GREEN YOUR CONGREGATION

Green Power & Renewable Energy

After addressing energy-efficiency opportunities available in your facility, you may also want to consider renewable energy and green power. Renewable energy refers to electricity supplied from energy sources, such as wind, solar, geothermal, hydro, and biomass. These energy sources are considered renewable sources because they are continuously replenished.

Air Pollution

Employing energy-efficient technology such as ENERGY STAR qualified products can help reduce emissions (air pollution) from power plants that produce energy. Carbon dioxide emission is a primary cause of global climate change, sulfur dioxide is a key component of acid rain, and nitrogen oxide is responsible for smog.

New Building Design

The intent of energy-efficient design for new construction and/or remodeling is to utilize efficient equipment while optimizing the use of natural energy sources. The ultimate goal is to provide increased comfort with reductions in energy costs and greenhouse gas pollution.

Paper

You may not think of your congregational facility's paper use as an area to save energy, but it is. Paper manufacturers in the U.S. consume a significant amount of energy each year in the production of paper – not to mention the energy spent harvesting and shipping trees, and shipping paper products to your facility. There are some simple steps you can follow to optimize your use of this valuable resource that will save money, reduce waste, protect our nation's forests and reduce energy consumption!

Recycling

It does not matter what type of facility you have or run – there is some amount of material you use that can be recycled. From aluminum cans, and glass and plastic bottles, to paper and printer toner cartridges, recycling reduces the amount of waste materials that are put in landfills or incinerated while decreasing greenhouse gas emissions and deforestation. That's good for everybody! Ask your building management or waste handler about recycling opportunities.

Water

You may wonder what water use and saving energy have to do with each other? In most cases, electricity or gas is used to heat water, and this costs you money. In addition, your water company uses energy to purify and pump water to your facility as well as in the treatment of your sewage. So part of your water and sewage bill is really an energy bill. The more water your facility consumes, the more you will benefit from optimizing water use.

Mega-Churches

A movement that began in the 1950s and has grown more widespread over the years is the mega-church. Mega-churches are large churches that have 2,000 or more worshippers for a typical service. These churches have large structures and parking lots that are able to accommodate the huge numbers of worshipers they attract. Many mega-church facilities are more akin to a theater or arena, with high-tech lighting, sound and video systems. In addition to a sanctuary/worship space, mega-church facilities can contain other space types such as retail, restaurant or office.

Learn More

Additional resources are available to find out more information on energy technologies.

GREEN YOUR CONGREGATION: RENEWABLE ENERGY AND GREEN POWER

After addressing energy-efficiency opportunities available in your facility, you may also want to consider renewable energy and green power. Renewable energy refers to electricity supplied from energy sources, such as wind, solar, geothermal, hydro, and biomass. These energy sources are considered renewable sources because they are continuously replenished.

Electricity that is generated from renewable energy sources is often referred to as "green power." Green power products can include electricity generated exclusively from renewable resources or, more frequently, electricity produced from a combination of fossil and renewable resources.

If you are interested in installing renewable energy equipment in your facility, incentives may be available in your state to "buy down" the cost. To learn more about incentives visit the "Finding Funds" section of this guide.

Of course, not every facility can install renewable energy technology. Fortunately you can buy green power for your facility directly from many utilities at a slightly higher cost than regular electricity. If your utility does not offer green power options you can still participate by purchasing renewable energy certificates. Renewable energy certificates (or green tags) document the purchase of renewable energy.

Check out the following links for additional information on renewable energy and green power:

EPA's Clean Energy Web site

EPA's Green Power Partnership

(EXIT>)

DOE's Energy Efficiency and Renewable Energy (EERE) Office

Renewable Energy Policy Project (REPP)

National Renewable Energy Laboratory's (NREL) Learning About Renewable Energy

Interstate Renewable Energy Council's Small Wind Energy

DOE's EERE's The Green Power Network

DSIRE Database for State Incentives for Renewables and Efficiency

GREEN YOUR CONGREGATION: AIR POLLUTION

Pollution Prevented Through Energy Savings

Employing energy-efficient technology such as ENERGY STAR qualified products can help reduce emissions (air pollution) from power plants that produce energy. Carbon dioxide emission is a primary cause of global climate change, sulfur dioxide is a key component of acid rain, and nitrogen oxide is responsible for smog.

Making your facility more energy efficient means you will use less energy and save money, while helping the environment at the same time! Since utilities will not need to generate as much electricity, they won't burn as much fossil fuel, which means they are releasing less pollution into the atmosphere. To find out more about estimating how much money you can save by reducing your facility's energy use, please visit the "Calculate" section of this guide.

Did You Know?

For each kilowatt-hour (kWh) that you save through the application of energy-efficient technologies, you are reducing the emissions of carbon dioxide, sulfur dioxide, and nitrogen oxides.

Air Pollution links:

EPA's Air Pollution Web Page

(EXIT>)

AIRNow

DOE's Clean Air, Soil, & Water Web Page

Centers for Disease Control and Prevention's Air Pollution & Respiratory Health

Michigan Interfaith Power and Light (MiIPL) is an example of pollution prevention through energy savings. MiIPL is a coalition of congregations and their partners across the State of Michigan whose mission is to "involve communities of faith as stewards of God's creation by promoting and implementing energy efficiency, renewable energy and related sustainable practices". To see a breakdown of the total emissions reductions to date that MiIPL has achieved through energy saving measures visit www.miipl.org.

Source: MiIPL Web site

GREEN YOUR CONGREGATION: NEW BUILDING DESIGN

Design & Construction Projects

The intent of energy-efficient design for new construction and/or remodeling is to utilize efficient equipment while optimizing the use of natural energy sources. The ultimate goal is to provide increased comfort with reductions in energy costs and greenhouse gas pollution.

Energy-efficient design and construction does not need to cost any more than standard design – so get started and realize significant energy and cost savings for your facility. Let ENERGY STAR's Building Design Guidance help you manage the design and construction process right from the start!

Get energy code advice from DOE's Building Energy Codes Program. **(EXIT>)**

Energy-Efficiency Design and Construction Resources

(EXIT>)

Energy Design Resources

Whole Building Design Guide's Building Types

DOE's Design, Construct & Renovate

ENVIRON Design Collaborative's Solar & Energy Efficient Design

Sustainable and Green Building Guidance

Building Green

(EXIT>)

Building Green's Making the Case for Green Building

California Integrated Waste Management Board's

Green Building Design and Construction

Sustainable Buildings Industry Council

U.S. Green Building Council

California Interfaith Power and Light

The Regeneration Project

GREEN YOUR CONGREGATION: PAPER

You may not think of your congregational facility's paper use as an area to save energy, but it is. Paper manufacturers in the U.S. consume a significant amount of energy each year in the production of paper – not to mention the energy spent harvesting and shipping trees, and shipping paper products to your facilty. There are some simple steps you can follow to optimize your use of this valuable resource that will save money, reduce waste, protect our nation's forests and reduce energy consumption!

- Use double-sided printing and copying.
- Distribute documents electronically instead of in hard copy when feasible.
- Select paper products with a high-recycled content.
- Recycle as much of the paper products you use as possible.

Check out the following links for additional information:

EPA's WasteWise

Paper Industry Association Council paperrecycles.org's Recycling: It Starts With You **(EXIT>)**

GREEN YOUR CONGREGATION: RECYCLING

It does not matter what type of facility you have or run – there is some amount of material you use that can be recycled. From aluminum cans, and glass and plastic bottles, to paper and printer toner cartridges, recycling reduces the amount of waste materials that are put in landfills or incinerated while decreasing greenhouse gas emissions and deforestation. That's good for everybody! Ask your building management or waste handler about recycling opportunities.

Check out the following links for additional information:

EPA's "Recycling" Web page

EPA's "Recycling/Pollution Prevention" Web page

EPA's "WasteWise" Web site

Technology Specific Recycling

During your upgrade projects, and normal maintenance, you will likely have to deal with lighting and electronic waste. The disposal of some of this waste may be regulated, since both electronic and lighting waste may contain potentially harmful substances, and these products may need to be separated from your other garbage. The best way to dispose of this waste is to recycle it.

To learn more about the recycling and disposal of lighting and electronic waste visit:

EPA's Toxic Substance Control Act (TSCA) Disposal Requirements for Fluorescent Light Ballasts Fact Sheet **(PDF) (EXIT>)**

EPA's Electronics: A New Opportunity for Waste Prevention, Reuse, and Recycling Fact Sheet **(PDF)**

National Park Service's Envirofacts: Lighting Waste Management Fact Sheet **(PDF) (EXIT>)**

National Electrical Manufacturers Association's Lamp Recycle.org Web site **(EXIT>)**

GREEN YOUR CONGREGATION: WATER

You may wonder what water use and saving energy have to do with each other? In most cases, electricity or gas is used to heat water, and this costs you money. In addition, your water company uses energy to purify and pump water to your facility as well as in the treatment of your sewage. So part of your water and sewage bill is really an energy bill. The more water your facility consumes, the more you will benefit from optimizing water use. Some ways to save related to the water you use are:

Did You Know?

Repairing a seal that is leaking water can save money and hundreds of gallons of water per year – and if it's a hot water leak, you can save even more money!

- Repair leaking pipes, fixtures and seals.
- Install water-efficient appliances where applicable.
- Install efficient showerheads **(EXIT>)** and faucets. **(EXIT>)**
- Install controls that turn faucets off automatically.
- Put in high-efficiency toilets and urinals. **(EXIT>)**
- Depending on the function of your facility, use horizontal axis washing machines.
- Practice green landscaping (greenscaping or xeriscaping) to preserve natural resources and prevent waste and pollution. If local code allows, consider diverting "gray water" **(PDF)** for irrigation rather than using fresh water.
- Install an insulation blanket on water heaters seven years of age or older, and insulate the first 3 feet of the heated water "out" pipe from your water heater.
- Install an energy-efficient electric **(EXIT>)** or gas **(EXIT>)** water heater.
- In areas of infrequent water use, consider "tankless" water heaters to reduce "standby" storage costs and waste.

Check out the following links for additional information:

EPA's "WaterSense: Efficiency Made Easy" Web page

"Water Wiser – The Water Efficiency Clearinghouse" Web site

"Water Efficiency Manual for Commercial, Industrial, and Institutional Facilities" **(PDF)**

Colorado Springs Utilities' "Xeriscape" Web page

GREEN YOUR CONGREGATION: MEGA-CHURCHES

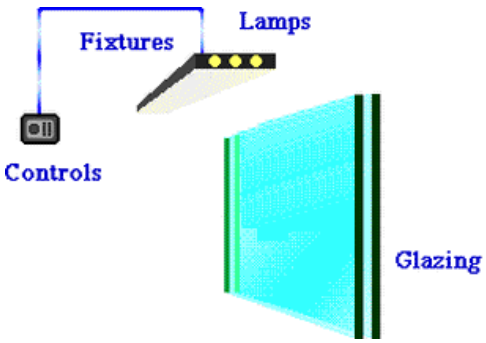
A movement that began in the 1950s and has grown more widespread over the years is the mega-church. Mega-churches are large churches that have 2,000 or more worshippers for a typical service. These churches have large structures and parking lots that are able to accommodate the huge numbers of worshipers they attract. Many mega-church facilities are more akin to a theater or arena, with high-tech lighting, sound and video systems. In addition to a sanctuary/worship space, mega-church facilities can contain other space types such as retail, restaurant or office.

Because of their size and/or use of multiple facilities, mega-churches offer unique challenges with regards to energy efficiency when compared to a regular congregational facility. It is still important to use energy-efficient products and equipment whenever possible. However, the proper controlling of those energy-efficient products and equipment is going to be crucial in saving energy.

The two systems that are most important to focus on with regards to controlling are the lighting and HVAC systems. These systems account for a large portion of the energy used in a facility and can be a prime area for energy-efficiency upgrades.

Lighting

There are lighting controls beyond the basic light switch that give you better flexibility in lighting usage and can save energy. Examples of these controls are occupancy sensors, dimmers, and daylight sensors.



Zones: lights are switched on corresponding to the use and layout of the lit areas, in order to avoid lighting a large area if only a small part of it needs light.

Time control: to switch on and off automatically in each zone to a preset schedule for light use.

Passive Infra-Red (PIR) Occupancy sensing: in areas that are occupied intermittently, occupancy sensors can be used to indicate whether or not anybody is present and switch the light on or off accordingly.

Light level monitoring: this consists of switching or dimming artificial lighting to maintain a light level measured by a photocell

Bi-level switching: a strategy that allows for better control of individual rooms/spaces. For example, specified areas are provided with two wall switches near the doorway to control the lights. In a typical installation, one switch would control 1/3 of the fluorescent lamps in the ceiling lighting system, while the other switch would control the remaining 2/3 of the lamps. This allows four possible light levels: OFF, 1/3, 2/3 and FULL lighting.

More information is available on these controls under “Lighting Controls” in the “Lighting” section of this Guide.

HVAC

To improve the efficiency of the heating and cooling systems in your congregational facility there are control strategies that you can incorporate that will run these systems only when necessary. Common control strategies

include ENERGY STAR qualified programmable thermostats, multiple zones, and CO_2 demand sensors for ventilation control. More information is available on these control strategies under "Control Systems" in the "HVAC" section of this Guide.

Energy Management Systems (EMS)

Computerized management of lights, heating, cooling, and other systems can be worthwhile for larger facilities like mega-churches. Energy management systems are computer-based tools that allow you to monitor, track, analyze, control, and optimize the performance of systems in one facility or for multiple locations and help reduce your energy consumption. This can even be done remotely from a computer that is not onsite. By combining EMS with the proper energy-efficient equipment, your facility can be on the road to saving energy, reducing pollution, and saving financial resources.

Simple identification and measurement techniques can be the first step toward eliminating waste and saving money. For example, you may discover that your peak electricity use occurs during a time of year when rates are at their highest. Using energy mapping tools can help identify issues like these and allow you to take action toward savings.

Project Suggestion

Congregational facilities might consider installing network thermostat systems, not only because of their simplicity and power, but also because they are affordable and allow for the system to expand as budget, time and the size of the facilities grow. With these systems you can control and monitor a single thermostat, or an entire building or multiple-building site using a personal computer.

Utility Bills too High?

Mega-churches are large enough that they may be susceptible to high demand charges from their electric utilities. In order to minimize this cost consider Demand Response Controls.

Digital demand controllers (DDCs) are small, relatively inexpensive energy-management devices that can simultaneously control the operation of a large number of equipment items, preventing all or most of them from operating simultaneously. The objective is to avoid the creation of power-demand "spikes" (i.e., short periods when power demand is unusually high), which often leads to high monthly demand charges.

The operation of some electrical loads in a facility (such as internal lighting) cannot be interrupted without causing a disruption. But many others – typically those that have some thermal-energy storage associated with them, such as water heating, air-conditioning, electric space-heating units, or refrigeration equipment – can be interrupted for periods of 10 to 30 minutes without occupants being aware of the interruption. These are the loads selected for peak-demand-limiting controls via a DDC.

DDC units can also be used to reduce electrical demand during periods when the utility grid is challenged and in danger of overloading, or when electricity prices are unusually high. Many utilities offer financial incentives to customers who install DDC units or other equipment that enable the utility to reduce the customer's load at these times.

GREEN YOUR CONGREGATION: LEARN MORE!

For more information on energy technologies contact:

- Air Conditioning Contractors of America (ACCA): www.acca.org
- American Council of Engineering Companies (ACEC): www.acec.org
- American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE): www.ashrae.org
- American Society of Mechanical Engineers (ASME): www.asme.org
- American Solar Energy Society (ASES): www.ases.org
- Association of Energy Engineers (AEE): www.aeecenter.org
- Association of Energy Service Professionals (AESP): www.aesp.org
- Center for Renewable Energy and Sustainable Technology (CREST): www.lboro.ac.uk/departments/el/research/crest/links.html
- Coalition on the Environment and Jewish Life: www.coejl.org
- DOE's EERE's A Consumer's Guide to Energy Efficiency and Renewable Energy: http://www.eere.energy.gov/consumer/
- Electric Power Research Institute (EPRI): www.epri.com
- Episcopal Power and Light: www.theregenerationproject.org
- Evangelical Environmental Network: creationcare.org
- Forum on Religion and Ecology (FORE): environment.harvard.edu/religion/information/index.html
- Interfaith Coalition on Energy (ICE): www.interfaithenergy.com
- International Dark-Sky Association (IDA): www.darksky.org
- Islam and Ecology: www.crosscurrents.org/islamecology.htm
- Lighting Research Center: www.lrc.rpi.edu
- National Association of Energy Services Companies (NAESCO): www.naesco.org
- National Council of Churches: www.ncccusa.org
- National Religious Partnership for the Environment: www.nrpe.org
- National Society of Professional Engineers (NSPE): www.nspe.org
- United States Conference of Catholic Bishops (USCCB): www.nccbuscc.org