



Activities of the new **ICG TC9** on Energy efficiency

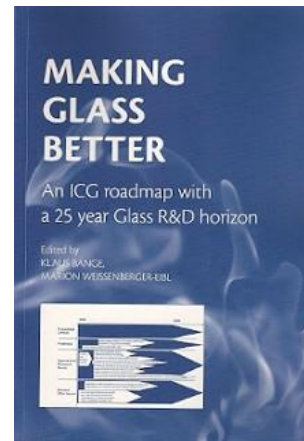
Hans van Limpt, chair TC9

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1. Motivation

- As a result of the very comprehensive ICG roadmap activities, the International Commission on Glass has launched a new Technical Committee addressing the need to focus on energy efficient glass production in order to decrease greenhouse gas emissions and primary energy consumption in industrial glass production.



- The aim is to bring experts together to discuss the energy saving potential and energy saving technologies available for all steps in the process of industrial manufacturing (from raw materials to glass product) and for all glass sectors.

2. Members

Glass producers	R&D	Forming / annealing / furnaces/ maintenance	Suppliers to glass industry
Philips (2013/2014)	HVG (2013/2014)	BDF (2013)	Praxair (2014)
Guardian (2013/2014)	SSV (2013/2014)	AGMS (2013)	Air-Liquide (2014)
Vidrala (2013)	British Glass (2013/2014)		Sibelco (2015)
Schott (2013/2014)	CelSian (2013/2014)		
Sisecam (2013/2014)			
Vidrala (2013/2014)			
IPGR (2014)			
Libbey (2014)			
Bormioli Luigi (2014)			
NSG (2014)			
NEG (2014)			

Allocation of roles



- Chair - Hans van Limpt (CelSian → Sibelco)
- Vice-chair - Wolfgang Schmidbauer (Schott)
- Secretary - Richard Hulme (Guardian)
- Webmaster - Diego Ochoa (Vidrala)

[http://www.icglass.org/technical_committees/?id=30&committee=TC09: Energy Efficiency](http://www.icglass.org/technical_committees/?id=30&committee=TC09:_Energy_Efficiency)

Meetings

- 28-11-2013 : Eindhoven, NL
- 30-5-2014 : Aachen, GER
- 24-9-2014 : Parma, I
- 20-4-2015 : Bilbao, SP

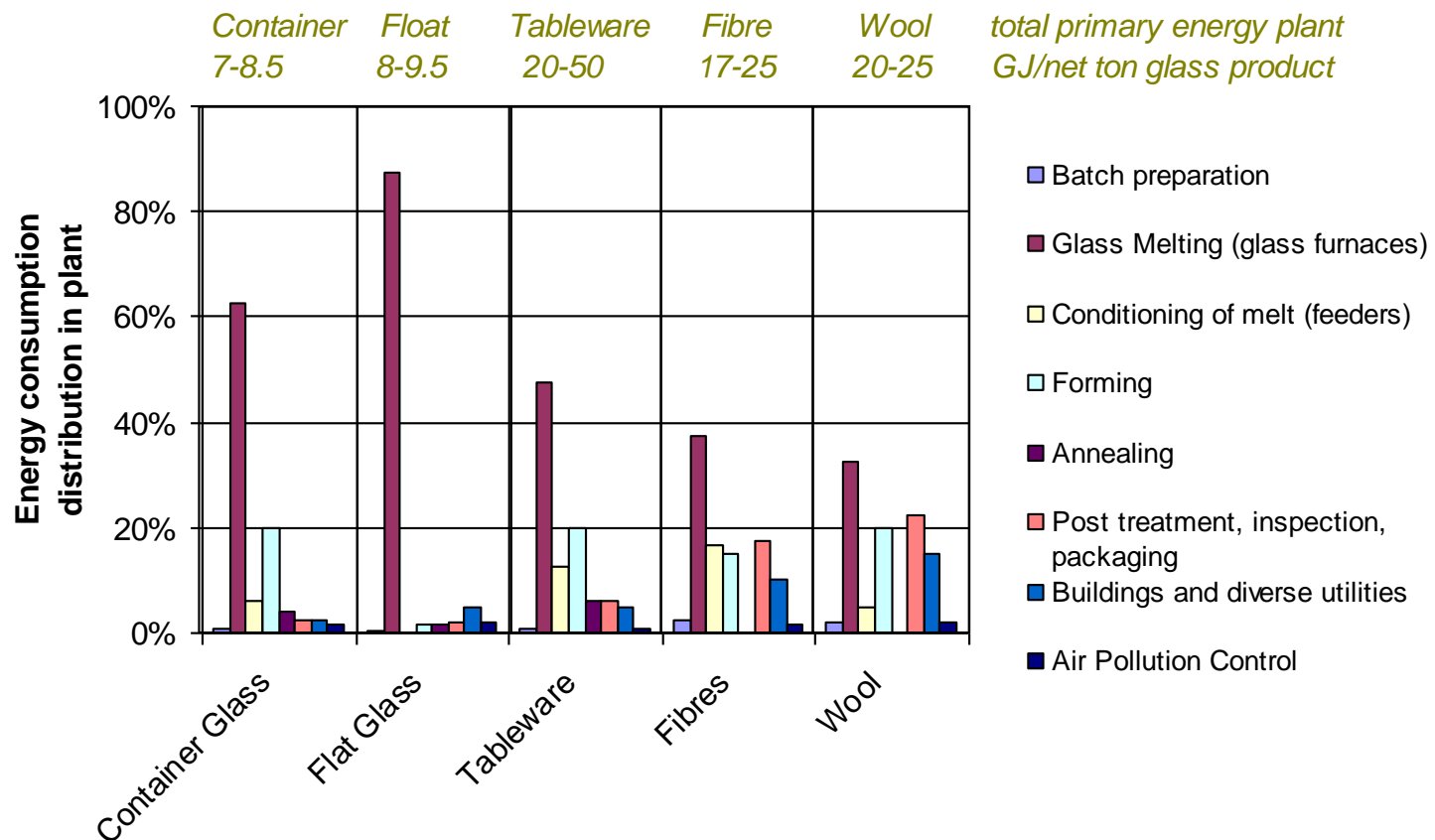
3. Activities TC09

Possible tasks of TC:

- Identifying the major process steps, for potential for energy efficiency improvement;
- Select appropriate technologies;
- Test or develop tools to support energy efficiency investigations (e.g. energy balance models, protocols for energy management, LCA modelling).
- Define research activities for developing energy saving glass production methods.
- Organize symposia;
- Share energy consumption and CO₂ emission data (anonymous) for benchmarking;
- Share LCA data;
- Share practical experiences and problems related to new energy saving technologies.

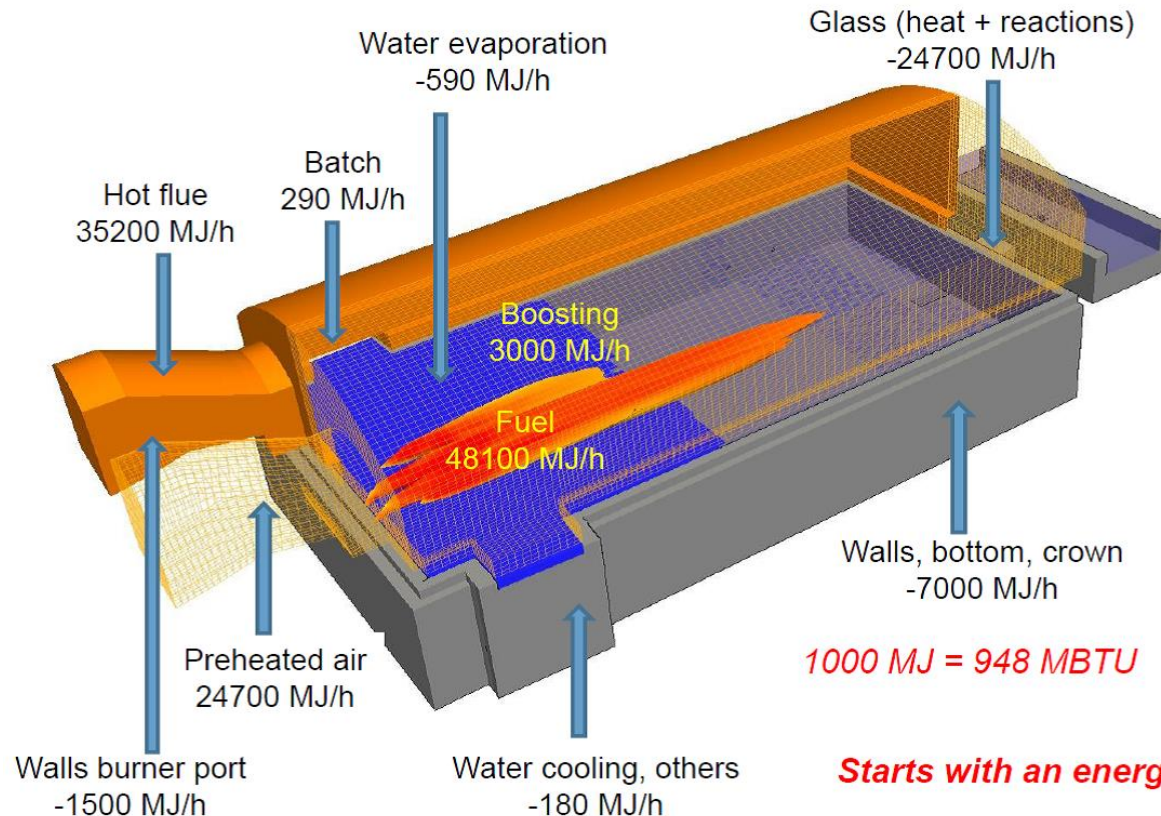
Energy distribution

Typical energy (primary energy equivalent) distribution in different glass sectors (2009)



Source: NCNG Glass Technology Course

Energy balance glass furnace



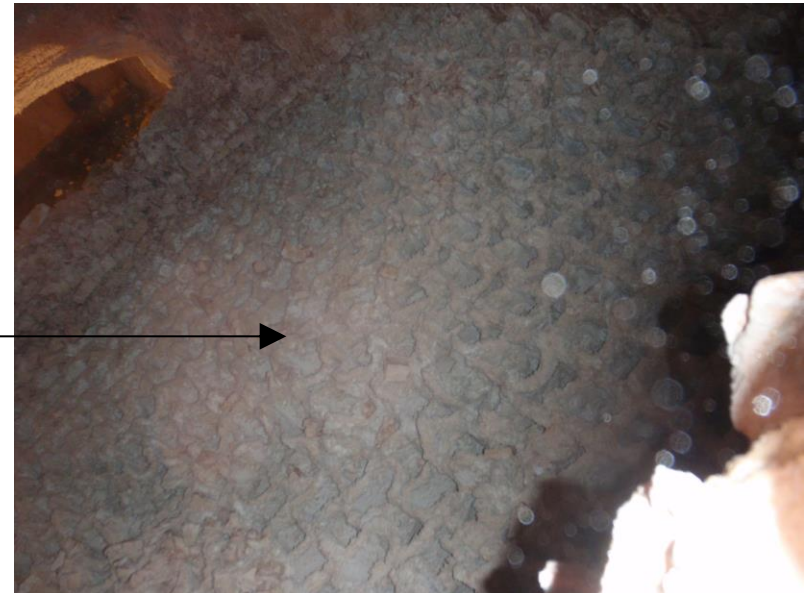
www.celsian.nl/wp-content/uploads/2013/02/EnergyBalance.png

Impact of carry-over and evaporation¹¹ on refractory corrosion



Corrosion of burner port

Corrosion of checkers



Source: Ardagh



Preliminary Announcement, Programme & Registration Form

GlassTrend - ICG TC9 Seminar, hosted by Vidrala

FURNACE HEATING TECHNOLOGIES AND ENERGY EFFICIENCY

21-22 April 2015, Bilbao, Spain

Objective of the meeting: Bringing together the glass industry (GlassTrend) and the Technical Committee TC 9 of the International Commission of Glass to exchange information, analyzing further needs and driving forces in the field of furnace energy efficiency improvement by innovative heating technologies.

Programme GlassTrend Seminar on “Furnace heating technologies and energy efficiency”, April 21 - 22, 2015, Bilbao, Spain, in co-operation with Vidrala and ICG TC9 (Energy efficiency)

Tuesday April 21, Euskalduna Conference Centre, Bilbao

09:00 - 10:45 **GlassTrend Council meeting** (open to all member companies)
10:45 - 11:00 Coffee Break

Session 1: Improved combustion technologies

Session Chair Wilfried Linz
11:00 – 11:30 **Air Liquide and Sisecam**, Luc Jarry; HeatOx : Combustion with Oxygen and natural gas preheated at High temperature
11:30 – 12:00 Glass Service, Erik Muysenberg; Heat transfer optimization performed by FlammaTec burners
12:00 - 12:30 BFI, Carsten Rein; Combustion technologies in the steel industry
12:30 – 13:00 **HVG – DGG**, Ulrich Roger and **Bernard Fleischmann**; Gaseous fuels in German Grids
13:00 – 14:00 **Lunch**

Session 2: Increase of overall furnace energy efficiency by various methods

Session Chair **Sven Kahl**
14:00 – 14:30 Allied Glass, John Naughton; Advancing Furnace Performance and Energy Efficiency
14:30 – 15:00 **CelSian Glass & Solar**, **Oscar Verheijen**, Johan van der Dennen, Marco van Kersbergen, Luuk Thielen & Stef Lessmann; Energy efficiency improvements of glass furnaces
15:00 – 15:30 **Sisecam**, **Emre Dumankaya**-**Neset Arzan**; Heat balance: a useful tool for creating a better fuel economy
15:30 – 16:00 **Coffee Break**

16:00 - 16:30	Vetropack, Jan Kebisek and Günter Lubitz; One year later – experience with fluid bed batch and cullet preheater pilot project
16:30 – 17:00	Vidrala , Estela Alejandro; The effect of glass redox conditions on furnace energy consumption and temperatures
17:00 – 17:30	Fives Stein, Andy Reynolds; Electric melting: an increasingly attractive technology*)
17:30 – 18:00	HarbisonWalker International, Thomas Kleeb: High emissivity coatings on furnace crowns and superstructures
18:00	End of first day of Seminar
20:00	Dinner in Bilbao offered by Vidrala

Wednesday April 22, Euskalduna Conference Centre, Bilbao

Session 3: Electric boosting and electric melting

Session Chair:	David Lever
09:00 – 09:30	Ardagh Glass , Sven Kahl ; Energy efficiency improvement by improved redox control*)
09:30 – 10:00	Schneider Electric, Rene Meuleman; Recent improvements in electrical glass furnace boosting systems
10:00 – 10:30	FIC, Stuart Hakes; How an all-electric furnace is the most fuel efficient option in tomorrow's world
10:30 – 11:00	Coffee Break

Session 4: Thermochemical recuperators/regenerators

Session Chair: Hans van Limpt

- 11:00 – 11:30 Praxair, Sho Kobayashi; Energy Savings by OPTIMELT Thermochemical Regenerators for a 50 tpd Container Glass Furnace
- 11:30 – 12:00 CelSian Glass & Solar, Mathieu Hubert, Agustín Suárez-Barcena and Hans van Limpt; Energy savings in glass furnaces using Thermo-Chemical-Recuperator Technology

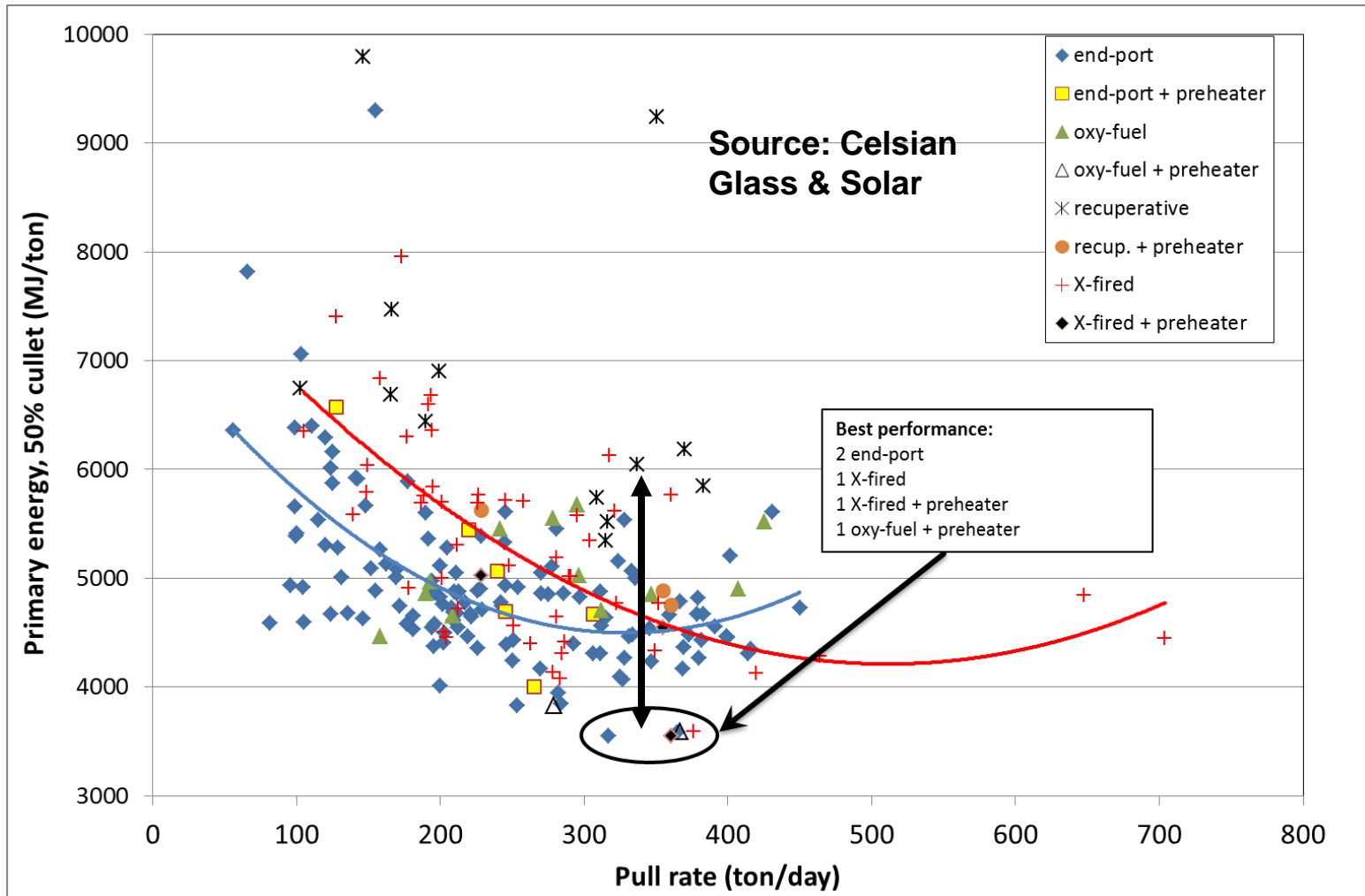
Session 5: Concluding papers

Session Chair AnneJans Faber

- 12:00 – 13:00 British Glass, Gareth Jones, Roadmaps for improving energy efficiency
- 12:30 – 13:00 ICG TC 9, Hans van Limpt; Activities of the new ICG TC9 on Energy efficiency
- 13:00 – 14:00 Lunch**
- 14:00 End of GlassTrend Seminar**

- Meetings twice per year to exchange information.
- Organization of symposia related to energy efficiency in glass production.
- Preparation of a vision document of required future directions for R&D to develop technologies improving the energy efficiency and CO₂ footprint of industrial glass production.
- TC09 tries to summarize new developments and publish results of these inventories and may prepare a specific energy efficiency roadmap for 2015-2025.
- Organization of excursions.
- Broadcasting of the activities and results to the community.

Why such spread ?



Brainstorming of TC09

- Focus on **glass melting furnace**
- Fixed agenda points:
 - Regulations on energy and energy savings and
 - **Definitions & standardization**
- Other topics in order of importance are:
 - **Sharing of practical experiences**,
 - Selection of appropriate technologies,
 - Identification major process steps for energy improvement,
 - Testing & development, evaluation tools,
 - **Energy data sharing**,
 - Vision or roadmap document,
 - Organize symposia,
 - Define research activities.



4. Dialogue with the glass industry



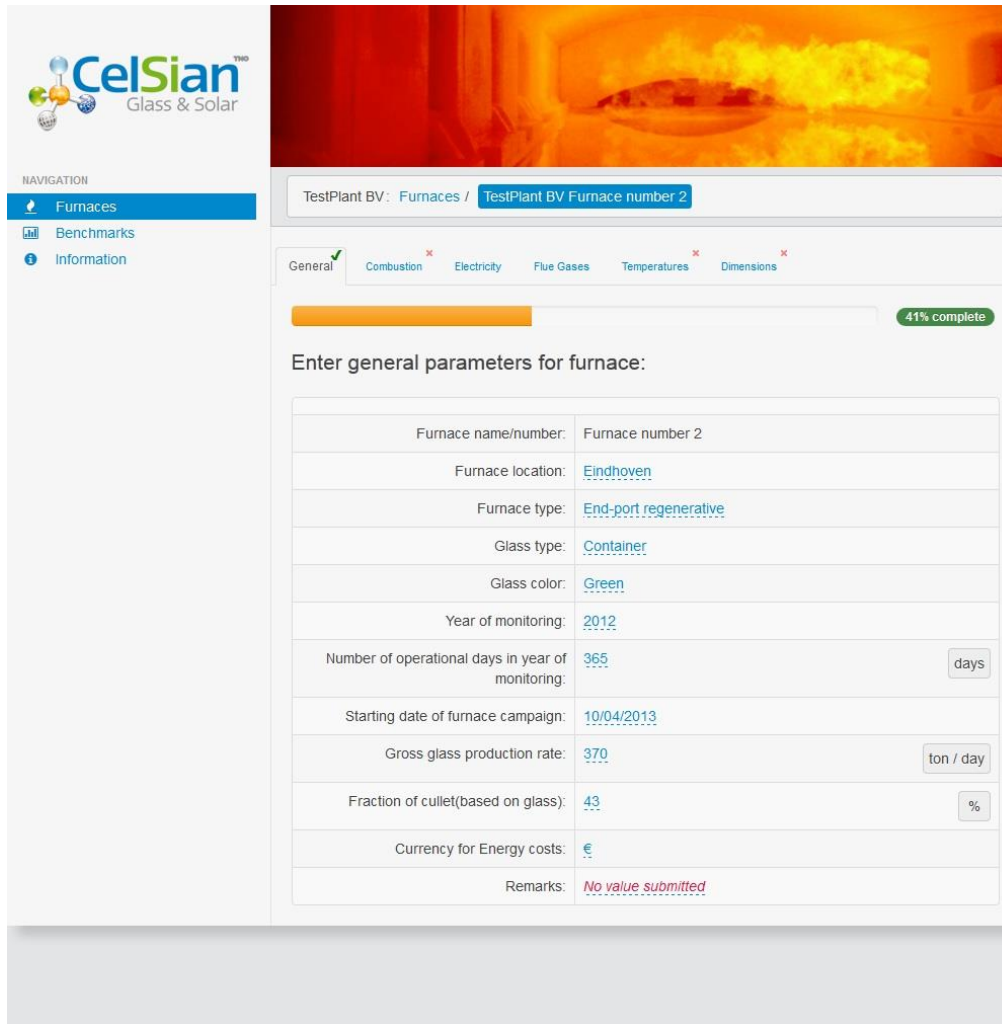
TC09 offers the glass industry a helping hand to realize their energy efficiency objectives. A continuous dialogue with the glass industry is essential!

How to compare energy efficiency of glass melting furnaces?

1. Specific energy per tonne molten glass, per tonne sold glass?
2. Higher or lower calorific value ?
3. In-or excluding working-end and feeders?
4. Primary or actual energy consumption ?
5. Normalization (cullet, age, pull...)?
6. Sector wise comparison ?
7. Comparison of efficiency?

References and data are needed !

Collection of furnace data via online portal



CelSian
Glass & Solar

NAVIGATION

- Furnaces
- Benchmarks
- Information

TestPlant BV: Furnaces / TestPlant BV Furnace number 2

General ✓ Combustion ✗ Electricity Flue Gases Temperatures ✗ Dimensions ✗

41% complete

Enter general parameters for furnace:

Furnace name/number:	Furnace number 2
Furnace location:	Eindhoven
Furnace type:	End-port regenerative
Glass type:	Container
Glass color:	Green
Year of monitoring:	2012
Number of operational days in year of monitoring:	365 days
Starting date of furnace campaign:	10/04/2013
Gross glass production rate:	370 ton / day
Fraction of cullet(based on glass):	43 %
Currency for Energy costs:	€
Remarks:	<i>No value submitted</i>

TC09 will support the glass industry in their efforts to produce glass in an efficient and sustainable manner. For this we need the support and input (data, reporting on new developments, cooperation in projects etc.) from the glass industry.

- Data and information will be treated anonymously;
- TC09 will respect the EU Competition laws, US Antitrust laws as well as proprietary rights of individual companies.

Interested?

For those who are interested to participate actively in Technical Committee 9 please contact:

Chair: Hans van Limpt
hans.van.limpt@sibelco.com

OR

Secretary: Richard Hulme rhulme@guardian.com

www.icglass.org/technical_committees/