

# THE FACTS ABOUT POOL COVERS - FACT SHEET 2

## Heating Capabilities

**A properly fitted and used Daisy Pool Cover will result in a pool that is significantly warmer to swim in.**

**Up to 8°C warmer.**

**If your pool is one of a growing number that is heated – a Daisy Pool Cover can reduce your heating energy costs 50 to 70%.**

**These are well proven scientific facts, and this Fact Sheet spells out the background to these benefits.**

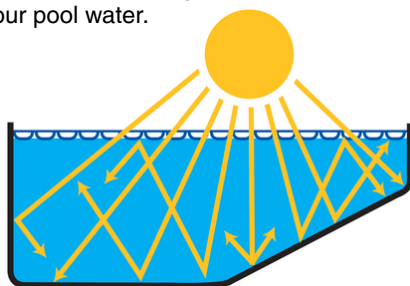
**PLEASE NOTE – CORRECT TERMINOLOGY:** The definition of 'transparent' is not 'clear' as many people think. It means, "allowing light to pass through so that bodies can be distinctly seen" – what is commonly referred to as 'translucent'. There are degrees of transparency, depending on colour and how much the light is diffused. 'Transparent' covers is the term correctly used in the scientific sources quoted and we also use it for consistency.

### How does a Daisy Pool Cover heat my pool?

Water is an excellent absorber of the sun's energy, and two metres of the world's oceans absorb close to 85% of available solar energy.

Free solar energy from the sun passes through the transparent Daisy Pool Cover to heat your pool water.

The Daisy Pool Cover continues to transmit solar energy into the pool while insulating and preventing evaporative heat loss - resulting in a warmer pool and an extended swimming season.



### Why must the cover be light-coloured?

To heat your pool to the maximum possible temperature. The US National Renewable Energy Laboratory says that outdoor pools can gain a significant amount of heat from the sun, absorbing 75 to 85% of the solar energy striking the pool surface.

They go on to say that a transparent bubble cover [like Daisy's] may reduce solar energy absorption by as little as 5% - but a dark cover can reduce it by as much as 40%.

It's common sense really - car windows are tinted to cut down the amount of heat inside the car. They do this by reducing the penetration of solar energy through the glass. Dark pool covers will still allow some solar warmth to reach the pool water. However, they allow much less - or no - direct penetration of solar energy.

Rather than the efficient direct energy transmission of transparent covers, they rely on the cover itself becoming hot, and this heat then being transmitted to the pool water.

A transparent Daisy Pool Cover transmits the maximum solar energy, and therefore heat, directly and efficiently to the pool water. To quote the CSIRO Department of Mechanical Engineering: *"The reason for recommending a transparent cover is because it allows solar radiation to enter the water during the day; thus heating the pool as though the cover was absent. The less transparent the cover the less solar radiation entering the water."*

For trial results on the greater warming of lighter bubble materials against darker, please refer to the concluding paragraph of the section: How much warmer will my pool be?

### How much warmer will my pool be?

According to the CSIRO Division of Mechanical Engineering, the water temperature in an unheated swimming pool depends on the total solar radiation absorbed in the water and on the rate of heat loss from the water.

In an open pool exposed to sunshine, the water temperature is normally close to the mean air temperature. Although it's very much subject to personal preference, the CSIRO concludes that the minimum acceptable water temperature for swimming is around 20°C - and the desired level seems to be about 25°C.

As early as 1960, the CSIRO Division of Mechanical Engineering proposed transparent solar pool covers exactly like those Daisy manufacture as a cost-effective means of providing solar heating for outdoor swimming pools.

Predicted Average Water Temperatures (°C)													
Location		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Melbourne	no cover	21.8	21.3	19.0	15.2	11.3	9.1	9.0	10.7	13.3	16.3	18.7	20.7
	with cover	28.0	26.7	23.2	18.1	13.1	10.7	10.7	13.1	16.6	20.9	24.2	26.8
Adelaide	no cover	22.5	22.5	20.2	16.8	13.8	11.1	10.9	12.7	15.6	17.7	20.0	21.8
	with cover	28.8	28.2	24.7	20.1	16.3	13.1	13.1	15.7	19.8	22.6	25.8	28.1
Perth	no cover	23.5	23.1	21.6	18.6	15.3	13.3	13.0	14.2	16.5	18.6	21.1	22.9
	with cover	30.3	29.4	26.8	22.3	18.0	15.7	15.6	17.6	20.9	24.2	27.8	30.1
Sydney	no cover	24.3	23.5	22.8	19.0	15.1	12.3	11.9	13.7	16.9	20.2	22.6	23.7
	with cover	29.9	28.2	27.4	22.3	17.8	14.6	14.5	17.0	21.1	25.6	28.7	29.5
Brisbane	no cover	27.0	22.5	20.2	16.8	13.8	11.1	10.9	12.7	15.6	17.7	20.0	21.8
	with cover	33.3	28.2	24.7	20.1	16.3	13.1	13.1	15.7	19.8	22.6	22.6	28.1

Swimming Season - No Cover >20°C. Extended Swimming Season >20°C

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The CSIRO also predicted pool water temperatures with a transparent, double-layer cover such as Daisy's. Here are the results (See Graph on reverse of this Factsheet).

Using the CSIRO minimum swimming temperature as a guide, they predicted a pool cover such as Daisy's would double the swimming season in Melbourne from just 3 months to 6 - with no cost for heating your pool.

Elsewhere, you could gain 3 to 4 months additional use from your pool, just depending on your own temperature preference. The highest temperature increase predicted in this table was 7.2°C - and the CSIRO concluded in their Technical Report No. 12/A/3 that a transparent pool cover will increase pool temperature by 'about 7°C'. This prediction was later independently confirmed by scientists at Rheem's Rydalmere Research Centre.

A controlled trial using identical insulated above-ground pools complete with filters and pumps used computer-linked sensors to monitor temperature in pools with and without pool covers. This trial confirmed a temperature increase of over 7°C in the pool with the transparent bubble cover. The Rheem trial also compared the performance of lighter-coloured bubble covers against darker-coloured bubble material.

The results were consistent and clear.

Lighter-coloured bubble covers consistently heated the pool water to a higher temperature than darker bubble material in controlled tests in realistic "full-size" pool tests.

### How does a pool cover retain heat?

According to the US National Renewable Energy Laboratory, almost all of a pool's heat loss - about 95% - occurs at the surface, mostly through evaporation to the air and radiation to the sky.

A Daisy Pool Cover effectively eliminates evaporation (see Fact Sheet No 1: Evaporation) when in place, therefore effectively eliminating this means of heat loss.

Daisy's advanced bubble profile (see Fact Sheet No 3: UltraDome™ Profile) also makes a Daisy Pool Cover a highly efficient insulating barrier against radiant heat losses.

### What if my pool is heated?

If your pool is heated - you must have a pool cover.

In colder overseas climates, such as parts of the United States, Europe and the United Kingdom, domestic pools are routinely heated, as are many domestic and large commercial or community outdoor pools in Australia.

Many scientific studies are available that clearly demonstrate the benefits of pool covers for heated pools. A growing number of domestic pools in Australia are also heated by various means.

However a pool is heated, if you don't have a pool cover, then evaporation and radiation will see a vast amount of heating energy wasted.

Evaporation not only wastes precious water, it also causes enormous heat loss from a pool. The reason is that evaporating water requires tremendous amounts of energy.

British Thermal Units (BTU) are a measure of the amount of energy required to raise or lower the temperature of a fixed mass of water by fixed amount.

It takes only 3 BTU to raise the temperature of 1.5 litres of water by 1°C - but, each 1.5 litres of 27°C water that evaporates takes a massive 3144 BTUs (921 watt hours) of heat out of the pool.

According to the US National Renewable Energy Laboratory - a pool cover is the single most effective means of reducing pool heating costs - and can reduce your heating energy bill by 50 to 70%.

If your pool employs solar heating, the Australian Standard for Solar Heating Systems for Swimming Pools contains an Appendix describing solar pool covers as a, "useful energy conservation measure with any type of pool."

This document recommends the use of solar pool covers on the basis of their capacity to:

- Reduce or eliminate evaporation - and consequent heat loss - from the surface of the pool
- Reduce heat loss by convection
- Reduce chemical use
- Reduce removal of leaves and debris
- Provide additional solar heating

A Daisy Solar Pool Cover will heat your unshaded outdoor pool by up to 8°C using free solar energy.

So, when you choose to run your pool heating system to extend your swimming season, you won't need to use nearly as much energy with a Daisy Pool Cover because the water will be warmer to begin with and insulated against heat loss.

### Every pool needs a Daisy Pool Cover

Wherever you live in Australia, a Daisy Pool Cover can warm your pool by up to 8°C and significantly extend your swimming season.

If your pool is heated, it can cut your heating energy costs by 50 to 70%. It does this primarily by insulated against heat loss, effectively eliminating evaporation, therefore saving a huge amount of water. Australian local, State and Federal Governments and all Water Authorities advocate pool cover use, as do many similar bodies right around the world.

By fitting a Daisy Pool Cover you'll have a warmer pool you can swim in for longer each year, save money and cleaning time, and you'll be doing the right thing in conserving our country's most precious natural resource - water.

### References

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Conserving Energy and Heating Your Swimming Pool with Solar Energy, US Department of Energy, National Renewable Energy Laboratory, July 2000

Czarnecki, J T, (1978) Swimming Pool Heating by Solar Energy, CSIRO Division of Mechanical Engineering Technical Report No TR 19

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