

Whole House Energy Retrofits



24-36 hours to complete with review of content, quizzes, final test and review of downloadable materials.

End-of-module quizzes plus practice exercises

Final test 100 questions

Passing mark on final test = 70

COURSE DESCRIPTION

The Built Green Whole House Energy Retrofit course is a partnership between Built Green Canada and Blue House Energy.

If you have some experience of energy efficiency projects already, it will build your knowledge to give you the bigger picture of an 'Envelope First' approach to a whole house energy retrofit - encompassing the basement to attic, assessing its energy use and building envelope to assess air leaks and drafts, insulation levels, and address heating/cooling problems. How to identify and deal with issues such as dampness, mold or mildew that could lead to structural and/or health problems.

Learners will gain an understanding of what a whole house energy retrofit is, what it is supposed to achieve, what you need to know when working in the industry, and what to look out for when installing energy efficiency measures in homes. Learners will also gain and understanding of the importance of how a systematic investigation is key to developing a whole house retrofit and plan.

This course aligns with Natural Resources Canada's EnerGuide for Houses Rating System and its envelope-first building science approach. The curriculum dovetails with Built Green's Renovation programs that include energy efficiency as a key focus and goes on to other critical aspects of sustainable building—like materials and methods, water conservation, and waste management.

WHOLE HOUSE ENERGY RETROFITS

LEARNING OBJECTIVES

To be truly Pan-Canadian, the course is broken into three 'streams' of whole house energy retrofits: Conventional Wood Framed, Special Cases (including heritage limitations, solid masonry and walls, rubble and permanent wood foundations), and Northern Housing. You get to choose your own adventure!

At the end of this course, you will be able to:

- Describe the characteristics of existing Canadian housing types, vintages and construction assemblies
- Explain the Envelope First approach to a variety of retrofits and its importance to Canadian housing
- Explain how to develop the Whole House Energy Retrofit through a systematic investigation and analysis of 'what you've got'
- Describe how to avoid unintended consequences when determining retrofit solutions by using the house as a system concept to improve the performance of the building envelope
- List ways to update mechanical systems before emergency replacement is needed
- Provide examples of retrofit roadmaps based on condition, vintage, and region
- Discuss, at a high level, the importance of roadmaps and future proofing

Whole House Energy Retrofits



COURSE OUTLINE

Prerequisite: Building Science Basics *included in your training plan!*

Module 1 Introduction to Whole House Energy Retrofits

Introduction

*Why Envelope First Whole House Energy Retrofits?
Resiliency in Housing and Extreme Weather
Building Codes and National Retrofit Programs*

Whole House Energy Retrofits

*What Is An Envelope First Whole House Energy Retrofit
Types and Levels of Envelope First Retrofits
Climate Zones and Retrofits*

Retrofit Hazards and Safety

*Common Hazards and Mitigation Issues
Healthy Indoor Environment
Avoiding Unintended Consequences*

Module 2: Building Science and the Existing House

What's Your Type

*House Types and Vintages
Building Structure and Components
Building Science and The Neutral Pressure Plane
How To Investigate A House*

Foundations

*Foundations and Building Science
Soil Conditions
Moisture Problems Above and Below Grade*

Roofs and Ceilings

*Roofs/Ceilings and Building Science
Moisture Driven Problems
Truss Uplift*

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COURSE OUTLINE

Above Grade Walls

Walls and Building Science
Thermal Bridging
Thermal Bypasses
Solar Vapour Drive
The Dew Point

Windows and Doors

Comfort Issues Associated with Windows
Anatomy of Openings
Types of Windows

Module 3: Upgrading the Building Envelope

The Envelope First

Control Layers
Permeability
Mechanical Ventilation
Insulation

Foundation

Exterior and Interior Moisture Remediation
Solving For Air Leakage
Improving The Thermal Envelope (Interior, Exterior, Both)

Roofs and Ceilings

Exterior and Interior Moisture Remediation
Solving For Air Leakage In Different Configurations
Improving The Thermal Envelope (Interior, Exterior, Both)

Walls

Exterior and Interior Moisture Remediation
Solving For Air Leakage In Different Configurations
Improving The Thermal Envelope (Interior, Exterior, Both)

Windows

Comfort
The Insulation Value of Windows
Repair, Retrofit, or Replace?

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COURSE OUTLINE

Module 4: Updates and upgrades for Mechanical Systems

Introduction to best practices

*How Mechanical Systems Impact House As A System and The Envelope First Approach
Solve For Combustion Spillage (Condensing Units Or Heat Pumps)
Occupant Behaviour*

Revisit house types and vintages

What Are Likely Mechanical Systems?

Space Heating

*Oil, Gas, Electric, Wood, Propane Fired
Equipment and Distribution Types*

Water Heating

*Oil, Gas, Electric, Wood, Propane Fired
Equipment and Distribution Types*

Ventilation

*Healthy House/IAQ
Spot (Bath and Kitchen)
Whole House (Air Exchanger, HRV, ERV)*

Ventilation

*How Much Is Provided (Garbage Bag Flow Test)
Calculating Required Amount Of Ventilation
Improving existing Equipment and Controls
Adding Whole House Ventilation (HRV or ERV?)*

Space Conditioning

*Upgrade Options (High-Efficiency Replacements, Integrated/Combi/Combo, Heat Pumps)
Fuel Switching (Service/Panel Issues, Benefits Of Electrification)
Cooling and Dehumidification
Improving Distribution Systems*

Domestic Hot Water

*Upgrade Options (Controls, Plumbing Choices, Layouts)
Replacement Options (Conserver Tanks, Hot Water Heat Pumps, Integrated Systems)
Implications Of Fuel Switching
Strategies For Reducing Hot Water Loads*

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COURSE OUTLINE

Module 5: Roadmaps for Whole House Energy Retrofits

Anticipating Change

Flexible Design

Accessibility

Preplanning

Future proofing

Financing Issues

Balancing Costs and Energy Savings

Metrics For Determining The Value Of A Renovation

Total Cost Of Building Ownership

Your Client's Emotional Drivers

Phased Roadmaps

Cost-Effective Planning

Envelope First Approach

Avoid Short Circuiting Future Deep Energy Savings

Packages and Phases Vs. Single Measures