

Recycling of Glass from Construction & Demolition Waste

Views from the flat glass industry

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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



AGC Glass

GLASS UNLIMITED

▶ Display



▶ Electronics



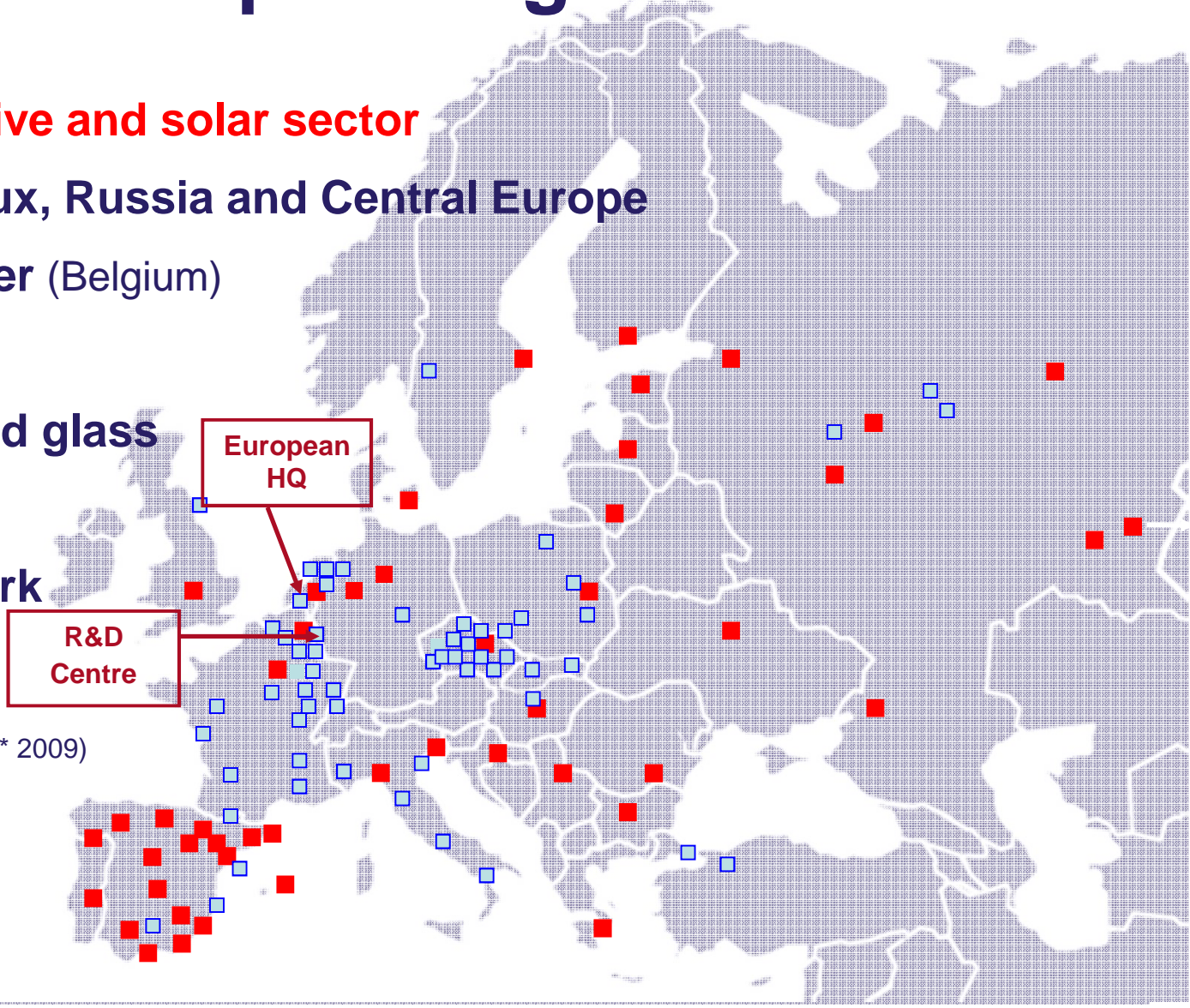
AGC Electronics

▶ Chemicals



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)**



■ Production
■ Sales

What do we do ?

Delivering **solutions** for climate change ...

Our top priorities are **energy** ...

... saving glass products

House & Building insulation

Daylight & free solar gain



... generating glass products

Solar glass solutions



... efficient manufacturing processes

Hotox process:
minus 25% CO2



... efficient transport means (multimodal)

Train and vessel containers = 5600 trucks less on the road



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.

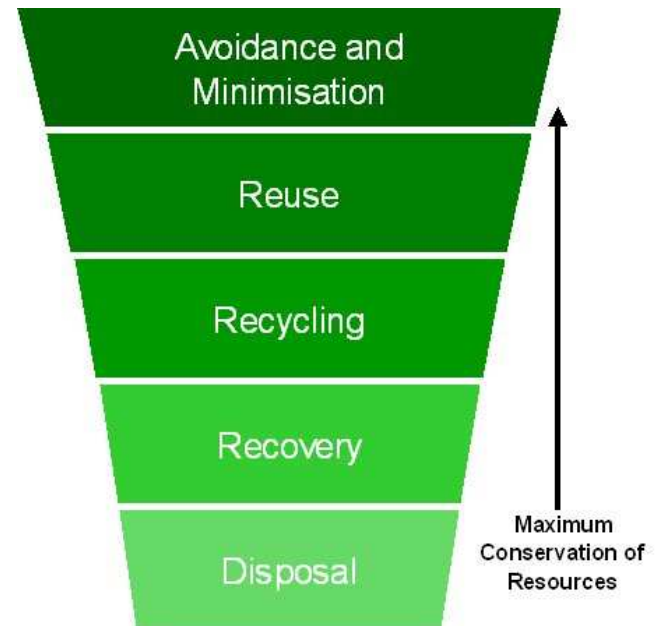
Potential of Building Flat Glass Recycling

Total Quantities per year



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*



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

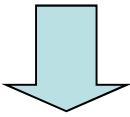


Landfill

DEMOLITION



DIRTY GLASS



Backfilling

**INDUSTRIAL
CONTAINER PARK**



VERY DIRTY GLASS



Down-cycling

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**

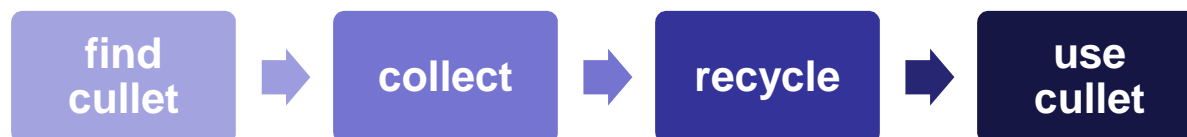


Widely used in flat glass industry

▶ **Domestic = Post-consumer glass**



Today, not used in flat glass



Flat Glass Quality requirement

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

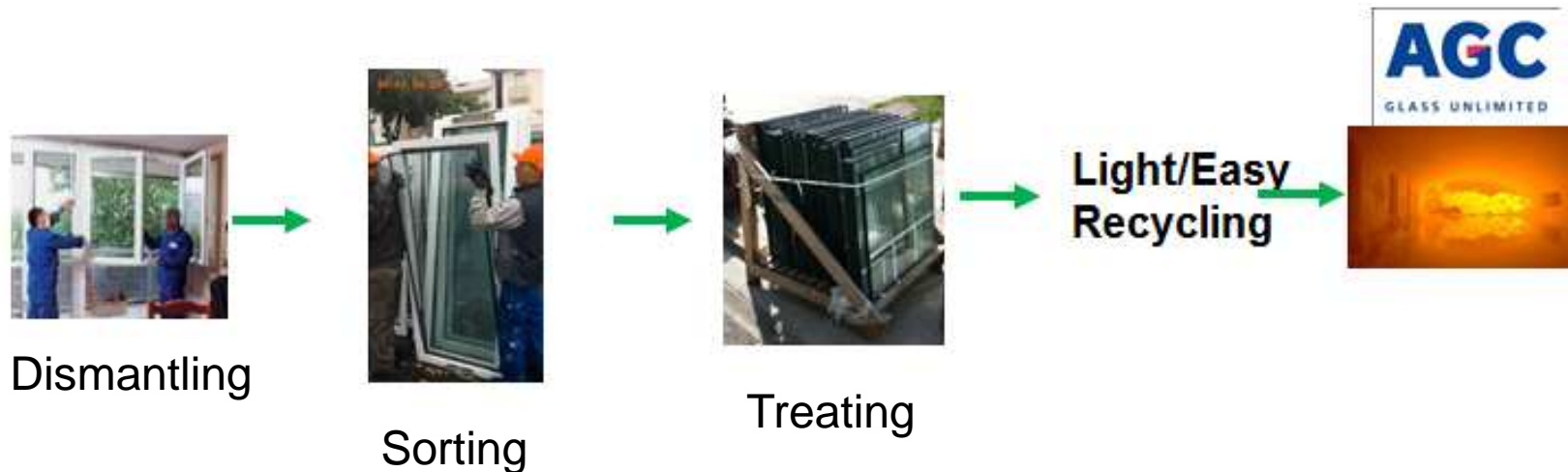
5 gr CSP per 1 Tonne cullet is too much.



Very hard to achieve float quality from polluted cullet

Keeping Cullet Clean

Keeping cullet clean is more efficient than cleaning dirty cullet.



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

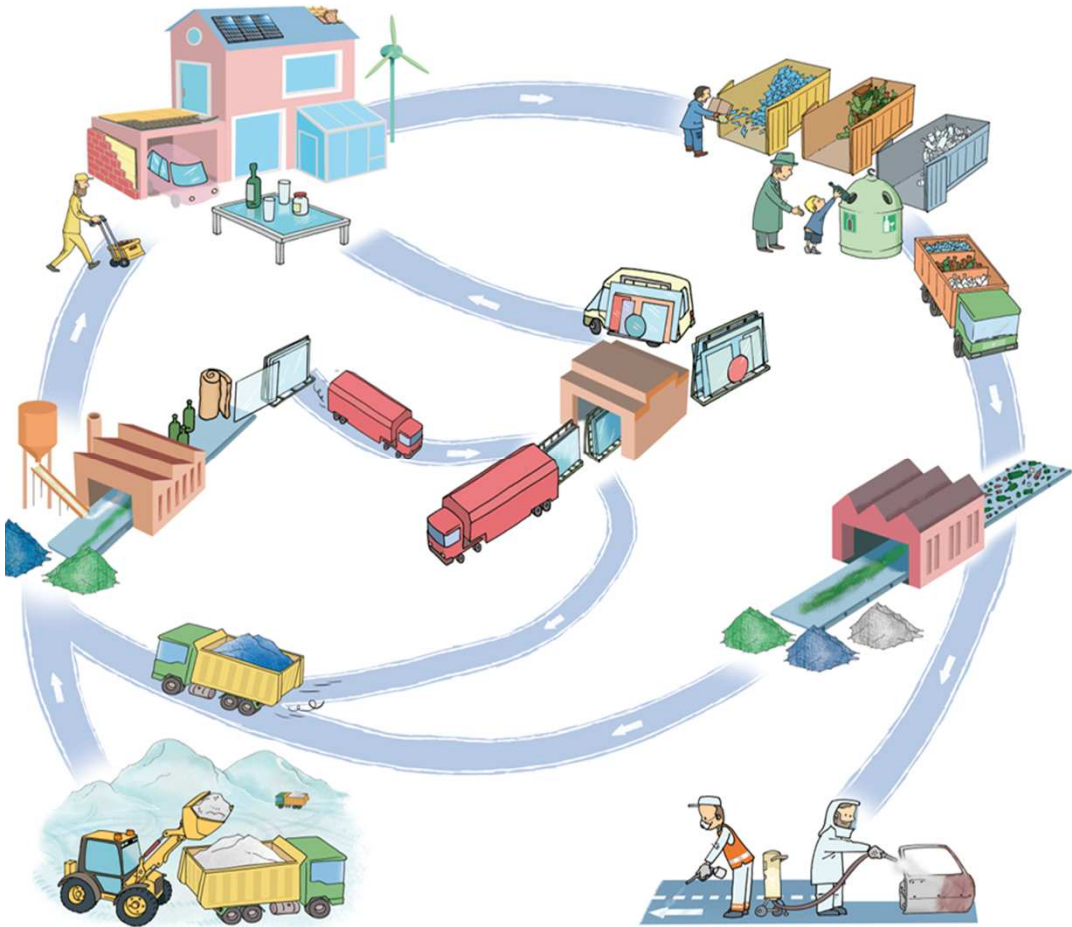
Recovery

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

Vlakglas Recycling  Nederland

- 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



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;
 - ▶ Waste Framework Directive (2008/98/EC)
 - ▶ 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 ?