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Sustainability at The Glenmorangie Company

Moët-Hennessy
United Kingdom
2017 > Ongoing
#C02Emissions #EnergyEfficiency
#WasteManagement #WaterUse

Objective

To minimise use of non-renewable resources.
To reduce and control pollutants and waste resulting from operations.

- To halve CO2 emissions by 2030.
- To achieve Net Zero by 2040.

Description

Glenmorangie has two coastal distilleries (Tain and Ardbeg), a bottling plant (Alba), brand homes and a supply chain. These six sites across the business means that ensuring their efficiency, quality and reduced impact on the environment is top priority and they aim to do all that they can to prevent pollution arising from their business. They take a visionary and sustainable approach to their environmental responsibilities and have been working on sustainability initiatives for many years, their main focus being reducing energy consumption and improving water quality.

Aerobic digestion plant

In 2015, work began to build an anaerobic digestion (AD) plant at Tain distillery. The plant, which opened in 2017, includes balance and divert tanks, an anaerobic bioreactor tank, a biomass separation membrane and a biogas energy management system complete with biogas boiler. To ensure the long-term advantages of the plant, the system is automated with remote access for plant monitoring.

The AD plant purifies the by-products created through the distillation process. This biological process uses bacteria cultivated in the reactor tank to anaerobically break down organic material in the waste liquid, creating biogas and helping to treat the water (this process was an environmental first for a distillery). This results in biogas, water and digestate.

- The biogas is cleaned and fed to the site's steam boilers to provide a sustainable energy source.
- The water is processed through membrane filters to remove impurities prior to it being released to the Dornoch Firth (this is measured in COD - chemical oxygen demand- an index of the effect the wastewater will have on the environment).
- The digestate is used as copper-rich fertiliser in nearby barley fields.

Improvements to the AD plant: In 2022, Alpheus made efficiency and performance improvements to the AD plant which resulted in increased biogas production, an improved filtration system, reduced chemical use to clean the biogas and improved COD removal.

Restoring oyster reefs: Working in tandem with the AD plant, the Dornoch Environmental Enhancement Project (DEEP) aims to reintroduce an oyster reef in the Dornoch Firth, just off the coast from the Glenmorangie distillery. The effluent from the AD plant is used as nutrient rich food for oysters, which further clean the effluent. See more **here**.

Ultimate project

The Ultimate Project is a 5 year project between Ultimate, Cranfield University, Aquabio Limited and Glenmorangie which began in 2021. The aim is to test new innovations for water, energy and material recovery which should bolster resource recovery from the current anaerobic membrane bioreactor effluents. It involves:

- A reverse osmosis unit was implemented after the anaerobic membrane bioreactor as an additional treatment step to clean distillery wastewater. This wastewater meets the quality requirements to be reused internally for cleaning purposes (instead of freshwater).
- Waste heat is recovered from the bioreactor effluent (35°C to 40°C) and used in the ammonia stripping process.
- For efficient nutrients recovery from the distillery wastewater, a system combining a pre-precipitation step for struvite crystallisation and a stripping column for ammonia recovery is being investigated. The recovered products will find potential application as fertilisers on the local barley fields.

Sustainable energy

- **Biogas:** From 2017, the biogas from the AD plant is cleaned and fed to the site's steam boilers to provide a sustainable energy source.
- **Compressed Natural Gas (CNG):** In 2020, the Fuel Oil used for boilers and generators was replaced with compressed natural gas (CNG) by using a "virtual pipeline" to bring gas to the distillery. The switch from heavy fuel oil to gas significantly reduces emissions at the distillery. Transitioning to bio-CNG is also being implemented.
- **Green Electricity:** In 2021, Glenmorangie began using fully green electricity contracts.
- **Solar panels:** In 2022, a 590.4kWp solar PV system was installed at its Alba bottling plant. The 1,476 panels cover the majority of the building's roof, allowing the plant to generate its own renewable energy, thus reducing its carbon footprint and reliance on the national grid.

- **Cromarty Hydrogen Project:** Since 2021, Glenmorangie has been taking part in a feasibility study into a green hydrogen hub for the Highlands, which could replace the use of fossil fuels at the distillery. Scottish Power and Storegga are developing the Project as part of the North of Scotland Hydrogen Programme. The project aims to have a 35 MWelectrolyser facility operational by the end of 2024, producing up to 14 tonnes of renewable hydrogen per day to meet local distillery demands and prove the technology at this scale. It will initially supply renewable hydrogen to local distilleries operated by Diageo, Glenmorangie and Whyte & Mackay, and the supply chain supporting those distilleries. It will then expand into a broader Cromarty regional solution for heat and transport needs whilst also enabling hydrogen export via the Port of Cromarty Firth.
- **Methanation system:** In 2022, Glenmorangie and Hydrogen Green Power commenced an onsite methanation feasibility study, supported by seed funding from the Scottish Government Industrial Energy Transformation Fund (SIETF). The project studied the feasibility of using renewable electricity to combine the CO2 generated in the fermentation process (and normally released to atmosphere) with hydrogen to convert it to biomethane. The system successfully proved its ability to deliver more than a 99% conversion rate for the c02 from the fermentation stage (99% pure CO2). The system also demonstrated a conversion rate in excess 99% on the CO2 from a stream of biogas being fed directly into the methanation system from the AD plant. The biomethane can be used to fuel the distillery's activities or be fed into the gas grid to replace the use of carbon fuels further down the line delivering double decarbonisation.

Other sustainability actions include:

- **Lighting:** LED lighting has been gradually installed in all buildings.
- **Suppliers:** Glenmorangie aims to work responsibly with its suppliers. All suppliers are required to align with the LVMH Code of Conduct which includes respect for national and international laws, regulations and rulings, notably in the area environmental legislation, a prerequisite for being a supplier of the company.
- **Packaging:** Bottles have been made as light as possible. All packaging is recyclable and where possible recycled materials are used.
- **Electric Vehicles:** In 2021, electric vehicle charging stations were approved and building began at both their Alba campus and Tain distillery. This enabled all distillery vehicles to transition to fully electric in 2023, reducing reliance on fossil fuels and lowering carbon emissions.
- **Water:** In 2021, water saving initiatives were installed in washrooms across numerous sites including water efficient taps, toilets and waterless urinals saving thousands of litres of water a year and subsequently emissions.
- **Recycled materials:** In 2021, the innovation centre (the "lighthouse") opened which used reclaimed stone salvaged from former distillery warehouses to provide a new mashing and fermentation building. The stillhouse used wooden panelling made from old whisky casks. Two further warehouses plus additional office space were also created as part of the project. To ensure The Lighthouse ties in with Glenmorangie's sustainable goals, it is partially powered by biogas, which is generated in Glenmorangie's anaerobic digestion plant.
- **Sustainability Strategy:** In 2021, a sustainability strategy was developed in line With Scotch Whisky Association (SWA) targets to become carbon neutral by 2040.

- **Malted Barley:** In 2021, to support the supply chain in working towards net zero by 2040, Glenmorangie partnered with the YEN Zero network, which brings together the barley supply chain to develop innovative sustainability practices. Three PhD students were also sponsored as part of a research programme on barley sustainability at the James Hutton Institute in Dundee.
- **Multiple operational efficiencies have been introduced including:** a Monitoring and Targeting platform (to monitor energy, compressors, boilers, chillers and water) which reduced energy consumption; a variable speed drive fitted to the induced draught fan reduced electricity consumption; High Gravity Mashing increased the yield without increasing the amount of water to be boiled off in a mash; renewal of the steam trap and blowdown system which reduced energy losses and an oxygen trim on the boiler lead to decreased fuel consumption.

Conservation

In 2020, inspired by its long affinity with the giraffe (the same height of its stills) Glenmorangie pioneered a three-year partnership with the Giraffe Conservation Foundation (GCF) and the Royal Zoological Society of Scotland (RZSS), to help conserve this endangered animal in the wild. In 2021, they helped GCF to reintroduce 15 giraffes to places where they had become locally extinct, and supported RZSS's new giraffe habitat at Edinburgh zoo, a vital conservation tool. In 2022, they renewed their partnership for a further three years. To raise awareness of the animal's endangered status, they also supported a giraffe sculpture trail in Edinburgh over the city's festival season. In 2023, Glenmorangie's assistance supported specialist training for wildlife veterinarians in Africa and ongoing genetic research aimed at maintaining and expanding healthy populations.

Partners

Air Liquide and CNG Services: Air Liquide run the station at Glenmorangie.

Alpheus Environmental: Water and wastewater asset management company.

DB Group and Emtec Energy: The installation of solar panels.

Hydrogen Green Power: Methanation study and mobile containerised methanation system.

Moët Hennessy (The Glenmorangie Company is owned by Moet Hennessy which is ultimately controlled by Moët Hennessy Louis Vuittonn LVMH).

The Giraffe Conservation Foundation (GCF) and the Royal Zoological Society of Scotland (RZSS): Conservation partnership.

The Port of Cromarty Firth, ScottishPower, Whyte & Mackay, Diageo and Storegga: the Cromarty Hydrogen Project.

Ultimate, Cranfield University, Aquabio Limited: the Ultimate Project.

Results

Total gross emissions (mandatory – tonnes of CO2e): 7,531.2 (2023); 8,233.9 (2022); 12,099.89 (2021) and 7,410.97 (2020).

Intensity ratios: Tonnes of CO2e per 1,000 l of alcohol produced: 0.78 (2023); 0.86 (2022) and 1.76 (2021).

Aerobic Digestion Plant

- 2022 improvements to the AD plant: The plant produced over 9.7 million KWH of energy from April 2022 to March 2023. The Biogas production increased by 5% (achieving nearly 20%). The average reduction in energy consumption was 1,500kWh per day. It consistently achieves 98% COD removal.
- 2020: The AD plant reduced the amount of organic effluent by 35% and CO2 emissions by 40%. The biogas covers 15% of the distillery's consumption needs which offsets 825te of heavy fuel oil per year and reduces primary fuel CO2 discharges by 2.7million KgCO2/year.
- 2017: The AD plant can treat 467 m3/day, clean COD load by 14,527 kg/day, remove 95% of COD on average, generate 8,000 Nm3/day of biogas and 2,500 Kg/h (F + A) of steam and reduce the need for heavy fuel oil by around 20%. The digestate is passed to local barley farmers as fertiliser. Over a 10-year period the AD plant will treat 12 million tonnes of water and remove 45,000 tonnes of COD from the discharge.
- **Solar energy:** The 1,500 photovoltaic panels at the Alba bottling site covered 40% of its energy requirement in 2022.

CNG: The CNG reduces CO2 emissions by 30%.

Methanation plant: The 1MWe (electric) plant has an output of 2 MW and generates 57 Nm^3/h of Synthetic Natural Gas (SNG). It should reduce the distillery's emissions by an estimated 825 tCO2e (equivalent) or 6% per year. When scaled up to collect all CO2 from fermentation, a reduction of 39% of the emissions from heat generation would be made. E xpansion would allow the CO2 from the combustion of the synthetic gas to also be added to the system, making a reduction of 95% of the emissions from heat generation possible.

Measurement & evaluation

2019: Environmental Champion Award by the West Lothian Chamber of Commerce - the award recognised the Glenmorangie Company for their commitment to creating a culture of sustainability for their processes.
2013: the distillery was awarded ISO 14000 certification which relates to environmental management: ensuring that operations do not negatively affect the environment, complying with applicable laws & regulations and continuous improvement.

Website

https://www.glenmorangie.com

Downloads

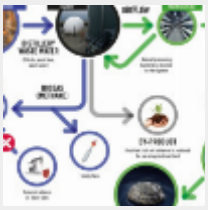
Photo gallery












Documents

Ultimate project (pdf - 1.09 Mo)
Aquabio Anaerobic MBR (pdf - 0.83 Mo)
Aquabio-AnMBR-Glenmorangie Distillery (pdf - 2.12 Mo)
CNG-Services_Highlands-CNG-Project-15th-June-2022 (pdf - 3.64 Mo)
CNG-Brochure-March-2021 (pdf - 10.78 Mo)