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Failing the Future: Extreme Heat in Schools

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EXECUTIVE SUMMARY

Extreme heat events significantly impact the health and well-being of students, teachers, and staff in schools across Canada. The impacts of heat on children are of serious concern given their unique vulnerability. Despite this, there remains no comprehensive federal or provincial law, policy or investment to ensure climate resilience in educational settings.

Heat negatively impacts children in many ways. Along with concerns about the acute impacts of extreme heat, heat slows cognitive function and hinders student performance. It negatively impacts the mental health of children. Heat is often accompanied by worse air quality, further impacting the health of children.

Heat also disproportionately impacts low-income and racialized communities. Children living in homes that are not mechanically cooled with heat pumps or air conditioning will be disproportionately burdened by exposures to heat at school.

Old and under-funded school infrastructure is not climate resilient. This is especially the case in schools in First Nations communities, where underfunding has resulted in large infrastructure deficits. Chiefs of Ontario have identified that $1.9 billion of additional funding is required to close the gap in education, $4.8 billion of additional funding is required to close the climate adaptability gap, and $9.2 billion of additional funding is required to close the infrastructure gap between First Nations communities and the rest of Ontario. More outreach, consultation, and research is required to understand the impacts of climate change on First Nations schools and children. Strategies to address climate resiliency in First Nations schools should be co-developed by First Nations communities and the Federal government.

Current government policy on extreme heat is not responsive to the needs of children and does not adequately address the scope of the problem of heat in schools. Children often do not have agency over their responses to heat. Mechanical cooling in schools, such as air conditioning and heat pumps, is a readily available solution to heat's impacts on the health and safety of students.

CELA makes the following recommendations to improve the climate resiliency of our schools and to better protect our children from extreme heat:

> Recommendation 1: Amend legislation to include a maximum indoor heat standard in schools of 26 degrees Celsius.
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> Recommendation 2: The maximum indoor temperature standard appropriate for children should be reviewed in two years.
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> Recommendation 3: Upgrade Canadian education infrastructure with mechanical cooling.
>
> Recommendation 4: Amend Ontario's Building Code to include HVAC requirements and mechanical cooling requirements for new schools and related requirements for retrofitting school buildings.

Recommendation 5: Amend Ontario's Building Code to include a maximum temperature standard for all schools.

Recommendation 6: Ensure that additional funding is provided to First Nations schools to address extreme heat and climate resiliency.

Recommendation 7: The Federal government must ensure meaningful participation of and partnership with First Nations in climate resiliency and heat mitigation efforts.

Recommendation 8: First Nations and the Federal government should co-develop a plan for assessing climate change impacts on First Nations children in schools.

Recommendation 9: Consideration of climate resiliency and the impact of under-funding of infrastructure in First Nations communities should be included in the Federal government's consultation and development of a national strategy pursuant to the *National Strategy Respecting Environmental Racism and Environmental Justice Act*, SC 2024, c 11 *("Environmental Racism Act").*

Recommendation 10: Install indoor temperature, humidity, and ventilation monitors in every classroom.

Recommendation 11: The province should create maps to identify schools that should be prioritized for installation of mechanical cooling.

Recommendation 12: Work with local public health units to gather data on heat impacts on children in schools.

Recommendation 13: Develop province-wide shade guidelines for school yards.

Recommendation 14: Increase green spaces in school yards to provide community benefits.

Recommendation 15: Schedule examinations and physical activities at cooler times of the day.

Recommendation 16: Integrate equity considerations into all aspects of extreme heat responses for schools.

1. Overview

As global temperatures continue to rise because of climate change, so too will the duration, frequency, and intensity of extreme heat events.[1] Extreme heat events significantly impact the health and well-being of students, teachers, and staff in schools across Canada. The impacts of heat on children are of serious concern given their unique vulnerability. Despite this, there remains no comprehensive federal or provincial law, policy, or investment to ensure climate resilience in educational settings.

The current focus of federal and provincial government policy on extreme heat is a heat alert and response system, and a series of safety recommendations including to use air conditioning if it is available, avoid sun-exposure, do not use your oven, and open your windows at night.[2] These recommendations and alerts do not adequately address the scope of the problem of excessive heat. They are also of limited use to children who lack agency over their location and schedule, including whether they can re-locate to places with air conditioning.

Canadian schools, many of which are ageing and lack sufficient mechanical cooling infrastructure like air conditioning or heat pumps, are notably vulnerable to extreme heat events. This is particularly the case in First Nations communities, where underfunding has resulted in large infrastructure deficits. The Truth and Reconciliation Commission highlighted that improved funding models must be co-developed by the Federal government and Indigenous communities to eliminate funding deficits and improve educational outcomes in First Nations.[3]

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[1] Christina Koppe et al., "Heat-waves: risks and responses" (2004) 2 *World Health Organization* at 14; Yuming Guo et al., "Heat Wave and Mortality: a Multicountry, Multicommunity Study" (2017) *Environmental Health Perspectives* at 1 [*Guo et al.*].

[2] Health Canada, "Extreme heat events: How to protect yourself from the health effects of extreme heat" (2024), online: *Government of Canada* https://www.canada.ca/en/health-canada/services/climate-change-health/extreme-heat/how-protect-yourself.html; Health Canada, "Keep Children Cool! Protect Your Child From EXTREME HEAT" (2020), online (pdf): https://www.canada.ca/content/dam/hc-sc/documents/services/publications/healthy-living/keep-children-cool-extreme-heat/extreme-heat-brochure-keep-children-cool-en.pdf [*Keep Children Cool!*]; Health Canada, "Extreme heat events: Overview" (2024), online: *Government of Canada* https://www.canada.ca/en/health-canada/services/climate-change-health/extreme-heat.html [*Extreme heat events*].

[3] Crown-Indigenous Relations and Northern Affairs Canada, "Delivering on Truth and Reconciliation Commission Calls to Action: Education" (July 2024), online: *Government of Canada* https://www.rcaanc-cirnac.gc.ca/eng/1524495412051/1557511602225[*TRC*].

Fortunately, there is a readily available solution to heat's impacts on learning, as air conditioning and heat pumps "offset most of the disruptive impacts of heat events on learning."[4] Addressing extreme heat in schools is a key public health priority, especially for children who are also living in home environments that are too hot.

2. Climate Change and Extreme Heat

TEMPERATURES IN CANADA ARE RISING FASTER THAN THE GLOBAL AVERAGE.[5] In Canada, the national average temperature has increased by 2°C between 1948 and 2023, making 2023 Canada's second warmest year.[6] The hottest temperature ever recorded in Canada occurred on June 29, 2021 in Lytton, British Columbia, where the temperature reached a scorching 49.6°C.[7] It is estimated that a 10-year-old in 2024 will experience 36 times more heat waves than experienced by a 10-year-old in 1970.[8]

EXTREME HEAT EVENTS HAVE MAJOR HEALTH IMPLICATIONS AND KILL MILLIONS OF PEOPLE EVERY YEAR.[9] Groups that are vulnerable to extreme heat events include the elderly, persons with certain disabilities or medical conditions, children, and people taking certain medications for conditions such as diabetes, cardiovascular disease, or asthma.[10]

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[4] Early Childhood Scientific Council on Equity and the Environment, "Extreme Heat Affects Early Childhood Development and Health: Working Paper No. 1." (2023) at 6, online (pdf): *Harvard University Center on the Developing Child* https://harvardcenter.wpenginepowered.com/wp-content/uploads/2023/03/ECSCEE-Heat-Paper.pdf [*ECSCEE*].
[5] Environment and Climate Change Canada, "Canadian Environmental Sustainability Indicators: Temperature Change in Canada" (2024) at 5, online (pdf): *Government of Canada* https://www.canada.ca/content/dam/eccc/documents/pdf/cesindicators/temperature-change/2024/temperature-change-en.pdf.
[6] *Ibid.*
[7] Jim Abraham, "Record-breaking heat in Canada," (2021), online: *Royal Meteorological Society* https://www.rmets.org/metmatters/record-breaking-heat-canada.
[8] Shwetlena Sabarwal et al., "Choosing Our Future: Education for Climate Action" (2024) at 82, online (pdf): *The World Bank Group* https://openknowledge.worldbank.org/server/api/core/bitstreams/9d1c318a-bcd3-49fa-b1c6-cc03e18d4670/content [*Sabarwal et al.*].
[9] *Guo et al., supra* note 1 at 4; The Canadian Climate Institute, "Extreme Heat in Canada" (2024), online: https://climateinstitute.ca/reports/extreme-heat-in-canada/ [*CCI*].
[10] Anna Goshua et al., "Child-focused climate change and health content in medical schools and pediatric residencies" (2023) *Springer Nature* [*Goshua et al.*]; J Bradley Layton et al., "Heatwaves, medications, and heat-related hospitalization in older Medicare beneficiaries with chronic conditions" (2020) *PLoS ONE* 15(12): e0243665.

Heat-related mortality rates for children are 50 to 100 times higher than that of adults, meaning that children are particularly vulnerable to extreme heat events.[11]

INDOOR HEAT IS OFTEN HIGHER THAN OUTDOOR HEAT. Without indoor cooling, there is no reprieve for children also exposed to high outdoor heat. The CBC recently tracked indoor temperatures in residential dwellings across 10 cities in Canada, including Windsor and Toronto, as part of its Urban Heat Project.[12] The CBC installed heat sensors in 50 homes, which took temperature and humidity readings every 10 minutes over an eight-week period from June to August.[13] The homes that were tracked had no central cooling system or a minimal central cooling system. Indoor temperatures were often higher than outdoor temperatures.[14] A similar study out of John Hopkins University found that indoor temperatures in houses without air conditioning were on average 1.4°C warmer than the outdoor temperature in the summer months.[15] These finding were also confirmed in studies of outdoor and indoor temperatures following British Columbia's 2021 extreme heat event.[16]

3. Indoor Maximum Temperature of 26 Degrees Celsius

There has been a growing consensus in the literature that temperatures over approximately 26°C indoors are unsafe. However, those studies tend to concentrate on older adults and are not focused on health-based indoor temperature thresholds for children.

A 2024 study of older adults in Ottawa found that core temperature and cardiovascular strain increased progressively where indoor temperatures were above 26°C.[17] This finding is supported by a Statistics Canada study which found that over two-decades extreme heat is related to higher

[11] Joshua Graff & Jeffrey Shrader, "Temperature Extremes, Health, and Human Capital" (2016) 26:1 *Spring* at 35 [*Graff and Shrader*].
[12] Tara Carman & Dexter McMillan, "How CBC measured heat in homes in 5 Canadian cities" (2023), online (article): *CBC* https://www.cbc.ca/news/investigates/urban-heat-project-methodology-1.6963593.
[13] *Ibid*.
[14] Tara Carman, Lori Ward & Dexter McMillan, "No escape from the heat" (13 September 2023), online (article): *CBC News* https://www.cbc.ca/newsinteractives/features/no-escape-from-the-heat.
[15] D. W. Waugh et al., "Indoor heat exposure in Baltimore: does outdoor temperature matter?" (2021) *Int J Biometeorol* 65, 479–488 at 1 [*Waugh et al.*]
[16] Sarah Henderson et al., "Analysis of community deaths during the catastrophic 2021 heat dome" (2022) 6(1):e189 *Environ Epidemiol*, online: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8835552/.
[17] R. D. Meade et al., "Effects of Daylong Exposure to Indoor Overheating on Thermal and Cardiovascular Strain in Older Adults: a Randomized Crossover Trial" (2024) *Environ Health Perspect*, online: https://ehp.niehs.nih.gov/doi/10.1289/EHP13159.

mortality risks for those aged 65 and older.[18] In 2022, the Government of British Columbia released a report that identified high indoor temperature as the primary cause of injury and death in the province's 2021 heat wave.[19] Moreover, the British Columbia Centre for Disease Control found that people were most in danger when indoor temperatures remained above 26°C throughout the event.[20] These reports add to the existing literature that identifies 26°C as an appropriate health-based indoor temperature standard.[21]

However, these studies do not focus on heat exposures and children. Since children are vulnerable to heat, a 26°C indoor temperature threshold is an important first standard to set, with the understanding that further study of the impacts of heat on children is needed to ensure that the maximum temperature standard should not be lowered.

4. Canadian Infrastructure

Data is needed to identify how many Ontario schools lack mechanical cooling in each classroom. We were also unable to identify any statistics tracking air conditioning in First Nations schools, but serious infrastructure deficits have been identified. There is a significant need to address those deficits along with installing mechanical cooling infrastructure in First Nations schools.

The latest Statistics Canada data identifies that much of Canadian educational infrastructure is over 15 years old. In 2009, "the average age of elementary and secondary schools in Canada was

[18] Statistics Canada, "The impacts of extreme heat events on non-accidental, cardiovascular, and respiratory mortality: An analysis of 12 Canadian cities from 2000 to 2020" (2024) at 8, online: https://www150.statcan.gc.ca/n1/en/pub/82-003-x/2024006/article/00001-eng.pdf?st=jzCexIUi.
[19] Government of British Columbia, "Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021" (2022) at 22, online (pdf): https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/death-review-panel/extreme_heat_death_review_panel_report.pdf [*BC Report*].
[20] *Ibid*.
[21] C. Uejio et al., "Summer indoor heat exposure and respiratory and cardiovascular distress calls in New York City, NY, US" (August 2016) *Indoor air*, 26(4), at 594-604, online: https://pubmed.ncbi.nlm.nih.gov/26086869/; F. Tartarini et al., "Indoor air temperature and agitation of nursing home residents with dementia" (April 2017) *Am J Alzheimers Dis Other Demen*, 32(5), at 272-281, online: https://pubmed.ncbi.nlm.nih.gov/28429641/; U. Lindemann et al., "Effect of indoor temperature on physical performance in older adults during days with normal temperature and heat waves" (February 2017) *Int J Environ Res Public Health*, 14(2), at 186, online: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5334740/.

21.0 years or 53% of their estimated useful life."[22] More recent data from the Toronto District School Board ("TDSB") reveals that 444 of the 547 schools in the TDSB are over 50 years old, "with the average age of a TDSB school at 60+ years."[23] Correspondingly, only 177 of TDSB's 582 elementary and high schools have central air conditioning.[24] The Ontario government has recently committed $16 billion over ten years to support school construction, repair, and renewal projects across the province, however, it is estimated that Ontario's school maintenance and repair backlog was $16.8 billion in 2022. [25] Going forward, funding for repair and renewal of old school buildings must explicitly incorporate requirements to improve climate and heat resilience, including incorporating infrastructure to provide mechanical cooling.

5. The Vulnerability of Children

The human body is equipped with many mechanisms for heat regulation, including hormones, increasing heart rate and respiratory rate, and sweat production. Correspondingly, the longer or more intense the heat event, the harder the body has to work to maintain its healthy internal temperature.[26] Excessive heat may impact the following bodily functions and systems: immune system, nervous system, kidney function, emotional and mental capacity and retention, muscle function, and respiratory system.[27]

CHILDREN EXPERIENCE HEAT DIFFERENTLY THAN ADULTS. Children "have greater metabolic rates and lower cardiac output," have little agency over their schedule or heat

[22] Valerie Gaudreault, Donald Overton & John Trstenjak, "Age of Education Infrastructure: Recent Trends – ARCHIVED" (2009), online (pdf): *Statistics Canada* https://www150.statcan.gc.ca/n1/en/pub/11-621-m/11-621-m2009081-eng.pdf?st=3W8mWyoA.
[23] Gabriel Zaharia, "TDSB Schools Built by Year" online: *Toronto Lands Corporation* https://torontolandscorp.com/100-years-of-tdsb-schools-by-decade/.
[24] Toronto District School Board, "Hot Weather" online: *TDSB* https://www.tdsb.on.ca/About-Us/Severe-Weather/Hot-Weather.
[25] Ministry of Education "Building, expanding and renewing schools" (2024), online: *Ontario* https://www.ontario.ca/page/building-expanding-and-renewing-schools; Ricardo Tranjan, Tania Oliveira, & Randy Robinson, "Catching Up Together: A Plan for Ontario's Schools" (2022) at 4, online (pdf): *CCPA* https://policyalternatives.ca/sites/default/files/uploads/publications/Ontario%20Office/2022/02/Catching%20Up%20Together.pdf.
[26] *Guo et al.*, *supra* note 1 at 8.
[27] *ECSCEE*, *supra* note 4 at 4.

exposure, and have still-developing bodily systems. [28] These factors all contribute to their unique vulnerability to extreme heat.

(a) Disruptions in Learning

EXTREME HEAT SLOWS COGNITIVE FUNCTION. According to a Harvard study, the most optimal temperature for learning and concentration is 22°C or lower.[29] Extreme heat makes concentration and retention more difficult for children and "may limit children's educational attainment and economic prospects in the long run."[30] There are several ways in which heat affects learning. For one, it can negatively impact a child's sleep, which correspondingly affects their retention and ability to problem-solve.[31] Extreme heat can also cause a child's brain to 'overheat.' The brain generally produces 20% of the body's heat and during prolonged extreme heat events, the brain cannot cool down, leading to significant effects on children's cognitive functioning.[32] A child's "attention, memory, and information processing" are likely negatively affected.[33]

EXTREME HEAT HINDERS STUDENT PERFORMANCE.[34] Several recent studies have found a correlation between lower test scores and increased temperatures leading up to a test.[35] Moreover, the temperature on the day of a test significantly impacts test scores, where even a 1°C temperature increase results in "a substantial decline in test scores."[36] Female and rural students were found to be most sensitive to these effects.[37] One study found that student performance can increase by an average of 20% if classroom temperatures are decreased from 30°C to 20°C.[38] It is concerning that students are often writing final tests in the hottest month of

[28] Mengmeng Li et al., "Heat Waves and Morbidity: Current Knowledge and Further Direction – A Comprehensive Literature Review" (2015) 12 *Int. J. Environ. Red. Public Health* at 5275.
[29] *ECSCEE, supra* note 4 at 6.
[30] *Graff and Shrader, supra* note 11 at 38.
[31] Eleanor Squires, Lisa Whiting, & Julia Petty, "Effects of climate change on the health of children and young people" (2024), *Nurs Stand* 39(4):60-65, at 3, online: https://pubmed.ncbi.nlm.nih.gov/38419409/; *ECSCEE, supra* note 4 at 6.
[32] *Graff and Shrader, supra* note 11 at 39.
[33] *ECSCEE, supra* note 4 at 6.
[34] *Ibid*; *Graff and Shrader*, *supra* note 11 at 39; *Sabarwal et al.*, *supra* note 8 at 17.
[35] *Sabarwal et al.*, *supra* note 8 at 17; *ECSCEE, supra* note 4 at 6.
[36] *Sabarwal et al.*, *supra* note 8 at 87.
[37] *Ibid* at 87.
[38] *ECSCEE, supra* note 4 at 6

the school year. The impacts of heat on test scores are particularly problematic for students writing important examinations that may impact their future.

(b) Asthma, Air Quality, and Extreme Heat

HEAT ADVISORIES ARE FREQUENTLY COUPLED WITH AIR QUALITY WARNINGS. Extreme heat events increase atmospheric levels of ozone, a potent lung irritant, and increase the intensity and incidence of wildfires.[39] While poor air quality affects everyone exposed to it, children are uniquely vulnerable due to the fact that children have a high number of inhales per minute and a greater inhale volume to body weight ratio than adults.[40]

Asthma is the most common chronic illness in children, affecting approximately one in ten children in Canada.[41] In heat waves, children's "smaller airways are more likely to become inflamed and obstructed" by air pollutants.[42] Consequently, a study of schools in Oakland, California found that children with asthma are more likely to suffer asthma attacks during heatwaves; in fact, children were 19% more likely to have an asthma-related hospital visit during a heat wave, and this number doubles as the heat wave's duration increases.[43]

AIR POLLUTION ALSO HAS AN EFFECT ON CHILDREN'S ACADEMIC ACHIEVEMENT. Exposure to harmful air pollutants in wildfire smoke has been found to lower test scores.[44] Wildfire smoke can be harmful even at significant distances away from the fires. Canadian governments should be concerned about the effects of wildfire smoke on air quality and children as Canada experiences longer and more intense wildfire seasons.[45]

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[39] *Ibid* at 7; Michael Oppenheimer & Jesse Anttila-Hughes, "The Science of Climate Change" *Spring* 2016 26:1 [*Oppenheimer*]; *Graff and Shrader*, *supra* note 11 at 36; *CCI*, *supra* note 9.
[40] *Goshua et al.*, *supra* note 10 at 2.
[41] *Ibid;* Canadian Paediatric Society, "Asthma in children and youth" (2023), online (article): *Caring for Kids* https://caringforkids.cps.ca/handouts/health-conditions-and-treatments/asthma-in-children-and-youth#:~:text=About%201%20in%2010%20children,these%20children%20have%20mild%20asthma..
[42] *Goshua et al.*, *supra* note 10 at 2.
[43] American Thoracic Society, "Extreme heat associated with children's asthma hospital visits" (2024), online (article): *ScienceDaily* https://www.sciencedaily.com/releases/2024/05/240520122830.htm#:~:text=The%20team%20discovered%20that%20daytime,associations%20for%20nighttime%20heat%20waves.
[44] *Sabarwal et al.*, *supra* note 8 at 88.
[45] Natural Resources Canada, "Canada's record-breaking wildfires in 2023: a fiery wake-up call" (2024), online (article): *Government of Canada* https://natural-resources.canada.ca/simply-science/canadas-record-breaking-wildfires-2023-fiery-wake-call/25303.

(c) Mental Health

EXTREME HEAT AFFECTS CHILDREN'S MENTAL HEALTH THROUGH SEVERAL DIFFERENT AVENUES. Firstly, the brain and body detect extreme heat events as a threat, which in turn activates the body's stress response system.[46] Any prolonged activation of the body's stress response system can have negative consequences for children's mental health.[47] Secondly, extreme heat can affect children with a pre-existing mental health diagnosis by increasing "the incidence of relapses or flares" and can even bring about the onset of new disorders.[48] Children taking antipsychotic medication may experience an increased sensitivity to heat as a side effect to their medication, which further complicates their diagnosis and prescription, and presents a significant risk to their health and safety.[49] Lastly, extreme heat events increase the incidence of violent crimes, domestic abuse, and suicide "through a combination of environmental factors."[50]

(d) Agency

CHILDREN HAVE LITTLE TO NO AGENCY OVER THEIR RESPONSE TO EXTREME HEAT. There has been little research into the impacts of agency on children's heat vulnerability. Regardless, it is generally accepted that children have little choice over how and where they spend their time, as most of their day is scheduled by teachers, parents, or guardians.[51] Moreover, when experiencing extreme heat "children are less likely to manage their own heat risk[, …] may have fewer ways to avoid heat than adults do," and may not be able to articulate the effects that heat is having on their body.[52]

(e) Socioeconomic Inequalities

EXTREME HEAT EVENTS DISPROPORTIONATELY AFFECT LOW-INCOME AND RACIALIZED COMMUNITIES. The intersectional effects of heat are important to recognize and address in any policy response to extreme heat. The urban heat island ("UHI") effect

[46] *ECSCEE*, *supra* note 4 at 7.
[47] *Ibid*.
[48] *Goshua et al.*, *supra* note 10 at 3.
[49] *Ibid*.
[50] *ECSCEE*, *supra* note 4 at 7; *Oppenheimer*, *supra* note 40 at 23.
[51] *Graff and Shrader*, *supra* note 11 at 34.
[52] *Ibid*.

describes the fact that cities are hotter than surrounding rural areas.[53] In North America, cities are 1°C to 3°C warmer than the nearby countryside.[54] The UHI effect is caused by the density of built, dark surfaces in cities, such as roads, parking lots, and high-rises, which "absorb large quantities of radiant heat from the sun."[55] A lack of nature and green space in cities contributes to this effect. In Toronto, Ontario, neighbourhoods with higher household income have significantly higher amounts of tree canopy cover.[56]

Racialized and low-income communities in Canada tend to live in neighbourhoods that are "far less climate-resilient" due to high concentrations of heat-absorbent materials and a lack of green-space.[57] This contributes to the phenomenon of temperature differences between neighbourhoods within cities. In Mississauga, Ontario, approximately 57% of low-income children live in areas where additional resources for greenspace would improve equity.[58] In Ottawa, Ontario, approximately 70% of low-income children live in areas where additional resources targeting air pollution would improve equity.[59] Neighbourhoods with the highest temperatures tend to also have the "most polluted air and the highest rates of childhood asthma."[60]

[53] Health Canada, "Reducing Urban Heat Island to Protect Health in Canada: An introduction for public health professionals" (2020), online (pdf): https://www.canada.ca/content/dam/hc-sc/documents/services/health/publications/healthy-living/reducing-urban-heat-islands-protect-health-canada/Reducing-Urban-Heat-EN.pdf.
[54] *Ibid*.
[55] *Ibid*.
[56] Inori Roy, "As Toronto Temperatures Rise, Inequalities Widen" (2022), online (article): *The Local* https://thelocal.to/toronto-heat-wave-inequality/; Christopher Greene, Pamela Robinson & Andrew Millward, "Canopy of advantage: Who benefits most from city trees?" (2018) 208:24-35, online (article): *Journal of Environmental Management* https://www.sciencedirect.com/science/article/pii/S0301479717311775).
[57] Felix Landry, Jerome Dupras & Christian Messier, "Convergence of urban forest and socio-economic indicators of resilience: A study of environmental inequality in four major cities in eastern Canada" (2020) 202(3):103856 *Landscape and Urban Planning*.
[58] Canadian Urban Environmental Health Research Consortium, "Explore Equity in your City" (2024), online (map): *HealthyPlan.City* https://healthyplan.city/en?utm_source=CANUE%20Newsletter&utm_campaign=ab9f1d23d9-EMAIL_CAMPAIGN_2017_08_31_COPY_01&utm_medium=email&utm_term=0_3dbd1ae370-ab9f1d23d9-596423750 [*CANUE*].
[59] *CANUE, supra* note 59.
[60] *ECSCEE, supra* note 4 at 7; Amanda Giang & Kaitlin Castellani, (2020) "Cumulative air pollution indicators highlight unique patterns of injustice in urban Canada." *Environ. Res. Lett.* 15:12, online (pdf): https://iopscience.iop.org/article/10.1088/1748-9326/abcac5/pdf.

Low-income and racialized communities typically have fewer resources to respond to extreme heat, further contributing to increased risk of heat-related morbidity and mortality.[61] Communities with structural, social, and economic barriers tend to also have "less air conditioning, fewer public cooling spaces, [… and a] greater likelihood of living in housing and neighbourhoods that trap rather than mitigate heat."[62]

Schools in low-income and racially diverse communities follow the same trends as housing; low-income students are more likely go to schools without air-conditioning than higher-income students.[63] Of the 154 schools in the Greater Toronto Area without air conditioning (as of 2016), 37% were in Scarborough, which has higher proportions of low-income and racialized students as compared to the rest of Toronto.[64] Correspondingly, a study out of the United States found that the negative effects of heat on learning and academic achievement are approximately three times greater for students of colour than for white students.[65]

(f) Cumulative Burden of Heat on Children without Air Conditioning at Home

CHILDREN WHO DO NOT HAVE AIR CONDITIONING AT SCHOOL OR AT HOME HAVE NO REPRIEVE DURING HEAT WAVES. Extreme heat events trigger the body's stress response system.[66] Prolonged activation of the body's stress response system is unhealthy, in addition to the other negative effects of heat on health. There is also a cumulative effect of heat when the body cannot be cooled over long periods of time; this is what often leads to the most severe consequences of extreme heat.[67] Children without access to mechanical cooling at home or at school face this cumulative health risk.

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[61] *Goshua et al.*, *supra* note 10 at 2; Samantha Ahdoot et al., "Climate Change and Children's Health: Building a Healthy Future for Every Child" (2024) 153:3 *Pediatrics* at 77 [*Ahdoot et al.*]; *Graff and Shrader*, *supra* note 11 at 36.
[62] *ECSCEE*, *supra* note 4 at 4; Shuchen Bu et al., "Mapping Heat Vulnerability in Toronto" (6 August 2024), online (article): *University of Toronto* https://schoolofcities.github.io/heat-vulnerability-toronto/?ref=magazine.frontier.is [*Shuchen Bu et al.*].
[63] *ECSCEE*, *supra* note 4 at 9.
[64] Victor Ferreira, "It's stinking hot. So why do so few of Toronto's schools have air conditioning?" (2016), online (article): *National Post* https://nationalpost.com/news/toronto/it-s-stinking-hot-so-why-do-so-few-of-toronto-s-schools-have-air-conditioning.
[65] *Ahdoot et al.*, *supra* note 62 at 76.
[66] *ECSCEE*, *supra* note 4 at 7.
[67] *BC Report*, *supra* note 17 at 22.

6. Vulnerability of Indigenous Children and Schools on First Nations Lands

SCHOOLS ON FIRST NATIONS LANDS ARE NOT CLIMATE RESILIENT DUE TO GOVERNMENT UNDER-FUNDING. Schools on First Nations lands are owned and operated by First Nations, but are largely funded by the Federal government through various departments and programs, such as the First Nations Infrastructure Fund, the First Nations Enhanced Education Infrastructure Fund, and the Capital Facilities and Maintenance Program.[68] Indigenous Services Canada ("ISC") and First Nations have also "co-developed a transformed policy and funding approach for First Nations elementary and secondary schools" in furtherance of the Truth and Reconciliation Call to Action #8.[69] The "co-developed transformed policy and funding approach" has resulted in the following changes to First Nations' education funding:

- Base funding is now comparable to provincial systems across the country;
- Education funding for First Nations on their lands has increased 80% between 2015 to 2016 and 2022 to 2023;
- The ISC has invested $2.07 billion of targeted funds, excluding operating expenses, to support 301 school-related infrastructure projects, 180 of which are complete. These projects will result in the construction or renovation of 224 schools, serving approximately 36,000 students, 151 of which are complete. Additionally:
    - Construction of 71 new schools, serving approximately 17,000 students, 48 of which are complete;
    - Renovations or upgrades to 153 existing schools, serving approximately 19,000 students, 103 of which are complete;

[68] Government of Canada "First Nation Infrastructure Fund" (11 July 2022), online: *Government of Canada* https://www.sac-isc.gc.ca/eng/1100100010656/1533645154710; Government of Canada, "First Nations Enhanced Education Infrastructure Fund" (28 May 2018), online: *Government of Canada* https://www.sac-isc.gc.ca/eng/1456150810793/1533641989260; Government of Canada, "Capital Facilities and Maintenance Program" (14 February 2024), online: *Government of Canada* https://www.sac-isc.gc.ca/eng/1100100016395/1533641696528.

[69] *TRC*, *supra* note 3 - **TRC Call to Action #8:** We call upon the Federal government to eliminate the discrepancy in federal education funding for First Nations children being educated on reserves and those First Nations children being educated off reserves; *Ibid*.

- Investment of $545.1 million over 3 years, starting in 2024 to 2025, for K-12 infrastructure to build and renovate safe and healthy learning environments for First Nations students.[70]

Despite these changes to the policy and funding approach for First Nations schools, current funding is not sufficient to remedy the infrastructure deficits in First Nations communities. In fact, the Assembly of First Nations found that Indigenous schools are only being funded up to 23% of their capital needs.[71] As a result, at least 202 First Nations schools are overcrowded and require additions, while 56 schools require immediate replacement.[72]

A Chiefs of Ontario report found that $58.9 billion is needed to close the infrastructure gap between First Nations and non-indigenous communities.[73] The categories considered in this report include all season road access, climate adaptation, housing, infrastructure, education, and several others. Specifically, in Ontario, $1.9 billion of additional funding is required to close the gap in education, $4.8 billion of additional funding is required to close the climate adaptability gap, and $9.2 billion of additional funding is required to close the infrastructure gap.[74] Infrastructure in First Nations communities requires large investments "to address the many decades of neglect" they have faced.[75] First Nations schools are at risk of exposure to climate events and environmental hazards, and their exposure will only "increase over the coming decade and likely escalate rapidly thereafter."[76]

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[70] *TRC*, *supra* note 3 - **TRC Call to Action #8:** We call upon the Federal government to eliminate the discrepancy in federal education funding for First Nations children being educated on reserves and those First Nations children being educated off reserves.
[71] Indigenous Services Canada, "Closing the Infrastructure Gap by 2030" (2023) at 8, online (pdf): https://afn.bynder.com/m/367574a3a5cb5abe/original/1-AFN-Closing-the-Infrastructure-Gap-by-2030-National-Cost-Estimate-English-report-1.pdf.
[72] *Ibid*.
[73] Chiefs of Ontario, "Closing the Infrastructure Gap: Ontario Regional Analysis" (January 2024) at 4, online (pdf): https://chiefs-of-ontario.org/wp-content/uploads/2023/08/CITG-Regional-Ontario-Analysis-COO-Jan-2024.pdf.
[74] *Ibid*.
[75] Isak Vaillancourt, "Chiefs of Ontario Launch Ontario-Specific Closing the Infrastructure Gap Report, Aligning with Assembly of First Nations National Scale Report" (9 April 2024), online : https://chiefs-of-ontario.org/chiefs-of-ontario-launch-ontario-specific-closing-the-infrastructure-gap-report-aligning-with-assembly-of-first-nations-national-scale-report/.
[76] Associated Engineering, "Closing the Infrastructure Gap by 2030: AE Discussion Paper" (2023) at 3, online (pdf): *Indigenous Services Canada* https://afn.bynder.com/m/367574a3a5cb5abe/original/1-AFN-Closing-the-Infrastructure-Gap-by-2030-National-Cost-Estimate-English-report-1.pdf.

Indigenous people are vulnerable to the impacts of climate change "because they tend to live in geographic regions experiencing rapid climate change and because they have a close relationship to and depend on the environment and its natural resources."[77] There are many compounding factors that further increase the vulnerability of Indigenous populations to extreme heat in schools. Notably, Indigenous children are more likely to live in areas with poor air quality, for instance because of poor infrastructure or proximity to wildfires, which results in increased rates of respiratory infections.[78] Extreme weather events like heat waves and wildfires will only worsen air quality for Indigenous children in the future.

More outreach, consultation, and research should be completed to fully understand the impacts of climate change on First Nations schools and children. The Assembly of First Nations discusses a First Nations Climate Lens in its National Climate Strategy.[79] The First Nations Climate Lens centres Indigenous knowledge systems, stepping away from technological and capitalistic solutions and instead focusing on "relationships that value the nexus of people and land," self-determination, language revitalization, and future generations.[80] Additional research into this area can employ this lens.

The under-funding of housing and schools in First Nations communities, and the corresponding heightened exposures to environmental harms for Indigenous children, is an example of environmental racism in Canada. The *National Strategy Respecting Environmental Racism and Environmental Justice Act*, SC 2024, c 11 ("*Environmental Racism Act*") requires the Federal government to develop a national strategy to address environmental racism and advance environmental justice. The *Environmental Racism Act* provides an opportunity for the Federal government to acknowledge, assess, and address the ongoing environmental racism in First Nations communities, including the impact of education infrastructure that is not climate resilient.

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[77] National Collaborating Centre for Indigenous Health, "Climate Change and Indigenous Peoples' Health in Canada" (2022) at 5, online (pdf): *Health Canada* https://www.nccih.ca/Publications/Lists/Publications/Attachments/10367/Climate_Change_and_Indigenous_Peoples_Health_EN_Web_2022-03-22.pdf [*NCCIH*].
[78] *Ibid* at 27.
[79] Assembly of First Nations, "National Climate Strategy" (October 2023), online (pdf): https://afn.bynder.com/m/77556e1d9da51db7/original/2023-Climate-Strategy-Report.pdf.
[80] *Ibid* at 24.

7. Legal Framework in Schools in Ontario

(a) Law and Policy Related to Extreme Heat in Schools

Provincial educational settings are governed by the following legislative framework:

i. Education Act

Section 265(1)(j) of the *Education Act* requires a school's principal to "give assiduous attention to the health and comfort of the pupils, to the cleanliness, **temperature** and ventilation of the school."[81] [emphasis added] This provision indicates the importance of temperature to the health and comfort of students but is of no practical effect when schools do not control their indoor temperature. There is a need for infrastructure upgrades to allow for compliance with this provision.

The Ontario Minister of Education is given authority through the *Education Act* to "establish policies and guidelines to promote the safety of pupils."[82] This provision gives the Minister of Education power to address extreme heat in schools. A policy or guideline that would set a maximum indoor temperature and require schools to be outfitted with mechanical cooling such as air conditioning or heat pumps requires funding to implement. The Ministry of Education took this approach with respect to ventilation during the COVID-19 pandemic. Specifically, the Ministry of Education's guidelines for respiratory illnesses include requirements that kindergarten classes, learning spaces in schools without mechanical ventilation, and mechanically ventilated spaces that are not supported by MERV-13 filters must have a standalone HEPA filter unit.[83] Per this policy, the Ministry of Education "deployed over 100,000 HEPA filter units and other ventilation devices to schools" across Ontario.[84] A similar approach that relies on guidelines and the distribution of mechanical cooling units could be used to cool classrooms.

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[81] *Education Act*, RSO 1990, c. E.2, ss 265(1)(j) [*emphasis added*].
[82] *Ibid*, at ss 301(7).
[83] Ministry of Education, "Respiratory illness: health and safety measures in schools" (2024), online: *Ontario* https://www.ontario.ca/page/respiratory-illness-health-and-safety-measures-schools#section-3 [*Ministry of Education*].
[84] *Ministry of Education*, *supra* note 84.

ii. Health Protection and Promotion Act

In addition to inspection and order-making powers under the *Health Protection and Promotion Act* ("*HPPA*"), section 7 requires that the Ontario Minister of Health and Long-Term Care specify the mandatory health programs and services provided by boards of health.[85] Under the Ontario Public Health Standards ("OPHS") and the *Healthy Environments and Climate Change Guideline, 2018* (the "Guideline"), requirement 3 of Climate Change Adaptation provides that "[boards] of health shall engage in actions to mitigate heat health impacts using tools such as the *Harmonized Heat Warning and Information System for Ontario, 2016* (or as current)."[86] Moreover, under the 2019 Health Hazards Response Protocol, "public health units are required to prevent and reduce the burden of illness from health hazards in the physical environment, including extreme weather and extreme temperatures."[87]

The 2018 OHPS require public health units to "use surveillance data to communicate information on risks" with the goal of effective responses to current and evolving conditions and the impacts of climate change.[88] The 2018 OPHS also require public health units to "assess health impacts related to climate change in accordance with the *Healthy Environments and Climate Change Guideline, 2018*."[89] The Guideline requires health units to monitor the impacts of climate change to inform local vulnerability plans, engage in multi-sectoral collaboration, and communicate identified health risks with the public.[90] The Guideline suggests the use of the Ontario Climate Change and Health Toolkit when monitoring the health impacts of climate change and when conducting relevant health vulnerability and adaptation assessments.[91]

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[85] *Health Protection and Promotion Act*, RSO 1990, c. H.7, ss 7, 10-13.
[86] Ministry of Health and Long-Term Care, "Healthy Environments and Climate Change Guideline, 2018" (2018), online (pdf): https://files.ontario.ca/moh-guidelines-healthy-environments-climate-change-en-2018.pdf [*HECCG*].
[87] Ministry of Health, "Harmonized Heat Warning and Information System for Ontario, 2023" (2023), online (pdf): https://files.ontario.ca/moh-harmonized-heat-warning-and-information-system-for-ontario-hwis-en-2023-05-29.pdf.
[88] Ministry of Health, "Ontario Public Health Standards: Requirements for Programs, Services and Accountability" (June 2021) at 19-20, online (pdf): https://files.ontario.ca/moh-ontario-public-health-standards-en-2021.pdf [*OPHS*].
[89] *Ibid* at 35.
[90] *Ibid*.
[91] Kristie Ebi, et al., "Ontario Climate Change and Health Toolkit" (2016), online (pdf): *Ontario* https://files.ontario.ca/moh-ontario-climate-change-toolkit-en-2016-08-01.pdf.

iii. Occupational Health and Safety Act

Occupational health and safety laws protect the health and well-being of staff in schools. Under section 25(2)(h) and 27(2)(c) of the *Occupational Health and Safety Act* ("*OHSA*"), employers and supervisors have a duty "to take every precaution reasonable in the circumstances for the protection of the worker."[92] This section includes a responsibility to develop hot and cold environment policies and procedures to protect workers from extreme heat and cold.[93] In addition, section 54(1)(e) and 54(1)(f) of the *OHSA* state:

> An inspector may, for the purposes of carrying out his or her duties and powers under this Act and the regulations, […]
>
> > (e) conduct or take tests of any equipment, machine, device, article, thing, material or biological, chemical or physical agent in or about a workplace and for such purposes, take and carry away such samples as may be necessary;
> >
> > (f) require in writing an employer to cause any tests described in clause (e) to be conducted or taken, at the expense of the employer, by a person possessing such special expert or professional knowledge or qualifications as are specified by the inspector and to provide, at the expense of the employer, a report or assessment by that person.

In a 2007 Ontario Labour Relations Board decision, the tribunal found that temperature is a physical agent."[94] The Board held that "section 54(1)(f) of *OHSA* allowed an inspector to issue an order to have a heat stress assessment."[95] The adjudicator also agreed with the Ministry that heat stress could be considered under the broad language of section 25(2) of the *OHSA*.[96] In

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[92] *Occupational Health and Safety Act*, RSO 1990, c. O.1, at s 25, 27 [*OHSA*].
[93] Government of Ontario, "Guideline No. 33: Working In extreme temperature conditions" (2022), online: https://www.ontario.ca/document/safety-guidelines-film-and-television-industry/guideline-no-33-working-extreme-temperature.
[94] *Cancoil Thermal Corp. v. United Food and Commercial Workers International Union, Local 175*, 2007 CanLII 15121 (ON LRB) at para 79, online: *CanLII* https://canlii.ca/t/1rbls#par79 [*Cancoil Thermal Corp*].
[95] *Ibid*.
[96] *Cancoil Thermal Corp*, *supra* note 95 at para 77.

general, the Ontario Court of Appeal found that the *OHSA* should be interpreted liberally, such that the legislation's public welfare and remedial purpose can be fulfilled.[97]

8. Solutions to Extreme Heat in Schools

CANADA'S EXTREME HEAT RESPONSE PLANS AND RECOMMENDATIONS ARE INADEQUATE. Currently, Canada has a heat alert and response system by which the government alerts communities affected by extreme heat and informs people about "recognizing, preparing for and adapting to extreme heat events."[98] Both the Federal and Provincial governments have released heat response recommendations, where it is recommended that people experiencing extreme heat:

- avoid sun exposure;
- take a break from the heat by taking a cold bath or shower or going to a public cool space;
- reschedule outdoor activities;
- block out the sun with curtains;
- refrain from using ovens; and,
- use air conditioning.[99]

These recommendations are helpful to populations with the resources to respond and the freedom to modify their behaviour. Children are usually unable to avoid sun exposure, re-locate to a cooled location, or even take breaks from their regularly scheduled activities. These recommendations do not offer long-term or systemic solutions and are not geared to educational settings. Further, these recommendations do not address economic, social, or structural barriers to mitigating the impacts of climate change. Without meaningful government action, extreme heat events stand to exacerbate inequalities, starting with children's learning and education.

[97] *Ontario (Ministry of Labour) v. Hamilton (City)*, 2002 CanLII 16893 (ON CA) at para 16, online: *CanLII* https://canlii.ca/t/1dwq1#par16.
[98] *Extreme heat events*, *supra* note 2.
[99] *Keep Children Cool!*, *supra* note 2.

CELA RECOMMENDATIONS TO PROTECT CHILDREN IN SCHOOLS FROM EXTREME HEAT

Recommendation 1: AMEND LEGISLATION TO INCLUDE A MAXIMUM INDOOR HEAT STANDARD IN SCHOOLS OF 26 DEGREES CELSIUS. A maximum indoor temperature standard could be set by amendments to the *Education Act* or the *Occupational Health and Safety Act*, or alternatively, a maximum indoor temperature standard could be set by an *Education Act* guideline or regulation pursuant to the *OHSA*. CELA recommends that the standard apply in all classrooms used for teaching, learning, or eating purposes, and should also include washrooms.

Recommendation 2: THE MAXIMUM INDOOR TEMPERATURE STANDARD APPROPRIATE FOR CHILDREN SHOULD BE REVIEWED IN TWO YEARS. The literature to date focuses on indoor temperature thresholds over which adults begin to experience heat-related health impacts. It is crucial that the standard reflect the unique vulnerabilities of children and be reviewed and lowered as appropriate in a short time-frame.

Recommendation 3: UPGRADE CANADIAN EDUCATIONAL INFRASTRUCTURE WITH MECHANICAL COOLING. To mitigate the effects of extreme heat, Canadian schools need to be heat resilient. This involves infrastructure upgrades in Canadian schools such that they include heat mitigation methods like air conditioning or heat pumps. In the Federal government's 2030 Emissions Reduction Plan, pursuant to the *Canadian Net-Zero Emissions Accountability Act*, the government expresses an intention to retrofit existing buildings and to create new, net-zero buildings going forward. Retrofits can benefit communities and residents in numerous ways, while also reducing "both municipal [greenhouse gas] emissions and building operations costs."[100] Some of the benefits of retrofits include: improving indoor environmental quality (air quality and temperature), increasing community resilience during extreme weather

[100] Green Municipal Fund, "Health, Equity and Other Non-Energy Benefits of Community Building Retrofits" (2024) at 1, online (pdf): *Clean Air Partnership* https://media.fcm.ca/documents/programs/cbr/gmf-cbr-health-equity-non-energy-benefits-guide.pdf.

events, reducing heat-related health impacts, and creating green jobs.[101] The federal Emissions Reduction Plan creates several investment funds for upgrading Canadian buildings, including:

- $200 million to support deep retrofits of large buildings through a retrofit accelerator initiative, which will help address barriers to deep retrofits (such as audits or project management).
- $183 million to support a decarbonized and climate resilient construction sector through the development of standards and building codes, the establishment of a Centre of Excellence, research and development activities – including a concrete and cement R&D initiative, timber construction R&D initiative, and multi-sector collaboration challenges – and a procurement challenge.[102]

There are several other funds that may be available to Canadian schools for infrastructure updates, including: the Investing in Canada Infrastructure Program, Capital Priorities Program, School Renewal Allocation via the School Facilities Fund under Core Education Funding, and School Condition Improvement Fund under Building, Expanding, and Renewing Schools.[103]

Case Study: Taiwan

In Taiwan, air conditioning units were installed in every public classroom in 2022 at a cost of $1.1 billion USD.[104] This project was announced on July 7, 2020 and took less than two years to complete, with the last air conditioners installed in January 2022.[105] In the end, 180,000 air conditioning units were installed in elementary and middle schools nationwide.[106] As part of

[101] *Ibid*, at 2.
[102] Ministry of Environment and Natural Resources, "Canada's 2030 Emissions Reduction Plan – Chapter 2" (2023), online: *Government of Canada* https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/emissions-reduction-2030/plan/chapter-2.html#toc5.
[103] Government of Canada, "Investing in Canada Infrastructure Program" (3 July 2024), online: *Government of Canada* https://housing-infrastructure.canada.ca/plan/icp-pic-INFC-eng.html; Ministry of Education, "Education Capital Policies and Programs Manual" (April 2024), online (pdf): *Ontario* https://efis.fma.csc.gov.on.ca/faab/Memos/B2024/B08_Attach1_EN.pdf; *Ibid* at 34; *Ibid* at 43.
[104] Department of Information Services, "Government achieves air conditioning for every classroom ahead of schedule" (2022), online (press release): *Executive Yuan* https://english.ey.gov.tw/Page/61BF20C3E89B856/b61dbdff-ec65-4f29-b67e-2bb95101c3e2 [*Department of Information Services 2022*].
[105] *Department of Information Services 2022*, *supra* note 105.
[106] *Ibid*.

this same initiative, the Taiwanese government installed solar panels to increase schools' power generation capabilities at more than 3,300 schools.[107]

In 2022-2023, there were 3,959 elementary schools in Ontario.[108] Moreover, the 2023-2024 Grants for Student Needs equalled $27.1 billion available for investments into Canadian schools.[109] This specific grant targets investments and adjustments in schools to ensure "safe and clean schools."[110]

Recommendation 4: AMEND ONTARIO'S BUILDING CODE TO INCLUDE HVAC REQUIREMENTS AND MECHANICAL COOLING REQUIREMENTS FOR NEW SCHOOLS AND RELATED REQUIREMENTS FOR RETROFITTING SCHOOL BUILDINGS. Canada's Emissions Reduction Plan acknowledges the importance of building codes as "key enablers of a net-zero buildings sector."[111] Widespread adoption and enforcement of these codes would also ensure climate resilience in the future. The 2024 amendments to the Ontario Building Code (the "2024 Building Code"), which became effective January 1st, 2025, include minimum temperature requirements in dwellings and various other kinds of buildings.[112] Moreover, part 12 of the 2024 Building Code is entitled "Resource Conservation and Environmental Integrity" and includes provisions for energy efficiency, carbon dioxide equivalents, and peak electric demand. CELA recommends the addition of maximum extreme heat mitigation measures, including mechanical cooling requirements, in Ontario's Building Code.

[107] Department of Information Services, "Next year to see air conditioning, power generation in all elementary, middle schools" (7 October 2021), online (press release): *Executive Yuan* https://english.ey.gov.tw/Page/61BF20C3E89B856/4665e854-bfb8-43e0-a975-34d8b4602d33 [*Department of Information Services 2021*].
[108] Ministry of Education, "Facts about elementary and secondary education" (2024), online: *Ontario* https://www.ontario.ca/page/facts-about-elementary-and-secondary-education.
[109] *Ibid.*
[110] Andrew Davis, "2023-24 Grants for Student Needs Funding" (2023), online (pdf): *Ministry of Education* https://efis.fma.csc.gov.on.ca/faab/Memos/B2023/B04_EN.pdf.
[111] *Ibid.*
[112] Ministry of Municipal Affairs and Housing Building and Development Branch, "Building Code Compendium" (May 2024), *ServiceOntario Publications* at s 6.2.1.1A, 9.33.3.1, 12.3.1.3 [*2024 BC*].

Recommendation 5: AMEND ONTARIO'S BUILDING CODE TO INCLUDE A MAXIMUM TEMPERATURE STANDARD FOR ALL SCHOOLS. Section 9.33.3.1 of the 2024 Building Code states that heating facilities shall be capable of maintaining an indoor air temperature of not less than 22°C in all living spaces, and then goes on to outline minimum temperature requirements in common service rooms, unfinished basements, and crawl spaces. This section should be amended to include a maximum temperature requirement of 26°C in all living spaces.

Schools in First Nations Communities

Recommendation 6: ENSURE THAT ADDITIONAL FUNDING IS PROVIDED TO FIRST NATIONS SCHOOLS TO ADDRESS EXTREME HEAT AND CLIMATE RESILIENCY. The existing infrastructure deficit means that schools on First Nations lands require more funding to adequately address the threats of climate change. Current infrastructure funding is not yet meeting the needs of Indigenous students. To ensure that Indigenous schools have the means to install heat mitigating technology and to further the TRC Calls to Action #7 and #8, the Federal government must provide additional funding to Indigenous schools on First Nations lands to address extreme heat exposures.[113]

Recommendation 7: THE FEDERAL GOVERNMENT MUST ENSURE MEANINGFUL PARTICIPATION OF AND PARTNERSHIP WITH FIRST NATIONS IN CLIMATE RESILIENCY AND HEAT MITIGATION EFFORTS.[114] The Federal government must ensure that First Nations communities are meaningful partners in the development of plans to address climate resilience in their schools, including in relation to extreme heat. The

[113] *TRC*, *supra* note 3 - **TRC Call to Action #7:** We call upon the Federal government to develop with Aboriginal groups a joint strategy to eliminate educational and employment gaps between Aboriginal and non-Aboriginal Canadians; *Ibid* - **TRC Call to Action #8:** We call upon the Federal government to eliminate the discrepancy in federal education funding for First Nations children being educated on reserves and those First Nations children being educated off reserves.
[114] Human Rights Watch, "'My Fear is Losing Everything:' The Climate Crisis and First Nations' Right to Food in Canada" (October 2020), online: https://www.hrw.org/report/2020/10/21/my-fear-losing-everything/climate-crisis-and-first-nations-right-food-canada [*HRW*].

infrastructure needs in a community, and the development of culturally appropriate buildings and curricula, should be accounted for in plans to protect Indigenous children from extreme heat.[115]

Case Study: Tít̓q̓et First Nation

Tít̓q̓et, a community part of the St'át'imc Nation in British Columbia, has been severely affected by climate change and extreme weather events such as wildfires and heat events. These events have disrupted traditional livelihoods such as fishing, hunting, and gardening. With funding support from Health Canada, a consultant worked with a Tít̓q̓et local Heat Team to develop a heat response plan that integrates existing emergency plans and builds on local knowledge. The Tít̓q̓et Heat Team has raised awareness of heat preparedness through various means, including a video made by Chief Sidney Scotchman, social media posts, and community meetings. During heat events, staff regularly check in on Elders and the most vulnerable, delivering water and distributing air conditioners. Cooling spaces were also established in two community buildings through the installation of tinted windows and a heat pump. When developing the heat response plan, both the consultant and the Tít̓q̓et Heat Team saw immense value in engaging with community members and Elders to align temperature and weather data with lived experiences and local knowledge.[116]

Recommendation 8: FIRST NATIONS AND THE FEDERAL GOVERNMENT SHOULD CO-DEVELOP A PLAN FOR ASSESSING CLIMATE CHANGE IMPACTS ON FIRST NATIONS CHILDREN IN SCHOOLS.[117] TRC Call to Action #9 calls on the Federal government to prepare and publish annual reports comparing funding for the education of First Nations children in their communities and in the rest of Ontario, as well as educational and income outcomes for Indigenous peoples. We encourage similar monitoring and reporting on climate impacts on Indigenous children in their schools.

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[115] Reed, G.. Fox, S., Littlechild, D., et al., "For our future: Indigenous Resilience Report" (3 July 2024), online (pdf): *Canada* https://changingclimate.ca/site/assets/uploads/sites/7/2024/03/Indigenous-Resilience-Report_Final_EN.pdf.
[116] Interior Health, "How First Nation communities are addressing climate change" (26 June 2024), online (podcast): https://www.interiorhealth.ca/stories/how-first-nation-communities-are-addressing-climate-change#how-the-ti--t--q--et-heat-team-prepares-for-extreme-heat-events.
[117] *HRW*, *supra* note 115.

Recommendation 9: CONSIDERATION OF CLIMATE RESILIENCY AND THE IMPACT OF UNDER-FUNDING OF INFRASTRUCTURE ON FIRST NATIONS LANDS SHOULD BE INCLUDED IN THE FEDERAL GOVERNMENT'S CONSULTATION AND NATIONAL STRATEGY PURSUANT TO THE *ENVIRONMENTAL RACISM ACT*. The *Environmental Racism Act* requires the Federal government to develop a national strategy to advance environmental justice and to assess, prevent, and address environmental racism. A study must also include information and statistics on the location of environmental hazards. Pursuant to the *Environmental Racism Act,* CELA urges the Federal government to include consideration of and consultation with First Nations communities about the climate resiliency of their schools and child care facilities in their study and national strategy.

Data Collection

Recommendation 10: INSTALL INDOOR TEMPERATURE, HUMIDITY, AND VENTILATION MONITORS IN EVERY CLASSROOM. Many schools do not have a way to measure the internal temperature of the building. Because of this, schools may rely on weather reports for outdoor temperature to gauge the indoor temperature. However, outdoor temperature has been found to be a poor indicator of indoor temperature.[118] It is vital that indoor temperature be measured so that staff know the actual temperature of classrooms and can implement appropriate mitigation measures.

Recommendation 11: THE PROVINCE SHOULD CREATE MAPS THAT IDENTIFY SCHOOLS THAT SHOULD BE PRIORITIZED FOR INSTALLATION OF MECHANICAL COOLING. Heat vulnerability maps show where "hotspots" overlap with child care centres and schools and thus identify which areas are most vulnerable to extreme heat events. Similar projects have been undertaken to identify vulnerable populations by Toronto Public Health and the University of Toronto.[119] Data on which schools are air-conditioned is a

[118] *Waugh et al., supra* note 15 at 1.
[119] *Shuchen Bu et al., supra* note 63.

relevant filter to add to existing vulnerability maps to ensure that schools in "hotspots" are prioritized for infrastructure upgrades.

Recommendation 12: WORK WITH LOCAL PUBLIC HEALTH UNITS TO GATHER DATA ON HEAT IMPACTS IN SCHOOLS. Public health units should be gathering data on extreme heat and schools because of the requirement of the *Healthy Environments and Climate Change Guideline, 2018* and the Ontario Public Health Standards to create climate change and health vulnerability assessments.[120] Public heath units could use new and improved data on heat in schools to inform their reports by ensuring that appropriate data is collected, including monitoring indoor and outdoor school temperatures, school absences during extreme heat events, school closures, and air quality. CELA recommends that public health units employ the Ontario Climate Change and Health Toolkit in conducting these health vulnerability and adaptation assessments.[121]

School Yards

Recommendation 13: DEVELOP PROVINCE-WIDE SHADE GUIDELINES FOR SCHOOL YARDS. Provincial guidelines on shade may be created pursuant to the authority provided by the *Education Act*. Exposure to the sun increases the temperature of not only students' bodies, but also of the school yard itself. By increasing the amount of shade in playgrounds, by any method, schools are reducing outdoor temperatures and protecting their students. Developing provincial guidelines would allow for flexible implementation such that schools could act according to their specific needs and spaces.

Case Study: Australia

[120] *HECCG*, *supra* note 88; *OPHS*, *supra* note 90 at 35.
[121] Kristie Ebi, et al., "Ontario Climate Change and Health Toolkit" (2016), online (pdf): *Ontario* https://files.ontario.ca/moh-ontario-climate-change-toolkit-en-2016-08-01.pdf.

The Cancer Council of New South Wales, Australia, has developed Guidelines to Shade and a Shade Advocacy Toolkit to help schools understand the importance of shade, identify their shade needs, and implement shade projects.[122]

A Canadian non-profit, Evergreen, has also released "A Climate Ready Schools guide to designing for shade" along with other resources for adapting school yards to climate change, including a Shade Audit Information Guide + Tool.[123] A shade audit "can determine existing shade usage patterns and assess and identify optimal shading from both natural and built shade requirements."[124]

Recommendation 14: INCREASE GREEN SPACES IN SCHOOL YARDS TO PROVIDE COMMUNITY BENEFITS. Increasing greenspace in school yards will assist in turning schools into "climate shelters," which assists with both the social and climate resilience of neighbourhoods. Social resilience is increased by creating a space for communities to come together in times of need, and by creating social infrastructure.[125] Climate resilience is increased because green spaces provide cleaner air, regulate local temperatures, and safeguard against flooding.[126] Any investment in green spaces must be cognisant of the disparities discussed in this report: racialized and low-income communities are the least climate resilient, hottest, and most polluted areas in cities. Funding for increasing greenspace is available from programs like the

[122] Cancer Council NSW, "Guidelines to Shade" (May 2020), online (pdf): *SunSmart* https://www.cancercouncil.com.au/wp-content/uploads/2020/05/Guidelines_to_shade_WEB2.pdf; Cancer Council, "Shade Advocacy Toolkit" (March 2025), online (pdf): https://www.cancercouncil.com.au/wp-content/uploads/2024/10/CPA-Skin-25_0225-Shade-Advocacy-Toolkit-2025-FINAL.pdf.
[123] Evergreen, "A Climate Ready Schools guide to designing for shade" (2024), online (toolkit): *Evergreen Resource Hub* https://evergreen.ca/resource-hub/resources/a-climate-ready-schools-guide-to-designing-for-shade/ [*Evergreen 2024*];Waterloo Region Shade Work Group "Shade Audit Information Guide + Tool: A Guide for Creating Shady Outdoor Spaces" online (pdf): https://www.regionofwaterloo.ca/en/health-and-wellness/resources/Documents/ShadeAudit_GuideTool.pdf.
[124] *Evergreen 2024*, *supra* note 124.
[125] Park People, "Sharing the Benefits of Green Space" (2021), online (article): https://ccpr.parkpeople.ca/2021/sections/nature/stories/sharing-the-benefits-of-green-space.
[126] *Ibid*.

Ontario Community Environment Fund and Tree Canada's Greening Canada's School Grounds Grant.[127]

Case Study: Irma Coulson Public School, Milton, Ontario

Irma Coulson Public School became Canada's first "climate ready school" in 2022. A climate ready school is one that has "multi-use, natural outdoor play and learning environments that also promote health and resilience in the face of a changing climate."[128] The renovated school ground now includes more vegetation and permeable surfaces, resulting in 100% absorption "of rainfall on the school site while mitigating flood risk in their neighbours."[129] Tree canopy was also increased at the school, as the project increased the total number of trees on site by 291%.[130] This project was completed through partnership between Evergreen, the Halton District School Board, and several community donors such as the Balsam Foundation and the LCBO's Spirit of Sustainability campaign.[131]

Case Studies: Spain and France

Barcelona, Spain: Green, Blue, Grey: Solutions for Adapting to Climate Change (GBG_AS2C)

Funded by the European Commission's Urban Innovative Action ("UIA") program, Barcelona completed the GBG_AS2C initiative in 2021 as part of the city's Climate Plan.[132] The GBG_AS2C aimed to increase Barcelona's climate resilience by converting schoolyards into climate shelters by creating water points (i.e. misting stations or water fountains) and incorporating greenery and shade into school yards, and by using permeable materials to do so. The project transformed the playgrounds of 12 schools across the city, reclaiming 1,000 square

[127] Government of Ontario, "Ontario Community Environment Fund" (5 September 2024), online: *Ontario* https://www.ontario.ca/page/ontario-community-environment-fund; Tree Canada, "Greening Canada's School Grounds", online: https://treecanada.ca/grants-awards/greening-canadas-school-grounds/.
[128] Evergreen, "Canada's first climate ready school" (2022), online: https://www.evergreen.ca/projects/canadas-first-climate-ready-school/ [*Evergreen 2022*].
[129] *Ibid*.
[130] Evergreen and the Halton District School Board, "Climate Ready Schools" (2023) at 29, online (pdf): https://www.evergreen.ca/wp-content/uploads/2023/10/Climate_Ready_Schools_Case_Study_2023.pdf.
[131] *Evergreen 2022*, *supra* note 129.
[132] Ajuntament de Barcelona, "Climate shelters in schools," online: https://www.barcelona.cat/barcelona-pel-clima/ca/escoles-refugi-climatic [*Ajuntament de Barcelona*].

meters for vegetation and soil, planting 74 trees, installing 26 new water points, and creating 2,213 square meters of shade.[133]

Paris, France: Openness, Adaptation, Sensitisation, Innovation, and Social Ties (OASIS)
Paris' OASIS project is a sister project to Barcelona's GBG_AS2C, and is also funded by the UIA. OASIS is similar to GBG_AS2C in that it is a project to transform schoolyards into climate shelters "through innovative techniques, nature based solutions, in an integrated approach."[134] Paris originally committed to turning 10 schoolyards into climate shelters, but now has the goal of transforming all schoolyards in the city. As of 2023, Paris has transformed 130 schools across the city and the OASIS project has spread to other cities across France.[135] OASIS schoolyards can now be found in Toulouse, Caluire-et-cuire, Bordeaux, and more.[136]

Reschedule Tests and Other Activities

Recommendation 15: SCHEDULE EXAMINATIONS AND PHYSICAL ACTIVITIES AT COOLER TIMES OF DAY. Examinations or physical activities should be held in cooled environments and scheduled for cooler times of the day to promote student well-being and success. In prolonged heat waves, certain activities may need to be rescheduled to a later, cooler date or cancelled altogether to ensure student success and safety.

Equity Considerations

Recommendation 16: INTEGRATE EQUITY CONSIDERATIONS INTO ALL ASPECTS OF EXTREME HEAT RESPONSES FOR SCHOOLS. Efforts should be made to address the existing disparities in school funding and infrastructure. Priority for funding and support should be given to under-resourced schools, including schools in neighbourhoods with other

[133] *Ajuntament de Barcelona*, *supra* note 133.
[134] Urban Innovative Actions, "Paris" online: https://uia-initiative.eu/en/uia-cities/paris-call3.
[135] European Union, "OASIS takes off! – Final Journal" (2023), online (blog): *Portico* https://portico.urban-initiative.eu/news-and-events/news/oasis-takes-final-journal.
[136] CAUE de Paris, "Observatoire des cours Oasis", online: https://www.observatoire-oasis.fr/.

environmental stressors or low-income populations, and First Nations, Inuit, and Métis schools where a large capital infrastructure deficit has been identified.

9. Conclusion

The impacts of climate change are unfair; children are not responsible for climate change but are experiencing disproportionate impacts. Extreme heat poses a threat to the health and well-being of children. Climate change is increasing the frequency, duration, and intensity of extreme heat events, and children are more frequently experiencing extreme heat events during the school year.

Canada's education infrastructure is old and Canadian schools are not prepared to protect students from extreme heat events. Additional funding for infrastructure upgrades are needed, specifically in First Nations communities dealing with ongoing injustice because of serious under-funding and infrastructure deficits.

Our children deserve safer and healthier learning environments, and mechanical cooling is essential to protect children exposed to longer summers and more frequent extreme heat events. A mandatory indoor temperature standard should be implemented. We also recommend a review of the standard after further study of the impacts of indoor heat on children to ensure it is protective of health and should not lowered.

Implementation of CELA's recommendations will serve to better protect our children from the unfair impacts of climate change and make our schools more climate resilient.