# A Building Code for Zero Carbon

In 2018, the non-profit organization Architecture 2030 created the Zero Code with the goal of reducing overall building sector emissions (to zero). To achieve this, a renewable energy procurement framework and standard formulas to calculate required renewable capacity have been created to encourage and assist in the construction of zero net carbon buildings.

ZERO CODE™

architecture 2030

What is a zero net carbon building?

A **zero net carbon (ZNC)** building is energy efficient and produces on-site, or procures, enough **carbon-free renewable energy** to meet building operations energy consumption annualy

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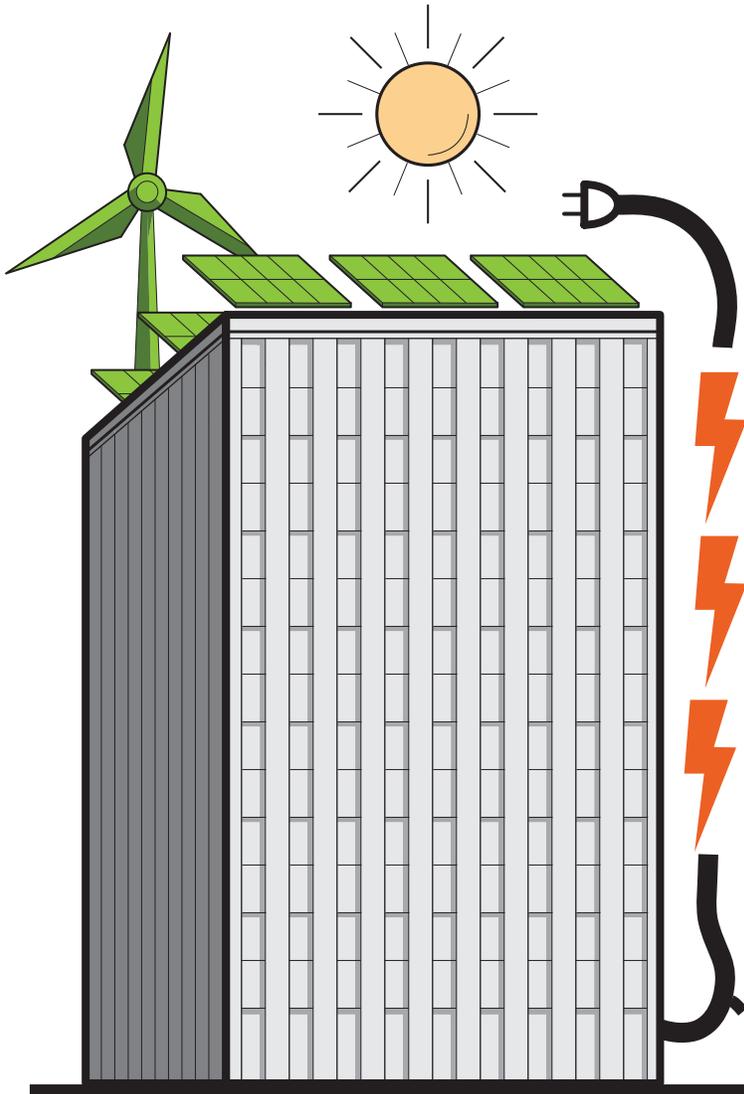
Electrification: **100%**
(All of the options below)
- Electric Heat Pump Space Heating
- Electric Water Heating
- Electric Appliances

Efficiency note:
Heat pumps are capable of producing energy efficient heat even in northern climates and sub-zero temperatures. (cold climate heat pumps)
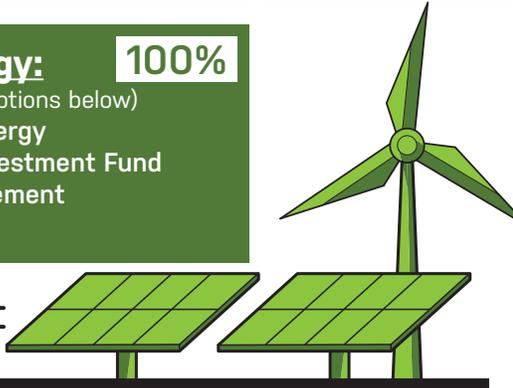
Energy Efficiency: **+**
(One of the options below)
- Current Code
  - ASHRAE 90.1-2019
- Stretch Code
- Latest Model Code
  - 2021 IECC
  - ASHRAE Standard 189.1-2020
  - IgCC 2021
  - California 2022 BEES
  - Any other (new or existing) standard with equal or greater efficiency requirements can be incorporated into the Zero Code framework

100% Electrification
+
Energy Efficiency
+
100% Renewable Energy
=
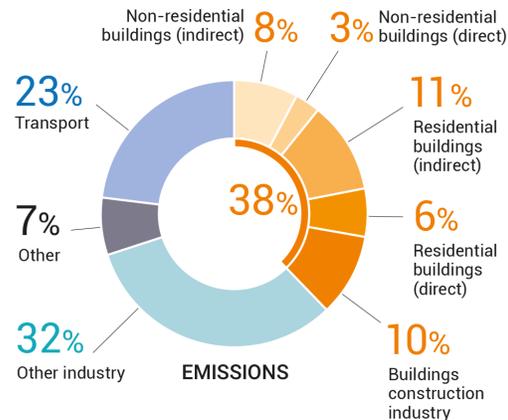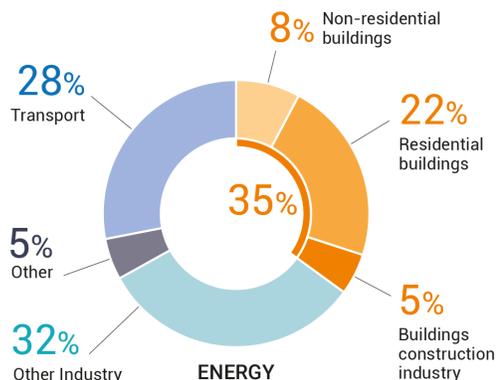**zero net carbon building (ZNC)**

Renewable Energy: **100%**
(Any combination of the options below)
- On-site Renewable Energy
- Renewable Energy Investment Fund
- Power Purchase Agreement
- Green power

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ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

Why are zero net carbon buildings important?

Buildings are responsible for roughly **38%** of global energy-related greenhouse gas emissions. Additionally by 2060, the world is projected to add **2.5 trillion square feet** of new buildings, essentially doubling our current global building stock. The Zero Code pushes to eliminate CO2 emissions from all new building operations while also making all new buildings far more efficient. The ultimate goal is to reduce overall building sector energy demand and emissions.

ENERGY

- 8% Non-residential buildings
- 22% Residential buildings
- 35%
- 5% Buildings construction industry
- 32% Other Industry
- 5% Other
- 28% Transport

EMISSIONS

- 8% Non-residential buildings (indirect)
- 3% Non-residential buildings (direct)
- 11% Residential buildings (indirect)
- 6% Residential buildings (direct)
- 38%
- 10% Buildings construction industry
- 32% Other industry
- 7% Other
- 23% Transport

Notes: Building construction Industry is the portion (estimated) of overall industry devoted to manurfacturing building construction materials such as steel, cement and glass. Indirect emissions are emissions from power generation for electricity and commercial heat.

How to design with the Zero Code?

Applicable Project Types

New - Commercial | Industrial | Institutional | Mid- to High-rise Residential
Existing Building Decarbonization

Section 5: Minimum Energy Efficiency

5.1 Prescriptive Requirment
Buildings shall comply with ASHRAE Standard 90.1-2019
(Other standards can be substituted if they result in equal or better energy efficiency)

5.2 Performance Requirement
Proposed building energy efficiency requirements calculated using performance rating method of ASHRAE Standard 90.1-2019 (Or other selected standard)

Use Zero Code Energy Calculator

Section 6: Renewable Energy

On-site renewable energy systems shall be installed or *adjusted off-site renewable energy* procured to meet the minimum renewable energy requirement.

- Minimum **Prescriptive** requirements are listed in a table by Building Type and Climate Zone
- Minimum **Performance** requirements determined by energy simulations following guidelines within ASHRAE Standard 90.1-2019 Appendix G
- *Adjusted off-site renewable energy* calculated with Zero Code's procurement factors

Access to **Zero Code 2.0**

ABOUT YOUR BUILDING

Code Pathway: ● Prescriptive ○ Performance
Standard ❶ Select
Country Select
City ❶ Select
Number of Stories Enter Number
Primary Building Use Select

ON-SITE PV SYSTEMS

Enter on-site PV system generation potential below, or estimate on-site PV system generation potential using PVWatts. If your building has multiple PV systems enter them below.
● Use PVWatts ○ Enter Generation Potential
Set Default Values ❶ delete ⊖
Estimated Area for Collectors Enter Number * Select *
Module Type Select
Losses (%) Enter Number
Array Type Select
Tilt (Degrees) Enter Number
Azimuth (Degrees) Enter Number
Inverter Efficiency (%) Enter Number
⊕ Add another PV System

GENERATE RESULTS ➔

Access to **Energy Calculators**

WHO WE ARE

Have a Question About the Energy Code? Contact Us.

SEDAC is the Energy Code Training Provider on behalf of the Illinois EPA Office of Energy. Attend SEDAC's workshops and webinars to learn more. We also offer online courses and technical support.

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