shelter locations, in emergency planning efforts, e.g. climate adaptation and urban resilience. These buildings will receive greater focus for vulnerabilities and the need for them to operate during and after a storm, or emergency event.

The push for upkeep of schools and hospitals, remedying backlog issues, greater energy efficiency, resilience, and key function in emergency planning, all need to proceed in concert with efforts to reduce the risk of CO poisoning. Schools and hospitals present special challenges that need to be integrated with several other trends and new programming impacting the same buildings.

Similar to the catalytic role TSSA took in helping MGCS to address elevator availability, a multi-sector, multi-agency review of schools and hospitals may be warranted.

Figures from, 'Conservation: Let's Get Serious. Annual Energy Progress Report – 2015/2016', Environmental Commissioner of Ontario, May 2016

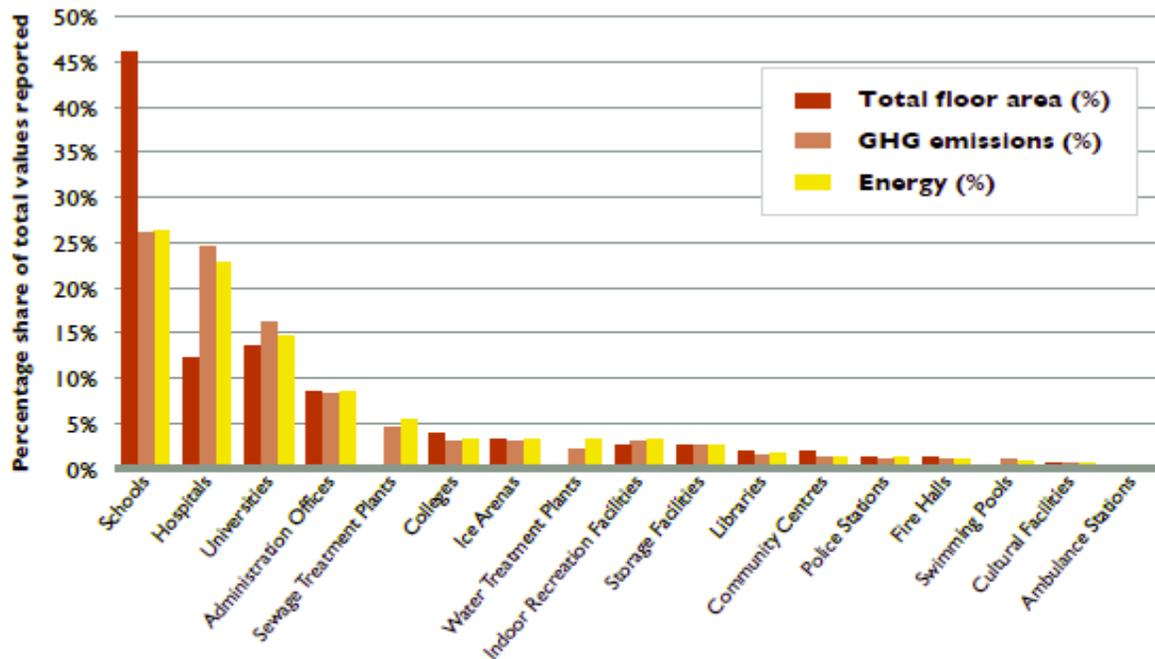


Figure 4.2: Square footage, energy, and GHG emissions by property type in 2011 as a percentage share of the total values reported.

Note: The floor area for Sewage Treatment and Water Treatment operations is not shown because energy consumption within these facilities is primarily influenced by the volume of water treated and not by the conditioned floor area.

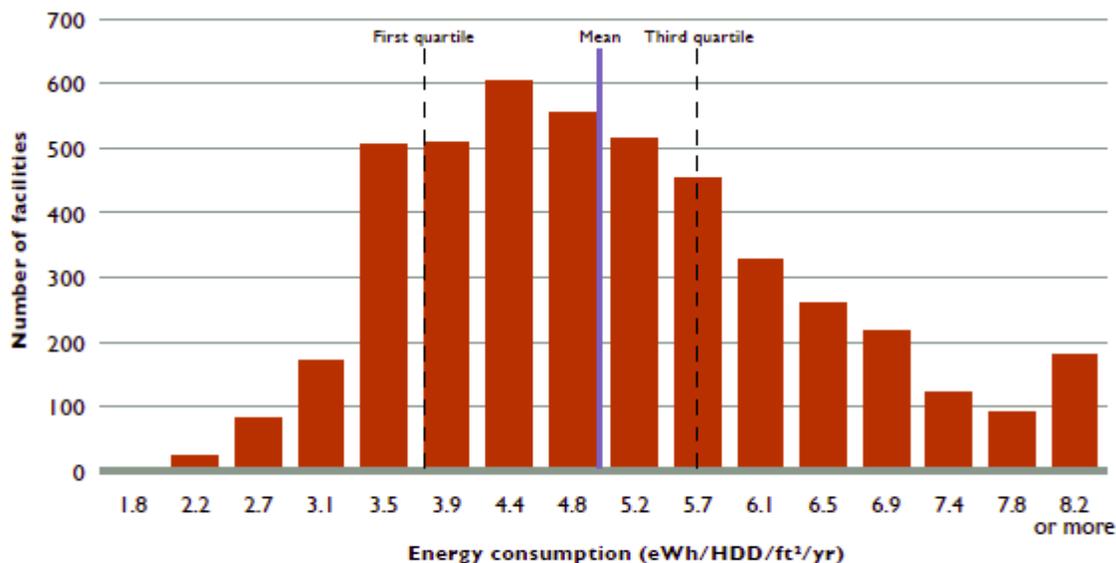


Figure 4.3: Energy consumption curve for Ontario schools – 2011

Note: Energy Consumption is shown as equivalent watt-hours per heating degree day per square foot because both area and weather (heating degree day) influenced the amount of energy used within each Ontario school. The above histogram is based on energy data for over 4,600 buildings.

Annex 2: Annual State of Public Safety Report - Background

Adapted from 2016 Review: This is TSSA's ninth enhanced Annual Public Safety Performance Report; now Annual State of Public Safety Report (ASPR). Publication of the ASPR is consistent with reporting requirements stipulated in the Technical Standards and Safety Act, 2000. The CSRO's mandate as amended October 25, 2010, includes "review, analyze and report on TSSA's annual safety performance reports."

Similar to last year, this year's ASPR includes 'Full Report' (101p), Summary 'Annual Public Safety Report, 2017' (101 p document prepared for general public).

General Overview

The ASPR provides an important state-of-the-Province risk benchmark. TSSA's mandated risk reduction efforts represent only about 0.1% of Ontario's fatality rate due to unintentional injuries. And even within TSSA's scope of oversight as stipulated in the Technical Standards and Safety Act, 2000, more than 95% of the residual risk of injury or fatality in the delegated sector is caused by external factors, such as user behaviour, rather than inadequate regulatory systems. However the ASPR underpins the ability of regulated entities to enter into Public Safety Risk Management plans, as well as providing nascent analysis for emerging issues such as elevator availability and fuel supply.

TSSA's risk informed decision making (RIDM) framework and the term "risk of injury or fatality"⁵ provides an objective, evidence-based assessment and decision-making approach that helps TSSA's Statutory Directors discharge and assess their regulatory responsibilities as trends and impacts can be readily monitored. The framework also enables development and monitoring of associated educational campaigns; and increasingly, expansion of risk reduction efforts to related activities, for example fuels and carbon monoxide poisoning in residences.

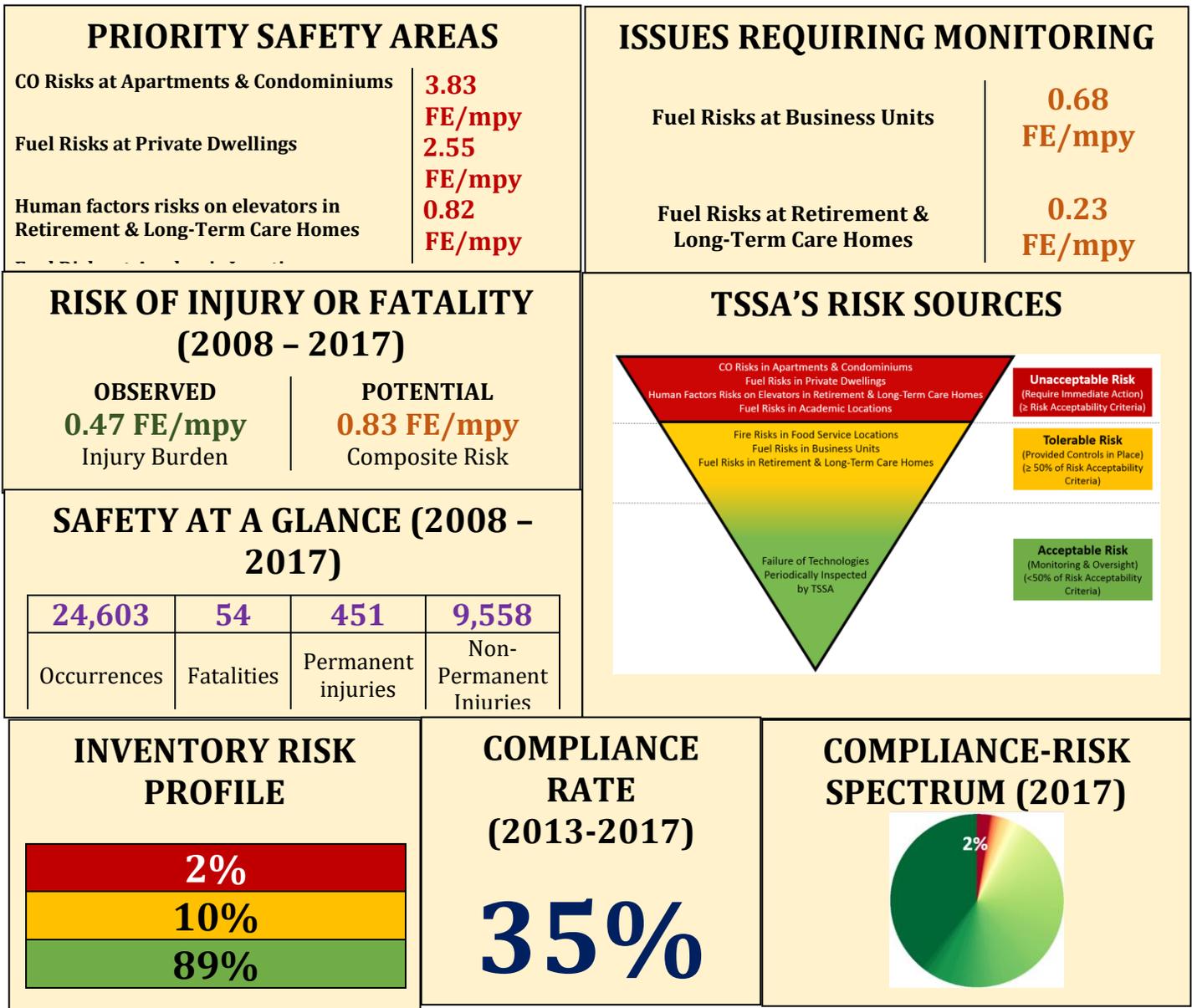
The majority of the estimated overall risk under TSSA's review continues to be caused by external factors, largely related to carbon monoxide poisoning; most of this in residences. This highlights the need for TSSA to increasingly work with safety partners and ensure, where practical, clear articulation of understood scope of mandate, and general input into a broader multi-stakeholder discussion on collective public safety needs.

This year's ASPR provides the fifth year of the predictive measure, 'risk of injury or fatality,' to facilitate prediction of the expected injury burden during the course of the upcoming year as well as trend analysis over a rolling five or ten-year average. The metric enables cross-sector and cross-jurisdiction comparisons thereby providing a valuable public policy tool.

Application of risk of injury or fatality is useful for TSSA's internal planning and programming as well as reviewing risk analysis across other sectors and jurisdictions. For example, work continues on harmonized North American fuels standards, and the assessment of risk in areas such as pipeline and rail safety, and newly emerging issues like autonomous vehicles.

⁵ RIDM – risk informed decision-making – is a general risk industry standard that originated in systems engineering. Complex systems and their human interactions, like amusement devices, ski hills, elevators, and fuel systems can be assessed through RIDM, and quantified by metrics like disability adjusted life year (DALY) or the simpler "risk of injury or fatality" (used within TSSA's ASPR beginning 2012/2013 edition – as well as 'fatality equivalent'). 'Risk of injury or fatality' denotes a consistent unit that enables comparison of risk across time, societies and activities.

Annex 3: State of Public Safety in Ontario – 2017 ASPR Summary



Annex 4: Elevator Entrapments

From 2016 ASPR review: Baseline statistics are not readily available, however several sources suggest the number of elevator entrapments is growing in Ontario (Canadian Press, Jul 21, 2016). Entrapments tend to be a reflection of general use, age of ED and maintenance practices. Annual trapped-in-elevator incidents in Ontario increased 110% from 2000 to 2015. In 2015 the City of Toronto had 2,862 elevator-rescue calls to 911. Some buildings in Toronto typically have two 911 calls a month from trapped-in-elevator passengers. And the majority of entrapment calls do not go to 911, rather they go directly to building staff, or ED maintenance companies [updated statistics for 2016 – 2017 not available].

About two-thirds of elevator entrapments continue to be in residential buildings. In addition to aging buildings, Ontario's elevator stock increased 11% over the last five years (and the rate of increase is growing). Anecdotally thirty years ago a typical elevator technician would service some 35 to 45 elevators per month (at about \$1000 per ED). Today that may have shifted to 100 elevators per month (at about \$600 per ED)⁶ [updated 2017 budget estimates not available].

The City of Toronto is introducing a multi-residential rental property license, modelled notionally after the cities of New York and Los Angeles. The program would apply to about 3,300 rental apartments three storeys or higher (excluding condominiums and co-operatives). The program would cost about \$3.5 million per year to administer (requiring an estimated licensing fee of \$12 to \$15 per unit, excluding Toronto Community Housing Corporation properties) and replaces the 2008 Multi-Residential Apartment Building (MRAB) Audit. Approximately half of Toronto's residents live in apartments.

The City of Toronto, like many Ontario municipalities, is also reviewing elevators within a growing focus on urban resilience. In storm events and power outages (presumably increasing with climate change) the critical role of elevators, particularly in residential buildings, is exacerbated.

The Deloitte Elevator Availability review, expected November 2017, should address many of these issues.

⁶ Broken elevators reaching 'crises' proportions across Canada. Colin Perkel, The Canadian Press Jul 21, 2016

Annex 5: Ontario Risks Outlook

Introduced in the 2015 CSRO Annual Report a consolidated Ontario risks outlook is proposed as a way to place risks in context. The risks combine the annual World Economic Forum's (WEF) Global Risks Report and Parachute Canada's latest assessment (Cost of Injury in Canada, 2015). The WEF Risks Report from 2015 to 2016 shifted slightly with greater risk identified from lack of climate adaptation and mitigation (see Figures A1 – A3).

The consolidated Ontario Risks Outlook 2015 to 2017 shifts slightly, with the risk of climate change moving slightly ahead of failure of critical infrastructure. Ontario's main risks remain failure of critical infrastructure and failure to sufficiently adapt to extreme weather events. Risks to individuals remain falls, transport incidents and self harm (including accidental poisoning).

ONTARIO RISKS OUTLOOK – 2017 DRAFT

- Failure of climate change adaptation and mitigation – extreme weather events
- Failure of critical infrastructure – including cyber-attacks and data theft
- Falls
- Transport Incidents
- Self-harm
- Unintentional poisoning
- Water crises
- Conflict – including terrorism, collapse of governance, and weapons of mass destruction
- Spread of infectious disease
- Violence (personal)

ONTARIO RISKS OUTLOOK – 2016 DRAFT

- Failure of critical infrastructure – including cyber-attacks and data theft
- Failure of climate change adaptation and mitigation – extreme weather events
- Falls
- Transport Incidents
- Self-harm
- Unintentional poisoning
- Water crises
- Spread of infectious disease
- Conflict – including terrorism, collapse of governance, and weapons of mass destruction
- Violence (personal)

ONTARIO RISKS OUTLOOK – 2015 DRAFT

- Failure of critical infrastructure – including cyber-attacks
- Failure of climate change adaptation – extreme weather events
- Falls
- Transport Incidents

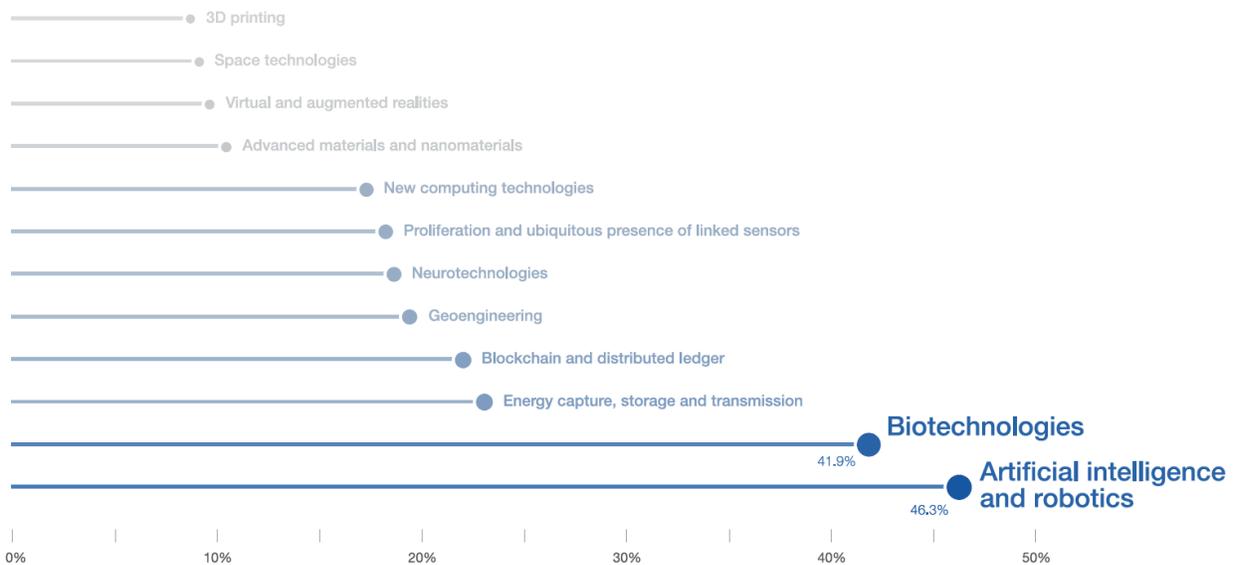
- Self-harm
- Unintentional poisoning
- Spread of infectious disease
- Water crises
- Conflict – including terrorism, collapse of governance, and weapons of mass destruction
- Violence (personal)

World Economic Forum 2017 Global Risks Report (12th Edition)

Figure A1: Top Ten Global Risks, Likelihood and Impact (2017)

Top 10 risks in terms of Likelihood	Top 10 risks in terms of Impact
1 Extreme weather events	1 Weapons of mass destruction
2 Large-scale involuntary migration	2 Extreme weather events
3 Natural disasters	3 Water crises
4 Terrorist attacks	4 Natural disasters
5 Data fraud or theft	5 Failure of climate-change mitigation and adaptation
6 Cyberattacks	6 Large-scale involuntary migration
7 Illicit trade	7 Food crises
8 Man-made environmental disasters	8 Terrorist attacks
9 Interstate conflict	9 Interstate conflict
10 Failure of national governance	10 Unemployment or underemployment

Figure A2: Emerging Technologies Perceived as Needing Better Governance



Source: WEF global risk perception survey, 2016. Percentage of respondents who selected each technology.

Figure A3: Change in Global Risks 2015 to 2017

Likelihood, 2015

- Interstate conflict
- Extreme weather events
- Failure of national governance
- State collapse or crises
- Under-, Unemployment

Likelihood, 2016

- Involuntary migration
- Extreme weather events
- Climate change mitigation and adaptation
- Interstate conflict
- Major natural catastrophe

Likelihood, 2017

- Extreme weather events
- Involuntary migration
- Major international disasters
- Large-scale terrorist attacks
- Massive incident of data fraud/theft

Impact, 2015

- Water crises
- Spread of infectious disease
- Weapons of mass destruction
- Interstate conflict
- Climate change mitigation and adaptation

Impact, 2016

- Climate change mitigation and adaptation
- Weapons of mass destruction
- Water crises
- Involuntary migration
- Severe energy price shock

Impact, 2017

- Weapons of mass destruction
- Extreme weather events
- Water crises
- Major international disasters
- Climate change mitigation and adaptation