

Policy Context

TransformTO Net Zero 2040



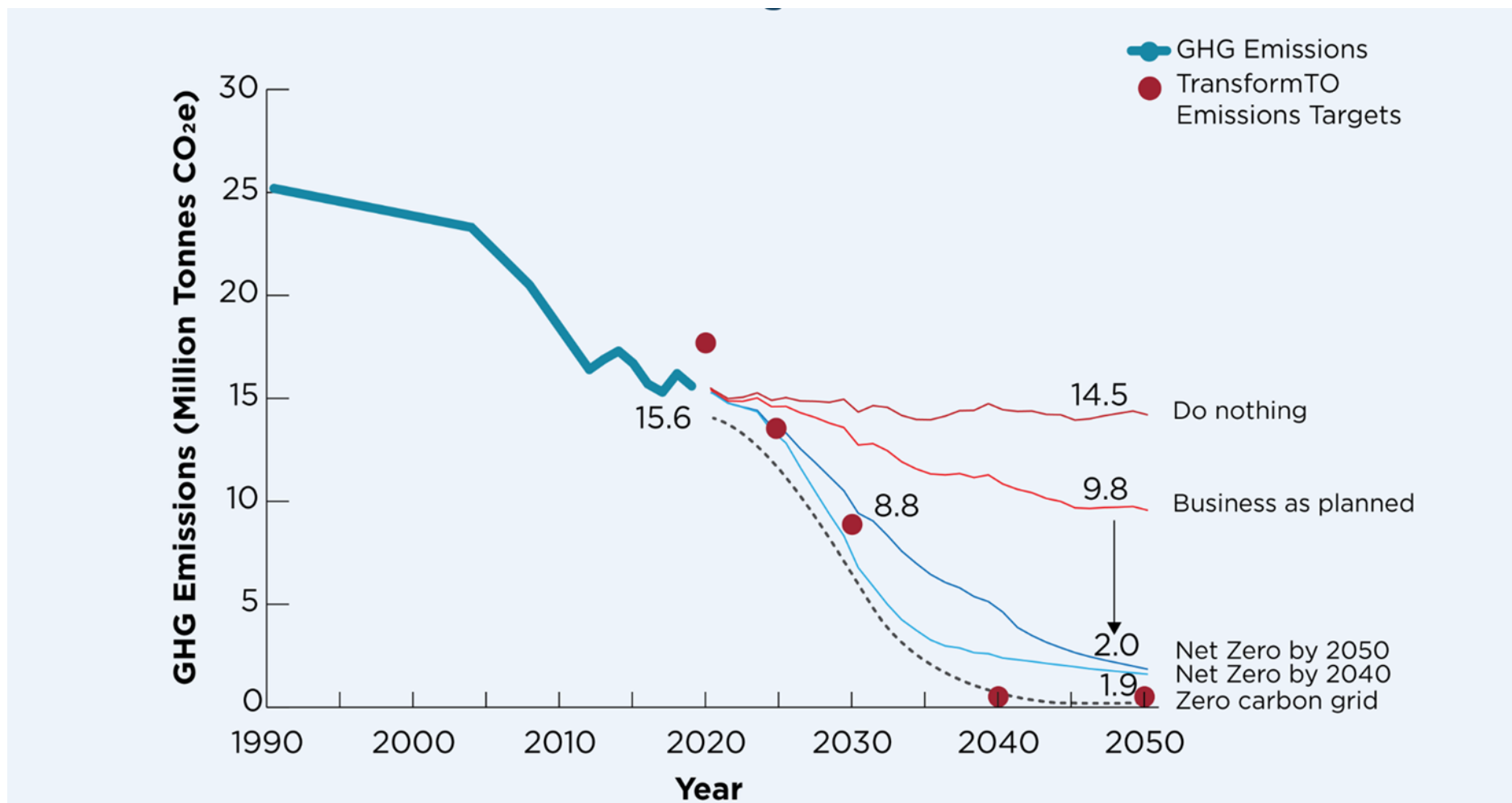
TransformTO Net Zero 2040 (Dec. 2021)

- City Council adopted the TransformTO Net Zero Strategy, which establishes a target of Net Zero GHG emissions by 2040 to address the Climate Emergency
- The interim reduction targets from 1990 levels:
 - 2025 target is 45 percent
 - 2030 target is 65 per cent reduction
- Climate investments will mean better outcomes that will last longer, reduce exposure to climate risks in future, will be cheaper now than later

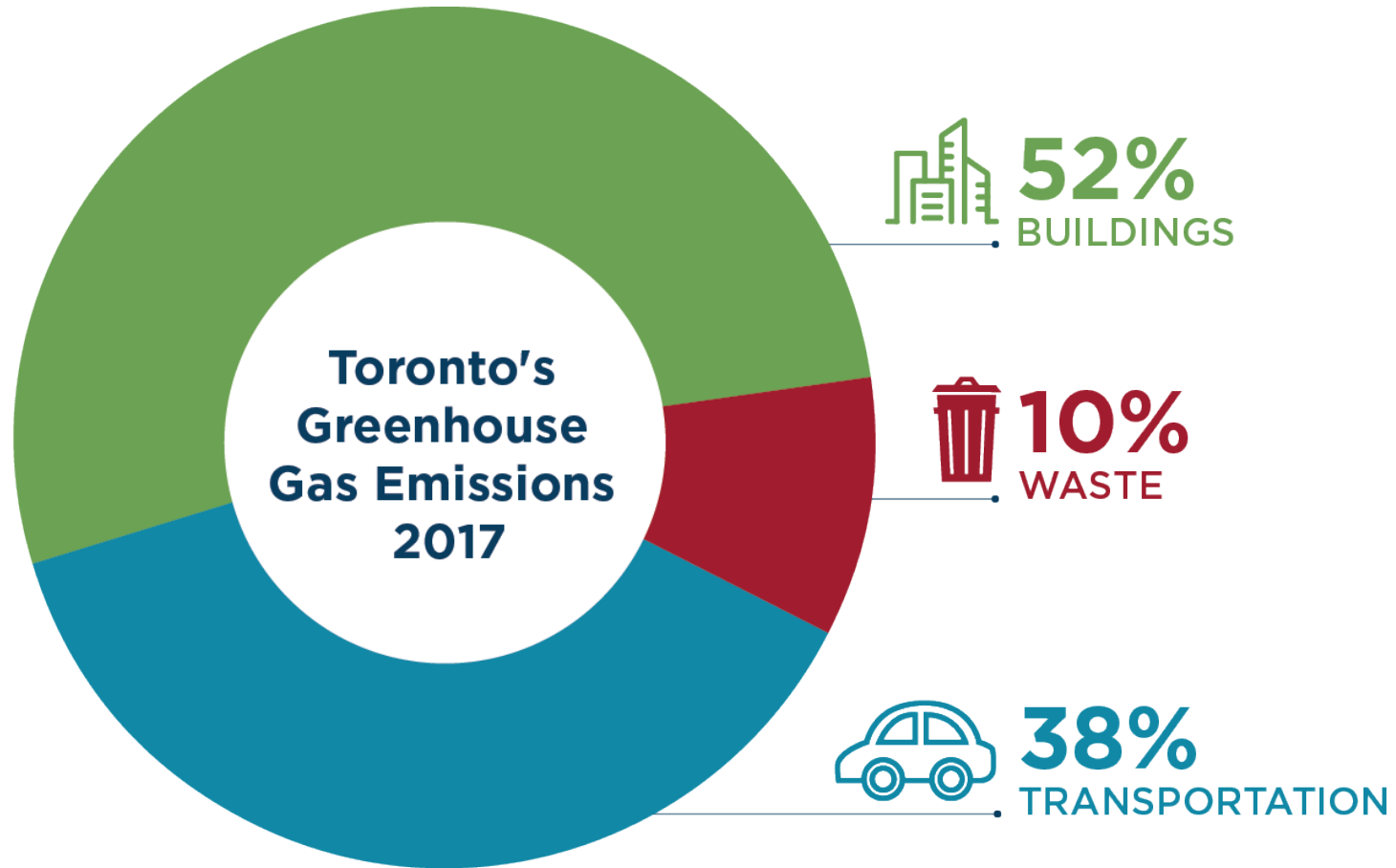
What is net zero?

'Net zero' is achieved when we decarbonize our city meaning we change how we move, build, generate energy, and dispose of our waste so that the greenhouse gases we produce are as close to zero as possible.

Not Business-As-Usual



GHG Emissions in Toronto



Toronto Green Standard Version 4



Toronto Green Standard (TGS) V4

- Sustainable design requirements for NEW private and City-owned developments since 2010
- TGS v4 applies to all new applications received after **May 1, 2022**
- Market transformation tool



What is TGS?

Three sets of standards:



1. Low-Rise Residential (Part 9)

2. Mid to High-rise Residential & Non-Res (Part 3)



3. City Agency, Corporation, Divisions



TGS Priority Areas



AIR QUALITY

- EV Ready parking, bike & pedestrian infrastructure



ENERGY & EMISSIONS

- Operational Energy & GHG Emission caps
- Embodied Carbon in Materials



CIRCULAR ECONOMY

- Waste collection/storage
- Sustainable Materials & CD Waste Diversion



WATER EFFICIENCY

- Green Streets/Green infrastructure
- Stormwater management
- Potable water reductions



ECOLOGY

- Tree Planting & Soils, Biodiverse plantings
- Climate Positive Design
- Bird Friendly design



Zero Emissions
Buildings

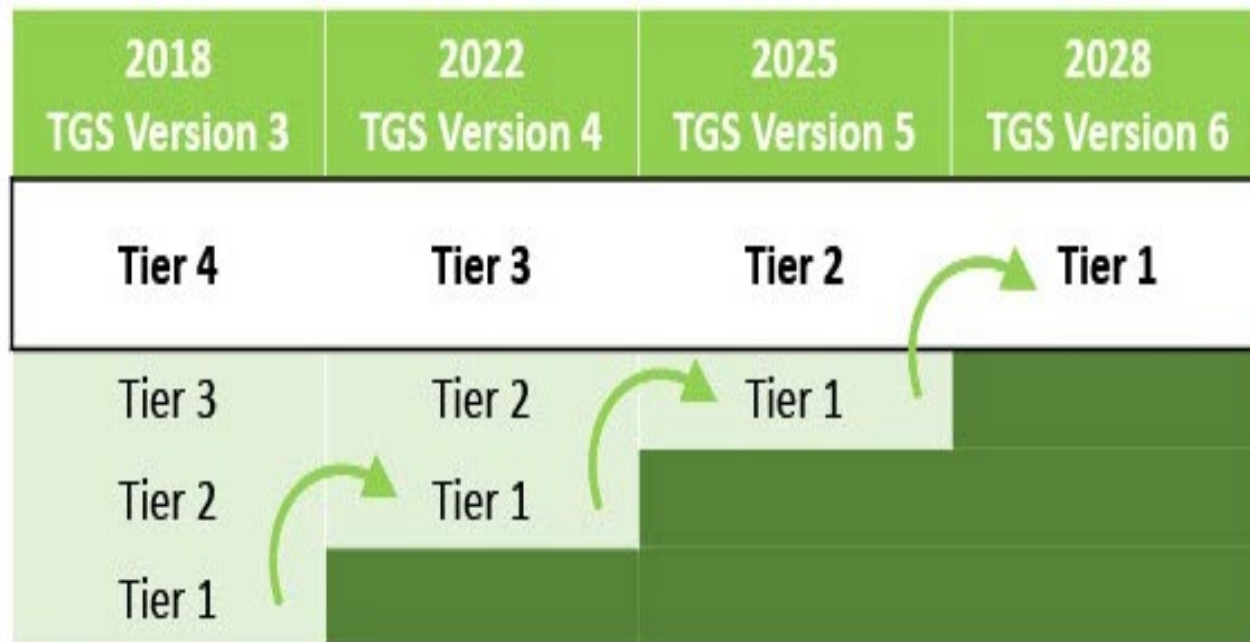
Advance Net Zero Construction Earlier



Toronto's Tiered Performance "Code"

Net Zero Ready by 2028

City Facilities-Net Zero 2022

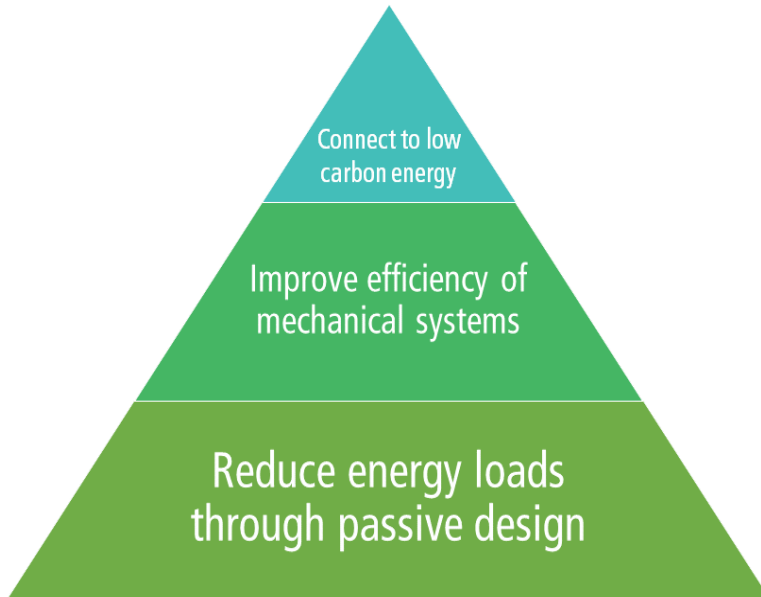


**Near-Zero
Emissions**

Toronto Green Standard V4 compared to OBC (NECB 2015):

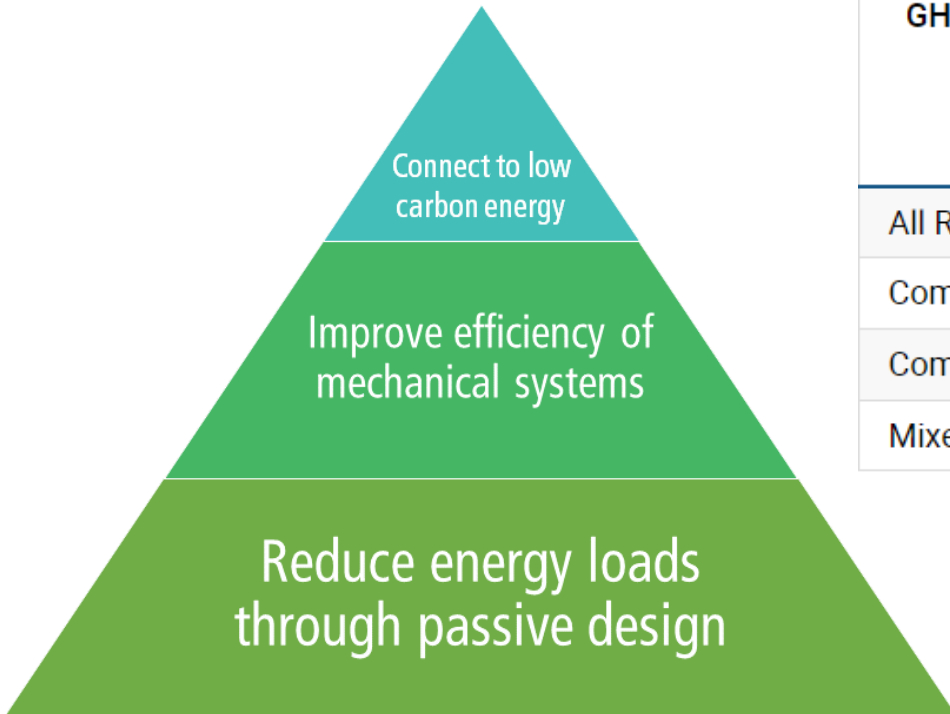
- Tier 1 ~30-40% less energy use
- Tier 2 ~50%
- Tier 3 ~65%

Performance-Based Standard



Building Type (kWh/m ²)	Tier 1 (mandatory)		Tier 2		Tier 3	
	TEUI	TEDI	TEUI	TEDI	TEUI	TEDI
Multi-unit Residential (> 6 storeys)	135	50	100	30	75	15
Multi-unit Residential (≤ 6 storeys)	130	40	100	25	70	15
Commercial Office	130	30	100	22	65	15
Commercial Retail	120	40	90	25	70	15
Mixed use (calculated using a weighted average of the above)						

Performance-Based Standard



Building Type: GHGI(kg CO ₂ e/m ² /yr)	Tier 1 Mandatory	Tier 2 Voluntary High performance	Tier 3 Voluntary Near Zero Emissions	Net Zero Emissions Mandatory for City- Owned Facilities
All Residential	15	10	5	0
Commercial Office	15	8	4	0
Commercial Retail	10	5	3	0
Mixed use (calculated using a weighted average of the above)				



Embodied Materials
Emissions

Reduce Embodied Carbon from Building Materials



Embodied Carbon: Building Materials



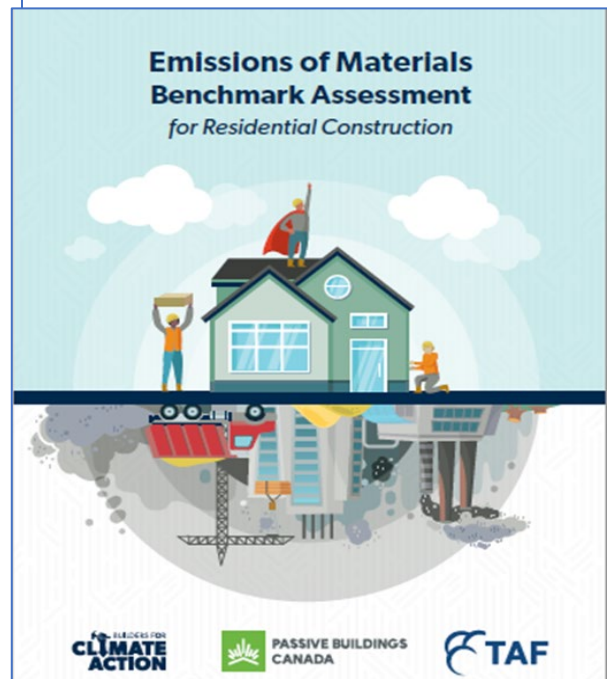
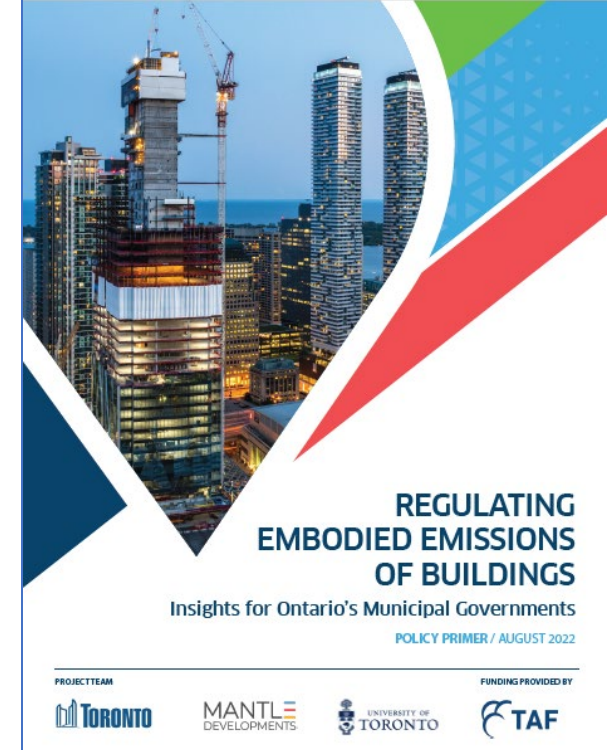
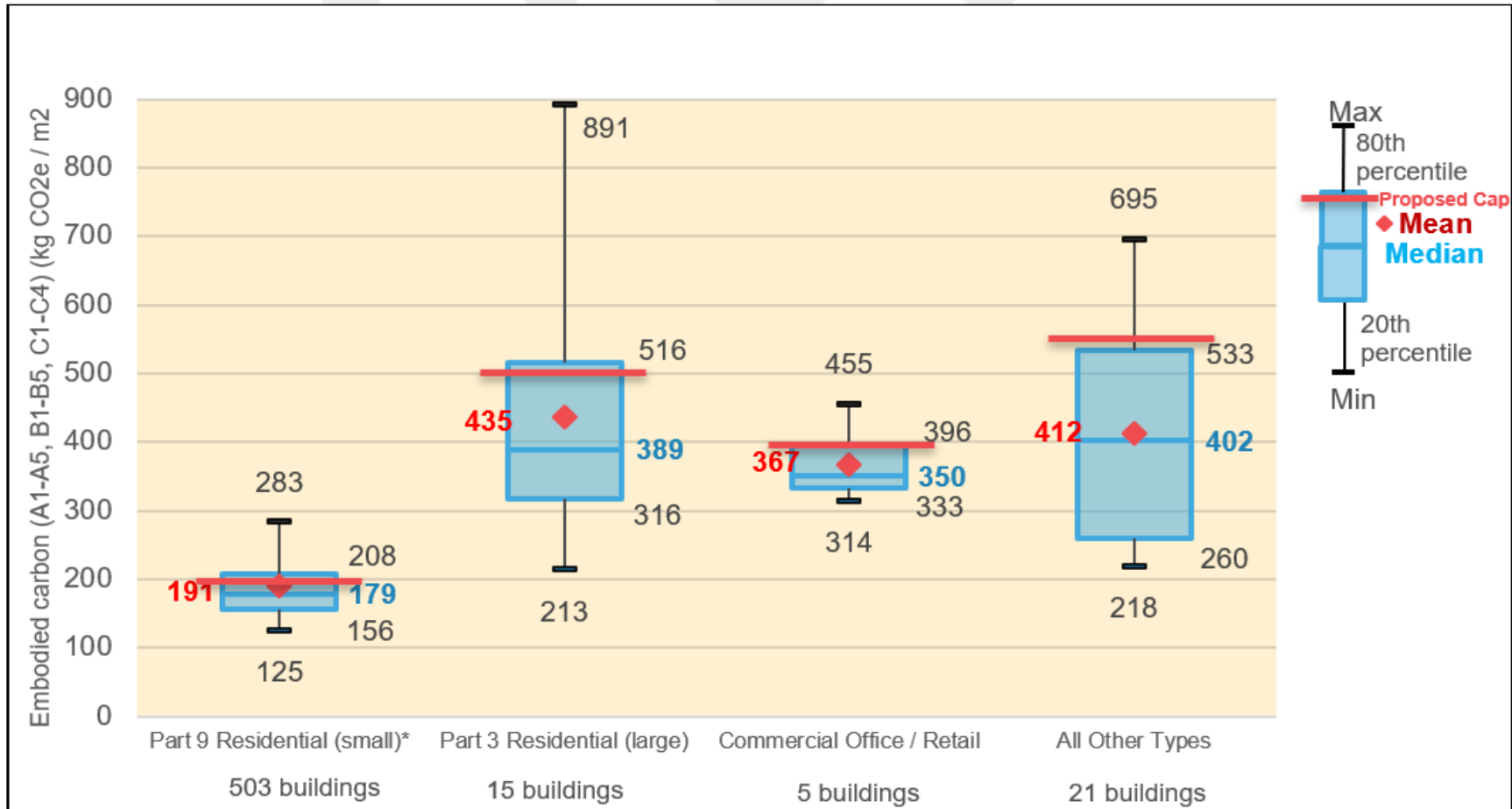
City-owned - Required, Tier 2 & 3 - voluntary

- Upfront materials emissions assessment
- Structural and envelope materials
- CAGBC Zero Carbon Building Standard method or BEAM for Low-rise residential
- Low-rise target Emissions Intensity $<250 \text{ kgCO}_2\text{e/m}^2$

Tier 3 (Large Buildings)

- Whole building LCA
- Optional target of 20% embodied carbon reduction

Benchmark Studies Proposed Caps

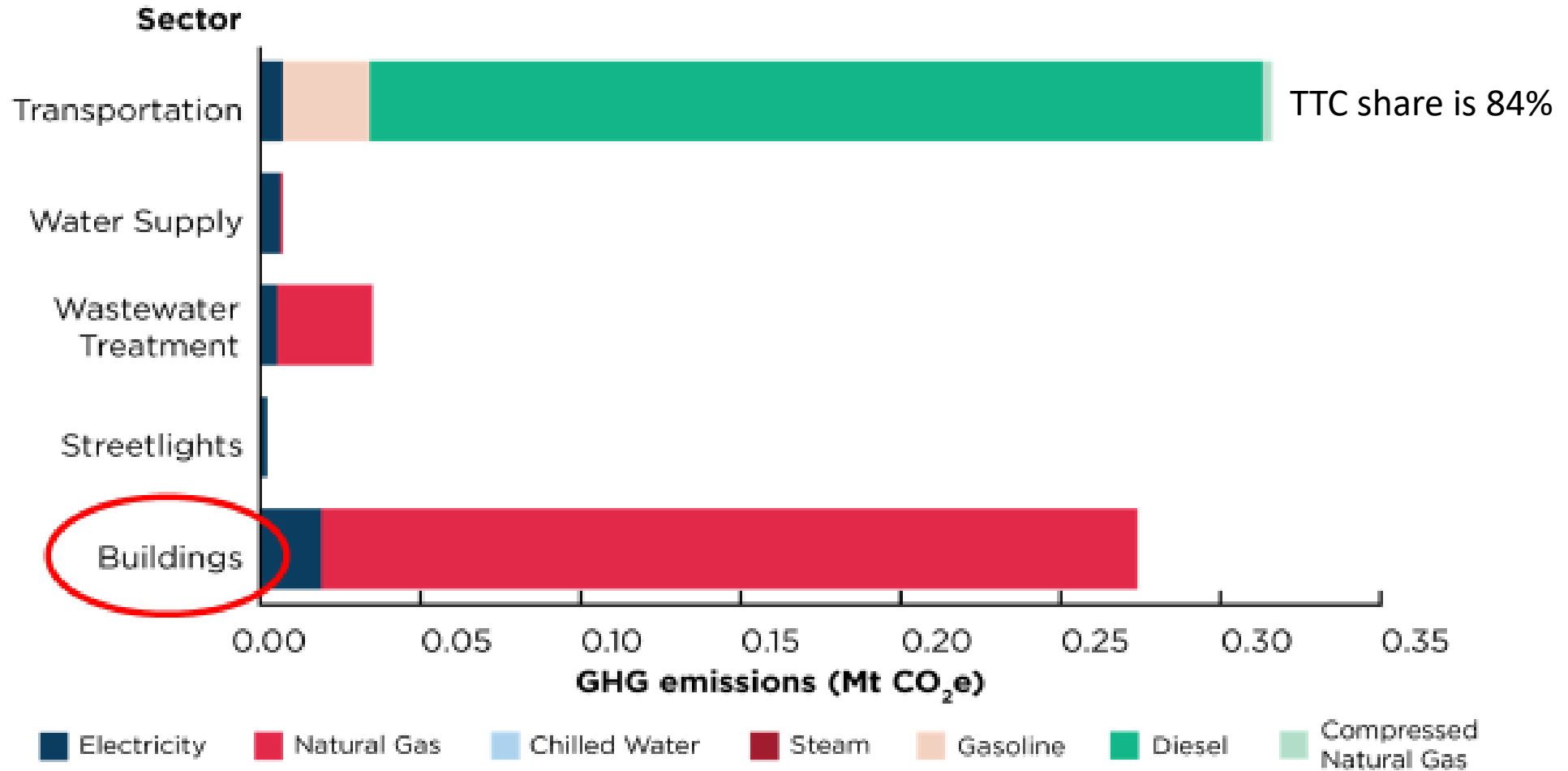


City of Toronto Net Zero Buildings



Corporate Emissions

City of Toronto Corporate GHG Emissions by Sector and Source (2017)



TransformTO

2030 Leading by Example targets

- Corporate greenhouse gas emissions reduced by 65% over 2008 base year
- **From 2022 new City-owned buildings designed and constructed to Net Zero.**
- Existing City-owned buildings reduce emissions from 2008 by 60% by 2030.
- **From 2023 all new equipment installed in existing buildings must contribute to net zero.**
- 50% of the City-owned fleet is transitioned to zero-emissions vehicles
- 50% of the TTC bus fleet is zero-emissions
- All City-owned facilities achieve zero waste

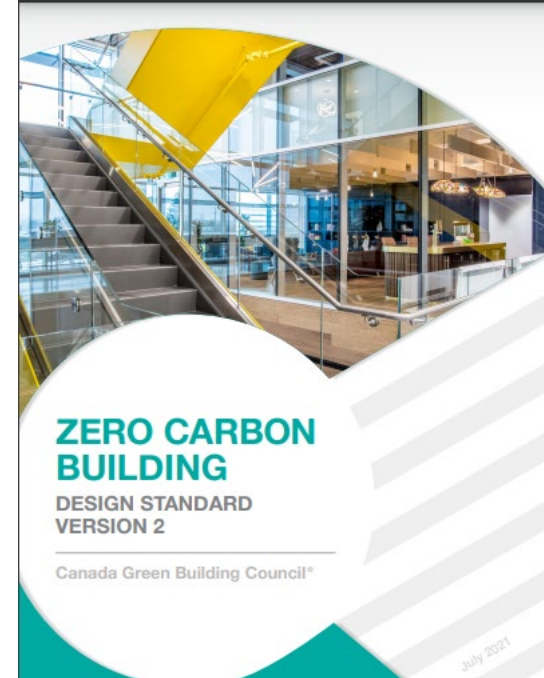
TGS for City owned buildings

GHG 1.1 Energy Use and Greenhouse Gas Emissions Limits

Achieve Greenhouse Gas Intensity (GHGI) of 0, and

meet one of the following options:

1. Minimum TEUI of 100 eKWh/m²/yr and TEDI of 30 eKWh/m²/yr;
2. Energy efficiency at a minimum 50% better than Ontario Building Code compliant building (SB-10 Division 3 2017);
3. Passive House levels of energy performance including registration and certification; OR
4. Follow the CaGBC Zero Carbon Building Standard v2 (Net Zero) design or performance standard including registration and certification.



Leadership by Doing

City non-residential development: Net Zero Now

- 2 City-owned Net Zero Facilities in construction:
 - Mt. Dennis Childcare Centre
 - North East Scarborough Community Centre
(both certified to CaGBC's Zero Carbon Buildings Standard)
- 15 City-owned Net Zero Facilities projects in design
 - Paramedic Multi-Function Centre
 - Davisville Aquatic centre
 - Western North York Community Centre



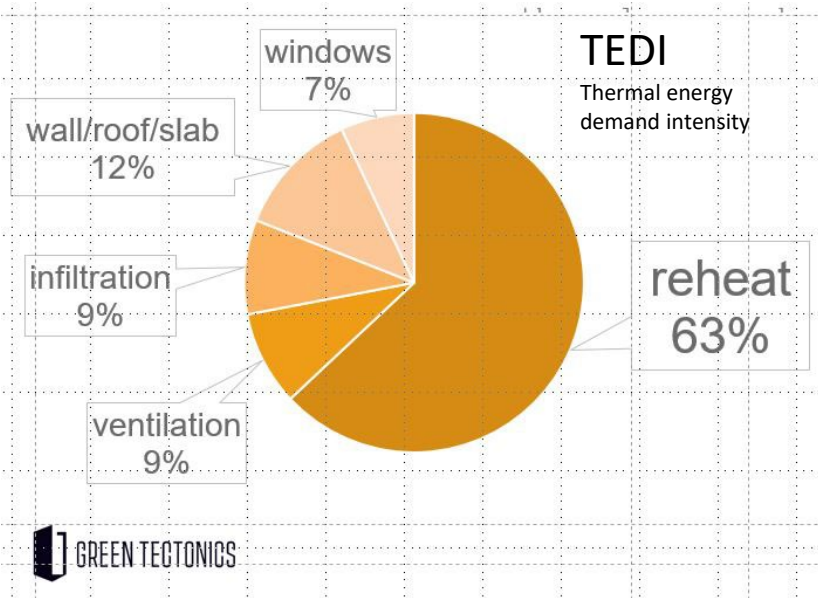
TGS: Davisville CAC NZE Case Study



Davisville CAC – How We Achieved Near Net Zero (TGS v3)

THE PATH Energy & Emissions

CaGBC Zero Carbon Building Certification

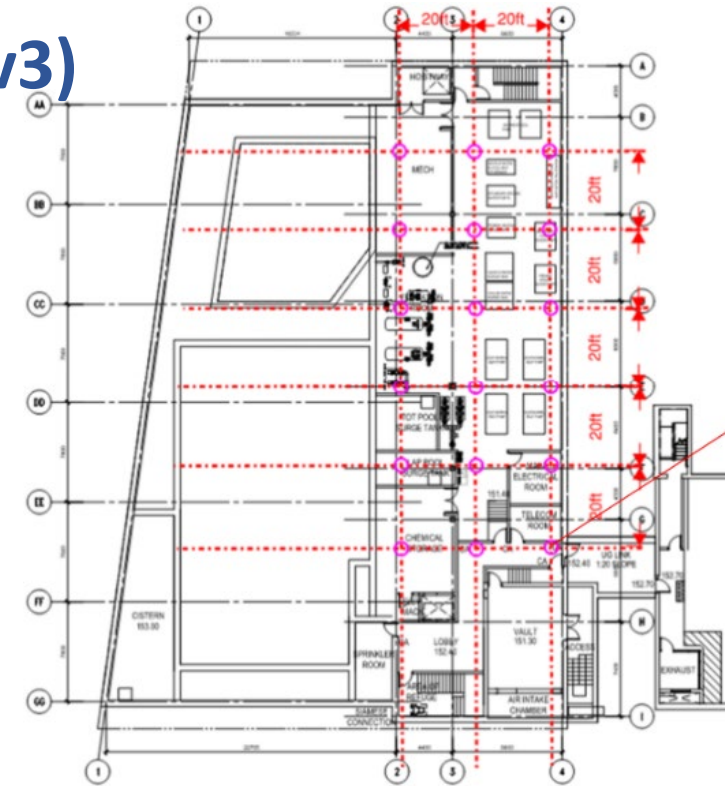


Improving **TEDI** through:

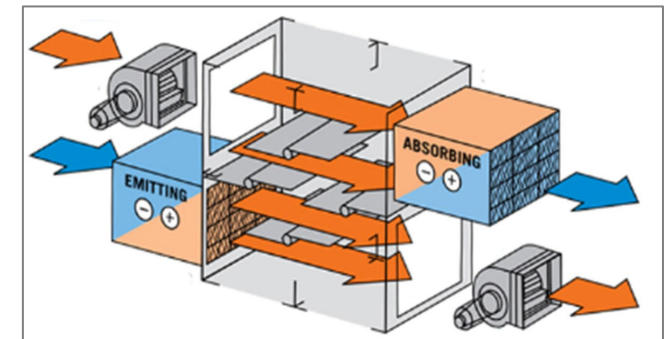
- Reduce energy loads through passive design
- Compact building
- Massing and orientation
- Reduced glazing percentage
- Envelope performance
- Model thermal bridging
- Air tightness

Improving **TEUI** through:

- Reduce energy loads through passive design
- Improve efficiency of mechanical systems
- Connect to low carbon energy
- Lower TEDI
- Glazing performance
- Daylighting
- Reducing plug loads



Ground Source Heat Pump



Air Side Heat Recovery

TPS Hub Station embodied carbon study

The project's LCA assessment calculated:

- Upfront carbon: 296 kgCO₂e/m²
- Cradle-to-grave embodied carbon: 380 kgCO₂e/m²

Top 3 carbon reduction strategies,
added to tender documents

- Lower carbon concrete,
- lower impact XPS insulation, and
- lower impact concrete sealant
- Over 800 tonnes of CO₂e avoided



Recommendations

- Start with simple massing, 30% WWR, and 25% slab-edge balconies
- Focus on passive measures first
- Minimize parking – this will reduce concrete use, and it also means fewer spaces to electrify (i.e. smaller service)
- Use geo-exchange if possible – more efficient than ASHP, and frees up mechanical penthouse space (which can be repurposed) and roof area (which allows for more PV)
- Specify low-carbon concrete where possible; Avoid XPS insulation and aluminum