Energy Efficiency in Glass Production (TC09) – Annual report 2016

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SUMMARY

The most important aim for 2016 is to define a uniform approach to define energy efficiency or specific energy use within or across the various glass industry sectors. With financial support of ICG, TC09 started a project to realize this goal. The existing non-uniformity is compounded by the fact that there is no common approach in the consideration of factors such as the effect of cullet, the efficiency of electric boosting, age, furnace design etc.. Furthermore reported energy data in literature do not clearly explain the validity of the reported data. In first instance TC09 is focussing on glass melting furnaces, the largest energy consumers of a glass factory.

TC09 will develop recommended Best Practices for defining energy use and efficiency so that companies within each glass sector can make useful comparisons. This approach will be used to explain some of the differences in performance between sectors and aid discussions with non-technical and/or external agencies.

The results of this project will be used to explain the energy balances of glass furnaces and to evaluate the methodology of applied energy balance models, measuring techniques and benchmark data. The first step in this study is an energy benchmark study for 6 to 8 float glass furnaces. In this study glass furnace energy consumption of individual glass furnaces will be benchmarked against a database of energy consumption of (anonymous) glass furnaces.

TC9 Started a round robin comparison of calculating the Thermodynamic Energy Requirement for glass melting for some selected glasses.

Besides this study on the definition of energy efficiency, TC09 exchanged information on running projects and new initiatives to reduce energy consumption in the glass production process. Many companies apply energy benchmark studies as a starting point of energy reduction programs. To reduce the CO_2 footprint and energy consumption some companies switched from air-fuel to oxy-fuel, while others increased the fraction of electric boosting. New initiatives in the glass industry are for example the application of Organic Rankine Cycle (ORC), Hot-Ox systems to preheat fuel and

oxygen, the application of the 'Optimelt' TCR system and the use of smart batches which melt more easily.

ACTIVITIES in 2016

1. TC09 Meetings

In 2016 three TC09 meetings were organized, the first meeting was organized on March 2016 at HVG in Offenbach Germany.
The 2nd meeting took place in form of a skype/web conference on October 2016.
The 3rd meeting was held at Sibelco in Maasmechelen Belgium on 20 December 2016.
The meetings were attended by respectively 10 and 10 and 13 (guest-) members.

2. Energy benchmark project

As explained in the summary an energy benchmark project has been done for 6 float furnace with the aim to define a uniform approach to define energy efficiency or specific energy use within or across the various glass industry sectors. A draft publication is in progress.

3. Calculation of minimum thermodynamic batch melting energy

There is not a clear standard for what is the actual minimum amount of enthalpy (thermodynamic energy requirement) that is needed to melt a certain soda lime (Container) glass batch.
Several batches were defined and HVG and Sibelco calculated the minimum melting energy using a thermodynamic method developed by Conradt and tuned by HVG and the thermodynamic model FactSage 7.0 (applied by Sibelco).

Based on first results, the differences between both models are of the order of magnitude of 5 to 10%.

4. Exchange of information

TC09 exchanged information on running projects and new initiatives to reduce energy consumption in the glass production process.
Hans van Limpt and Sven Kahl visited Glass Alliance Europe to explain the activity of TC09 to them.

5. Publications & Presentations

- Draft publication of the Float Benchmark is in progress

PLANS FOR 2017 AND DELIVERABLES

- Organization of 2 annual meetings. First meeting will be held with the DGG conference in Weimar on 31 May.
- Finishing publication of energy benchmark project for float furnaces.
- Execution of calculating minimum thermodynamic melting energy for more batches
- Exchange of information on running projects and new initiatives to reduce energy consumption in the glass production process