



Report on networking actions

LIFE CleanOx
LIFE16 CCM/BG/000059



LIFE CleanOx




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

Deliverable title:	Report on networking actions
Action:	E.1. Dissemination planning and execution
Reporting date:	09/12/2022
Prepared by:	Air Liquide
Security level:	Private
Number of pages:	7

Acknowledgements:

This report was produced under co-finance of the European financial instrument for the Environment (LIFE) during the implementation of the Project *Cleanest oxy-fuel combustion technology with radiation based waste heat recovery for glass melting furnaces* “LIFE CleanOx” (LIFE16 CCM/BG/000059). The CleanOx team would like to acknowledge the European financial instrument for the Environment (LIFE) for the financial support.

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Introduction

The main focus of the LIFE CleanOx project aims to implement at full-scale an innovative technology with a strong positive environmental impact (GHG and energy savings) that will be economically viable, which will ensure its replicability.

In particular, LIFE CleanOx consists in demonstrating an innovative radiative heat exchanger based HeatOx solution.

The project has three main objectives:

- **Reduction of GHG emissions** linked to tableware glass production (compared to air combustion using a regenerative heat exchanger: 30% less CO₂ and 90% less NO_x emissions)
- **Increase of thermal efficiency** in tableware glass plants (compared to air combustion using a regenerative heat exchanger: 30% less)
- **Significant CAPEX reduction** (50-75%) compared to LIFE Eco-HeatOx




Lowering GHG emissions and energy consumption are a recurrent challenge in the industry because the methods employed have to be environmentally sustainable and at the same time economically viable. In response LIFE CleanOx aims at facilitating the widespread use of waste heat recovery for oxy-fuel furnaces with an innovative heat recovery system. The project will focus on tableware glass.

Objective

The objective of this action is to ensure an effective networking with other projects, to a mutual benefit, not only during the project duration but also after its termination.

The main objective is the transfer of knowledge and information exchange with professionals of the area and of the LIFE programme.

The benefits from this action are diverse, but the main result is to transfer expertise and new knowledge. Sharing development approaches can also optimize the management and the monitoring of the project. Another objective is to develop our own network and to have contacts of diverse expertise for further collaborative activities or projects.

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Networking

Networking activities

During the project, project's partners made networking activities with the aim to ensure an effective networking with other projects, to a mutual benefit. The main objective was the transfer of knowledge and information exchange with professionals of the area and of the LIFE programme.




To that purpose, networking with some other LIFE projects as well as with H2020, ERDF... 's ones for the development of environmentally friendly technologies, approach, and knowledge was targeted as well as some new LIFE, H2020... projects. This was planned with the aim to communicate on the development of energy heat recovery solutions such as LIFE CleanOx technology and its benefits, in particular to which extent the technology can contribute to the reduction of GHG, pollutants emissions, and energy consumption in the Glass Industry.

The targeted audience for these dissemination activities was:

- Public authorities, which will be encouraged in the future to adopt stricter environmental standards for glass industry (and possibly others) as HeatOx and CleanOx technologies demonstrate that viable Heat Recovery solutions to reduce both energy consumption and pollutants' emissions exist,
- The glass industry, which will be pressured to use similar technologies to comply with the regulations,
- The glass industry clients, which will be made aware of the environmental efforts performed,
- Other industries for the transfer of the technology: cement producer, steel, enamel, porcelain, coal power plants, incineration plants, tire manufacturers, etc.

Partners have also been proactively participating in conferences and seminars as detailed in the next paragraph "Dissemination activities".

It is to be noted that these activities have been paused between 2020 and 2021. The covid 19 pandemic has impacted the networking and dissemination activities of the project. Since there was no opportunity for face-to-face meetings and site visits, networking activities were mostly carried out as on-line meetings such as the 35th and the 36th Şişecam Glass Symposiums that were fully virtual events.

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Dissemination activities

Project's partners have attended the following conferences & seminars:

ICG (International Commission on Glass):

ICG is an **organization that seeks to generate value by leveraging its know-how and network to bring academia and industry together** while constantly striving to attract young talents to invest in a sustainable glass society.

ICG organization has sub-committees named Technical Committees (TC), which are specialized in their field (such as Basic Glass Science, Glass Production, Characterisation, Application or Information & Education), and **Şişecam** played an active role in these committees.




Air Liquide attended the **2017 ICG (International Commission on Glass) Annual Meeting** in Istanbul, Turkey on October 22-25th 2017. In 2017, the ICG Annual Meeting was held in conjunction with **32nd Şişecam Glass Symposium** where Şişecam invited glass world stakeholders to share and discuss knowledge about the latest developments on glass science and manufacturing technology.

At the occasion of this ICG, **Air Liquide** made a **presentation of Life Eco-HeatOx project results** and **introduced the new Life CleanOx project** and thus started the dissemination activities, in particular those related to the project objectives.

Technical Committee on Energy Efficiency TC09, mainly focuses on glass melting since this contributes on average to about 60-65 % of the total energy consumption in glass production. The aim of this committee is to identify the major process steps with energy efficiency improvement potentials, to select suitable technologies, to test or develop tools that support energy efficiency investigations such as energy balance models, protocols for energy management, energy audits and finally to define research activities for developing energy saving glass production methods. The **Life CleanOx project** was presented on 07 April 2021 via Video Conference to the TC9 Energy Efficiency committee members. In particular, tableware and flat glass manufacturers were closely interested in the CleanOx technology, LIFE grant opportunities, and LIFE's general procedures. All necessary information has been conveyed during this meeting.

Glass Trend Seminar

The **GlassTrend** organization is a **consortium of worldwide operating industries and institutes working in the field of glass and glass production**. The name GlassTrend is an acronym of Glass Technology Research & New Developments and the association aims to coordinate research and development activities to improve the competitive strength of glass industries, its suppliers and customers. The **purpose of GlassTrend** is to **identify the needs and requirements for improved and innovative production technologies** for the whole **glass industry** in the broadest sense and to define and coordinate research and development activities which fulfill these requirements.

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At the occasion of the Glass Trend Seminar on "How to face the technological challenges of the Paris climate agreement?" in Marktheidenfeld (Germany) in April 2018, both Partners were present and attended:

- the session "Low carbon raw materials" where Şişecam presented the Melting properties of fiberglass batch with low gas content,
- the session "Low carbon combustion technologies and heat recovery" where Air Liquide presented the Combustion technologies and models helping carbon neutrality developed by Air Liquide.

Asian Green Glassmaking plant

Air Liquide attended the **Asia Green Glassmaking Plant Summit 2018** which was held on May 9, 2018 at the Pullman Shanghai Skyway. The conference was dedicated to **Build Energy Efficient Digitalised, HE-ULE Glassmaking Plant.**

The Asia Green Glassmaking Plant Summit 2018 covered topics such as:

- The economics of green glassmaking in the region
- Policies across the Asian countries
- Challenge and opportunities with investors, funders and advisors
- What investors need to make a project bankable
- New technologies in green glassmaking
- How green glassmaking markets are developing in the region
- The future of the emerging green glassmaking market with industry leaders
- The market opportunities for advanced glassmaking technologies and their outputs




ICG (International Commission on Glass)

ICG (International Commission on Glass) **Annual Meeting 2018** was held in **Yokohama, Japan** from Sept 23rd to Sept 26th, 2018. Main issue of ICG 2018 was "Innovations in Glass and Glass Technologies: Contributions to a Sustainable Society". Over 500 Glass Industry professionals attended the event.

Air Liquide made a **presentation** on "HeatOx to Glass industry for Low Carbon & Circular Economy". Air Liquide also shared a Digital Internet Of Things (IoT) solution for optimum burner operation.

LIFE Platform Meeting on Climate Change Mitigation in Energy Intensive Industries in Utrecht (Netherlands)

The **LIFE Platform Meeting on Climate Change Mitigation in Energy Intensive Industries** held in Utrecht, Netherlands on **26-27 September 2018** brought together beneficiaries of the LIFE Programme and other EU funding mechanisms, policy makers and stakeholders with the aim to

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discuss how Energy Intensive Industries (EII) can contribute to implementing the European Union’s roadmap to decarbonisation.

The main objective of the meeting was to **promote the exchange of good practices** and to **facilitate networking and synergies among LIFE and other EU projects such as H2020** related to **energy intensive industries**. The sectors primarily covered in this meeting were: glass, ceramics, cement, steel and other metals.

The meeting included three main parts:

- Plenary sessions on the policy context, industry commitments, technological solutions,
- Working groups focusing on key issues of shared concern and possible synergies among the participating projects,
- Visits to relevant projects near the platform meeting location.

LIFE CleanOx project beneficiary was **invited** to participate in the platform meeting due to its contribution to making European industry more climate-friendly and less energy-consuming.

Glasstec

At **Glasstec 2018** (international trade fair for glass production, processing and products), from October 23rd to 26th in Düsseldorf (Germany), **Air Liquide featured solutions that ensure “CLEAR EFFICIENCY”** for the **glass production and processing**. Among the **technologies showcased** by Air Liquide, **HeatOx technology** was the **flagship** !

Thanks to connected glasses, **live-streaming sessions** were **organized between project’s partners** in order to **allow the Glasstec attendees to visit the HeatOx technology** for Glass implemented at Paşabahçe in Bulgaria. It was a first of its kind: the **visitors** of the Air Liquide stand were **taken** in this way to the **plant in Bulgaria to see virtually the Heatox process in a real environment**, while sitting in Düsseldorf. These live-streaming sessions of HeatOx installation in Bulgaria have attracted about hundred attendees and customers for a unique live journey.




A **3D model of HeatOx technology** was also **made available by Air Liquide on its booth**.

During **Glasstec 2022**, Air Liquide’s trade show motto was **“Growing Clean with Air Liquide”**. With **Oxy-combustion, Heat Recovery & Hydrogen Combustion solutions** in its technologies portfolio, **Air Liquide** was able to **present low-carbon energy solutions to glassmakers** and interested parties.

At GLASSTEC, Air Liquide also showed a new oxygen on-site plant to reduce the CO2 footprint at customer sites.

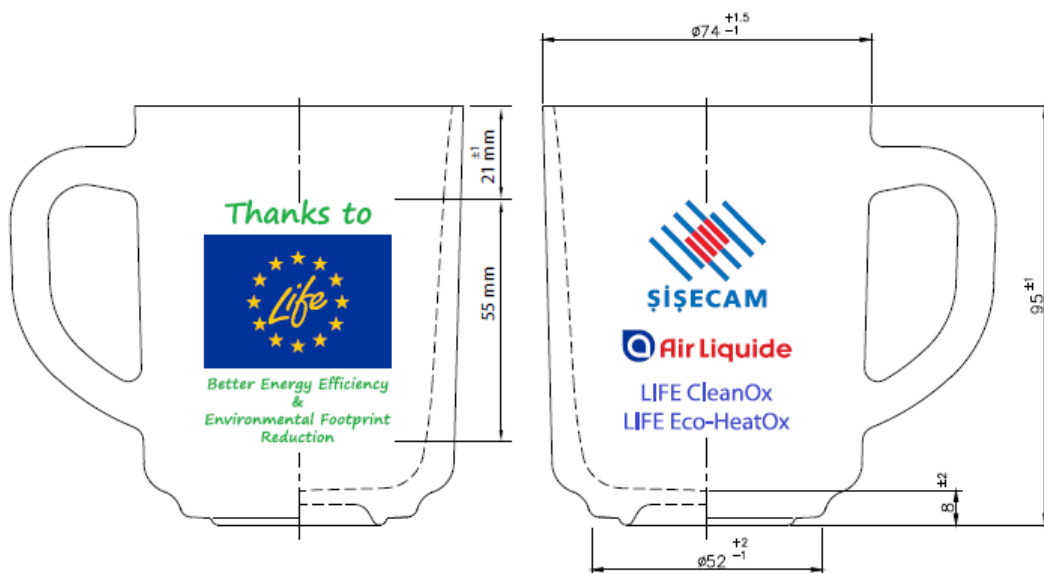
Glass Problem Conference (GPC)

The **Conference on Glass Problems (GPC)** is the **largest glass manufacturing conference in North America**, attracting **glass manufacturers and suppliers worldwide to exchange innovations and solutions**.

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Air Liquide, Paşabahçe and Şişecam have jointly presented HeatOx technology and the LIFE CleanOx project at this conference multiple times, so that participants are aware of the continuous development of the technology, notably including a paper presented by **Şişecam** in 2016 and a presentation of **Four Major Levers for Contribution of Glass Industry Decarbonization in 2019**. **In 2022, the partners** presented the latest Radiative HX results from the Life CleanOx project at the 83rd GPC.

In the framework of the CleanOx project, **Paşabahçe, Şişecam and Air Liquide** also worked on the following glass which was manufactured in the Paşabahçe’s plant in Bulgaria. The purpose was to communicate on the Life+ project:



Conclusion

Project’s partners have been very active during the CleanOx project in terms of networking and dissemination activities. Some dissemination related actions will be continued according to what is defined in the After LIFE Plan. As explained in the dissemination action, the website will be updated after the end of the project. Networking with other projects will be pursued as they can give new elements for new technological breakthroughs to reduce GHG emissions and energy consumption. Some activities will continue such as site visits and virtual tours of the plant. These activities will be led by both Air Liquide and Paşabahçe.