Recycling of Glass from Construction & Demolition Waste

Views from the flat glass industry

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AGC Glass Europe
AGC corporate profile
AGC Group – a global company

- Global annual sales: more than €11bn
- Approx 50,000 employees
- More than 200 companies all over the world
- Headquarters in Tokyo
- Quoted on Tokyo Stock Exchange
AGC Group – a global player in different industries

- Flat Glass
- Automotive Glass
- Display
- Electronics
- Chemicals

AGC Glass
GLASS UNLIMITED

AGC Electronics

AGC Glass Europe
AGC Glass Europe at a glance

- Building, automotive and solar sector
- No. 1 in the Benelux, Russia and Central Europe
- HQ and R&D Center (Belgium)
- 130 plants
- Leader in advanced glass products
- Large sales network
- 13,500 employees
- 1.8 billion € sales (* 2009)
What do we do?

Delivering **solutions** for climate change …

Our top priorities are **energy** …

<table>
<thead>
<tr>
<th>… saving glass products</th>
<th>… generating glass products</th>
<th>… efficient manufacturing processes</th>
<th>… efficient transport means (multimodal)</th>
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</thead>
<tbody>
<tr>
<td>House &amp; Building insulation</td>
<td>Solar glass solutions</td>
<td>Hotox process: minus 25% CO2</td>
<td>Train and vessel containers = 5600 trucks less on the road</td>
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<td>Daylight &amp; free solar gain</td>
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Recycling views
What is Recycling?

EC Definition:

“recycling means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations; ....“

Directive 2008/98/EC, Article 3
http://ec.europa.eu/environment/waste

... so not «downcycling».
Recycling: current EU regulatory framework

Waste Framework Directive (2008/98/EC) establishes specific targets for the re-use and recycling of building waste, including glass. Defines high levels of recycling as key for Europe’s resource efficiency.

- A 70% target for re-use, recycling, and recovery applies to C&D waste in general.
- The target can be achieved without glass recycling since glass represents less than 1% of C&D waste.

Landfill Directive (1999/31/EC) is the milestone in EU waste policy.

- Aim: shift from landfill to the EU’s waste hierarchy.
- No specific glass measures: as an inert material it is however easy and relatively cheap to send glass to landfills, which does NOT favour the upgrade of glass recycling.
Potential of Building Flat Glass Recycling

**Total Quantities per year**

**Construction & Demolition Waste Material:** 340 mio T

**Potential Flat Glass:** 2,25 mio Tonnes

**Collected Glass waste:** 0,6 mio Tonnes

**Recycled Glass:** ??? Tonnes

*Eurostat, EU27 - 2010*
Advantage of recycling C&D waste glass into flat glass

- Respect waste treatment hierarchy
- Safe energy
  - 3,000 TJ*
- Safe CO₂
  - 600,000 T CO₂*
- Safe non renewable raw materials
  - 2,4 mio tonnes*

* Based on recycling 90% of potential C&D waste glass
Available end-of-life building flat glass

Glazing in buildings comes in many forms depending on the building type, the frames and frame materials used, the installation period and the locations (construction code).

There are roughly 3 categories:

- Glazing from large building (facades)
- Glazing from residential collective buildings and individual houses (generally integrated in windows)
- Glass used for interior applications (balustrades, glass walls, mirrors, etc.)
Post - Consumer Glass

WINDOW MAKERS

CLEAN GLASS

DEMOLITION

DIRTY GLASS

INDUSTRIAL CONTAINER PARK

VERY DIRTY GLASS

Landfill

Backfilling

Down-cycling

AGC Glass Europe
The Recycling Route

Collection and recycling of end-of-life building flat glass

We see the following steps in the process:

1. **Dismantling** of the window, glazing or other flat glass products from the building
2. **Collection** of the dismantled window, glazing or other flat glass products
3. **Segregation** of the glass from the window
4. **Treatment** to remove pollutants from glass
5. **Recycling** in glass furnaces
6. **Logistic networks** from building site to glass furnace
**Flat Glass Recycling**

*Industrial vs Domestic sources*

- **Industrial** = from factories
  - Widely used in flat glass industry

- **Domestic** = Post-consumer glass
  - Today, not used in flat glass

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**AGC Glass Europe**
Flat Glass Quality requirement

Flat glass is highly sensitive to ceramic, stone, porcelain.

5 gr CSP per 1 Tonne cullet is too much.

Very hard to achieve float quality from polluted cullet
Keeping Cullet Clean

Keeping cullet clean is more efficient than cleaning dirty cullet.

Dismantling → Sorting → Treating → Light/Easy Recycling
Recycling flat glass to flat glass

Most favoured option

Reduce
- lowering the amount of waste produced

Reuse
- using materials repeatedly

Recycle
- using materials to make new products

Recovery
- recovering energy from waste

Landfill
- safe disposal of waste to landfill

Least favoured option
Projects
REVALO Project - France
Recovery & recycling of “post-consumer cullet”

Financial support from the French Environment and Energy Management Agency.

- Coordinated by GTM/VINCI, with VEKA Recyclage, Veolia, ISEL and AGC.
- Aim: recycling windows from building renovation
- Ensure cullet quality

Dismantling of windows. Stacking the window in skip. After recycling.
VRN – The Netherlands

- Recycling of flat glass, a national scheme
- Levy of €0.50 for every m² of insulated glass paid by producers and importers
- Network of 300 collection points
- 400–600 temporary locations per year
- Around 85 000 tonnes collected per year
- Contract with glass recyclers for processing

http://www.vlakglasrecycling.nl
New policy
Europe’s ‘Resource Efficiency’ agenda

- DG ENTR Forum on Sustainable Competitiveness of the Construction Sector: thematic group on Sustainable Use of Natural Resources
- Sustainable Buildings Initiative
- Review the Waste legislation to look at how new markets and better recycling can contribute to growth:
  - Landfill Directive (1999/31/EC)
- European Innovation Partnership for Raw Materials
Suggestions for the revision of the EU policy instruments …

- To promote the dismantling, collection, and recycling of building glass

- Financial incentive
  - Contribution to kick-start a self supporting scheme
  - Government or EU support

- Legal framework
  - Ban recyclable flat glass from landfill
  - Mandatory dismantling
  - Review key targets
Suggestions for the revision of the EU policy instruments ...

Waste Framework Directive, including:
- Recycling targets for glass
- Mandatory dismantling
- EU guidelines
- National waste management plans

Landfill Directive, including:
- Ban on landfill deposit of recyclable glass

Or do we need a Construction & Demolition Waste Directive?