

GLASS PERFORMANCE DAYS 2025



Technologies for Recycling and Reuse of Insulating Glass

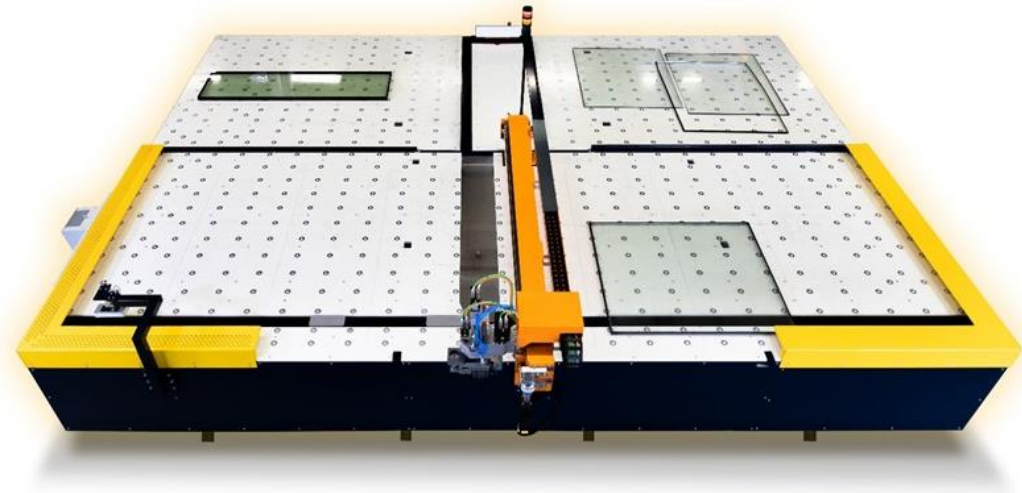


Dr. Heinrich Ostendarp / HEGLA

Agenda

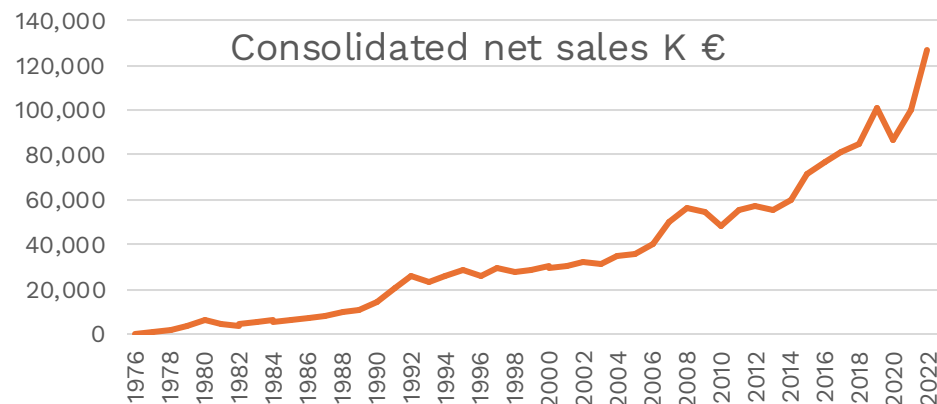


- HEGLA
- Situation
- Environmental potentials
- Concept
- Use cases
- Outlook

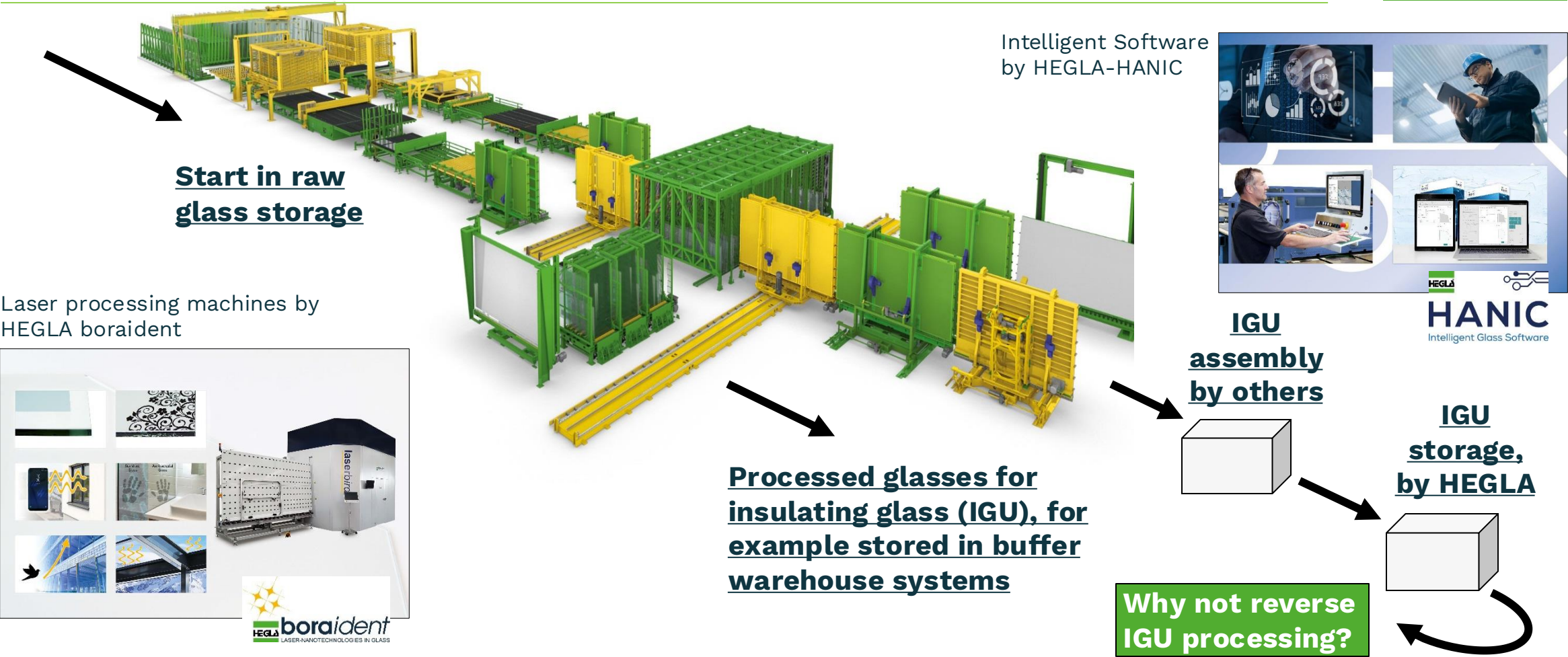


HEGLA Beverungen was founded in 1976

- Expansion by 5 further German locations
- 6 further international locations
 - of which USA has its own assembly
- 9 international Representatives
- approx. 740 employees



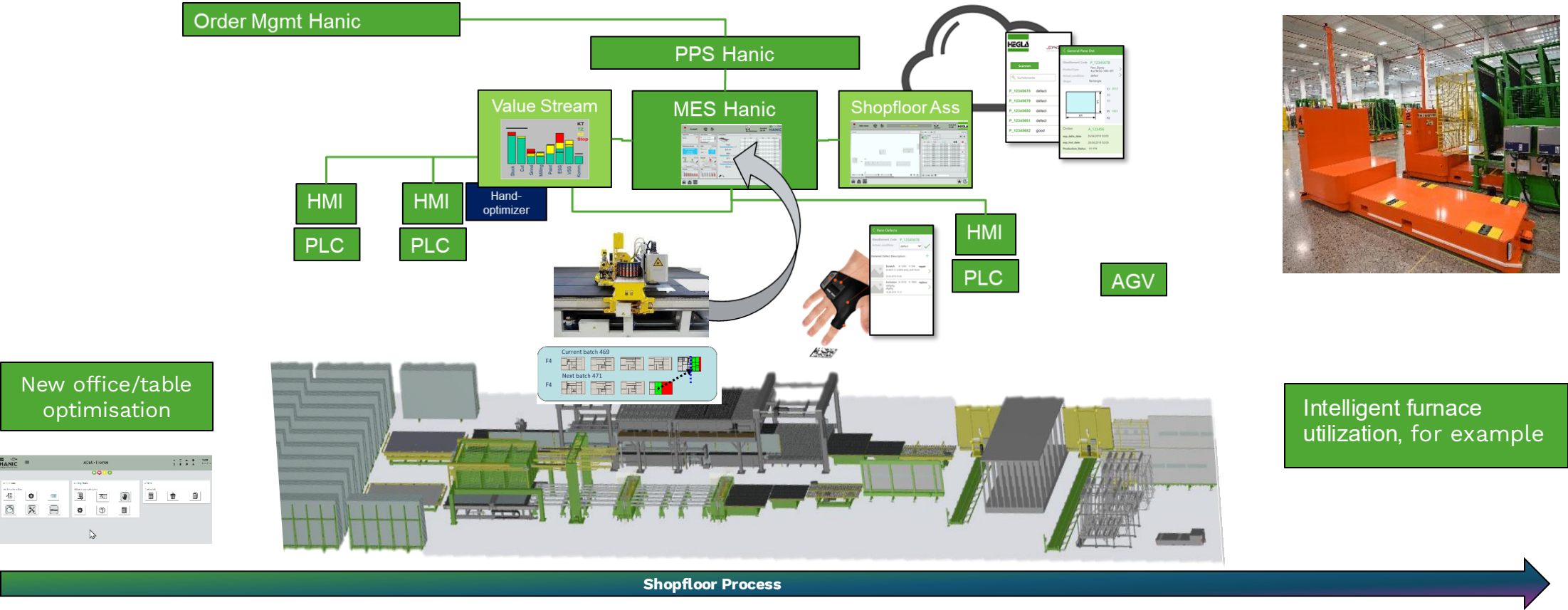
HEGLA – Typical fully Automated Glass Processing Line



HEGLA – Product Overview



HEGLA Automation Software / VISION by HEGLA-HANIC

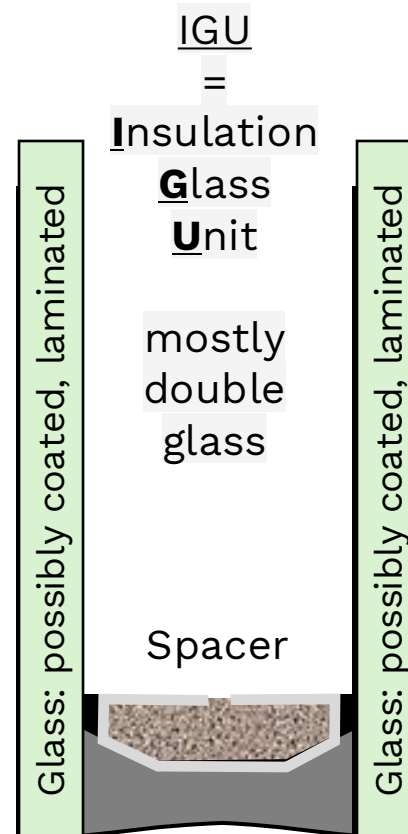


End of Live Windows and their Potential for Circularity

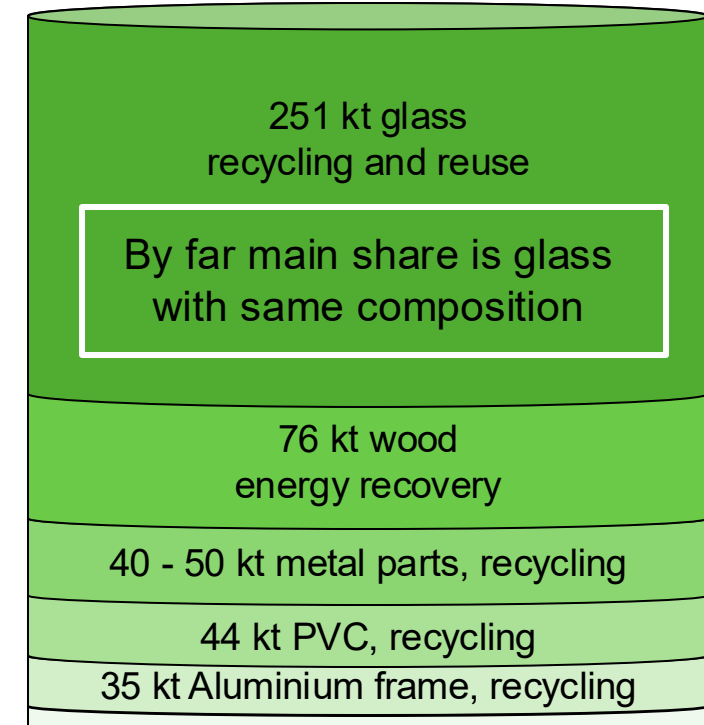


Windows, consisting of

- Frames: **Aluminium, PVC, Wood**
- **Metal** parts in or at Frames
- IGUs
 - **Glasses**
 - **Spacer:** mostly Aluminium frame, filled and sealed



470 kt Harvesting potential / a in Germany *



20 kt others (spacer, ...) – partly recyclable

*: Conversio: Abfallmengenszenario und Value Chain für Fenstersysteme in Deutschland, Juli 2023; other sources providing comparable figures

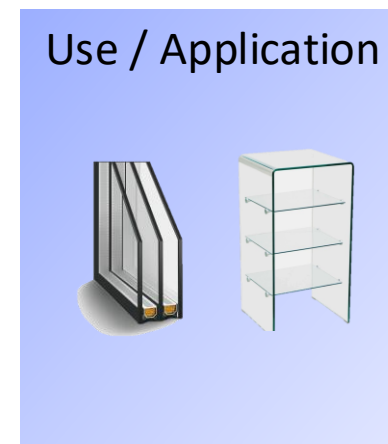
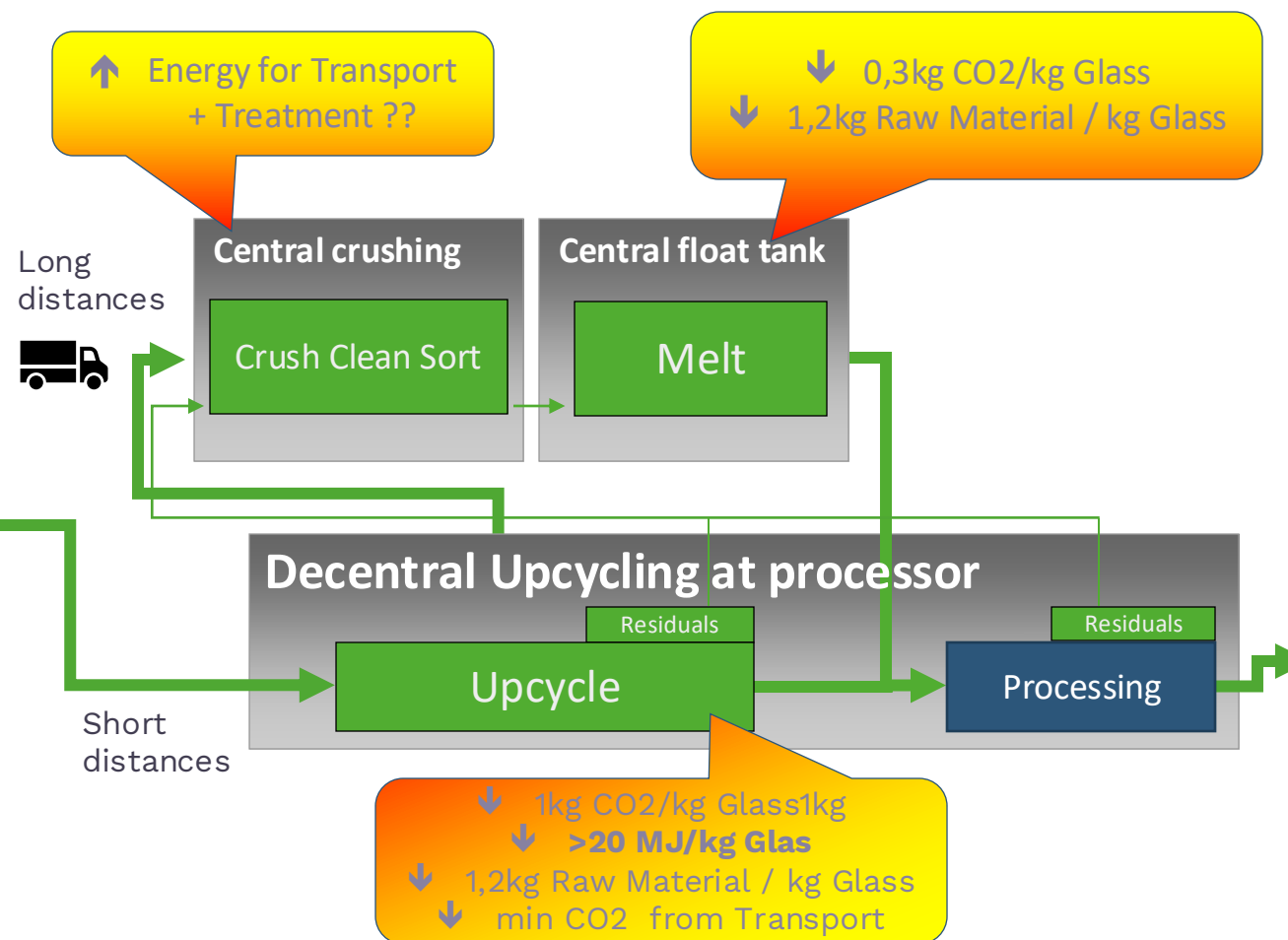
Scenarios for Glass



Path 1 Recycling



Path 2 Upcycling



State of the Art Material Flows for End-of-Life Windows



From disposal as waste ...



... to a more orderly recycling process

- Container handling of windows or separated into IGUs + Frames
- followed by automatic separation system
 - Frames, Metal to Shredding and sorting
 - Glass fragments for recycling



but limited cleanliness limits remelting to glass panes



Typical Initial Situations for Advanced Window Circularity



Removed end of live windows

- removed from buildings
- collected and stored for further processes



Insulation glass Units (IGUs)

- faulty production or end of live IGUs
- removed from frame, stored for further processing

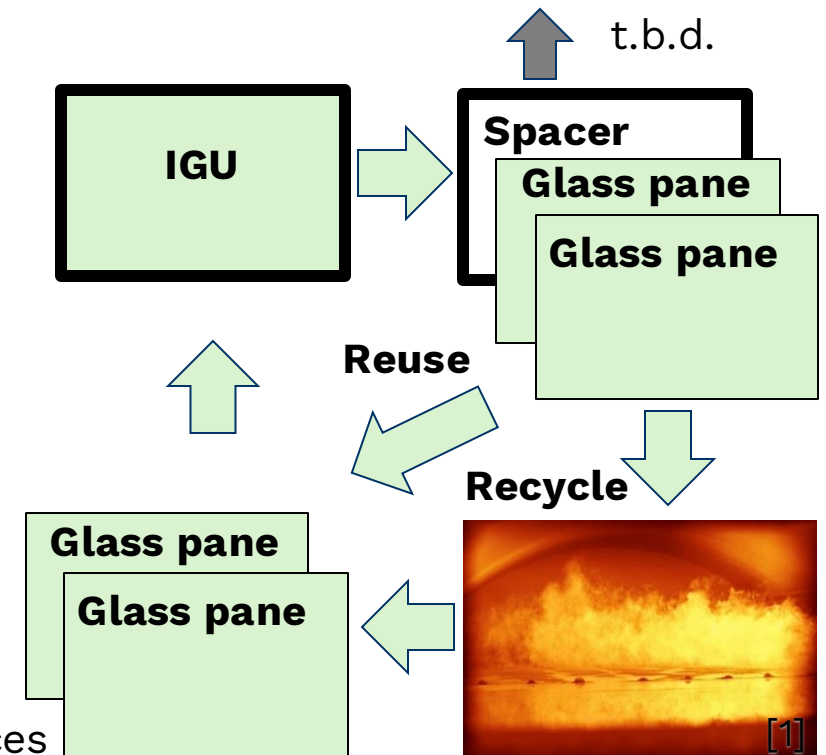
Good base for further clean circular processing

HEGLA – Approach for Window- & Glass Circularity



Advanced material separation processes with focus on Glass

- **Glass pane separation as a whole enables**
 - Clean Enough Glass material for remelting to flat glass
 - to overcome cullet shortage for flat glass producers
 - per 10% cullet content in raw material \approx 3% Energy saving
 - Undamaged Glass Panes for a second life
 - As the whole or in shorter parts
- **Smooth, highly automated and productive separation**
 - Key success factor for economic efficiency
 - Including utilization of advanced software and measurement devices
- **Next:** window pre-evaluation in building + removal flows; automated disassembly Frame + IGU



From an Historical Approach to IG2Pieces



Too chaotic,
too slow,
too early, ...

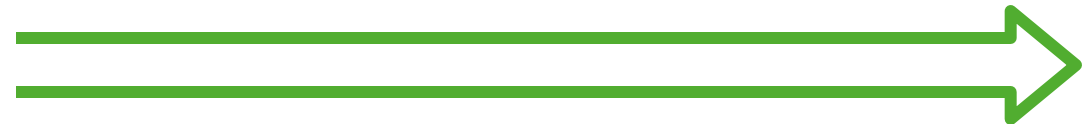
Simple table for manual glass breaking

in 1980s

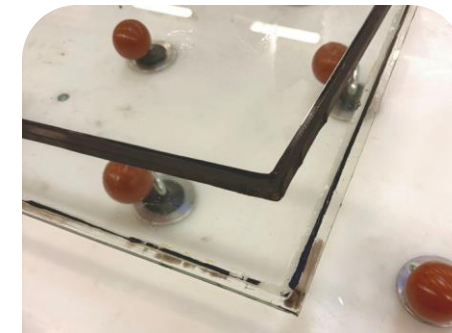
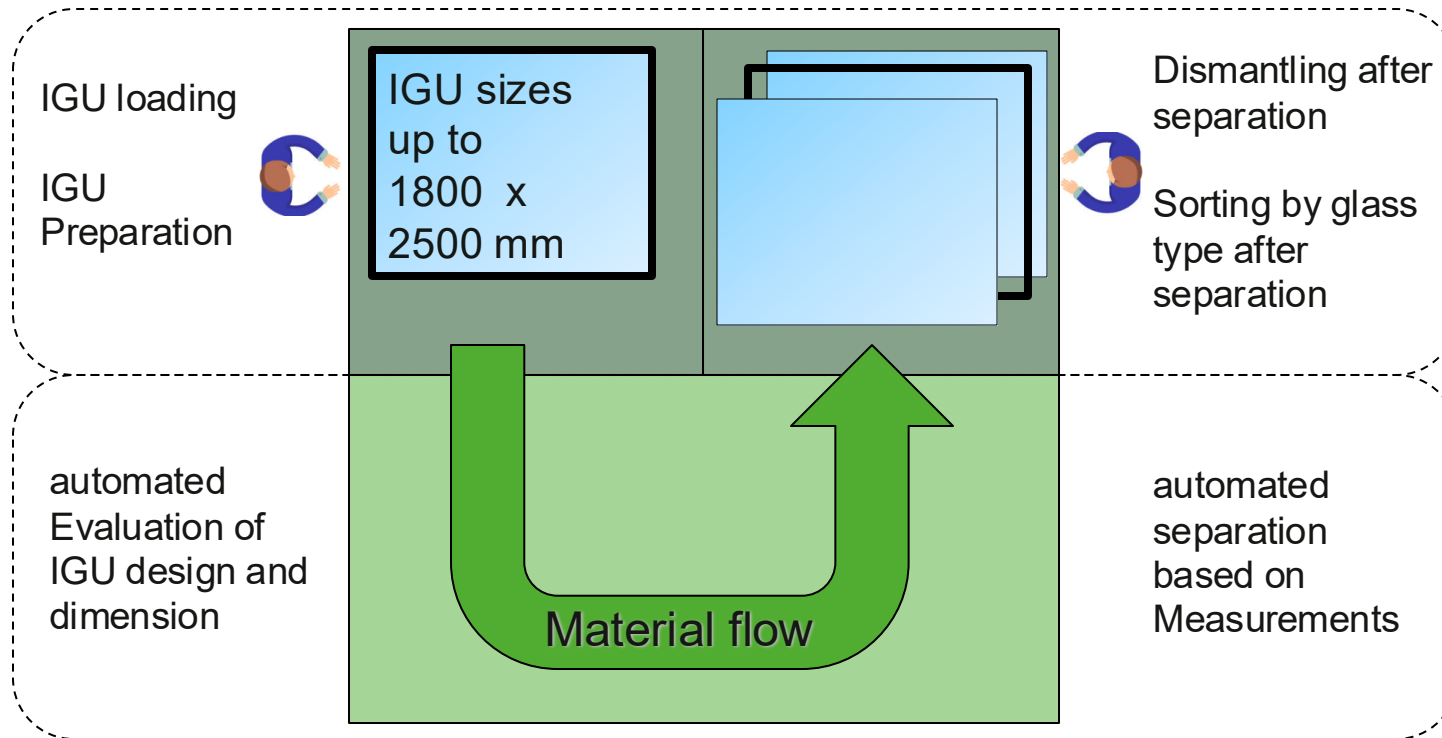


Automatic non destructive
IG-separation machinery

in 2024



Basic machine concept - Layout



+ related Data

Reuse:

2nd life IGU with old glass

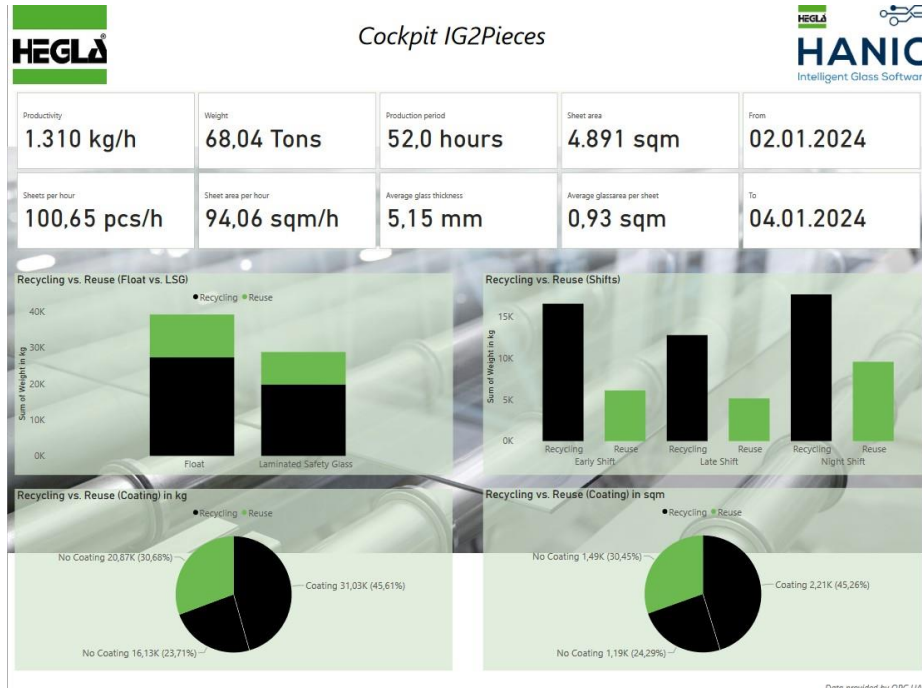
Recycle:

Crush and melt raw glass

Repair:

Usable glass from faulty IGU

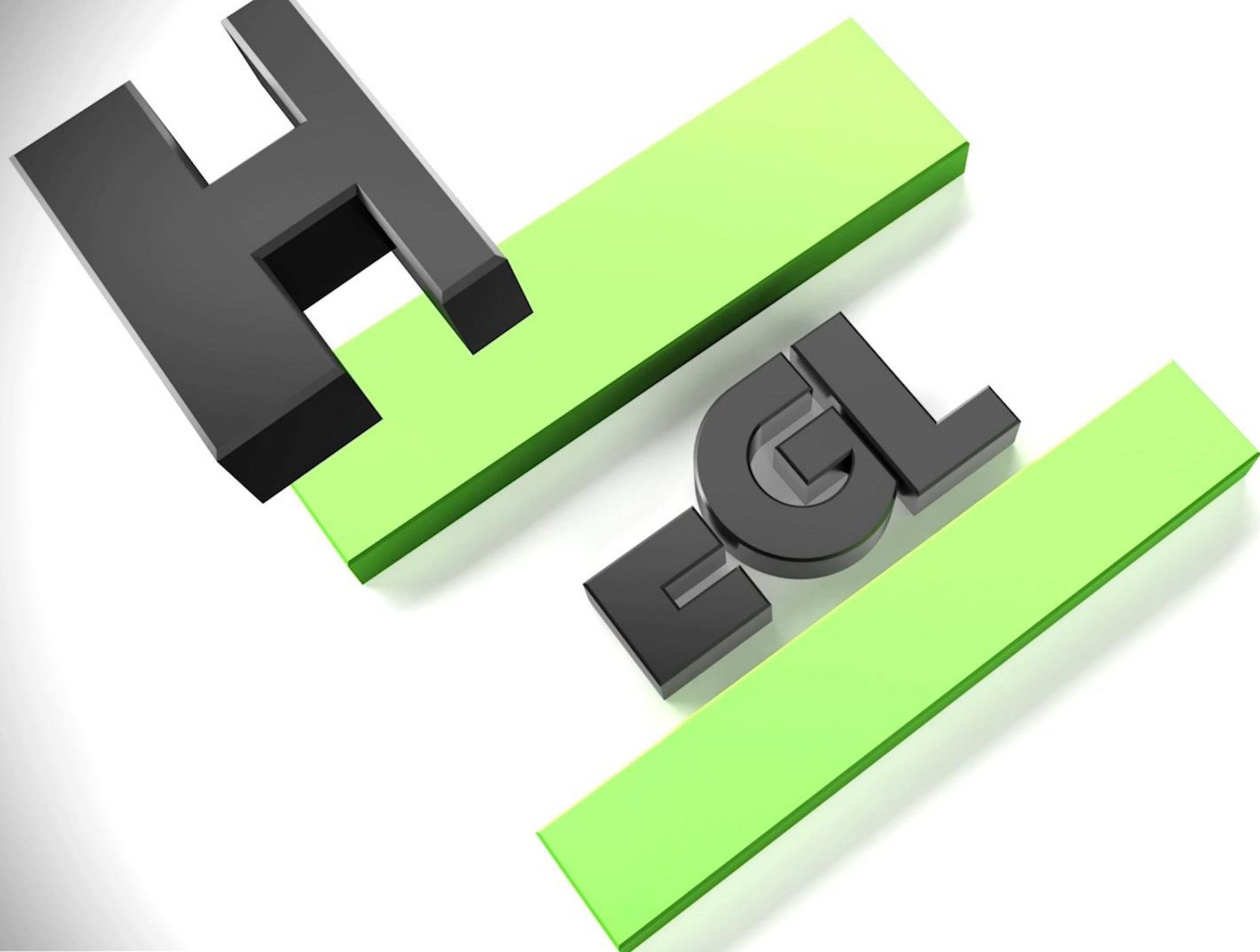
Machine Connectivity and Cockpit



Data as a **valuable** source:

- Glass properties
- Production data, statistics about use- cases and productivity
- Machine connectivity via OPC UA Interface

Outlook **Productivity** \approx **1200 kg** glass weight **per hour** at \approx 114 glasses
Assumptions: 1,05 m² double-IGU, 65 s cycle time, 95 % OEE



Political Framework and Conditions



Germany, Coalition Agreement

- Promotion of the use of recycled construction materials and strengthening of material cycles (p. 26)
- The coalition plans to establish an internationally competitive electricity price for energy-intensive companies (p. 7)
 - Competitive industrial electricity price: Ideally around €0.06/kWh (for comparison: France average €0.043/kWh)*
- Incentives for climate-friendly and affordable construction (p. 25)

*[Federal Ministry of Economics presents concept for an industrial electricity tariff | Chatham Partners](#)



Netherlands – in Implementation

- Planned Recycling Incentive: €17.50 per ton
 - Scheduled to take effect on January 1, 2026 (subject to ministerial approval)
- Additionally, reuse of flat glass is already included in tenders

[Recyclingbijdrage vlakglas vanaf 2026 per kilo • Glas in Beeld](#)

Vlakglas Recycling  Nederland



Thank you for your attention!



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