



Air conditioners (ACS) often consume large amounts of energy, typically generated from non-renewable electricity – emitting greenhouse gases and contributing to climate change.

As heating and cooling systems are an essential part of guest comfort. It's important to consider energy efficiency and water conservation.

This factsheet overview:

- Energy options to consider
- AC system efficiency
- Operating your AC efficiently
- Cooling alternatives

Air conditioning (AC) units or systems can be used in both domestic and commercial environments. They typically remove heat and moisture from the interior of an occupied space to optimise employee and guest comfort. In addition, AC is used to cool and dehumidify rooms filled with heat-producing electronic devices, such as computer servers, power amplifiers, and to display and store sensitive items, such as artwork. The use of these systems varies significantly within the tourism industry depending on climate and for some properties ACs can represent up to 50% of overall energy consumption.

Whether you have AC or are considering investing in a window/wall unit, split system, ducted system or a portable unit, there are options that could help to reduce cost and limit environmental impact.

ENERGY OPTIONS TO CONSIDER

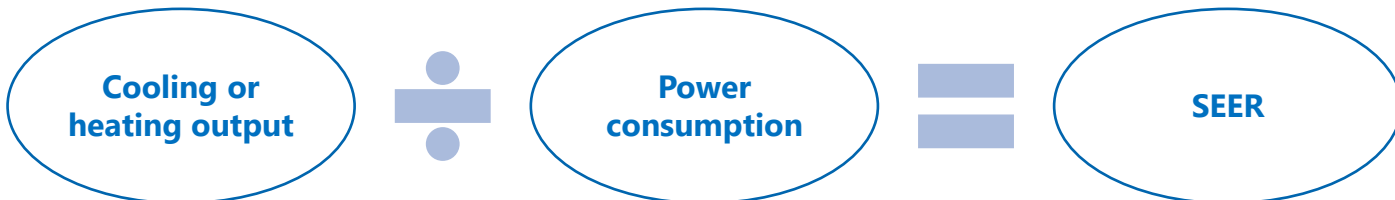
The output of AC systems varies depending on size, location, structure and style of the property. Although a retrofit of AC systems can be expensive, it is sometimes more efficient than using old equipment. Consider the following options before making any changes:

- Is there a need for a cooling system? Is it possible to make simple changes such as window glazing or increasing shade cover?
- Are there rooms/areas that may have different cooling requirements?
- Will the building materials, room size, aspect and wind direction affect the efficiency of AC systems?
- What is the water availability? (Some AC systems use water, others use coolants).
- Have you checked the building codes and regulations?
- Have you investigated the life cycle and environmental considerations?

The potential for improving energy efficiency is, in most cases, high and can be achieved by determining how effective your current cooling systems are.

CURRENT AC SYSTEM EFFICIENCY

Energy efficiency can be determined by a rating. For most central and ductless AC systems, an energy efficiency rating can be identified using the Seasonal Energy Efficiency Ratio (SEER). This is calculated by dividing the system's cooling or heating output by its power consumption through the season and the standard load and climate of countries. The higher the rating, the more efficient the cooling equipment.



Single units are calculated slightly differently from central and ductless AC systems. An Energy Efficiency Ratio (EER) is used in the same way as the SEER but only on 'peak days' (the hottest days specific to the country of operation). An EER of 13 or more is desirable, similar to the SEER.

Once you have determined the energy efficiency rating of your system and answered the questions on the AC Efficiency Checklist, actions can be taken to ensure that your AC is operating as efficiently as possible.

AC EFFICIENCY CHECKLIST

- Is your system correctly sized and located?**
An undersized AC will be inefficient while an oversized system will cool or heat an area quickly but then cycle on and off resulting in higher operating and maintenance costs.
- Is your system suitable for your operating conditions?**
If your AC system will be operating for long periods, during which time cooling and heating requirements (or load) will vary considerably, the system's compressors should be able to operate effectively at part loads.
- Are your AC ducts insulated and not leaking air?**
If your AC ducts are in the ceiling or basement which are not cooled, they may be at risk of undetected air leaks, drawing in dust and pollen and losing cool or warm air through walls.

OPERATING YOUR AC MORE EFFICIENTLY

There are technologies and procedures that can be implemented to ensure your AC system is running as efficiently as possible.

INSTALL A VARIABLE SPEED DRIVE (VSD)

Sites with existing compressors operating inefficiently at part loads could investigate the viability of replacing the compressor or installing a VSD that will adjust the compressor's motor speed to continually match the load.

CHECK FOR LEAKS AND INSULATE DUCTS

Visually inspect duct connections, piping, windows and door frames for leaking air, water, rust, rips or breaks and for connections or joints that have broken. If you are concerned leaks may be significant, contact your service provider to conduct a more precise leak test using pressure and air flow monitoring to determine the size of any leaks and their location.

Existing poorly-insulated ducts can be covered in duct tape to improve insulation, whereas newer ducts will often come with an R (resistance) insulation rating. In addition to saving energy, insulation will help maintain a constant temperature, reduce noise levels and prevent condensation.

CLEAN AND MAINTAIN YOUR AC SYSTEM

AC systems require regular cleaning and maintenance by qualified staff or service providers. Dirty filters and coils reduce capacity to absorb heat, and clogged filters can block airflow and decrease system efficiency.

IMPLEMENT ENERGY CONTROLS

1. Switch off your AC in unoccupied areas - when AC systems are left running for prolonged periods and doors and windows left open, there is significant energy wastage and increased costs.
2. Automated systems - automated systems can be linked to thermostats which can block the air flow to zoned areas and maintain the correct temperature in occupied areas. Larger operations often use an automated Building Management System (BMS) to control guest rooms, offices, restaurants and conference rooms and respond quickly to a range of thermal comfort requirements. For more information on Building Management Systems refer to EarthCheck's fact sheet on this topic.
3. Optimal operation of thermostats - thermostats set at 24-25°C in summer and 17-19°C in winter provide optimal comfort and energy savings. For every 1°C decrease in the set temperature during winter it may be possible to reduce energy use by 15%. Similarly, in summer every 1°C increase will decrease energy usage by 10%.
4. Turn off heat generating equipment when cooling - Remove any unnecessary heat generating equipment from air-conditioned spaces and turn off heat generating equipment and lighting, especially halogen lights, when they are not needed.

ENERGY CONTROL OPTIONS

- **Electronic access cards** - the AC system is automatically turned off when guests take their key card and leave the room. Energy can also be saved by reducing the time it takes for control circuits to turn off after guests have left the room.
- **Occupancy sensors** - these sensors can detect heat (infrared), movement or carbon dioxide levels emitted by occupants to determine when to cycle AC systems on and off.
- **Balcony and door switches** - these switches temporarily turn the AC system off when a door is open.

COOLING ALTERNATIVES

- **Evaporative coolers** - draw outside air through a wet pad and then blow it through a building, forcing hot internal air out through vents or windows. They work best in hot, dry climates as they add humidity to the air. While they consume considerably more water and require extra maintenance, they use about half of the energy consumed by an AC of similar capacity.
- **Fans** - create air movement which evaporates moisture from the skin providing a cool effect. Fans used in conjunction with AC can reduce running costs and improve efficiency.

Remember that an airtight building running an AC system is unhealthy as a certain level of ventilation is required to remove contaminants, odours, water and CO₂.

CASE STUDY



AMORA HOTEL RIVERWALK MELBOURNE

Amora Hotel Riverwalk Melbourne is a boutique 4.5 star hotel located on the banks of the Yarra River in Richmond.

The hotel is powering ahead with renewable energy and as part of their sustainable commitment, the more than 200 rooftop solar panels were installed to provide 15-20% of the hotel's electricity requirements.

The Amora Hotel Riverwalk Melbourne **installed new A/C controllers** in all rooms with a **door sensor and movement sensors**. These sensors detect when guests leave the room so that lights and air conditioning turn off automatically to reduce energy use.

OTHER INITIATIVES

- ✓ Reduced boiler and chiller run times with a building management system.
- ✓ Improved energy management by running VSDs on pumps, resetting the chiller control temperatures at different ambient temperatures.
- ✓ Sensors on all refrigeration to detect problems in a timely manner.
- ✓ Extended the hotel's domestic hot water to kitchens and staff rooms that were using electrical hot water units.
- ✓ Installed Lux sensors for all lighting circuits reducing heat and run times.