

SEDAC ENERGY SMART TIPS



Places of Worship



Environmental Stewards

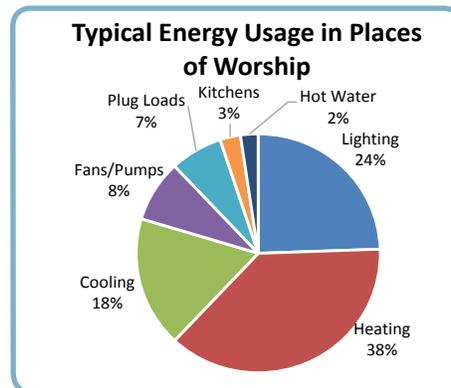
Congregations who are determined to be good stewards of the earth can set a constructive example by adopting smart energy practices. SEDAC can assist in these efforts by identifying energy efficiency strategies best suited to your place of worship, whether your facility is small or large, old or new.

Where to Make Changes

SEDAC has analyzed many places of worship throughout Illinois and developed an energy use profile typical for this kind of facility (see pie chart). The average congregation spends most of its energy dollars on heating, lighting, and cooling. Even small improvements in the top three areas of energy usage will yield considerable impacts on energy consumption and performance.

An important variable with worship buildings is the number of hours of use. Your facility may only be fully used for six

hours on a weekend, and only partially utilized during the week. Or, it may have limited use in all areas of the space all throughout the week.



Keep in mind that each energy-saving measure produces different economics, depending on how your facility is used. Compare building hours with equipment operation hours to eliminate off-hour costs. A review of energy-efficient measures can help your congregation

prioritize where to start with energy management and stewardship goals.

Get Your Members Involved!

Responsibility for improving energy efficiency within your house of worship can be shared throughout the congregation. Post graphs of your utility bills; associate energy costs with a budget percentage. Start an Energy Efficiency Steering Committee. Celebrate successes in decreasing energy costs and improving efficiency.

Offer seminars to educate members (and the community) on energy efficiency and environmental consciousness. Get more help at sedac.org or see *Energy Smart Resources for Congregations* on the back page of this document. Some possible topics include:

- Energy Efficiency
- Climate Change
- Smart Meters
- Water Usage
- Renewables
- Local Economies

The Smart Energy Design Assistance Center performs energy assessments on various building types. Each building type has different energy requirements. SEDAC's Energy Smart Tips help building operators identify energy cost reduction measures.

SMART LIGHTING SOLUTIONS FOR CONGREGATIONS

A lighting retrofit can be a great place to start; retrofits are simple, quick, and can be launched with low up-front costs. Lighting typically accounts for 24% of congregational energy use, which can be reduced by taking advantage of newer technologies.

- Replace outdated and soon-to-be unavailable, linear fluorescent T12 lighting with high-efficiency T8 or T5 fixtures. A typical retrofit replaces T12 lamps and magnetic ballasts with 28 W T8s and electronic ballasts.
- Replace high intensity discharge (HID) lamps with high-bay linear fluorescent fixtures. HIDs have long start-up times and lose a percentage of light output after only 3 years. A linear fluorescent retrofit can eliminate those issues and reduce energy consumption by 50%, yielding a payback period of 5-10 years.
- Swap energy-guzzling incandescent bulbs with 50% more energy-efficient compact fluorescents (CFL) and, where possible, LED bulbs.
- LED bulbs offer good potential for use with dimming fixtures [new dimmers sometimes required]. Compared with incandescents, LEDs provide 10 times the lumens per watt, use less electricity, and last 10 times longer.
- Retrofit existing exit signs with LEDs. Each LED sign retrofit saves roughly \$30/year and lasts up to 10 years longer. Purchase a retrofit kit to replace your exit sign or simply upgrade bulbs within the existing fixture. Incentives available from your utility provider.
- For outdoor areas, use efficient lighting such as low-pressure sodium, pulse-start metal halide, LED, or induction lamps. Install photosensors, timers, or astronomical clocks that automatically activate lamps in diminishing daylight then turn off lighting from 1 to 5 AM.
- Install occupancy sensors in spaces with frequent periods of extended vacancy such as restrooms, kitchens, and classrooms. Most places of worship have numerous areas that can benefit from occupancy-based lighting.
- Where possible, take advantage of the best and least expensive type of light: Daylight! Consider turning off lights and using task lighting. In sunny areas, install daylight sensors so lights are not inadvertently left on.



RECOMMENDATIONS FOR CONGREGATIONS

1. Worship Sanctuaries and Organs

Add padding to chilly seating surfaces and you may experience fewer requests to “turn up the heat!” Use temperature setbacks. Considering setbacks for a space that contains an organ?

Temperatures can be reduced as low as 40°F without posing a concern; however, excessive seasonal variations in humidity can damage organ components. A humidity gauge (inside the organ) should generally stay above 30% (winter) and below 80% (summer).¹



2. A Way to Reduce Ventilation Demands

Ventilation is the process of bringing in outside air to provide occupants with fresh air to breathe, which means the ventilation process is only necessary when the building is occupied. Consider installing demand-controlled ventilation (DCV), which can either close ventilation at night, or sense CO₂ levels and adjust air intake and venting in accordance with fluctuating occupancy demands. DCV moderates the amount of ventilation air provided to your building to correspond with occupancy, thereby reducing energy costs.

Savings are greatest for high density buildings that experience intermittent occupancy such as worship centers. They stem from both reduced fan usage, and decreased need for indoor air conditioning. Several HVAC manufacturers offer DCV-ready rooftop units and variable air volume boxes that may benefit many congregations. DCV installation can result in energy savings of \$0.05 to \$1.00 per square foot annually.²

3. High Ceilings

High Ceilings can present unique challenges to HVAC systems. In a tall sanctuary, the heated air rises to the ceiling, without warming the occupants. One solution: high volume, low

speed fans that blow downward. If properly spaced and sized, the fans will properly mix the air.

In the summer, take advantage of stratification by not turning on ceiling fans and letting heat rise. Parishioners still too warm? Use floor fans to keep air moving.

When installing a cooling system, consider a low-velocity displacement system. This system brings cool air down low—where the people are—and allows hot air to rise. Attic exhaust fans also help remove hot air and improve ventilation.



4. Quick Fixes

Turn off all power-drawing equipment when not in use and print double sided to reduce energy use. Remember: screen savers waste energy. Roughly half the energy used for personal computers is expended during idle hours. Place monitors and computers into sleep mode when not in use and make use of power management settings on all equipment. Possible benefits from these changes include:

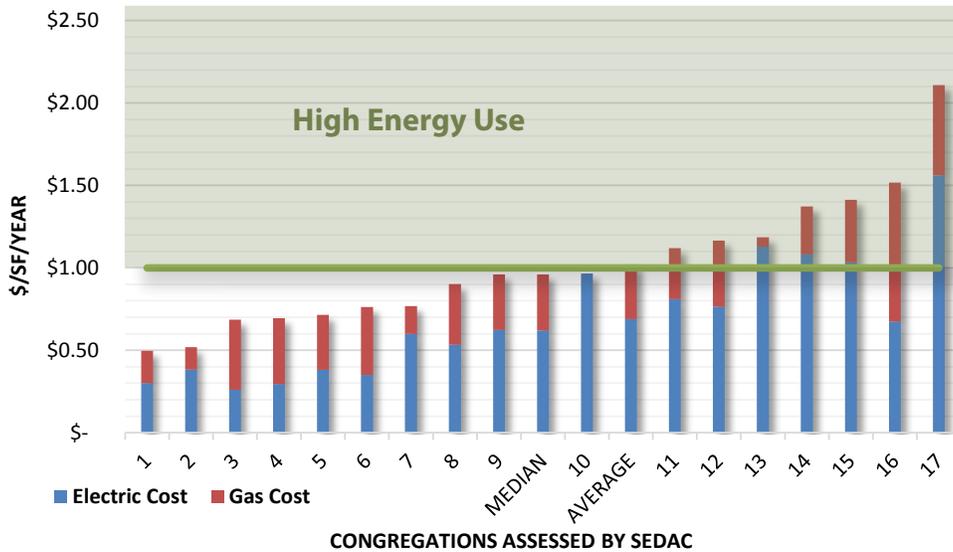
- Decreased plug loads
- Better data security
- Smaller carbon footprint³

1 www.greenfaith.org/files/organ-temperature-control

2 www.demandcontrolledventilation.lbl.gov/potential.html

3 www.energystar.gov/index.cfm?c=power_mgt.pr_power_mgt_users&s=mega

HOW DOES YOUR BUILDING COMPARE?



Consider your facility in relation to 17 congregations analyzed by SEDAC. Simply add up one year's energy costs, divide by the square footage, and compare.

If your building falls within the shaded region, your energy costs are higher than average and energy reduction measures could produce great results!

Even if your facility falls below the "High Energy" region, your congregation can find ways to further reduce energy usage.

Remember: Energy usage is highly related to hours of use.

INVEST TO SAVE

HEATING, VENTILATION & AIR CONDITIONING

Consider the following ways of "fine tuning" your HVAC system to operate at maximum efficiency:

- Install a programmable thermostat to adjust temperature set-backs.
- Regularly change or clean reusable HVAC filters.
- Check HVAC ducts regularly for size and adequate insulation; repair leaky ducts.
- New condensing high efficiency gas boilers or furnaces can save 10-30% on gas costs and reduce maintenance issues. Modern AC systems with larger heat exchangers have high efficiencies and may save 5-15% on cooling costs.
- Small, single-room, mini-split AC systems are good alternatives when only a few spaces need cooling.
- Geothermal can be very effective, but very expensive to install. It is most likely to be cost effective when switching from expensive electric or propane heat.
- During cooler months, ensure south facing windows allow for maximum heat gain. During warmer months, use measures such as solar films, shades, and landscaping to limit heat gain.
- Are you using electric resistance heating? Switching to natural gas or a heat pump can cut your costs in half.
- Balancing a steam system improves energy and comfort issues by ensuring steam moves into all building radiators.



AIR SEALING

Eliminate air leakage by installing weather stripping on windows and doors; seal other sources. Areas of concern include: basement rim joists, perimeters of recessed light fixtures, holes in mechanical room closets, around plumbing and HVAC frames, and at wiring penetrations through floor decking and wall plates. EPA estimates that air sealing can save up to 10% in energy costs.

WATER

- Install water-saving low-flow faucets, showerheads, nozzles, toilets and urinals.
- Insulate hot water pipes.
- Govern maximum hot water temperature (110-120 degrees) to reduce water heating costs.
- Consult www.epa.gov/watersense and www.nrdc.org/water for further guidelines.

KITCHEN & FOOD SERVICE

- Purchase ENERGY STAR® qualified appliances; for example, ENERGY STAR refrigerators can save 35% on older refrigerators.
- Have refrigerator coils cleaned and ensure that door gaskets are tightly sealed.

DEHUMIDIFICATION

Set basement dehumidifiers to a reasonable level of 50% relative humidity. If inadequate drying occurs, consider piping to a drain instead of manually emptying the reservoir.

RENEWABLE ENERGY

Although SEDAC generally encourages prioritization of measures based upon economic payback, some congregations emphasize a long-term outlook and place high priority on renewables. Solar PV panels on the roof are an easy addition and require nearly no maintenance.

A medium-sized 10kW installation generates roughly 12,000kWh/year in electricity. At costs ranging from \$2-8/W (\$20,000-\$80,000), this initiative may require 16-66 years for payback (without incentives).

Up to 60% of initial costs may be offset by incentives from the Illinois Clean Energy Community Foundation. Renewable energy certificates (RECs) also provide congregations with a means to offset their electricity use by purchasing up to 100% renewable energy from the open market; DCEO offers up to 40% rebates for solar and wind.

TOP 10 MEASURES FOR CONGREGATIONS

1. Replace T12 lamps & magnetic ballasts with 28W T8 lamps and electronic ballasts
2. Install occupancy/ vacancy sensors for lighting control
3. Upgrade incandescent lighting to fluorescent or LED
4. Upgrade exit signs to LED
5. Perform air-sealing
6. Install vending machine controls or remove their lights
7. Install programmable thermostats with temperature setbacks
8. Upgrade or tune up boiler
9. Upgrade to high-efficiency AC
10. Upgrade windows

WE CAN HELP!

If your facility is greater than 20,000 sq. ft. or a high energy user, consider applying to SEDAC for a free energy assessment.

For all facilities, call SEDAC at 1-800-214-7954 for on-the-spot advice.

Apply at smartenergy.illinois.edu



Energy Smart Resources for Congregations

Incentive Information

For up-to-date incentive information from your utility company, consult SEDAC <http://smartenergy.illinois.edu/energy-incentives.html>

ENERGY STAR® for Congregations

Detailed guide of suggested small and large-scale energy improvements for worship facilities www.energystar.gov/buildings/tools-and-resources/putting-energy-stewardship-energy-star-guide-congregations

ENERGY STAR® Purchasing Guide

Guide for purchasing decisions as you compare the energy efficiencies of equipment updates www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/save-energy/purchase-energy-saving-products

Federal & State Energy Incentives & Tax Credits

For information about state and federal rebates as well as tax credits for energy efficient upgrades, consult DSIRE www.dsireusa.org/index.cfm?EE=0&RE=1

Cool Congregations

Read testimonials from numerous congregations pursuing energy conservation and stewardship www.coolcongregations.org

Faith in Place

Illinois based organization that gives congregations tools and education resources to "become good stewards of the earth" www.faithinplace.org & www.energyfederation.org/ipl/default.php

SEDAC

WHO WE ARE

SEDAC is sponsored by the Department of Commerce and Economic Opportunity Illinois Energy Now (IEN) program in partnership with investor-owned utilities to achieve energy efficiency savings in buildings throughout the State of Illinois.

SEDAC is an applied research program at the University of Illinois at Urbana-Champaign.

SEDAC works in collaboration with the 360 Energy Group.

SEDAC PROGRAMS

- Energy Assessment
- Public Sector Retro-Commissioning
- New Construction Design Assistance
- Public Sector New Construction Incentive Review
- Public Housing Efficient Living
- Training and Outreach
- Energy Incentive Guidance



Air Force Chapel

MAY 2014

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Department of Commerce
& Economic Opportunity
Pat Quinn, Governor

