The largest glass furnaces in the world are located at the Encirc factory.

Bottles & Bottling

Innovation

Sustainability

Glass acts: Innovation driving a more sustainable bottle

Glass remains at the heart of wine packaging, but how it is made, filled and transported is rapidly evolving. Writer **Simone Madden-Grey** recently visited a major glass manufacturing facility in the UK to explore how key innovations—from hybrid furnaces and recycled content to lightweight bottles and in-market bottling—are helping wine producers reduce emissions while meeting commercial and consumer expectations.

From vineyard to glass, sustainability underpins many a decision in the journey to market, not least of which relates to glass production and format preference.

Manufacturing glass bottles is a carbon intensive process and wine producers looking to manage their Scope 3 packaging emissions will be keen to partner with companies offering strategic carbon emissions management.

In Cheshire in north-west England, the largest glass furnaces in the world are located at the Encirc factory in Elton. The intense heat and raw power produced by the two furnaces is quite literally awe inspiring, leaving no doubt as to the energy hungry process required to shape molten glass into containers.

> ...the glass charge may well come down due to the better recycling rates and ease of being fully recyclable.
>
> Mark Satchwell

To address energy efficiency, Encirc implemented a host of initiatives across the production process including the rebuilding of both furnaces, which completed in 2020. The largest furnace at Elton, EL1, was expanded by just over 10 per cent to a total of 228m² sitting alongside EL2 at 206m². The uplift from the rebuild was significant. Up to 15% less energy is used to run EL1 while output increased to 900T per day of molten glass, twice that of a standard container glass industry furnace.

As the largest glass manufacturer in the UK, being at the forefront of new technology is vital. Madalena Moreira, oenologist at Encirc said, "Delivering and accessing green energy is a strategic priority. The wine and glass industries are actively redefining efficiency, not just in output but in reducing energy

consumption and emissions. Optimising energy in our new furnaces is a significant challenge, and one we are tackling proactively".

The company is involved in several projects with the aim of producing the world's first net-zero glass bottle at scale by the close of the decade. In 2021 in partnership with research body Glass Futures, Encirc was successful in producing a bottle from 100% recycled glass using plant-based biofuel to power one of the glass furnaces at the Derrylin factory in Northern Ireland. A carbon emission reduction of up to 90% was recorded and work continues to understand how this can be implemented at scale.

Another project is underway to develop a fully decarbonised glass furnace by the end of the decade. The aim is to design and build a hybrid furnace powered by a mixture of electricity and hydrogen as part of the UK's industrial decarbonisation HyNet Project. The project is working towards accessing blue hydrogen in the interim while the transition to fully renewable hydrogen evolves.

The product

Innovations in the bottle market are focused on increased ratios of recycled glass, known as cullet, and on lightweight bottles. Encirc currently use around 60% of cullet in their furnaces, with a target of 90%. As the concept of manufacturing a glass container entirely from cullet is proven, the difficulty is not in the technology, but in accessing enough cullet. In the absence of a national glass recycling programme, UK councils are left to manage recycling independently. So, while glass may be infinitely recyclable, the tension comes from accessing enough cullet of suitable quality to manufacture bottles entirely from recycled glass.

In addition to reducing emissions associated with transportation, lightweight bottles can also help manage costs associated with the UK's recently implemented Extended Producer Responsibility (EPR) tax. EPR is structured according to packaging weight and given that glass is still the primary packaging format in the U.K. lightweight bottles help mitigate these costs.

Unsurprisingly, some producers have made the switch from glass to alternative formats as a means of reducing EPR costs, however industry experts caution against rushing this decision. Greencroft Bottling managing director Mark Satchwell said that, "Even moving to other pack formats has a risk at this time as DEFRA (Department for Environment, Food & Rural Affairs) has stated that charges associated with other packaging material will rise over the

Encirc forming supervisor Mick Gavin

coming years, whereas the glass charge may well come down due to the better recycling rates and ease of being fully recyclable".

At Encirc, Moreira said, "We advocate for glass as the preferred choice for consumers, as well as a sustainable and health-conscious packaging option compared to alternatives." And for Greencroft, their fastest growing alternative packaging format is still glass. "At present it's the 300g glass bottle", said Satchwell. However, he "would expect to see more requests for large format BIB 18L and Slimline Key Keg 20L for the large scale on-trade wine business".

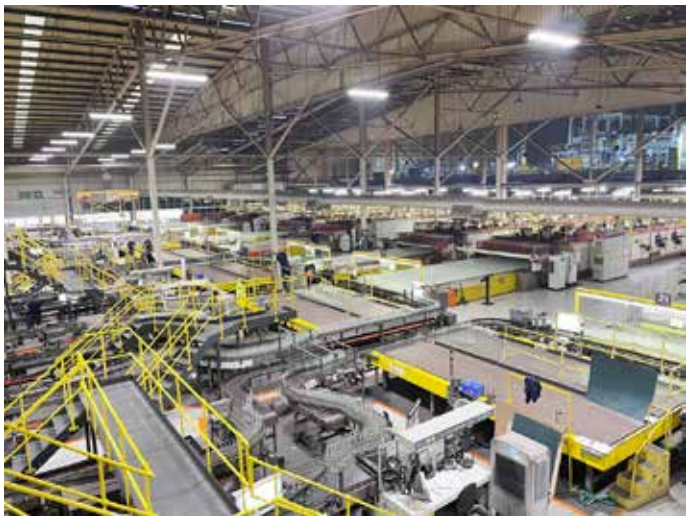
Equipment and data

Innovation in equipment and data analytics are being used from filling lines to business administration in order to streamline and improve process.

For Satchwell, a number of changes to equipment have enhanced the bottling process, including the deployment of FOSS equipment and similar technology to make basic wine chemistry analysis faster, more accurate and cheaper. He also says that more monoblock fillers alongside better gas management of the product from beginning to end continue to improve the process.

> In economies of scale the key is small changes for big wins.
>
> Madalena Moreira

Robots utilised in the bottling area



The bottling area at the Encirc facility in Cheshire

Glass bottle production

Data analytics and predictive logic generated from the software package Lineview, enabled Encirc to implement a number of changes for significant savings. One example is the real-time adjustments that can be made during bottle filling to improve bottling accuracy. This has reduced wastage by 50%. Another example is the integration of multiple data platforms from across the business ranging from furnace control to filling line, providing an end-to-end, fully integrated view of the process. This revealed that the furnaces could operate at a lower temperature without impacting the integrity or quality of the final product. The boost to energy efficiency is significant. "In economies of scale", says Moreira, "the key is small changes for big wins."

Sustainability

For producers in Australia and New Zealand who have capacity, an important consideration is whether to bottle at source or in market. Better materials for flexi-bags, increased packaging options in market and competitive pricing for the consumer, combined with lower transportation emissions, make bottling in market a compelling choice.

Framing sustainability in economic terms, the savings offered by bottling in market were highlighted by Satchwell at the World Bulk Wine Exhibition in November 2025. This is where economies of scale come in to play. Moving more wine at the same cost, extensive competition for dry goods in market and savings through logistics consolidation were some of the benefits he spoke to. At Greencroft, for example, he said one significant benefit to cost is realised by packing multiple customers onsite for a weekly consolidated delivery to regional distribution centres.

Glass continues to be the dominant packaging format in the UK and for customers working to meet in market sustainability criteria, lightweight bottles are an important resource. Across his career, Paul Braydon, director of business development and marketing at Kingsland Drinks, has seen demand for in market bottling increase significantly alongside a heightened focus on sustainable production. "A lot of the major multiples that we work with expect that the wineries we are putting forward are working to sustainable credentials. It's almost become a prerequisite now". The technology to produce a lightweight bottle has also come a long way since Kingsland Drinks pioneered the release of a 300g bottle to the UK market in 2010. Lightweighting is the key, says Braydon, and the company continues to trial a range of 300g bottles.

Innovation and new technology in manufacturing glass bottles and bottling lines continue to help the industry balance sustainability requirements with consumer preference. Hybrid furnaces, lightweight bottles and bottling in market all play a role in improving energy efficiency and carbon emissions management. GW

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