Clean Foundation
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Net Zero ("NZ")
Frequently Asked Questions ("FAQs")

Recommended readings:

Homeowners – "FAQs for Homeowners"

Contractors – "FAQs for Homeowners" + "FAQs for Contractors"

Municipalities – "FAQs for Homeowners" + "FAQs for Contractors" + "FAQs for Municipalities"

NZ – FAQs for Contractors

Table of Contents

Common Terms and Definitions

Deep Energy Retrofit (“DER”)

An advanced application of energy conservation measures to improve overall performance of an existing building.

EnerGuide Rating

Demonstrates a home’s annual energy performance.

Energy Advisor (“EA”)

An individual who evaluates how energy is being used in a home and identifies opportunities to reduce and optimize energy consumption.

Energy Efficiency (“EE”)

The use of less energy to provide the same level of service.

Envelope Upgrades

Includes any retrofits to your home’s physical separation between the conditioned and unconditioned environment, including walls, floors, ceilings, windows, doors, etc.

Net Zero Energy (“NZE”)

A building standard designated to a building that produces as much energy on-site as it consumes annually.

Net Zero Energy Ready (“NZEr”)

A building standard designated to a home that could produce as much energy as it consumes annually, if a renewable energy generating system (such as Solar, Wind and/or Micro-hydro) existed on-site.

Pan-Canadian Framework

National framework developed with provinces and territories and in consultation with Indigenous Peoples, to help meet Canada’s emissions reduction targets, grow the economy, and build resilience to a changing climate.

Property Assessed Clean Energy (“PACE”) Financing

Provides homeowners within a participating municipality with financing at low lending rates for energy efficiency upgrades that pay for themselves within a set number of years. Should the home sell, the remaining payments become the obligation of the new homeowner. Specific municipalities may have different requirements.

Renewable Energy

Energy generated from a natural resource that is not depleted with use.

Retrofit

Addition of a component or accessory to a house after it was first built.

Return on Investment ("ROI")

The timeframe that the energy savings from an upgrade will equal the capital cost or cost of financing (if financing is required).

Solar Photovoltaics ("PV")

Renewable energy technology that converts sunlight (solar radiation) to direct current (DC) electricity using semiconductors.

1. What housing stock is a good candidate for NZE?

The best candidate houses are those that are already quite energy efficient and do not have significant barriers to DERs. The most common energy efficiency opportunities include improving areas with high air leakage, under-insulated areas, and failing space conditioning systems. An EA can help you to identify these and other opportunities in the home and make plans to correct them.

A NZE home must offset any electric power consumed through either purchasing renewable energy or producing it using some form of on-site renewable energy generation. The most common way to do this is to pair a net metering device with the installation of a solar PV system on-site, generating electricity throughout the day and accumulating energy credit with the local utility. This requires space (either as a ground mount or on the home's roof) facing as south as possible with minimal shading. Some homes may have opportunities for other types of renewable energy systems such as wind turbines or micro-hydro systems, but these tend to be less common and more expensive. Other homes may have little or no opportunity to generate on-site renewable energy; these homes may not be able to achieve NZE, but they can often still benefit from a DER and strive to be NZEr.

2. What homeowners are good candidates for NZE?

Factors that most influence homeowners to explore home energy efficiency upgrades are financial and ethical. Most homeowners wish to make a financial investment in their home and install energy-saving upgrades that will reduce their bills and save them money over time. However, some homeowners investigate energy-saving upgrades to reduce their carbon footprint, become better environmental stewards, and improve local energy security. Often homeowners will have a blend of these motivations, which can strongly influence their tolerance for financial risk and rate of return on investments. While these are significant considerations, there are many other factors that contribute to the successful engagement of homeowners:

- Tenure*:* How much longer do they plan to own the house, and do they plan on passing it down to their family members?
- Credit: Can they borrow the money needed for upgrades?
- Demographic: Are they likely to see a benefit from long term ROIs. Do they have a young family or a large family? Do they have a home-based business?
- Ethics: Do their moral principles include improving sustainability and greenhouse gas ("GHG") reduction?

3. What goals should a NZE home project include?

The goals of a NZE retrofit project will be tailored to the home and homeowner, though all NZE projects should have the following core end-goals:

- Use existing rebate and financing programs to maximize ROIs, providing more incentive to homeowners and ensure cost effectiveness of upgrades.
- Creation of a feasible retrofit pathway to approach NZE using in-home assessments and monitoring, determining existing conditions, initial energy usage, and utilizing renewable resource surveys.
- Use envelope upgrades, air sealing methods, and implement efficient mechanical equipment/appliances to reduce the home's energy consumption.
- Use renewable energy generation to offset any remaining energy consumption through on-site generation and/or through purchase of off-site renewables.

4. Should I have an EA on staff?

Having knowledge of advanced building science and the energy assessment process is becoming increasingly important for contractors. As energy efficiency retrofits increase in complexity, the phrase "This is how we have always done it" will not be good enough without the backing of verifiable science. Understanding a house as a system of interconnected processes rather than making recommendations based on a narrow area of expertise will help ensure retrofit work does not negatively affect how the home functions in another areas. Being able to perform official energy assessments under the EnerGuide Rating System can provide a contractor the lens necessary to see the house as a complicated network of behaviours. To provide these assessments, contractor companies must be certified Service Organizations through NRCan, employ a Service Organization Manager, a Quality Assurance Specialist, and registered EAs. This may be an option for contractors seeking to specialize in energy efficiency or gain access as a delivery agent to established energy efficiency programs.

For more information on becoming a certified Service Organization through NRCan, visit the NRCan page here.

Contractors may also choose to form a relationship with an already established NRCan Service Organization to support their company. Making use of an EA through a third-party organization may produce similar feedback on a home's energy profile and allow for comprehensive DER upgrades, while alleviating some of the administrative burden of managing all aspects of the NRCan Service Organization relationship.

You can find a list of Service Organizations in your area here.

5. What is the process of planning a NZE or DER Project?

Climate Region and Building Science

Identify your climate region and know the heating degree days ("HDDs") to accurately model heat losses.

Building science is what energy professionals use to understand how the house works as a system and is focused on controlling three key issues: heat, air, and moisture flow. Improving the performance of a house in any one area impacts all these factors and can have a major influence on occupant health and safety, the durability of the structure, and its greenhouse gas emissions. The building envelope needs three key items to perform well from a building science perspective:

- A completely insulated building envelope, controlling heat flow;
- A continuous air barrier, controlling air flow;
- A vapour barrier, controlling moisture flow.

These three items are crucial in each climate region and depending on the project location, you may find varying building practices. Careful design and implementation of these integral systems is required to create a high-performance home.

For more information on identifying your climate region and further understanding building science principals, please refer to "Keeping the Heat In" provided by NRCan's Office of Energy Efficiency.

Energy Assessment

This is the start of a NZE or DER retrofit project. An NRCan certified EA carries out a site visit and a blower door test. A blower door test determines the airtightness of the home. While this provides good baseline information, an NZE or DER project requires much more data in order to accurately plan a suite of energy-saving upgrades. Including but not limited to:

- A homeowner interview should be performed to determine occupant energy use (lights, appliances, electronics, etc.).
- Historic energy bills must be gathered and compared against weather data, and home occupancy levels to provide a clear picture of the home's existing conditions.
- Energy monitoring equipment is installed at the home during the initial stages of the project. Energy monitoring equipment allows the service organization to obtain accurate and detailed energy consumption than energy bills provide, helping to make informed

decisions towards energy conservation recommendations, monitor upgrade results and determine actual payback.

Renewable Energy Resource Assessment

A renewable energy contractor or other qualified 3rd party consultant should be hired to assess the potential for the installation of a renewable energy system on-site. This assessment should explore the maximum amount of energy that can be generated at the home. On-site generation can be attained through solar PV, wind, micro-hydro or a combination. Careful consideration should be given to barriers that can be moved and removed (tree clearing/topping options, water diversion and existing buildings) to ensure maximum energy generation. Choosing the final size of the renewable energy generation system will happen later in the process as the energy conservation and efficiency upgrade pathway is created and modelled. The cost of installing a larger solar PV system should be compared against the cost of additional upgrades to the building. Solar PV is easily scalable and often leads to a better return on investment compared to upgrades that can be grouped with deferred maintenance such as exterior insulation, siding and window replacements.

In Nova Scotia, a preliminary solar assessment can be performed online using Solar Assist. Other options may be available to you if you are in a different province or territory.

Create the NZE/DER Plan

Once all the information about a home has been collected, a phased NZ/DER plan is developed by the Project Manager who determines energy savings, costing, and ROI of the proposed upgrades. The plan should align with the homeowner's goals and offer optimal financial returns and long-term durability of the proposed upgrades. A phased approach must be taken, grouping or bundling work whenever possible to maximize cost-effectiveness and ensure occupant health, safety, and comfort. Often, energy savings from the early upgrade phases can help to pay for additional upgrades in later phases.

Leverage Existing Programs & Services

Help homeowners find and apply for rebates in their area to maximize cost effectiveness of upgrades and provide the homeowners with more incentive to move closer towards the NZE goal.

Click here for more information on financing options available within Nova Scotia.

Click here to see financial incentives currently available by province, compiled by NRCan.

6. Is any training required to complete a NZE or DER project?

No, but to be a leader in this growing industry you will need to seek further training and continuing education as home building and renovation standards are changing. Canadian Home

Builder Association (“CHBA”) offers NZ training and can certify your company and the completed home.

For further information on leading developments and demonstrations in the field of clean energy technologies, search CanmetENERGY publications. CanmetENERGY is Canada’s leading research and technology organization in the field of clean energy.

7. How can a company become a Qualified Net Zero Service Organization?

Search the CHBA website for details.

8. What if I still have questions regarding NZE?

Please feel free to contact an Energy Professional with the Clean Foundation to discuss your questions.

- Click here for contact information

Resources

Canadian Home Builders Association ("CHBA")

The voice of Canada's residential construction industry.

https://www.chba.ca

CanmetENERGY

Canada's leading federal research and technology organization in the field of clean energy.

https://www.nrcan.gc.ca/energy/energy-offices-and-labs/canmetenergy/5715

Natural Resources Canada ("NRCan")

The ministry of the Canadian government for natural resources, energy, minerals and metals, forests, earth sciences, mapping and remote sensing.

https://www.nrcan.gc.ca/home

SolarAssist

A user interface developed by Nova Scotia Department of Energy and Mines and Clean Foundation, used to quickly estimate a home's solar potential.

https://www.solarassist.ca/

SolarHomes

A program offering rebates to Nova Scotia homeowners for installing eligible solar photovoltaic systems. Efficiency Nova Scotia administers the program.

https://www.efficiencyns.ca/service/solarhomes/