

Simple Steps to Reducing Energy Use

Following are nearly 100 tips on improving the energy efficiency of your religious facility using low-cost or no-cost approaches. Most of them are based on the three R's: reducing operating time, reducing temperature, and reducing operating losses.

Included is a special section on water conservation, since unnecessary water use literally means pouring money down the drain.

Reduce Operating Time

Usually, the easiest way to reduce the operating time of any device is to turn it off when it isn't required.

Lights

Lower cost measures

- Always turn off lights in storerooms and utility rooms when you leave the room. Put up signs advising others to do the same.
- Put up signs to encourage people to turn off the lights in unoccupied washrooms and meeting rooms.
- Encourage people to use task lighting instead of area lighting (e.g., use a desk lamp instead of lighting the whole room).

Higher cost measures

- Install occupancy sensors that turn the lights off when the room is unoccupied.



Occupancy sensor. This model senses heat and motion to sense an occupant and avoid turning off lights at the wrong time.

However, note that the less expensive sensors, especially the ones that replace light switches, may not be able to “see” the occupant all the time and could turn off the lights at the wrong time. Some occupancy sensors use heat and motion to sense an occupant, but these are more expensive and must be installed by an electrician.

- Turn off exterior lights during the day. Control them with: a timer, a photocell switch, a motion sensor, or a combination of these devices.
- Where the lights in a room are controlled by a breaker panel, consider installing a local light switch or occupancy sensor. A less expensive alternative is to label and colour-code all circuit breakers so everyone knows which breakers control which lights and can turn on only the lights that are needed.

Natural Gas Pilots in Summer

Lower cost measures

- If the furnace or boiler has a standing gas pilot, turn it off in the spring when the heating season ends. Natural gas pilots use as much as \$5 to \$10 worth of gas a month.
- If there is a water heater that is not used during the summer, turn it off and drain the tank.

These measures save money if there is someone in the congregation who is willing to turn the pilot lights off and re-light them again. If you have to call in a tradesperson to relight the pilots, then it may not be worthwhile depending on how many furnaces or boilers you have.

Ventilation Systems

Lower cost measures

- Ensure that washroom, gym and kitchen/coffee room exhaust fans are turned off by the last person leaving the room. Turn off general exhaust and supply fans in the late evenings or during the day when not required.

- In the winter de-stratification or ceiling fans should run all the time at a speed appropriate to the space and in summer they should be operated to provide cooling only when the room is being occupied.

Higher cost measures

- Exhaust fans in high humidity areas, such as showers and washing areas, can be controlled with a humidistat so they only come on to reduce the humidity to a preset value, and then turn off.
- To ensure fans are turned off when not required, connect them:
 - to occupancy sensors or time clocks
 - to manual spring-wound or automatic timers
 - to illuminated local manual switches
 - in tandem with light switches.

Heating Systems in Summer

Lower cost measures

- Turn off boilers and furnaces in the spring and leave them off until fall when the heating season starts. Always follow manufacturers shut down, lay up and start-up instructions.
- Turn off circulating pumps when not required.
- Turn off electric baseboards at the breaker when not required.
- Turn off unit ventilators and vestibule heaters when not required.

Car Plugs/Block Heaters

Lower cost measures

- Use a block heater on cold days in the winter instead of leaving your car running to warm it up.
- Turn off the car plug breaker(s) in the evening when staff are leaving. Do not turn them back on until three to four hours before staff go home the next day. Note that an engine block reaches maximum heat in one to two hours with a block heater.

Higher cost measures

- Cycle car plugs on and off during normal operating hours.
- Install an automatic timer with a thermostatic control.
- Install a flip-flop timer that powers one or a group of receptacles for say 15 minutes on then 15 minutes off. CAUTION: This reduces block heater capacity by 50 percent under all weather conditions and can cause starting problems.
- Install a regular timer and have the car plugs come on for only three to four hours a day.

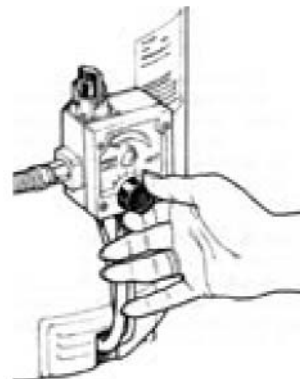
Reduce Operating Temperature Domestic Hot Water Systems

Lower cost measures

- Reduce temperature of hot water. For normal hot water usage, hot water should be 54°C (130°F).
- Select the dishwasher's no-heat or air-drying cycle.

Higher cost measures

- For manual dishwashing and automatic dishwashers, for safety reasons, final rinse water temperature may need to be as high as 82°C (180°F). It would be preferable to ensure the dishwasher is equipped with a



Adjusting the temperature of water heated by a natural-gas-fired hot water tank. [Note some hot water heaters now come with regulated thermostatic mixing valves to prevent scalding, often called anti scalding valves. These may be difficult to adjust.]

booster heater. One option is to reduce the temperature to 130°F or 54°C and increase the temperature to 180°F or 82°C a few hours before it is needed then reduce it to 130°F or 54°C when the event is over.

- If higher temperatures are required on a regular basis, consider a separate point-of use hot water tank or a natural gas tankless water heater (a heat-on-demand unit).

Adjusting the Hot Water Temperature

- Electric Water Heaters: The thermostat is usually located behind a cover plate; and can be accessed by removing a few screws.
- Many electric water heaters have two thermostats — one for the upper heating element and one for the lower. Make sure to adjust both of them.
- When lowering the setting on an electric water heater, be sure to shut off the power at the circuit breaker/fuse box to avoid the danger of electric shock.
- Gas Water Heaters: If the thermostat dial is visible, simply adjust it to the desired temperature.
- The lowest temperature is the safest setting.

Experiment with the setting to find a temperature that provides adequate hot water, while still minimizing wasted energy.

Refrigerators and Freezers

Lower cost measures

- The ideal temperature for refrigerators is 3°C (37°F). If the temperature is lower, turn it up.
- The ideal temperature for freezers is -18°C (0°F). If the temperature is lower, turn it up.
- Keep freezers full. It is easier to keep a full freezer at the correct temperature than a partially empty one. Ice cream pails full of water can be kept in a freezer that is usually less than half full.
- Ensure coils of refrigerators and freezers are kept clean.

- Ensure air can easily flow around the coils of refrigerators and freezers.
- Don't keep doors open longer than necessary.

Heating Systems

Lower cost measures

- Manually turn the thermostat down or install an automatic setback thermostat. Setback the temperature to 16°C (60°F) or lower, if possible, in all areas during unoccupied hours. The amount of set back depends on the outside temperature and how long it takes to bring the area back to normal temperature. The heating system may not be able to reheat the building in a reasonable amount of time if the building temperature is set too low. If it takes too long to reheat the building, then use 16°C (60°F) and start heating a little earlier. Set back thermostats can save at least 1 percent of the heating bill for every 1°C (2°F) the temperature is lowered for a period of 8 hours. Lowering the temperature from 21°C to 16°C (70°F to 60°F) over-night can save 5 percent of the annual heating bill.



Programmable thermostat for automatically setting back temperature.

- In heating systems with circulating pumps, install a timer or thermostat to shut off the circulating pumps when not required. Sometimes there are two circulating pumps that are both running at the same time. If a pump is not used regularly it can seize up. The easiest way to ensure that both pumps will work is to run both all the time. This is not the most energy efficient

solution as both pumps may run only partially loaded and therefore inefficiently. Either switch the pumps manually on a daily basis or install a timer and a relay to operate one pump for a day and then switch to the other pump for a day. This will insure that both pumps will be available but only one pump is being used. Both pumps may be needed on very cold days. Confirm operation with a heating expert first.

- Ensure furnace and fan filters are kept clean.
- In a hot water heating system, adjust the water temperature in accord with the outside seasonal temperature either manually every 2-4 weeks or with an outside temperature re-set boiler control thermostat.
- Ensure cooling coils and any heating coils are also kept clean. A dirty or clogged coil will reduce airflow and heat transfer resulting in a decrease of the effectiveness of the heating system.

Ventilation Systems

The following measures, which apply to central air handling systems and air conditioners, may require professional help to ensure adequate ventilation:

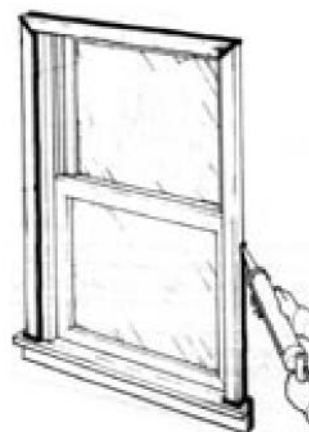
- Increase mixed air temperatures to reduce volume of outside air. Mixed air temperatures are normally set at 55°F or 13°C but in some case can be set as high as 16°C to 18°C (60°F to 65°F) without causing problems.
- Reset discharge temperatures if there are preheat or reheat coils. This may be useful if some areas overheat. Reduce the discharge temperature to the lowest possible to keep all heated areas comfortable in winter. A similar method may be used for the cooling season.
- Adjust the amount of outside air to occupancy, either manually, by timer, or with a carbon dioxide sensor.

Reduce Operating Losses

Windows, Doors and Building Envelope

Making energy efficient changes to the doors, windows and walls of a building can be expensive, particularly if you have to hire someone to do the work.

To be certain that the energy saving measures will be cost effective, a detailed energy audit should be conducted. A detailed audit will give you a better idea of the actual energy savings possible, and you will have a better idea whether the costs justify the expense.



Running a continuous bead of clear or paintable caulking along the gap between window trim and wall, and trim mitre joints.

Drafts

Lower cost measures

- Locate air leaks using an incense stick along the inside walls, doors and windows on a windy day.
- Caulk and seal around doors and windows...
 - If you can see daylight,
 - If you can feel a draft,
 - If weather stripping is worn or missing.
- Prevent drafts from electrical outlets in exterior walls by installing foam seals and plastic plugs.

Higher cost measures

- Add a second pane of glass or plastic to the inside of all single pane windows, particularly stained glass windows. Ensure the glazing is well sealed. To protect

stained glass windows from vandalism, add a sheet of lexan (clear acrylic sheet similar to plexiglas) to the outside. Ensure that the window is well sealed on the inside, to prevent condensation from forming as warm moist air leaks from the interior.

- Block, insulate and seal windows that are not required for light or ventilation.

Insulation

Lower cost measures

- Insulate accessible attics.
- Insulate uninsulated/unfinished walls.
- Insulate basements and crawlspaces.
- Insulate hot water pipes.
- Insulate hot water tanks.
- Insulate steam and hot water heating pipes.
- Insulate condensate return tanks in steam heating systems.
- Ensure dampers close tightly when fan is off (repair as required) or insulate and enclose the dampers of infrequently used exhaust fans.



Adding insulation to an accessible attic. The second layer of fibre glass batts are positioned at right angles to the first layer. Make sure there is a vapour barrier installed, with at least two thirds of the insulation on the cold side.

Higher cost measures

- Insulate finished walls.
- Replace windows with high performance triple glazed units.
- Replace doors with insulated metal doors.

Lights

Lower cost measures

- Remove some bulbs, or use lower wattage bulbs if a lower light level is acceptable.
- Open blinds or curtains during the day and leave the lights off.
- Locate desks requiring the most light nearest to the windows.
- Use messages next to switches to make people aware of the need to conserve energy.
- Make it easy for employees to turn off lights.
- Install lighting controls: occupancy, motion sensors and timers.

Higher cost measures


- Install switches for smaller areas. Often one main switch controls dozens of unnecessary lights.
- Install more energy efficient lamps and ballasts if lamps are on for 35 hours or more. Consider modifying fixtures with reflectors and lowering the height.
- Replace regular T-12 fluorescent lamps with T-8 fluorescent lamps and electronic ballasts.
- Replace incandescent lamps with compact fluorescents.



Exit sign illuminated by an LED lamp. LEDs reduce energy consumption by roughly 90 percent over incandescent bulbs and have a life of about 10 years, for reduced maintenance.

- For sanctuary lighting, consider replacing large (500-1000 watt) incandescent bulbs with ceramic metal halide units.
- Replace incandescent exit signs with new LED exit signs or just replace the bulbs if you can.
- If you are making improvements to outdoor lighting, consider shields to reduce glare, and focus the light in the desired direction. Focussing light downward not only means substantial savings, it also limits wasteful light pollution into the night sky.

Appliances/Equipment

 The EnerGuide label provides up-to-date, objective information on the energy used by major appliances and heating and cooling equipment. It shows how much energy is consumed in a year of normal service and makes it easy to compare the energy efficiency of each model to others of the same size and class. Because these products last a long time, making a decision based on energy makes a lot of sense, for both your chequebook and for the environment. Replace older equipment models with newer ones — they use much less energy and cost far less to operate.

 For some products, the internationally recognized ENERGY STAR symbol goes one step further and identifies specific models that meet or exceed premium levels of energy efficiency while providing the same or better performance than conventional models and indicates that the product is among the most energy efficient available.

For more information on Canada's EnerGuide logo and ENERGY STAR's qualified products, and how it can help you to buy the most energy-efficient appliances and heating and cooling equipment, call the toll-free publications line of Natural Resources Canada's Office of Energy Efficiency at 1-800-387-2000, or visit the Web site at energystar.gc.ca.

Other related web sites:

oeo.nrcan.gc.ca/energuide/home.cfm/oeo.
nrcan.gc.ca/energystar/english/consumers/index.cfm
oeo.nrcan.gc.ca/publications/infosource/home/index.cfm?act=category&category=13&Text=N&PrintView=N

General Water Conservation Priorities

Leaks

- Fix leaks. Schedule regular leak detection of all toilets and other water using devices. Scheduled maintenance of fixtures is usually the most cost effective method of reducing water bills, as well as saving water heating costs. As an added benefit, scheduled maintenance checks may reveal other problems, reducing the chance of disruptions or emergency maintenance incidents.
- A slow leak can waste about 50,000 litres of water per year. If hot water is leaking, repairing the leak will also reduce energy costs. Leaking faucets can result in stained wash basins, resulting in additional costs for cleaning.
- A toilet that continues to run after flushing can waste up to 200,000 litres of water in a single year. At \$2.00 for 1000 litres, the yearly water cost of a single toilet leak could exceed \$400.

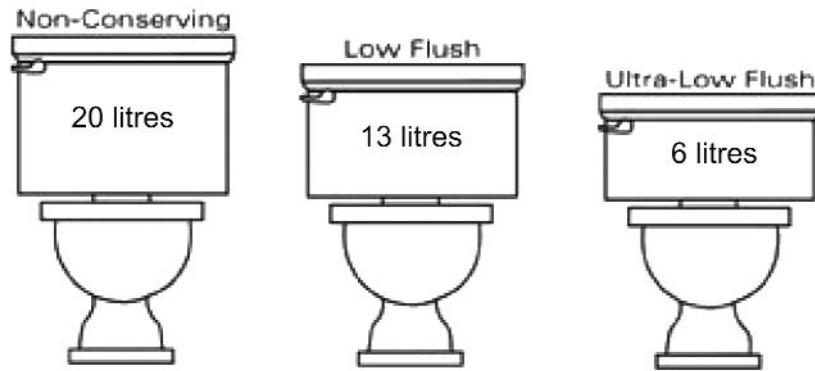
Fixtures

- As old fixtures need replacement, install fixtures that are cost effective and both water and energy efficient
- Retrofit existing fixtures
 - Install flow control devices on faucets
 - Install early closure devices for flappers on toilets.
 - Replace existing fixtures/appliances

Toilets and Urinals

- Reduce water use of toilets by installing toilet retrofit devices. Facilities may wish to experiment with various devices, such as early closure devices for flappers or toilet

made prior to 1985, it uses more than 13 litres per flush; significantly older toilets can use 20 or more litres per flush. Modern low flow toilets use 6 to 13.5 litres per flush.



Consider replacing toilets in high traffic areas with ultra low-flush toilets to conserve water.

dams, to determine which will result in the most reasonable investment. Take care not to obstruct the float assembly. Consider: water saved, ease of installation, incidence of multiple flushing, cost, and water saved per flush. Various retrofit devices may work better in certain brands of toilets than in others. Payback often occurs within one year.

- Target toilets in high traffic areas for replacement with Ultra Low Flush toilets (six litres per flush). Or you may want to install a dual flush toilet that permits the user to select between a “half” flush for liquid waste and a “full” flush for solid waste. Studies have shown that dual flush toilets can save approximately 25 percent more water than a 6L toilet.
- Fix toilet leaks. To check for a toilet leak, put a non-toxic and non-staining dye (e.g., food colouring) in the toilet tank. Wait fifteen minutes. If the dye seeps into the toilet bowl (no flushing), you have a toilet leak. The most common cause is a flapper that needs to be replaced.
- Determine flow rate of toilets in litres per flush: This is sometimes noted between the seat attachments and the tank; or note make, model and year made. If toilet was

Faucets

- Bathroom faucets are normally set to 8 litres per minute. Flow control devices can reduce this to less than 3.5 litres per minute. Flow control devices should be installed on faucets with excessively high flows to reduce splashing, water waste and hot water energy costs. However, taps in the janitor’s rooms or in the kitchen used for filling pots or for pre-rinsing dishes should be left at full flow. Note: Low flow aerators may not fit on all faucets.



Installing a water-saving aerator on a faucet. The device saves water that would otherwise be wasted when faucets are left running while rinsing vegetables or washing hands.

- When replacing faucets, consider newer technologies. Options that should be considered, depending upon the type of use and amount of use of the faucet areas are as follows: faucets that deliver a pre-measured quantity of water when you turn or push the handle; self-closing faucets that close as soon as the user releases the knob; and automatic sensor-controlled faucets. Some faucets are manufactured to limit maximum flow rate without using an aerator. When considering payback for reducing water flow at faucets and showers, remember that water-heating costs may add substantially to predicted savings.
- morning. This is healthiest for the plant and will reduce evaporation caused by heat and wind.
- Consider the use of a drip irrigation system rather than sprinklers.
- Be sure hoses have shut-off nozzles.

Landscaping Best Management Practices

- Reduce or eliminate lawns that are not used by converting them to naturalized gardens that, once established, require minimal water and maintenance.
- Research which plants, such as junipers, native flowers or indigenous ground cover plants, require minimal water and maintenance.
- Use a three to four inch layer of mulch to cover bare soil around ground covers, trees, shrubs, etc; this will reduce weeds and evaporation. Common mulch materials are wood chips, straw, recycled plastic, peat moss, dried grass clippings and bark.
- Use rain barrels with childproof lids to catch water for landscaping needs. (See Water Conservation section on Rain Barrels for more information).
- Mow regularly, but leave grass 2 to 3 inches high, and allow clippings to remain on lawn as a natural fertilizer and mulch.
- Do not over-fertilize or over-prune.
- Monitor for and fix leaks and broken sprinkler heads.
- Ensure your irrigation system is efficient. Rates of water flow should be appropriate for each area.
- Control the application of water with moisture sensors or timers.
- The best time to irrigate is in the early