



# The Climate Wizard of Oz!



**Natural air conditioning that's out of this world,  
but won't cost the earth!**





Frank Seeley AM, Chairman and founder of Seeley International

## The INDUSTRIAL AIR-VOLUTION has begun...

Every now and then, there is a breakthrough that changes things forever, a new way of doing things that sets industry standards for years to come. Climate Wizard, from Seeley International, is such a breakthrough.

Seeley International has been synonymous with ground-breaking new technologies for nearly 40 years – and this is its most exciting development yet.

This new way of cooling is like nothing the world has seen before. For the first time, we can cool even the hottest climates in the world AND radically reduce energy use. It will change the way the world looks at air conditioning.



## What is Climate Wizard?

Climate Wizard is a completely new category of cooling – a **high-performance** indirect evaporative air conditioner. It uses the same principles as traditional (direct) evaporative cooling, but does not add water to the air as it cools.

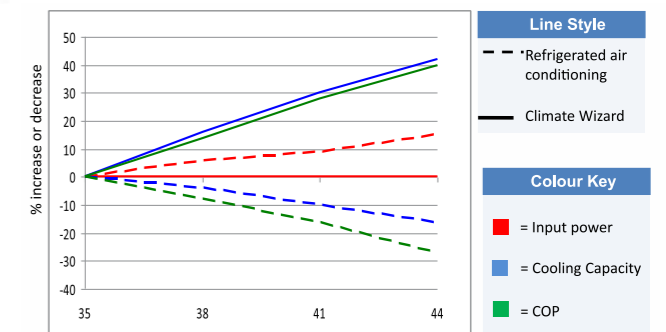
This means that Climate Wizard's cooling performance can rival that of refrigerated systems, using up to 80% less energy. That's not only great for reducing power bills, it's also great for the environment.

And, no matter how hot it gets outside, Climate Wizard uses the same amount of power and still delivers amazingly cool air inside. This is in direct contrast to refrigerated systems, which require increasing amounts of power as outside temperatures rise.

Climate Wizard's cost-saving capabilities actually **increase**, when the heat is at its highest. At the same time, Climate Wizard's performance also **increases** as temperatures rise – again, in complete contrast to refrigerated systems. (See graph.)

Climate Wizard adds no moisture to the air it cools, so you get lots of beautifully fresh, naturally-cooled air.

**Performance comparison**  
Climate Wizard v refrigerated cooling as temperature rises



Outdoor Temperature (Degrees Celsius DB)  
Source: Uni SA Roxby Downs Report June 2009

## How does it work?

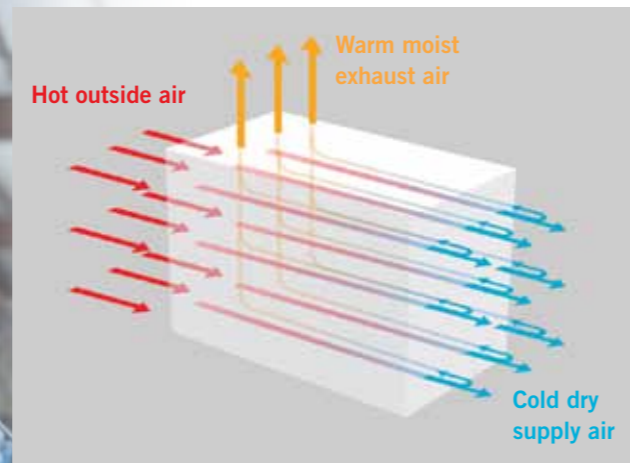
Climate Wizard is an indirect evaporative air conditioner. It works by drawing in hot outside air and passing it through a series of wet and dry channels. This allows natural evaporation to cool the air. Warm, moist air is expelled, while cooled, but otherwise unchanged, air is delivered into the building.

In some ways, this approach is similar to traditional evaporative cooling, because it contains no synthetic refrigerants and uses only water and moving air to cool. Like direct evaporative coolers, Climate Wizard uses a single, electric motor driven fan, water management system and water distribution system.

Where it's radically different, however, is its use of revolutionary new technology – an ultra-high-efficiency counterflow heat exchanger. This means Climate Wizard can use natural evaporation to super-cool the air, but without adding any moisture.

The cold air produced by Climate Wizard can be equivalent to that produced by refrigerated systems, with temperatures that approach the ambient dew-point temperature. The air delivered into the building is cold and has no added moisture. The entering cold air cools the building and is then exhausted to the atmosphere.

The diagram below demonstrates how Climate Wizard works.



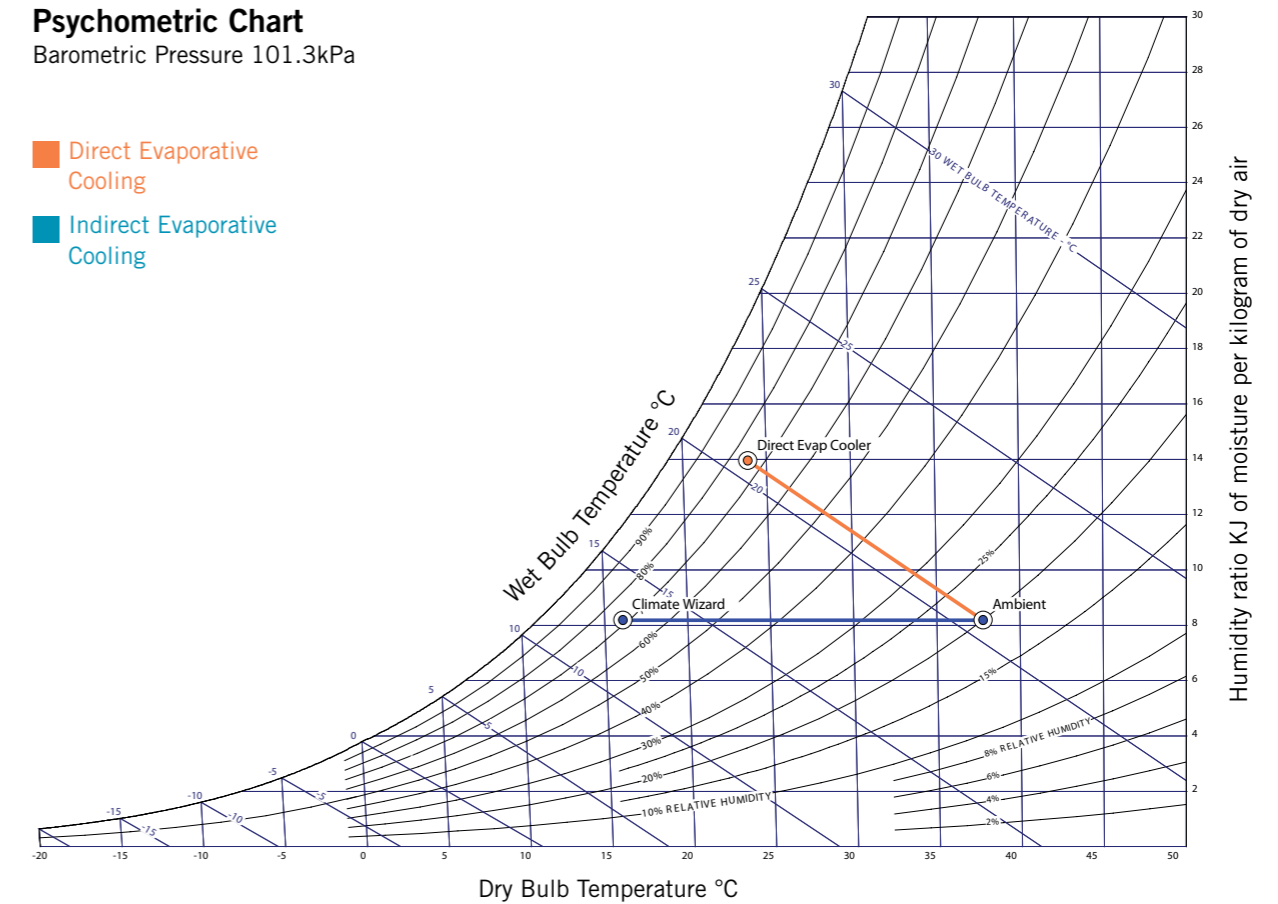
Climate Wizard's counterflow heat exchanger.

## This is how it works

- There are dry channels and wet channels, alternating throughout the heat exchanger core
- All of the air passes along the dry channels and gains no additional moisture
- The portion of the air that returns along the wet channels, does gain moisture, because the channels are continuously soaked with water. This moist air is then exhausted outside of the building
- No moisture is transferred across the membranes between the dry and wet channels; only temperature (heat) is transferred
- The heat passes out of the air in the dry channel through the membrane and into the air passing through the wet channel
- In this way, the dry channel becomes progressively colder but gains no moisture. The dry, cool air then passes into the building.

The coloured lines on the psychrometric chart compare Climate Wizard's performance to that of a direct evaporative cooler on a hot day.

**Psychrometric Chart**  
Barometric Pressure 101.3kPa



**Chart explanation:** Consider fresh air entering the cooler at 38°C dry-bulb and about 30% relative humidity. If the cooler is a direct evaporative air cooler, the fresh air passes directly through the wet cooling pad where it becomes cool and also moist, and emerges at about 23°C dry-bulb and 82% relative humidity. The process has travelled along the wet-bulb (orange) line and the air has gained about 3.5 grams/kg of additional moisture.

In the case of an indirect evaporative air cooler, the fresh air passes through the dry channel where it is super-cooled and emerges at about 16°C. But, no moisture has been added as the cooling process has occurred along the constant moisture (blue) line. The 'wet-bulb effectiveness' of Climate Wizard is about 125%, whereas regular direct air coolers have a wet-bulb effectiveness of about 85%.

Climate Wizard can be used on its own to provide stand-alone cooling, or in conjunction with new or existing refrigerated systems to slash energy use and reduce load on plant.

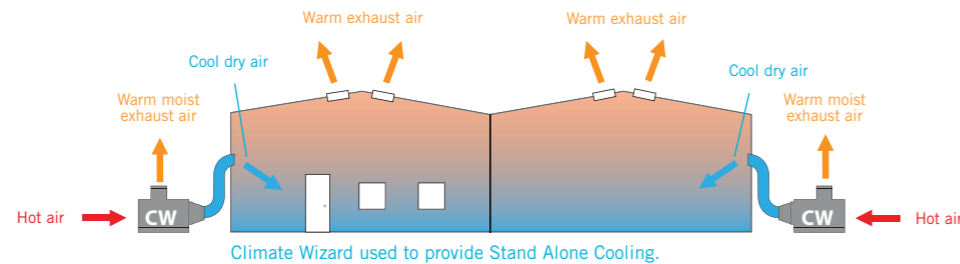
It can be used in three different configurations and has a large range of applications – covering new or existing buildings. All three configurations deliver significant energy savings, thereby reducing greenhouse gas emissions.

### INSTALLATIONS INCLUDE

- data centres
- food processing plants
- offices
- factories / warehouses
- supermarkets
- leisure centres
- education faculties
- commercial / industry sites

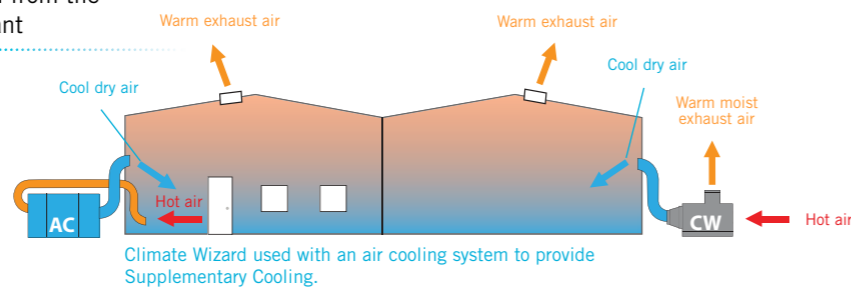
## Stand Alone Cooling

- Delivers all the cooling required for the building – no other equipment required
- No moisture is added into the building
- Ideally suited to the addition of in-line heating equipment
- Product of choice where indoor moisture must not be increased and low cost air-cooling is required
- Depending on latent load, up to 50% of return air can be re-circulated through the Climate Wizard for added savings.



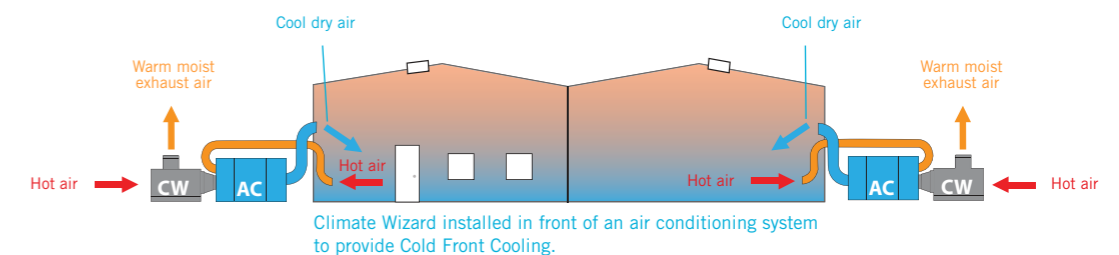
## Supplementary Cooling

- Serves the same purpose as Cold Front Cooling
- Used where physical layout of existing plant prevents Climate Wizard being installed directly on to the main refrigerated air conditioning plant
- Also used to provide fresh cool air, where split air conditioning is installed
- Designed to provide all the fresh air that any system requires, removing that load from the main plant
- Depending on latent load, up to 50% of return air can be re-circulated through the Climate Wizard for added savings.



## Cold Front Cooling

- Climate Wizard pre-cools all the required fresh air before it enters the refrigeration plant
- This is achieved with much lower energy use than the refrigeration plant consumes to deliver the same temperature, thereby taking significant load off the plant and cost off the cooling bill
- The total cooling capacity of Climate Wizard actually rises with increasing temperature, in contrast to the refrigerated air conditioning, where the capacity decreases with increasing temperature
- Depending on latent load, up to 50% of return air can be re-circulated through the Climate Wizard for added savings
- Easily retrofitted to existing air conditioning plant for immediate cost and energy savings, and load relief for both the plant and the electricity supply infrastructure
- For new air conditioning system design, Climate Wizard offers the option of downsizing the refrigeration equipment, where Climate Wizard provides all the fresh air.



## Reduce load on plant

Your air conditioning plant is designed to constantly introduce a percentage of fresh air – usually 10% to 25% of the total air quantity being delivered into the building. In summer, this fresh air can be very hot and must be cooled, which requires large amounts of energy... and that means running costs increase.

Climate Wizard can pre-cool fresh air for a much lower cost, removing this cooling load from your existing plant. Not only do you save money on your power bill, but you also save expensive wear and tear on your air conditioning plant, extending its useful life.

### New and existing projects

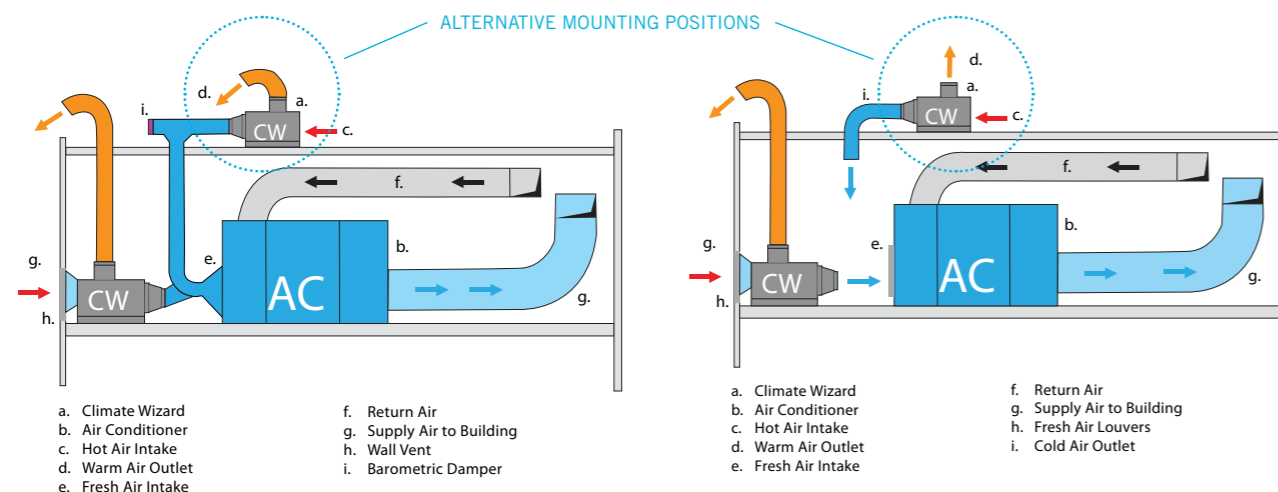
Climate Wizard is easy to fit to existing buildings with refrigerated air conditioning plants, as well as brand new projects. In most cases, some design expertise will be required to correctly apply the Climate Wizard system. This can be provided by Seeley International, an HVAC advisor or by your Consulting Engineer, depending on the complexity of the project.

If you want more cooling than you currently have, with minimum disruption to your operations, install Climate Wizard as a Stand Alone or Supplementary system into your building:

- Regular air conditioning practices apply to the system design regarding duct sizes, outlet registers/diffusers, etc
- It will not interfere with your existing air conditioning system because it adds no moisture – in fact, it will enhance its performance
- The additional airflow into the building must be accounted for either by adding natural exhausting, or by adding mechanical extraction

Climate Wizard produces large amounts of cool air at very low cost, so use it as a Stand Alone system, or in conjunction with refrigerated systems – either way, it will save you lots of money. Climate Wizard takes load off your existing air conditioning plant when you employ it for fresh air pre-cooling, thereby removing load from your existing air conditioning compressors as well.

If you want to simply reduce the cost of running your existing air conditioning plant, install Climate Wizard as a Cold Front Cooling system. Climate Wizard can be ducted directly into the fresh air intake of your plant, or it can be delivered into the plant room, as shown in the diagrams below. Alternatively, it can be a Supplementary installation, remote from the plant, and discharging all of the required fresh air into the conditioned space.



Pre-cooling of all the fresh air entering your air conditioning plant removes that load off your compressors, reducing running costs and extending the life of your plant.

### The great advantage

The great advantage of installing Climate Wizard cooling technology into new buildings is that all of the air conditioning equipment can be designed to accommodate the Climate Wizard system, resulting in a host of savings in both original equipment and running cost:

- Input energy costs are reduced
- Equipment capital costs are reduced
- Equipment maintenance costs are reduced
- Equipment lifetime is extended
- The carbon footprint of the building is reduced
- Indoor air quality is noticeably improved
- Floor area utilisation factor is improved
- The constant circulation of fresh air through the building can eliminate many causes of sick building syndrome
- Static electricity occurrence is minimised
- Employee wellbeing is increased due to having more fresh air.

Further cost reductions may be achieved when return air is directed through the Climate Wizard since lower supply air temperatures from the Climate Wizard are possible.

### Climate Wizard comparisons

Climate Wizard is different to direct evaporative coolers because:

- Indirect evaporative air conditioning does not add any moisture to the supply air and can cool the supply air to about the same temperature as a refrigerated air conditioner, which means it can be used in a very wide range of geographic locations;
- The supply air temperature is always lower than the ambient wet-bulb temperature and approaches the dew point temperature;
- The external duct resistance capability is much higher; and
- The airflows can be much lower than for direct evaporative coolers, because the supply air temperature is lower. Therefore, not as much air is required, so the duct sizes can be substantially smaller.

Climate Wizard is remarkably different from other indirect evaporative coolers because of:

- Low supply air temperatures;
- High heat exchange efficiency;
- Low maintenance;
- High wet-bulb effectiveness;
- High external duct resistance capability;
- A unique supply air volume control damper;
- A revolutionary counterflow heat exchanger; and
- Chlorine generators in order to ensure a healthy water system.

### Refrigerated air conditioning has a challenger!

Climate Wizard ranks as a legitimate contender alongside regular refrigerated air conditioners. It can either replace refrigerated systems or significantly reduce their energy usage.

The table shows a comparison between Climate Wizard and refrigerated air conditioning.

As you can see, Climate Wizard delivers fresh, amazingly cool air, with greatly reduced energy consumption.

Capital costs to install are similar, but Climate Wizard's running costs are much lower. The main difference is that refrigerated systems remove moisture from the air as they cool, whereas Climate Wizard does not remove (or add) any moisture to the air.

	Climate Wizard – Indirect	Refrigerated air conditioning
<b>Temperature of supply air</b>	Cold	Cold
<b>Moisture control</b>	No moisture added or removed	Moisture removed
<b>Moisture control impact</b>	Preserves essential moisture	Removes essential moisture
<b>Fresh air control</b>	100% fresh air	Maximum about 25% fresh air
<b>Fresh air control impact</b>	100% fresh air eliminates many causes of Sick Building Syndrome	Recycled air can result in Sick Building Syndrome
<b>Capital costs – installed</b>	Similar	Similar
<b>Running costs</b>	Very low	Very high
<b>Energy consumption</b>	Very low	Very high
<b>Refrigerant type used</b>	Natural – H <sub>2</sub> O (water)	Synthetic – Hydrofluorocarbons
<b>Environmental impact</b>	No synthetic refrigerants	Synthetic refrigerants have very high global warming potential. They damage the environment as they leak into the atmosphere over time

## PERFORMANCE

Whether it's airflow, pressure, cooling capacity, or efficiency, Climate Wizard tops them all. At Seeley International, we rigorously test all of our energy efficient products, to ensure they surpass the relevant standards.

## HIGHEST COOLING CAPACITY

The Climate Wizard counter-flow heat exchanger has an amazing ability to produce very cold air. This occurs because of the way the wet-bulb evaporation efficiency is intensified within the core as the wet-bulb temperature is pushed lower and lower along the wet channels.

## HIGHEST WET-BULB EFFICIENCY

Nothing about the Climate Wizard's performance happens by chance. Every aspect of the core design has been researched over many years. The result? A low energy consumption cooler that cannot be matched for performance by any other similar product.

## 100% FRESH AIR

100% fresh air means really healthy indoor air quality. Evaporative air coolers have always delivered 100% fresh air but Climate Wizard's cooling technology delivers much cooler air that has no added moisture! How cool is that?

Conventional refrigerated systems use very high proportions of return air because the cost of cooling 100% fresh air is exorbitant in those systems. When 100% fresh air is delivered into your building with Climate Wizard, you eliminate many causes of "sick building" syndrome.

In using Climate Wizard cooling technology, your climate control system will far exceed the Government regulations for indoor ventilation rates because Climate Wizard can supply 100% fresh air all of the time.

## NO ADDED MOISTURE

Climate Wizard cools without adding any moisture to the delivered air. By ensuring that the supply and delivered air never come into direct contact with water, Climate Wizard can use the natural process of evaporation to provide lots of fresh, cool, air, without adding any moisture.

## BUILDING MANAGEMENT INTEGRATION

Climate Wizard cooling technology is easily integrated into building management systems.

- Every Climate Wizard comes with a standard thermostat wall control, and cable plugged at both ends for easy, fault-free installation.
- Every Climate Wizard air conditioner comes with an in-built interface panel that can be connected into building management systems, or to local custom-designed management systems, eg Programmable Logic Controller (PLC).
- The Climate Wizard interface panel receives digital and analogue inputs for system ON-OFF, pump ON-OFF and fan speed control. It also has a system alarm contact that can be connected to a central alarm facility.
- ON-OFF inputs must be in the range of 4 - 32 volts DC.
- Fan speed input must be 0 - 10 volts DC.

## CONSTANT AIRFLOW UP TO 200 PA (0.8" WG)

The unique adjustable discharge damper can be varied to achieve constant airflows at full speed, regardless of downstream resistance, up to a total external resistance of 200 Pa.

## STATIC PRESSURE COMPENSATION

In order for the counter-flow heat exchanger to function correctly, the pressure in the discharge transition must be carefully set after the Climate Wizard is connected to ductwork, during installation. A manual damper is fitted to the discharge opening for this purpose and should be set at the time of commissioning the completed system. Full instructions are provided in the installation manual.

## WATER MANAGEMENT SYSTEM

Climate Wizard is designed to use water efficiently, using less water and less energy.

To use water efficiently in an evaporative air conditioner, you have to optimise a number of factors. Climate Wizard has the highest evaporation efficiency of any indirect evaporative air conditioner in the world. That means it produces more cooling per litre (gallon) of water than any other air conditioner, making it much more environmentally friendly than other systems.

Most fresh water contains some dissolved salts that can be deposited as water moves through the air conditioner. If these dissolved salts build up, they can reduce an air conditioner's efficiency. Climate Wizard has a unique water quality measuring system that allows clean, fresh water into the reservoir but drains just enough water to stop salt building up. Electrodes in the water constantly monitor the water quality, sending data back to the electronic module that then activates the water control as needed.

Climate Wizard optimises the water usage and watering frequency to exactly the correct amount to ensure maximum evaporation efficiency and minimum water consumption.

## INBUILT CHLORINATION

Chlorine eliminates harmful bacteria. Climate Wizard incorporates chlorine generation, which destroys bacteria in the water to keep the water healthy. These chlorinators are designed so that they have a very long life. No additional chemicals are required to make them function.

## AIR FILTER

All inlet air is cleaned through an air filter. You receive fresh, clean air with minimum outside dust and airborne particles. An air filtering assembly is fitted to the inlet of the Climate Wizard that contains pleated, disposable cartridges that are easily removable for cleaning and/or replacement.

## Environmental benefits of Climate Wizard

Not only does Climate Wizard reduce energy use by up to 80%, it also uses no synthetic refrigerants. This means no harmful CFCs are released into the atmosphere. Climate Wizard does not require any additives to maintain cooling performance and hygiene.

And, Climate Wizard uses water sparingly, so it does not require large amounts of water to deliver all of its many unique benefits.

## GREEN BUILDINGS

Perfect timing! Climate Wizard has entered the global air-conditioning arena at precisely the right time - when building owners world-wide are looking for ways to 'green' their buildings, save running and maintenance costs and demonstrate their environmental credentials.

Air-conditioning systems in buildings are major contributors to high building costs and greenhouse gas emissions. They also use up huge amounts of available power - power generating costs are driven to very high levels under peak load conditions in summer, due almost exclusively to demand for air conditioning.

More designers and consulting engineers are now recognising how Climate Wizard's cooling technology can minimise greenhouse gas emissions, as well as reduce upfront capital and running costs for new buildings. They are specifying Climate Wizard systems, either as Stand Alone, Supplementary or Cold Front Cooling.

## EMISSIONS

Using Climate Wizard cooling technology with, or in place of, refrigerated cooling significantly reduces greenhouse gas emissions. Climate Wizard's innovative, energy-saving design delivers large quantities of very cold air for a fraction of the power used by conventional refrigerated systems.

As more people choose Climate Wizard, the impact on reducing greenhouse gas emissions will become even more significant. Because far less electrical power is used, CO<sub>2</sub> emissions will be reduced right at the power station! Imagine having no power failures due to overloading of the power supply during peak demand on a hot summer day.

Every Climate Wizard you install will save the environment from more unnecessary CO<sub>2</sub> emissions - and save you money!

## SEELEY INTERNATIONAL

Seeley International is Australia's largest air conditioning manufacturer and a global leader in developing ingenious, energy-efficient cooling and heating products.

**Our vision is to lead the world in creating climate control solutions which continue to be highly innovative, of premium quality and inspirational in their delivery of energy-efficiency.**

But it's more than just a vision... it's a way of life!

A commitment to innovation and excellence is at the heart of all that we do. Our success in delivering on that commitment has been recognised by our many awards and our expanding global presence... Seeley International now exports to more than 100 countries. Not bad for a company that started out in 1972 in the garage of its founder and Chairman, Frank Seeley!



### Awards



[climatewizard.com.au](http://climatewizard.com.au)



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