



# How Your Office Can Save Money with Sustainable Practices

## Introduction

If you work for an office-based organization like a software company, a financial institution, an insurance company, or a law firm, pay attention! Your organization has a chance to become more efficient—and more profitable—simply by making a few sensible changes to the way you consume energy.

According to Natural Resources Canada, offices consume more energy than any other type of organization in the Canadian commercial and institutional sector—35% of the total in 2008.<sup>1</sup> Yet if you look around your building, you'll probably see a lot of desks, chairs, lights, and computers—maybe a printer here and there—but no obvious energy-guzzlers. So what gives?

To find out, you have to take a step back and consider your building as a whole. Worldwide, buildings are the single largest source of energy consumption and greenhouse gas (GHG) emissions. Likewise, in Canada, buildings account for 48% of GHG emissions.<sup>2</sup>

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1. Energy Use Data Handbook Tables, Table 1: Commercial/Institutional Secondary Energy Use by Energy Source, End-Use and Activity Type, Office of Energy Efficiency, Natural Resources Canada, [http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/tableshandbook2/com\\_00\\_1\\_e\\_4.cfm?attr=0](http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/tableshandbook2/com_00_1_e_4.cfm?attr=0), accessed on November 7, 2010.

2. "2030 Challenge Factsheet: Climate Change and Architecture", The Royal Architectural Institute of Canada, [http://www.raic.org/architecture\\_architects/green\\_architecture/2030/2030factsheet\\_e.pdf](http://www.raic.org/architecture_architects/green_architecture/2030/2030factsheet_e.pdf), accessed on November 7, 2010.

Those are sobering statistics, and we should be deeply concerned about them, but realistically, what can the people at your office do to make the organization more sustainable? After all, you still need electricity to power your lights and run your computers. You need heat, water, and proper ventilation. This stuff isn't optional: You can't just shut down your furnace and ask everyone to work in a parka.

As it turns out, there are meaningful steps you can take to improve the sustainability of your office. The catch is that if you want to get approval for changes to your organization's consumption practices, you'll first have to demonstrate a net positive impact on the bottom line. If you choose to, you can explain the benefits of sustainability in terms of the *Triple Bottom Line*: economics, environment, and people.

This white paper, however, focuses solely on the economic advantages of sustainability, and discusses the environmental and social dimensions only when there are specific, direct economic benefits associated with them. So even though the goal of this paper is to help office-based organizations reduce their GHG emissions, you'll find very few references to GHGs in the following pages.

Obviously, a short paper like this one is not intended as an authoritative guide to sustainable business practices. Think of it, instead, as a starting point for future conversations with architects, engineers, interior designers, builders, and other experts who specialize in energy efficiency and sustainable buildings.

## Change Is Hard—Show Me the Money First

Before discussing how to achieve a more sustainable office, let's talk briefly about why you should even bother.

Indeed, why should you? Because reducing your carbon footprint is the right thing to do? Well, yes. And because, by adopting sustainable practices, your office-based organization can enjoy these benefits:

- Lower energy costs.
- Higher morale that comes from a pleasant working environment.
- Healthier, more productive employees who perform better and take fewer sick days, thanks to improved indoor environment quality (IEQ)—air cleanliness, humidity, temperature, noise, and lighting.
- Lower HR costs resulting from better employee retention.
- Improved image and goodwill, as well as a stronger brand and tremendous PR opportunities (you can talk about your sustainable policies, initiatives, and achievements on your website).
- An enhanced ability to attract top performers to your organization.
- Higher property value and, for landlords, the ability to lease *green office space* at premium rates.
- Potential future tax savings from having a reduced carbon footprint.

## The Time Is Right

If you plan to bring sustainable thinking into your office, you might have to be patient because organizations often find it difficult to transform an established workplace culture. However, given the current Canadian zeitgeist, now could be the perfect time to effect this kind of change.

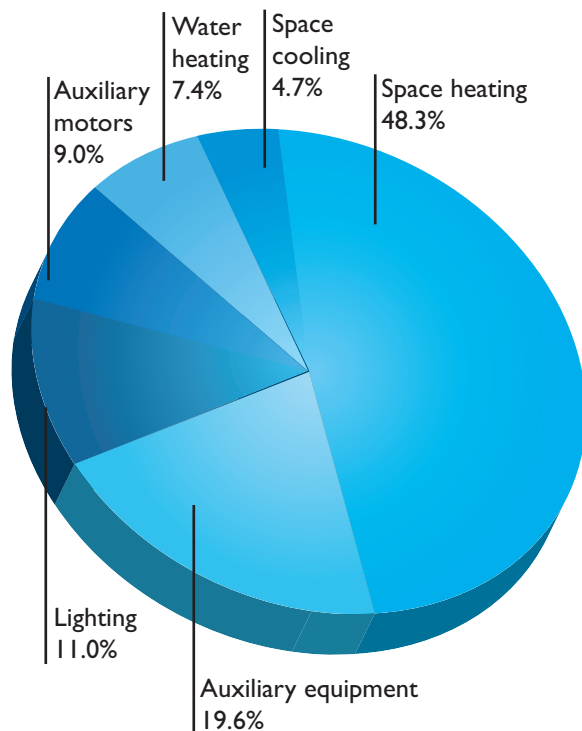
Consider the results of a 2009 Canadian Press-Harris/Decima survey in which 64% of Canadians said that environmental initiatives should remain a high priority for governments, regardless of economic conditions.<sup>3</sup> With that level of commitment, it's probably safe to assume that most people in your organization will look favourably on sustainable office initiatives.

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3. "Canadians Say Environment Still a Priority and Press for Action in Copenhagen", Harris/Decima, December 7, 2009. <http://www.harrisdecima.com/sites/default/files/releases/2009/12/07/hd-2009-12-07-en401.pdf>, accessed November 21, 2010.

## Daily Energy Consumption

As you know, Canada can get a little cold at times, so it should come as no surprise that space heating accounts for roughly half the *operational energy* consumed by Canadian offices (Figure 1). Operational energy includes electricity, natural gas, oil, propane, and any other energy source that you draw upon to run your office.



**Figure 1: Operational energy use in Canadian offices, 2008.**<sup>4</sup>

*Auxiliary equipment* like computers, monitors, printers, photocopiers, coffee makers, and refrigerators consume about 20% of operational energy in offices. It's interesting to note that, in 2005, computers made up about 55% of auxiliary equipment units, while printers, photocopiers and fax machines together accounted for another 20%.<sup>5</sup>

Although space heating and auxiliary equipment consume the lion's share of operational energy, *lighting* and *auxiliary motors* (e.g., ventilators, pumps, compressors) also consume a significant amount—about 10% each—while *water heating* and *space cooling* account for the smallest portions.

## Standby Power

Many people don't realize it, but *auxiliary equipment consumes electricity even when it's switched off* because power supplies and other circuits remain energized. For example, devices with remote control capabilities must contain "always on" circuitry that's receptive to incoming user commands.

This hidden electricity consumption is known as *standby power* (aka *phantom load*). In 2007, the International Energy Agency (IEA) estimated that standby power accounts for 5 to 10% of worldwide residential electricity use, plus an undetermined amount that's consumed in commercial and industrial buildings.<sup>6</sup>

### Energy Vampires

You know that little black box on the power cord of your laptop computer? The one that's always warm? That's an external power supply, also known as an *energy vampire* because it has twin prongs and will suck power 24/7 if you let it. The power supply is always warm because it continuously converts AC power to DC and dissipates waste energy as heat.

Unfortunately, people are often reluctant to unplug their laptops because they're afraid the batteries might run down. So, before you shut down your laptop at the end of each day, check the onscreen battery charge indicator. If the battery charge looks good, why not unplug the laptop for the night?

4. "Commercial/Institutional Sector—Energy Use Analysis", Table: Office Energy Use by End-Use, Office of Energy Efficiency, Natural Resources Canada, [http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/tablesanalysis2/com\\_00\\_1\\_e\\_2\\_4.cfm?attr=0](http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/tablesanalysis2/com_00_1_e_2_4.cfm?attr=0), accessed on November 7, 2010.

5. *2005 Commercial and Institutional Consumption of Energy Survey, Summary Report—June 2007*, (Ottawa: Office of Energy Efficiency, Natural Resources Canada, 2007), 25.

6. "Standby Power Use and the IEA '1-watt Plan'", International Energy Agency (IEA), April, 2007, [http://www.iea.org/papers/2007/standby\\_fact.pdf](http://www.iea.org/papers/2007/standby_fact.pdf), accessed on November 21, 2010.

## How to Minimize Daily Energy Consumption

To significantly reduce your daily energy consumption, you'll have to foster an energy-conscious office culture that rewards sustainable thinking. You can promote sustainable best practices through information sessions, workshops, online wikis, and perhaps even a few small signs around the office to serve as reminders.

Let's look at some ways that you can reduce energy consumption in your office without having to renovate.

### Space Heating

You can save on heating costs by reducing standard thermostat settings by 1 to 2° C during the winter months. If possible, program the environmental controls for even lower temperatures at night and on weekends. Provided you don't have plants in your office, you can set the temperature at 15° C (or even a little lower) during off-hours. Just be sure to allow sufficient time to recover the temperature before the start of each workday.

“It's important to get employee buy-in for your sustainable initiatives.”

To cut heating costs even further, adjust the ventilation system to eliminate over-ventilation, which wastes energy by heating excess air. If possible, set environmental controls to minimize ventilation when the office is unoccupied.

Another way to save on heating is to use adjustable window covers to let in direct sunlight during the day and retain heat inside the office at night. Make sure that windows remain closed when it's cold outside.

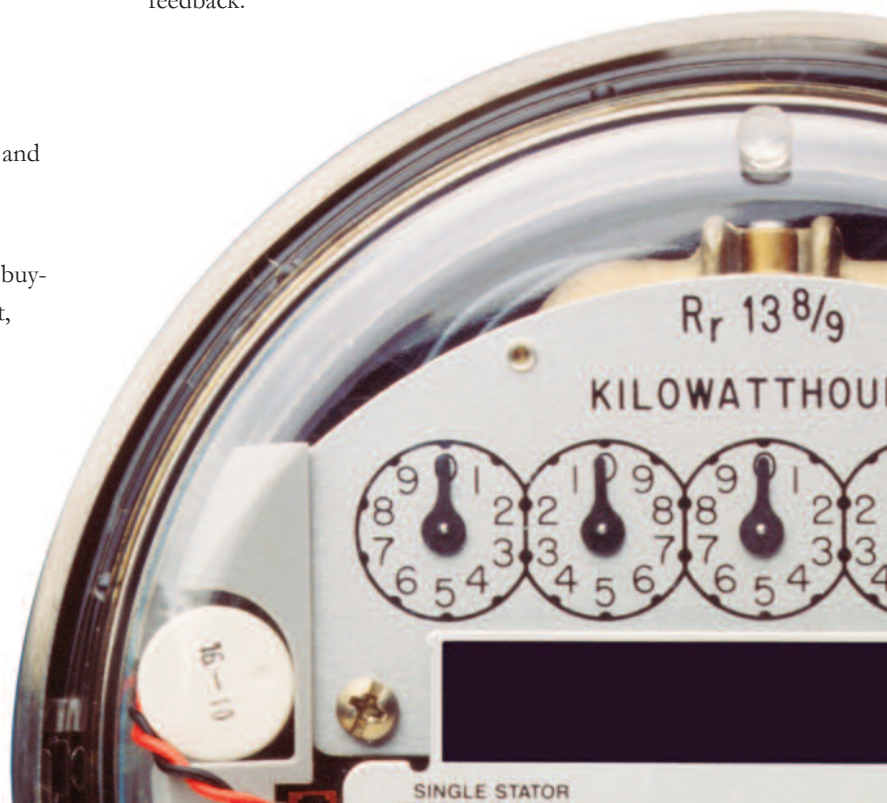
Finally, keep in mind that you'll have to get employee buy-in before making too many changes. To help with that, you might consider adjusting the office dress code so employees don't feel the need to set up (inefficient) portable space heaters under their desks.

## Auxiliary Equipment

Most offices have auxiliary equipment like computers, monitors, printers, photocopiers, fax machines, and projectors. In addition, your office probably has a kitchen of some sort, with a refrigerator, coffeemaker, kettle, and maybe even a toaster.

To use auxiliary equipment more efficiently, try implementing some of these best practices:

- Purchase energy-efficient products that come with a certification like Energy Star.
- Reduce the number of energy-intensive, in-house computer servers by outsourcing computing power to more energy-efficient providers.
- Get rid of screensavers and use power-saving options that either put LCD monitors into standby mode or shut them off. Unlike old-style CRT monitors, LCD monitors cannot be damaged by “burn-in”.
- Configure all electronic devices to enter energy-saving modes when left unused.
- Use multifunction printers (e.g., printer/scanner/photocopier).
- Print documents only when necessary. Whenever possible, review documents onscreen and use the commenting tools in your word processor to return feedback.



- Set printer defaults to duplex printing, black and white, and draft mode (which uses less ink). If the printers at your office are networked, the system administrator might be able to update all of them simultaneously.
- Reduce your ink consumption by standardizing lightweight fonts, using slightly smaller font sizes, and setting font fill colour to less than 100% black.
- Receive fax transmissions via e-mail instead of printing them out.
- Connect equipment to conveniently located power bars that can be switched off to minimize standby power consumption.
- Encourage employees to shut off devices when they're not in use, especially at the end of each workday.
- Use timers to shut off equipment that's not needed at night and on weekends. One company in California has actually linked their printers and copiers to the security system, which shuts down the equipment during off-hours.<sup>7</sup>

## Lighting

Most people probably know how to save energy on lighting: Let in as much daylight as possible by opening shades and blinds. Of course, direct sunlight can also heat up the office in the summer and cause

uncomfortable glare all year round, so you might have to experiment with your window coverings and office layout to strike a proper balance.

When it comes to artificial lighting, you should install

energy-efficient, long-lasting light bulbs—choose low-mercury bulbs for fluorescent lights—and ballasts that will allow you to reduce ambient light levels (and electricity consumption). Of course, you'll have to maintain adequate task lighting around desks and in meeting rooms.

If you have programmable lights, set them to turn off at night and on weekends. If you have manual switches, encourage employees to turn off the lights when they leave a room or when they leave the office at the end of each workday.

Finally, you might be able to use existing light sources more efficiently by rearranging your office layout.

## Space Cooling

In the summer, try increasing standard thermostat settings by 1 to 2° C. Although you might be able to raise the temperature even more during off-hours, take care not to damage auxiliary equipment, building systems, or any plants in the office. Higher temperatures can reduce the life of electronic devices and force their cooling systems to work harder, consuming more energy.

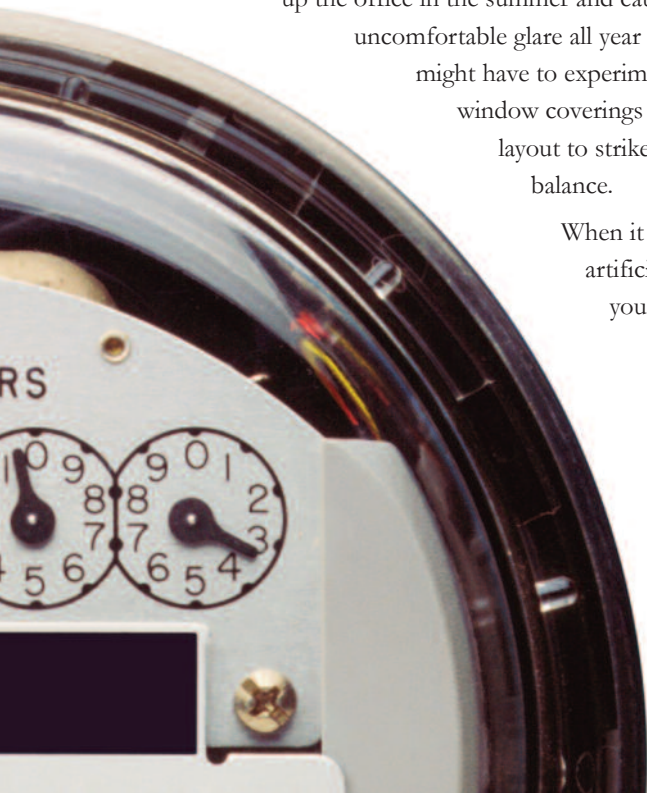
As with space heating, you can make your cooling system more energy-efficient by eliminating over-ventilation—bringing in and, in this case, *cooling* more air than necessary—and minimizing ventilation when the office is empty. You can also use window coverings to block direct sunlight.

## Water

Save on water heating costs and utility bills by installing inexpensive low-flow aerators on water faucets. Also, be sure to promptly repair any leaky plumbing fixtures, especially hot water faucets.

If you have a dishwasher in the kitchen, encourage employees to fill it up before they wash a load.

7. "Improving Your Bottom Line: How Energy Efficiency Can Reduce Carbon Emissions and Boost Profitability, A Guidebook for Small and Medium Businesses in the Silicon Valley", Sustainable Silicon Valley, 2008, , <http://www.sustainable.v.org/sites/default/files/dms/small-and-medium-enterprises-handbook.pdf>, accessed on December 14, 2010.



## Other Tips

Here are a few other suggestions for minimizing your daily energy costs:

- Whenever possible, use teleconferencing and videoconferencing technology instead of spending money to travel for face-to-face meetings. Gasoline, diesel and other fuels are expensive!
- Encourage employees to take the stairs instead of relying on the elevator.
- Investigate how much it would cost to purchase electricity from a green energy provider. If the rates are competitive, why not switch?

## Two Important Concepts

Before we discuss some best practices for renovating your office space, let's quickly introduce two important concepts: *embodied energy* and *lifecycle energy*.

### Embodied Energy

If you plan to either renovate your office or construct a new building, you should familiarize yourself with the concept of *embodied energy*. Embodied energy is the total energy that goes into producing, delivering, and installing materials or equipment. Your current office contains a tremendous amount of embodied energy that would be lost if you decided to demolish it and build a new one.

Compare the cost of new materials (which are expensive because you have to pay for the initial embodied energy) with the cost of reusing materials that you have on hand—materials you've already invested in. If you can reuse the existing materials, you'll save not only on new material costs but also on demolition and disposal. Even better, older materials like timber and bricks are often superior to new materials.

It's important to note that embodied energy, though significant, is still relatively small compared to a building's lifetime operational energy consumption. However, as buildings become more energy efficient, embodied energy will account for an increasingly larger percentage of total lifecycle energy costs.

### Lifecycle Energy

Regardless of whether you plan to renovate, build, or rebuild, you should consider the *lifecycle energy* of your office. Lifecycle energy is the sum total of the embodied energy, the operational energy, and the energy required to demolish and dispose of the current materials.

To minimize your costs, you need to minimize the total lifecycle energy consumed by your office. In other words, use less, use what you have wisely, and keep more money in your pocket.

### Green Building Certification Programs

Before jumping into renovations or planning a new office building, spend some time learning about certification programs like LEED Canada and BOMA BEST. Even if you choose not to seek either certification, you can certainly borrow good ideas from these programs as you design and build your new office space.

Keep in mind that a recent study of building construction costs found that, on average, *LEED-certified buildings cost only 0.8% more to construct than standard buildings*.<sup>8</sup> Considering that the cost of a new building is small compared to its lifetime operational energy costs, investing a little extra to construct an energy-efficient structure makes good business sense.

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8. Lockwood, Charles. "Building the Green Way", Reprint R0606J, Harvard Business Review, June, 2006, <http://www.rizzogroup.com/pdf/Harvard%20Business%20Review%20Article.pdf>, accessed on November 22, 2010.

## LEED Canada

Leadership in Energy and Environmental Design (LEED) is a green building certification program that's been developed by the Canada Green Building Council (CaGBC), based on a similar program in the United States. There are four levels of certification: certified, silver, gold, and platinum.

In addition, LEED Canada offers several distinct rating systems for commercial buildings:

- *Commercial Interiors*—helps tenants develop healthy, sustainable work environments even when they don't have control of overall building operations.
- *Existing Buildings*—contains good policy suggestions that help owners operate and maintain their buildings with the least environmental impact.
- *New Construction*—sets a green standard for building construction and major renovations of existing buildings.
- *Core and Shell*—provides certification for buildings where less than 50% is fitted out as per *LEED New Construction* at the time of certification.

## BOMA BEST

Developed by the Building Owners and Managers Association (BOMA) of Canada, the Building Environmental Standards (BEST) program also has four levels of green building certification.

## Renovating Office Space (Interiors)

If you intend to renovate your office, you can make a lot of cost-effective changes that will decrease your consumption of energy and materials.



Here are some upgrades to consider when you're renovating your interior office space.

### Space Heating

Install programmable thermostats that allow you to vary the temperature at different times of day and from zone to zone in your office.

Check weather-stripping around windows and doors. Replace if necessary.

### Lighting

Design office space so that it maximizes the effect of daylight and minimizes glare and external light pollution. Wherever possible, use internal reflectors to bring daylight as deep as possible into the office. Let in direct sunlight away from work areas—but not in the summer, when it will add to the cooling load. Control glare with blinds and, if necessary, with window glazing.

Install manual switches, occupancy sensors, timers, and light-level sensors that will dim or shut off the lights automatically. Also, establish lighting zones: Use task

lighting and minimize ambient lighting.

And, of course, install energy-efficient light fixtures and bulbs. Remember, bulbs emit heat as well as light, so your lighting choices will affect the amount of energy required to cool your office in the summer.

### Water

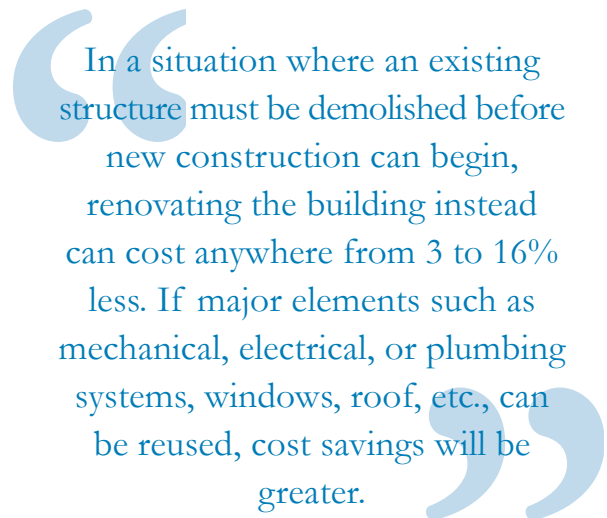
Reduce water usage by installing low-flow toilets and faucets with electronic sensors or timed valves. Savings here can be significant because toilets account for as much as 50% of total water consumption in offices.<sup>9</sup>

In addition to minimizing water consumption, you can minimize heat loss from the hot water system by adding pipe insulation to plumbing. If hot water temperature at the taps is maintained by a circulating pump, install a timer that shuts off the pump after hours.

### Other Tips

Here are some other ideas that you might want to consider:

- Design an open office layout with walls that you can easily reconfigure.
- Install smart metering that shows how your office uses energy. Establish benchmarks and then measure improvement—very important!
- Improve indoor air quality (IAQ) by using construction materials that do not emit toxic gases. Choose renewable materials like straw board, sunflower seed board, linoleum flooring, bamboo flooring, and wool carpets.
- To help ensure good air quality, maintain clean ductwork. If you lease office space, talk to the landlord about building maintenance and efficiency upgrades.



In a situation where an existing structure must be demolished before new construction can begin, renovating the building instead can cost anywhere from 3 to 16% less. If major elements such as mechanical, electrical, or plumbing systems, windows, roof, etc., can be reused, cost savings will be greater.

An Architect's Guide for Sustainable Design of Office Buildings<sup>10</sup>

### Renovating an Office Building

If your organization intends to construct a new office building, perhaps you should take a second look at renovating either your current structure or some other building in the local inventory of commercial real estate.

Here are some advantages of renovating an existing building:

- If you intend to construct a new building on the site of the old one, demolition costs could be 5 to 10% of total construction costs. You can save those costs by upgrading an existing structure.
- There's no need to pay for dumping massive amounts of building materials into a landfill. Remember, as landfill sites fill up, rates become more and more expensive.
- You won't have to purchase undeveloped land, which is typically more expensive.

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9. *An Architect's Guide for Sustainable Design of Office Buildings*, (Ottawa: Public Works and Government Services Canada, September, 1999), 73.

10. *Ibid.*, 13.



- Construction takes less time. Year-round construction is easier because work can be done inside during the winter. (Also, when a new building is constructed during the winter, the construction site is heated with propane heaters—inefficient and expensive.)
- Less construction time means lower interest costs—and you can start charging rent sooner.
- If you renovate in stages, you can earn rental income even sooner and use it to fund construction.
- Older buildings have unique character and features (e.g., high ceilings, large windows) that can improve the marketability and increase the rental/resale value.



If you decide to renovate an existing building, consider commissioning a building audit before you begin to upgrade the building envelope and major mechanical systems.

A building auditor will analyse and benchmark performance parameters like energy consumption, water consumption, and indoor environment quality. The auditor can also catalogue any hazardous materials present in the building. With all of this information, you can identify problem areas to address in the renovation and measure the effectiveness of your upgrades after work has been completed.

Please note that in the previous section, *Renovating Office Space (Interiors)*, we discussed many positive

changes you can make in your office space. Although that information is equally relevant when renovating an entire office building, we will not repeat it here. Instead, let's focus on desirable upgrades to the building envelope and mechanical systems.

### Space Heating

If you plan to renovate the building envelope and major mechanical systems, then you have an opportunity to completely revamp your heating system.

Here are some of the upgrades you can implement to make your building more comfortable and efficient:

- Install heat recovery ventilators that use outgoing stale air to warm incoming fresh air.
- Reskin the building to reduce both radiant heat loss and heat loss through air leaks. You can also optimize insulation in the walls and roof at the same time. Note that *green roofs* provide more insulation than conventional roofs.
- Install new windows with optimized specifications (e.g., thermal resistance and solar transmittance).
- Install high-efficiency heating equipment.
- Optimize all mechanical systems.

### Lighting

If possible, add windows to increase the amount of natural light in your offices.

Do your best to minimize outdoor lighting and eliminate vanity lighting. Wherever possible, use motion sensors for outdoor lighting.

### Auxiliary Motors

Try to incorporate natural ventilation into the design of building upgrades (e.g., operable windows, skylights).

Take care to optimize mechanical systems so they operate at peak efficiency. Choose premium efficiency motors, as well as systems that allow motor speed to be decreased when full output is not required.

## Water

Here are some ways to use water more efficiently:

- If possible, reposition water heaters so they're as close as possible to fixtures. This will minimize heat loss.
- Upgrade plumbing to current water efficiency standards.
- Consider installing a solar water heating system.

## Space Cooling

Here are some ideas for making your cooling system more efficient:

- Employ natural ventilation—perhaps operable windows and skylights.
- Install individual controls for different cooling zones.
- Install high-efficiency cooling equipment.
- Optimize all mechanical systems so they operate at peak efficiency.
- Add a green roof to minimize the heat-island effect and reduce the energy required to cool the building during the summer.
- Cover south- and west-facing walls with green screens (lattices covered in vegetation) or shade them with deciduous trees.

## Other Tips

Here are some other tips to consider when renovating your office building:

- Ensure that fire suppression equipment does not contain halons (which destroy the ozone layer).
- Invest in renewable energy systems that can heat and/or power the building, perhaps putting electricity back into the grid.
- To reduce the lifecycle cost of the building, perform preventive maintenance on the building envelope and mechanical systems. By doing this, you'll slow down deterioration of the building and save energy by operating optimal mechanical systems.

## Designing a New Office Building

In the two previous sections, we discussed many of the features that you can incorporate into the design of a new building. Instead of repeating that information here, we'll limit our discussion to best practices that we haven't mentioned elsewhere in the paper.

## Landscaping

Here are some landscaping ideas that will help you reduce energy consumption:

- Shade walls and paved areas near the building. Plan shaded areas to minimize the amount of solar radiation that hits the building.
- Minimize temperature build-up near the building by replacing nearby pavement with vegetation.
- Plant deciduous trees to act as windbreaks and to provide shade for buildings of three stories or less.
- Install fountains and ponds near the building to reduce air temperature in the summer.
- Use rainwater instead of costly potable water to maintain vegetation.
- Choose drought-resistant vegetation. Design landscaping to minimize requirements for potable water, lawn mowing, and fertilizer.

## Building Orientation

By choosing a proper building orientation and window configuration, you can:

- Significantly increase the amount of daylight that enters your offices.
- Control the angle at which sunlight enters. In winter, direct sunlight can be employed to heat some areas of the building.
- Maximize natural ventilation from wind.
- Replace artificial lighting (a significant source of heat) with natural lighting and reduce cooling requirements in summer.

## Learn More

This white paper has briefly introduced some ideas that can help make your office-based organization more efficient and more environmentally sustainable. Of course, sustainability is a broad topic and we've barely scratched the surface.

If you want to learn more, you can start by checking out some of these online resources:

**Advanced Lighting Guidelines**—a not-for-profit organization that provides information on energy-efficient lighting  
<http://www.algonline.org/>

**American Council for an Energy-Efficient Economy**  
<http://www.aceee.org/>

**Architecture 2030**—a not-for-profit organization that promotes sustainable buildings  
<http://architecture2030.org/>

**Architecture Canada**/Royal Architectural Institute of Canada  
<http://www.raic.org/>

**BOMA BEST** Environmental Certification Program for Commercial Buildings  
<http://www.bomabest.com/>

**Canada Green Building Council**  
<http://www.cagbc.org/>

**Canadian Architect Magazine**  
<http://www.canadianarchitect.com/>

**Canadian Business for Social Responsibility**—a not-for-profit, member-led organization that encourages Canadian companies to contribute to a better world  
<http://www.cbsr.ca/resources/cbsr-publications>

**Carbon Neutral Steel Building Systems Research Project**  
<http://cn-sbs.cssbi.ca/home>

**Commercial Buildings Energy Consumption Survey**, U.S. Energy Information Administration  
<http://www.eia.doe.gov/emeu/cbecs/>

**Commercial Office Buildings Best Practice Guide**, Flex Your Power  
<http://www.fypower.org/bpg/index.html?b=offices>

**Global Footprint Network**—a not-for-profit organization that's "advancing the science of sustainability"  
<http://www.footprintnetwork.org/>

**Green Building**, U.S. Environmental Protection Agency  
<http://www.epa.gov/greenbuilding/>

**Heat Island Effect**, U.S. Environmental Protection Agency  
<http://www.epa.gov/heatisld/about/index.htm#3>

**Office of Energy Efficiency**, Natural Resources Canada  
<http://www.oec.nrcan.gc.ca/english/index.cfm>

**Office of Greening Government Operations**, Public Works and Government Services Canada  
<http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/index-eng.html>

**New Buildings Institute**—a not-for-profit organization that's trying to make commercial buildings more energy efficient  
<http://www.newbuildings.org/>

**Report of the World Commission on Environment and Development: Our Common Future**  
<http://www.un-documents.net/wced-ocf.htm>

**Standby Power**, Lawrence Berkeley National Laboratory  
<http://standby.lbl.gov/>

**Sustainable Business: Corporate Environmental Innovation**, Environment Canada  
<http://www.ec.gc.ca/cei-ice/default.asp?lang=En&n=DC145895-1>

**Sustainable Silicon Valley**—a not-for-profit organization that's helping Silicon Valley become more sustainable  
<http://www.sustainablesv.org/>

**Sustainable Waterloo**—a not-for-profit organization that helps corporations in the Waterloo Region of Ontario become more sustainable  
<http://www.sustainablewaterloo.org/>

**World Architecture**—a free online database and forum  
<http://www.worldarchitecture.org/main/>

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