Net Zero Building Retrofit Guides

Smart Homes and Appliances

Technology Companion Guide

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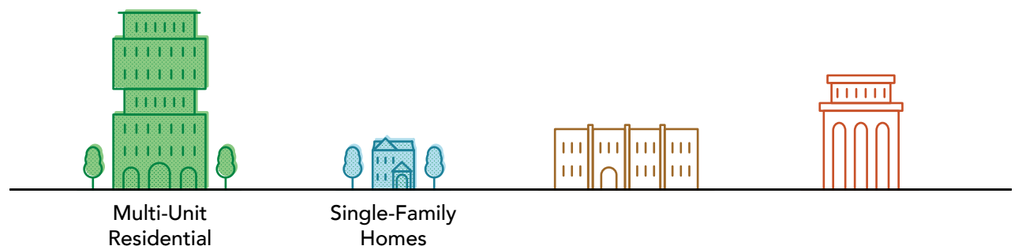


Co-benefits

Resilience	Indoor Air Quality	Occupant Comfort	Property Value
●●○○	●●○○	●●○○	●●●○

Impacts

Emissions Reduction	Utility Savings	Capital Cost	Maintenance Requirements
●●○○	●●○○	●○○○	●●○○

TORONTO

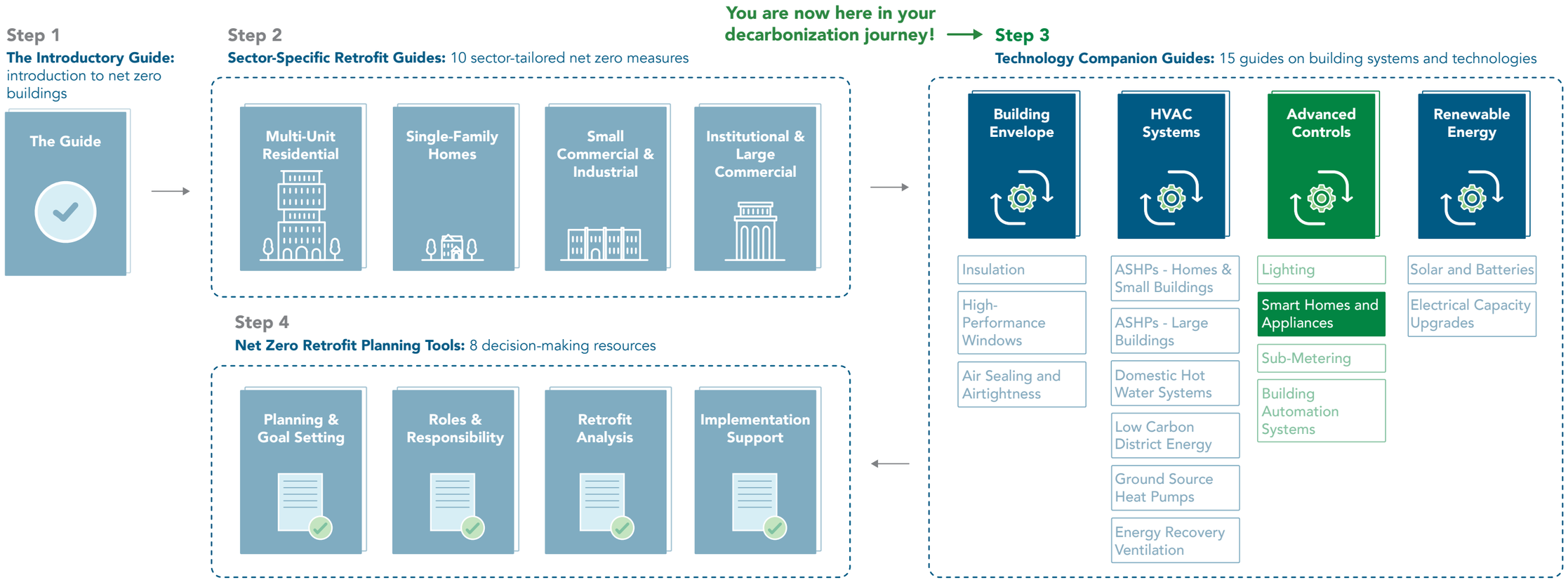
Live green Toronto

Navigating the Net Zero Building Retrofit Guides

Reducing Greenhouse Gas (GHG) emissions is a journey. It's also an opportunity to make your building more comfortable, healthier, valuable, and resilient to extreme weather events. Successfully arriving at your net zero destination requires careful planning and the right travel companions to ensure a smooth trip.

The City of Toronto's **Net Zero Building Retrofit Guides** include a range of documents designed to support home and building owners reduce GHG emissions from their buildings.

1. **The Introductory Guide** introduces the topic of "net zero buildings." The guide's goal is to familiarize all home and building owners with Toronto's net zero goals and concepts.
2. **The Sector-Specific Retrofit Guides** highlight net zero measures tailored to each building sector and type. These guides provide direction to plan and implement retrofit projects specific to your building.
3. **The Technology Companion Guides** provide technical information about building systems and technologies related to net zero measures and retrofits.
4. **The Net Zero Retrofit Planning Tools** provide decision-making resources to help home and building owners prioritize their retrofit projects. The tools include needs assessments, checklists, and support for contractor selection.

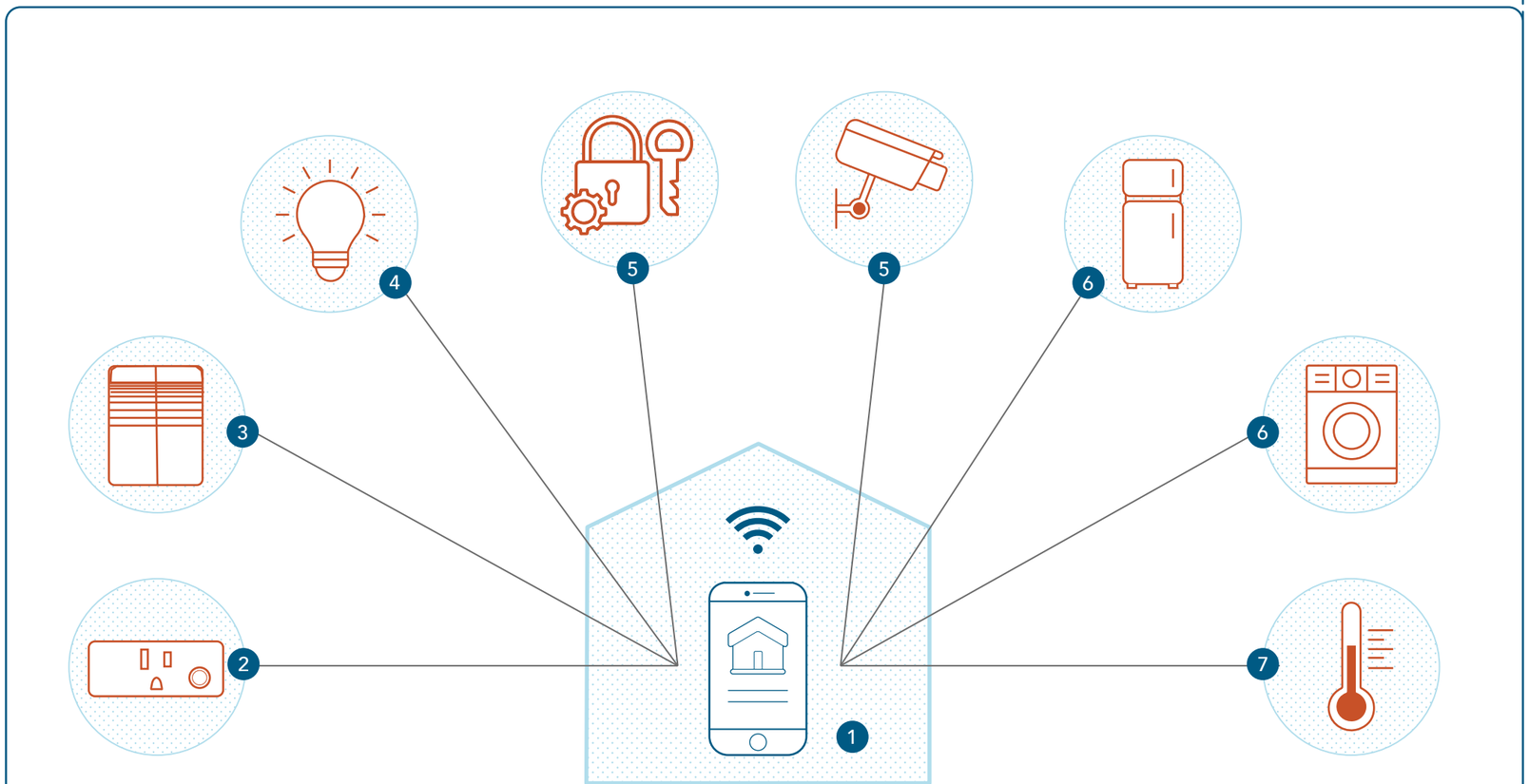


Net Zero Building Retrofit Guides Document Navigation

Smart Homes and Appliances

What Is This Technology

Smart Homes and Appliances refer to automated technologies that provide remote control of household devices. These smart home technologies and appliances can be interconnected to work together, creating a cohesive system. They can be controlled remotely via smartphones, voice command or other internet connected devices. Examples include smart thermostats, plugs, security systems, and kitchen and laundry appliances.



Retrofit technology explained

How Smart Homes and Appliances Work

Smart home technologies and appliances work by connecting various devices to a single network. This interconnection allows for them to communicate and work with each other. These upgrades allow homeowners to modernize their spaces without extensive renovations, making everyday tasks easier and more efficient. Here are some key retrofitting options to consider:

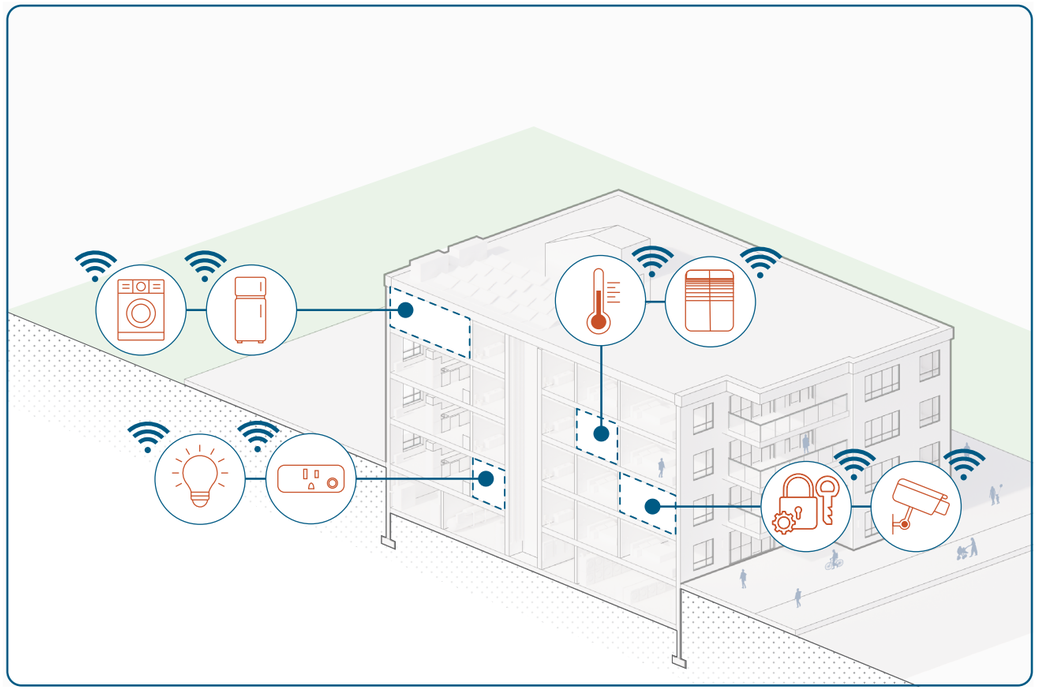
1. Smart home hub, which acts as the control hub for all connected devices.
2. Smart plugs, which allow remote control of plugged-in devices.
3. Automated window blinds, which can enable automated adjustments based on time of day or sunlight.
4. Smart lighting, such as smart bulbs, which can allow for automation and remote control.
5. Smart locks and security systems, which improve security and provide real-time monitoring and alerts.
6. Smart appliances, which can optimize the usage of your fridges, washers, dryers, ovens, etc.
7. Smart thermostats, which can learn and automatically adjust heating and cooling based on occupancy habits.

When to Retrofit This System

Smart home technologies and appliances can be stand-alone measures that are implemented at any time, piece by piece, or all at once. You can optimize the connectedness of your home by adding smart home technology along with other planned retrofit projects. Ensure you consider how a given smart home technologies and appliances will work with future planned retrofits to improve your homes efficiency. This retrofit should be considered by default when your related existing equipment reaches end of life.

Why Retrofit This System

Smart home technologies and appliances allow you to track your energy consumption to identify and reduce electricity waste. It uses automated controls and schedules to help save energy, boost security, and make your home more comfortable. By reducing energy consumption, you can decrease reliance on utilities and protect yourself from rising energy costs, all while lowering GHG emissions.



Typical locations in a building associated with this technology

Below are co-benefits and impacts to help you better understand this technology.

Co-benefits

Resilience:
Smart home systems increase resilience by providing remote monitoring and control, allowing for quick responses to any issues or disruptions, while maintaining home functionality during unexpected events.

Indoor Air Quality:
Smart thermostats can adjust ventilation and provide insight into indoor air quality, ensuring a healthier indoor environment.

Occupant Comfort:
Smart home technologies enhance comfort by adjusting settings based on individual preferences and usage patterns, while providing greater control over the indoor environment.

Property Value:
Homes with smart technologies and appliances often see an increase in value due to improved efficiency, convenience, and modern amenities.

Impacts

Emissions Reduction:
Smart homes and appliances optimize energy use, leading to lower GHG emissions.

Utility Savings:
Reduced energy consumption leads to overall savings on utility bills.

Capital Cost:
Smart devices are becoming increasingly affordable. You can automate several systems in your home with a relatively small investment.

Maintenance Requirements:
Smart appliances are generally low maintenance but may involve regular software updates and occasional troubleshooting.

Types of Systems and Retrofit Solutions

Many existing homes lack modern connectivity and automation. They often have manual and inefficient lighting, HVAC, and security systems. You can make your home smarter by adding automatic controls, energy management systems, and connected appliances that you can control remotely using your phone or computer.

Here are some smart home technologies and appliances to retrofit your home:

Smart Home Hub

A smart home hub acts as a "brain" for your home, and collects all of your smart technologies under a single control platform to make controlling your home easy and effective.

Smart Plugs

Replace traditional plugs with smart plugs that allow remote control of plugged-in devices. These plugs can be scheduled or controlled via smartphone apps to optimize energy use.

Automated Window Blinds

Replace manual blinds with smart motorized blinds or shades that can be programmed to adjust based on time of day, weather conditions, or user preferences. They help regulate indoor temperatures naturally and reduce reliance on heating and cooling.

Smart Lighting

Upgrade to smart lighting systems that can be controlled remotely and automated based on occupancy and natural light, enhancing energy savings and convenience. Include smart bulbs and fixtures with customizable settings and scheduling.

Smart Locks/Security Systems

Install smart locks and security systems that can be monitored and controlled remotely, offering enhanced security for your home. These systems offer features such as remote access, real-time alerts, and integration with other smart home technologies.

Smart Appliances

Replace traditional kitchen appliances (refrigerators, dishwashers, ovens), laundry machines (washing machines, dryers), and domestic hot water heaters with smart versions. These smart appliances feature energy-efficient modes, usage pattern settings, and remote control via smartphone apps. They can alert users to maintenance needs and adjust water and energy usage based on load size and fabric type for washing machines and dryers.

Smart Thermostats

Replace traditional thermostats with smart thermostats that can be controlled remotely with your phone or computer. They can automatically adjust based on occupancy, weather, and energy usage patterns.

How to Implement

Before starting, refer to the **seven-step roadmap to net zero** in the **Introductory Guide** and in your **Sector-Specific Retrofit Guide**, to ensure your retrofit aligns with your overall strategy and goals. Here are a few steps to get you started with a smart homes and appliances retrofit:

1. Evaluate the existing technology and systems in your home, such as heating, cooling, lighting, and appliances.
    - o Are your current systems outdated or manual?
    - o What types of smart devices are compatible with your existing setup?
2. Consult with experts, such as smart home specialists, to guide you through the selection and installation of smart technology.
3. Select smart devices that meet your needs and fit with your existing systems. Your experts will help you with the following steps.
    - o Install selected devices and set them up according to your preferences. This may require integrating with a central management system, if applicable.
    - o Check that all systems are functioning correctly and adjust settings for optimal performance.
4. Regularly update software and check system performance to ensure continued efficiency and reliability.

What is the Internet of Things?

As technology advances, more and more sensors, software, and technologies are being built into the items or "things" we use day to day. These "things" are able to share information with each other to improve their function and our experience. This is often referred to as "the internet of things" or "IOT". Smart homes are an example of how the internet of things can make our homes more convenient and efficient.

Opportunities

Evaluate how this retrofit can be integrated with the following building systems to maximize potential synergies and optimize overall performance.

HVAC Systems

Heating Systems

Smart thermostats reduce energy consumption by optimizing temperature management and improving comfort.

Domestic Hot Water

Smart controls reduce your energy use by monitoring water demand and optimizing the system.

Building Controls and Automation Systems

Lighting Controls

Lighting

In combination with BAS systems, smart lighting can help to adjust lighting automatically based on your home occupancy and daylight.

Energy Generation

Energy Storage

Smart appliances and systems can help you make the most of renewable energy sources and reduce your reliance on grid power.

Challenges and Solutions

Adding smart technologies and appliances to your building can be challenging. Below are some common challenges you may face and how to solve them.

Challenge 1: Compatibility with Existing Systems

Solution: Check the current infrastructure system carefully and get help from experts for a smooth installation and for any updates to your current system.

Challenge 2: Data Privacy Concerns

Solution: Implement robust security measures and adhere to best practices for data management and protection.

Challenge 3: System Complexity

Solution: Refer to the manufacturers' detailed user manuals, FAQs, and online tutorials to help troubleshoot common issues and understand how to use your devices effectively.

Toronto's Climate Considerations

Due to Toronto's climate, there are a few things to consider before implementing smart homes and appliances retrofit.

Temperature Ratings

Ensure fixtures are rated for both low and high temperatures, accommodating outdoor installations that may face extreme weather.

Energy Star Rating

Select Energy Star-rated lighting and appliance products to enhance energy efficiency and lower operating costs, beneficial during both heating and cooling seasons.

Daylighting Strategies

Maximize natural light through effective daylighting techniques, adjusting designs to leverage seasonal variations in daylight hours.

Regular Maintenance

Schedule routine maintenance and software updates to check for any impacts from extreme temperatures, ensuring reliable operation throughout the year.

Ready!

You should now have a better idea of what **Smart Homes and Appliances** are, their co-benefits and impacts, and how to implement them in your building given potential synergies and challenges!

Also check your building **Sector-Specific Retrofit Guide** for steps to achieve net zero and visit the other **Technology Companion Guides** to learn more about retrofit measures.

Other guides in the Advanced Controls Technology Companion Guides:

- Building Automation Systems
- Lighting
- Sub-Metering

Other resources in the Net Zero Building Retrofit Guides:

- The Introductory Guide
- Sector-Specific Retrofit Guides
- Net Zero Retrofit Planning Tools

For more information, please refer to these other City of Toronto resources:

- Net Zero Existing Building Strategy
- Transform TO Net Zero Strategy
- Toronto Green Standard
- Better Buildings Partnership
- Better Homes: Green Resources for Residents
- Energy & Water Reporting for Building

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