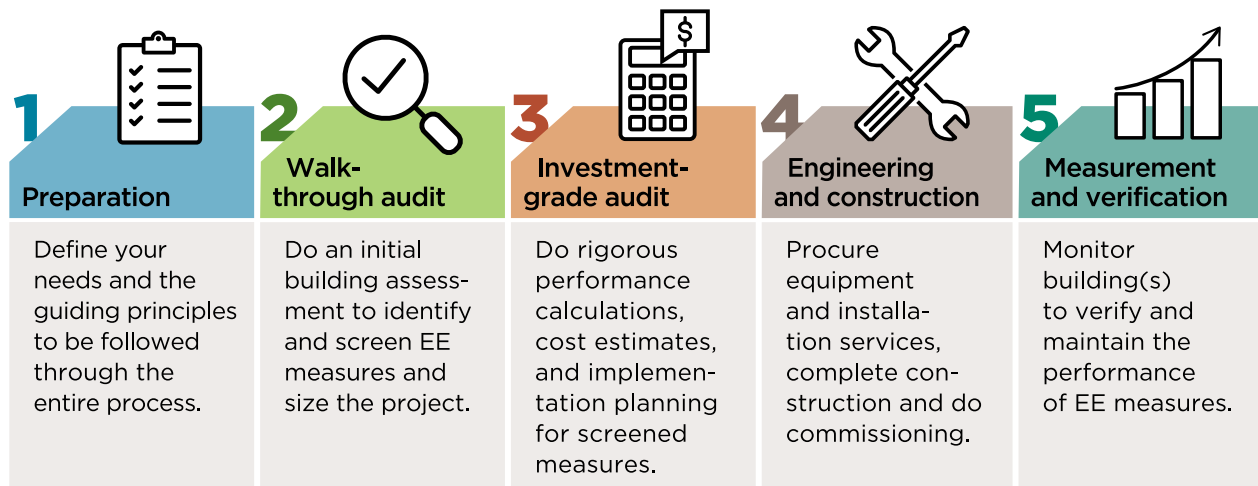


# How to undertake deep energy retrofits

This factsheet for housing providers presents a general approach to planning and implementing successful energy-efficiency retrofit projects.

## Typical project steps

The following five steps are a tried-and-tested process for large comprehensive projects. You can use this process either for a single energy-efficiency (EE) retrofit or for a series of projects. This process minimizes risk because it provides opportunities to abort the project during the first three steps or to make course corrections during the last two steps if the project is not meeting expectations.



## 1 Preparation: Get organized and define “success”





The preparation stage will help you get the most value from your suppliers. Before engaging any energy-efficiency expert, complete the following steps:

- **Identify a project lead and a project champion:** Appoint a staff member as a point person who keeps the project moving, and a board member who will keep the board informed.
- **Establish a mission and vision:** Develop mission and vision statements for your project, ideally endorsed by the board and/or the highest position of authority. Declare your energy and environmental performance goals. Be as ambitious as you can, and be mindful of funders’ requirements.

- **Calculate annual utility consumption and costs:** Make these calculations for your building or portfolio of buildings (gas, electricity, propane, heating oil, water, etc.). If suites are metered individually, seek the collaboration of a few tenants willing to share their bills and estimate the building consumption based on that sample. In addition, gather other documents on building performance, such as asset management registries.
- **Determine the business case:** It's important to indicate your project's size and scope, your targets for energy savings, your preferred performance indicators (e.g. percentage of energy saved compared to current usage) and your preferred financial metric(s). Commonly used metrics include net present value and simple payback period. Consult the factsheet in this series, *Developing a Business Case for an Energy-efficiency Retrofit*, to learn more.
- **Define the project scope:** What buildings are included? Are other nearby housing providers interested in bundling their projects with yours? What types of energy-efficiency measures are particularly desirable (or undesirable)?

**Before embarking on the next step, you will need to recruit and select an energy-efficiency expert. Determining whether to source your energy-efficiency expert from an engineering and architectural firm or from an energy service company (ESCO) is a critical decision. The descriptions below explain the two options.**

<p><b>Energy-efficiency expert</b></p> 	<p>If your portfolio comprises mostly multi-unit residential buildings then you should seek energy-efficiency experts (“energy experts”) that are professional engineers or licensed architects with professional designations such as Certified Energy Manager (CEM), Certified Measurement and Verification Professional (CMVP) or Certified Energy Auditor (CEA). If your portfolio comprises mostly single detached or plexes, seek the services of an <a href="#">Energy Advisor</a> (EA) registered with Natural Resources Canada.</p>
<p><b>Energy service companies</b></p> 	<p>Energy service companies (<a href="#">ESCOs</a>) are general construction contractors that specialize in energy-efficiency projects. They employ many qualified energy-efficiency experts (“energy experts”) who can do walk-through audits and investment-grade audits. ESCOs can be an efficient way to procure all the professional services you require through one contractor. ESCOs typically offer project financing and performance guarantees. Savings associated with upgrades are used to pay the ESCO for equipment and services. Both <a href="#">federal</a> and <a href="#">provincial</a> governments employ ESCOs for retrofits and have published guidance documents for working with ESCOs.</p>

Whichever option you choose, your expert can guide you through the rest of your project. Vet your choice carefully: require professional certification (e.g. CEM, CMVP, CEA, EA), ask for a list of past projects and check references.

## 2/ Walk-through audit: Get initial expert guidance



A walk-through audit (WTA) is a quick study conducted by your energy expert to identify energy-efficiency measures, estimate savings and costs (based on rough estimates of current market prices and rates), screen energy-efficiency measures, and calculate figures for your financial indicators. FCM's [Green Municipal Fund](#) offers funding for pre-feasibility and investment-grade audits. Some companies will even offer to conduct the WTA for free, if it is a precursor to more substantial work and revenue. Remember to ask.

## 3/ Investment-grade audit: Choose measures and demonstrate ROI



An investment-grade audit (IGA) is a detailed study to develop a robust business case before making a final investment decision. It includes thorough and systematic reviews of on-site equipment data loads and comprehensive modelling/simulation of potential energy savings projected to result from the recommended improvements.

Your energy expert will use maintenance records, interviews with staff, measurement and data logging, and more rigorous methods for calculating energy savings. The energy expert will also estimate project costs based on contractor price quotes and prepare a risk analysis and detailed project schedule. You will also want to submit applications for pre-approval to incentive programs. The result is your final business case—you are ready to secure your financing.

Remember to plan your performance measurement and verification (M&V) before the start of the construction project (see step 5).

## 4/ Engineering, procurement and construction: Execute the project



Even after an IGA, some large capital-intensive projects will require more detailed engineering. If you need to tender the work, get your energy expert to draft the statement of work and recommend a few reputable suppliers. When evaluating bids, use “best value” criteria that consider factors such as the technical approach and past performance in addition to price. Consider retaining your energy expert for quality assurance during the work. Ensure that the lines of communication are clear during the construction process. Remember to ask for training on the new installed systems.

## 5 Performance measurement and verification: Track your real-world savings



Measurement and verification (M&V) is the determination of actual impacts after construction is complete. Impacts that were determined at the IGA stage are only forecasts. M&V is a “must” for GMF-funded projects; it’s also a “nice-to-have” for other projects because it can help you achieve your operating and performance needs. M&V will help you fine-tune the new systems to ensure best performance, and can alert you to future deviations. The following tips can help you make the most of this step:

- Plan for M&V thoroughly during the IGA step. Keep in mind that M&V methods often rely on a “before and after” comparison of energy use.
- Be aware that certain M&V approaches (like the use of sub-metering units) require pre-construction measurements.
- Remember to ask for compliance with the [International Performance Measurement and Verification Protocol](#) (IPMVP), the most-used standard practice for M&V.
- Require professional designations such as Certified Measurement and Verification Professional (CMVP) for contractors that you hire to undertake M&V.
- Be aware that it is acceptable and even desirable, despite being counter-intuitive, to adjust the figures for the “before” energy use (known as “baseline”), as long as the adjustments are done according to IPMVP accepted practices. Baseline adjustments are often necessary to account for changes in energy consumption due to weather, building occupancy or unexpected events—the COVID-19 crisis, for instance.

### Get started!

Consult the following resources and factsheets in this series for tips on how to plan and implement your project:

[FCM’s Sustainable Affordable Housing initiative](#)

[Why undertake energy-efficiency retrofits](#)

[Developing a business case for an energy-efficiency retrofit](#)