Comparative Carbon Footprint of Glass Containers From Conventional Natural Gas Fired Furnaces With Ardagh 'NextGen' Hybrid Furnace.

Context

With the innovative hybrid furnace called NextGen, Ardagh will deliver breakthrough technology and aims at reducing the CO_2e footprint by switching from max. 20% electricity and 80% natural gas (common conventional scenario) to 20% natural gas and 80% renewable electricity in the NextGen furnace.

To prove the CO_2e reduction based on a standard container, a lifecycle assessment was performed to compare the conventional furnace with the NextGen concept. The assumptions and calculations behind the study were reviewed by Eunomia Research & Consulting Ltd (Eunomia) in line with ISO 14067 to confirm the veracity of the findings.

Key Assumptions

The conventional furnace scenario refers to the previously operated furnace OBE-F02 in Obernkirchen, Germany, at its last year of life (2022-2023) and uses actual energy and raw material data. This furnace principally uses natural gas and <10% electric heating to generate heat.

The NextGen furnace scenario is based on modelling by the furnace supplier and therefore is a theoretical calculation. As the NextGen furnace replaces the conventional furnace in Obernkirchen and is expected to operate under similar conditions (pull, cullet%, colour), the two scenarios are considered comparable. All input data to the InstantLCA tool are kept constant except for changes resulting from the change in concept (i.e. electricity and natural gas ratio and renewable electricity consumption). The results are also only valid for glass containers produced at Obernkirchen, Germany by Ardagh.

Once Ardagh have a robust dataset based on operational data for the NextGen furnace, the assessment will be re-run to prove the actual figures on the basis of primary data and not theoretical values.

The electricity used in the conventional furnace is a current grid mix for Germany which comprises largely of coal and gas. It is planned that the NextGen furnace will use electricity from renewable sources only. This electricity will also come directly from the German grid, but assigned specifically to Ardagh via a certificate compliant with the rules of the European Energy Certificate System (EECS). The current certificate specifies solar electricity will be assigned to the process.

The comparison is made for a 330ml glass bottle of 190g— a standard product produced in the current furnace and contains 55% external cullet.

Methodology

- ISO14067 is applied in the InstantLCA tool available to Ardagh via FEVE, the European Container Glass Federation. The tool uses a mix of primary data from Ardagh and averaged European plant data from FEVE and secondary data from Ecoinvent.
- The system boundary is Cradle-to-gate which excludes the end of life which would not be affected by the change in furnace design.
- External cullet (recycled content) is supplied burden free to the system.

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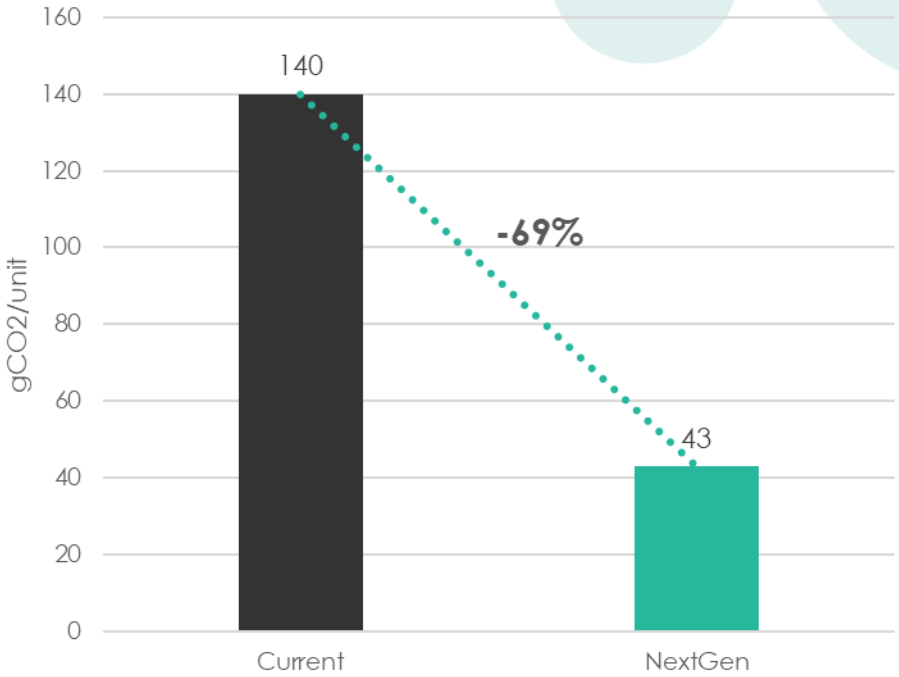
Results

The results show that the current carbon footprint of a 190g glass bottle at the factory gate is 140g CO_2e for the conventional furnace. This is reduced by 69% to 43g CO_2e when produced in a NextGen furnace.



Critical Review

Eunomia have been given full access to the underlying data and assumptions and the ECCC certificate confirming approximately six months' supply of electricity from solar sources in Germany (registered with the Umweltbundesamt HKNR). Background documentation also included the methodology behind the InstantLCA tool. It can be concluded that the scenarios created by Ardagh are credible and accurate and in line with the requirements of ISO 14067.

There are two important aspects that results are contingent on; that it can be proven that the NextGen plant is run solely on renewable electricity which is not double counted within the Germany electricity grid (as stipulated in ISO 14067), and; that this declaration be updated with primary operational data once the furnace is up and running.

Verified by

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