

Benefits of the project.

The performances demonstrated during the project after ramp up and the process stabilisation (in stationary conditions) are:

- CO₂ emissions reduced by 5.5 +/-3 % meaning up to 4,800 t of CO₂ saved per year;
- NO_x: specific emissions reduced by 85 %;
- SO_x: specific emissions reduced by up to 82 %;
- Energy consumption reduced by about 18.7 +/-3 %.

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

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 worth noting that from a product perspective, the glass types produced are satisfying the automotive criteria 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.

Finally, it has to be noted that this technology and the related environmental benefits might be transferred (after technical studies) to other applications such as cement, ceramics and steel.

Partners:



AGC Glass Europe, a leader in flat glass

Based in Louvain-la-Neuve (Belgium), AGC Glass Europe produces, processes and distributes flat glass for the construction (external glazing and interior decorative design), the automotive and the solar sectors. It is the European branch of AGC, the world's largest flat glass producer.

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;
- Over 100 sites throughout Europe, from Spain to Russia;
- A worldwide marketing network;
- Its 16,000 employees.

More information on www.agc-glass.eu (corporate), www.yourglass.com (building and interior design) and www.agc-automotive.com (automotive)



AGC Flat Glass Czech, largest glassmaker in Central Europe

Based in Teplice (North Bohemia), AGC Flat Glass Czech is the largest producer of flat glass and its applications in Central Europe. It manages production plants in the Czech Republic, trade agencies in Central Europe and processing plants in the Czech Republic, Slovakia and Poland. In addition to processing facilities for manufacturing architectural glass, mirrors and decorative glass, the Czech operations rely on 3 float plants located in Teplice and an automotive glass plant in Chudovice. AGC employs around 4,500 people in the Czech Republic and is regularly ranked in the top 5 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

<http://www.agc-hoxygas.eu/>

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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 used to produce high quality coloured 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%;
- reduce CO₂ emissions by 5.5%;
- decrease NO_x emissions by nearly 80%;
- decrease SO_x emissions by 35%;
- decrease dust emissions by 70%.

Key figures:

Duration of the project:
1 June 2012 to 31 January 2017

Total budget: 12,102,320 €

EU contribution: 4,250,924 €



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

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

The glass production process is very energy intensive, therefore, 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.

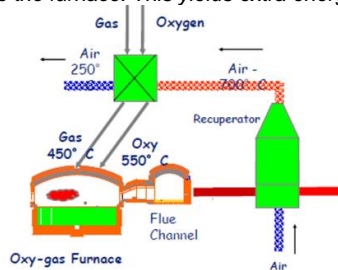
Hot oxy-combustion is one of the several technologies investigated by AGC, should it be at prototype scale or at industrial scale.

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 industry.

AGC Glass Europe, however, overcame the profitability issue by developing a system that allows reusing 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 (refractory 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 took place in Boussois, France, and started in 2008 with the aim at validating the feasibility of producing good quality 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 also funded by the European Commission Environment - LIFE Programme – HotoxyGlass – LIFE07 ENV/F/000179.

The second industrial application took place 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 has been evaluated end of January 2017. At the end of the project, it has showed promising results since the first glass from an oxy-combustion furnace has been supplied to an automotive customer and emissions/energy savings targeted have been nearly reached (see the section "Benefits of the project" for more details).

This project was also funded by the European Commission - 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 Corporate Social Responsibility policy. The four shared values are: Innovation & Operational Excellence, Diversity, Environment and Integrity.

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 minimise 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.