Standing Committee of the European Glass Industries
Comité Permanent des Industries du Verre Européennes

CPIV Position Paper on the ECOFYS reports on CO2 Benchmarking in industry – "Project Approaches and General Issues" and "First draft report for the Glass Sector"

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Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

CPIV comments on "First Draft Report for the Glass Sector"

1 Background

The revised ETS directive foresees for Phase III two allocation mechanisms:

1. Auctioning for the power sector and for non-exposed sectors (for the latter, a gradual introduction from 20% to 100% is foreseen between 2013 and 2027)
2. Benchmarking as a means to distribution of a proportion of free allowances for exposed sectors (and also non-exposed sectors during the transitional phase)

The Commission has contracted a consultant (Ecofys, in cooperation with Fraunhofer Institute for Systems and Innovation Research, and Öko-Institute) to further develop the knowledge base to be used in setting EU wide benchmarks under the ETS.

CPIV has already sent comments on the first Ecofys report which was published in March 2009.

However, this first report did not consider the latest developments of the ETS directive, adopted in December 2008 and published in the Official Journal on the 5th of June 2009, especially Article 10(11) 2 which states that "*In defining the principles for setting ex-ante benchmarks in individual sectors or sub-sectors, the starting point shall be the average performance of the 10% most efficient installations in a sector or sub-sector in the Community in the years 2007-2008. The Commission shall consult the relevant stakeholders, including the sectors concerned*".

CPIV received on the 16th of June 2009 the second Ecofys report on the glass industry "First draft report for the glass sector" and was asked to give comments before the 6th of July.

In this paper, CPIV formulates a series of comments on this report, together with comments on the general part of the report "Consultation paper on project approach and general issues", not dealing specifically with glass but outlining general principles to be used when setting up benchmarks.

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

2 Presentation of CPIV

CPIV is the umbrella association for national and the following sectoral glass federations:

- FEVE, the European Container Glass Federation
- GLASS FOR EUROPE, the European Flat Glass Federation
- APFE, the European Continuous Filament Glass Fibres Association
- ESGA, the European Special Glass Association
- EDG, the European Domestic Glass Association

The EU glass industry represents ca. 1,200 companies (this figure includes glass processors who are not covered by the ETS) and about 215,000 workers. The size of the glass companies range from small furnaces (SME) to big multinationals present in several countries.

The European glass industry is very diverse and covers a variety of very different types of products and technologies, including bottles & jars, flat glass, continuous filament glass fibres (CFGF) (not to be confused with mineral glass wool), flaconnage, tableware, mineral wool, optical fibres and special glass (cathode ray tube, glass for televisions and monitors, lighting glass, optical glass, laboratory and technical glassware, borosilicate and glass ceramic (cookware), etc). The product ranges that the glass industry can produce are very diverse, ranging from tiny jewellery products to huge swathes of architectural flat glass for buildings. The common factor between these industries is that they all need glass melting furnaces to manufacture their products. The raw materials they need, the size and type of furnace, the amount of energy needed, the type of fuel used, the amount of cullet that can be used, the length of time needed to melt and produce a finished product varies considerably from one sector to another.

In 2008, total EU-27 glass production reached a volume of 36.4 million tonnes, making the EU-27 the largest glass producer in the world. The production value amounted to ca. € 39 billion.

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

3 Comments on the general part of the Ecofys report – Project Approaches and General Issues

1. Pages 3&4, Section 2.3. - Average of the 10% best: Unique outliers should be considered and potentially excluded from the calculation of the benchmark. A very specific plant producing a very specific type of product cannot be taken as a reference point for the rest of that subsector.

2. Page 4, Section 2.3: CPIV agrees with the last bullet point stating that "*Given that benchmarks are envisioned for products rather than for "sectors" or "subsectors" as a whole, the words "most efficient installations in a sector or sub-sector" in this paragraph are used as "most efficient installations producing a certain product or product group for which a benchmark can be defined*". **Therefore, CPIV is of the opinion that the starting point to design benchmarks should be the PRODCOM nomenclature, and not the definition of sub-sectors, which are not precise enough to derive benchmarks and were not created for this purpose. We discuss this point more broadly in the section devoted to the glass report.** It is also vital that product benchmarks are applied appropriately to installations. Given that it is the intention to develop benchmarks on a product basis, where one or more different product categories (with benchmarks) are produced at a single installation, it is logical within the scheme to calculate the distribution of free allocation based upon the ratio of product manufacture at that installation. Consideration should be given to materiality and ability to monitor and verify output.

3. Page 6, section 3.1: - Starting Points: An important general principle should be added here, namely that a benchmark should be achievable by all installations, if appropriate efforts and investments are made. Imposing an unrealistic product benchmark on installations not able to reach it because of external factors (such as potential to recycle post-consumer glass or availability of a particular fuel) is unfair. This principle should also be used to assess and exclude outliers if they benefit from unusual raw materials or exceptional circumstances.

4. Page 6, Section 3.1. – Starting points: There is a strong concern as to point 4 relating to fuel specificities. CPIV is concerned about the methodology, which specifically favors installations using gas. For reasons developed in the glass report, CPIV would favor two benchmarks, one for gas and one for oil, and, if not permissible, at least a benchmark based on a fuel-mix. This approach supposes to determine the fuel mix within a product group for which a benchmark has been derived, and then correct the curve assuming all plants use this average fuel mix.

5. Page 7, Section 3.2. – Sectors identified for the development of product benchmarks: Benchmarks are meant to apply to ETS covered activities only, i.e. melting and downstream activities. However, in many instances authorities include in their permits the entire plant, even when that covers additional, non-ETS covered activities. As the

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

benchmark specifically applies to only the ETS-covered activities, where non-ETS activities are permitted, special treatment must be given to the rest of the activities to make sure that those activities receive the needed CO_2 allowances.

6. Page 8, Section 3.3,: see comment #2. above.

7. Page 12, Section 3.5, 2nd paragraph: CPIV agree with the principle of carefully assessing the potential exclusion of “non representative installations” rather than dismissing industry arguments out of hand. To be technically correct the report should of course refer to the exclusion of “non representative product manufacture” as the Directive primarily recommends the establishment of product benchmarks. CPIV also supports the principle of “one-product - one benchmark” particularly where more than one product is manufactured at an installation and due allowance must be made for this in the benchmarking and allocation process.

8. Page 12, Section 3.6, last sentence: CPIV supports the second point, namely to take into account the indirect emissions via a uniform emission factor for electricity. Interchangeability of fuels is indeed of concern in the glass industry. There should not be a perverse incentive to leak carbon across installation boundaries. In the glass industry, electric furnaces or all oxygen fired furnaces may show the lowest direct CO_2 emissions. These situations may lead to false CO_2 benchmarks in a sector or for a given product since the indirect emissions of CO_2 (production of electricity and oxygen) may not have been taken into account in deriving the benchmarks and this would give unreasonable values for the average of the 10 % most CO_2 efficient installations

9. Page 13, Section 3.7. – Cross-boundary heat and CO_2 containing waste gases: Point 3 needs to be clarified so as to avoid penalising installations that produce electricity and steam from the waste gas (recuperation of waste heat). Glass installations should get allowances on the basis of the glass benchmark(s) and not on the basis of heat or electricity production.

10. Page 15, Section 3.8: CPIV strongly advocates in favor of the option described in the footnote, namely a projected production or standard utilization rates in combination with capacity. Taking a reference year such as 2005 would unreasonably penalize growing sectors. For example, demand for flat glass increases year by year on average by 2.5%. The use of historical data, i.e. 8 to 15 years old, to determine the share of free allocation of allowances to existing installation after 2013, would lead to a considerable and systematic under allocation to this sector. CPIV finds no justification for such a proposal and seeks explanation for this stance. CPIV believes that an alternative methodology is required. The use of a rolling average factor is an effective way of picking up changes in activity whilst avoiding the creation of perverse incentives (by virtue of its continuous updating).

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

4 Comments on the glass part of the Ecofys report

4.1 General comments

4.1.1 Breakdown of the glass industry should be done by product as stated in the directive and not by subsector or installation categories

The ETS directive states in its Article 10 a) that "*For each sector and subsector, in principle, the benchmark shall be calculated for products rather than for inputs*". The report refers to four categories; these are actually the traditional manufacturing categories. CPIV is of the opinion that the consultants should align their approach with the directive and start from the PRODCOM list of 33 different glass products and not from the vague definition of the four glass categories (container, flat, fibre glass and specialty glass).

The categories used by the consultants are not precise enough to set up product benchmarks, and indeed the proposed methodology groups together products which can be very different. For instance continuous glass fibers and glass wool are very different products grouped together in the category "glass fibers" but with very different manufacturing technologies; container glass groups together bottles, flaconnage and tableware which are completely different in terms of products, CO2 emissions, production technology, quality demands... Similarly in the flat glass sector, float glass and rolled glass and low iron glass are clearly distinct types of products which have unique applications. Because they are produced via distinct manufacturing processes, their energy intensities are also very different.

A product based approach can also be used more easily to deal equitably with installations producing different products on the same site (e.g. bottles and flaconnage). Where one or more different product categories (with benchmarks) are produced at a single installation, it is logical within the scheme to calculate the distribution of free allocation based upon the ratio of product manufacture at that installation

PRODCOM codes offer a starting point to differentiate products and establish relevant benchmarks. However, it must be noted that going beyond the codes may actually be necessary for certain new products. For instance, there is no truly appropriate code for low-iron glass, which is a type of glass increasingly demanded as it has very unique properties for use in photovoltaic cell manufacture. It also has different specific energy consumption than standard clear glass.

It is not the responsibility of CPIV to demonstrate that sub-sectors or categories have different efficiencies or emission patterns but rather (in the interests of reducing the potential number of benchmarks) for the consultants to demonstrate that some PRODCOM codes can be grouped together. This may be because their manufacture can be reasonably and equitably undertaken using similar benchmarks.

CPIV is ready to help in this exercise and proposes the following product groupings, which reduces the number of product benchmarks from 33 to 10 (see table below).

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

For those product categories where too few installations are present to derive a representative benchmark, a fall back option should be left open. It will probably be the case for flaconnage, tableware and for all types of special glasses.

For continuous Filament Glass Fibre (CFGF), the products can be grouped in two main categories, namely 23.14.11 (chopped strands, rovings, yarns, staple fibres articles) and 23.14.12 (mats and voiles or veil articles). Those two categories are produced through the same initial process steps to obtain the basic filament fibers (namely batch mixing, glass melting and refining, fiberizing and sizing application) and differ in the downstream processes applied to obtain the commercial articles. The downstream process to obtain "mat and voiles" articles consists of the application of a coating (wet application) on the formed mat followed by drying and curing (in gas fired ovens) and is significantly more "direct CO2" intensive than the downstream processes applied for obtaining the other category of CFGF 13.14.11 products.
For CFGF products overall, the common process steps (melting, refining) represent ca. 80% of the direct CO2 emissions with ca. 20% for downstream process. For mat and veil products however, the downstream direct CO2 is significantly higher (up to 40% of total) and would definitely justify two distinct benchmarks for CFGF products, provided supporting statistical data can be worked out. In case of statistical limitations to have two distinct benchmarks, the default option would then be to group all CFGF products into one single product category

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

Benchmark #	Prodcom code (rev. 2)	Indicative name
1	23.11.11.10 23.11.11.30	Cast / Rolled glass
2	23.11.12.12 23.11.12.14 23.11.12.17 23.11.12.30 23.11.12.90	Float glass
3	23.13.11.40 2313.11.60	Bottles of colourless glass and glass containers
4	23.13.11.50	Bottles of coloured glass
5	23.13.11.70	Glass containers for pharmaceutical products
6	23.13.11.80	Flaconnage
7	23.13.12.40 23.13.12.60	Soda-lime drinking glasses
8	23.13.12.90 23.13.13.30 23.13.13.50 23.13.13.60 23.13.13.90 23.13.14.00	Tableware & Cookware (different glasses, excluding soda-lime drinking glasses)
9	23.14.11.10 23.14.11.30 23.14.11.50 23.14.11.70	CFGF* chopped strands, rovings, yarns and staple fibre articles
10	23.14.12.10 23.14.12.30	CFGF* mats and voiles articles

* CFGF = Continuous Filament Glass Fibres.

PRODCOM code 23.11.11.50, *sheets of drawn or blown glass, whether or not having an absorbent, reflecting or non-reflecting layer, but not otherwise worked*, is deliberately taken out from the above table. To CPIV's knowledge, this type of glass is no longer produced in the EU. As a consequence, a benchmark is not needed and these products cannot be associated with either cast/rolled or float glass.
We would also like to highlight the fact that some glass products are not covered by this list such as:

- glass-jewellery (Prodcom Nr.: 23.19.26.70)
- speciality-glass (Prodcom Nr: 23.19.24.00)
- lightings (Prodcom Nr: 23.19.26.40)
- optical glass (Prodcom Nr: 23.19.26.70)
- glass beads, etc...

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We understand from the Ecofys report that a fall-back position for these products will be adopted, as only very few companies in Europe produces these products, and that an approach based on benchmarks will be impossible.

4.1.2 Cullet (recycled glass) should receive special treatment

The use of cullet is specifically referred to in the Ecofys report “First draft report for the glass sector” and also in the previous report “Developing benchmarking criteria for CO2 emissions (February 2009). Cullet is the term for recycled glass. Cullet incorporation in a glass furnace tends to reduce the energy consumption and the CO_2 emissions of a glass furnace compared to the use of virgin raw materials. Glass producers are therefore continually trying to maximize the amount of cullet they put into the furnace. However, in section 4.1 first paragraph on page 13 of the glass benchmark report, taking the high end (3%) (which no doubt draws on section 9.2 Page 98 of the February report) of the quoted energy saving range (2.5 – 3.0% for each 10% of cullet), is considered unjustified in many cases from the glass industry’s experience, particularly at higher cullet levels.

Indeed in the February report, Page 98, last paragraph: the “cullet share” assumed for container glass is much too high. The ability to use cullet depends on several factors.

<u>The glass manufacturing industry can only use post consumer cullet which is available</u>

- Cullet availability is not comparable in all Member States. While France and Germany for instance achieve high recycling rates, other Member States are lower for infrastructure reasons (e.g. Portugal).
- As the collection and reprocessing infrastructure is largely independent of the glass industry it cannot be penalised for its suppliers not being able to meet even the existing demand for cullet.
- There are also many logistic issues concerning waste glass recycling that have not been addressed at all by the Ecofys report.

<u>The glass manufacturing industry can only use cullet of an adequate quality.</u>

- Even if cullet is available the glass industry is reliant on its suppliers to meet basic quality specifications in order for it to be able to make saleable glass. Unfortunately the collection and reprocessing infrastructure is not always able to do this.
- This is a particular problem when post consumer glass is collected mixed with other recyclates (paper, plastic, metals, glass ceramics, ceramics) or when glass of different colours are collected mixed together. Material and colour separation at source is therefore crucial!

<u>The quality requirements of the product must not be undermined.</u>

- The specific quality requirements of several products limits the ability of the industry to use even high quality post consumer cullet.
- In some special cases, the technique for producing the glass is even such, that no solid raw materials can be used.

The possibilities of post-consumer cullet recycling in flaconnage, tableware, flat glass and special glass production are very limited for evident quality reasons. For these sub-sectors

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

only internal cullet is recycled or, in the case of flat glass, perfectly treated post-consumer cullets. No post-consumer cullet is used because this would negatively impact the quality of cosmetic bottles, flaconnage, tableware or special glass products.

The choice of cullet target percentage must reflect reality in each Member State and not an aspirational target, particularly as the industry has, in practice, no control over the supply of cullet to the market or indeed its ultimate destination, for instance different member states implement the Waste Packaging Directive in different ways. Anyhow, the ETS directive should not interfere with the Waste Packaging directive !
Finally, some glass products are produced in one country and transported with the food or beverage contained overseas (e.g. export beer for USA market). This glass even when trying to collect after consumption cannot be recycled anymore in the country of origin due to transport limitations.

To conclude, cullet availability at Member State level is most particularly a problem of trade balance. Countries exporting more of their empty or filled containers have less cullet available even if national collection rates conform to or are higher than those required by the Packaging and Packaging Waste directive. **If exporting countries are penalised by the benchmark system this latter could be considered an impediment to the free circulation of goods**.

CPIV is of the opinion that a sound benchmark for the glass industry should be realistically achievable by all participants within the specific benchmark cohort. It should take into account:

- the cullet availability (including the technical requirements needed for re-incorporation) across Europe.
- the actual capability that each glass sector has to effectively use recycled cullet (e.g. not to impose an unrealistic 85% cullet incorporation for the whole container glass industry as proposed in the Ecofys report). Colour of the glass is an important factor.

4.1.3 Forcing operators to switch to natural gas has far-reaching implications

In the glass industry, heavy fuel oil and natural gas are widely used and often interchangeable. While CPIV fully recognizes the need to curb CO_2 emissions, it is of the opinion that simply promoting gas (by prescribing it as the benchmark fuel) without taking into consideration other important issues is not a reasonable approach. These factors should at least also be taken into account:

- Energy efficiency: whilst a gas-fired furnace emits less CO2 than an oil-fired furnace, its energy efficiency is lower, due to flame emissivity and flue gas heat contents (about 4 to 7 %). A balance has therefore to be struck between energy efficiency and greenhouse gases efficiency. And in this respect, the ETS directive states in Article 10 a) 1 that energy efficiency shall be taken into account: “For each sector and subsector, in principle, the benchmark shall be calculated for products rather than for inputs, in order to maximise greenhouse gas emission reductions and energy efficiency savings throughout each production process”. Operators are also required to consider energy efficiency as part of the IPPC Directive.

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

- Security of supply: forcing all operators to switch to gas makes Europe more dependent upon one energy source, and reduces the security of supply in all Member States. Furthermore when there is a gas shortage operators do not necessarily have the choice to refuse to switch to oil, not least because it is some Member States' energy policy to divert gas away from manufacturing to domestic consumption in case of shortage.
- Global CO_2 emissions: heavy fuel oil is a residue of crude oil after gasoline and the distillate fuel oils are extracted through distillation. Its commercial uses are limited, and the glass industry remains one of the few industries which can burn it. Forcing operators to switch to gas will limit the markets for this product, which will then probably be incinerated or shipped outside the EU, with no benefit to global CO_2 emissions. To reduce overall CO_2 it is necessary also to consider emissions to the environment as a whole from the adoption of a particular technology and not in isolation at installation level. This principle is enshrined in the IPPC Directive.
- Fuel switching: it should be noted that switching fuel is not necessarily as easy an option as it is presented in the report. This may sometimes impose changes in operating permits and adjustment to installations such as new burners and control systems.
- The fuel choice for the operator: the choice of fuel is a strategic decision. Today, operators can switch (for example) from heavy fuel to gas depending on the price of these fuels thus helping to maintain competitiveness; especially with competitors outside Europe.

Moreover, it is unfair to penalize operators in countries or regions where natural gas is simply not available. The consequences of causing closure of plant in those countries could be to wreck the recycling infrastructure in those regions and increase imports because the collected waste glass cannot be recycled anymore without glass production in these areas. It should be borne in mind that alternative glass recycling options, such as aggregates, are less carbon efficient.

CPIV therefore strongly recommends that an average fuel mix should be used instead of opting for natural gas only.

There is a risk that the benchmark value of direct CO_2 emissions could be determined by referring to furnaces using high levels of electric boosting or oxygen firing, thus exhibiting low on-site CO_2 emissions. But, the total (direct plus indirect) CO_2 emissions of oxygen fired or electric heated furnaces may even be higher compared to natural gas-air or oil-air fired furnaces. Therefore, the benchmark should not be based on furnaces using high levels of electricity boosting or oxygen.

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
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4.2 Specific comments

1. Section 1, page 1, 1st paragraph, 1st line: "The Glass industry is usually divided into four categories…" instead of "The products of the glass industry usually are divided into four categories…". See also the general comments in the section 4.1.1 above where the PRODCOM list of the glass products is discussed.

2. Section 1, page 1, 2nd paragraph, 4th line: "end-fired recuperative furnaces" should read "end-fired regenerative furnaces".

3. Section 1, page 1, 2nd paragraph, 6th and 7th line: The statement beginning "Apart from these furnace types…." suggests that these furnaces are a specific type on their own. Rather, it is electric boost that may be applied to an otherwise conventional cross-fired or end-fired furnace or an oxy-fuel furnace.

4. Section 1, page 1, bullet points, CPIV is also the umbrella association for EU national associations reflecting the interests of companies which are not members of the other listed associations. The 3rd line should read, "is the umbrella association for national associations and the following glass federations"

5. Section 1, page 1, table 1: In "Annex I activities" NACE code 26.12 (processing of flat glass) is not generally included in the EU ETS. There may be some specific exceptions but these are generally caused by the fact that the activity takes place on a site caught under the combustion plant classification (code 26.11) or other classification.

6. Table 2, page 2: add a footnote regarding the 16 installations for CFGF which says "16 is the numbers of installations of CFGF APFE members companies, which are estimated to represent more than 90 % of EU 27 CFGF production (CPIV is aware of 2 other installations in EU 27, one in Poland and one in Romania).

7. Section 1, page 2, text between tables 2 & 3: This talks about GHG; is this not just CO_2? The same is true in several other locations and in the table titles.

8. Table 3 and 4 titles: these refer to a "glass production chain" but the scope of this is not clearly defined. It needs to be stated whether this has taken into account the different interpretations of a glass installation by the different member states and whether some indirect emissions such as those generated for the consumption of electricity or gases are included.

9. Table 3, page 1: The specific value "Range of direct emissions" should be calculated with figures from the same year, which is not the case for flat glass where 2007 and 2008 data are correlated. Official 2008 production figures are not yet available.

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

10. Table 3, page 3: Manufacture of continuous filament fibre (+ add footnote (13) Preliminary results from NERA study are and TNO study)
    a. Production: 0.9 [13]
    b. CO2 emissions (kg CO2 / tonne product) : 0.78 [13]
    c. Approximate GHG emissions (Mt CO2) : 0.7 [13]

11. Section 1, page 2, Table 3: The 3rd column is entitled "***Range*** of direct emissions". It is not a range; only one figure is quoted. It is what is usually termed a "specific emission".

12. Table 4, page 3: Manufacture of continuous filament fibre (+ add footnote (13) Preliminary results from NERA and TNO study are)
    a. Production: 0.9 [13]
    b. Electricity power consumption (KWh/t of product) : 1110 [13]
    c. Approximate power emissions (Mt CO2) : 999 [13]

13. Section 2.1, 2nd paragraph, it might be less confusing to refer to "hollow glass" rather than "container" and divide this into the relevant subsectors of container (=bottles and jars), flaconnage and tableware. This would align the 23.13 categorisation with that actually used in the European NACE system.

14. Section 2.1, 3rd paragraph, There is a new product emerging low iron glass for photovoltaic cell manufacture and this is seen as of increasing importance. A number of furnaces have been modified to produce this material and therefore CPIV recommends that this product is not left aside. It should also be stated that the effects of the financial crisis have altered the production profile during the final quarter of 2008.

15. Section 2.1, page 5, 1st paragraph, 1st line: "The Glass industry is usually divided into four categories…" instead of "The products of the glass industry usually are divided into four categories…"

16. Section 2.1, page 5, 2nd paragraph: Add an explanation for the higher values for flaconnage: "The higher value of flaconnage products is due to higher glass quality, more downstream activities (decorating with enamels, colouring, flame polishing, cutting and graving, sticking, painting) which consume more energy". Higher value products can also include other containers for beverages, and in particular containers with additional downstream value added processes such as decoration.

17. Page 5 - 3rd paragraph : A typical CFGF furnace has an output of ca. 100 ton/day of molten glass, with a wide range extending from 20 to 160 t/day.

18. Section 2, sub-section 2.1, page 5, 4th paragraph, 4th line: over the last decade, a significant proportion of cross fired recuperative furnaces have been converted (when rebuilt) to oxy fuel fired furnaces, generally with natural gas as fuel; as of 2007, 55% of CFGF furnaces are oxy-fuel fired, some of which also having electric boosting.

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

19. Section 2, sub-section 2.1, page 5, 4th paragraph, 7th line: The use of regenerative furnaces for continuous filament fibre is not ***advisable***. Is this really what is meant? Is it not more the case that it is uneconomical to use a large regenerative furnace due to the relatively low production volumes and shorter residence times? Or, is it the fact that the use of borates would lead to blockage in the regenerators, that makes it not advisable to use a regenerative furnace? It is not regarded as a technical feasible solution to melt CFGF glass in regenerative furnaces.

20. Section 2, sub-section 2.1, page 5, footnote: E glass formulation is defined by Standard ASTM D578; it is based on the following main oxides, namely - silica, calcium, alumina, boron and magnesium; it has a very low content of alkaline elements; boron free E-glass formulation have also been produced for more than 10 years now.

21. Table 5, page 6: a new table is available in the draft version of the new Glass BREF document.

22. Section 2, sub-section 2.1, page 6, 3rd paragraph, 4th line: See point no. 1 above regarding size of furnaces.

23. Page 6 - 4th paragraph (oxy-fuel) : For CFGF, in the past, the vast majority of furnaces were air/gas recuperative furnaces. Over the last decade, a significant share of furnaces has been converted to oxy-firing when they are re-built; the current share of oxy-firing is >50% of the total;

24. Section 2, sub-section 2.1, page 6, 4th paragraph, 3rd line: The use of oxygen for combustion is beneficial in terms of direct CO_2 and NOx. However, due to the fact that electricity is needed to produce the O2, indirect CO2 is emitted at the power plant and the overall CO2 balance will strongly depend on the way the electricity is produced and its CO2 emission factor.

25. Section 2, sub-section 2.1, page 6, 5th paragraph: this paragraph should be amended. Thermal efficiency is not the only criterion for the choice of a particular technique. Technical and economic considerations should be taken into account! The choice of electric furnaces is only appropriate in some very specific cases (small furnaces, low electric resistance of the glass,…) !

26. Section 2, sub-section 2.1, page 6, 5th paragraph, 2nd line: Are they not commonly inserted in the side also? Strictly speaking the last 2 sentences require clarification i.e. "the thermal efficiency of fossil fuel fired furnaces **increases with increasing unit size**" and "the thermal efficiency of **smaller** electric furnaces is two to three times higher than that of **smaller** fossil fuel fired furnaces". (*Note we do not have the figures to confirm this statement*.)

27. Section 2, sub-section 2.1, page 7, 1st paragraph: reference to types of furnace. See point no. 2 above.

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

28. Section 2, subsection 2.2, page 7, heading “Emissions and steam use”: we believe that steam use should be replaced by “heat recovery”.

29. Section 2, subsection 2.2, page 7, 2nd paragraph, first sentence is unclear. Suggestion: “Direct CO2 emissions result from process emissions as well as from fossil fuel combustion.”

30. Section 2, sub-section 2.2, page 7, 3rd paragraph, 3rd sentence: we do not believe that such a simple generalization is correct. Each sub-sector (and even each product) has its own shares for direct/indirect and process emissions, especially for processes with downstream activities.

31. Section 2, sub-section 2.2, page 7, 3rd paragraph, last sentence: “as there is no lehr, but the fiberising operation and the drying/curing ovens consume also significant amounts of energy.”

32. Page 7 table 6 : for CFGF, the shares should be 85-90% (fuel direct CO2) and 10-15% (process CO2)

33. Page 7 Paragraph under table 3: It should be specified which energy it is supposed to represent (delivered or primary, fuel + electricity). As reference is made to the BREF, we suppose it is fuel + electricity as delivered. Considering total delivered energy (fossil fuel + electricity), the average split for a CFGF installation is: Furnace: 48% / Forehearths: 17% / downstream processes: 34%. Considering total fossil fuel energy, the typical split for a CFGF installation is: Furnace: 58% / Forehearths: 23% / downstream processes: 19% (i.e. more than 80% for glass melting and refining).

34. Section 2, sub-section 2.2, page 7, 4th paragraph, 1st line: The meaning of the statement “Steam use is applied by regenerative and recuperative furnaces” is not clear. Do the authors mean, for instance, that steam may be produced using the waste gases from these furnaces? If so, then this is not widely done, for reasons of cost and return on investment. The potential for using steam in the glass industry is extremely limited. See also above (remark concerning the heading of the section)

35. Section 2, sub-section 2.2, page 7, 4th paragraph, 3rd line: The sentence beginning “The purpose of this design….” should come after the sentence beginning “regenerative furnaces…..”, to make it clear that it is the regenerative furnace, not the positioning of the burners, that achieves preheating of the air by the waste gases.

36. Section 2, sub-section 2.2, page 8, 4th line: change 800°C into 750°C.

37. Section 2, sub-section 2.2, page 8, last line: There are only two recuperative furnaces that preheat the recycled cullet (in Germany). We have no information about their efficiency.

38. Section 3, subsection 3.1, page 10: CPIV recommends that it is recognized that there is no truly appropriate PRODCOM code for low iron glass whether float or rolled.

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

There should really be new codes one for low iron float and one for low iron rolled. Both these products have different energy patterns from normal clear glass and have unique applications in the manufacture of photovoltaic glass.

39. Section 3, subsection 3.1, page 10&11 : CPIV welcomes the idea of taking downstream processes into consideration in setting up the benchmark (the perimeter of allocation = one industrial site with all its activities consuming energy). It would be unfair to penalize installations where downstream processes take place. Pragmatic and simple solutions should be developed to keep the benchmark workable, such as for instance typical correction factors for given downstream processes.

40. Section 3, subsection 3.1, page 11, 2nd paragraph as in comment 7 above, it might be less confusing to refer to "hollow" glass rather than "container" when referring to the 23.13 NACE category. The second sentence would benefit from rewording. The 9th line should read "If jars, flaconnage…".

41. At different points the report refers to "packed" and "packed and shipped". Glass products may remain in the warehouse for some time after manufacture and packing, and to insist on the additional requirement to have shipped the glass will distort the emissions factor calculations. Storage in a warehouse does not affect site emissions! Therefore section 3, sub-section 3.1, page 11, final paragraph, 2nd line should read "The other is glass packed, which is always a lower amount….". Similarly page 12, (which should be section 3.2 not 3.1), the 2nd and 3rd line should read "…benchmarks on the packed output…". Benchmarks should be based on packed glass and not on packed and shipped.

42. Section 3, sub-section 3.1, page 11, 5th paragraph, 4th line. Not all subsectors can easily recycle all glass products. Suggestion: "Any process losses can normally eventually be recycled in the flat and hollow glass subsectors."

43. Page 11, heading at bottom of page: The sub-section reference should be 3.2.

44. Page 12: as stated in the general comments (see section 4.1.1), CPIV is of the opinion that this approach is too simplistic and not accurate enough to derive workable and realistic benchmarks for the glass industry. Starting from the 33 Prodcom codes (which would require 33 benchmarks), CPIV proposes in the general comments to group some of them. This grouping leads to 10 benchmarks for the glass industry. For those product categories where too few installations are present to derive a representative benchmark, a fall back option should be left open. It will probably be the case for flaconnage, tableware and for all types of special glasses.

45. Section 3, subsection 3.2, page 12, last line: same possibility The fall back option should also be open to other glass products where it is obviously not possible to derive a benchmark (too few installations e.g.).

46. Section 3, subsection 3.3, page 12 – Last paragraph, 1st line, does the percentage refer to direct or total emissions. Clarification is required.

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

47. Section 4, sub-section 4.1, 1st paragraph, 6th line: The section of text beginning "Beyond the direct effect….." to the end of the paragraph is misleading and repetitive. Suggested wording:

    "Beyond the direct effect on energy demand and CO_2 emissions, a higher cullet use contributes to a reduced demand for raw materials. The most significant are carbonates such as soda ash, limestone and dolomite, which decompose in the furnace releasing CO_2. Therefore, the addition of cullet will reduce process emissions from these sources (as well as reducing energy consumption during melting)."

48. Section 4 sub-section 4.1, 2nd paragraph, second line: Add the underlined words in "Flat glass products *<u>and flaconnage products or extra-flint bottles</u>* require higher material qualities which can only…"

49. Section 4, sub-section 4.1, 2nd paragraph, 3rd line: add the underlined words "No cullet input at all is applied in the continuous filament fibres sector <u>and many special glass products for manufacturing process reasons (low alkali formulation for CFGF)</u>. With regard to availability of cullet it should be added at the end that "Not only collection infrastructure but national production and demand characteristics dependent upon the market also influence availability of appropriate cullet e.g. in the container glass sector, the balance between spirits, beer and wine and food.

50. Section 4, sub-section 4.1, 3rd paragraph, 3rd line: add the underlined word "…cullet of <u>almost</u> any colour..".

51. Section 4, sub-section 4.1, 4th paragraph: CPIV is strongly opposed to the opinion expressed in this paragraph! It is naïve to assert that penalizing operators in those countries where cullet is not available in sufficient quantity by setting unrealistic targets will create the supply in a timely fashion. A supra-regional cullet market is a possibility (issues around the definition of waste in the various EU member states will have to be resolved), though the cost (and CO2 penalty) of transportation against the energy saved will have a bearing on the commercial reality of the proposition. It is probable that affected companies could be damaged financially in the short term, perhaps terminally, before a solution is found. It is for the EU to resolve the issues which arguably stem from a different implementation of the EU directives) that lead to the differences in cullet supply in the members states. Then, it may be possible to achieve what the consultants propose. Furthermore it cannot be assumed that price sensitivity due to higher prices resulting from not taking cullet availability into account will somehow override consumer choice and product and market requirements. In other words, putting a higher price on the product will not encourage the general public to recycle more; other mechanisms need to be put in place

52. Section 4, sub-section 4.1, page 14, 1st paragraph, 3rd line: The statement "Both fuels are interchangeable" applies only to fuel used for melting. Working ends, forehearths and gas-fired lehrs are not normally changeable to oil firing. Neither is gas available nor the national fuel of choice throughout the EU.

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

53. Section 4, subsection 4.2, 3rd line: this should refer to NSG-Pilkington and to Saint-Gobain Glass. The flat glass industry is not unwilling to provide information but is constrained by the competition authorities and therefore can only provide data under positive legal advise. Today, CPIV and Glass for Europe are in a position to provide the following information in an effort to help complete table 7 on page 15 with regards to flat glass. Data were collected by a third party fiduciary to guarantee that no single installation can be identified.

Prodcom code (rev. 2)		**Number of data** (number of installations within the EU)	**Average of direct emissions (kg CO2/t of product) 2008 data**	**Spread factor 2008 data**
23.11.11.10 23.11.11.30	Cast / Rolled glass	9 (10)	952	227
23.11.12.12 23.11.12.14 23.11.12.17 23.11.12.30 23.11.12.90	Float glass	45 (50)	697	119

As previously mentioned, cast/rolled and float glass are two distinct types of products, which are not necessarily interchangeable in their usage. In addition, they are produced in different installations, not using the same processes and tools. The above figures show that these different manufacturing processes imply different energy intensity and direct GHG emissions. On average, direct GHG emissions per tonne of rolled glass packed are more than 35% higher than for float glass. Even with major investments in upgraded rolled glass installations, direct emissions per tonne of rolled glass will always stay considerably higher than for float glass.
The spread factor of 119 for float glass reveals the linearity between a vast majority of float installations. This would tend to illustrate fairly widespread “normal practice” throughout the industry. However, a curve would most likely reveal that installations below the 10th percentile and those above the 90th percentile deviate quite significantly from the normal practice. These installations would be the so-called “outliers”. In the case of float glass installations, factors such as the recourse to electric boosting, the degree of cullets use and the extent to which downstream activities are taking place in the reported installation would most likely explain the significantly lower or higher direct CO2 emissions.

54. Table 7, page 15: What is the difference between the “range” in the 2nd column and the “spread factor” in the 3rd column? If there is a spread factor, a range is redundant. Is point no. 6 above relevant?

55. For container glass, a questionnaire has been sent by an external consultant to companies across Europe in order to collect figures on greenhouse gas efficiency. Although those figures should be refined, average values for some products are given as a first indication in the table below to illustrate the necessity to distinguish between

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html

the different products of the container glass industry. Available data did not allow to distinguish between “Glass containers for pharmaceutical products” and “Flaconnage” (even if differences could be identified between these 2 products type: flaconnage looks more like tableware (little furnaces, short runs and including downstream activities), than pharmaceutical products) nor between “Tableware & Cookware (different glasses, excluding soda-lime drinking glasses)” and “Soda-lime drinking glasses”. Determination of the average of the 10% best performers could only be derived once clear indications about how to treat fuel mix, cullet level, outliers etc… will be known.

<table>
<tr><th>Prodcom code (rev. 2)</th><th></th><th>Average of direct emissions (kg CO2/t of product)</th><th>Number of data</th></tr>
<tr><td>23.13.11.40
2313.11.60</td><td>Bottles of colourless glass and glass containers (> 80% of flint glass)</td><td>500 (spread: 480)</td><td>56</td></tr>
<tr><td>23.13.11.50</td><td>Bottles of coloured glass (> 80% of green glass)</td><td>370 (spread: 210)</td><td>28</td></tr>
<tr><td>23.13.11.70</td><td>Glass containers for pharmaceutical products</td><td rowspan="2">970 (spread: 1210)</td><td rowspan="2">16</td></tr>
<tr><td>23.13.11.80</td><td>Flaconnage</td></tr>
<tr><td>23.13.12.40
23.13.12.60</td><td>Soda-lime drinking glasses</td><td rowspan="2">1440 (spread: 2610)</td><td rowspan="2">23</td></tr>
<tr><td>23.13.12.90
23.13.13.30
23.13.13.50
23.13.13.60
23.13.13.90
23.13.14.00</td><td>Tableware & Cookware (different glasses, excluding soda-lime drinking glasses)</td></tr>
</table>

OoO

Avenue Louise, 89 1050 Bruxelles (Belgium)
Phone: +32 (0)2 538 44 46 **Fax**: +32 (0)2 537 84 69
E-Mail: info@cpivglass.be **Website**: http://www.cpivglass.be/main.html