

**This fact sheet outlines common types of energy consuming equipment found in churches and other places of worship and will help you to identify energy efficiency initiatives.**

Energy consumption in churches and other places of worship is relatively small, however there are often many opportunities to save energy and money. This is increasingly important in charitable organisations, who have very little income and frequently operate at a loss.

## WHY DOES ENERGY EFFICIENCY IN CHURCHES AND OTHER PLACES OF WORSHIP MATTER?

Churches and places of worship do not always have a good record when it comes to energy efficiency. Church buildings tend to be built with a focus on initial construction costs with a requirement for a large open auditorium space (that can present heating and cooling challenges), rather than a long term view on operational costs. Frequently, lights are left on in communal areas and whole areas are heated/air conditioned when there may only be a few people using a small part of the area.

Keeping costs low is of paramount importance to organisations operating in this sector, with many operating in loss-making conditions or reliant on donations to meet operating costs. Any savings achieved from energy efficiency opportunities result in greater funds being diverted to other support services that churches typically provide to the community.

In addition to this, climate change has the potential to cause increasing levels of natural disaster such as floods, droughts and mass population movements – and all the humanitarian issues that come with these. It is believed that the greatest impact in the fight against climate change is through energy efficiency. Therefore, making your place of worship more efficient will help you to take a leading role in your community and help in the fight to become more sustainable, as well as helping your local “business” to become more financially secure.

## ENERGY CONSUMPTION IN CHURCHES AND PLACES OF WORSHIP

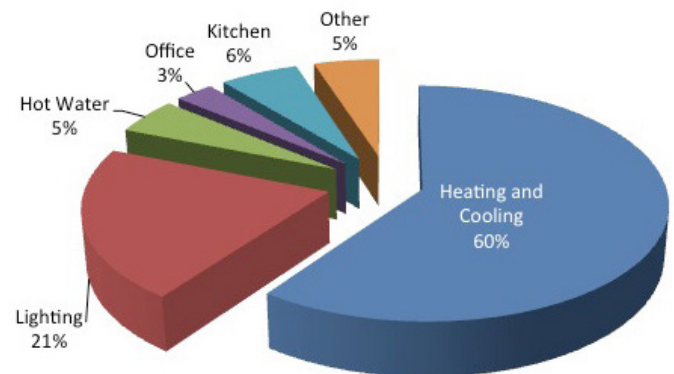
Energy in places of worship typically tends to be used most in the following areas:

- Heating, Ventilation and Air Conditioning (HVAC)
- Lighting
- Domestic hot water
- Kitchen appliances and domestic refrigeration



## ENERGY BREAK UP FOR PLACES OF WORSHIP

The typical breakdown can be seen in the following pie chart:



## ENERGY SAVING OPPORTUNITIES

There are two fundamental areas where savings can be made:

- Quick wins – can be done at no or low cost almost straight away
- Strategic - those which are more complex, or require more capital investment

## QUICK WINS

The following are some of the most common types of quick and easy opportunities to save energy in places of worship:

**Turn lights off** - Turn off lights if you are away from a room for more than ten minutes and ensure employees turn off all lights in appropriate areas when not in use. Also consider using sensors or push button timer switches.

**Turn heating, ventilation and air conditioning units off** - Turn off HVAC systems when not in an area, or if only a small group of people are using a small part of an area.

**Fridge/freezer consolidation** - Places of worship can have a variety of refrigerators and freezers for numerous different purposes (functions, catering, community centre, domestic units for the presbytery, etc.). These are frequently only partly full – in these instances, look for opportunities to fill one unit whilst emptying one or more units so that they can be switched off. Fridges with nonperishable goods (such as soft drinks) can be switched off overnight or when not required. It is also important to replace any damaged door seals and keep condenser grilles clean and well ventilated.

**Optimise temperature settings of hot water generation** - Hot water systems typically have their temperature set very high to prevent bacteria buildup. However, many set this much higher than required to introduce a “safety factor” which is not always needed.

**Standby power consumption** - Many electrical appliances in this sector tend to be left on all of the time. Although this equipment generally goes into standby mode when not used for a period of time, this can still have a substantial energy cost. This is generally a very small amount of power, however when multiplied over 24 hours and 365 days per year, this turns into a large amount of energy consumption. Either manually switch appliances off at the wall, or use smart switches, which sense standby mode and automatically shut off power. The use of a 7 day timer can also assist in turning items off completely outside of normal open times.

**Use natural ventilation where available** - Open windows and look for opportunities to use a fresh air draught rather than turning on air conditioning units.

**Maximise natural daylight** - Look for opportunities to switch off lights and use natural light from windows. Frequently cleaning windows or skylights can lead to vast improvements in the amount of natural light.

**Swap light globes for more efficient types** - One of the easiest ways to reduce energy is to remove old and inefficient incandescent light globes and replace them with CFL (Compact Fluorescent Lights), or replace halogen lights with LED.

## STRATEGIC OPPORTUNITIES

The following are some of the most common types of energy saving projects worth consideration in places of worship:

**Use shading** - Shade external windows (or even walls) which have a high exposure to sunlight. Special solar film can be purchased which reflect heat from windows. Shading can be as simple as planting a tree or bush to block sunlight, or can involve installing blinds, awnings, verandas or shutters. This can help to reduce solar heat gain in summer by as much as 70%.

**Use white/reflective paint** - White or reflective paints used on an external roof or wall can lead to energy savings (where roofs are adequately insulated), through a reduced need for air conditioning. Special reflective paint sometimes termed “cool roof” paint can come in a variety of colours – even black, although the lighter colours reflect a higher percentage of heat. “Cool roofs” can save up to 15% of air conditioning energy consumption.

**Insulation/draught-proofing** - As heating and cooling is generally accepted as the largest energy consumer in this sector, it makes good sense to minimise heat gains and losses. Improved insulation can reduce energy requirements for heating and cooling by as much as 25%. In colder climates, draught proofing can reduce heating requirements by as much as 40%.

**Lighting upgrade** - Older lighting types are typical in this sector, even though lighting technology has advanced rapidly in the past few years. It is therefore highly likely that there will be a more efficient lighting solution in existence. Lighting upgrades in this instance can consist of fitting new reflectors, new ballasts, or entire new luminaires. It can also include improved controls or improving the use of daylight and delamping. Refer to the **Lighting Fact Sheet** for more information.

**Upgrade cooling systems** - Many cooling systems in this sector, such as air conditioning units, are older technology. Advancement in this technology means that there are many systems on the market today that are many times more efficient. If you have an older system, it is worthwhile considering an upgrade based on energy savings, as well as a need to replace certain types of refrigerant gas (e.g. if you have a system that uses R22 gas, this must be replaced by 2015).

**Timers, sensors and motion control** - Use programmable timers, daylight sensors or movement sensors to control lighting, heating, cooling, ventilation and dispensing systems.

**Efficient appliances** - Many older electrical appliances such as televisions, stereos, fridges, freezers and washing machines are inefficient. Recent advancement in technology has seen many improvements in the efficiency of these appliances. Look for energy ratings labels that rate the appliance from one to 6 stars. The higher the number of stars, the less energy it takes to do the same job.

**Low flow taps and showerheads** - Fit low flow hot water taps and showerheads. These will reduce the need for hot water, thereby reducing the energy spent on hot water generation.

**Solar hot water** - Solar water heating (residential solar thermal) is one of the most energy efficient means of heating water. This is where the water is pumped through coils, which are heated by the sun before being stored in a storage cylinder (all of which is generally situated on the property roof). Booster heat is typically required to raise this water to the required temperature on cloudy days or at night. Gas boosting should be used in preference to electric boosting where this is available. Solar hot water systems generally also attract small-scale Renewable Energy Certificates, which can be sold for cash, effectively meaning that the capital cost to install these systems.

## HEAT PUMPS

Heat pumps can also have fantastic levels of efficiency for generating heat. These work like a reverse refrigerator, which means that due to the properties of the 'refrigerant' gas, you can get many times more 'units of heat' out from these than the 'units of electricity' you put into them. On average you get 3-5 times the heat energy out, compared to the electrical energy you put in. This makes them very efficient indeed, so if you have an older electrical element or resistance heater, then it is highly likely that installing a heat pump will be worthwhile.

## SOLAR POWER (PHOTOVOLTAIC)

Australia is blessed with an abundance of sunlight (in most states) and solar panels can convert this sunlight into electricity. This electricity can then be stored in batteries (for off-grid sites), or converted to grid electricity and either used at the site, or sold back to the electricity supplier. Solar photovoltaic systems can also attract Small-Scale Technology Renewable Energy Certificates – which can be sold for cash, effectively meaning that the capital cost to install these systems are greatly reduced. Refer to the **Solar PV Fact Sheet** for more information.

### FOR FURTHER INFORMATION

#### NEEN – NATIONAL ENERGY EFFICIENCY NETWORK

NEEN is a national initiative to promote open learning and collaboration amongst faith-based and not-for-profit community organisations, with the aim of increasing energy efficiency and establishing a positive energy future for the sector.

#### WHAT MAKES THE NEEN INITIATIVE SO POWERFUL?

NEEN provides small to medium sized community organisations with the resources to reduce energy consumption and the

opportunity to connect and collaborate on a range of initiatives that foster a resilient, sustainable future for the not-for-profit sector and the communities they serve.

#### AN OPEN INVITATION

No matter where you are on your journey to achieve your sustainability goals, you're welcome to join the NEEN community. Make the connection and discover a better energy future for your organisation.

### CASE STUDY – ST ANDREWS PARISH PRIMARY SCHOOL

St Andrews Parish Primary School is located in South Clayton in Victoria. They have a large main hall which is used as a gymnasium and assembly hall. This hall was previously lit for the entire school day, costing a substantial amount of money for the school. The school installed 25 daylight tubes in the hall, passageway and changing rooms allowing the lights to be switched off. In addition to this the natural light is said to create an excellent teaching and learning environment. Following the installation, the school principle claims that lights are now able to be turned off for the entire school day (during school hours) saving significant amounts of money.

### USEFUL LINKS, WHERE TO NEXT?

**St Andrews Parish Primary School light tube upgrade** Information on case study

<http://commercial.solatube.com.au/case-study/st-andrewsparishprimary-school/>

#### Cool roofs

US video on cool roofs

<http://energy.gov/eere/videos/energy-101-cool-roofs>

#### EnergyStar Congregation Resources

US EPA resources written to support energy efficiency take up in places of worship

<http://www.energystar.gov/buildings/tools-and-resources/energystar-action-workbook-congregations>

#### Green Church Association

Sustainability resources for churches

[http://www.greenchurchassociation.org/Certification/Energy\\_Conservation.html](http://www.greenchurchassociation.org/Certification/Energy_Conservation.html)

#### International Ground Source Heat Pump Association

<http://www.igshpa.okstate.edu/>

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#### Government Disclaimer

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