

Technical Standards and Safety Authority

Annual State of Public Safety Report

2018 Edition

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Summary

This is a draft version. An additional annex will be provided summarizing an audit of ASPR data carried out in October.

The Annual State of Public Safety Report (ASPR) provides information on Ontario's public safety sector in the areas overseen by the Technical Standards and Safety Authority (TSSA). This year's ASPR provides the sixth year of the predictive measure 'risk of injury or fatality' (terminology converted to 'health impact' this year), 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 temporal cross-sector and cross-jurisdiction comparisons. This is the 18th annual edition.

For at least the last five years carbon monoxide exposure in multi-unit residences and fuel-related risks at private dwellings, are TSSA's highest (actionable) risk. Elevator risks in hospitals remain a top safety issue (actionable area). User interactions on elevators in retirement and long-term care homes, and fuels in academic locations are a top safety issue (actionable area) due to the vulnerable nature of served populations. Fuel risks in business units, food service locations, and retirement and long-term care homes, approach the risk threshold but do not exceed it, are subject to enhanced monitoring. All technologies periodically inspected by TSSA (core activities) are within acceptable risk levels. Pipeline strike occurrences and fuel contractor audit results were added to the Fuels Safety section. There was no demonstrable trend in the number of strike occurrences.

This is a review of TSSA's analysis of collected data and compliance trends (as reported by TSSA staff), it is not an assessment of data *per se*.

Comments and Recommendations

TSSA's top sources of risk in 2018 are: CO in apartments and condominiums; fuels in private dwellings; hospital elevators; user interactions on elevators in retirement and long-term care homes, and; fuels in schools. Areas demanding enhanced monitoring include fuel risks in retirement and long-term care homes, business units, and food service locations. These remain shared risks where TSSA is one of several safety partners.

Risk levels in three of the five actionable areas increased 2017 to 2018 (with user interactions on elevators in retirement and long-term care homes declining from 0.82 FE/mpy, 2017 to 0.70 FE/mpy, 2018). The five-year average of fatalities is down 40% from 2012.

TSSA deserves credit for addressing these complex risks. The ASPR could suggest what aspect of these risks fall solely within TSSA's mandate, and how these are linked (or not) to the overall, broader risk. The ASPR could also present a plan to address overall risks, and suggested outlines (or summaries of published plans) for various safety partner accountabilities. The ASPR's strength is its annual publication, allowing credible monitoring of trends. Even a simple list of the current understanding of which agencies are responsible for which safety aspects, would be a useful starting point. This can readily be adapted to monitor trends in broader multi-partner safety issues such as carbon monoxide poisoning and fuels. 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. For example, the pie-chart for amusement device rides already shows that 95% of the risk caused over the past eleven years was due to factors external to the regulatory environment.

The ASPR would benefit from a section outlining where TSSA's safety mandate is particularly shared with other safety partners. In the Statutory 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 on these shared initiatives.

The following comments and recommendations also include updates of previous CSRO reviews.

- (i) Appendix F - Legislation and Regulatory Information, is a useful addition to this year's ASPR. Statutory Directors, or alternate, 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). Appendix F provides much of this information. Statutory Directors may also want to signal potential areas for enhanced future integration as new administrative authorities and government-supported programs are announced or discontinued.
- (ii) Elevator reliability (availability) 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 (even though entrapments not regulated by TSSA). These issues could be raised in a 'shared mandate' section of the ASPR. Water exposure, and inoperability (and possibly entrapment) is a similar aspect that will likely grow in Ontario (especially in larger cities). Programing and plans may need to be added to discussions within future ASPRs.
- (iii) 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. Ideally no later than 1 January 2020, 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.
- (iv) The risk of elevators and fuel risk in retirement and long-term care homes is actionable or warrants enhanced monitoring. An integrated approach, combining the two sectors, as well as other agencies, may be useful. The 'special buildings pilot' might be expanded to bring in other safety partners.
- (v) As raised in earlier reviews, 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.

- (vi) 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). Item raised in 2017 review.
- (vii) 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). Item raised in 2017 review.

Review of Specific Sectors

Several recommendations from previous years remain.

Boilers and Pressure Vessels (BPV)

- (i) The marked increase in the number of occurrences (e.g. from 3 in 2017 to 18 in 2018), with corresponding increase in observed injury burden, reflects increased reporting by Ministry of Environment, Conservation and Parks on low-level releases of refrigerants. This is a prudent addition by TSSA considering recent serious ammonia leaks in other jurisdictions. Continued monitoring of releases is warranted, with possible regulatory action.
 - (ii) There may be continued 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’). Fuel risk (with powered boilers) in schools continues to be a risk nexus.
 - (iii) Continued comparison to the National Board’s Violations Tracking KPI that started in 2017 should continue. Adding comparators from outside North America may be informative.
- Compliance rate (2014 – 2018): 98%
 - Increasing trend of 1% per year for the compliance rate
 - In 2018 there were 18 reported occurrences and one permanent injury (marked increase in occurrences due to new reporting of low-level refrigerant releases)
 - Predictive model estimates risk of injury or fatality to Ontarians (from BPVs) to be 0.02 FE/mpy

Operating (Power) Engineers (OE)

- (i) As quickly as practicable TSSA should regularly publish the names of Operating Engineers licence holders, similar to Professional Engineers Ontario (either as part of TSSA 20/20, or separate).
- (ii) Continued involvement with national public-safety association (NAPSAC) on special requirements of ammonia cooled recreation facilities (areas), and possibly enhanced monitoring (oversight) may be warranted.

- 41% compliance rate
- No observed trend in compliance rate; less than 1% of inspections pose unacceptable levels of risk
- Risk-based profile in Ontario remained 'low risk' (potential of 0.01 FE/mpy)
- 3,280 plants and 12,571 operating engineers (same as previous year) in Ontario (3,314 plants and 12,571 operating engineers in 2017)
- Three of four reported occurrences in 2018 involve ammonia leaks (two in recreational arenas)
- 34 high-risk facilities (down from 120 in 2016 and 46 in 2017)
- MGCS and TSSA undertaking a review of relevant regulation (Reg 219/01) – progress stalled, awaiting resumption with new provincial government

Amusement Devices (AD)

- (i) TSSA's commitment to review incident data and relative safety of Ontario's amusement devices is commendable. There is likely merit in reviewing these incidents within a broader framework of other jurisdictions (e.g. Canada, US, international).
 - (ii) The role of ride operators is important in ensuring that users are adhering to rules. Ride operators are likely also important in efforts to make rides more accessible to persons with disabilities. TSSA's inspection practices to witness ride operation should be continued and perhaps enhanced.
 - (iii) There may be merit in presenting number of riders at major facilities/rides (for trend analysis on number of users vs number of occurrences) – this is particularly relevant for waterslides
 - (iv) TSSA should be prepared to comment on emergency situation and evacuation plans for major amusement facilities (municipalities may request these plans of operators)
- Approximately 2,468 permitted amusement devices in Ontario
 - 4,028 occurrences 2008 – 2018 (188 permanent and 3,644 non-permanent injuries; 19 permanent injuries in 2018)
 - Potential risk of injury or fatality 0.14 FE/mpy
 - About 4% of all inspections in past five years pose unacceptable levels of risk (ranges from 2% to 6%)
 - Only one 'high-risk' device (a waterslide)
 - 63% compliance rate (with 5% per year decreasing trend)
 - Increasing occurrences and injuries of approximately 6 to 7% per year
 - 95% of risk due to external factors (outside TSSA regulatory mandate, e.g. user behavior); 95% of all amusement occurrences due to human factors
 - Trips and falls account for nearly almost half (47%) of observed injury burden
 - Over the past 9 years injuries on waterslides make up 48% of observed injury burden
 - Increasing trends in number of occurrences and injuries reported over the last three years, likely attributable to better reporting
 - Rides with highest levels of physical impacts (43% of human factor occurrences – 13% of injury burden) were waterslides, ziplines, coaster rides and circular rides (29%, 22%, 14% and 11% of impacts respectively)
 - Rides with highest levels of trips and falls (19% of human factor occurrences – 47% of injury burden) were waterslides, circular rides, and coaster (46%, 17%, 11% of impacts respectively) – 95% of injury burden occurred at waterslides, most typically in the flume area of the ride

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 [either within or separate of TSSA 20/20].
 - (ii) Identifying and targeting 'actionable areas' for higher risk in hospitals (3.49 FE/mpy) and user interactions in retirement and long-term care homes (0.70 FE/mpy) is commendable.
 - (iii) A specific target date for publication of ED information (and scope of data publication) should be proposed by TSSA, regardless of 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) With concerns about continued trend in decreasing compliance, benchmarking with other jurisdictions may be informative. So too specific trend analysis on key manufacturers.
 - (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).
 - (vi) Elevator entrapment incidences are typically compiled by local fire departments (and 911 calls). Strictly speaking, elevator entrapments (and water exposure) 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. Flooding of elevators, and shafts, should be included in compiled data.
 - (vii) TSSA and MGCS should ensure that mandatory courses required for licencing Condominium Mangers include information on elevator maintenance standards, industry practices, and best-practices in service contracts.
 - (viii) The status and Implementation of Bill 8, Elevator Availability Act, 2018, *vis a vis* the new provincial government (MGCS and TSSA roles) needs to be confirmed. The evolution and implementation of the regulation should be included as a case study of the 'Making of a Modern Regulator' study; there are likely important lessons.
 - (ix) Elevator occurrences caused by damage due to water exposure continues to increase. How these occurrences might be impacted by climate change and efforts toward greater building resilience should be monitored (inclusion in City of Toronto's storm-water master plan is a minimum contribution).
- 55,812 elevators licensed in Ontario (a decrease of 400 from 2017)
 - Two actionable areas identified: elevator risk in hospitals and user interactions in retirement and long-term care homes
 - 4,199 occurrences 2008 – 2018 (8 fatalities, 81 permanent and 1,445 non-permanent injuries)
 - Observed injury burden of approximately 0.04 FE/mpy (same as 2017); potential health impact 0.70 FE/mpy (up from 0.48 FE/mpy in 2017)
 - Unacceptable level of risk in retirement and long-term care homes of 0.70 FE/mpy (down from 0.82 FE/mpy in 2017; often due to door closing occurrences (primary) and levelling occurrences (secondary), largely attributed to human factors and defective equipment)
 - Overall occurrences demonstrate an increasing trend of approximately 7% per year (13% if water exposure included – 36% of all external factors)

- Median compliance rate of 23% (decreasing by 2% per year)
- 69% of estimated historical risk (last eleven years) due to factors external to regulatory requirements (most external factor occurrences due to human factors)
- Decline in 'high-risk' devices over 5 years (large increase from last year)
- Hotels make up only 6% of occurrences of elevator doors closing on passengers, however there is an increasing trend in the number of these occurrences of 21% per year
- Rental locations accounted for only 16% of occurrences of elevator doors closing on passengers, but 82% of associated injury burden
- Damage due to water exposure accounted for 36% of occurrences
- Passengers struck by closing doors main cause of injury (51% of observed injury)

Escalators and Moving Walks (EM)

- (i) Continued focus at mass transit facilities is warranted. Trip/fall occurrences continue to increase 6% per year (entrapments increase by 13%). Operating escalators in transit facilities are particularly important in emergency events (affect of water exposure not clear).
 - (ii) Overall there remains a need for improved compliance rate as stated in Director's comments. The links and commonality with elevators may be important ('escalator availability' likely also an issue to emerge, similar to elevator availability).
 - (iii) The Director's messaging to industry to enhance level of compliance related to required maintenance is commendable.
- Over 2,100 installations regulated by TSSA in Ontario
 - 6,503 occurrences 2008 – 2018 (1 fatality, 41 permanent and 4,424 non-permanent injuries – occurrences increasing by 4% per year)
 - 10% 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 human factor occurrences and almost 100% of associated injury burden
 - Mass transportation locations account for nearly 60% of trip/fall occurrences (increasing by 6% per year)
 - One high-risk device (at a mass transit location), over 51% of all medium risk devices in mercantile locations (which comprise 39% of entire provincial inventory)

Ski Lifts (SL)

- (i) Addressing major non-compliance through complementary services such as Ski Instructors continues to provide benefits. With 95% 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 and Parachute Canada, with educational videos on how to safely ride passenger ropeways appear to be positively influencing user behavior.

- 254 ski lifts in Ontario
- 958 occurrences 2008 – 2018 (26 permanent and 776 non-permanent injuries)
- 95% of estimated risk caused by factors external to regulatory requirements
- External factors 48% falls, 30% physical impacts, 9% entanglement (same as 2017)
- No high-risk devices in Ontario (six medium-risk devices)
- No discernible trend for occurrences, fatalities or injuries
- 51% inspection compliance rate
- Predictive model risk of injury or fatality to Ontarians of 0.02 FE/mpy (same as 2017)

Fuels (FS)

- (i) Fuels continue to represent the largest risk center under TSSA's oversight. The potential risk of injury or fatality is 1.89FE/mpy (an 'unacceptable level'). The fuels sector warrants continued focus for enhanced regulatory approaches.
- (ii) The need for 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 5.32 FE/mpy at apartments and condominiums and 3.73 FE/mpy at private dwellings).
- (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 – this is already taking place on resilience – adaptation – enhancements for single-family dwellings, e.g. new program at Seneca College). 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.¹
- (iv) Inclusion of pipeline strikes is a prudent addition to the ASPR. Continued partnership with Ontario Regional Common Ground Alliance important to reduce occurrences.
- (v) Subsequent phases of the Special Buildings Inspections Pilot to address schools is welcome (from 2016-2017). Reviews should include a focus on integrated support by various safety partners, and facilities upgrading, e.g. replacement of boilers and HVAC systems.²
- (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. Similarly, Condominium licence-holders should be provided a rudimentary understanding of CO risks in buildings through their course-work requirements.

¹ 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.

² 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. Progress could be reported in subsequent ASPRs.

- Fuels represent the largest risk center under TSSA's oversight
- 7,880 occurrences 2008 – 2018 (48 fatalities, 152 permanent and 521 non-permanent injuries). 4,220 liquid fuel and 1,346 propane facilities.
- From 2008 – 2018 there were 25,356 pipeline strikes; no demonstrable trend
- Average injury burden of 0.33 FE/mpy (0.07 FE/mpy in 2018) and predictive estimate (potential) of risk of injury or fatality from fuel-fired appliances of 1.89 FE/mpy.
- Largest source of risk continues to be CO release (estimated at 5.32 FE/mpy CO risks at apartments and 3.73 FE/mpy at private dwellings; well above international benchmark of 1.0 FE/mpy)
- Majority of all vapour releases observed in academic institutions continues to be due to improper or negligent work practices
- 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 – Impending introduction of hydrogen fueling stations along 400-series highways for heavy-duty trucks; possible use of cell-phones near fuel-pumps (Ontario, apparently only jurisdiction in North America that continues to ban the practice); hydrogen production and transmission by pipeline (e.g. Hydrogenics, Enbridge – Markham Power power-to-gas pilot); liquefied natural gas (LNG) for small plants; refueling and vehicles standards development; possible 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); 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 change (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)

- In 2018 conducted 1,808 inspections, issued 13,740 orders
- Over past seven years five incidents involving 6 people (contaminated fill material); 30 'near misses'

Emerging Issues in Upholstered and Stuffed Articles

"The Ministry of Government and Consumer Services (MGCS) will revisit plans to modernize the regulation for TSSA's USA program at a future date." In the mean time the existing regulation remains in force, with TSSA regulation oversight.

Reviewing the Data

This review does not audit the data presented in the ASPR. This task is part of TSSA's internal audit functions. A random review of baseline data was completed in October 2018 and will be provided in the next Annual Report. This is the 18th edition of the ASPR, now with 5 consecutive years of aggregated rolling averages (over 5 years) and RIDM-based probabilistic risk assessments through collected and inferred data. These evaluations are assumed 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 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 – 2018 (Continued from previous years)

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 – not updated since 2015 report) and proposed top five regionally manifest large-scale risks (potential impacts – updated annually by WEF, see 13th annual report).

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 CSRO draft Annual Report, August 2018).

Draft top Ontario's Risks Outlook – 2018

- Failure of critical infrastructure – including cyber attacks
- Failure of climate change mitigation and adaptation, natural disasters
- Falls
- Transport Incidents
- Self-harm
- Unintentional poisoning
- Rapid spread of infectious disease and food-borne ailments
- Water supply and quality
- Conflict – including terrorism, collapse of governance, and weapons of mass destruction
- Violence (personal)

Annex 1: Continuing to look at schools and hospitals

[Updated from previous reviews]

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 for 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. This discussion was included in previous CSRO reports, and remains here to help track progress of building improvements.

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

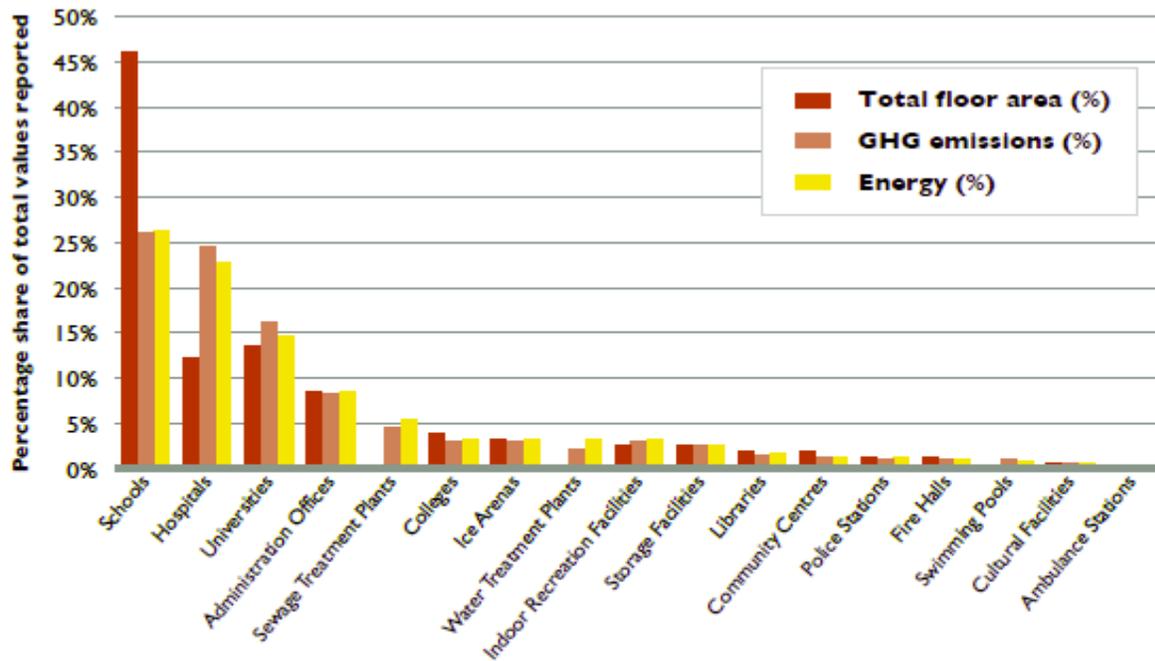


Figure 4.2: Square footage, energy, and GHG emissions by property type in 2011 as a percentage share of the total values reported.

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.

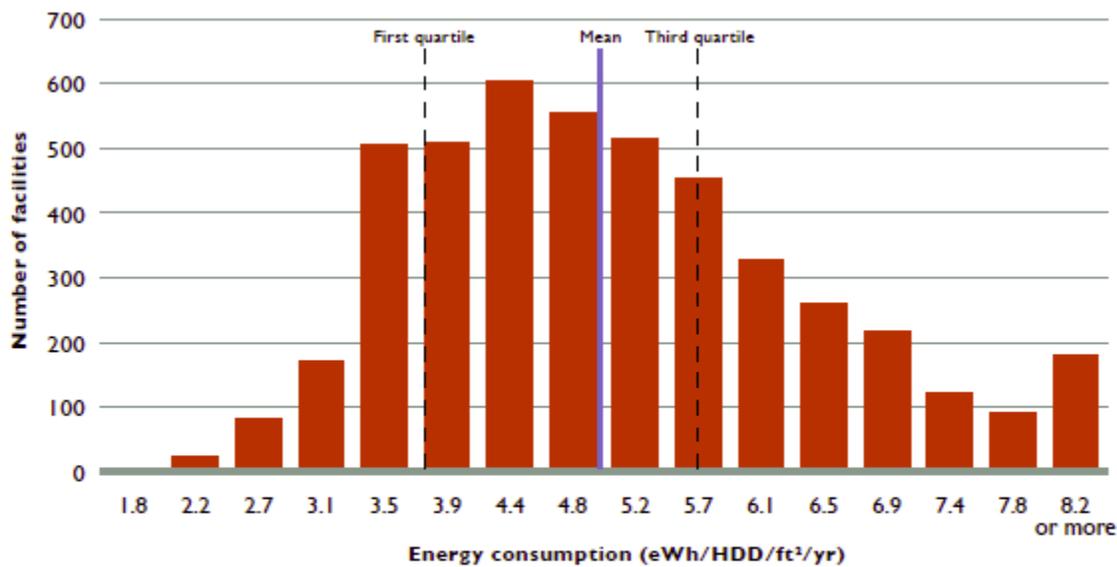


Figure 4.3: Energy consumption curve for Ontario schools – 2011

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 previous reviews: This is TSSA's tenth enhanced Annual Public Safety Performance Report; now Annual State of Public Safety Report (ASPR). This is the 18th edition, and 5th in the current format. 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."

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 some delegated sectors 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"³ 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.

With application of ALARP (as low as reasonably practicable) principles TSSA classifies risk into 'Actionable Risks' (those where the risk acceptability criteria exceeds 1.00 FE/mpy for the general population, or 0.30 FE/mpy for sensitive sub-populations, e.g. residents of long-term care homes), and those risks 'Requiring Enhanced Monitoring' (below 1.00 FE/mpy for general public and below 0.30 for sensitive sub-populations). TSSA core activities are all below risks levels requiring enhanced monitoring.

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 sixth 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.

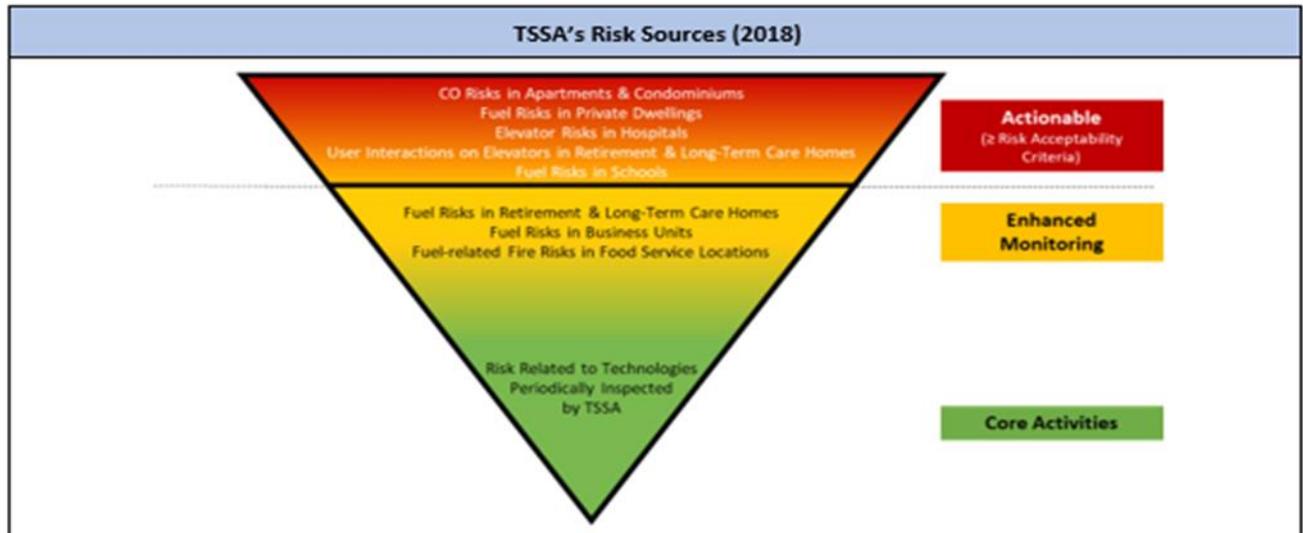
³ RIDM – risk informed decision-making – is a general risk industry standard that originated in systems engineering. Complex systems and their human interactions, like amusement devices, ski hills, elevators, and fuel systems can be assessed through RIDM, and quantified by metrics like disability adjusted 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.

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.

Annex 3: State of Public Safety in Ontario – 2018 ASPR Summary

STATE OF PUBLIC SAFETY IN ONTARIO

Top Safety Issues (2018)			
Actionable Areas		Enhanced Monitoring Areas	
CO Risks in Apartments & Condominiums	5.32 FE/mpy	Fuel Risks in Retirement and Long-Term Care Homes	0.26 FE/mpy
Fuel Risks in Private Dwellings	3.73 FE/mpy	Fuel Risks in Business Units	0.73 FE/mpy
Elevator Risks in Hospitals	3.49 FE/mpy	Fuel-related Fire Risks in Food Service Locations	0.61 FE/mpy
User Interactions on Elevators in Retirement & Long-Term Care Homes	0.70 FE/mpy		
Fuel Risks in Schools	0.56 FE/mpy		



Inspection Risk Spectrum (2018)		
	Major Issues	1%
	Minor Issues	69%
	Fully Compliant	30%

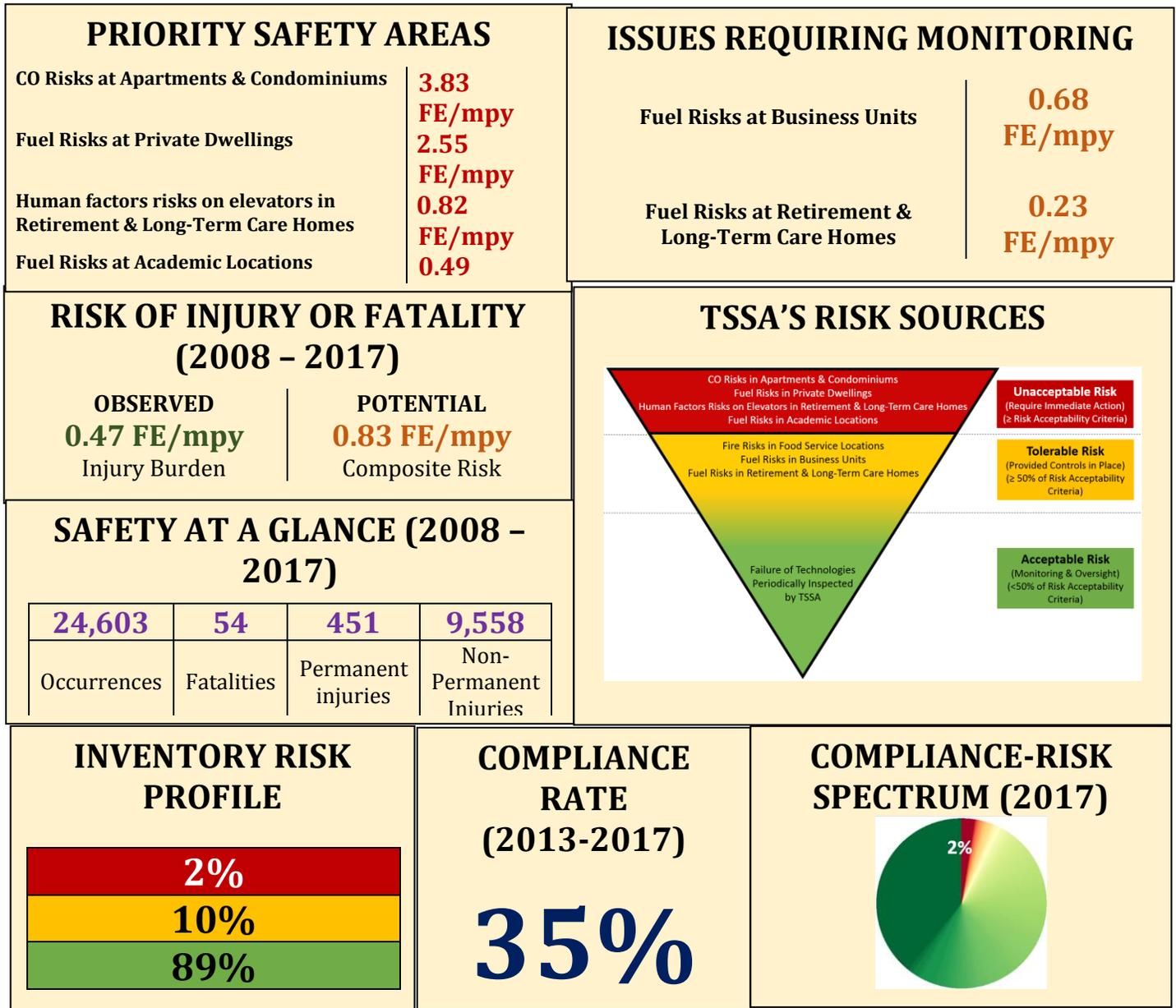
Inventory Risk Profile (2018)	
High Risk	1%
Medium Risk	9%
Low Risk	89%

Compliance Rate (2014 – 2018)	
32%	

Health Impact		
Observed		Potential
0.46 FE/mpy (2008 – 2018) Injury Burden	0.14 FE/mpy (2018) Injury Burden	0.99 FE/mpy (2018) Risk of Injury or Fatality

Safety Numbers (Safety at a Glance)				
Reporting Period	Incident & Near-Miss Occurrences	Non-Permanent Injuries	Permanent Injuries	Fatalities
2008 – 2018	27,457	10,821	499	57
2018	2,827	1,236	35	1

State of Public Safety in Ontario – 2017 ASPR Summary



Annex 4: Ontario Risks Outlook

Introduced in the 2015 CSRO Annual Report a consolidated Ontario risks outlook is proposed as a way to help place risk 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 2018 shifted slightly with greater risk identified from lack of climate adaptation and mitigation.

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 – 2018 DRAFT

- Failure of critical infrastructure – including cyber attacks
- Failure of climate change mitigation and adaptation, natural disasters
- Falls
- Transport Incidents
- Self-harm
- Unintentional poisoning
- Rapid spread of infectious disease and food-borne ailments
- Water supply and quality
- Conflict – including terrorism, collapse of governance, and weapons of mass destruction
- Violence (personal)

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)

Change in Global Risks 2015 to 2018 (WEF annual reports)

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

Likelihood, 2018

Extreme weather events
Natural disasters
Cyber attacks
Data fraud or theft
Climate change mitigation and adaptation

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

Impact, 2018

Weapons of mass destruction
Extreme weather events
Natural disasters
Climate change mitigation and adaptation
Water crises