

Benefits.

The performances measured during the first months after ramp up and the process stabilization (in stationary conditions) are promising. It is more than likely that this breakthrough technology at worldwide level, will meet the initial targets which are

- CO₂ emissions will be reduced by 5.5% meaning 6000 t of CO₂ saved per year
- NO_x: specific emissions will be reduced by a bit less than 80%
- SO_x: specific emissions will be reduced by about 35 %
- Dust (particles) will be reduced by a bit less than 80 %
- Energy consumption will be reduced by about 20%

The reference is a 100% gas air combustion technology, which is a state of the art reference.

These world premieres serve as references and demonstrate that AGC Group is mastering the most sustainable technology of flat glass furnaces at worldwide level. It is important to notice that from a product perspective, the glass types produced are satisfying the automotive criteria's which are among the most severe in the large flat glass markets

The economical evaluation of the technology is closely linked to the energy price (both fossil fuels and electricity) as well as to the price of CO₂, this can be a barrier to its deployment in some countries.

Partners:



AGC GLASS EUROPE

AGC Glass Europe produces and processes flat glass for the construction industry (external glazing and indoor decorative glass), the automotive industry, solar applications and various specialist industries.

Its baseline "Glass Unlimited" reflects the possibilities offered by:

- Glass as a material to meet a growing variety of needs (comfort, energy control, health & safety, aesthetics)
- Innovation in products and processes, derived from sustained research in advanced glass technology
- Industrial facilities comprising more than 100 production, processing and distribution facilities throughout Europe from Spain to Russia
- A worldwide marketing network



AGC FLAT GLASS CZECH

AGC Flat Glass Czech as, a member of the AGC Group is the largest producer of flat glass and its applications in Central and Eastern Europe.

The headquarter and the main industrial plant are located in Teplice, 90 km north of Prague, close to the border with Germany. AGC Flat Glass Czech produces and processes flat glass for architectural and for automotive industry. Its aim is not only to put priority volume of production increase, but also to maintain a high quality of products and services offered to customers.

It reflects the need for continuous investment in new technologies. AGC Flat Glass Czech exports three quarters of its production to eight countries around the world.

The company is also regularly ranked in the top ten of best employers in the country

LIFE11 ENV/CZ/000488 **HOxyGas**



Validation of an innovative automotive glass process: hot oxygen and hot natural gas combustion

With the contribution of the LIFE financial instrument of the European Community

Key figures:

Duration of the project:
1 June 2012 to 31 January 2016

Total budget: 12.102.320 €

EU contribution: 4.250.924 €

Key objectives:

Reduction of the fossil fuel consumption and GHG emission linked to automotive glass production process.

Demonstration of the technical feasibility of preheated oxygen and gas combustion technology use to produce high quality colored glass for the automotive industry, using only natural gas

Industrial application is located in the Czech Republic.

Compared to a state of the art reference which is 100% gas air combustion technology, this project should allow the furnace:

- to decrease melting energy by 20%
- to reduce CO₂ emissions by 5.5%
- to decreased NO_x emissions by nearly 80%
- to decrease SO_x emissions by 35%
- to decrease dust emissions by 70%.

Produce automotive glass using only hot natural gas (450°C) and hot oxygen (550°C).

The glass production process is very energy intensive, consequently, AGC Glass Europe has been focusing its manufacturing and R&D activities on lowering its energy consumption and greenhouse gas (GHG) emissions from flat glass furnaces. Therefore, over the last years many different techniques have been developed to reduce energy consumption and GHG emissions.

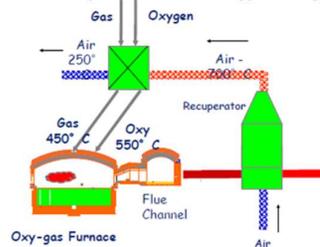
Hot oxy-combustion is one of the several technologies investigated by AGC, should it be at prototype scale or at industrial scale.

AGC Glass Europe has developed flat glass furnace technology that uses pure oxygen instead of air as oxidiser, combined with the recovered thermal energy from waste gases to preheat both oxygen and natural gas.

As 79% of nitrogen contained in air is useless for the combustion and generates nitrogen oxides (NOx) at high temperature, it is known that the use of pure oxygen instead of air helps to reduce the energy required for combustion and prevents the formation of NOx.

Because of its low economic viability, especially with the current CO₂ and energy prices and its inherent technical challenges the application of oxy combustion is rare in the flat glass.

AGC Glass Europe however overcame the profitability issue by developing a system that re-uses heat from the flue gases to preheat oxygen and natural gas before its injection into the furnace. This yields extra energy savings.



Regarding the technical challenges and risks, numerous studies have been carried out at R&D level (such as 3D numerical simulation; lab furnace tests), engineering (refractories selection) and industrial level (training, safety) to decrease the industrial uncertainties as much as possible before deciding to “jump” at a full industrial scale.

Technology implementation on AGC sites.

The first industrial application was located in Boussois, France, and started in 2008 with the aim at validating the feasibility of producing good quality of clear glass for architectural applications with a hybrid combustion, using partially heavy oil and partially natural gas.

During this first experience, AGC Glass Europe evaluated and validated technical components. These included technology design and material selection (furnace, burners, refractory); safety issues linked to hot oxygen use; glass melting settings (fire curve, internal furnace atmosphere and foam management).

The environmental as well as the energy interests have also been assessed.

This first project was funded by the European Commission Environment- LIFE Programme -HotoxyGlass- LIFE07 ENV/F/179.

The second industrial application was located in the Czech Republic.

It aimed at demonstrating the maturity and potential of the new technology by producing high quality automotive colour glass (which has higher quality requirements than architectural glass), using only natural gas as a combustible (more corrosive atmosphere; more foaming on glass surface). This installation started by mid-2014 and is still under evaluation. At current stage, it has showed promising results since the first glass from an oxy combustion furnace has been supplied to an automotive customer.

This project was also funded by the European Commission Environment- LIFE Programme -HOxyGas- LIFE11 ENV/CZ/488, for the validation of preheated oxygen and gas combustion technology to produce high quality colour glass for the automotive industry.

The HOxyGas project aims at demonstrating a new type of production technology for automotive flat glass that has a lower carbon footprint than usual state to the art comparable furnaces in terms of reduced fossil fuel consumption and reduced GHG emissions

Environment.

The technology described here above, perfectly fits with AGC Glass Europe’s environmental policy.

Environment is one of the four shared values of the AGC group and is a key part of the company’s Social Responsibility.

AGC Glass Europe’s environmental policy is twofold:

- To be at the forefront in developing new products with improved environmental performance during their lifetime.
- To manufacture these products using the best available technologies from an environmental point of view, to minimize the environmental impact.

Instead of considering the sustainability as a constraint, AGC Glass Europe turned this into a challenge and met successfully the challenge to achieve the best balance between sustainable development and profitability while improving comfort, safety and aesthetics for the end user.