



The Power of Green

How to improve your
condo's energy efficiency
and save **big**

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go green!

You want to **live in a well maintained, comfortable building**, but you also want to **keep your maintenance fees under control. How are you going to do both?**

The answer is simple – **get control of your energy costs.**

Payments for gas, electricity and water can account for 40% or more of your building's ongoing operating costs. That makes **utility bills easily the largest controllable expense** for your condo corporation.

How controllable? Most older condo buildings can **cut these costs by 30%** with routine upgrades (lighting, boilers). Even relatively new buildings are ripe for 15% or more in savings because the building code that said how your building should be constructed is more focused on keeping it upright than making it energy efficient.

So do yourself a favour: Read over this guide and start thinking about how to make your building greener for both your wallet and for our environment. You can also get current info on greening your building at www.TowerWise.ca. You may want to start by viewing our series of four five-minute videos on Cutting Your Condo's Energy Costs at www.TowerWise.ca/videos.

1

Form a green committee



2

Develop an implementation plan



3

Secure necessary approvals and financing



4

Implement the plan



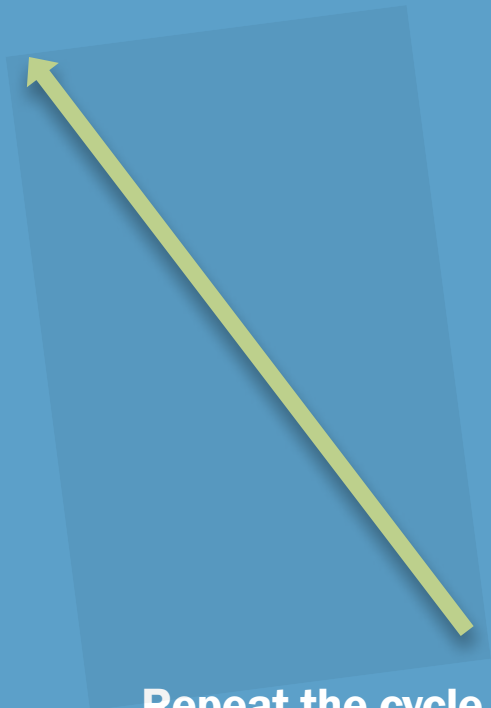
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Communicate results and celebrate your success

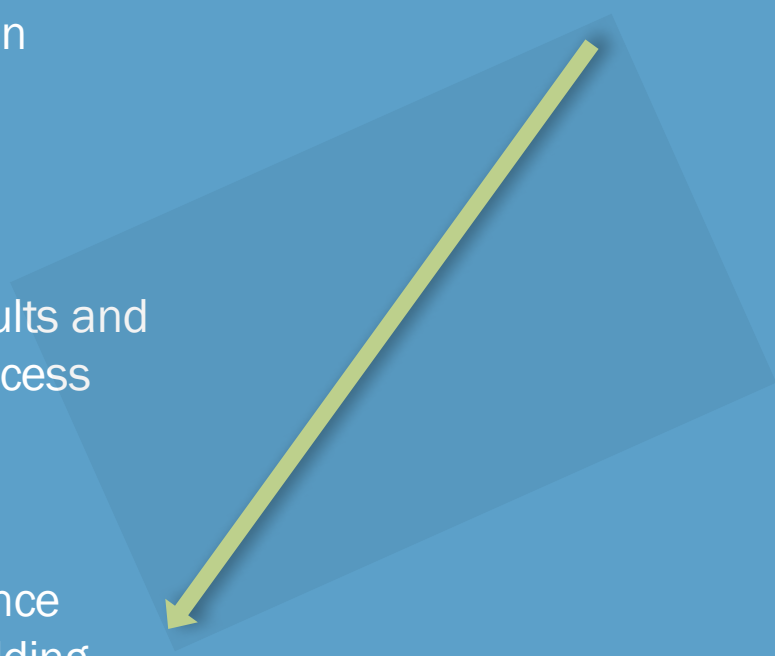


6

Monitor performance and keep your building in tune



Repeat the cycle for additional upgrades or to implement new technologies



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WHY GO GREEN?

four elevator conversations

THE BUYER LOOKING AT UNITS IN YOUR BUILDING

Yeah, this is a really well-run building and interest in units is through the roof. We're getting a reputation for really having our act together when it comes to controlling costs and keeping the building in great shape. The only problem is being pestered by real estate agents who want me to sell my unit! No way am I leaving a top performing building like this!

YOUR KIDS (AND GRANDKIDS)

See those lights up there? They use just 5 watts of energy. The old bulbs used 50 watts. We're doing a bunch of stuff like that in this building so that we can lower our environmental footprint – you kids talk about what that means in school, right? If we use less energy, we are doing our part to fight climate change and air pollution, which is important because I want you to grow up in a healthier world. We're going to do more stuff, maybe even install solar panels, to make this place a lot greener. And you know what – it really isn't hard to do. More people should be doing it.

YOUR NEIGHBOUR

Cold outside, eh? Good thing we bought that new super efficient boiler. Otherwise, we'd be paying a fortune for gas right now. Can you press P1? Those new garage lights are pretty nifty too. You can see so much more clearly than with those old yellow lights and they're saving us a ton of money on our electricity bill. I hear the new lobby furniture and carpet is coming next week. With the new LED wall sconces, it's going to look pretty splashy and it's all being paid for with the money we've saved on our utility bills. I love this green business!

THE PROPERTY MANAGER

Marta, you look lost. Nothing to do now that the boilers and water heaters aren't constantly breaking? Just joking, but the building really is running smoothly, eh? The heat is more even and I'm not constantly either freezing or cooking. Thanks for taking the lead on this energy retrofit stuff – it has really improved the building. You really know your business.

SECTION 1: Getting Started

As the old saying goes, if you don't know where you're going, you're likely to get lost. Any energy retrofit should start with a good plan, a plan that describes all the potential upgrades (lighting, boilers, chiller, system controls, windows, etc.) that can save you energy, what the return on investment will be for each item, which items should be tackled first, which short- and long-term payback items can be combined to produce a more easily digested blended payback period, and how the upgrades are going to be financed (drawing from reserves, special assessment, loan).

So how do you put together a plan?

STEP ONE: STRIKE A GREEN COMMITTEE

Condo boards are often too busy managing the building or reacting to the latest crisis to be proactive about energy efficiency. You can lighten the load on your board by striking a green committee to look specifically at energy efficiency and renewable energy opportunities and oversee development of a green plan. It's important to have a few interested board members on the committee, but it is also a good idea to invite other residents to participate. Down the road, the fact that your plan is supported by a committee will also help to generate buy-in from the rest of the board.

Here are a few guiding principles for your committee:

- Keep the board and your property manager up-to-date by circulating minutes from your green committee meetings and giving green committee updates at board meetings.
- Take a comprehensive look at your building, top to bottom. If you focus on just one or two quick payback items, you're likely to miss out on more substantial savings that require a bit more patience.
- Get expert advice from an independent energy auditor before starting any changes.
- Forget you ever heard the phrase "if it ain't broken don't fix it." Prolonging the life of inefficient boilers, chillers, etc., can be a costly mistake.
- Get the sequence right. Replacing boilers before you replace leaky old windows will leave you with an oversized boiler once you do get those windows replaced.
- Learn what incentives are available from governments and utilities, but don't let incentives completely determine what actions you take or you may miss important (and economically sensible) opportunities.

STEP TWO: GET EXPERT ADVICE

Once you have struck a green committee, the next step is to hire an energy management firm to conduct a comprehensive energy audit of your building.

elevator conservation with: **YOUR BOARD PRESIDENT**

Jane, I'm glad I bumped into you. I know the board has been working hard to figure out how the HST is going to impact our fees, but have you thought about what we could be doing to cut our energy and water bills? Now that we're paying 8% more for this stuff, it seems to me like this would be a great time to set up a green committee to see what we could be doing to save energy. I'd be happy to join. We could start by looking at these videos I found on this TowerWise.ca website that explain really well the basics and how to get started.

Even if you are lucky enough to have committee members with some background in energy management, it's usually still worthwhile to get professional advice. An energy audit will report on how and where energy is being used in your building and will identify a list of building-specific energy efficiency or renewable energy opportunities with estimates on the costs and benefits for each measure.

An energy audit can cost anywhere from \$20 to \$80 per suite, depending on the size of your building and how comprehensive an audit you want. Luckily, government incentives are available to cover most of the cost of your audit as long as you end up implementing at least one of the recommendations. Here are a few tips for getting your money's worth out of an audit.

- Ask for detailed audit proposals from at least three reputable energy management firms.
- Don't just pick the firm with the lowest price.

Do an 'apples to apples' comparison and evaluate the value you are getting for your money. There may be considerable differences in the scope of the service being offered.

- If the audit proposal is vague and poorly written, your audit report will be too! Go with a firm that communicates clearly and professionally.
- Find out whether the firms will also evaluate the potential for renewable energy projects, like putting solar panels on your roof.
- Once you see a first draft of the audit report, ask questions about anything that is unclear. Don't be afraid to ask for a second draft if you feel there are gaps in the report. See the appendix on page 28 for more on selecting an energy auditor.

STEP THREE: PUT TOGETHER A DETAILED PLAN

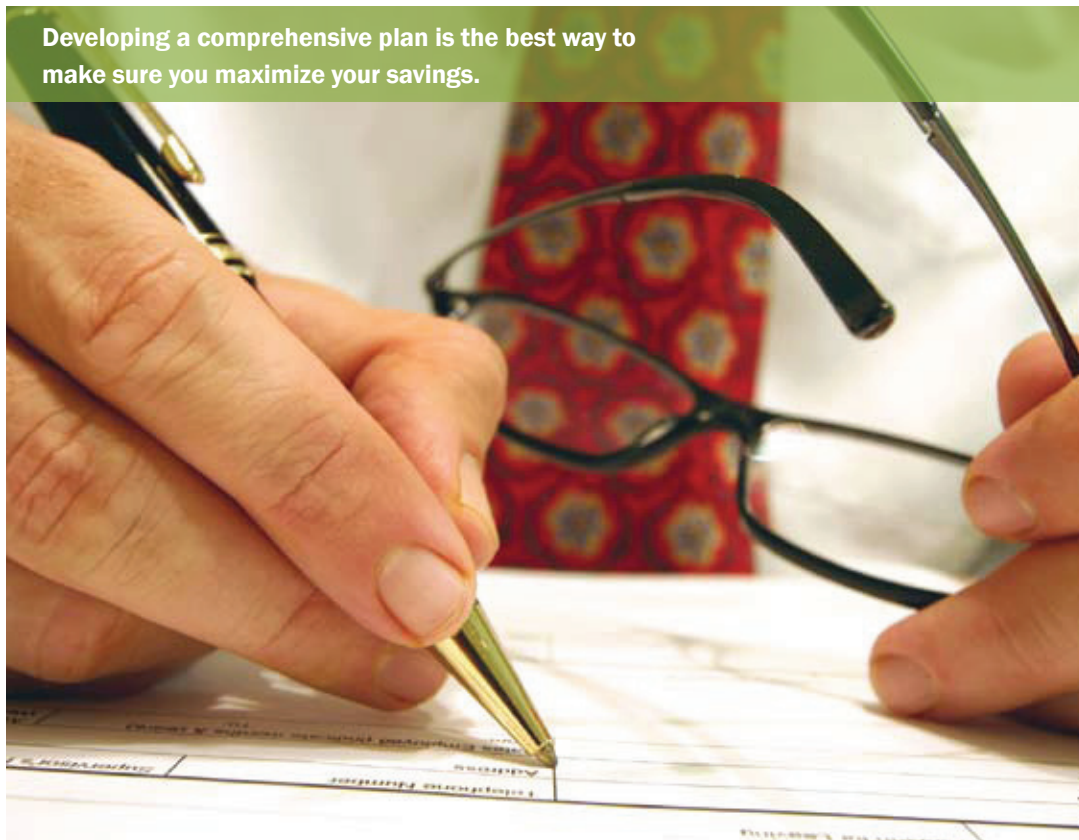
Your energy audit report will include a recommended list of retrofit options and operational changes. This document can guide your energy management efforts for years to come. However, you'll need to review the report carefully before deciding which measures will meet with your buildings goals and expectations. Some of the recommended measures may require a more detailed feasibility study as well.

Look at the costs and benefits from each measure individually, but don't just "cherry pick" the quickest payback items and leave the rest. The best approach is usually to combine quick payback measures with some of the longer payback measures, resulting in an attractive long-term investment for your building.

Once your green committee has come up with recommendations about which measures to implement, you'll still need to address how and when to do the work and how to pay for it. For example you'll need to decide whether you want an energy management firm to oversee the whole project or whether your property manager can oversee the project themselves. Having an energy management firm manage the project costs more, but is often worthwhile especially if the project is complex and will involve multiple contractors. You'll also want to take a close look at your building's latest reserve fund study to see whether any of the measures identified by the audit coincide – or conflict with – upcoming maintenance and renewal needs identified in the reserve study.

A solid plan should include the following elements:

- Recommendations on which measures should be implemented and which should be studied further before further action
- A rough timeline for when the work will be done
- Recommendation on who should manage project implementation — your property manager or an energy management firm?
- A plan for how to finance the project (see the Financing section on pg. 15 for further info)



Developing a comprehensive plan is the best way to make sure you maximize your savings.



Brampton condo boosts boiler performance

A 30-year-old condo in Brampton took a look at its mechanical systems and didn't like what it saw: aging and inefficient boilers, an energy blasting air handling unit, and a chiller filled with now banned CFCs. The residents decided to use a healthy reserve fund for a staged retrofit.

- First they replaced an aging domestic hot water boiler with two high efficiency condensing boilers. Not only did this take a big bite out of operating costs, it also made hot water supplies more reliable and demand easier to meet at peak periods.
- Then they replaced five atmospheric boilers with two more high efficiency condensing boilers, including new controls and new fully insulated piping. Efficiency of gas use jumped by more than 30% and most days it only takes one condensing boiler to keep the building warm.
- After this, it was reworking the air handling unit to get rid of inefficient burners and draw heat from the new condensing boilers and cool air from the new chiller instead. A far more efficient solution that delivers greater building comfort.
- Finally, they replaced a chiller that presented a potential major maintenance headache under rules that require the replacement of any unit leaking CFCs and the replacement of all units containing CFCs before Jan. 1, 2012.

The boiler and air handling upgrades alone are saving this condo more than \$80,000 per year in utility costs and they expect to recapture their investment within 4-5 years. Meanwhile, the new more efficient chiller will help save on electricity expenses especially given that it is likely to be most often operating in peak electricity pricing periods on hot summer days.

You can watch a short video profile of this retrofit at www.TowerWise.ca/videos

You can find a list of Energy Management Firms and Consultants that can help you with your plan at <http://oee.nrcan-rncan.gc.ca/providers/index.cfm?attr=20>

To view the “Cutting Your Condo’s Energy Costs” video series, visit TowerWise.ca/videos.

SECTION 2: The Opportunities

From an energy perspective, we’ve come a long way in the last 15 years. Equipment and lighting available today is much more efficient than what was available even a decade ago. Condensing boilers can be more than 90% efficient (90% of the energy in the gas burned becomes useful heat) compared to the 60% (or less) efficiency of old atmospheric boilers. Variable speed drives can cut the energy used by fans and motors by 40% or more. New LED fixtures can cut power used for lighting in half. Low-e coated argon-gas filled windows can cut your heating costs by 25% or more (and that is without factoring in better sealing around new windows). Six litre toilets can cut water consumption by more than half, and even more efficient toilets are now available.

One of the big, but often overlooked, advantages of equipment replacement is that it is also often an opportunity to fix other energy leaks, whether it is un-insulated or leaking pipes, leaky seals around windows, drafts and cold spots, or inefficient showerheads, giving you an even bigger bang for your buck by further lowering utility and maintenance costs.

BOILERS

There are two kinds of boilers in most buildings: boilers for space heating and domestic hot water boilers. In both cases, the biggest heat loss in conventional boilers is from flue gases (waste combustion gases) that go out the exhaust (up the chimney essentially). Condensing boilers capture this heat with advanced heat exchangers that suck the heat and moisture out of these exhaust gases before they are released. The result is that almost all the potential energy in the gas being fed into the boiler becomes useful heat for space or water heating.

Condensing boilers also tend to be much smaller than old atmospheric boilers. In one 30-year-old condo, two condensing boilers the size of small broom closets replaced five large atmospheric boilers (and generally only one condensing boiler is needed to actually heat the building unless it is extremely cold.) Condensing boilers for domestic hot water also have a faster recovery time, which means that your building won’t run short of hot water in peak demand periods.

According to Natural Resources Canada: “The cost of a high-efficiency boiler can be up to twice that of a conventional boiler. On the other hand, high-efficiency models often pay for themselves in less than five years when the high price of fuel and the long boiler life (25 years on average) are factored in.”

You can get more information on selecting boilers here:

<http://www.oeenrcan.gc.ca/industrial/equipment/boilers/savings.cfm?attr=24>

HEAT REFLECTORS

Take a look around your unit – how many of your radiators are installed on an exterior wall? When hot water baseboard or convector radiators are installed against an exterior wall, a very significant portion of the heat is absorbed into that wall and diffused into the great outdoors. It's kind of like having a window cracked open all winter long. Heat reflectors are a simple technology that reflect most of the heat that was going through the wall back into the building. Installing heat reflectors can trim your heating costs by up to 10%, especially in older buildings, and will often pay for themselves within three years.

CHILLERS

Any chiller containing CFCs must be replaced if it begins to leak refrigerant and all chillers containing CFCs must be replaced by Jan. 1, 2012 in Ontario. New high efficiency chillers (e.g., 0.48 kW/ton) use as little as half as much power as those installed 30 years or more ago.

One of the key aspects of any chiller replacement is sequencing – lighting should always be upgraded first (or simultaneously) as it represents an important heat source in any building. In fact, by retrofitting lighting first, it is often possible to downsize your chiller (and many older buildings already have oversized chillers due to an abundance of engineering caution).

Moving to a high-efficiency chiller that is also slightly smaller (e.g., 325 tonnes instead of 350 tonnes) could save a 140,000 square foot building \$12,000 a year in electricity costs (at 10 cents a kWh). With time-of-use electricity pricing now in effect and cooling equipment generally operating full throttle during peak price periods, these savings could actually be significantly higher. And because, like boilers, chillers have long lifetimes, you will reap these savings over 25 years or more – another incentive to maximize operating performance rather than seeking to minimize upfront cost.

Ensuring that the chiller equipment is paired with variable frequency pumps and fans (see next section) is an important way to secure even deeper energy savings.

VARIABLE FREQUENCY DRIVES

Fans and motors are part of your heating and air conditioning system, water distribution system and mechanical systems, such as elevators. Variable Frequency Drives (VFDs) can make these systems much more efficient by changing them from simple on/off devices to devices that respond to the actual workload. In other words, a VFD in an HVAC system will not operate at full power when the cooling or heating load is light but will ramp up to full power on a hot or cold day. The

LED lighting and adaptive controls can cut the energy used by parking garage lights by as much as 70%.



Shedding new light on energy savings

The Masters Condominium in west-end Toronto was grappling with growing electricity bills when it decided to shine some light on what could be done to reduce its costs.

With the help of the City of Toronto's Better Building Partnership (www.toronto.ca/bbp) and consultants Lighting Solutions, the condo corporation conducted an in-depth study of its lighting and how it could be upgraded to save energy while maintaining or improving visibility and safety.

The resulting retrofit focused on two major areas:

- Metal halide lighting from the garage was removed and replaced with a high efficiency T8 lighting system. This retrofit resulted in a 74% reduction in kilowatt load and a yearly reduction of 291,139 kilowatt-hours in energy consumption.
- Lighting systems in the stairwells, fitness area, meeting rooms and clubhouse were also upgraded, resulting in a yearly reduction of 126,723 kWh.

The goal of this project was to save \$40,000 per year, which was surpassed. At a cost of \$80,000, the project will be paid for in just two years and the condo corporation will reap ongoing savings for years to come.

**elevator conservation with:
YOUR FELLOW GREEN
COMMITTEE MEMBER**

I know that condensing boiler is a big chunk of change, but we don't want to be penny wise and pound foolish, as my wise old grandmother used to say. That boiler is going to be here for the next 20 years plus and that's why we need one that is really efficient. I know gas prices go up and down like a yo-yo, but the guy holding that yo-yo string is steadily climbing the stairs – we are going to have much higher gas prices down the road and we better be ready for that.

result, in terms of energy savings, is quite significant. According to Natural Resources Canada, replacing a single 40 hp motor in an HVAC system with a VFD will result in a savings of close to \$10,000 a year (based on 10 cents per kWh). Natural Resources Canada estimates that this changeover would have about a one-year payback when installation costs for the VFD are included.

You can get further info and tips on selecting VFDs here: <http://www.oeenrncan.gc.ca/industrial/equipment/vfd/savings.cfm?attr=24>

LIGHTING

Lighting can often be one of your most lucrative retrofit choices due to a relatively low replacement cost and instantaneous savings. Whether it is replacing older T12 fluorescents with high-efficiency T8s equipped with electronic ballasts; halogen or incandescent lobby and hallway lighting with LEDs; or high pressure sodium (HPS) parking garage lighting with T8 fluorescents or LEDs, savings can be 50% or more and paybacks can range from one to three years.

However, many condos make the mistake of just undertaking lighting retrofits and ignoring bigger ticket items like boilers and chillers or even windows. This can be a mistake because by combining short- and longer term payback items, you can create a “blended” payback that keeps your building’s cash flow healthy while delivering deeper long-term savings. In fact, the Toronto Atmospheric Fund has developed a finance product called a STEP loan to support just these sorts of blended projects – contact Tim Stoate, Director of Mandate-related

Water, water everywhere

Many condo owners overlook the link between water and energy. But Summerhill Property Management has made it a practice to take the cash out of every flush in the buildings they manage. Noting fast rising municipal water rates, the company takes advantage of toilet replacement incentives to earn quick cost savings for residents. The company has found that the average toilet replacement program can pay for itself in under 18 months. See the video case study at www.towerwise.ca/videos for some tips on planning a toilet replacement.



finance for details (tstoate@tafund.org, 416-393-6368). As well, there are certain synergies between retrofit actions such as new windows and boilers and new lighting and chillers that you will want to harness.

Newer lighting can offer additional benefits. LEDs for example, are much less breakable than conventional lamps and never completely burn out (they simply decline in performance). LEDs also have much longer lifespans than conventional lamps, meaning less maintenance. And they can provide better visibility, particularly in settings like parking garages.

Advanced controls such as occupancy sensors are another great way of saving energy – and money. In a laundry or storage room, for example, such sensors turn lights off unless the area is in use. Toronto city council has passed an amendment to the property standards code to allow the use of motion sensor-controlled lighting in multi-unit residential and other buildings. Motion sensor lighting will be allowed in corridors, parking garages, storage rooms and laundry rooms, but are not allowed in stairwells and lobbies.

TOILETS

We don't often think about it, but every time we flush, we are flushing away energy – and money. The energy it takes to pump and purify the water that is used in your building is substantial, which is part of the reason that water rates in most municipalities are rising rapidly. Replacing conventional toilets with six litre models can help take the bite out of these rising rates. Many municipalities have incentive programs for efficient toilets, but you need to make sure the model you have selected is on their approved list (which also gives you an assurance that it will work well). And while you're in your neighbour's bathroom, offer them a low-flow shower head as well – another great way to conserve water and the gas needed to heat it for a hot shower.

SECTION 3: Renewable energy

Once you've reduced your building's energy appetite by improving its efficiency, it's time to start feeding it some green – energy that is. You can start small, with solar pool heating, for example, or think big and turn your rooftop into a solar generating station. With Ontario's new feed-in tariff system, interest in renewable technologies like solar PV is exploding.

Here's a quick look at some of the most popular applications.

Solar photovoltaics (PV): PV systems generate electricity, which is fed into the provincial electrical grid. Your building continues to be connected to the conventional electricity system, but you earn revenue for every kilowatt you send to the grid from your PV system. These payments are called “feed-in tariffs” or

Solar – own or lease?

OWNING

As the owner of a renewable energy project, your responsibilities will include:

- hiring qualified installers
- sourcing and purchasing equipment
- arranging for project financing and insurance
- obtaining all necessary approvals (e.g., building permits)
- arranging for an electrical safety inspection
- working with your local distribution company to connect your project to the grid
- obtaining and maintaining a microFIT contract
- paying for ongoing operating costs

Some of the benefits of owning your own project could include:

- having control over your own project
- receiving payments directly for the electricity produced.

Some of the risks of owning your own project could include:

- purchasing equipment that does not perform as well as expected
- being responsible for the costs associated with substandard equipment or installation
- being responsible for all ongoing project costs.

LEASING

As a lessor or “host” of a microFIT project, your responsibilities could include:

- negotiating a leasing agreement with the project developer. We recommend that you consult a lawyer for this.
- ensuring that the project developer obtains all necessary approvals. For example, building permits, electrical safety inspection, etc.
- arranging for property insurance, if necessary
- maintaining an ongoing relationship with the project developer

Some of the benefits of leasing your property could include:

- receiving steady income from your leasing agreement. Note that the payments to you may be taxable as business income. We recommend that you consult the Canada Revenue Agency or a tax professional.
- no upfront capital investment.

Some of the risks of leasing your property could include:

- damage to your property if the project is poorly installed
- non-payment from the project developer
- penalties for terminating the lease agreement

Adapted from: <http://microfit.powerauthority.on.ca/pdf/microFIT-Program-Overview.pdf>

FITs for short. Under Ontario's microFIT program, any system smaller than 10 kilowatts (kW) can qualify for a 20-year guaranteed supply contract at a rate of 80.2 cents per kilowatt-hour (kWh). Larger projects may qualify for the standard FIT program, which pays 63.5-71.3 cents per kWh.

Don't think solar will work in Toronto? We actually have better solar conditions than Germany, a world leader in solar use, and we get more summer sun than Miami.

Key considerations for solar PV:

- Roof space: You will need up to 80 square metres of space to accommodate a 10 kW system (but a smaller system is an option).
- Roof structure: You will need to ensure your roof can handle the additional weight, including the "uplift" load that occurs when the wind gets under angled panels (this usually requires an engineering assessment). You will also need to ensure that your roof will not need to be refurbished in the near-term – you don't want to have to move dozens of solar panels to re-roof.
- Sun exposure: The panels must be completely unshaded from 10 a.m. to 3 p.m. at the very least and must have a good southern or southwesterly exposure.

If your building's conditions are right, a solar PV system could produce a healthy revenue stream for the next 20 years.

elevator conservation with: A SOLAR INSTALLER

There's a pretty big unshaded area on the roof that we think could be quite good for solar panels. This new microFIT program is really exciting and our residents are keen on the idea of generating green energy right on top of our building. We'll have to discuss whether a lease or partnership type agreement makes the most sense once you have a look, but we definitely see solar playing a role in our building's future.

With Ontario's new microfit program, a solar system can deliver power and a steady revenue stream for 20 years or more.



Some buildings may choose to lease roof space to a system developer rather than own and operate the system themselves. Or they may enter into a co-ownership agreement with an installer. See the sidebar for some considerations about which approach is best for your situation.

For more information on the microFIT program, visit microfit.powerauthority.on.ca

For a list of solar installers, visit www.cansia.ca

Solar thermal: The most common solar thermal application is solar water heating, although solar air heaters (solar walls) are also a proven technology. Solar water heaters come in two types: systems where fluid filled pipes run through a heat absorbing panel and “evacuated tube” systems, where vacuum glass tubes absorb heat and transfer it via the tips of copper cores to fluid (water or glycol) as it flows past the panel (see <http://www.solarneighbourhoods.ca/sdhwindepth.php> for more).

In either case, the panels act as pre-heaters for the water coming into your building. On a hot summer day, they may provide all the water heating you need while on a cold winter day, they may provide an initial temperature boost while your conventional boiler handles most of the load. A general rule of thumb is that a solar hot water system can handle up to about 50% of your year-round water heating needs.

As well, you may be able to negotiate a “utility” type agreement with a solar supplier where you pay only for the heat energy provided by the system.

One application where solar water heating is almost always an economic slam dunk is pool heating, partly because the heating season is a solar peak performance period and partly because solar pool heaters are less costly (because they do not need to operate year-round). If your condo has a heated pool, you should be looking at solar water heating.

For a list of solar installers, visit www.cansia.ca

Geothermal: Also known as “geoexchange,” these systems tap the warmth stored in the earth a few metres beneath the surface to heat or cool buildings. Essentially, geothermal systems pump fluid (water or glycol) through a loop that runs either vertically or horizontally beneath the ground’s surface. This loop captures the stored heat in the earth and transfers it to the building’s heating and cooling system. In warmer months, the system runs in reverse, absorbing heat from the building and transferring it back into the earth.

Key considerations:

- Do you have an open area where a large horizontal piping loop can be run or an area where vertical wells can be drilled?
- Are your current chiller and boilers ready for replacement?

Geothermal systems qualify for incentives under the EcoENERGY for Buildings program. The eligible incentive is based on the *lowest* of the following three amounts:

- \$10 per gigajoule (277.8 kilowatt hours) of estimated annual energy savings;
- 25 percent of eligible project costs; or
- \$50,000 per project (\$250,000 per organization).

IMPORTANT: The deadline for applications is March 31, 2011.

For more information, visit www.geo-exchange.ca/en/

SECTION 4: Financing

One of the key benefits of greening your condo is that while doing something good for the environment, you are also doing something good for your bottom line. There are a variety of ways to finance the up-front costs of a retrofit, but the beauty of these measures is that with a well-thought-out plan, that investment is certain to pay for itself, often in under five years. That's not all: a retrofit can

EnergySTAR windows keep the heat in and the cold out.



Looking Up

Upper Broadview Suites is a 32 unit building constructed built in the 1930s. Its windows let in light – and most of the weather. By replacing all windows with low-e thermapane units, along with upgrading some boiler controls and steam traps, the building's owners slashed their gas bill by 38%. The building won a Green Toronto Award for its efforts to save energy, water and reduce waste.

also generate cash flow through utility cost savings that can be used to deal with other building repairs that are simply a cost drain, like changing carpets, fixing drainage, or repairing the roof.

Keep in mind as well, that the financial return from an energy retrofit can actually be better than anything you can get by keeping your reserve funds in a bank account. The internal rate of return on an energy retrofit can range from 5-30% compared to the less than 3% that you'll likely receive for keeping your reserve funds in a bank.

INCENTIVES

There are a number of government and utility conservation programs that can offset a significant chunk of the upfront costs of an energy retrofit (sometimes as much as 50%). Incentives are available for actions that conserve electricity, natural gas and water. However, these programs often have application deadlines and caps on the total funding they will disburse. Talk with your energy auditor or an energy management firm to make sure you are in a position to benefit from these programs.

For a list of high-rise incentive programs, download the TowerWise Incentives Program Guide at www.towerwise.ca/files/incentivesbrochure.pdf

Reserve funds: This is the most likely source for the funds needed to finance an energy retrofit, especially where you are replacing existing but aging equipment. If you're considering using reserve funds, you'll want to check your reserve study

Thinking big, saving big

It's not a condo, but the Green Phoenix housing complex has many of the same attributes of other 1970 and '80s high rises: Exposed floor slab edges and thin exterior insulation, aluminum windows, and outdated and inefficient mechanical systems.

The board of Green Phoenix decided that rather than trying to chip away at a multitude of problems one-by-one, it would harness major synergies by undertaking a comprehensive retrofit that included everything from new exterior insulation and low-e windows to geothermal space heating and cooling and solar domestic hot water heating.

While the project was complex and ambitious, it was also firmly grounded in reality: the foundation that runs the building built a business case that demonstrated that over the longer term, the comprehensive approach would actually be cheaper than sticking with incremental and more conventional upgrades. You can find out more about the value of thinking deep at www.greenphoenix.ca.

to make sure that funds are not already earmarked for other upcoming projects.

The Ontario Condominium Act also places certain limitations on how you can use your reserve funds. For example, if your reserve fund study suggests that you will need to replace your aging boilers five years from now, but your board wants to replace them early to benefit from the energy savings, that would be fine. But if the reserve fund study anticipates keeping those inefficient boilers running for another 10 years, dipping into the fund earlier probably wouldn't be allowed. As well, the reserve fund is intended for repairs and replacements rather than additions, so using it to finance a new solar water heating system would not be allowed.

However, you can overcome these restrictions by preparing a special funding plan (see below) and having it approved by your condo members. The bottom line is that you may need to consult with your lawyer before using your reserve funds for an energy retrofit.

SPECIAL FUNDING PLANS

Most energy investments – replacing old boiler and chillers, for example – involve *capital replacements*. However, some energy investments would be considered *capital additions*, such as installing a solar PV array or a geothermal system. Sometimes, even replacing old equipment like a boiler with newer, higher efficiency equipment is considered a *capital addition* if you are paying a significant premium to get something that is much more efficient than average.

The Ontario Condominium Act (Section 97) stipulates that condominiums must take certain steps before implementing a *capital addition*. If the cost of the capital addition is less than 1% of the annual budget, the addition can be approved by a resolution of the board. If the cost is between 1% and 10% of the annual budget, the board must provide written notice to all unit owners and allow 30 days for them to request a special meeting to vote on the addition. If no meeting is requested, the board can proceed with the addition. If the cost is greater than 10% of the annual budget, the addition must be approved in a vote with support from at least two-thirds of the unit owners.

Special Assessments: Basically, the owners in your buildings pay a special levy to pay for building upgrades. This can save you from having to secure outside financing – and from paying interest on the money you raise – but it could be difficult to raise sufficient funds for a major retrofit through this approach alone. Your fellow owners' pockets are only so deep. Special assessments can be

elevator conservation with: YOUR BOARD TREASURER

So what are we getting on those GICs these days, Jose? Two percent, three percent? Our energy auditor says we can get better than 15% annually by upgrading our HVAC systems and lighting. I don't think we have any other safe investment options that offer returns like that.

imposed completely at the discretion of the board of directors. However, this tends to be a controversial measure and should only be implemented following consultation with the unit owners.

Borrowing: Many condo corporations are leery of the idea of borrowing to finance an energy retrofit, but this can actually be a financially sensible way to capitalize on the significant cost savings available from improving your building's energy efficiency. You'll be paying interest on the loan, of course, but in most cases your energy cost savings should be more than sufficient to cover the *full* loan repayment costs.

There are a few legal steps you must take before signing on the bottom line for a loan, however. First you need to fully inform your unit owners of the purpose and cost of the loan and its terms and conditions. You will then need to hold a special meeting to pass a borrowing by-law authorizing the loan with the support of 50% +1 of the corporation's unit owners to proceed. This approval step may not be necessary if the expenditure for which the loan is required is already in the corporation's annual budget or a by-law has been previously passed.

So how do you actually get a loan? First, check your reserve study to see what funds can be drawn from reserves and then get approval for your plans from the unit owners by circulating an information package on the costs and benefits and then talk to your bank.

Bankers generally consider condo corporations to be good credit risks, so you should be able to negotiate favourable terms. You can also look at alternative financing options, such as through an energy management firm or a condo

Myth busting

You may need to do some myth busting as part of your efforts to get residents onside with an energy retrofit plan. Here are some common objections:

Residents with larger families will get more of the benefits

Not really. Utility costs are often common costs in condominiums that are reflected in monthly fees. Everyone will benefit equally if these costs are contained by reducing consumption. Right now, you are all paying for energy that is simply being wasted.

I may not be here long enough to see any payback

A good energy retrofit will help protect the capital you have invested in your condominium by ensuring the building's systems are in good operational order and by keeping operating costs under control. A green building is a comfortable, cost-efficient building, which will make it more attractive to buyers and will protect your investment.

finance specialist. You can find information on Energy Management Firms on the TowerWise.ca website under Step 2: Getting the Big Picture or ask other condominium owners, boards or managers for recommendations.

If you are considering a loan as part of your retrofit finance package, you will probably want to calculate an Internal Rate of Return to ensure your energy savings will offset the borrowing costs over the lifetime of the loan. See www.towerwise.ca/calculators for help in doing this.

SECTION 5: Evaluating the business case

Payback – It's by far the most popular measure for looking at the potential business case for an energy retrofit. But a singular focus on quick payback will lead you to miss opportunities for larger longer-term savings. At the very least, you will also want to look at Return on Investment to get a sense of what the ongoing returns of your project will be beyond the initial payback period – this is particularly important for items like boilers or chillers with long lifespans. If you're planning to use your reserve funds or borrow, it's a good idea to look at Internal Rate of Return so that you have a sense of how the project's returns compare to your cost of borrowing or the current returns from your reserve fund investments.

You can easily calculate all of these measures on the TowerWise website at www.towerwise.ca/calculators. Or ask your energy management firm to provide you with these measures.

QUICK DEFINITIONS

- **Simple payback:** The time it takes to recover the initial investment through cost savings.
- **Return on investment:** Your net gain from your initial investment over a set period (anywhere up to the full expected lifespan of the equipment).
- **Internal Rate of Return:** The return that an alternative investment would need to produce to be the equivalent of investing in an energy-saving upgrade. So if your IRR is 10%, the alternate use of your capital would have to return better

The case for going deep

Some of the lowest cost conservation measures, like lighting retrofits and toilet replacements, also tend to have the fastest payback. Many of the more expensive measures, like boiler or chiller upgrades, take longer to recoup the upfront cost. But all too often, buildings make the mistake of “cherry picking” the quick payback measures. Integrating quick payback items with long payback items to create a deep energy retrofit will lengthen the payback on your project, but is often a good idea. Just ask yourself: would you rather save \$10,000 a year and get a three year payback or \$50,000 a year with a four year payback?

Elevator conservation with: YOUR NEIGHBOUR:

“Hi Felicia. I see you have the information package about the building upgrades. I think this is going to be really good for our building. I’d rather spend a little now to save a lot later than just cross my fingers and hope our boilers keep working this winter. We can save some serious cash and that’s going to keep our maintenance fees from skyrocketing, especially when we tackle fixing that parking garage.”

than 10% to be financially competitive. Alternatively, if you need a loan to finance the project and the interest rate is 7%, your IRR would need to be more than 7% to cover the borrowing costs.

For a broader discussion of different financial measures and their strengths and weaknesses, see www.towerwise.ca/files/Core%20Financial%20Measures.pdf

COST OF WAITING

This is another important concept when it comes to considering an energy retrofit. Because energy retrofits deliver savings right away, waiting until you have increased your reserves or for interest rates to fall means these savings are slipping through your fingers.

The longer you wait, the more you miss out.

You can find a link to an EnergyStar spreadsheet under Step 3: Moving forward on a retrofit (in the “Calculate Your Savings” section) on our website at www.TowerWise.ca that can help you calculate the cost of waiting.

SECTION 6: Communicate, communicate, communicate

In real estate, they say “location, location, location.” In the energy retrofits, we turn that into “communicate, communicate, communicate.” You need to have your residents onside with your retrofit plan for a couple of reasons:

- They may need to approve financing or a reserve fund use
- Their behaviour can have a big impact on your results (heat or A/C turned too high; windows left open and lights on; wasteful water use).

First, sell the advantages:

- better building comfort (fewer drafts and cold spots, better lighting, better air quality)
- protection against rising utility costs (the emphasis here should be on reducing exposure to rising costs rather than on net savings given the odds that prices for gas and electricity will continue to increase)
- making the most of already necessary changes, like the need to change old chillers or boilers (and the benefits of acting before things breakdown)
- improved resale values and a better building reputation (faster sales and better asset value)
- lower maintenance costs now that old equipment is gone and associated problems fixed

- increased cash flow (savings from energy costs) that can be used for other building repairs or to help keep condo fees under control.

Whether member approval is necessary or not, your green committee may want to prepare an information package about the retrofit for residents: what is being done, how long the changes will take, the cost and benefits of the work, and how it is being financed. More information is better than less, as it helps to reduce uncertainty and concern, but also make sure your information is clear and understandable.

You may want to chart out how much energy and money the retrofit will save – a picture is worth a thousand words. Examples of other buildings that have tackled their energy demons are also very useful – the final video in our Cutting Your Condo’s Energy Costs series, for example, profiles the retrofit of a 30-year-old Brampton condo (see www.TowerWise.ca/videos).

Then keep residents informed as the work progresses. Post bulletins in the lobby and elevator and send out an e-newsletter or create a simple blog about the project (you can set up a blog for free with a few clicks at www.blogspot.com). Again, knowledge is power and residents who know what is going on will be less fretful and more supportive.

If you are going to require access to residents’ suites, work with your property manager to ensure that this causes the least disruption possible. Stress to contractors that access must be scheduled well in advance and that they must



Be sure to outline all the benefits of energy upgrades: utility costs savings, fewer maintenance calls, a more comfortable building and cash flow to help with other repairs. Plus, of course, badly needed help for our climate.

**Elevator conservation with:
ANOTHER NEIGHBOUR:**

“Hey Bob, what are you doing tonight? Want to drop by and watch the game on my new flat screen? It’s an EnergySTAR model, so I told my wife it was part of our plan to improve our unit’s energy efficiency! The new fridge is EnergySTAR too, so the beer is green as well. And we picked up a bunch of those CFL lightbulbs with those coupons the Green Committee distributed, so we’re really jumping on this whole green bandwagon.”

stick to the schedule. Make sure you also have a modest contingency budget for any bumps and scrapes that may happen during window or toilet replacement or other in-suite work. Better to get small problems taken care of quickly than to get into a long dispute about who broke the towel rack. Then give your residents ample notice of the need to enter their suites and a description of what work will be done and how long it is likely to take.

Then celebrate. Treat your energy retrofit as an important collective achievement – because it is. Have a party and thank residents for their support and tell them again what a difference they are making, especially for the environment.

Finally, keep them informed about how much money and energy your building is saving and the tonnes of greenhouse gases you have prevented from going into the atmosphere as time marches on. Keeping residents engaged is a great way to get them ready for the next step – whether it is solar panels for pool heating or a green roof. It’s also a good way to slip in a reminder about what they can be doing in their own suite to help save energy. Especially where buildings do not have in-suite metering, it can be tough to get residents to think about their energy use and conserve. But once they have the green bug, you can rely on peer pressure to help keep the momentum going.

Of course, you can also help this along. Hold a movie night with a screening of “An Inconvenient Truth” and afterwards hand out energy efficiency lightbulbs or low-flow shower heads. The point is to keep the idea of saving energy and the environment in front of residents regularly. Another way to do this is with prompts and reminders. Reminder stickers to “Switch off” are great in common areas like party or exercise rooms if you don’t have sensor controlled lighting and, on hot days, a quick elevator or blog note to suggest that air conditioning not be left blasting while residents are off at work can work wonders. See the next section for more tips on in-suite conservation measures.

SECTION 7: In-suite conservation

As a famous politician once said (sort of) the condo board has no place in the bedrooms of its residents. Except to ensure they are doing their part to save energy, that is. Changing behaviour can be an important part of improving your building’s energy performance. However, this can be challenging in condominiums where residents rarely see individualized utility bills. But most people these days are concerned about the environment and with a little help and prompting will do the right thing.

Things you can do for your residents in their suites:

- Install low-flush toilets (if your corporation is responsible for toilet replacement)
- Install radiator reflector panels
- Install e-coated EnergySTAR windows
- If suites have individually controlled electric heating, install programmable thermostats

Things your residents can do themselves:

- Install a low-flush toilet (if unit owners are responsible for their own toilets)
- Install a low-flow shower head (saves water and gas)
- Install faucet aerators (saves water)
- Install energy efficient lighting (compact fluorescents or LEDs and motion detectors and timers)
- Purchase EnergySTAR qualified appliances and electronics
- Plug “always on” devices (TVs, DVD players, computers) into power bars that can be switched off when the devices are not in use
- Close blinds during hot summer days and at night in winter
- Contact the property manager about heating issues instead of leaving windows open mid winter
- Install ceiling fans to help with cooling in summer and keep heat from rising in winter

Make it easy for your residents to make these changes: Offer them low-flow shower heads and faucet aerators as part of a toilet replacement program. Have a lightbulb giveaway day in conjunction with a Power Savings event, such as the everykilowattcounts.ca discount program, which runs each spring and fall (tell residents they can download coupons from the everykilowattcounts.ca website or ask your electric utility for coupons to distribute). Finally, give residents an in-suite checklist of energy savings actions they can take. Later, survey your residents to see what they have done and report the results in your condo newsletter – it’s a great way to highlight the collective impact of small actions and to prod those who are lagging behind.

Make sure, as well, that you regularly report to residents on your building’s electricity, water and gas costs so they fully understand just how much of their maintenance fees are tied to these expenses. You may not be able to give residents personalized bills, but you can show them how costly it is to waste energy.

SECTION 8: Keeping your building tuned up

Once you’ve completed your initial retrofit, you will want to take steps to protect your savings. That means ensuring that your property manager fully understands any new controls or systems that have been installed and that new equipment is on a proper service schedule. Inaccurate and erratic controls are a big problem

in many buildings. In many cases, controls have never been properly calibrated while in others, problems have gone undetected.

Make sure training for your property manager is part of your retrofit plan and work with your equipment provider to ensure that systems are properly maintained and monitored. Also, make sure your property manager and board closely monitor your utility bills. Unexpected results (savings not as large as expected or unexplained consumption increases) could indicate a system problem. An ounce of prevention is worth a pound of cure.

Make sure to monitor the volume of energy your building is consuming, not just the dollar costs. Over time, increases in energy prices can *appear* to erode your energy savings, when in actual fact you are saving even more than before.

And don't forget that energy conservation is an ongoing process: Once you've completed your energy retrofit and enjoyed the savings for a few years, take a fresh look at the building to see what other conservation opportunities may be available. Technological improvements and the depreciation of existing infrastructure can create new opportunities over time. Energy audits are like reserve fund studies – they should be updated on a regular basis over the life of the building.

Conclusion

High rise buildings produce 40% of the greenhouse gas emissions that come from the residential sector. Many high rises actually produce more emissions per square foot than the average single family home. And that means these buildings are wasting energy and costing their residents money. By improving the energy efficiency of your condominium, you are not just keeping your money in your wallet instead of paying ever higher utility bills, you are helping to create a greener more climate friendly city.

Thanks for taking the time to read this guide and remember the TowerWise program is here to help your building go green. See the next page for more information on some of the services we offer and subscribe to our e-newsletter for news on events, seminars and new financing and technology programs. Go to www.TowerWise.ca/enews to subscribe.

Planning an energy audit

There can be considerable difference in the breadth and depth of energy audit services offered by different service providers. Some firms offer low cost or even free audits, but they may only look at one or two elements of the building, like the common area lighting. These free/low cost audits are typically connected to a product and/or service that will be recommended through the course of the audit. A comprehensive audit will ensure that you don't miss any valuable energy conservation opportunities, and that your decisions are based on the best possible information. Here is the minimum service level we recommend you look for in an energy audit:

- Inspection and documentation of all of the buildings major mechanical and electrical systems, including:
 - Heating, ventilation and air conditioning
 - Building automation system (BAS)
 - Domestic hot water equipment
 - Water conservation equipment (in both common and in-suite areas)
 - Common Area Lighting
 - Garage heating, ventilation, and lighting
 - Laundry room appliances and equipment
 - Building envelope (windows, doors, insulation, and air tightness)
 - Inspection of a representative sample of suites to identify in-suite conservation opportunities
- Energy and Utility analysis
 - Analysis of two or more years of historical utility data
 - Summary and breakdown of buildings' energy use and costs by fuel source as well as end use (lighting, heating, etc)
- Recommended energy conservation measures
 - A list of recommended energy conservation measures, including both operational changes and changes to mechanical/electrical equipment
 - A list of optional upgrades that could be included as part of a retrofit plan
 - A list of potential renewable energy deployments (solar photovoltaic, solar thermal, etc)
 - Estimate of costs, savings, and payback and return on investment for each measure

