

NextGen Furnace – First operational experience

Furnace Solutions 18, St Helens, June 5th 2024

Overview

- Ardagh Glass Packaging - Introduction
- Ardagh Glass Packaging - Sustainability strategy
- NextGen Furnace - Project basics
- NextGen Furnace - Results
- Other sustainability projects
- Conclusions



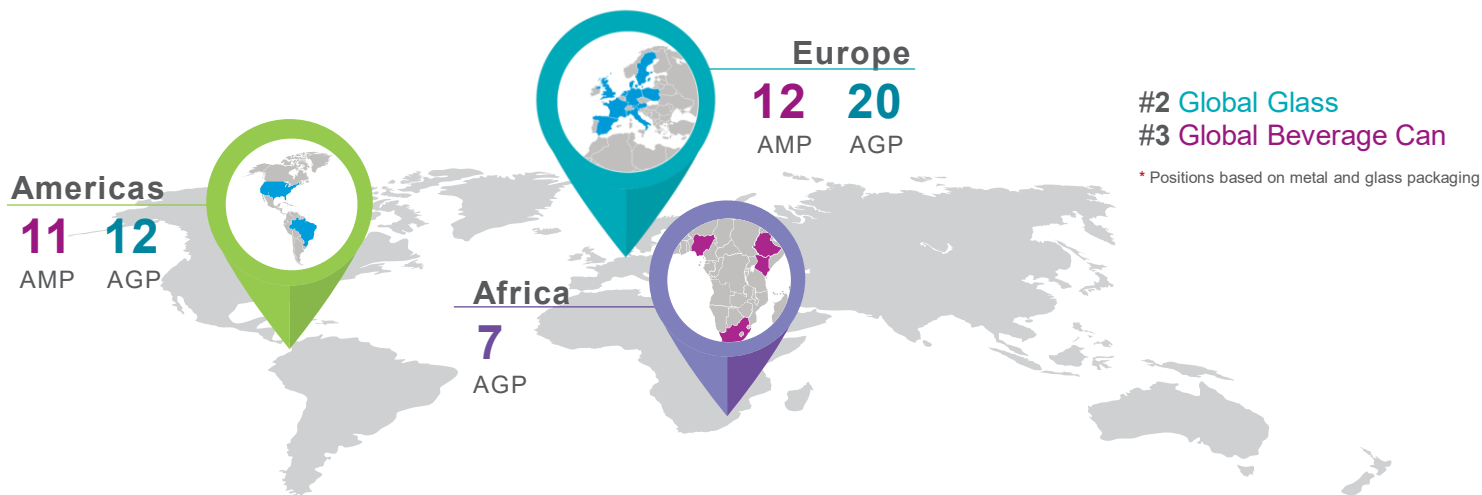
Wir schreiben
Glas-Geschichte seit 1799

Making history in
glassmaking since 1799

In Obernkirchen



AGP Global footprint



Sustainability

“

Our aim is to minimise any environmental impact of our business while remaining economically sustainable and socially responsible.

”

Our sustainability strategy

Our sustainability levers

Our direct link with UN's [Sustainable Development Goals](#)

Our sustainability filter₅

Emissions and Ecology



Minimise our GHG emissions

- Achieve 100% renewable electricity
- Implement energy efficiency projects
- Increase recycled content
- Innovate in product design
- Internal/external low carbon transport
- Reduce NO_x emissions



Minimise our ecological impact

- Achieve excellence in water management
- Promote zero waste to landfill across all plants
- Promote circularity narratives on use of infinitely recyclable glass

Social



Our people and communities

Our People:

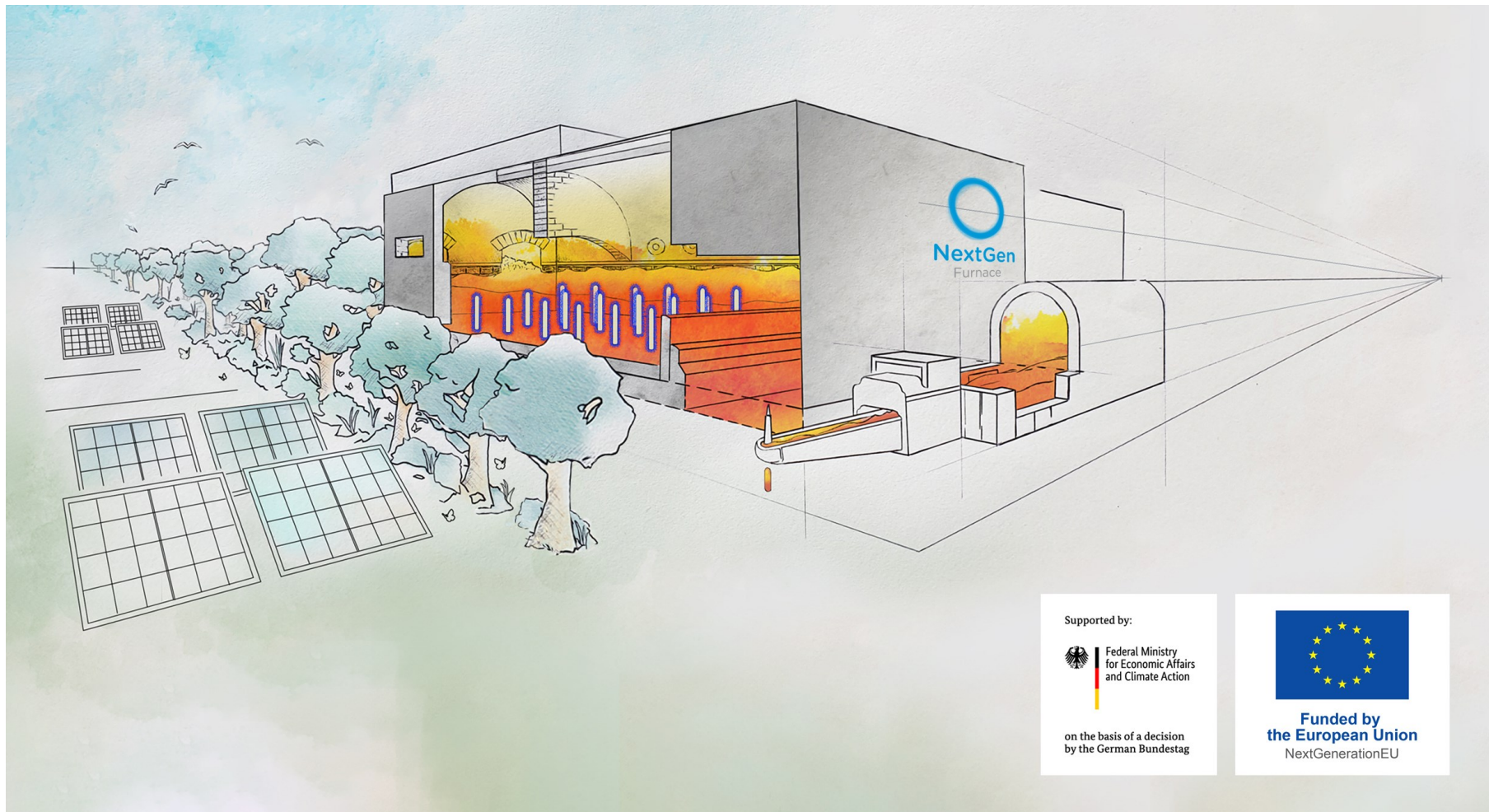
- Diversity, Equity & Inclusion
- Increase Engagement Levels
- Recognition

Our Communities:

- Engage proactively with our local communities
- Accelerate our investment in Ardagh for Education



Sustainability only has a sustainable impact if it is economically viable both long and short term



Supported by:



Federal Ministry
for Economic Affairs
and Climate Action

on the basis of a decision
by the German Bundestag



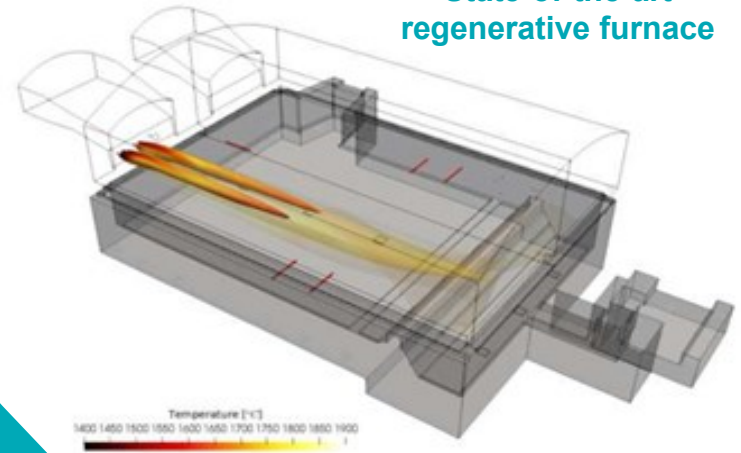
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NextGenerationEU

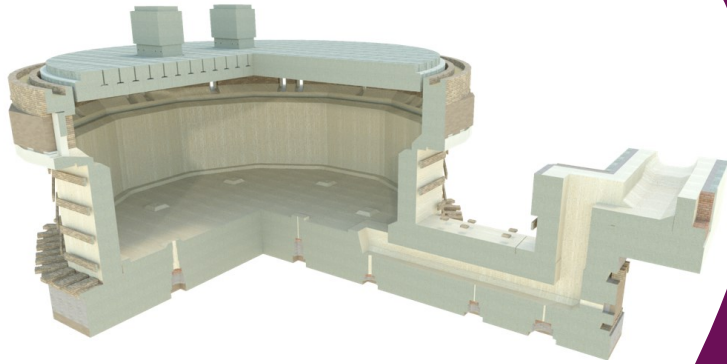
NextGen Furnace – project background

Current container glass production technology

- From recycled cullet and raw material (sand, soda ash, limestone)
- Energy-intensive & continuous industry
- Production rates, glass colour, cullet levels
- CO₂ emissions - from melting energy and raw materials
- Glass melting technology: 85-100% natural gas fired, and 0-15% direct electrical heating
- Specific emissions (CO₂/kg glass) reduced by > 30% from 1960 to 2022
- Technology is mature – a breakthrough was needed

State-of-the-art
regenerative furnace





**All-electric cold-top melter
(VSM® of SORG)**

NextGen Furnace - background

- All-electric melting available
- Technical limits (mainly batch blanket related)
 - Limited pull
 - Limited cullet %
 - Reduced glass
- Break technical limitations of all-electric melting
- Taking into account:
 - Furnace lifetime
 - Furnace maintenance

NextGen Furnace - Project scope

Project – Hybrid furnace

- Industrial amber container glass production, maximum decarbonisation
- Up to 350 tonnes per day, 70% cullet, amber beer bottles
- 80% (direct) electrical heating / 20% oxy-gas
- Flexibility of top heat position - oxy-gas firing
- Start up / maintenance / risk mitigation - 80/20% flexibility

Ardagh Glass Packaging - Obernkirchen Plant

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



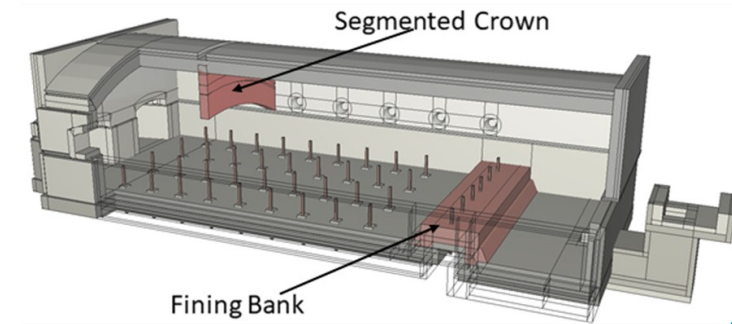
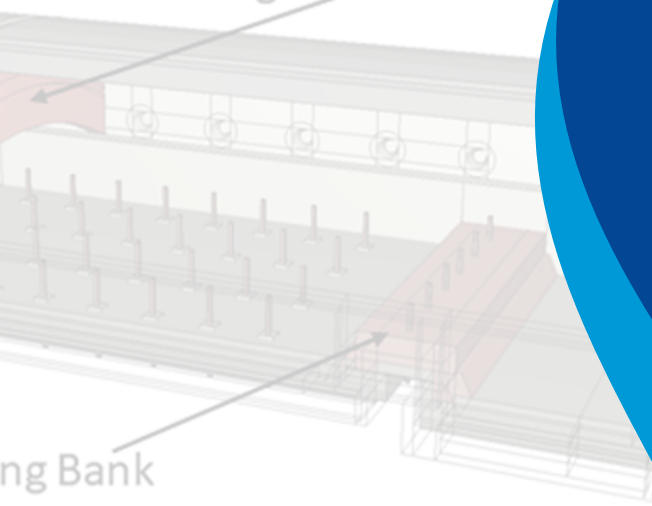
NextGen Furnace - Project

Selection process

- Various technical discussions
- SORG Clean Melter® design selected

Innovative elements

- Combination of known furnace design elements
 - Segmented crown
 - Heated fining shelf
 - Deep refiner
- Matrix of 42 bottom electrodes - up to 80% direct electrical heating
- Design optimisation



NextGen Furnace - Installation

Furnace + Double Y-feeder

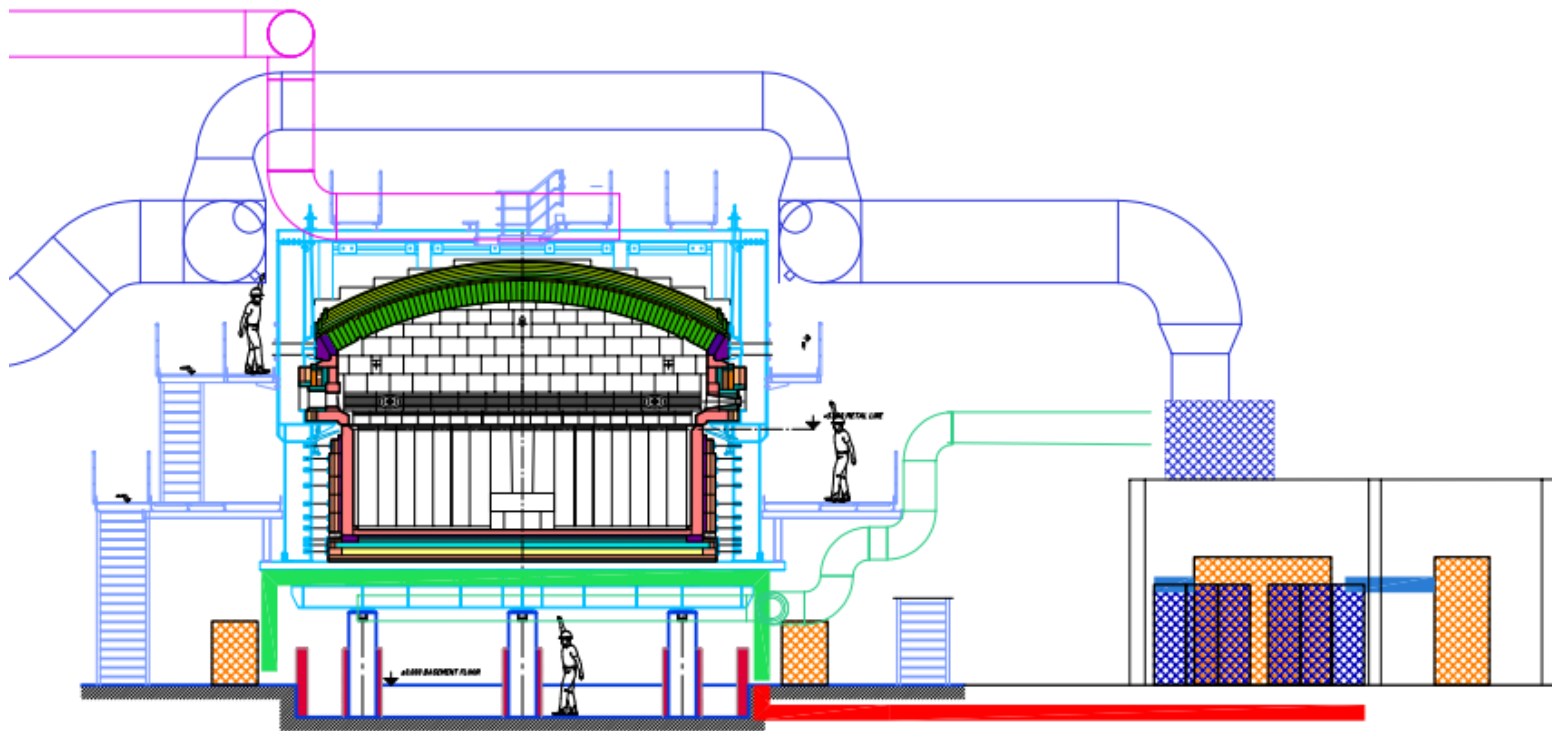
Combustion

- VSA + LOx back up
- Oxy-gas burners
- Waste gas exit to quench (air / water)
- Filter - Interprojekt CCF (3 modules) - limit T and humidity
- Chimney - limit min /max volume (speed)

Refractory inspection

- Fluxline cooling ducting from above
- Slots in soldier block insulation
- Monitoring regime

NextGen Furnace – Basic Layout





NextGen Furnace - Installation

Electrical

- Grid connection - 30 kV connection
- E-infrastructure plant
- SORG Hy-Power system
 - primary transformers - separate rooms
 - thyristor power control
 - secondary transformers - under furnace

Safety

- Furnace bottom level - fence
- Procedures: inspection / maintenance /..
- Magnetic field strength - measurements within guidelines





ArdaghGlassPackaging 

NextGen Furnace - Resources

Raw material & cullet

- No changes - cullet standard quality
- Extra metal detection & rejection systems installed

Renewable electricity supply

- Local (off-site) solar PV project
- Bridging solution - PPA in place

Procedures & Training

- Plant & AGP Central Engineering personnel
- Operations & Maintenance
- Procedures Operational & Emergency

NextGen Furnace - Status

Operational status

Obernkirchen Plant, Germany

Built Q2+Q3 2023

Glass out

Flint glass - start electrodes

Colour change to amber

Commercial production since Oct 2023

Ramp up electrical heating towards 80%

Carbon reduction of 60% per bottle achieved

Support SORG

Supported by German Federal Government (BMWK) & EU



Supported by:



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and Climate Action

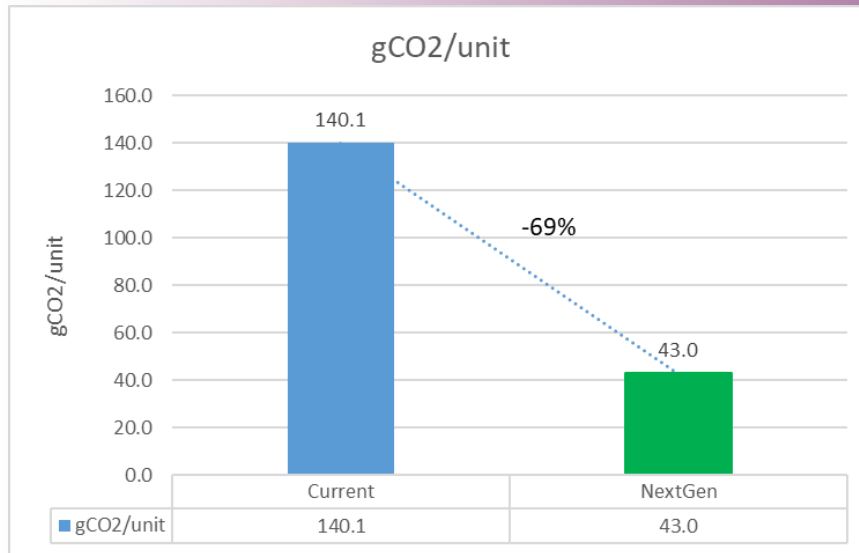
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Life Cycle Analysis (LCA)

LCA of a glass bottle produced in the NextGen Furnace compared to one produced in a conventional furnace at AGP in Obernkirchen



- Externally verified
- Based on actual data and theoretical NextGen data
- Across scope 1, 2 and 3 emissions

At 80% electric melting

→ **69% reduction** (to 43g CO₂)

At 60% electric melting*

→ **64% reduction** (to 51g CO₂)

Ardagh Hydrogen Project

- Limmared, Sweden
- 5 MW PEM electrolyser
- Target is to replace 20% fossil energy with Hydrogen
- Natural gas-hydrogen mixture
- Operational summer 2024



Conclusions

- Commercial production of amber glass at high electric heating rates is possible
- A significant reduction in carbon footprint is realised
- 80/20 – 20/80% flexibility to be evaluated, no longer required for risk management



Thank you!

Any questions?





Link to Videos:

Animation

<https://www.youtube.com/watch?v=1YLOx-aClvk>

Opening Event

<https://www.youtube.com/watch?v=g2P797abZzk>

Time Lapse

<https://www.youtube.com/watch?v=U-VbE712MyU>

Closer Look:

[NextGen Furnace, delivers low carbon glass packaging \(youtube.com\)](#)