

ENERGY RESOURCE MANAGEMENT PLAN



Western Australian
Council of Social Service Inc

*Ways to make
a difference*

Administrative and Policy

There is a growing momentum within business sectors (government, non-government and private enterprise) for business to operate in a sustainable manner. It should be expected that future funding opportunities will have sustainability criteria attached in some way, or funding opportunities increased if sustainability outcomes can be demonstrated.

With current utility price increases and the likelihood of further increases and a growing need for all areas of society and business to be mindful of their energy and water use, waste minimisation and carbon footprints, it may be timely for community services organisations (CSOs) to take a broader look at current policy and procedures for overall improvements in these areas. To bring about effective change within these areas, CSOs have a responsibility for ensuring that an effective Energy Resources Management Plan (ERMP) is implemented and that it engages all areas of the business from the organisational management, procurement and administration, through to the maintenance and property management and finally the staff of the organisation and where possible, the residents and clients.

One of the biggest barriers to organisational energy and water efficiency is a lack of information and education. Even where good systems and technology are in place, the benefits for an organisation are often not realised due to a lack of understanding of how the system or technology works. A robust ERMP would assist CSOs to identify information gaps about the current building/s and to compare buildings with each other. CSOs will then be in a better position to understand the artificial energy requirements of the current buildings and the cost of this demand and how to better manage these costs. The ERMP would also enable a better understanding of the energy use in all areas of the business (i.e. administration and management buildings), providing savings that could be used to further the capacity of the organisation in its service delivery. A significant barrier towards achieving energy and resource efficiency is that it is usually not a formal part of anybody's job description.

Property Selection/Design Considerations

This section will discuss the importance solar passive and sustainability design when building and procuring new aged care facilities and ILU's.

Building envelope is a term used to describe the roof, walls, floors, windows and internal walls. The envelope controls heat gain in summer and heat loss in winter. The building envelope can have an

important effect on the thermal performance of a building. The time for maximising the gains that can be attained from a quality building envelope is during the design and construction phases of building development.

Ethical and energy efficient building decisions, made with consideration to reducing the collective environmental impact, will empower CSOs to make a difference. By providing low impact solutions to make the buildings more energy efficient and healthy for the residents, CSOs can also reduce demand on the limited Perth water and energy resources and the environment. For example, installing a solar system for domestic hot water needs instead of an electric system is the equivalent of taking a small car off the road.

Consideration should be given to accessibility of all areas of the new building. The design should incorporate 'ease of use solutions' for the communal and utility areas.

Passive Design

Passive design is building design that takes advantage of natural climate to maintain thermal comfort and will dramatically reduce a building's reliance on artificial heating and cooling. On average, 38% of energy consumed in Australian buildings is for air heating and cooling. Using passive solar design dramatically reduces this figure, creating savings in energy costs and providing sustainable savings in reducing Greenhouse Gas (GHG) emissions. With careful building design, it is possible to achieve internal temperatures that are 5°C warmer in winter and 10°C cooler in summer.

Effective utilisation of passive design needs to occur in the building design and development stage, to achieve maximum passive heating and cooling and to remove reliance on artificial means. In consideration of the proposed building, it is recommended to employ a green or sustainable architect who has good knowledge of passive design.

Specific information on this can be attained from:

- Green Building Council of Australia GBCA
 - Green Star Rating Tools
- Building Code of Australia (BCA)
 - Section J / Sustainability

Orientation

The ideal orientation for living areas is true north and can be extended to between 15° west and 20° east of solar north. This allows standard eave overhangs to admit winter sun to heat the

building and exclude summer sun, thereby reducing the need for artificial heating and cooling and resulting in lower energy bills and reduced greenhouse gases.

Below are descriptions of the three houses shown in the photograph. These descriptions show the importance of how orientation can impact on a buildings comfort levels and need for artificial heating and cooling. The principles learnt from these descriptions can be incorporated into the design and procurement of new buildings.



House A

From the photo it can be reasonably assumed that the house itself has good passive potential if the living areas are on the North side. If the living areas are on the south then it is predictable these areas are likely to need additional artificial lighting (pergola shade). It is likely that the glazing on the East and West will be relatively small (as is appropriate) but that passive shading on the East and West is also available (trees). It is therefore predictable that summer overheating will not be a significant issue. Of concern may be that the tree to the Northeast will reduce freely available winter-warmth into the home. It is therefore predictable that additional winter heating will be needed because of this shading. Conclusion: This house is probably OK, provided that no permanent shading devices are installed on the North side

House B

From the photo it is reasonably predictable that this house will be uncomfortable in both summer and winter. It is likely to have its largest glazed areas on the East and West faces. Unless there is active management of shading devices, this glazing will (is predicted to) receive full sun shining

directly and deeply into the home for several hours in summer in the morning and the afternoon. It is predictable that this will decrease comfort and subsequent demand for air-conditioning. In winter the sun rises and sets further to the north, so sun shines on the glazing for perhaps 1 or 2 hours. Unless there are good curtains, that are managed well, then it is predictable that the amount of heat gained by the glass in the mornings would be lost through the glass during the day, and the home would remain cold. It is predictable that the energy use (costs) associated with House B will be very significantly higher than House A if equivalent comfort is to be achieved

House C

It is predictable that this house will be cold for most of the year because at times of the year when heating is needed; the windows on the sunny sides will be mostly shaded by the trees. It is predictable that without the trees, winter warmth would be acceptable, but that summer would be extremely uncomfortable (hot), unless very active management options were chosen- ie: put up and take down shade sails on a seasonal basis, (other easily managed external shading), good curtains and windows. It is predictable that the rear skillion roof is not insulated and that this would increase unwanted summer heating. It is also predictable that this (probably) uninsulated skillion will increase the demand for both winter lighting and heating

Shading

Artificial or natural shading of the building and outdoor spaces reduces summer temperatures, improves comfort and saves energy.

Recommendations for new and existing buildings:

- Install adjustable shading (awnings, pergolas, removable shade cloths or sails). These are particularly useful for northern, eastern and western elevations to manipulate sun access to the building.
- For single storey units, install fixed shading devices (eaves, pergolas, and horizontal louvers) to regulate solar access on northern elevations.
- For multi-level building, balconies and shade structures may be used rather than reliance on eaves.
- Use shade structures over otherwise exposed balconies and other living areas.
- Use plants to shade the building, particularly windows; to reduce unwanted glare and heat gain.

Insulation

A high level of insulation is essential in solar passive design, because it acts as a barrier to heat flow to keep the building warm in winter and cool in summer. Installing insulation in the roof and ceiling can save up to 45% on heating and cooling energy.

The minimum code requirements for insulation have recently been increased to a total R-value of 3.5 (measures resistance to heat flow). The higher the R-value, the better the thermal performance of a building. Consider building with insulation in excess of the current code requirements to improve building performance and insure that the building remains competitive in its thermal performance during its anticipated lifetime. R-values can be up the value of 5 and come in a variety of materials. Wool batt insulation is environmentally the most sound as it uses natural materials. There are two main types of insulation; bulk insulation and reflective insulation, which can sometimes be combined into a composite material. The degree and type of insulation depends on building construction specifications and should be used in conjunction with passive solar design

Avoid the use of any light fittings that compromise the integrity of insulation. For example, regulations require that downlights do not have any insulation closer than 200 mm (which means that greatly increased heat transfer) and in general, light fittings that penetrate the ceiling allow significant direct air loss).

Recommendations for new buildings:

- Apply insulation in the ceiling, under roofing material, and external walls.
- Avoid the use of any light fittings that compromise the integrity of insulation.
- Choose roofing materials and construction/assembly methods that intrinsically promote effective insulation (e.g. avoid the reduction in insulation effectiveness that always occurs when it is compressed i.e. roofing iron and steel purlins).

Recommendations for the existing buildings:

- Install ceiling insulation, if none is present.
- Ensure that the replacement of insulation is a contract condition of any maintenance work.

Glazing

Single glazing has poor insulation properties, and transfers 6W of thermal power per m² for every degree of temperature difference between the inside and outside (more when there are breezes blowing). Glazing also transmits a lot of road noise from the street. Double glazing can dramatically reduce both heat and sound transfer, but can be expensive. There are some cheaper options available that can be installed to the windows in the existing building which will reduce heat gain in summer and heat loss in winter.

Recommendations for new buildings:

- Look for a suitable area of glass on the north facing walls with access to winter sun. As a general rule this should be 10-25% of the floor area of the room.
- Glazing on other sides of the building should be minimised to prevent unwanted heat loss and gain.

Heating and Cooling

Heating and cooling are the biggest contributors to energy use for ILU's and other Baptist Care buildings. Every effort should be made to reduce the amount of use and the thermostat set-point to reduce total energy demand. Manually setting the thermostat for air-conditioning is an effective method of controlling artificial heating and cooling. By increasing or decreasing the thermostat temperature by 1o, an energy saving of approximately 10% can be made.

Recommendations for new buildings:

- Utilisation of passive design in the building development stage, to deliver maximum passive heating and cooling to remove the reliance on artificial means.
- Keep external reverse a/c units away from windows
- Consider installing fans as these can be a cheap cooling alternative.

Recommendations for existing buildings:

- Develop organisational wide policies for heating and cooling settings.
- Summer cooling temperatures should be set between 23oC and 25oC and winter warming temperatures between 19oC and 21oC
- When replacing any air heating or cooling systems ensure Reverse Cycles are used.

Lighting

Lighting can be a significant source of energy use. Behaviour change is often the best method for addressing excessive lighting costs. However, below are some design and structural tools that can reduce the need for artificial lighting.

Natural Lighting

Natural light should always be the first option for a building. A combination of natural and artificial lights would provide a better mix of lighting and would aid in reducing the energy usage. Skylights provide some of the best ways to admit daylight and distribute it evenly, saving energy and improving visual comfort levels.

As an alternative to skylights, solar tubes also offer natural lighting into a building. Solar tubes with double-glazing, allowing very little heat in or out. Solar light tubes collect sunlight from any angle and filter it thoroughly. This makes the solar light tubes more efficient than the normal skylights, which require only specific angles for them to work. The conventional ones likewise run only on days without any clouds in the sky; <http://greenhousevt.blogspot.com/2008/05/solar-tubes.html>

Sensor lights

Sensor lights are an effective way to reduce energy use associated with lighting in areas of limited use. In bathrooms, kitchens and storerooms where use is limited and lights may be unnecessarily left on, sensor lighting could significantly reduce the amount of energy consumed.

Energy Efficient Lighting

The amount energy required for artificial lighting varies considerably, but all require some running costs. Fluorescent batten luminaires and compact fluorescent lights (CFL) are the most common types of indoor lighting in community facilities.

Compact fluorescent lights (CFL) are a great energy efficient lighting choice, using about a quarter of that needed for incandescent globes. Not only are CFLs less expensive to run, have a smaller carbon footprint, they can last 15 times longer.²

One problem with all fluorescent lighting is it contains mercury vapour. As a highly toxic substance, broken fluorescent lights need to be carefully disposed of. However, fluorescent lights can be disposed of correctly.

When selecting lights, it is important to not only choose the most suitable light output (watts), but also colour tone. Incandescent globes emit a very yellow light that is very different to daylight. Colder coloured lights emit more light than warm lights that draw the same energy. “Cool white” (above 5,000 kelvin) is often used in offices as it is brighter and is easier to read under than “warm white” (2,700-3,000K). However, for ambient lighting, warm white may be more appropriate.

Recommendations for new buildings:

- Incorporate skylights or solar tubes into the design of the proposed building
- Consider installing sensor lighting
- Consider installing LED lighting, as an alternative to any other artificial lighting

Recommendations for existing buildings:

- Consider replacing fluorescent tubes, incandescent and halogen downlights with CFL’s and/or LED’s.
- Consider installing sensor lighting.

Water Use

In 2010, Perth experienced its driest year on record and the need to conserve water is essential. There are a number of tools that can be used to reduce water use in proposed and existing buildings. New buildings can be designed with grey water systems and rain tanks that can collect water and reuse water in gardens. Both of these initiatives can dramatically reduce water in Baptist Care facilities.

In addition, low-flow showerheads and aerators can be installed in existing buildings, reduce water use and water heating costs

Recommendations for new buildings:

- Building and designing buildings with grey water systems and rain water tanks.

Recommendations for existing buildings:

- Install low flow shower heads and aerators

Property Management

CSO residents and staff may not necessarily have the sense of personal responsibility for the buildings that would make a property manager's job easy. This would therefore require a higher level of management of properties than may otherwise be expected.

As such the responsibility sits with CSOs to begin to understand variations in usage over time and pinpoint where systems are not working appropriately. This will save CSOS time and money by identifying any issues early. A property management register or schedule may be a simple way to achieve this.

This schedule may include the following items:

- Record utilities use for each property on a record sheet for that property. This record should be kept in an easily accessible place with data recorded in physical quantities (i.e. Units of gas and electricity, and litres of water). Changes, discrepancies and unexpected increases can then be monitored, investigated and remedied.
- Keep a maintenance register/log for each property (including air-conditioners, lighting timers and irrigation systems).
- Keep copies of all of the manuals for electrical equipment in CSO buildings, with contact numbers for electricians, manufacturers and air-conditioner maintenance personnel.
- Communicate energy reduction strategies to staff.
- Research and recommend energy efficiency when it comes to buying new equipment.

A property management inspection should be conducted on a regular basis. Some additional inspection items could be included in a property checklist, so as to ensure effective energy management is occurring and also to provide information that could improve the energy efficiency of the properties on an ongoing basis.

A table of suggested items that could be included in monthly property checklists are:

Checklist item	Rationale
Read and record water	<ul style="list-style-type: none">• To identify the proportion of water consumption

meter reading	<p>costs per resident</p> <ul style="list-style-type: none"> • To identify (and respond to) consumption anomalies (within and between properties)
Read and record gas meter reading	<ul style="list-style-type: none"> • To identify the proportion of water consumption costs per resident • To identify (and respond to) consumption anomalies (within and between properties)
Read and record electricity meter reading	<ul style="list-style-type: none"> • To identify the proportion of water consumption costs per resident • To identify (and respond to) consumption anomalies (within and between properties)
Utilities mains turned off as possible	<ul style="list-style-type: none"> • Fire alarms and reticulation systems may require mains supply to be left turned on.
Toilets no leaking, not overfilling	<ul style="list-style-type: none"> • There is a risk that water leaks are not identified for many months.
Taps not dripping	<ul style="list-style-type: none"> • When left dripping for long periods, a dripping tap can become physically damaged inside, requiring the replacement of the tap-ware itself- (not just the washer).
Reticulation timers set appropriately	<ul style="list-style-type: none"> • Reticulation timers can be set to water for many months after watering is needed, if a routine is not established in high-turnover properties.
Windows catches work properly	<ul style="list-style-type: none"> • Window catches offer a first level of protection against unauthorised entry. • When things “work”, client attitudes towards the property are more likely to remain positive.

The information from these checklists could then provide areas for improvement in regards to energy and water efficiency. The data could also build into an overall Maintenance Management plan for all Baptist Care’s properties.

Effective and efficient property management is required to ensure that all is being done to improve the efficiencies of the current properties leased and owned by Baptist Care, this may require the

involvement of landlords (Department of Housing) to enable structural improvements (i.e. insulation, appropriate shading) and timely action by CSO staff.

Replacement and Repair Policy ensuring energy efficient products are utilised wherever appropriate and available.

Recommendations for existing buildings:

- Review of current policies on Replacement and Repair to ensure sustainability and energy efficiencies are included in procurement.
- Review current policies regarding building Maintenance to include sustainability and energy efficiencies.
- Provision of training for existing staff and management on Energy and Water usage.
- Implementation of monthly property checklists.
- Implementation of a property management register or schedule.

Resident/Staff Behaviour

Because of the client group that CSOs service; there is a unique challenge in addressing behaviour that is supportive of energy and water efficiency. In many cases, it may not be possible to promote energy efficient behaviour with CSO residents. However, there is an opportunity to promote energy efficient behaviour amongst staff. With coordinated effort from staff, there is potential for significant levels of energy and water to be saved across all CSO properties.

Often staff are not aware on how to operate heating and cooling systems, there was conflict and confusion on the appropriate settings between staff and there was no policy or procedures that could direct them in appropriate use.

There are a number of tools that could address this confusion; however they need to be driven from a top down approach. These tools are summaries below:

Recommendations for existing buildings:

- Develop policies and procedures for heating and cooling in buildings and make these available to staff.
- Place signs and reminders next to heating and cooling systems for what the correct settings should be.

- Include the control and setting of heating and cooling systems as part of staff inductions and handovers.
- Provide access of manuals to appropriate maintenance staff.