

WHISKY LOVERS ENCYCLOPEDIAE ©

THE COMPLEX HORIZON OF CLIMATE CHANGE AT THE HEART OF OUR DISTILLERIES



Whisky, beyond mere tasting, is the reflection of a "terroir" whose existence is debated, but whose dependence on the environment is indisputable.

From the barley fields to the silence of the warehouses, every stage of whisky production is governed **by thermal and hydric balances** now **weakened by climate change**. We are no longer facing a landscape threat, but a major technical challenge for an industry built on the long term, which does not make things easier. **It all begins in the fields** and ends in our "glencairn glass" for tasting purposes.

BARLEY, the pillar of our production, is particularly sensitive to the whims of meteorology. **The irregularity of precipitation** and the **rise in temperatures disrupt not only yields**, but above **all the very quality of the cereals**. As highlighted by work published in *Nature Plants*, these environmental stresses lead to **an increase in the beta-glucan rate** and **reduced enzymatic activity**. Other cereals, with certain variations, also suffer.

THE AVAILABILITY OF WATER, a fundamental resource, is becoming **uncertain**. In Scotland, watercourses like the Spey are experiencing summer levels that force some distilleries to halt production. Furthermore, **the rise in the temperature of cooling waters** hinders the condensers. However, when thermal efficiency drops, the separation of volatile compounds during the cutting of the heads and tails becomes less precise, threatening to weigh down the aromatic profile of the heart of the cut.

FOR THE DISTILLER, this means **a more complex saccharification process**, imposing a new rigor in malting, at the risk of seeing the distillate profile altered by technical adjustments. **DISTILLATION** itself, this technique where every degree counts, finds itself under tension. Copper, this noble and expensive catalyst that sculpts the spirit of whisky, thus finds itself constrained by distillation protocols that must constantly adapt to preserve the whisky that will be bottled.

But it is undoubtedly during **MATURATION** that the effects of the climate are most palpable. In our warehouses, maturation results from a progressive interaction between the distillate and the wood, closely influenced by **hygrometry** and **ambient temperature**. **Global warming is accelerating this kinetics**.

The extraction of tannins and aromas occurs more rapidly, **risking premature saturation of the distillate** and **depriving the whisky of this subtle complexity** that is only acquired over several years.

Let us not forget here that the modification of the evaporation ratio between water and alcohol, the famous "**angel's share**," disrupts the physico-chemical balance of the spirit, transforming its final structure.

FACED WITH THESE MUTATIONS, THE INDUSTRY DOES NOT REMAIN PASSIVE. It draws on its capacity for innovation to put in place active resilience. Whether through investment in **renewable energies** like biomass, through **drastic optimization of water consumption**, or through reflection on **the management of peatlands**, true threatened carbon sinks, producers are committed.

The goal is no longer to resist change, but to know **how to preserve the heritage** while reinventing the techniques of tomorrow.

If nature has forged the character of whisky, it is now up to us to forge a process that, in an unstable climate, will know how to continue to offer excellence. This is how producers have launched themselves into the fight against the consequences of climate change. Here are some examples among many others.

DECARBONIZATION PROGRAM AND RENEWABLE ENERGIES

[The Nc'nean distillery](#) became in 2021 the first whisky distillery in the United Kingdom to have verified zero CO₂ emissions for its production operations. This performance relies notably on the use of a biomass boiler feeding the stills, operating with wood chips coming from a locally sustainably managed forest, supplemented by electricity from renewable sources and by the offsetting of residual emissions.

[The Ardnamurchan distillery](#) uses a biomass boiler for its thermal needs and produces its own electricity thanks to a hydroelectric turbine that produces a significant portion of the electricity consumed on the site.

OPTIMIZED WATER MANAGEMENT AND CIRCULAR ECONOMY

[The Glengoyne distillery](#), since 2011, has operated a system of artificial wetlands (constructed wetlands) intended for the biological treatment of spent lees, the liquid effluents resulting from distillation. The waters pass through a series of twelve basins planted with reeds where plants, microorganisms, and the substrate naturally eliminate a large part of the organic load. After this purification, they can be discharged into the local watercourse with a reduced environmental impact. This device decreases the recourse to industrial treatments, reduces effluent transport, and favors biodiversity on the distillery site.

[The Glentauchers distillery \(Chivas Brothers\)](#) has integrated a Mechanical Vapour Recompression system. After the heating phase of the stills, this process allows for the recycling of practically all the heating steam of the distillation circuit by compressing it and then reusing it as a thermal source. This heat recovery considerably reduces the needs for steam produced by the boiler, decreases energy consumption, and contributes to a significant drop in CO₂ emissions.

PRESERVATION OF PEATLANDS AND BIODIVERSITY

In a complementary approach of ecological restoration, the [Glenmorangie distillery](#) is developing the DEEP project (Dornoch Environmental Enhancement Project), dedicated to the reintroduction of the native flat oyster (*Ostrea edulis*) in the Dornoch Firth. This program aims for the reconstitution of disappeared natural reefs, the improvement of water quality through biological filtration, and the strengthening of local marine biodiversity, in collaboration with scientific and environmental partners.

[The Diageo group](#) is part of a global environmental strategy integrating the restoration and rehabilitation of degraded Scottish peatlands. These environments, essential as natural carbon sinks, are the subject of interventions aiming for their rehydration, revegetation, and the preservation of their specific biodiversity, in partnership with various conservation organizations. These actions are part of a larger set of sustainability initiatives rather than a unique and centralized program.

TECHNOLOGICAL INNOVATIONS AND WASTE VALORIZATION

[The Roseisle distillery](#) is part of a global strategy of carbon footprint reduction integrating thermal recovery and energy optimization of processes. * In the group, the valorization of distillation by-products (draff and pot ale) through anaerobic digestion to produce biogas and energy is particularly developed on certain specialized sites like Cameronbridge, while Roseisle distinguishes itself above all by its integrated energy efficiency. * Furthermore, biotechnology companies like [MiAlgae](#) are developing processes for the conversion of distillery effluents into algae biomass rich in omega-3, intended notably for aquaculture, illustrating the emergence of circular valorization chains around the whisky industry in Scotland.

Other Online References

- [The green footprint of Scotch Whisky](#)
- [Impact of distillation and climate change](#)
- [How climate shapes whisky in new regions](#)
- [Maturation in a hot climate](#)
- [Threats to Scottish peatlands](#)
- [Analyses of consequences on distillation](#)
- [Climate challenges and distillery adaptation](#)
- [Diageo invests in peatlands](#)
- [Sustainable commitments of distilleries](#)
- [Veolia solution for the Roseisle distillery](#)
- [SWA case studies on sustainable development](#)
- [Sustainable practices \(Scotch Whisky Association\)](#)
- [whiskymag.fr/whisky developpement-durable](#)
- [regeneration/oysters-dornoch-firth](#)
- [glenmorangie-oysters-to-the-dornoch-firth-](#)