



#### CoolGuard™ specific benefits:

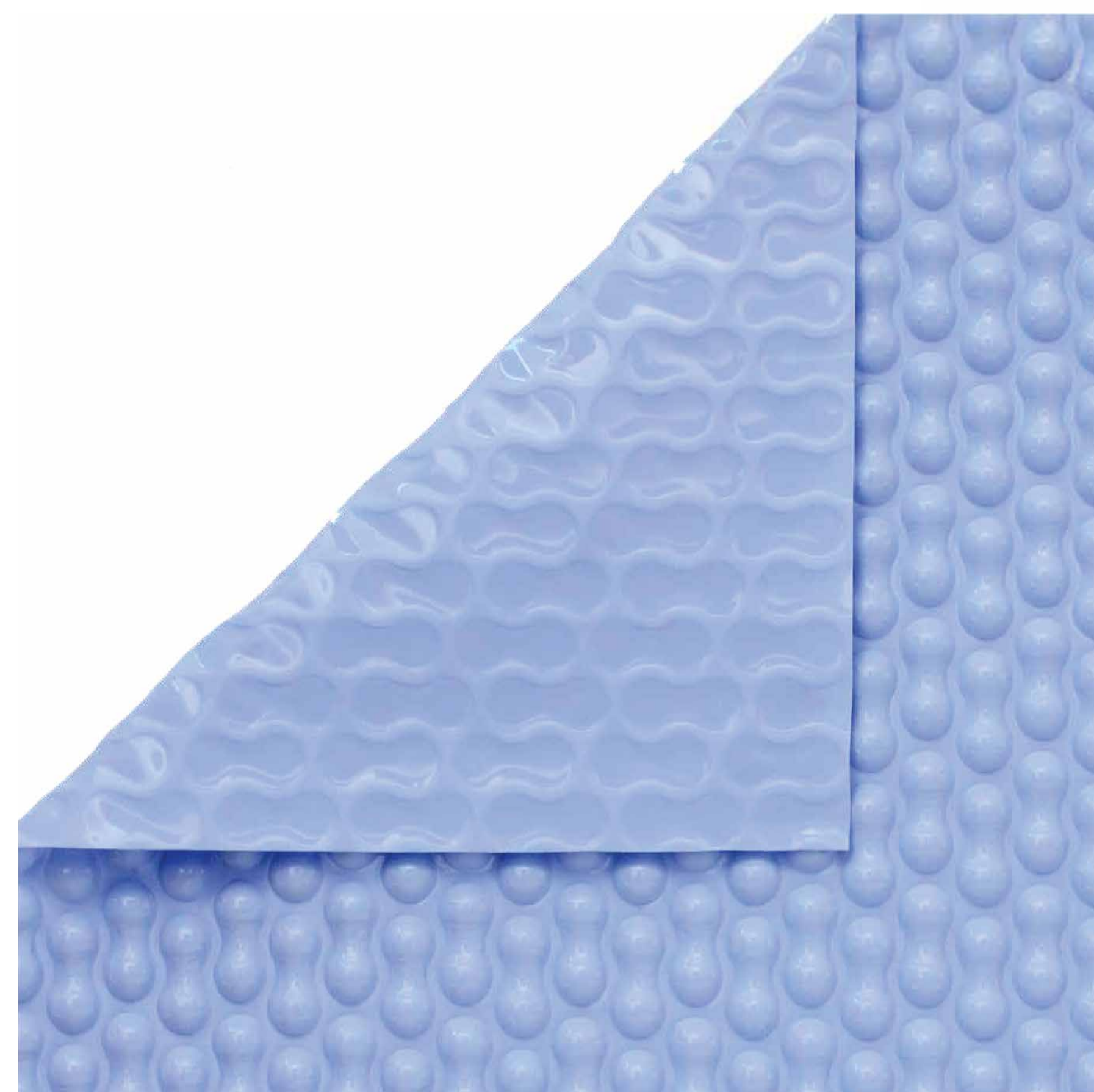
- Reduces daily solar gains by 55%
- Keeps the water 10% cooler
- Reflects 65% of all solar radiation
- Reduces chemical consumption by up to 75%
- Saves money and Energy
- 6 years + expected lifespan

#### General cover benefits:

- Available with GeoBubble™ technology
- Eliminates water evaporation by 98% +
- Reduces debris contamination
- Reduces the pool's carbon footprint

CoolGuard™ Ultra is a new, innovative solution to water temperature management. Its highly reflective, glacial blue colour provides effective protection against solar radiation. Scientifically developed to reduce solar energy entering the pool, CoolGuard™ Ultra is the latest development in temperature regulation pool covers.

CoolGuard™ Ultra is the 2nd generation pool temperature regulation cover from Plastipack Ltd. With a 70% increase in light reflectivity compared with the original, CoolGuard™ Ultra drastically reduces the amount of solar radiation able to penetrate through the cover, protecting the water underneath. In the UK, it has been shown to keep the water 3.5°C cooler than an uncovered pool, providing a refreshing water temperature. Furthermore, the highly reflective nature of the cover means that in hotter climates, this figure is estimated to rise as the strength of the radiation from the Sun increases. CoolGuard™ Ultra also reduces the chemical consumption of the pool by 75%, significantly reducing maintenance time and costs. Ultimately, CoolGuard™ Ultra provides a simple and effective solution to water temperature management in the swimming pool industry.



#### ***What is GeoBubble™ technology?***

The GeoBubble™ material has a geometric bubble shape developed specifically for swimming pool covers, increasing the material's longevity and boosting overall performance.

Traditional bubble designs exhibit excessive thinning at the corners resulting in a far more vulnerable material susceptible to premature degradation.

The smoother shape of the patented GeoBubble™ technology eliminates these weak points with a material 50% thicker at its thinnest points than those using the traditional bubble designs. With the inclusion of a larger air cell profile and addition of a structural arch to withstand air expansion and prevent bubble collapse, combined with Plastipack's UV anti-oxidising additive packages, the material's lifespan has been increased by over 25%.

## Testing

At the unique test facilities at Plastipack Ltd. in the South East of the UK, CoolGuard™ Ultra was tested against a pool covered with the previous CoolGuard™ product (a reflective blue top surface and a black bubble layer), and an uncovered pool



The 5 pools used are 8m x 4m x 1.15m deep, containing thermocouples at 6 different depths to monitor temperatures throughout the pool. The temperature is taken at 5-minute intervals 24/7, and logged centrally. The results included in this study are from June 2018, when the covers were tested simultaneously.

## Laboratory Testing and Development

Collaborating with the University of Surrey, Plastipack Ltd also characterised various trial materials for their optical properties, allowing calculations to be made about their performance on a pool. Using custom built computer analysis programmes, Plastipack Ltd was able to maximise performance through repeated testing and development.

Figure 1 shows the difference in performance over 24 hours between a pool covered with CoolGuard™ Ultra, and an uncovered pool. CoolGuard™ Ultra reduces temperature gains in the day from the Sun by 55% compared with an uncovered pool, meaning that during the hottest part of the day the pool is 55% cooler than it would be if it were left uncovered.

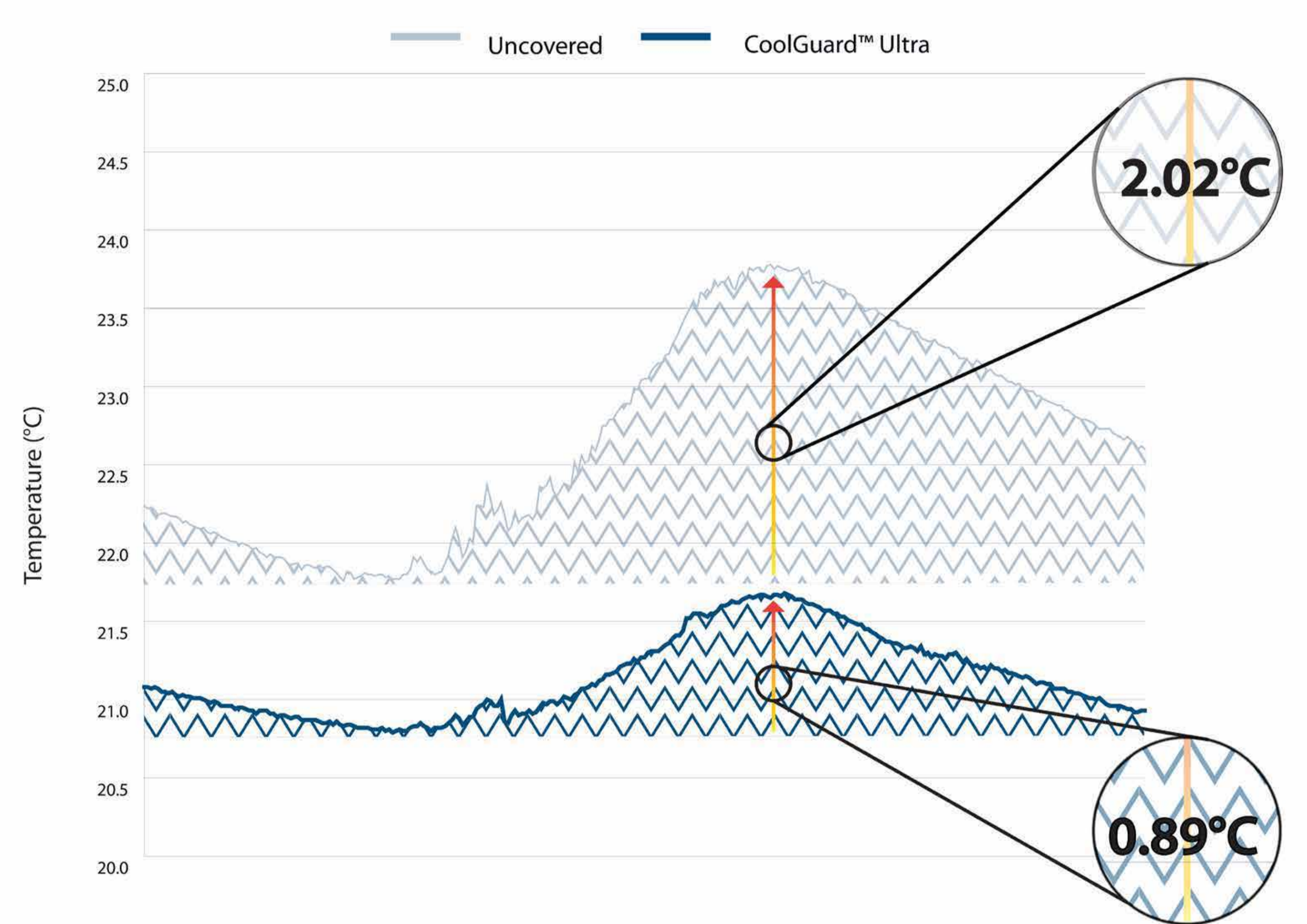


Figure 1: Graph comparing the performance of the covers over a 24 hour time period in June 2018

As Figure 2 shows, the 55% reduction in daily solar gains will equate to a cooler pool over a number of days. The water covered by CoolGuard™ Ultra ended 10% cooler than an uncovered pool during early June 2018 after an extensive test duration. The insulation value of the cover coupled with the evaporation control means that the uncovered pool will lose more heat at night, but over a number of days, CoolGuard™ Ultra will result in a 10% cooler pool by preventing 55% of the daily solar gains.

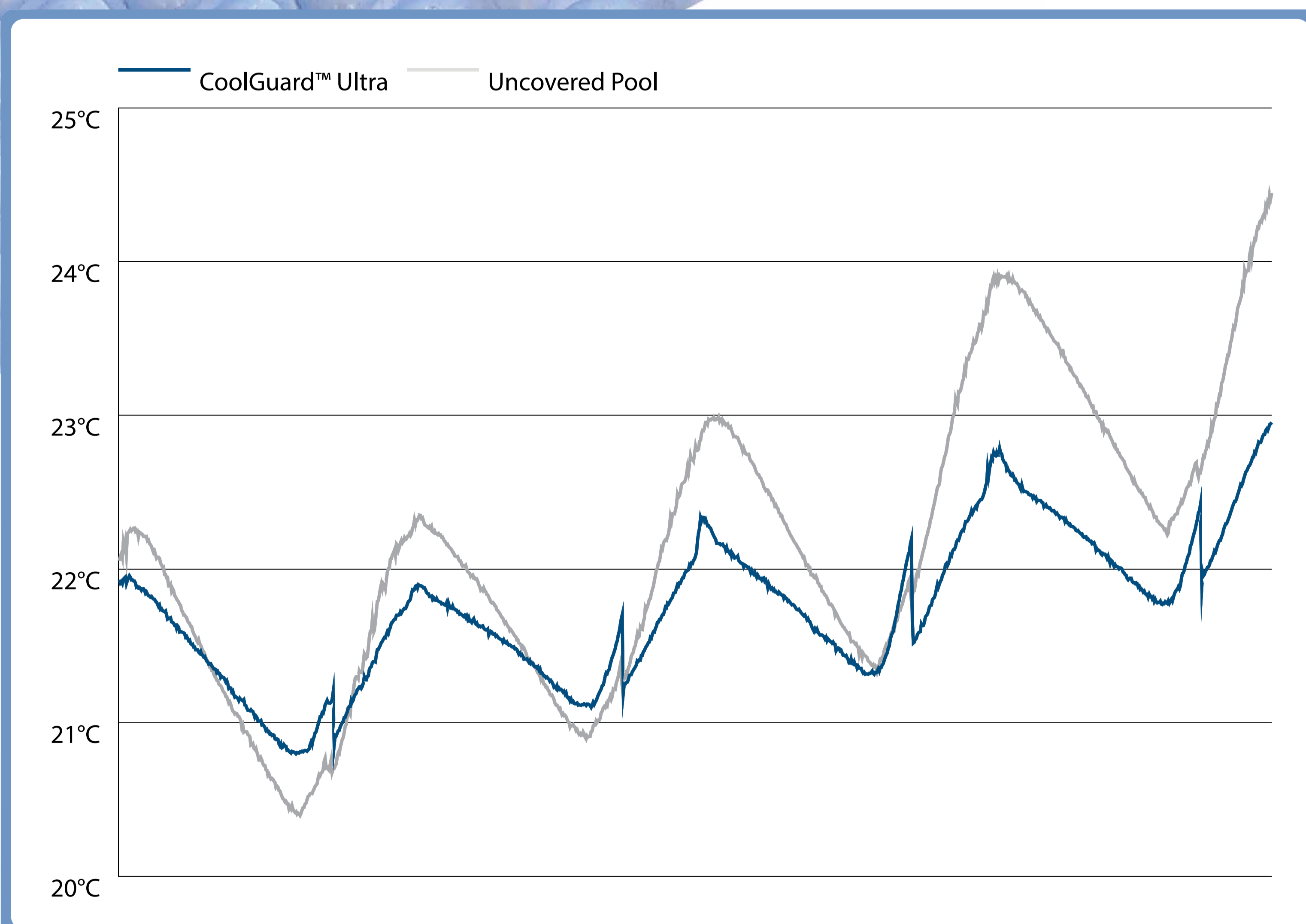
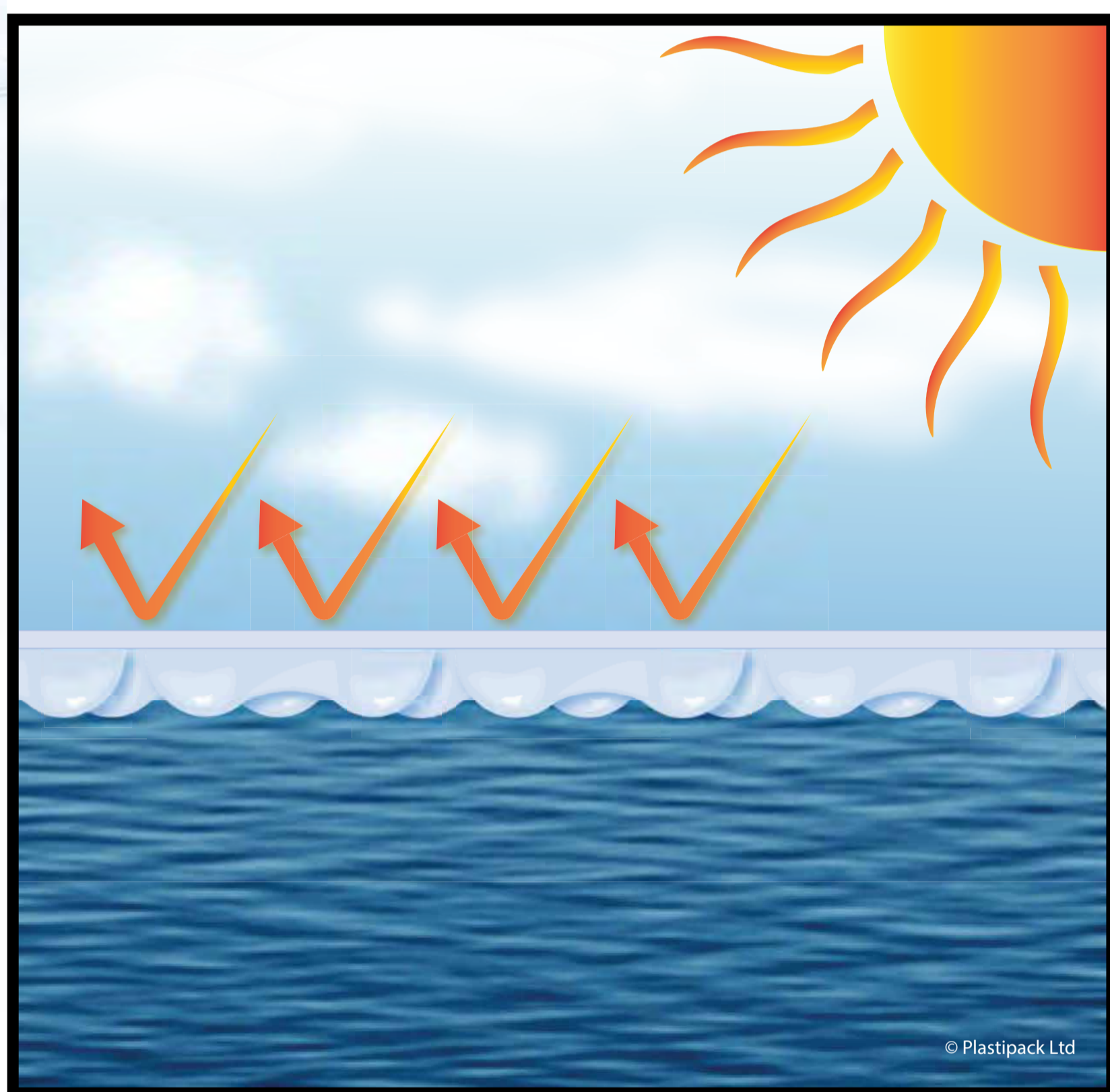
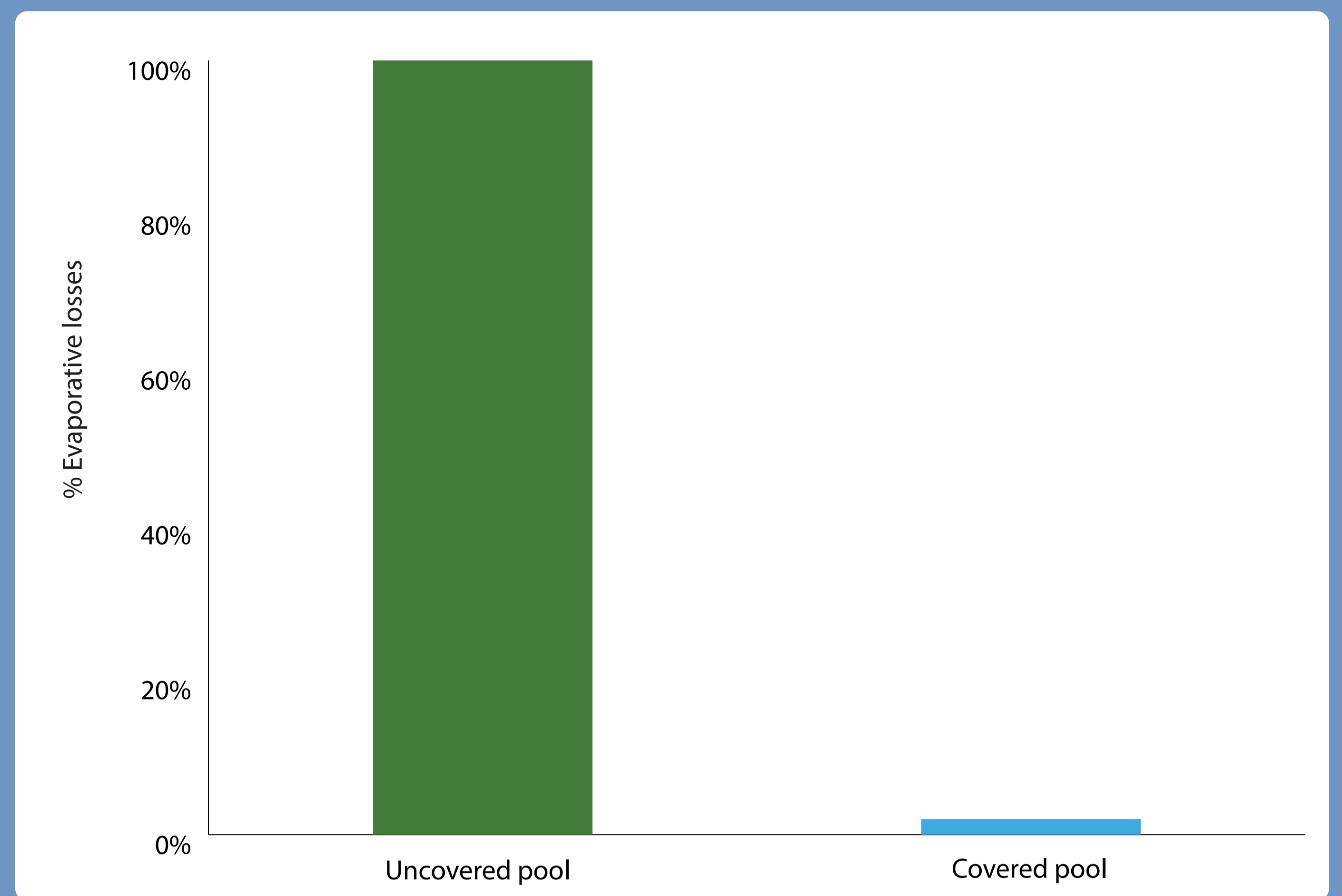


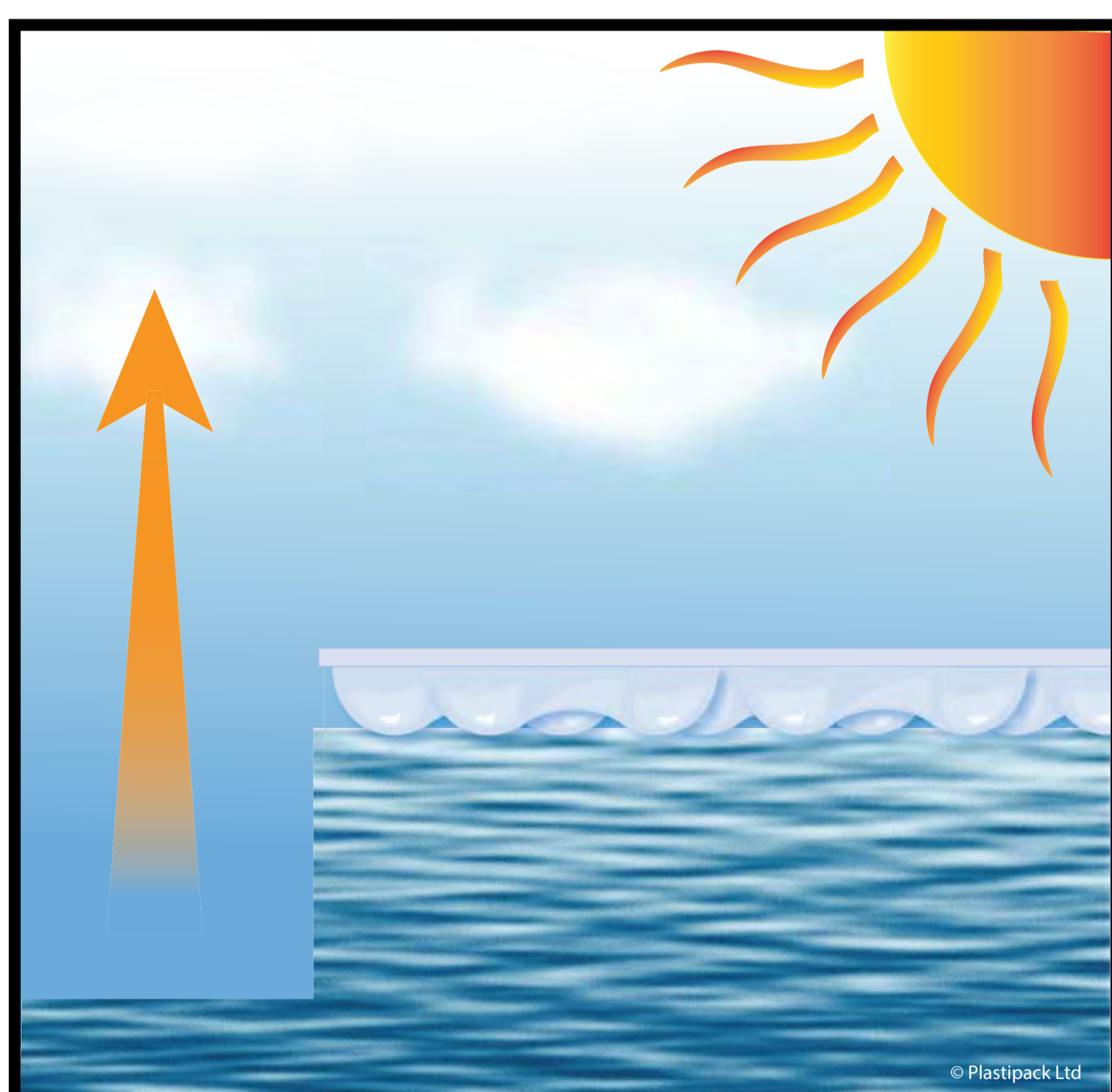
Figure 2: Longer Test of CoolGuard™ Ultra and an uncovered pool

## Evaporation Prevention

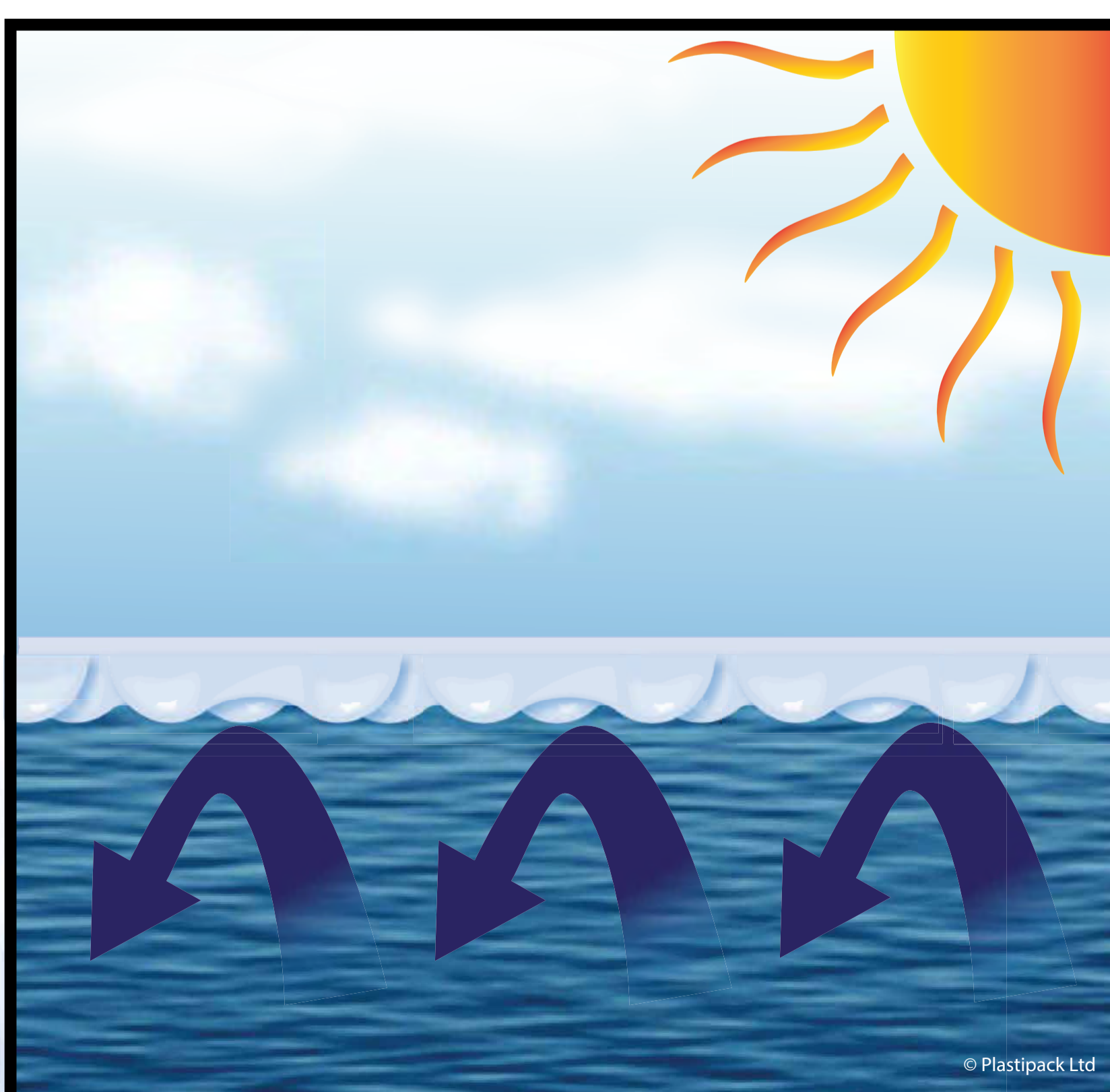
To test a pool cover's ability to curb evaporation, Plastipack conducted tests using two unheated outdoor tanks, each measuring 1 x 1.5 x 0.435m. One tank was covered, the other left uncovered. This test was done in July 2008 in the South East of the United Kingdom. The covered tank showed a 98% reduction in water losses. This equates to a saving of approximately 32,000 litres per year for an average sized pool of 4m x 8m. This saving would be considerably higher in hotter climates and in areas subject to high winds. A swimming pool cover or solar blanket eliminates almost all water evaporation, saving water resources and enabling a more sustainable pool with a lighter water footprint. Without the natural cooling effect that occurs when water is converted to vapour and released into the atmosphere, more stable water temperatures are achieved.



**Reflects heat**



**Prevents evaporation**



**Insulates to prevent heat transfer**

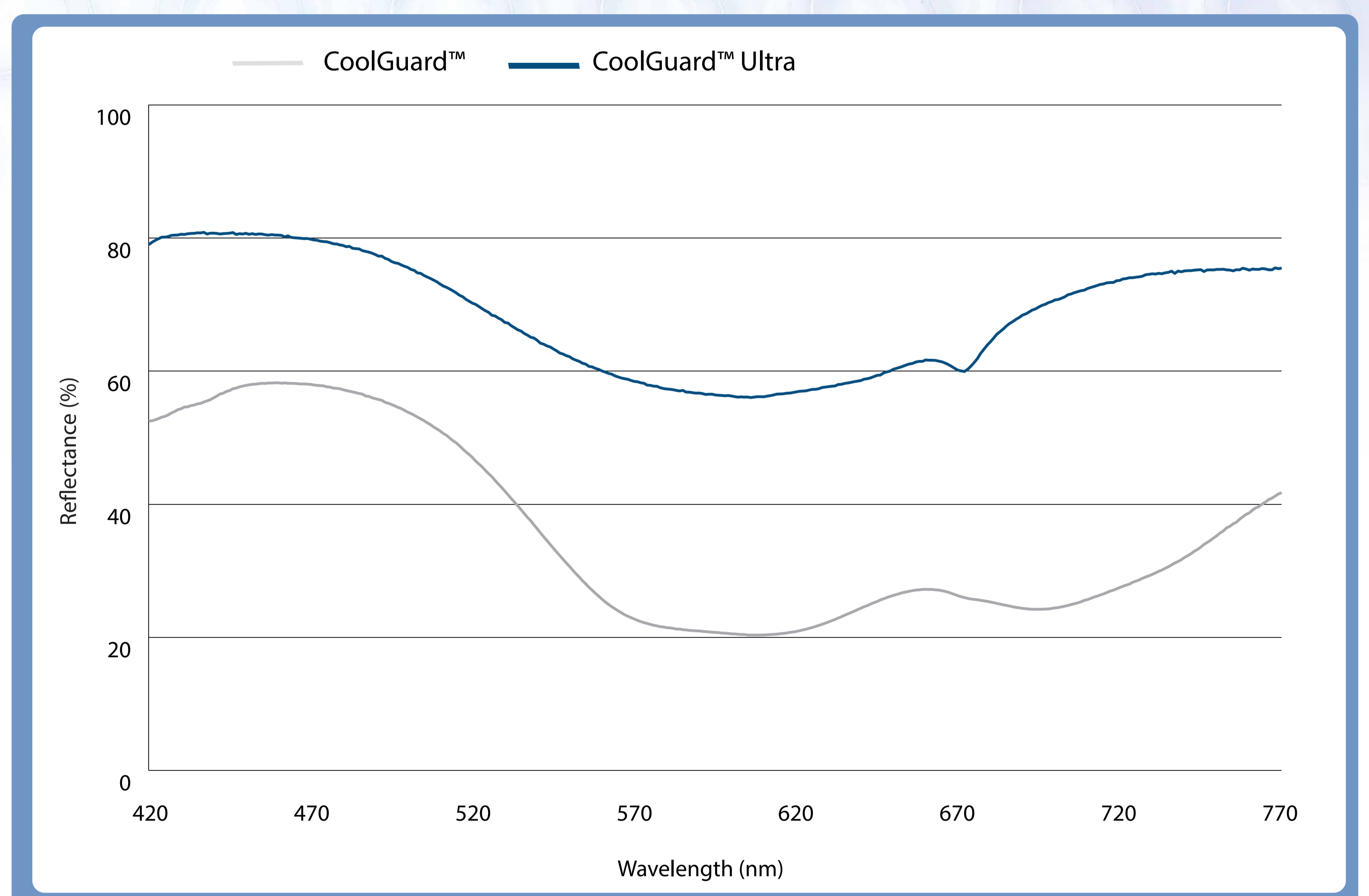
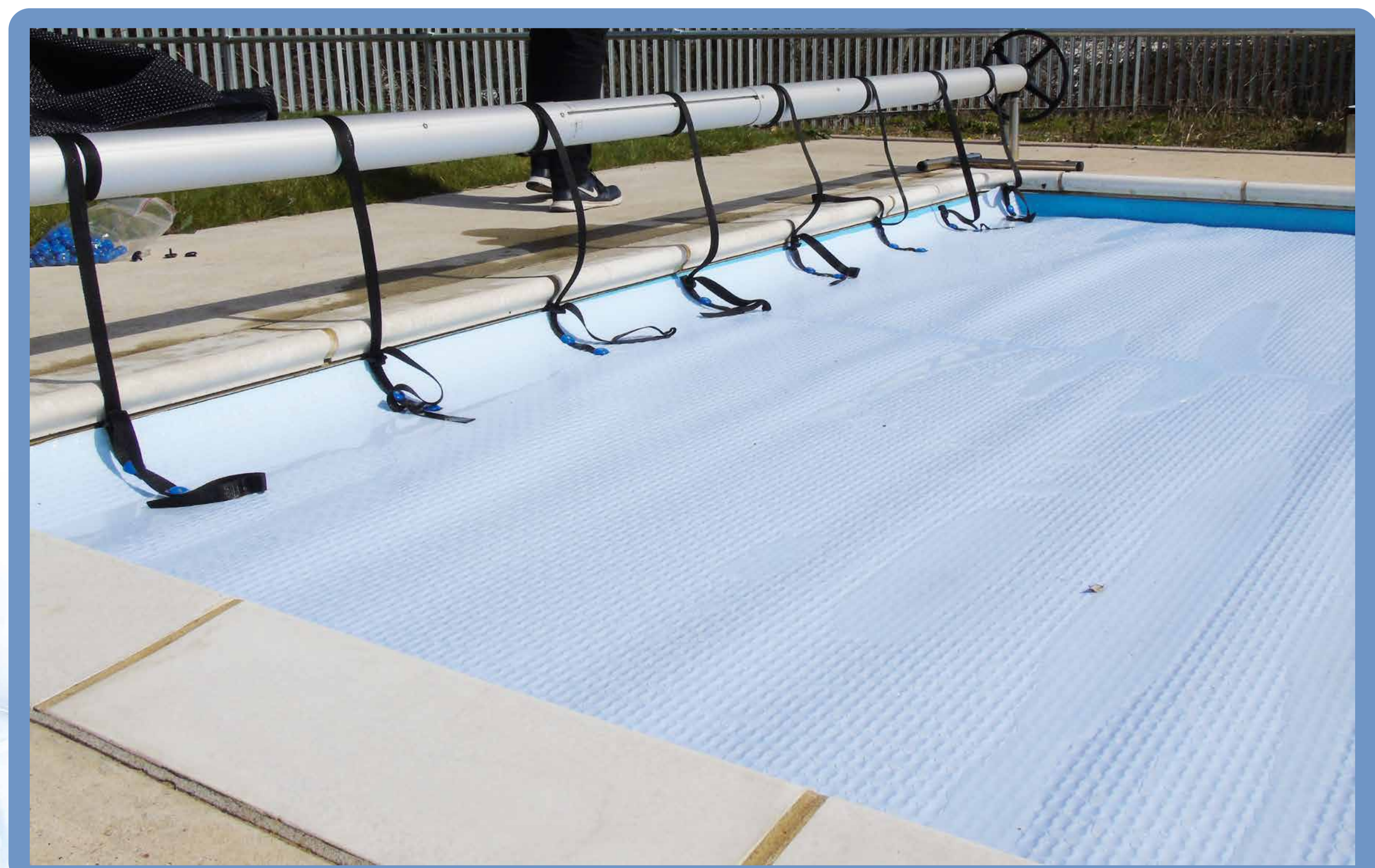


Figure 3: The difference between the original CoolGuard™ and CoolGuard™ Ultra in terms of reflectance in the visible region

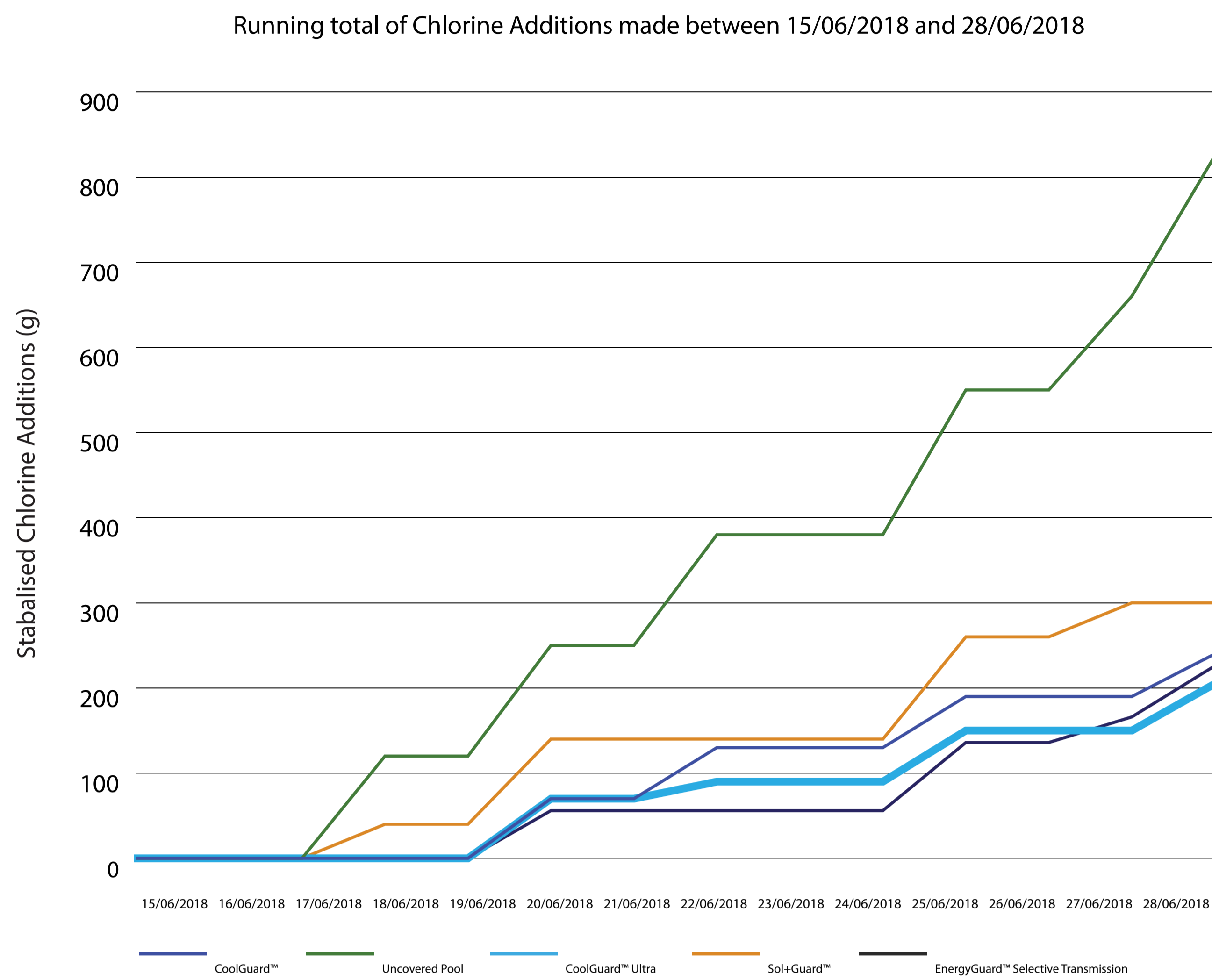
As shown by Figure 3, reflectance has been improved significantly from the original CoolGuard™, a direct cause of the improvement in temperature regulation in the pool. CoolGuard™ Ultra is reflecting more of the solar spectrum away from the water below, further minimising the heating effect of the Sun.



## Chlorine Consumption

To compare the chlorine addition rates of CoolGuard™ Ultra, the same 5 pool testing set-up was used as for temperature testing. Using a hand-held photometer, the full chlorine, total chlorine and combined chlorine was tested 3 days a week in order to determine how much stabilised chlorine needed to be added to each pool to take the full chlorine up to the target amount.

Industry standards are between 2-4 ppm (parts per million); however due to the nature of the environment around the testing facility at Plastipack Ltd, a level of 3.5ppm was chosen as the target.



% Saving in Stabilised Chlorine between 15/06/2018 and 28/06/2018

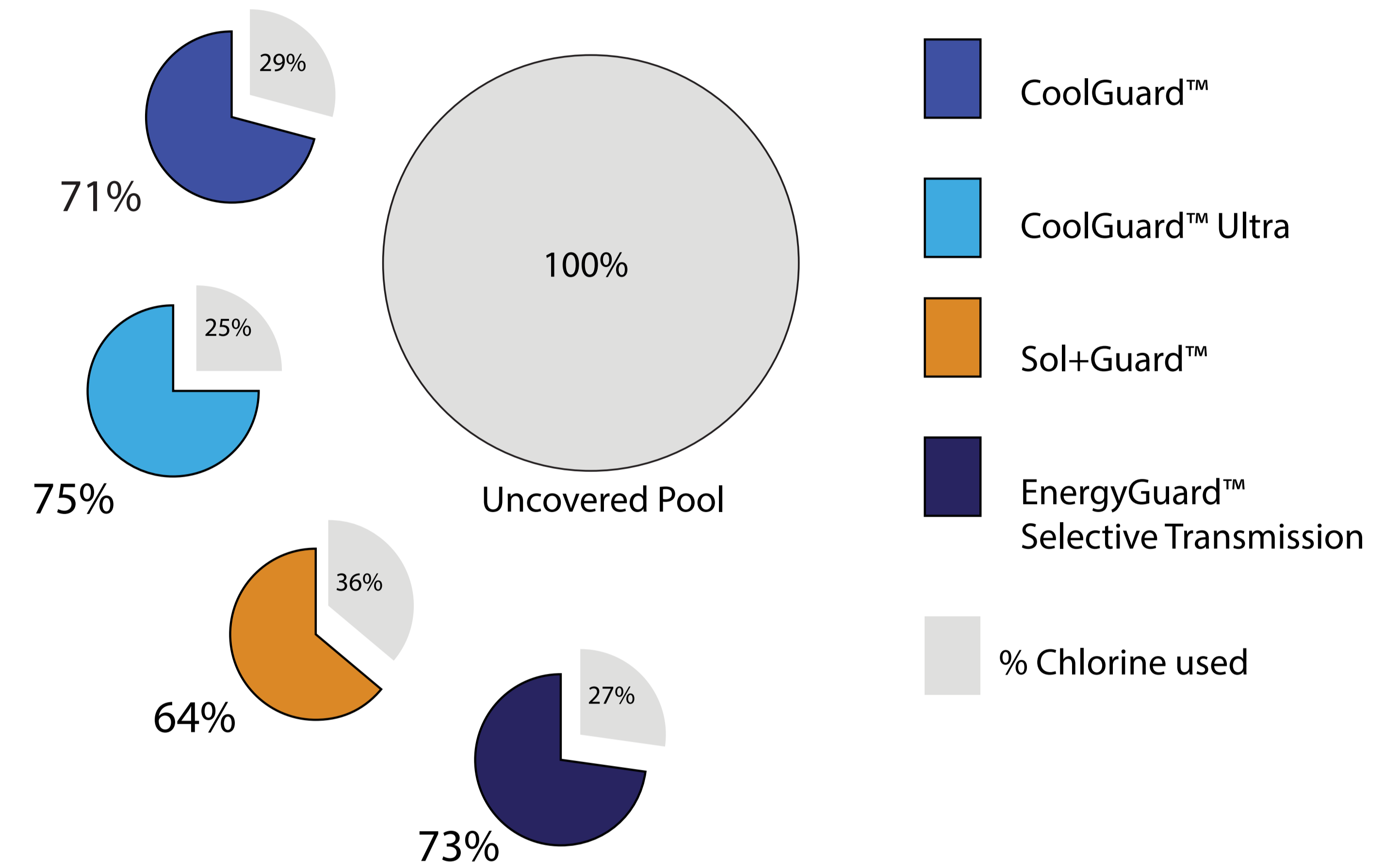


Figure 4: Displaying the difference in chlorine consumption between uncovered and covered pools

Figure 5: The comparison of the tested Plastipack Ltd material against the consumption of chlorine of an uncovered pool

Figures 4 & 5 show the chemical consumption of each the pools with their separate covers. During the duration of the testing each pool provided over a 50% reduction in chemical consumption, compared with the uncovered control pool. The new CoolGuard™ Ultra presented the highest savings during this testing period of 75%. However, this number needs to be adjusted for the regular treatment of the pool for algae prevention that did not occur during the testing duration. It is expected that a CoolGuard™ Ultra cover would provide savings of up to 50% in standard domestic pool conditions.



CoolGuard™ Ultra material uses scientifically proven techniques and innovations like the GeoBubble™ to make the product a resource saving material.

All testing was carried out using strict scientific methods, to ensure the findings of this report are accurate. To see more information about CoolGuard™ covers please visit

[www.plastipack.co.uk/coolguard.php](http://www.plastipack.co.uk/coolguard.php)

CoolGuard™, EnergyGuard™, Sol+Guard™ and VapourGuard™ materials are manufactured by Plastipack Limited. EnergyGuard™ is a Registered Community Trademark No. 007290241.

© Illustrations are copyright Plastipack Limited. Patent applied for EnergyGuard™ No. 0820440.6, CoolGuard™ No. 0820437.2, Sol+Guard™ No. 820435.6 and GeoBubble™ No. PCT/GB2010/001851