Ardagh Glass Packaging

Decarbonisation in the Glass Industry

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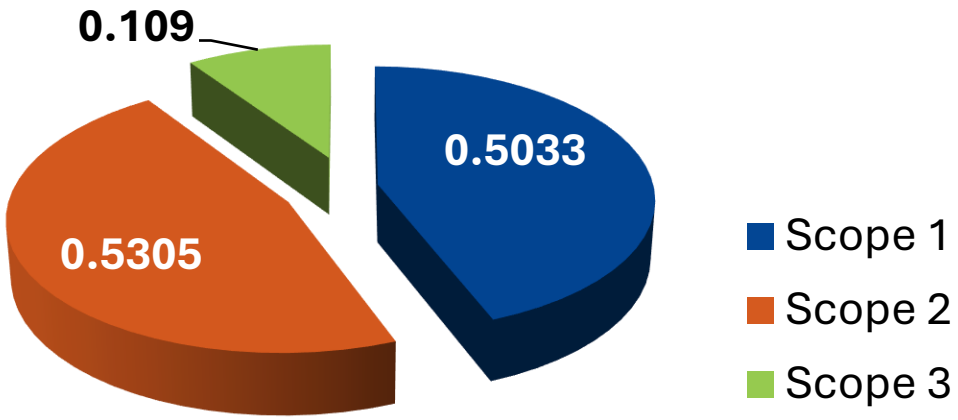
Future Pack 2025

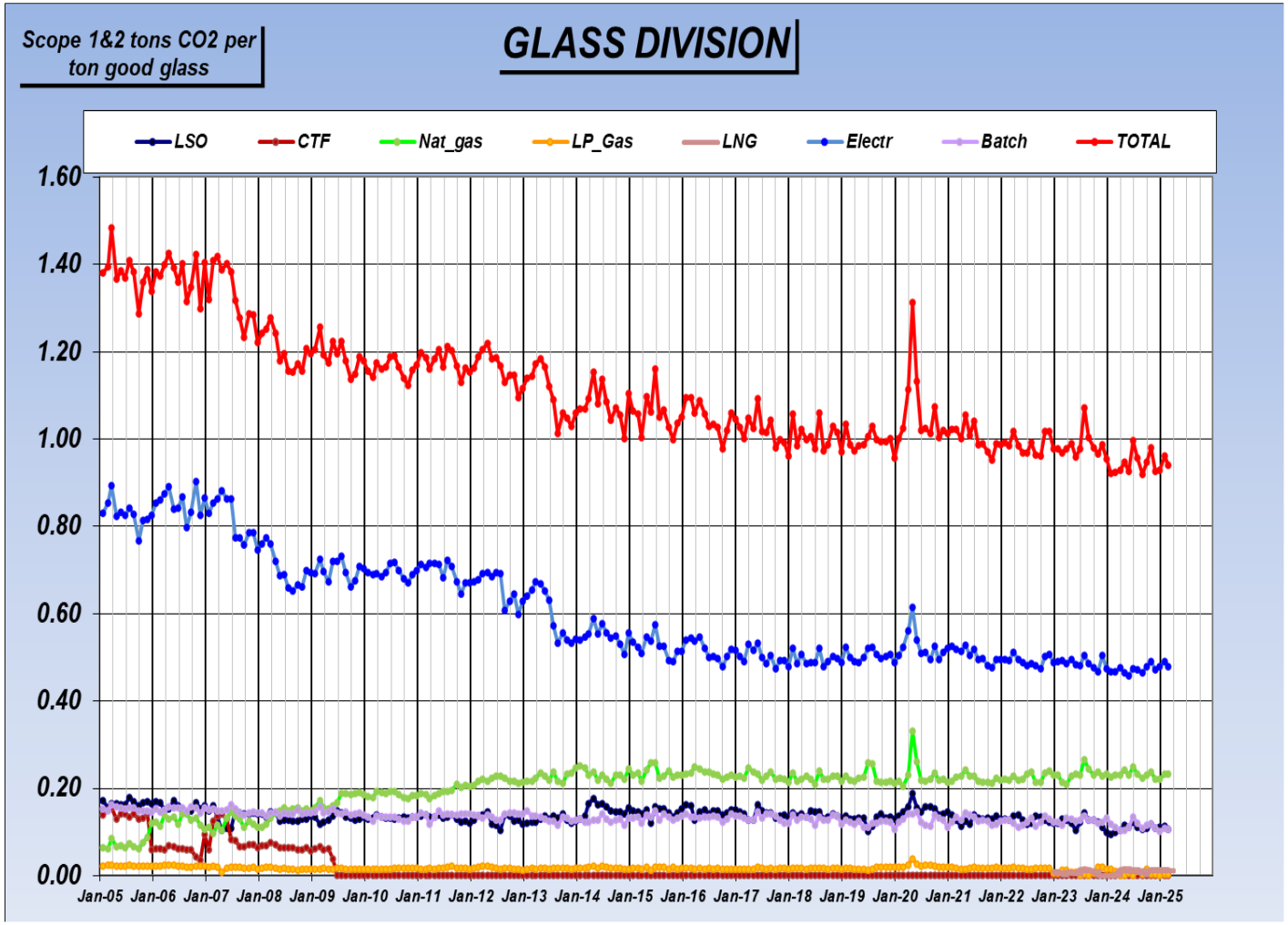
The SBT and 2030 Commitments

Metric	Target: 2030
Renewable Electricity	100%
Scope 1 and 2 GHG Emissions	42% reduction
Scope 3 GHG Emissions	12.3% reduction
Water Usage Intensity	37% reduction
Zero Waste to Landfill	100%

An Incremental Story of (Hard Work!)
to Date

Typical CO_2 emissions spilt per ton good glass





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Business-as-Usual Initiatives

- Incremental efficiency solutions to date
  - Improved as-is technology is important but diminishing returns
  - Largely scale and energy/operational efficiency driven
- Recycling rate is key
  - Doubling of recycling rate will reduce carbon per ton by more than 10%
    - Energy and process emission benefits but also yield risks!
  - Currently around 40% - targeting 65% in the next three years!
  - Already achieving 90% recycled glass input on specific furnace trials
  - Current recycling limitation is raw cullet availability and processing
- Renewable electricity is key
  - Green electricity alone will reduce the manufacturing footprint by 40%!
- Work has to continue outside the business too for Scope 3 to be addressed

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Glass Recycling in South Africa

Extended Producer Responsibility Regulations

forestry, fisheries & the environment
Department: Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

EPR
Extended Producer Responsibility

Key Objectives

- Lifecycle Responsibility: Producers manage the **entire lifecycle** of their products
- Circular Economy: Promote **reuse** and **recycling** to reduce raw material use
- Compliance: **Producers** must register with the DFFE and meet recycling targets.

Structure

- PROs: Producers join **Producer Responsibility Organisations**
- Collection Systems: Establish systems for **collection** and recycling of glass packaging
- Partnerships: Collaborate with **waste pickers** and **recycling facilities**

Targets – Glass Packaging

- Recycled content by product segment – **40% by 2026**
- Reuse targets – **5%**
- Collection targets – **65.4% by 2026**
- Recycling Target – **54.1% by 2026**

Effective 2021, waste management responsibility shifts from municipalities to producers

money4glass

money4glass

Achieving milestones in glass recycling

Significant progress has been made in glass recycling.

The total cullet rate rose from 42.2% in 2023 to an average of **48.3%** in 2024. Notably, several furnaces of AGP-Africa's operations exceeded **90%** cullet for the first time. This is different across the various colour ranges, with Flint reaching **30%**, Amber at **63%** and Green breaking the records with an average of **85%** cullet content.

In 2024, AGP-South Africa collected **44 304** tonnes (**15**%) more post-consumer cullet than in 2023.

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Solar Projects

Rolling out solar across all facilities

Nigel will shortly house our largest renewable project to date – a nearly 9 MWp solar PV array.

Further, we are investigating with rooftop solar projects for other facilities and have ambitions to achieve 25 MWp installed capacity.

We are also in the final stages of negotiating 150 000 GWh per annum of wheeled renewable energy.

These projects, which include solar, wind and hydro power, are critical to our energy transition strategy and will help us fulfil our goal of using only renewable electricity by 2030.

Smart Trucks (PBS)

Smart Trucks: a brighter, greener future

Partnering with our logistics provider, we introduced a performance-based standards (PBS) vehicle or “Smart Truck”, which is safer, more efficient, and less impactful on road infrastructure.

On average, these vehicles reduce road wear by 50% when compared to a baseload vehicle and use 17% less fuel, lowering emissions and operational costs.

Five more Smart Trucks will be added to our fleet in 2025, as will a new fleet of eighty-five Euro V truck tractors which will provide an approximately 3% improvement in fuel consumption and the associated reduction in greenhouse gases.

Zero Waste to Landfill

ZWTL, a pilot for future expansion

Our Zero Waste to Landfill (ZWTL) campaign, initially piloted at our Head Office, is part of a Group- wide strategy to minimise and ultimately eliminate operational waste being diverted to landfills across all our operations.

The campaign will soon be expanded to our other Ardagh Glass Packaging-Africa facilities to ensure we achieve our target of zero waste to landfill by 2030.

To get to Zero Carbon a Step Change is required

- All Electric Melting with Renewable Electricity
  - Tried and tested for smaller furnaces and limited colours and recycling levels up to 50%
  - Scale and colour issue needs to be addressed
  - Applicable today at a cost premium to certain markets

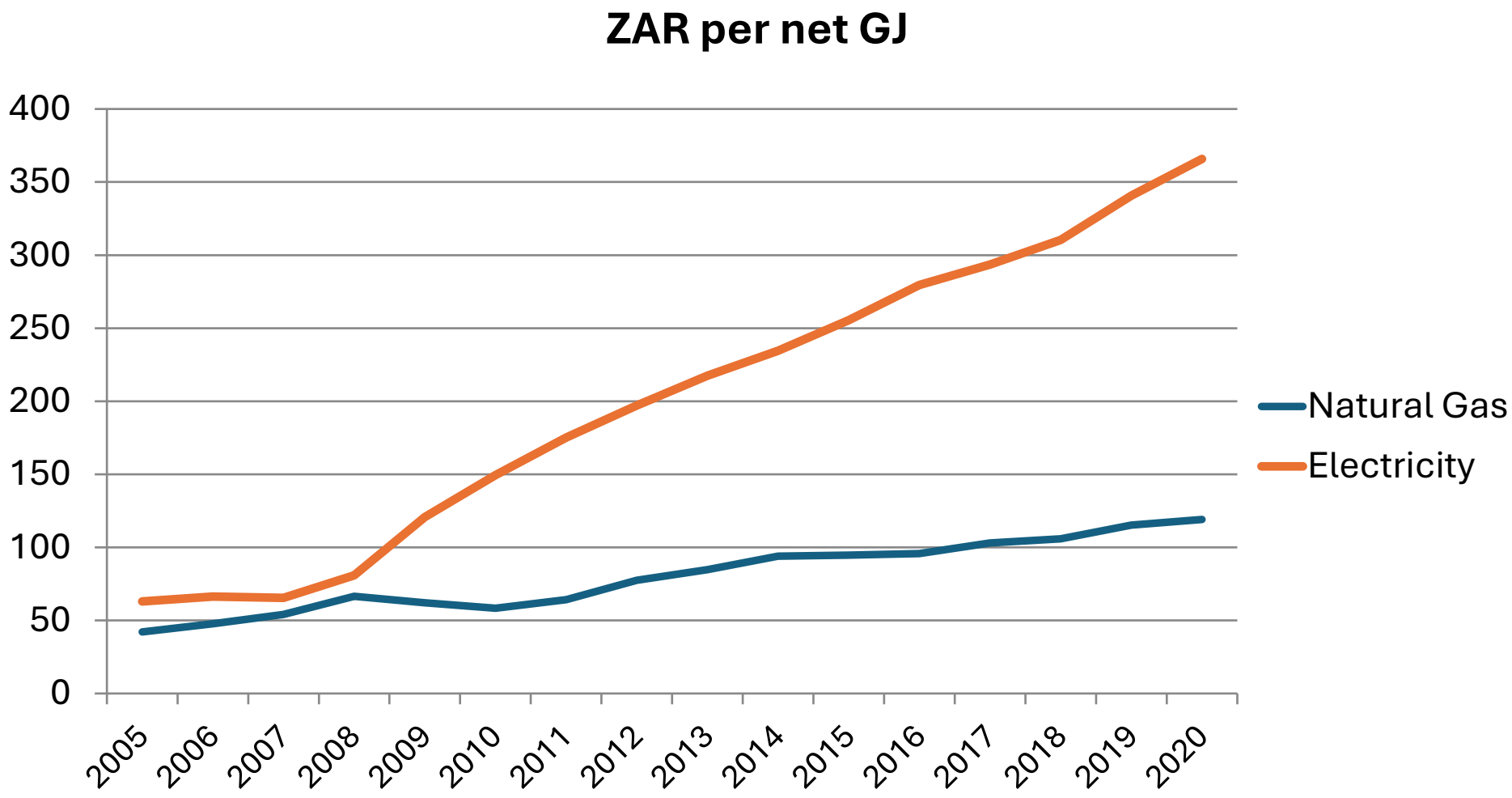
- HYBRID Melting (80% electricity, 20 % Hydrogen)
  - Applicable today for larger furnaces, higher recycling rates and more difficult coloured glass
  - Complexity and cost for hybrid technologies and hydrogen
  - Available today at a cost

Back in 2003, all Electric Furnaces were the Rage!

- Total of 5 cold top electric furnaces in operation
- Included the worlds largest
- Size range from 40 to 180 TPD
- Colours: Flint, Green, Amber and Antique Green

- All main stream product ranges *(beer, spirits, soft-drinks, food)* were all produced on the Wadeville furnaces in flint and green
- In our Pretoria plant we also produced amber and dark green for the wine, spirit and pharmaceutical industries

The Challenge then (and now!) besides Coal Fired Electricity



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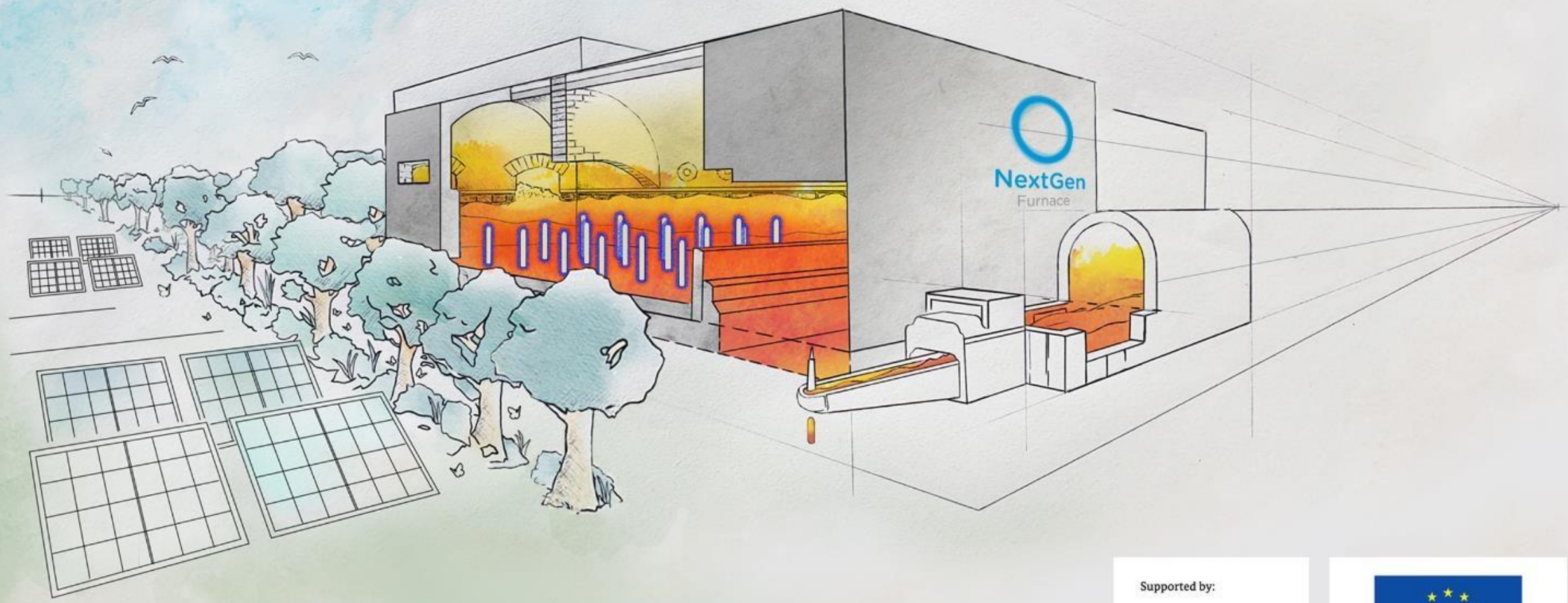
A Hybrid Option
The NextGen Furnace



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NextGen Furnace - Project Scope

Project – Hybrid furnace

- Industrial container glass production
- Up to 350 tonnes per day
- 70% cullet, standard quality specification *(with extra metal detection)*
- Maximum renewable electricity for direct heating / remaining oxy-gas

Why Ardagh Glass Packaging - Obernkirchen Plant?

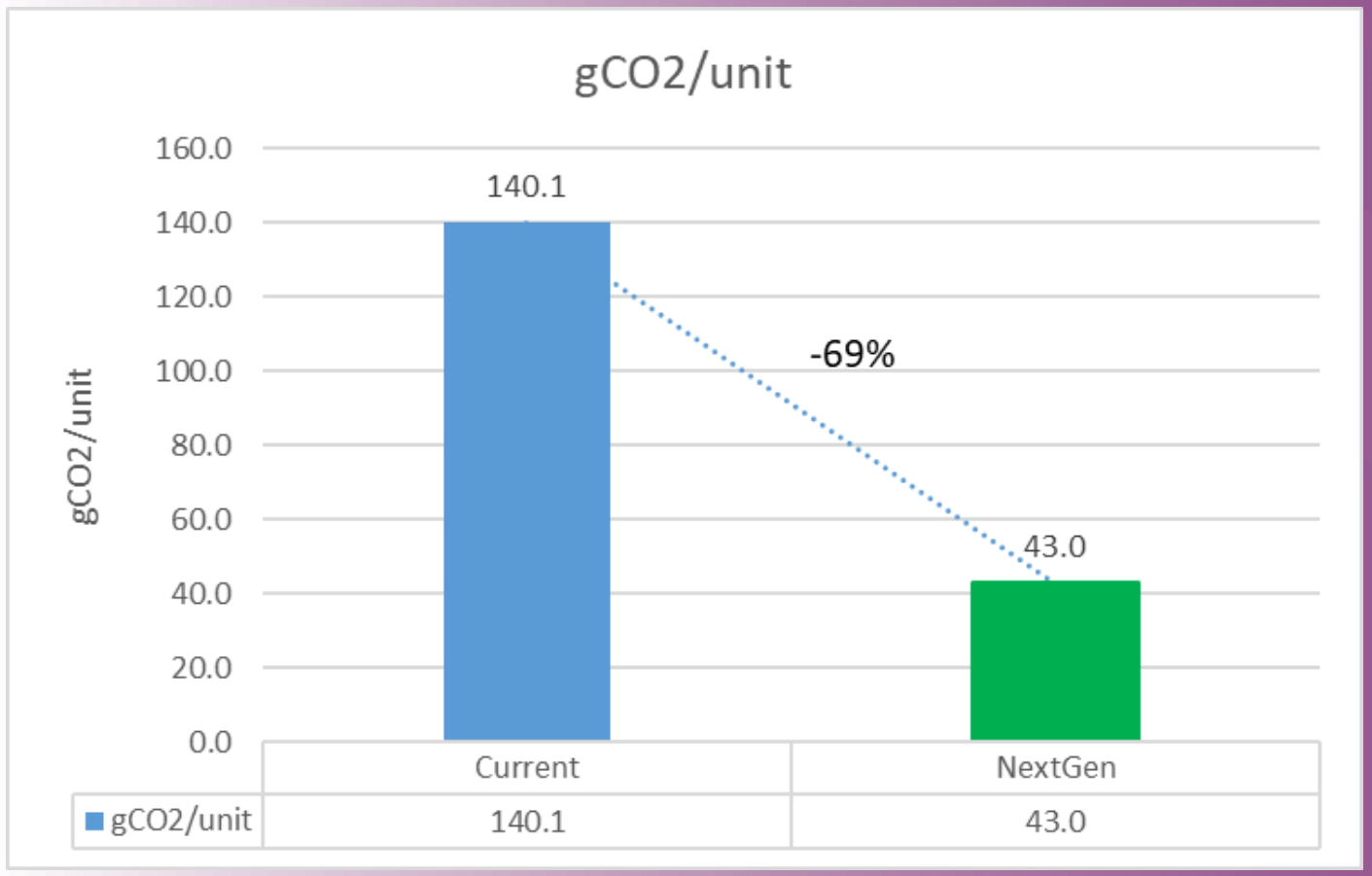
- Grid connection capacity available
- Replaced an existing oxy-gas furnace
- Oxygen generation & back-up available

NextGen Furnace
Status 2025

- Commercial production since Oct 2023
- Renewable electricity since start-up
- Amber glass production
  - Stable electrical heating at 60%
  - 64% CO_2 reduction per bottle
  - Higher electrical heating – tested
- Green and Flint glass production
  - In development
  - Operating parameters - TBC
  - CO_2 reduction TBC
- 2nd phase – Green Hydrogen (TBC)

Life Cycle Analysis (LCA)

LCA of a glass bottle produced in the NextGen Furnace compared to one produced in a conventional furnace at AGP in Obernkirchen – NextGen currently runs on 60% renewable electricity



- Amber Glass
- Based on actual and theoretical NextGen data
- Across scope 1, 2 and 3 emissions

At 80% electric melting (verified, theoretical data)
→ **69% reduction** (to 43g CO_2)

At 60% electric melting (not verified, actual data)
→ **64% reduction** (to 51g CO_2)

- Other colour Green & Flint - to be validated


SORG

We make packaging for good

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