



**ZERO CARBON
BUILDING STANDARDS™**
Canada Green Building Council®

What's new in Zero Carbon Building – Design Standard v4

The Zero Carbon Building – Design Standard™ v4 (ZCB-Design) was released in June 2024. ZCB-Design v4 was updated to guide ambitious market transformation and take advantage of new technologies and processes to accelerate the reduction of carbon emissions. Key updates are outlined below.

Embodied carbon

ZCB-Design v4 has refined embodied carbon requirements. The new limits are a critical next step towards the goal of reducing embodied carbon by 40 percent by 2030. The Canada Green Building Council® (CAGBC) leveraged data from its programs and other published data to ensure projects can achieve these targets:

- New maximum embodied carbon intensity limit is 425 kg CO₂e/m² for all buildings except warehouses and distribution centres, which must target 350 kg CO₂e/m².
- Option to demonstrate a 10% improvement against a baseline, retained from the previous version.
- Earn two Impact and Innovation strategies by achieving further reductions in embodied carbon, choosing between an absolute threshold or a percent improvement against a baseline.

Onsite combustion

ZCB-Design v4 continues the last version's focus on eliminating onsite combustion by lowering the space heating combustion limit and introducing limits for service hot water production.

- Projects must be capable of supplying all space heating with installed non-combustion-based technologies at an outdoor air temperature of -15 C or the design temperature, whichever is higher.
- All service hot water must be provided without onsite combustion. Multi-unit residential buildings (MURBs), long-term care facilities and other occupancy types with significant hot water demand may adopt a hybrid water heating approach provided they demonstrate one of the following:
 - At least 70% of service hot water annual heating load is provided without combustion; or,
 - Service hot water is heated to at least 45 C without combustion.





Refrigerants

Refrigerants are an increasingly important issue as buildings decarbonize their operations with heat pump technology, which can be a significant source of greenhouse gases because of fugitive emissions.

- ZCB-Design v4 expands the range of mechanical equipment that must be reported to include all HVAC equipment, service hot water systems, and commercial refrigeration equipment.
- Assumed annual refrigerant leakage is now factored into the carbon balance, which aligns with the scope of emissions reporting in the Zero Carbon Building - Performance Standard.
- New maximum global warming potential (GWP) limits have been introduced for refrigerants based on the equipment type.
- The Impact and Innovation strategy for use of low-GWP refrigerants (below 750) is maintained.

Alternative design & transition plans

- For those buildings that still rely on onsite combustion for some space heating or service hot water, additional guidance and new requirements are added in ZCB-Design v4. An alternative design that does not use onsite combustion must be evaluated, including a detailed financial analysis.
- Buildings connecting to district energy systems (DES) with combustion will benefit from additional guidance for detailing Zero Carbon Transition Plan requirements for the DES.

Good grid citizenship

To further encourage building owners and designers to consider measures that reduce the impact of buildings on electrical grids, ZCB-Design v4 introduces three grid citizenship strategies in the Impact and Innovation section:

- Reduce annual peak electrical demand by 10% using onsite renewable energy and/or energy storage.
- Reduce annual peak electrical demand intensity to no more than 18 W/m² of gross floor area for warehouses and distribution centres (except cold storage), or 30 W/m² for all other buildings.
- Incorporate intelligent building systems that can receive and automatically respond to demand response requests from a utility, electrical system operator, or third-party demand response program provider. Ensure the building is capable of shedding over 10% of its electricity demand.



Resiliency

Guidance is provided to assist project teams in evaluating the possible impact of future design conditions for heat, humidity, and wildfire smoke, and to help them evaluate the proposed design's ability to maintain thermal comfort in a representative future year. Project teams that elect to evaluate the implications of future extreme weather are encouraged to report their findings in the ZCB-Design v4 Workbook and in the project narrative.

Efficiency

The National Energy Code of Canada for Buildings (NECB) has been updated since the previous 2017 version, allowing ZCB-Design v4 to now leverage NECB 2020. Office and multi-unit residential building energy use intensity (EUI) targets have also been lowered for climate zones 4, 5, and 6.

ZCB-DESIGN V4 UPDATES SUMMARIZED



| TOPIC | ZCB-DESIGN V3 | ZCB-DESIGN V4 |
|-------------------|---|--|
| Embodied Carbon | <ul style="list-style-type: none"> 500 kgCO₂e/m² | <ul style="list-style-type: none"> 425 kgCO₂e/m² for all buildings for all buildings 350 kgCO₂e/m² for warehouses & distribution centres |
| Onsite Combustion | <ul style="list-style-type: none"> -10 C space heating only | <ul style="list-style-type: none"> -15 C space heating Limits on service hot water |
| Refrigerants | <ul style="list-style-type: none"> General guidance | <ul style="list-style-type: none"> GWP limits Default leakage by equipment type |
| Transition Plan | <ul style="list-style-type: none"> Develop a plan | <ul style="list-style-type: none"> Evaluate alternative design Develop a plan |
| Grid Citizenship | <ul style="list-style-type: none"> No requirement | <ul style="list-style-type: none"> Three Impact & Innovation strategies |
| Efficiency | <ul style="list-style-type: none"> NECB 2017 EUI targets | <ul style="list-style-type: none"> NECB 2020 Lower EUI targets for offices and MURBS (climate zones 4-6) |
| Resiliency | <ul style="list-style-type: none"> Optional sensitivity analysis | <ul style="list-style-type: none"> Detailed guidance, still optional |

