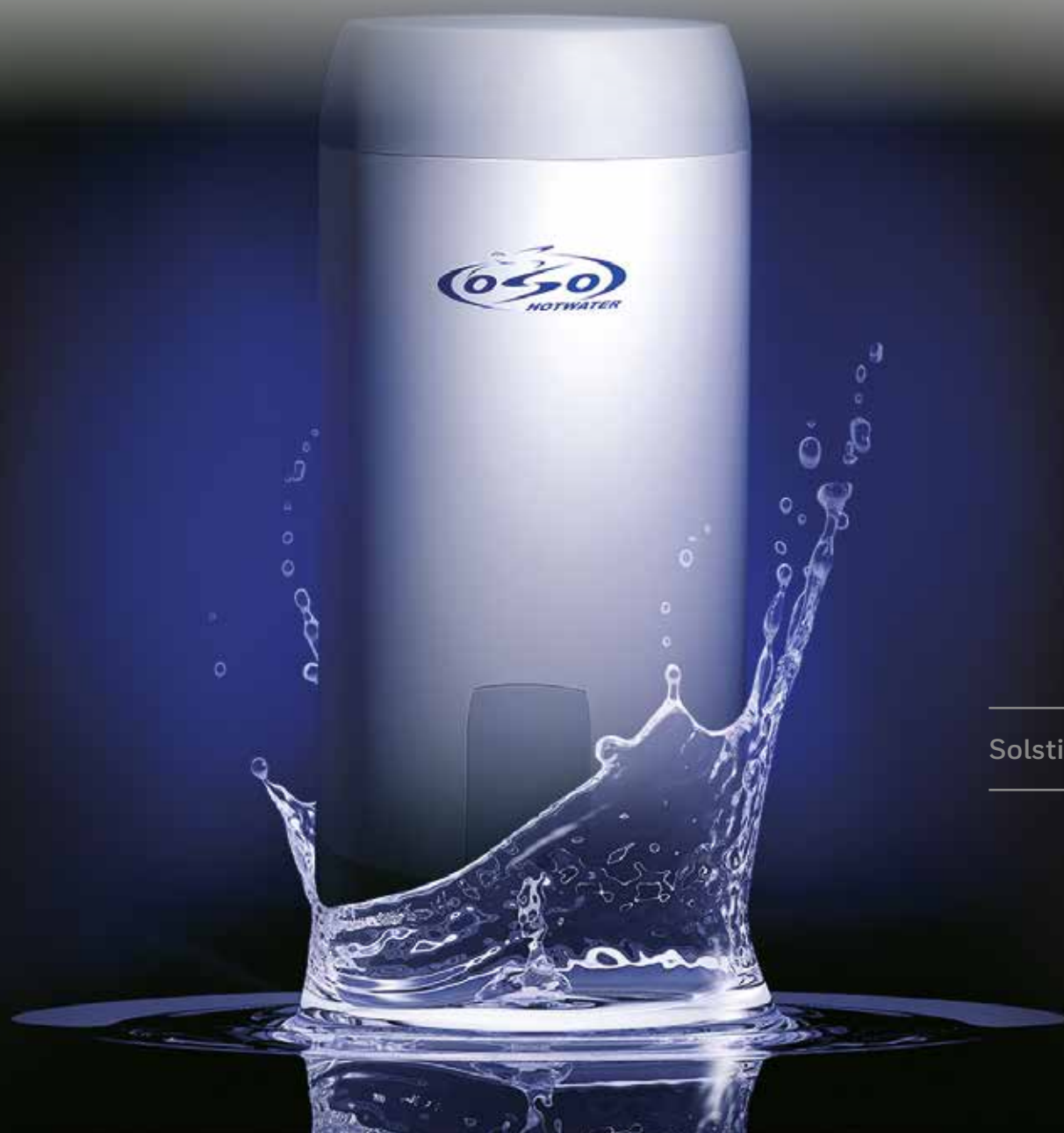




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Solstice® LBA

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**SOLSTICE LIQUID BLOWING AGENT (LBA)  
HELPS DELIVER 15% ENERGY GAIN FOR  
OSO HOTWATER**

# The Opportunity

OSO Hotwater wanted a PUR system that delivered a level of energy efficiency that would enable the company's products to meet A-rating standards of the European regulation Ecodesign Directive. They were also particularly keen to find a solution that would work with its existing injection foaming machines, to avoid the potentially high capital expenditure costs of new equipment.

## The Solution

OSO Hotwater found in Solstice LBA a blowing agent that was not only a perfect drop-in replacement for the previous water-based system, but which also improved the insulation properties and energy performance of the final product to the standard required by the Ecodesign Directive.



**“Solstice® LBA offers considerable advantages over other insulation blowing agents, increasing energy efficiency by up to 15 % and enabling us to achieve A-rated products within the scope of the Ecodesign Directive.”**

*Sigurd Braathen, Managing Director  
OSO Hotwater*

### OSO Hotwater: Focused on enhancing energy efficiency and sustainability

Norway-based OSO Hotwater has been a market leader in the production of water heaters for more than 80 years, supplying domestic and commercial products to both home and export markets, as well as to the OEM sector. It was the first company in the world to mass-produce stainless steel water heaters.

Its competitive advantage comes from the development of its own manufacturing equipment, which supports continuous automation. The company specializes in using high quality stainless steels for drinking water applications for its products, ensuring lower weight, higher strength, better corrosion resistance and reduced material consumption.

In 1956, OSO Hotwater became Norway's first environmentally sustainable company, and since then the environment has been at the core of the company's values – indeed one major initiative has been the establishment of the OSO ECO foundation, which provides financial support for environmental projects.

Energy efficiency and environmentally-responsible manufactures are at the heart of the OSO Hotwater way of working, so the company set about becoming the first in its sector to achieve A-rating for its products under the Ecodesign Directive. Central to this was enhancing insulation performance of the polyurethane foam (PUR) used to improve the energy efficiency of the company's products – and this is where Honeywell's Solstice LBA made a significant difference.

With the ban of CFCs and HCFCs for blowing agent use in the manufacture and application of polyurethane foam insulation, companies such as OSO Hotwater are looking to Honeywell for blowing agent solutions that offer the required performance along with being non-ozone-depleting and having an ultra-low global warming potential (GWP).

### The Alternatives

#### Water-blown Systems

While water ( $\text{CO}_2$ ) blown foam manufacture may appear to offer some initial cost advantages, **water-blown systems provide poorer insulation performance** because its thermal conductivity is higher and deteriorates at a faster rate over time. **Operational costs associated with water-blown systems are also higher** because molds need to be heated in order to guarantee acceptable adhesion to the liner, while mixing and processing are more difficult since the polyol has a higher viscosity. Lastly, **water-blown foams have typically higher densities** compared to Solstice LBA blown foams.



## Pentane-blown Systems

Pentane produces lower thermal conductivity foam compared to water-blown PUR, but **pentane systems require considerable investment in safety systems because of the flammable nature of this material**. So, any transition to pentane needs to take into account the high costs associated with safety equipment needed to mitigate the flammability risk, the operational requirements of constantly monitoring working areas, and the use of specialized detection equipment and powerful ventilation systems.

## HFC-blown Systems

HFCs provide good insulation capabilities thanks to their low thermal conductivity. However, regulations in the European Union will limit their use in the future due to their high GWPs.

## Solstice LBA-blown Systems

Honeywell's Solstice® LBA is an ultra-low GWP, nonflammable, energy-efficient blowing agent that provides companies with a near drop-in replacement for HCFC, HFC, hydrocarbons and other non-fluorocarbon blowing agents. It combines the potential to deliver high energy ratings in end product without the need for major equipment investment. Additionally – and of direct relevance to OSO Hotwater – the ultra-low GWP of Solstice means it is not impacted by Norway's tax for high GWP products.

## Proving the value of Solstice LBA

OSO Hotwater introduced polyurethane as standard insulation for its water heaters in 2004 – since then it has sold more than 1,000,000 units. The company has always used processes that are environmentally-friendly and its second-generation water-blown PUR system offered good environmental performance but not the level of energy efficiency that would enable the company's products to meet A-rating standards of the European regulation Ecodesign Directive.

So the company adopted Honeywell's fourth generation hydrofluoro-olefin (HFO) blowing agent – Solstice LBA. It was particularly keen to find a solution that would work with its existing injection foaming machines, to avoid the potentially high capital expenditure costs of new equipment.

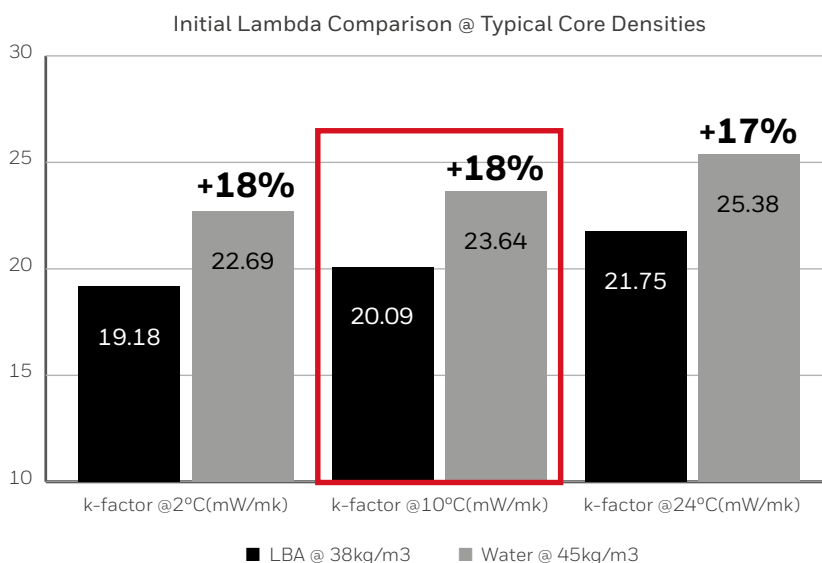
OSO Hotwater had found in Solstice LBA a blowing agent that was not only a perfect drop-in replacement for the previous water-blown system, but which also improved the insulation properties and energy performance of the final product to the standard required by the Ecodesign Directive.

## The Results:

- Insulation foams produced using Solstice LBA delivered a 10-15% improvement in energy efficiency for OSO Hotwater over the water-blown polyurethane system.
- The use of Solstice LBA enabled the company's products to meet the energy efficiency criteria needed to achieve an A-rating under the Ecodesign Directive.
- Solstice LBA enabled existing foaming equipment to be used in the manufacturing process – thereby avoiding large capital expenditure that would otherwise have been required to handle flammable blowing agents.
- The Solstice LBA PUR system demonstrated good dimensional stability and exhibited negligible environmental impact during the product lifecycle – a key priority for the company.

Based on all these factors, OSO Hotwater has adopted Solstice LBA in the manufacture of PUR insulation for all its products.

## Lambda Value Comparison – Solstice vs. Water



Honeywell's internal lab evaluations determined that test panels made with Solstice LBA showed 17% better insulation performance than water-blown PUR foam over a 180-day period.

Solstice LBA  
outperforms  
water blown  
foams by >17%  
in insulation  
performance

## Solstice LBA: A drop-in replacement with environmental benefits

Honeywell Solstice® Liquid Blowing Agent is the latest advance in blowing agent technology. It is an ultra-low GWP, non flammable (ASTM E-681), energy-efficient blowing agent for commercial appliance insulation applications and, as proven by OSO Hotwater, does not require platform design changes or significant process configuration modification.

It offers up to 15% energy consumption improvement compared to water (CO<sub>2</sub>) blown PU systems and up to 10% compared to pentane-blown PU systems. With a GWP of 1, its widespread adoption could save about 60 million metric tonnes per year of CO<sub>2</sub> equivalent, comparable to eliminating carbon dioxide emissions from more than 11.8 million cars every year.\*

Solstice LBA exhibits no flashpoint or vapour flame limits, and has no limitation on hazards classification. Solstice LBA has a very low Maximum Incremental Reactivity (MIR) when compared to hydrocarbon blowing agents. It is also a near drop-in replacement for liquid HCFC, HFC, hydrocarbons and other non-fluorocarbon blowing agents – it does not require expensive hydrocarbon storage and handling or risk mitigation equipment.

\*(Source: GHG Equivalencies Calculator: <http://www.epa.gov/cleanenergy/energyresources/calculator.html>)



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OUR COMMITMENT TO SUSTAINABILITY

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### For more information

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