



**CATALOGUE OF
CIRCULAR
GLASS
BUSINESS
IDEAS**

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A: GLASS TYPES AND SOURCES

Container & Table Glass (soda-lime)

Recycling difficulty: low

This is the workhorse feedstock that is going to be the main type of glass used. It comprises bottles and jars in clear (flint), green, amber, and occasional blue. This type of glass cuts cleanly, slumps and kiln-casts reliably, and fire-polishes to a durable rim.

This type of glass could be sourced from:

- Municipal bring-banks
- Café and bar back-of-house collections.
- Breweries and distilleries operating take-back loops.
- Hotel banqueting and event operations.
- Food producers with overrun or mislabelled stock.
- Cosmetics and perfumery packaging lines.

Flat (Float/Annealed) Glass

Recycling difficulty: low

This category consists of clear or low-iron panes with consistent thickness that are ideal for trays, tiles, lighting diffusers, and kiln-formed panels. This type of glass cold-works easily and responds predictably in forming cycles when sorted by thickness.

This type of glass could be sourced from:

- Window and façade fabricators providing off-cuts or mis-cuts.
- Shopfitting and interiors contractors.
- Photographic framers with pane off-cuts.
- Construction sites during fit-out phases.

Tempered Glass

Recycling difficulty: medium

This material cannot be re-cut and requires specialised crushing, screening, and controlled full-fuse cycles to achieve consistent results. Many studios lack the equipment and dust control to process it safely and repeatably, which is why this type of glass is not recommended without proper equipment and experience. This type of glass benefits from careful handling to preserve cullet quality.

This type of glass could be sourced from:

- Shower-screen installers and bathroom refitters.
- Commercial door and glazing contractors.
- Office and retail refurbishments.
- Hospitality venue refits using screens and partitions.

Mirror Glass

Recycling difficulty for hot processes: high

Recycling difficulty for cold processes: medium

Mirror is float glass with a metallic backing and protective paint that requires mechanical or chemical removal before hot forming. Because of this, mirror glass is better suited to cold-worked reuse. Without removing the backing and paint, after being crushed, it can be used for making terrazzo tiles, or it can be used for mosaics after being cut to size.

This type of glass could be sourced from:

- Interior designers and refit contractors.
- Theatre and film set builders.
- Architectural salvage yards.
- Residential renovation clear-outs.

Borosilicate (lab/culinary)

Recycling difficulty for hot processes: high

Recycling difficulty for cold processes: medium

The chemistry is of borosilicate glass, not compatible with soda-lime, because of its higher melting point, which is why mixed melts with soda-lime will fail. In the case of cold processing, a dedicated cold shop with diamond tools and wet extraction is needed to avoid cross-contamination with soda-lime.

This type of glass could be sourced from:

- University and school laboratory decommissions (non-hazard only).
- Hospitality kitchens disposing of cookware.
- Scientific suppliers with cosmetic-defect stock.
- Medical and educational stores that can provide provenance paperwork.

Lead Crystal / “Crystal Glass”

Recycling difficulty for hot processes: medium

Recycling difficulty for cold processes: medium

This type of glass contains 24% or more lead oxide, giving it a superior brilliance and malleability for decorative items. Its composition demands segregation and careful compliance for any food-contact. For hot processing, it can be cast or slumped **only** in a separate crystal stream. Avoid food-contact goods and never commingle tools or coolant with soda-lime. For cold processing, it can be re-cut, and re-polished. Vintage pieces could be repaired, or crystal elements assembled into new designs with adhesives or metalwork.

This type of glass could be sourced from:

- Auction houses and estate clearances.
- Charity warehouses and vintage dealers.
- Hotel banqueting stores retiring sets.
- House-clearance specialists.

Opal & Opaque Glass

Recycling difficulty for hot processes: very high

Recycling difficulty for cold processes: medium

This type of glass has a milk/opal matte finish and is common in vintage luminaires and tableware. It is made non-transparent by **surface treatments** like acid-etching or sandblasting, or by **built-in systems** such as laminated opaque interlayers, ceramic-frit/paint back coatings, and even switchable “smart” layers. Because laminated interlayers and ceramic/paint backings fundamentally change how the glass behaves in heat, and because tempered opaque panels cannot be re-cut, opaque stock is **high-risk for hot processing** unless you have verified provenance and the ability to strip coatings or confirm delamination. Accordingly, opaque glass should be used in a **cold-work-first** stream.

This type of glass could be sourced from:

- Lighting manufacturers and wholesalers.
- Electricians removing old luminaires.
- Theatre and film prop departments.
- Vintage markets and charity warehouses.

Laminated Glass

Recycling difficulty for hot processes: very high

Recycling difficulty for cold processes: very high

Laminated glass consists of two or more glass plies bonded with a plastic interlayer such as PVB, EVA, or ionoplast, so the panel remains intact if cracked. It is widely used in façades, solar panels, and windscreens. It is practical only for **cold reuse** when the panel already matches the required size: you can dress or lightly polish exposed edges and add surface finishes on the glass face. Cutting to size, drilling holes, or shaping after lamination is risky and typically requires industrial equipment and processes, so these operations should be outsourced or avoided. Hot processing is not recommended unless the glass has been fully delaminated by a specialist and verified clean, as interlayers and coatings will contaminate firings and cause defects.

B: PROCESSING METHODS

COLD PROCESSING METHODS

SAFETY NOTE

When doing any type of glass processing, it is essential to wear safety glasses and gloves, and any other safety equipment needed for the specific processing method.

Cutting and shaping

Cutting is the first transformation step where reclaimed sheets, bottles, or cast blanks are resized for reuse. Scoring and snapping are suitable for float and container glass; a wet diamond saw is recommended for thicker or irregular pieces. For rounded forms such as bottles, a rotary bottle cutter or diamond-blade wet saw gives precision and reduces chipping.

Grinding, Sanding & Edge Finishing

Edge finishing defines both the look and safety of reused glass. Cold-grinding on diamond belts or flat laps removes sharpness and readies pieces for assembly or kiln work. For artisan studios, a sequence of coarse (80–120 grit) to fine (600–1200) produces clean, fire-polishable edges. Proper coolant filtration and sediment separation are essential to prevent cross-contamination and protect health.

Polishing & Surface Refinement

Polishing revives surface clarity and increases perceived value. Studios use felt laps, cerium oxide compounds, or flame-polishing (for small decorative edges). Avoid open-flame polishing on mixed glass types or lead crystal due to volatility. Incorporating recycled cerium powders and closed-loop water polishing reduces waste and fits EU waste hierarchy principles.

Sandblasting, Etching & Surface Decoration

Cold decoration adds value and can produce different visual effects on the glass. Sandblasting, acid etching, or laser engraving can personalise upcycled pieces without remelting. Use low-toxicity etchants and sealed booths to capture dust. This stage is ideal for involving community workshops or training participants, offering low-barrier entry into glass finishing.

Assembly & Cold Construction

Cold construction includes bonding, laminating, and framing glass into final products. Studios use UV-curing adhesives or eco-resins to join components while preserving recyclability. Hardware should be reusable or separable. These techniques are accessible to community artisans and form the backbone of circular product design.

HOT PROCESSING METHODS

KILN FORMING

1. Fusing (*Full fuse, Tack fuse*)

Fusing bonds multiple sheets or inclusions. For soda-lime glass, this typically occurs at 780–820 °C, whereas borosilicate and crystal require separate kilns and schedules. Cleanliness is vital during this process, as residues can cause devitrification or bubbles.

- **Full Fuse** (~790–820 °C): The glass is heated until it becomes molten enough to merge completely. Layers flatten into a single uniform thickness (usually 6mm) with a smooth, glossy surface. This is ideal for creating solid sheets or strictly flat designs.
- **Tack Fuse** (~730–760 °C): A lower-temperature bond where layers stick together but retain their individual definition, texture, and relief. "Soft tack" rounds the edges slightly, while "hard tack" keeps them crisp.

2. Slumping and Sagging

Slumping reshapes glass using controlled heat (typically 620–700 °C for soda-lime) so that the glass softens and drapes over or into moulds. This process enables the production of bowls, lighting diffusers, and panels without blowing.

- **Slumping:** The glass takes the shape of a solid mould (e.g., a bowl or platter) by bending under its own weight. Moulds are typically made from ceramic fibre, stainless steel, or plaster-silica mixes.
- **Sagging (Drop-Out):** A specific variation where glass is placed over a mould with a central hole (a ring mould). Gravity pulls the softening glass through the opening to create deep vessels or vases that cannot be achieved with standard open moulds.

3. Casting (*Open casting, Lost wax casting, Box casting*)

Casting transforms frit (crushed glass) or cullet (chunks) into solid 3D forms. This method requires longer firing schedules to ensure heat penetrates the thick glass mass.

- **Open-Faced Casting:** The most straightforward method, where glass is melted into a plaster-silica mould with an open top. One side of the object will always be flat (the meniscus).
- **Lost Wax Casting:** Used for intricate, fully 3D shapes. A wax model is created and encased in investment (plaster mix). The wax is steamed out, leaving a cavity that is then filled with molten glass.
- **Box Casting:** Glass is melted into a simple geometric enclosure (often made of vermiculite boards or dams) to create thick slabs, blocks, or billets for further cold-working.

FIRING PROCESS

1. Annealing

Annealing is the critical controlled cooling stage designed to remove internal stress. The temperature window depends on composition, around **520 °C** for soda-lime.

- **Soak Phase:** The glass is held at this temperature to equalise the core and surface temperatures.
- **Cooling Phase:** The kiln is cooled slowly to the "strain point" to prevent thermal shock. Poor annealing leads to spontaneous cracking (checks) later, significantly reducing product lifespan.

2. Fire Polish

Fire polishing is a finishing technique used to restore a glossy finish to glass that has been cold-worked (ground, sanded, or sandblasted).

- **Process:** The glass is heated to approximately **700–760 °C** (similar to a tack fuse).
- **Goal:** This temperature is hot enough to surface-melt microscopic scratches and make the glass shiny again, but cool enough that the object retains its crisp edges and does not distort.

3. Bubble Squeeze & Rapid Cool

To ensure high-quality results, specific ramp-control stages can be added to the schedule:

- **Bubble Squeeze (~600–670 °C):** A pause or slow ramp during the initial heating. This allows air trapped between glass layers to escape before the edges seal up, preventing unsightly air bubbles in the final piece.
- **Rapid Cool:** Immediately after the top process temperature is reached, the kiln is vented or cooled quickly to the annealing range (approx 500 °C). This "freezes" the shape and prevents devitrification (scummy white crystallisation), which can occur if glass lingers in the 600–800 °C range during cooling.

C: CARBON FOOTPRINT CALCULATOR

The ArtGlass Carbon Footprint Calculator is a tool designed to help small studios and creative entrepreneurs understand the environmental impact of their glass-making activities. It translates all greenhouse-gas emissions from materials, electricity, fuels, water use, wastewater, and waste disposal into a single unit - kg CO₂-equivalent, so different processes can be compared easily. The calculator can be completed monthly or after finishing a specific product collection. When filled out monthly, it shows the emissions per kilogram of glass produced in that month. When filled out after a collection, it provides a more precise footprint for individual products, based on studio bills and recorded material use during the chosen period. Its purpose is not to burden makers, but to give a practical and accessible overview of energy use, resource consumption, and opportunities for emission reduction.

Disclaimer

All carbon-footprint values presented in this catalogue are estimates based on typical studio conditions and indicative assumptions. Actual results may vary depending on the country's energy mix, local infrastructure, material sources, equipment efficiency, and individual workshop practices. The calculations serve as illustrative guidance only and should not be interpreted as definitive Life Cycle Assessment values.

D. MARKETING AND PROMOTION

Marketing and promotion are defined at a strategic level and centred on professional visibility, material credibility, and artistic authorship. Promotion is primarily realised through curated exhibitions, participation in design and craft fairs, and presentations during architecture and design weeks, where the material qualities of recycled glass, its tactile presence, and the production process can be experienced directly. These physical contexts allow each work to be understood simultaneously as a functional object, a design component, and a material practice, reinforcing the link between circularity, craftsmanship, and design value.

Professional outreach is built through long-term relationships with architects, designers, cultural institutions, and companies, supported by material libraries, sample kits, studio visits, and project based collaborations. This ensures that glass objects and architectural elements are evaluated within real spatial and technical contexts, strengthening trust in both the material and the production process.

Digital channels are used selectively as complementary tools for documenting process, provenance, and authorship, extending professional visibility beyond physical exhibitions without replacing them. Long-term recognition is established through sustained exhibition presence, participation in professional networks, and inclusion in platforms dedicated to contemporary glass, craft, and circular design, positioning the catalogue's ideas within established artistic, design, and architectural ecosystems.

**IDEAS OF GENERAL
RELEVANCE TO THE TOPIC**

1. Buy and rent a 3D glass printer

A 3D glass printer offers cutting-edge opportunities to produce intricate, sustainable glass objects for architecture, design, and industry. By buying and renting it out, you can serve clients who need high-tech glass fabrication without the upfront investment.

1. Glass Types and Sources

See part A for a more detailed overview of glass types and sources. The main type of glass used to make filament for the 3D printer is soda-lime glass, with the sources being:

- **Clear soda-lime cullet:** It can be sourced straight from the local bottle bank or a nearby container-glass recycler. Supply is huge in every EU country. It melts at the right temperature for the 3-D printer, flows smoothly, and stays neutral so that we can tint it any colour later.
- **Green and amber container glass:** It can be collected, if already sorted, from the colour bunkers at any municipal recycling plant or sign a deal with the local bottling company for their rejects. It melts the same way as clear soda-lime, but the natural green or brown tint gives printed bricks or art parts a cool look without extra pigments.

2. Processing and craft methods

See part B for a complete overview of possible processing methods of glass.

To run a 3-D glass printer, you first need basic digital modelling skills so you can create the 3D render of the part and save it, then you learn the slicer software to choose layer height, temperature, and speed. Material prep is done by washing, drying, and sieving the crushed glass to a steady 1–4 mm size. Safe machine loading matters: visor, heat gloves, check thermocouples, tip the clean cullet into the hopper. After a print finishes, you run an annealing programme so the piece cools slowly and doesn't crack, and then you can do basic cold-working. Finally, you inspect the part for stress with polarised light or send bricks for compression tests, and you log every setting so you can repeat a good job next time.

3. Value propositions

The 3D glass printer can offer clients shapes no mould could make, print them on demand in just a few days, and use mostly recycled glass, so every piece tells a strong eco story. Because it can be produced locally, buyers save on long shipping, protect their designs, and get lower carbon emissions. The machine also lets us build hidden channels for light or cables, so parts are useful as well as beautiful. Each run can be a true limited edition—easy to tweak, easy to number—so brands charge premium prices. It offers great PR for designers, museums, or public projects.

4. Knowledge about customer segments

The demand for a 3D glass printer arises from the diverse problems it has the potential to solve.

- **Architects and facade engineers** want special shapes for bricks, curved mullions, and light-friendly blocks. A 3D glass printer can create these parts directly from their digital model file, eliminating the need for expensive moulds while maintaining very high accuracy. When we feed the printer with recycled glass cullet, the parts have much lower embodied carbon, which helps projects win competitive green tenders. In one step, they get eye-catching design plus better thermal and optical performance-an easy way to stand out.
- **Designers and lifestyle brands** are always looking for fresh shapes and small, special runs. With a 3-D glass printer, they can get a finished object in days, with no costly moulds or big minimum orders. That means quick testing of new ideas and real, limited editions that stay exclusive. If they print with recycled glass, the product also carries a clear eco-story that buyers love and brands can show in their marketing. Local, on-demand printing cuts long shipping times and helps them launch collections faster while keeping a green image.
- **Art museums and heritage sites** want pieces that tell local stories and pull in visitors. With a 3-D glass printer, they can turn old window glass or bottle shards from the same place into custom sculptures, tiles, or light panels. Each project stays one-of-a-kind and shows the public how waste becomes art right on site. Printing with recycled cullet also matches EU grants for circular heritage and keeps the carbon count low. Live printing demos and hands-on workshops bring schools and tourists, making a greater community impact.
- **Premium packaging and corporate-gift companies** always need eye-catching shapes, but in small, high-quality batches. A 3-D glass printer lets them make special bottles, trophies, or presentation pieces fast; even 200 or 300 units is fine. Printing with recycled cullet gives the item a clear eco-story that fits ESG reports and luxury “green” campaigns. On-demand production means no big inventory and local printing cuts shipping time, so brands can launch limited editions or seasonal gifts quickly while showing real sustainability.

5. Space and equipment needed for work and the technological process

You can run a pro-level 3-D glass studio in roughly 120 m². Split it into a 40 m² hot zone for the printer and annealing kiln and a 30 m² cold zone for grinding, polishing, and sand-blasting; the rest is storage and a small office. Essential gear: a Maple 3 / 4 printer, a kiln sized for your biggest part, and a cullet-prep corner with crusher, sieves, washer, and drying rack. For finishing, add a wet belt sander, sand-blast cabinet, and hand tools. You'll also need a pallet jack to move cullet bags, three-phase power (~25–30 kW peak), an extraction hood, and a basic safety kit-heat gloves, face shields, respirators, eye-wash station, and fire-brick flooring.

Technological process: Crush, wash, and dry the waste glass to 1–4 mm, sieve out dust, and pour the clean cullet into the printer hopper. Choose layer height, speed, and set the melt point. The printer lays the glass down layer by layer while the heaters keep it hot. When the print finishes, the build plate enters a slow, 6–12-hour annealing cool-down. Once cool, grind the base flat, polish or sandblast any details, then check the piece for stress (and compression-test bricks). Note the settings, sweep up leftover cullet, and you're ready for the next job.

6. Distribution channels

Besides renting the 3D glass printer, we can also sell our printed glass in several easy ways: through our own web shop and social-media store, on design marketplaces like Etsy, and by placing samples in museum shops, concept stores, and architectural material libraries. We also earn by printing parts for designers, renting machine time to universities, and offering small pilot runs for luxury packaging firms. Finally, we host ticketed live-printing demos, short workshops, and virtual studio tours so visitors and brands can see the process, make their own pieces, and spread the word.

7. Cost structure

Initial Costs

Cost item	€ estimate	Comments
3D glass printer (Maple 3 or 4)	32 000 – 42 000	Core production equipment
Programmable annealing kiln	~12 000	Sized for the largest bricks/parts
Cold-working tools (belt sander, diamond saw, sand-blast cabinet)	~10 000	Essential finishing equipment
Studio fit-out	20 000 – 25 000	Infrastructure & health/safety
Branding, marketing setup & launch activities	included in buffer	Covered by initial budget
Total CAPEX	110 000 – 140 000	Fully functional 3D glass studio

Monthly costs

Cost item	€ estimate	Comments
Electricity	300 – 600	High energy demand for the printer & kiln
Studio rent & utilities	1 500 – 2 000	120 m ² light-industrial unit
Labour (1–2 FTE)	2 500 – 4 000	Depending on staffing and region
Consumables (grit, pigments, protective gear)	200 – 400	Includes kiln wash, filters, and PPE
Cullet collection & transport	100 – 200	From local suppliers
Marketing & outreach	400 – 800	Digital ads, samples, promotions
Total OPEX / month	5 000 – 8 000	Lean operation estimate

8. Revenue streams

Revenue for a 3-D glass-printing studio typically comes from five sources:

- retail and wholesale sales of finished pieces, art objects, facade bricks, and custom bottles;
- print-for-hire services, charging designers or brands per part or per cubic centimetre;
- supervised machine-rental blocks (hourly or daily) for universities and R&D teams;
- paid experiences such as workshops, live-printing demos, and corporate team-building sessions sold by ticket or package;
- design-consulting packages that guide clients from prototype to small-batch production, billed as project fees with an optional margin on any follow-up orders.

9. Social Impact and Gender Equality

See part C for a detailed overview.

10. Carbon footprint level

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this process is 4.87 kg CO₂e per 1 kg of 3D-printed recycled glass, based on representative input assumptions for small-studio production. Most emissions arise from electricity consumption during glass melting, continuous printing, and annealing, while smaller contributions stem from transport, material losses, and wastewater treatment. Because this idea relies entirely on recycled cullet rather than virgin raw materials, direct material-related emissions remain low, and overall energy demand is driven primarily by furnace efficiency, printing duration, and the workshop's electricity mix. These results should be

understood as indicative estimates rather than exact measurements and may vary depending on equipment type, production volume, operational practices, and national electricity sources.

11. Marketing / Promotion

In alignment with the strategic marketing framework defined in the introduction, the 3D glass printing capability is positioned as a specialised fabrication service for high-precision architectural components and bespoke lifestyle editions. This technology is professionally experienced through technical demonstrations at trade fairs and within material libraries, where the emphasis remains on the artisanal control over recycled cullet and the unique refractive qualities of printed geometries. By facilitating direct collaboration between the studio and design professionals, the process is documented digitally as a record of technical authorship, situating these complex, low-carbon glass forms as essential assets for green-certified heritage and contemporary design projects.

2. Start a B2B waste glass studio

Just like the public-access waste glass studios, B2B studios are still very rare in Europe. One of the most notable examples is the [Glint Glass Studio](#), a fully equipped cold working studio in the heart of Dublin city. It works with local businesses to utilise their waste glass, harvesting glass that would be destined for recycling or landfill. Pubs, restaurants, wine merchants and clubs save their bottles for Glint so they have a regular supply of similar shapes and colours. All of Glint's machinery runs on electricity, which they use carefully. Glint reuses all its grey water, which it harvests in buckets, and recycles 90% of the waste in production.

One fact strongly proving the need for B2B waste glass studios is the **Roca Recicla** by El Celler de Can Roca, one of the best European wineries and restaurants. Following the upcycling mainstream, the restaurant is sorting and recycling-upcycling: empty glass bottles, expanded polystyrene food transportation boxes, wooden boxes, and plastic pouches for vacuum cooking. Roca Recicla wants to take one step beyond recycling by transforming the bottles emptied at the restaurant into tableware pieces that can be reused. “We use creativity so as to give a second life to these bottles, turning a supposedly useless object into something useful and beautiful, involving in the process people at risk of labour exclusion that are also given a second chance”, says Joan Roca.

Since many HoReCa cannot afford to have their own waste glass studios like Roca Recicla, starting a B2B waste glass studio could serve many local clients and develop B2B brands. Cold working techniques are obviously the greenest and easiest to apply, but responsible usage of other techniques could result in products with higher value.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources.

The main type of glass used for recycling is soda-lime glass, which can be sourced from:

- Bar & pub bottle bins – nightly loads of clear, green, and amber beer bottles of the same size; easy to turn into matching tumblers or candle-holders.
- Winery and distillery returns – pallets of identical wine or spirits bottles, perfect for uniform gift sets after cutting and polishing.
- Restaurant pantry jars – bulk pickle, coffee, and sauce jars from kitchen waste; wide-mouth shapes suit planters, storage, or lanterns.
- Hotel housekeeping glass – chipped drinkware and broken minibar bottles gathered in-room; grind edges and sell back as tealight cups.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

Know-how is mostly cold-work craft and basic branding: sort the glass by client and colour, use a bottle-cutting jig or wet saw to slice necks off cleanly, then run the rims through coarse-to-fine diamond wheels until they're restaurant-safe smooth. Learn simple sand-blasting or CO₂-laser etching so you can add each customer's logo, and practice flame-polishing or acid-etching for a glossy or matte finish

on demand. Add drilling and countersinking skills for turning thick bases into lamps or soap dispensers, and keep a basic QA routine - tap-test for cracks, gauge rim thickness, and wash pieces to HACCP food-safe standards if needed, so every up-cycled batch goes back to the client ready for service or resale.

3. Value Propositions

Hand over yesterday's empty bottles and, a week later, get them back as polished, logo-etched tumblers, lamps, or décor-ready to use or sell. The studio turns a disposal cost into branded stock, cuts the client's waste footprint to near-zero, and delivers a local, closed-loop story guests will see every time they pick up a glass. No bulky minimum orders, no overseas freight, just the client's own glass, reborn a few streets away.

4. Customer Segments

- Hospitality venues (bars, cafés, restaurants) - Hospitality businesses generating a continuous stream of uniform glass bottles, enabling consistent production of branded tumblers, candle-holders, and tableware used in daily service and sold as merchandise. This segment provides regular material supply, repeat orders, and strong visibility through everyday customer interaction.
- Hotels, event venues and corporate clients – Hotels, event spaces and corporate gift agencies commission bespoke glassware, décor, and gifting items made from their own waste glass to support ESG strategies, branding, and guest experience. These clients enable higher-margin, project-based orders and clear storytelling value.
- Architects, interior designers, and fit-out contractors - Design professionals sourcing custom lighting, tiles, surfaces, and spatial elements made from post-consumer or post-construction glass for hospitality, retail, and office interiors. This segment positions recycled glass as a material solution within professional design and construction workflows.

5. Space and Equipment

Space and equipment: A modest 60 m² unit does the job. Up front, a sorting and washing zone with deep sinks, label-soak tubs, and colour crates. Along one wall: a bottle-cutting station (jig saws or wet tile saw), two bench-top diamond-wheel polishers, and a flame-polish torch. A small booth houses a sandblaster / CO₂ laser for client logos. Add a drill press with diamond bits, drying racks, and a packing table. Standard 230 V sockets, good LED lighting, and a wet-vac filtration box keep the shop safe and clean - no furnace needed unless you later add hot-work.

Technological process: Wash and de-label each client's bottles, cut off the neck with a jig or wet saw, grind the rim smooth on diamond wheels, then flame-polish or acid-etch for the final finish. Add the customer's logo with a quick sand-blast or laser pass, drill a hole if the piece will become a lamp or dispenser, give everything a food-safe rinse and inspection, and pack the up-cycled items back into the same crates they arrived in, ready for immediate use or sale.

6. Distribution Channels

Most work moves through direct, local channels: arrange a weekly pickup-and-return loop with nearby bars, cafés, and distilleries; take bulk orders once clients see a sample set. Showcase before and after pieces on LinkedIn and tag hospitality groups so venue managers can enquire. List the service on green-procurement platforms that restaurants already use, and keep a small display shelf at local food-service suppliers where chefs buy linens and glassware. Finally, staff a stand at regional hospitality trade shows, pour tap water into logo-etched tumblers made from yesterday's event bottles and hand them straight to passing buyers.

7. Cost structure

Initial Costs

Cost item	€ estimate	Comments
Cold-work machines	~9 000	2× bench-top diamond polishers, wet tile saw + bottle jig, drill press, compact sand-blast cabinet
CO ₂ laser etcher	~4 000	Small desktop unit for branding/logos
Benches, sinks & hand tools	~2 000	Workbenches, tubs for soaking, drying racks, and glass tools
Studio fit-out	~2 000	Lighting, splash guards, wet-vac filter, insurance
Total CAPEX	17 000	Core setup for B2B production

Monthly costs

Cost item	€ estimate	Comments
Rent & utilities	~300	
Detergents & consumables	~50	Cleaning agents, polish pads, filters
Packaging & return crates	~70	Durable crates, padding
Website & marketing	~30	Simple hosting, basic outreach
Total OPEX / month	450	Lean monthly operation

8. Revenue Streams

Income flows in several lanes at once: the studio charges a straightforward “per-piece” fee to wash, cut, polish, and logo-etch each bottle or jar; it runs a weekly subscription pickup plan that bills venues a flat rate for collecting and returning their transformed glassware; it sells higher-margin add-ons like lamp kits or soap-pump heads made from the same glass; and it offers short design consults-priced by the hour-for chefs and bar owners who want custom shapes or engraving layouts before placing an order.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon footprint levels

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this B2B cold-working studio model is 1.8 kg CO₂e per 1 kg of finished recycled-glass products. Most emissions originate from electricity consumption during washing, cutting, grinding, polishing, and surface finishing, while smaller contributions stem from transport logistics, water use, and wastewater handling.

Because the process relies entirely on post-consumer recycled glass and does not require primary glass melting, direct material-related emissions remain low; the overall footprint is driven mainly by equipment runtime, workshop scale, and the local electricity mix.

These figures represent average, indicative estimates based on typical small-to-medium B2B studio operations and may vary depending on machinery efficiency, production volume, and national energy sources.

For actors implementing this concept in practice, the calculator allows direct input of real operational data, enabling the generation of a project-specific carbon footprint reflecting actual production conditions.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, the B2B waste glass studio is positioned as a critical circular partner for the hospitality and architectural sectors, transforming local post-consumer glass into site-specific functional objects. This collaborative model is professionally experienced through localised studio consultations and technical showcases at design fairs, where the emphasis remains on the materiality of the cold-working process and the studio’s role in verifying closed-loop provenance. Digital documentation serves exclusively to archive the authorship of these bespoke commissions, illustrating how individual waste streams from hotels and restaurants are elevated into high-value, branded glassware and spatial elements.

HOME DÉCOR & INTERIOR DESIGN

3. Upcycling to Hybrid Glassware

Every day, wine and spirits bottles become shape-shifting design pieces - objects that flip from candle-holder to vase in one motion. The makers cut, polish, and precision-fuse reclaimed glass into seamless dual-purpose forms where symmetry and imperfection coexist. Each piece retains the bottle's original colour and texture, so no two are alike. The result is a contemporary heirloom that saves material, space, and energy while telling a quiet circular story at every table or windowsill.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. The main type of glass used for recycling is soda-lime glass, which can be sourced from hospitality venues and beverage producers, clear, green, and amber bottles in consistent sizes. Reliable supply can be arranged through bar and restaurant collection loops or brewery take-back schemes.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

Production starts with cutting: each bottle is scored and separated on a diamond wet saw, then the rim is ground and flame-polished to achieve a soft, tactile edge. Segments are aligned and joined using a laser welder, which delivers pinpoint fusing without adhesives, creating an invisible seam. Optionally, for an even more secure finish, pieces can be annealed at 510 °C for one hour to relieve stress, then cleaned and inspected under polarised light. The final QC includes a drop-test onto cork mats and dishwasher-cycle simulation to ensure longevity and safety.

3. Value Propositions

The studio delivers a single object that performs two functions, appealing to customers who value modular design and story-driven craftsmanship. Every piece embodies true circularity, transforming post-consumer glass without re-melting, saving up to around 700 °C worth of furnace energy per item. The design language follows trends favouring sculptural, sustainable objects as signature décor. Laser-welded seams last longer than epoxy joins, guaranteeing dishwasher-safe durability and minimal returns. For clients, each hybrid piece is both a conversation starter and a visual token of low-impact luxury.

4. Customer Segments

- Boutique interior designers seeking versatile centrepieces adaptable to seasonal styling.
- Eco homeware retailers demanding verified recycled content and small-batch uniqueness.
- Corporate gifting agencies offering custom-engraved twin sets for CSR-driven campaigns.
- Hotels, restaurants, and bars wanting décor that transitions from daytime vase to evening candlelight.

- DIY craft enthusiasts drawn to limited “maker’s kits” for home workshops or gift experiences.

5. Space and Equipment

A 70 m² studio could provide sufficient space: 25 m² for cold working, 15 m² for the laser room with fume extraction, 20 m² for finishing and packing, and 10 m² for a small showroom. Essential equipment might include an Orion LZR 80 Pro laser welder, a wet diamond saw, bench polishers, and a 45 L annealing kiln (max 650 °C). A UV-curing station, fume hood, and Category III PPE would complete the setup. Modular planning could allow the addition of a second laser or a larger kiln without relocation. Closed-loop water systems and energy metering could help monitor resources and qualify the workshop for the REPowerEU or LIFE programme efficiency support.

6. Distribution Channels

Sales could begin through B2B channels, with sample boxes couriered to interior designers and hospitality clients to encourage small-batch orders. A secondary channel could include an e-commerce shop offering EU-wide delivery in eco-friendly packaging. Each item could feature a QR-coded tag tracing its origin and production details to enhance transparency. Community “Glass Swap” pop-ups could invite locals to exchange empties for discounts, strengthening both supply and outreach. Presence at trade fairs and design markets could demonstrate the dual-function switch live, attracting press and partnerships.

7. Cost Structure

Initial Costs		
Cost item	€ estimate	Comments
Benchtop YAG laser welder	~15 000	Orion LZR 80 Pro list price
Diamond wet saw + blades	~600	Standard bottle-cutting setup
Annealing kiln 45 L	~3 000	Max 650 °C, single-phase
UV-curing station & resins	~400	For non-structural sealing
Safety PPE & fume hood	~800	Category III compliant
Workbenches & jigs	~1 000	Adjustable steel frames
CAD-CAM software licences	~700	Rhino + plugin, year 1
Storage bins & racking	~500	Modular crates
Total CAPEX	22 000	Core setup for small-scale production

Monthly Costs

Cost item	€/month	Comments
Studio rent & utilities	~1 100	70 m ² light-industrial space
Electricity	~450	Laser and kiln, night tariff
Consumables (blades, resin, argon)	~250	Variable with output
Part-time artisan (0.5 FTE)	~1 000	Living-wage contract
Marketing & web hosting	~250	Social ads, SEO
Insurance & compliance	~150	Liability and device cover
Shipping & packaging	~200	EU average
Contingency (5 %)	~175	Unforeseen expenses
Total OPEX / month	3 575	Lean, scalable operation

8. Revenue Streams

- Retail hybrid vase/candle pieces could retail at €45–60 each.
- Custom colour or logo runs might start at 30 pieces per batch at €70 each for design clients.
- Corporate twin gift sets could sell at around €90 retail, with higher demand in Q4.
- Workshops and “maker kits” could be offered at €65 per person, providing steady off-season income.
- Studio collaborations could feature bottles from a single venue, creating branded décor collections.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this hybrid upcycling process is around 2.4 kg CO₂e per 1kg of finished product. Most emissions originate from electricity consumption during cold-working (cutting, grinding, polishing) and precision joining, as well as short annealing cycles used to relieve internal stress after laser fusing. Transport and auxiliary materials contribute only marginally. Because the process relies entirely on post-consumer bottles and avoids full glass remelting, direct material-related emissions remain low; the overall footprint is primarily driven by equipment runtime, batch size, and the local electricity mix. These figures represent average, indicative estimates for small-studio production conditions and may vary depending on workshop efficiency, kiln usage, and production scale. For practitioners implementing this concept in real settings, the ArtGlass Carbon Footprint Calculator enables direct input of operational data, allowing the footprint to be recalculated based on actual energy use, volumes, and local conditions.

11. Marketing and Promotion

Following the strategic framework defined in the introduction, these hybrid glassware objects are positioned as versatile, dual-purpose functional sculptures for the boutique hospitality and interior design sectors. The collection is professionally experienced through curated displays at design fairs and material libraries, where the physical duality of the forms, transitioning from vessel to light-source, highlights the precision-fused authorship and energy-efficient cold-working techniques. Digital documentation could be utilised strictly to provide transparency regarding the material's post-consumer provenance, ensuring that each small-batch series is recognised as a high-value contemporary heirloom within professional circular economy networks.

4. “Let us choose for you” Large Pieces – Demijohns and Jars

“Let us choose for you” is a curated collection of large demijohns and glass jars selected for their size, form, and material quality, and prepared for immediate use in interior and event settings. Each piece is cleaned, inspected, and, where appropriate, lightly finished to ensure durability and visual consistency, while preserving the original character of the glass. The concept offers ready-to-use vessels that function as vases, containers, or standalone objects, allowing circular reuse to be expressed through careful selection and preparation rather than intensive processing.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. For this product, because of very little processing, any type of glass could potentially work, and in the following list, you can find potential sources.

- Demijohns - Thick-wall soda-lime glass, usually light green or amber. Turn up in old wine cellars, olive oil mills, cider farms, and rural household clear-outs. Establishing a partnership with small vineyards as a potential source.
- Large jars - Clear or faint-blue jars from canning factories. Try to cooperate with factories so you can have oversized or misprinted jars.
- Local flea market - set up a drop-and-cash desk at weekend flea markets to build community supply and brand awareness.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

Start with a good scrub, warm water, dish soap, and a long bottle brush, until the glass is clean. Once it is dry, give the jar a makeover: two light coats of matte black or white spray paint, then a quick clear coat so the colour will not chip. If you want a pattern, stick on masking tape in stripes or shapes and spray again, or dab on etching cream with a stencil. Turning one into a lamp is just as easy: under running water, drill a small hole near the bottom with a diamond bit, thread an LED cord through, and pop the bulb in the neck. For a beachy vibe, wind some jute rope around the shoulder with a hot-glue gun. Finish off with felt pads under the base so it does not scratch the table.

3. Value Propositions

Old demijohns and big jars offer instant vintage charm with no work for the buyer: each piece is already cleaned, sometimes painted in easy-match black or white, and ready to use as a vase, lantern, or standalone accent. Because the glass is reused, the carbon footprint is low, and the item carries a clear “upcycled” story that eco-minded customers can share. Sizes are generous and one-of-a-kind, yet the

colour palette stays consistent, so decorators save time hunting for matching statement pieces and pay far less than for new designer décor of the same scale.

4. Customer Segments

- Home decor lovers – They appreciate ingenuity and vintage style. At this price point, it is much more competitive than designer decor.
- Interior designers – Could use jars and demijohns for props in the setting, as well as eye-catching, unique pieces.
- Event planners – From corporate parties to weddings, jars could be used for decoration.
- Florists – Demijohns and jars make up a unique vase for flowers.
- Hotels, cafes, restaurants - Use as rustic centrepieces or to hold dried herbs, shells, or fairy lights.

5. Space and Equipment

A small 40 m² garage-style space is enough. Set up one corner with a deep sink, long bottle brushes, and a pressure washer for label-soak and cleaning; add draining racks so jars air-dry overnight. Next to it, keep a simple spray booth (or just a well-ventilated area with a drop cloth) for two-coat painting and clear sealing. A fold-out table holds basic tools: a hot-glue gun and jute rope, a battery drill with a diamond bit for lamp holes, masking tape, sandpaper, and stencil supplies. Storage shelves or pallets stack the clean jars three high, and a packing bench with recycled cardboard and bubble wrap readies orders for shipping. The whole process is straightforward: inspect for cracks, soak and scrub, rinse and dry, paint or decorate, wrap rope if needed, let the finish cure, then pack and ship.

6. Distribution Channels

Sell the jars through a small web-shop and Instagram/Facebook Shop for direct, high-margin sales; list the best pieces on vintage and craft platforms like Etsy and Vinted to reach décor hunters; offer bulk sets to florists, wedding planners, and event-hire companies via email and local trade groups; and place a few showcase pieces in nearby concept stores or zero-waste shops on consignment. Pop-up at weekend flea markets and design fairs to meet DIY fans in person, and let interior stylists borrow samples for photo shoots, because it can attract new clients.

7. Cost Structure

Initial Costs

Cost item	€ estimate	Comments
100 demijohns & jars	~600	Bought second-hand, €6 each
Tools & equipment (pressure washer, brushes, drill, glue gun, spray booth kit)	~1 200	Basic processing & finishing tools
First stock of materials (paints, sealers, rope, stencils, cleaners, packing)	~700	Consumables for first production runs
Workshop furniture (shelving & fold-out packing table)	~500	Storage & workspace setup
Van hire/transport fuel for collection runs (setup)	~400	Covers initial setup logistics
Working capital buffer	~3 000	Extra inventory, marketplace fees, ads
Total CAPEX	6 500 – 7 000	

Monthly Costs

Cost item	€ estimate	Comments
Workshop rent & utilities	~400	40 m ² workspace
Electricity & water	~100	Basic equipment use
Van hire / fuel	~400	Monthly bottle collection runs
Consumables restock (paints, sealers, rope, packing)	~200 – 300	Ongoing materials
Marketing & online ads	~200 – 400	Marketplace fees & promotions
Total OPEX / month	1 300 – 1 600	

8. Revenue Streams

- Sell individual jars or demijohns at retail-online, in pop-up stalls, or through local shops.
- Supply decorators, florists, and event planners with bulk batches at a wholesale rate.
- Rent the cleaned jars for weddings, photo shoots, and other short events, taking a security deposit.
- Charge an extra fee for custom finishes such as special paint colours, stencil designs, or rope wraps.
- Offer a lamp-conversion upgrade, drilling the glass and adding the cord-set and LED bulb.

- Run workshops where people learn to clean, paint, and style their own jars.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this low-intensity upcycling model is 1.42 kg CO₂e per 1 kg of finished product, based on representative input assumptions for small-studio production. Most emissions arise from indirect sources, primarily transport fuel for collection routes and electricity used for cleaning, drying, and light surface finishing. At the same time, smaller contributions stem from auxiliary materials such as paint, sealers, and packaging.

Because the process avoids remelting and any high-temperature transformation, direct material-related emissions remain low; the overall footprint is driven mainly by logistics intensity, batch size, and the local electricity mix.

These values represent estimates rather than exact measurements and may vary depending on collection distances, finishing choices, production scale, and national electricity sources.

For practitioners implementing this concept in real settings, the ArtGlass Carbon Footprint Calculator enables direct input of operational data, allowing the footprint to be recalculated using actual fuel consumption, electricity mix, and production volumes.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, these monolithic upcycled demijohns and vessels are positioned as sculptural focal points for interior design and event scenography. The collection is professionally experienced through curated studio showcases and collaborative placements in design concept stores, where the emphasis remains on the significant physical scale and the artisanal refinement of the reclaimed glass surfaces. Digital documentation focuses on the authorship of the restorative process and the material's regenerative provenance, situating these large-scale objects as essential, low-impact elements within professional decorative and hospitality portfolios.

5. Upcycled Glass Hydro Gardens

This concept intentionally uses low-complexity craft techniques to demonstrate a low-barrier circular production model, suitable for inclusive employment, women-led craft clusters, and community-based regenerative economies.

Hydro Garden turns ordinary glass bottles into elegant, self-watering planters for kitchens, balconies and desks. Each planter is cut and finished so the top holds the plant and the base stores water; a cotton wick feeds moisture to the roots without soil or mess. We work with bottles collected from local cafés and households, keep energy use low by avoiding remelting, and finish edges to a safe, smooth line that invites touch. Clear glass makes water levels and root growth visible, encouraging successful first harvests and a simple daily ritual of topping up and trimming herbs.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. Since the product requires minimal processing, almost all types of glass could be used. The following list provides a quick overview of possible sources.

- Post-consumer bottles: locally gathered wine and spirits bottles-good wall thickness for cutting, clear enough to show water/roots.
- Household & hospitality drives: households, cafés, restaurants, and bars set aside bottles via small collection drives and take-back boxes.
- Municipal/NGO pickups: steady flow of clear, green, and amber glass from bring-banks and local NGOs.
- Small containers: tonic, vinegar, etc., repurposed as mini planters or bundled herb sets.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

Turning a bottle into a hydroponic planter is a paced, hands-on sequence rather than a single cut. Bottles are rinsed, soaked to remove labels and glue, then washed with a mild, biodegradable detergent. Each one is inspected for hairline cracks before scoring on a simple jig. Separation is done with a diamond wheel or by controlled hot-cold shock, depending on the glass. Cut edges are worked wet through fine grits (typically P400–P1200) to remove chips, then bevelled and either flame-polished or buffed to a smooth, safe lip. PPE, clamps and splash control stay on the bench throughout, and every piece gets a fingertip test around the rim before moving on.

The top becomes the planter; the base is the water reservoir. A cotton wick links the two, so moisture rises by capillary action, and roots never sit in stagnant water. Clear glass makes levels and root growth easy to read, which helps new growers adjust light and topping-up routines. Makers are trained in the basics of oxygenation, nutrient mix and light exposure, so form and function stay aligned. Each planter

leaves the bench only after leak, wick-flow and finish checks, giving a clean object that works reliably in everyday use.

3. Value Propositions

For customers, this is an easy, tidy way to grow herbs where space is tight. The self-watering wick keeps plants alive between top-ups, and the clear glass lets you see water levels at a glance, no guesswork, no soil on the counter. It looks good on a windowsill and makes a straightforward gift that's useful the moment it's unboxed.

For the environment, we keep good glass in use rather than sending it to a furnace. Local collection and light tooling mean low transport and low energy, and our packaging sticks to recycled paper and card. Each batch includes a simple count of bottles diverted so the impact is visible, not abstract.

For makers and partners, the process is safe, teachable and repeatable. Cafés, bars and households can see their bottles come back as planters, which builds pride and loyalty. Every piece can be shipped with a short origin note, sometimes a familiar wine bottle from a celebration, now reborn as a basil pot in someone's kitchen, so the story travels with the object.

4. Customer Segments

- Urban renters and young professionals choose the planter as a compact way to add greenery to small flats. It's tidy, low-maintenance and looks good on a windowsill or shelf, so it fits the pace of city living without adding chores.
- Style-driven home décor shoppers like that it pairs clean design with a credible reuse story.
- Eco-aware families and schools use it as a hands-on teaching tool. Children can watch roots develop, learn simple topping-up routines and see how local bottles are kept in circulation rather than thrown away.
- Hospitality venues - cafés, restaurants, boutique hotels and wellness retreats - adopt the planters for fresh bar herbs, table accents and lobby displays. The product signals care for materials and gives guests a talking point that aligns with sustainable dining and wellbeing.
- The gift market is strong: the planter packs neatly, works straight out of the box and carries a short origin note. Corporate clients use it for onboarding and seasonal gifts; local workshops turn interest into community engagement, letting participants make and take home their own piece.

5. Space and Equipment

Upcycled Hydro Gardens run comfortably in a small workshop, spare room or community makerspace. A clear, ventilated area of 10–20 m² is enough when laid out with an intake shelf, a “wet” bench for cutting and grinding, a “dry” bench for assembly, and a small packing table. Natural light helps with inspection; task lights cover the rest. The core kit is simple: a bottle-cutting jig or pro glass cutter, a bench grinder or wet-sanding setup for edge finishing, and basic PPE-safety glasses, cut-resistant gloves and a dust mask for any dry work.

On the materials side, keep a tidy stock of clay pebbles, cotton wicking cord, nutrient solution and seeds (basil, mint, thyme work well). Packaging stays in line with the concept: recycled paper sleeves, cardboard boxes and biodegradable fillers. Wet grinding keeps dust down and the workspace clean; offcuts and labels go into separate tubs for easy disposal or reuse.

The process scales in small, affordable steps. Adding a second grinder or an extra bench lifts throughput without changing address, and tasks can be batched, cut, finished, assembled, and packed to smooth flow. As a baseline, one maker can produce up to 60 planters per month under normal conditions, with output rising as jigs, jigs and layout are refined. The result is a low-overhead set-up that turns local glass into consistent, sale-ready pieces.

6. Distribution Channels

Sales could take place both online and locally, reaching different audiences while reinforcing the reuse narrative.

- Online, platforms such as Etsy or an Instagram shop could showcase the range through short before-and-after clips demonstrating the cutting, grinding, and planting process. Listings on eco-design marketplaces could help reach customers already seeking sustainable, reuse-led products.
- Locally, eco-lifestyle boutiques, florists, and concept stores could stock curated sets chosen to suit their interior styles and price points. Participation in seasonal gift fairs or wellness events could further raise visibility during peak gifting periods when customers are looking for meaningful, low-impact presents.
- In the hospitality sector, cafés and restaurants could use branded planters for bar herbs or table décor-pieces that both serve a function and tell a clear reuse story to guests.
- Finally, hands-on workshops could complete the circle, allowing participants to make their own planters, take them home, and share the results, generating organic word-of-mouth promotion and new collection partnerships.

7. Cost Structure

Start-up costs stay modest. A small kit of cutting and polishing tools, seeds and hydro materials, recycled packaging and basic digital setup totals roughly €500–€650. Because bottles arrive as donated waste, the purchase cost of new glass is avoided. Energy use is low as there is minimal processing, with most work happening with hand tools and a bench grinder. Labour is the primary driver of unit cost and reflects the time needed for safe cutting, finishing and assembly. Against conventional decorative planters made from new stock, our material spend is significantly lower while finish quality remains high. This balance of low capital, low energy, and time invested shows that it keeps the product viable at a small scale and allows output to grow in step with demand.

Initial Costs

Cost item	€ estimate	Comments
Bottle cutting & finishing kit	~200–350	core tools
Workbench & shelving	~150–300	small footprint
Hydroponic starter set	~120–200	nutrients & media
Basic packaging setup	~100–180	recycled materials
Brand & website (year 1)	~80–150	optional
Contingency (≈10%)	~80–150	Buffer
Total CAPEX	730 – 1 330	

Monthly Costs

Cost item	€ estimate	Comments
Materials & packaging	80–160	variable with volume
Workspace rent (shared)	200–400	adjust by location
Utilities	20–40	low usage
Labour	400–800	part-time/artisan
Marketing & web tools	60–180	ads + SaaS
Insurance & misc.	30–70	basic cover
Total OPEX / month	790 – 1 650	

8. Revenue Streams

Income comes from a few clear lanes, which keeps cash flow spread rather than hinging on one buyer type. Retail is the anchor: single planters sell at €20–€30, and two- or three-piece gift sets at €40–€50. Custom runs-engraved logos, themed colours or limited bottles sit higher, up to about €60 per unit. Workshops add a steady trickle at €15–€25 per person and often convert into follow-on sales. B2B orders from eco-restaurants and design studios provide the most predictable volume and help smooth quieter retail weeks. With a modest output of 50–80 units a month, early revenues land around €1,000–€2,000, with room to grow through better online reach, repeat hospitality placements and seasonal gifting peaks.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this low-intensity hydroponic upcycling process is 1.44 kg CO₂e per 1 kg of finished Upcycled Glass Hydro Garden planters. Most emissions arise from indirect sources-primarily electricity used for cutting, wet grinding, and edge finishing, as well as limited water use during washing and cleaning-while direct material-related emissions remain low due to the exclusive use of post-consumer glass and the absence of remelting.

Additional minor contributions stem from auxiliary materials such as cotton wicks, clay pebbles, seeds, and recycled packaging. Because the process relies on cold-working techniques and local glass collection, overall energy demand stays modest. It is primarily influenced by equipment efficiency, batch size, and the local electricity mix.

These values represent indicative estimates for small-scale workshop conditions and may vary depending on production volume, tooling choices, and national energy sources. For practitioners implementing this concept in real settings, the ArtGlass Carbon Footprint Calculator enables direct input of operational data, allowing the footprint to be recalculated based on actual electricity use, material inputs, and output levels.

11. Marketing and Promotion

Following the strategic framework defined in the introduction, these upcycled hydro gardens are positioned as functional lifestyle objects that bridge the gap between community-led regenerative craft and urban interior design. The series is professionally experienced through botanical installations in hospitality venues and hands-on studio workshops, where the tactile quality of the cold-worked glass and the visible root-growth function emphasise the transparency of the circular process. Authorship is documented through selective digital records of the local bottle-harvesting sequences, situating these self-watering planters within professional networks as credible, low-energy alternatives to mass-produced horticultural products.

6. Add Value to Upcycled Glass with Old and Vintage Pieces

This concept increases the value of simple upcycled glass objects by curating them into thoughtful sets with old, vintage, or demodé pieces. Instead of treating upcycled items as standalone products, they are paired with complementary objects found at flea markets, antique shops, or through local reuse streams, such as ceramic vases, wooden trays, or vintage glassware. The value of each set lies in the designer's selection and composition, where contrast between new and old, simple and character-rich, creates a complete and desirable product. Through this mix-and-match approach, low-value upcycled glass is introduced into everyday use as part of coherent, functional, and aesthetically balanced collections.

1. Glass Types and Sources

As detailed in the introductory section, the Initiative works with multiple glass streams; this concept applies those principles through the combination of locally sourced upcycled and vintage materials. This concept combines upcycled soda-lime glass from cafés, bars, and municipal depots with vintage and antique glassware sourced through estate sales, charity shops, and auction houses. Local take-back agreements can ensure a consistent flow of colour-sorted bottles and jar bases, while partnerships with vintage dealers can provide unique pieces graded by quality and provenance. Each item is verified for stability and labelled “decorative use only” when necessary. Complementary reclaimed materials, such as oak, brass, and ceramics from certified salvage yards, complete the circular design narrative.

2. Processing Methods

Refer to the Processing Methods – introductory section for complete guidance on cold/hot techniques, safety, and QA. For this concept, prioritise restoration, reversible assembly, and digital traceability over reshaping. Select intact vintage/antique pieces and prep with low-impact cleaning (ultrasonic baths, cerium-oxide micro-polish, pH-neutral wax sealing) to stabilise patina and prevent degradation, avoid aggressive polishing or repainting that erases historical character.

Plan pairings between restored items and upcycled glass by colour tone, transparency, and texture. Keep mounting fully reversible, use museum-grade gel, clip-rings, or silicone pads rather than permanent adhesives and ensure joints are stable yet easy to disassemble for future repair or recycling.

Implement provenance and traceability: apply discreet laser-etched batch codes, and add QR or NFC tags to packaging to record material origin, artisan information, and carbon-impact data. This digital layer links each object to its sustainability story, reinforcing authenticity and circular value.

3. Value proposition

This concept elevates simple upcycled glass objects by pairing them with restored vintage and demodé pieces, transforming low-value items into curated, collectable sets. The contrast between clean, contemporary forms and aged materials with visible patina increases both aesthetic appeal and perceived value, while the limited availability of vintage elements adds uniqueness and scarcity.

The approach responds to growing demand for sustainable and individual home décor, particularly among buyers who value authenticity over mass production. Each set is defined by design selection rather than heavy processing, allowing modular combinations that keep collections flexible and inventory low. By combining reuse and restoration, the model extends material lifespans, preserves craft heritage, and creates market-ready products that are visually coherent, giftable, and commercially viable without high production costs.

4. Customer Segments

Home-décor enthusiasts balance aesthetics with ethics and want statement pieces that tell a visible circular story. Curated mix-and-match sets deliver instant styling without design anxiety. QR-coded provenance adds transparency and emotional value. Concept stores and lifestyle boutiques focused on slow living seek novelty and exclusivity without large MOQs or opaque supply chains. Modular pairings keep assortments fresh. QR storytelling supports their transparency ethos. In-store demos such as bottle-cutting and styling help build community.

Interior stylists, set decorators, and Airbnb hosts need portable, photogenic items that tolerate frequent handling. Lightweight upcycled glass on sturdy vintage bases suits varied aesthetics. Rental or subscription packages keep inventories refreshed within tight budgets. Vintage collectors want relevance without losing authenticity. Pairing restored items with upcycled elements respects provenance while modernising display. Limited editions and clear restoration information stimulate collector interest and trust.

Corporate gifting teams seek credible ESG gifts. Curated, provenance-rich sets with carbon-impact notes and optional co-branding provide a premium, shippable alternative to generic promotional items.

5. Space and Equipment

- Glass workshop (20–30 m²): cutter, diamond grinder, polisher, small kiln (optional).
- Curation studio (15 m²): cleaning basin, gentle abrasives, photo-station for cataloguing.
- Storage: adjustable shelving for fragile vintage stock and finished sets.

*A 25 m² glass bay houses a bottle cutter, a diamond grinder and a 60 L kiln; negative-pressure vents ensure dust control. A 15 m² curation studio pairs a stainless steel cleaning sink with a daylight-box photography corner. Modular shelving (with a 4 m ceiling height) protects fragile vintage stock, and every workstation rolls on castors, allowing the layout to scale for pop-up events or a future 100 m² hub.

6. Distribution Channels

The primary channel is the e-commerce site with a *build-your-own set* configurator. Shoppers choose an upcycled base (e.g., a cobalt bottle vase), preview restored vintage pairings via real-time mock-ups for scale and colour harmony, and see an embedded carbon-savings counter that quantifies impact.

To boost offline visibility, the brand runs pop-up installations at vintage fairs, design weeks, and flea markets. Stalls double as workshops with on-site bottle cutting; customers can trade family heirlooms for bundle discounts, an engaging format that drives foot traffic, media interest, and urgency at low cost.

Eco-boutiques and museum shops provide a steady retail presence. These partners value traceability and distinctive merchandising; mix-and-match sets carry QR provenance. Museums add cultural credibility by pairing products with educational notes.

For B2B, wholesale staging kits serve interior design studios. Pre-assorted kits save time on projects and can be returned for credit, enabling reuse across multiple high-profile interiors.

Finally, scarcity marketing via quarterly newsletter drops releases limited palettes to subscribers first, fostering collector behaviour and repeat site visits.

All channels reinforce one another: pop-ups grow the mailing list; newsletter exclusives fuel social content; retail partners lend cultural validation; and the website captures global sales and data.

7. Cost Structure

Initial Costs

Cost item	€ estimate	Comments
Bottle wet-saw & diamond grinder	~1 800	Mid-range, splash-guarded
Bench-top kiln (40 × 40 cm)	~1 200	3 kW, single-phase
20 W fibre laser	~3 500	Shared across SKUs
Daylight photo-box & DSLR	~650	Essential for e-commerce
Modular shelving & workbenches	~900	Powder-coated steel, mobile
Total CAPEX	8 050	

Monthly Costs

Cost item	€ estimate	Comments
Vintage sourcing outlay	~450	Estate lots & charity picks
Maker/curator labour	~2 400	Two part-time artisans
Utilities (kiln, lighting)	~160	Off-peak tariff
Packaging & story cards	~120	Recycled kraft + NFC
Digital marketing	~200	Ads & newsletter platform
Total OPEX / month	3 330	

8. Revenue Streams

The mix-and-match model combines direct product sales with project-based and experience-driven income. Core revenue is generated through curated set sales, offered as ready-made or limited collections that rotate based on available vintage materials. Additional income comes from made-to-order curation for events, hospitality, and corporate gifting, where each set is assembled around a specific theme or spatial context. Workshops focused on creating vintage-upcycled centrepieces provide an additional revenue stream while strengthening customer engagement and design literacy. A limited subscription or seasonal release model can further support recurring income and improve cash-flow stability without increasing material throughput.

9. Social impact & gender equality

See the introduction for the complete overview.

This concept supports inclusive participation in circular craft and design by creating accessible roles across sourcing, restoration, and glass processing, combined with opportunities for skills development and creative leadership. Collaboration with local partners strengthens small circular economies and supports fair visibility for craft practitioners. Training and mentorship pathways enable long-term professional growth, while transparent working practices promote equity, fair pay, and sustainable livelihoods within the value chain.

10. Carbon Footprint Level

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this curated upcycling and restoration process is 2.36 kg CO₂e per 1 kg of finished mix-and-match sets combining upcycled glass and vintage pieces. Most emissions arise from indirect sources-primarily electricity used for cutting, grinding, light polishing, cleaning, and documentation activities-while direct material-related

emissions remain low because both the glass and the vintage components are reused rather than newly manufactured.

Additional minor contributions stem from low-impact restoration materials, reversible mounting elements, packaging, and limited transport associated with sourcing vintage items. Because the process prioritises cold-working, restoration, and reversible assembly over reshaping or melting, overall energy demand remains moderate and largely dependent on workshop efficiency, batching practices, and the local electricity mix.

These values represent indicative estimates for small-scale studio conditions and may vary depending on sourcing distances, restoration intensity, and production volume. For practitioners implementing this concept in real settings, the ArtGlass Carbon Footprint Calculator allows direct input of operational data, enabling recalculation of the footprint based on actual electricity use, material inputs, and output levels.

11. Marketing & Promotion

In alignment with the strategic framework defined in the introduction, these curated assemblages are positioned as high-value collectables that bridge the gap between contemporary upcycled glass and historical material culture. The series is professionally experienced through curated installations at design fairs and boutique concept stores, where the juxtaposition of artisanal glass-cutting with the patina of vintage brass, silver, or wood emphasises a sophisticated, non-industrial authorship. Digital documentation serves to archive the specific provenance of each hybrid set, providing a transparent narrative of restoration and reuse that situates these objects as essential, narrative-rich assets for interior stylists and corporate ESG portfolios.

7. Eco-conscious Glow-In-The-Dark Glass Mosaics for Children's Room

Phosphorescent mosaics made from upcycled glass tiles absorb daylight and emit a soft, ambient glow after dark, transforming surfaces into quiet sources of light and atmosphere. Designed as wall artworks or movable panels, these mosaics create gentle spatial orientation and visual comfort through the interplay of material and light, allowing them to integrate naturally into diverse interior contexts. Each piece can be developed as a fully customised composition or as part of a curated series, using post-consumer or post-industrial cullet combined with eco-certified phosphorescent pigments based on strontium aluminate and bio-based binders. This controlled material palette enables variation in colour, glow intensity, and texture, while maintaining consistency in safety, durability, and tactile quality. The same material and surface qualities can be translated across scales, extending the concept from architectural surfaces to smaller design objects that carry the same visual identity and circular logic.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. The main type of glass used for this product is soda-lime glass, which can be sourced from:

- Clear bottle cullet - Melts easily and takes phosphorescent pigment well. Partnership with local bars and restaurants is a potential source.
- Float glass – Excellent for smooth tiles. Window installers could let you have their scrap sheet.
- Lamp and light-bulb reject glass - Very clear and lead-free; good for tiny decorative dots. Contact local lighting factories and ask for misfit bulbs

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

For this concept, waste glass is transformed into phosphorescent mosaic elements through a controlled craft-based process that combines cold-working, kiln-fusing, and surface finishing. Post-consumer or post-industrial cullet is carefully cleaned, size-selected, and combined with eco-certified (non-toxic) phosphorescent pigments based on strontium aluminate, ensuring long-lasting glow without the use of toxic additives. The glass is fused in small-format kiln firings to create stable, light-absorbing tiles, then slowly annealed to prevent internal stress and cracking.

Once cooled, tiles are cut, shaped, and finished by hand, with edges smoothed and surfaces refined to ensure safe handling and suitability for interior use, particularly in children's spaces. Final assembly into mosaics is carried out using low-emission, bio-based adhesives and grouts, with each panel or artwork produced as a unique composition or as part of a limited series. The process emphasises

material safety, durability, and tactile quality, while preserving the visual softness and gentle glow that define the concept.

3. Value Propositions

Glow-in-the-dark glass mosaics turn a wall into daytime art and a soft night-light in one, giving kids a friendly glow that helps them feel safe after lights-out. Each tile is handmade from recycled glass and non-toxic, strontium-based pigment, so parents and designers get a fun feature piece with a clean eco story. Designs can be anything-names, animals, or abstract patterns-and colours stay bright in daylight while storing energy to shine for hours in the dark, all without wiring or extra power.

4. Customer Segments

- Parents of young children want a fun, gentle night-glow that also looks stylish in daylight, and they care about non-toxic, recycled materials for a safe bedroom.
- Interior designers for family homes – need eye-catching, custom wall art or moving panels that tick both “eco” and “playful” boxes when presented to clients.
- Children’s play spaces or educational interiors- install statement pieces to draw attention and tell an “up-cycled, safe for kids” story that matches their brand.

5. Space and Equipment

A spare-room-sized workshop, about 20 m²-covers everything. One sturdy table holds bottle-breaking boxes, sieves, and safety gear (gloves, goggles, dust mask). Next to it sits a small, programmable hobby kiln (inside chamber ≈ 30 × 30 cm) on a heat-proof stand, with a shelf for firing moulds and thin float-glass sheets. Add a bench with a hand glass-cutter, scoring wheel, a basic grinder or wet-sanding station, and a rack for drying tiles. Storage shelves keep buckets of clean cullet, strontium-aluminate glow powder in sealed jars, bio-epoxy, and light-coloured eco grout. Standard 230 V power and a simple extractor fan for kiln fumes are enough; no special plumbing is needed-just a plastic tub for wet sanding.

The workflow is straightforward: smash and rinse bottles, sieve to the chosen grain, weigh and stir in glow powder, spread the mix in shallow ceramic molds (or between two thin glass sheets), then fire to about 780 °C and anneal. After cooling, score the slab into squares, snap, and smooth the edges. Brush on a thin epoxy-glow topcoat if extra brightness is wanted, let it cure, and store the finished tiles flat until they’re glued onto backing boards and grouted. One small kiln load yields dozens of 3 × 3 cm tiles in a single afternoon, making the process fast, compact, and perfectly suited to a home studio.

6. Distribution Channels

Distribution is organised through direct studio sales and project-based commissions, allowing mosaic panels and tiles to be produced in formats adapted to specific interior needs. Orders are typically placed through the studio’s online portfolio and professional contact channels, enabling clients to request customised dimensions, colour compositions, and glow intensities.

Finished works are also distributed through selected collaborations with interior designers, children’s furniture studios, and design-oriented retailers, where sample panels support specification and ordering. Smaller objects derived from the same production process are placed in curated design and museum shops, ensuring controlled distribution aligned with the concept’s emphasis on safety, durability, and circular value.

7. Cost Structure

Initial Costs

Cost item	€ Estimate	Comments
Small programmable kiln	~1 500	Compact model for tiles & décor
Hand tools (glass-cutter, scoring wheel, grinder, sieves, safety gear)	~600	Essential starter kit
Moulds, firing shelves & workbench	~400	For shaping & firing pieces
Starter materials (glow powder, bio-epoxy, eco grout, sanding supplies)	~500	First production batch
Website, product photos & first ads	~300	Branding & online launch
Total CAPEX	3 300	Lean setup under €5 000

Monthly Costs

Cost item	€ estimate	Comments
Rent & utilities (20 m ² garage/spare room)	~300	
Consumables restock	~120 – 200	Epoxy, grout, powders, safety items
Marketing & ads	~100 – 200	Online promotion
Total OPEX / month	520 – 700	Covers essentials for small-scale ops

8. Revenue Streams

Money comes in by selling finished glow panels and small items like mirrors or coasters online and at fairs, taking custom orders from parents and designers, offering educational craft kits for supervised use and licensing popular patterns to bigger tile or kids-decor brands.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this glow-in-the-dark recycled-glass mosaic process is 5.18 kg CO₂e per 1 kg of finished mosaic tiles/panels. Most emissions come from electricity used for kiln firing and annealing (hot-processing), while smaller contributions stem from cold-working (cutting/grinding), and auxiliary inputs such as strontium-aluminate pigment, bio-epoxy coating/binders, grout, and panel backing materials. Because the concept relies on recycled cullet rather than producing new primary glass, direct raw-material emissions remain comparatively low; however, the footprint is strongly driven by kiln efficiency, batch size (kiln load factor), and the local electricity mix.

These values represent indicative estimates for small-studio conditions and may vary depending on firing schedule, equipment type, and production volume. For practitioners implementing this concept in real settings, the ArtGlass Carbon Footprint Calculator allows direct input of operational data, enabling recalculation of the footprint based on actual electricity use, material inputs, and output levels.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, these phosphorescent glass mosaics are positioned as functional, energy-independent light elements for bespoke interiors, particularly those designed for children. The work is professionally experienced through curated exhibitions, darkened gallery displays, and material libraries, where emphasis is placed on the artisanal fusion of recycled glass cullet with non-toxic strontium aluminate pigments and the gentle, stored light they emit after dusk. Digital documentation supports transparency of making and authorship, presenting these light-storing surfaces as safe, durable, and material-based alternatives to conventional wired lighting in interior environments where comfort and care are central.

8. Slump, Cut-And-Fuse Local Waste Glass into Practical and Decorative Pieces

Discarded bottles and shattered window panes find a new life, where each shard is cut, kiln-fused and slumped into lustrous tiles, bowls and lighting panels. Harnessing the unique colours already present in post-consumer glass, the studio would need no added pigments; instead, controlled heat work teases out marbled patterns and jewel tones. However, it is essential to use compatible pieces of glass. Every finished piece, therefore, tells the story of waste diverted from landfill and transformed into durable, functional art.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. The main type of glass used for recycling is soda-lime glass, which can be sourced from:

- Municipal bring-banks
- Local glass glazing firms

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

After manual colour-sorting, shards are cold-worked: edges trimmed on a diamond saw, surfaces etched for texture, then washed to remove fines. Soda-lime pieces are slumped at 650–700 °C for plates and architectural tiles ([source](#)), while full fusing of layered work runs to 770–800 °C with a 20-minute soak ([source](#)). Mixed-glass runs (e.g. borosilicate inclusions in soda-lime backing) adopt a two-stage schedule: a 600 °C compatibility test tile, then a conservative 730 °C fuse. Each batch is annealed with a 100 °C h⁻¹ ramp to 510 °C, held 90 min, then cooled to avoid stress fractures. Operators wear category-III heat-resistant gloves, face shields and respirators when handling powdered frit. A final QC step employs polarised light to reveal hidden stress before items are signed off.

3. Value Propositions

For studios and producers, the model converts mixed local waste glass into functional and decorative products with higher added value, using simple processing methods and stable local supply streams.

For architects and clients, the resulting pieces offer clear provenance and material uniqueness, supporting the specification of authentic circular materials in interiors and small-scale architectural applications.

For artisans, the use of local waste glass reduces material costs and dependence on virgin inputs while enabling consistent small-batch production.

For municipalities, diverting glass from household waste streams lowers collection and handling costs while supporting local circular value chains.

4. Customer Segments

The primary customers are boutique interior architects and hospitality designers in the EU who specify recycled-glass surfaces and elements for projects seeking a strong local or regional narrative. Design-oriented homeware retailers form a second segment, targeting customers who associate visible upcycling with quality and ethical value.

Corporate CSR and sustainability departments use the model to commission branded objects and awards made from their own office glass waste, creating visible closed-loop examples for internal and external communication. Eco-tourism venues and cultural accommodations adopt custom glass panels and elements that function both as interior features and as storytelling tools during guest workshops and experiences.

5. Space and Equipment

A 75 m² ground-floor workshop in an industrial zone suffices: 40 m² hot room for two 90 × 60 cm kilns plus extraction, 20 m² cold-shop with saw, grinder and sand-blast cabinet, and 15 m² packing/showroom. Services, three-phase 32 A supply, and filtered water are standard. Scalability is modular: adding a third kiln grows output 40 % without new floor-space, while a containerised cold-shop can be craned on-site as orders scale.

6. Distribution Channels

The primary distribution channel is direct collaboration with designers and clients, supported by sample kits, site visits, and project-based contracts. Secondary sales take place through curated online channels using strong visual documentation and origin tagging to communicate material provenance. Visibility is further built through pop-up exhibitions, local design events, and open-studio days, combined with glass collection drives, turning suppliers into participants in the circular system. Across all channels, communication consistently highlights the material journey from waste to finished object, reinforcing the closed-loop narrative.

7. Cost Structure

The biggest CAPEX is an energy-efficient ceramic-fibre kiln; buying a late-model second-hand keeps embodied carbon and cash outlay down. Core hand tools and safety gear follow. OPEX centres on rent and electricity, though energy-use-monitoring and night-rate firing shave 15 % off the bill. One part-time artisan scales with sales, maintaining flexible costs.

Initial Costs

Cost item	€ estimate	Comments
90 × 60 cm programmable kiln (used)	~8 000	Includes controller, new elements
Secondary test kiln	~1 200	Rapid prototyping
Cold-shop tools (saw, grinder, sand-blast)	~2 000	Refurbished units
Ventilation & HEPA extraction	~1 500	
Workshop fit-out & insulation	~4 000	Leasehold improvements
Design software & licences (year 1)	~600	CorelDRAW, kiln-link
Safety PPE & fire-safety kit	~700	Initial sets
Glass storage bins & pallets	~500	Modular crates
Total CAPEX	18 500	

Monthly Costs

Cost item	€ estimate	Comments
Workshop rent & rates	~1 200	75 m ² , industrial zone
Electricity (night tariff)	~600	Average 1,000 kWh
Raw consumables (fibre paper, kiln-wash)	~300	Variable
Part-time artisan (0.5 FTE)	~1 000	Living-wage contract
Marketing & website hosting	~250	SEO, social ads
Insurance & compliance	~150	Public liability & kiln cover
Shipping & packaging	~200	EU/EFTA average
Contingency (5 %)	~185	Unexpected costs
Total OPEX / month	3 885	

8. Revenue Streams

Revenue is generated through wholesale and direct sales of glass tiles, panels, tableware, and decorative objects to designers, retailers, and hospitality clients. Custom colourways and bespoke elements provide higher-margin options for project-based work.

Additional income comes from commissioned services such as corporate waste-to-object programmes, branded awards, and small custom production runs, providing stable B2B cash flow that complements seasonal retail demand.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this process is 3.58 kg CO₂e per 1 kg of finished slumped and fused recycled-glass products. Most emissions arise from electricity consumption during kiln firing for slumping, fusing, and annealing cycles, while smaller contributions stem from cold-working operations such as cutting, grinding, washing, and surface finishing. Because the process relies entirely on locally sourced waste glass and avoids the production of new glass batch materials, direct material-related emissions remain low.

These values represent indicative estimates for small-scale studio production and may vary depending on kiln efficiency, firing schedules, batch density, and the carbon intensity of the local electricity mix. Even within these variations, the footprint remains substantially lower than that of conventional hot-glass production based on virgin raw materials.

The ArtGlass Carbon Footprint Calculator can be directly applied by practitioners implementing this idea, allowing studios to input their own energy use, production volumes, and transport distances to generate a tailored, project-specific carbon footprint.

11. Marketing and Promotion

Following the strategic framework defined in the introduction, these slumped and fused glass elements are positioned as high-performance material solutions for boutique architectural surfaces and bespoke interior objects. The collection is professionally experienced through localised material libraries and site visits, where architects and designers can engage with the physical samples to appreciate the marbled textures and jewel tones achieved through low-energy kiln work. Digital documentation is utilised to provide a transparent record of the studio's technical authorship and the specific provenance of the regional glass cullet, situating these tiles and panels as credible, low-carbon assets for professional hospitality fit-outs and corporate commissions.

9. Start a Collection Made of Waste Glass Found in the Local River, Lake, Forest...

Great glass products can be made from waste glass collected in more or less regular cleaning of rivers, forests, lakes... For example, the [Vjosa collection](#) by Joana Dhiamandi (Qelq Glass Hub, Tirana) is a decorative piece made by fusing the waste glass extracted from the Vjosa river. As a blend of elegant design and sustainability, this ambitious project is implemented in collaboration with the Commissioner for the Right to Information. The first collected bottles, fused into unique pieces, became gifts for the participants of one international conference in June 2024.

“The Vjosa project is a powerful example of the positive impact business can have”, explains Dhiamandi – “Qelq is not just an art centre but also a force for change and global awareness about environmental conservation”. While Dhiamandi is fusing the waste, other techniques could also be applied – from simple cutting and polishing, to decorating by etching, engraving, hand-painting, etc., to grinding and melting the waste so that it can be handblown into the brand-new pieces.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. The main type of glass used for the product is soda-lime glass, which can be sourced from:

- Bottle shards - perfect for small jewellery or inlay work once the dirt is scrubbed off.
- Window glass fragments - often dumped in forests or dragged downstream after storms;
- Coloured medicine or perfume bottles – rarer but prized for their deep blues and ambers; they hide in river silt and along exposed tree roots after floods.
- Any other type that could be found wasted in nature.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

First, scrub the river-glass clean and sort it by colour, then learn a few key glass moves: use a bottle-cutter and wet-sandpaper to slice necks for vases; master basic kiln-fusing to make smooth trays or art tiles; practise cold-working-grinding, polishing, or sand-blasting to tidy edges; and, for showpieces, melt the washed cullet in a small furnace and hand-blow or cast it into new shapes. These steps need simple but solid skills: safe glass handling with gloves and goggles, steady scoring and sanding, setting a basic kiln schedule, and patient finishing work.

3. Value Propositions

Each piece tells a visible “pulled from nature, reborn as art” story: the glass was littered in a local river or forest, then cleaned, reshaped, and finished by hand. Buyers get a unique object- colours and bubbles vary with every shard, plus a clear environmental impact they can show off (a tag notes how

much trash was removed). This turns ordinary décor or gifting into a conversation starter and an easy way for homes, shops, or companies to prove real support for local cleanup work.

4. Customer Segments

- Local municipalities and tourism boards – commission souvenir lines that showcase regional pride and environmental care.
- Environmental NGOs and foundations – buy batches to resell or use as donor rewards, reinforcing their mission while raising funds.
- Corporate & conference organisers – need meaningful, branded gifts.
- Design collectors & art patrons – seek numbered, one-off works with provenance; the “found in nature, reborn in the studio” angle adds collectable value.

5. Space and Equipment

A single-room workshop of about 25 m² is enough. Set one corner with a deep sink, scrubbing brushes, and drying racks for washing river glass. Keep a sturdy table for bottle cutting, colour-sorting, and hand tools (gloves, goggles, glass-cutter, wet sandpaper). Add a small hobby kiln on a heat-proof stand for fusing shards into flat pieces, and, if you plan to blow or cast, a tabletop furnace or torch crucible plus basic blow-pipes and moulds. Finish with a bench grinder or belt sander for smoothing edges, a simple sand-blasting cabinet for matte effects, and shelves for finished work and packing supplies.

Process is straightforward: rinse and scrub the found glass, sort by colour and type, cut or crush as needed, then either load shards into a mould and fire to about 780 °C for fused trays and tiles or melt cullet in the furnace for small blown or cast forms. Let the glass cool slowly (anneal) to avoid cracks, grind or sand sharp edges, give any decorative blast or polish, and pack the finished piece with a tag showing how much river waste it removed.

6. Distribution Channels

Sell the river-glass pieces first through your own web-shop and linked social media store, where the cleanup story can be told with before/after photos. Place small batches-numbered and tagged with the “collected from our river” message-in local museum or eco-tourism gift shops, and approach conference planners and companies as branded CSR gifts. Offer limited editions to interior designers and cafés via email pitches that include provenance cards, and keep a booth at regional green-living fairs so visitors see the material’s journey firsthand. Finally, run weekend cleanup-plus-workshop experiences: volunteers collect glass in the morning, then spend the afternoon turning it into a souvenir they take home-an engaging channel that combines product, service, and storytelling in one.

7. Cost Structure

Initial Costs

Cost item	€ estimate	Comments
Small programmable kiln	~1 500	For fusing and shaping
Hand tools (cutter, grinder, sander, jig, safety gear)	~1 000	Essential toolkit
Deep sink, brushes, drying racks, sturdy workbench	~700	Cleaning & prep station
Sand-blasting cabinet & shelves	~800	For surface texturing
Tabletop furnace & simple blow-pipes	~1 000	Optional small-scale hot-work
Total CAPEX	5 000	Core tools & equipment

Monthly Costs

Cost item	€ estimate	Comments
Rent & electricity (small studio)	~330	
Website hosting & maintenance	~50	Basic upkeep
Marketing & ads	~100 – 150	Initial promotion
Consumables (safety gear, grit, adhesives)	~120 – 200	Restock per month
Total OPEX / month	600 – 730	Covers essentials

8. Revenue Streams

Money flows in from selling finished river-glass decor and gift pieces online and in local eco-shops, taking custom orders from companies or events that want branded “cleanup” awards, charging a fee for weekend “collect-and-create” experiences where participants pay to turn the glass they pick up into a keepsake, supplying interior designers and cafés with limited-edition items at a wholesale margin, and partnering with environmental NGOs that buy batches for donor thank-you gifts or share in the sales revenue.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, this mixed-technique studio model generates an estimated 3.94 kg CO₂e per 1 kg of finished river-glass products. Emissions primarily arise from electricity used for kiln fusing, annealing and occasional small-scale melting, supported by cold-working processes such as grinding and polishing. Additional indirect emissions come from cleaning and transport linked to organised river, forest and lake clean-up activities.

Because the process relies entirely on recovered glass collected from natural environments and avoids the use of virgin raw materials, direct material emissions remain low. The overall footprint is therefore driven mainly by energy use and firing schedules rather than glass production itself.

These values represent indicative estimates for small-studio, artisanal production and may vary depending on processing choices, batch size, firing frequency and local electricity mix. Even within these variations, the footprint remains significantly lower than manufacturing new glass products, while delivering added environmental value through waste removal from natural ecosystems.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, this collection is positioned as a series of high-value artistic objects and commemorative gifts that serve as tangible evidence of regional environmental restoration. The work is professionally experienced through curated installations at institutional conferences and regional design showcases, where the emphasis remains on the studio's role in transforming hazardous environmental waste into refined, numbered glass editions. Digital documentation is utilised exclusively to archive the "collection to creation" journey, establishing a rigorous provenance that makes these pieces essential assets for NGOs, municipalities, and collectors seeking verified ecological narratives.

10. Start Blowing Eco-glass-pieces Made of 100% Recycled Glass

Molten bottles and waste glass shards are used to create carafes, lamps and ornaments whose tiny air bubbles testify to their second life. This product line is mouth-blown from 100 % post-consumer cullet in energy-efficient electric or hybrid furnaces, marrying twenty-first-century kilns with a craft that UNESCO placed on its Intangible Cultural Heritage list in 2023 ([Glass International](#)). Every piece thus keeps both heritage skills and glass out of landfill while offering customers stories they can hold to the light.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. The only type of glass used for this product is soda-lime glass, which can be sourced from:

- Hospitality empties – Bars, cafés and hotel kitchens generate large volumes of “single-trip” bottles that remain remarkably clean;
- Beverage-distributor breakage – Regional bottling and logistics hubs inevitably produce rejected or broken bottles during filling, labelling and transport. A standing agreement with them would allow you to collect this pre-consumer scrap, often palletised and already colour-pure, before it enters the waste stream.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

All incoming glass is re-checked for ceramics or metals, washed at 60 °C, and sorted by colour before entering the batch, guaranteeing consistent melt behaviour and vivid, reproducible hues. Clean cullet is batch-mixed and charged into a 50 kg all-electric pot furnace with a thermal efficiency reaching 70–85 %, far above gas units(MO SCI). The glass is gathered at 1 140 °C, hand-shaped on the blow-iron, reheated in a glory-hole, tooled, then annealed on a slow ramp from 520 °C to 460 °C.

3. Value Propositions

Each piece embodies a tangible “heritage reborn through waste” story: molten bottles and discarded shards transformed into new glass forms-carafes, lamps, and ornaments that shimmer with air bubbles from their past lives. Every object would be mouth-blown from 100 % post-consumer cullet in energy-efficient electric or hybrid furnaces, blending cutting-edge sustainability with an old traditional craft . Buyers would hold not just an elegant, hand-blown artefact, but a living symbol of renewal, proof that traditional skill and environmental responsibility can share the same flame. Each piece could include a maker’s note tracing its origin and melt batch, turning an everyday purchase into a small but visible act of cultural and ecological preservation.

4. Customer Segments

- Design-led homeware retailers – could commission exclusive private-label runs of eco-blown glassware that align with their sustainable design ethos and handmade aesthetic.
- Farm-to-table restaurants and boutique hotels – might order branded carafes, jugs, and lighting pieces that reinforce their local sourcing and circular values.
- Zero-waste event and wedding planners – could use bespoke glass centrepieces and décor to create meaningful, reusable displays for clients who want beauty with purpose.
- Design collectors and gallery buyers – would likely seek out limited “vintage-fusion” art lamps or numbered editions that merge traditional craftsmanship with environmental storytelling, following the same market momentum seen in [La Soufflerie's](#) journey from a small Paris studio to a global design brand.

5. Space and Equipment

A 90 m² unit divided into cold-prep, hot-shop, annealing, and packing zones. A core kit should include: 50 kg electric furnace and glory-hole in one (€15 000 – €20 000); for example, the Studio NG Photon, 40 L annealer, shared glory-hole, pipe rack, wet belt-sander, LEV hood, and LED daylight booth for QC. The furnace's 5-15 kW draw ([Studio NG Photon](#)) fits a standard three-phase 32-A feed. Adding a second pot doubles the output without expanding floor space.

6. Distribution Channels

Primary sales could flow through an own-branded e-shop featuring QR-coded origin stories and AR “place-it” previews. Secondary routes include craft-trade fairs, drops for concept stores, and B2B portals already used by Jarapa and Trademark Living ([Jarapaen.trademarkliving.dk](#)). Social reels of bottles morphing into goblets feed organic reach, while limited club editions on crowdfunding platforms could pre-finance new product lines.

7. Cost structure

Capital intensity centres on the furnace; variable costs skew to electricity (≈1.2 MWh/month at artisan scale). Outsourcing days at partner eco-glassworks (€ 350/day plus cullet) stay in play for overflow or colour runs.

Initial Costs

Cost item	€ estimate	Comments
Electric 50 kg pot furnace	~15 000 – 20 000	Studio NG Photon
Annealing kiln 40 L	~2 500 – 4 000	CE-marked
Pipe & punty set + bench	~1 200 – 1 800	20 pcs, Italian steel
Wet belt-sander & diamond wheels	~1 000 – 1 600	For cold-work
LEV extraction & filters	~1 100 – 1 600	For silica control
Brand identity & e-commerce	~800 – 1 200	For worksite and packaging
Total CAPEX	21 600 - 30 200	

Monthly Costs

Cost item	€ estimate	Comments
Electricity (furnace + annealer)	~300 – 450	1.2 MWh @ €0.25 – 0.38
Cullet collection & washing	~90 – 140	van share + detergent
Studio rent & utilities	~550 – 800	90 m ² light-industrial
Artisan labour (1.5 FTE)	~1 800 – 2500	incl. social charges
Colourants & tools	~120 – 180	oxides, new pipes
Marketing & samples	~80 – 120	reels, trade boxes
Total OPEX/month	2 940 - 4190	

8. Revenue Streams

Core product could be: carafes €45 – 70, statement lamps €160 – 280. Custom “heritage bottle” runs a 30 % premium. Hot-shop experience days (€95 pp) smooth seasonality peaks.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon footprint level

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this eco-glassblowing process is 4.62 kg CO₂e per 1 kg of finished mouth-blown glass. Most emissions arise from electricity consumption required to maintain the molten glass furnace, operate the glory hole during forming, and

run controlled annealing cycles. Smaller contributions stem from washing and sorting cullet, internal handling, and studio utilities.

Although this concept involves high temperatures inherent to glassblowing, the exclusive use of 100% recycled soda-lime cullet significantly reduces material-related emissions compared to virgin glass production. The use of modern electric or hybrid furnaces further lowers the overall footprint by improving thermal efficiency and avoiding direct fossil fuel combustion.

These values represent indicative estimates for small-scale artisan hot-shop production and may vary depending on furnace efficiency, batch size, production rhythm, and the local electricity mix. Even within these parameters, the footprint remains substantially lower than conventional blown-glass manufacturing based on primary raw materials, demonstrating the environmental advantage of circular hot-glass craftsmanship.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, this 100% recycled mouth-blown collection is positioned as a sophisticated fusion of UNESCO-recognised intangible heritage and modern circularity. The work is professionally experienced through technical demonstrations in studio settings and curated displays at international craft fairs, where the emphasis remains on the distinct material character, such as the signature aeration bubbles produced by energy-efficient electric melting. Digital documentation serves to archive the technical authorship and the specific melt-batch provenance, situating these hand-blown carafes and lamps as high-value assets for design-led homeware retailers and boutique hospitality projects seeking verified artisanal sustainability.

ARCHITECTURAL & BUILDING MATERIALS

11. Recycled Glass Bricks and Blocks

Recycled glass bricks and blocks are produced from post-consumer bottles, jars, and industrial off-cuts that are kiln-cast or mould-pressed into structural and decorative units. These elements offer durability, fire resistance, and weather stability while allowing controlled light transmission through the material. Compared to conventional clay bricks, they require lower melting temperatures and enable the use of translucent colours and internal textures, expanding the architectural palette for façades, partitions, and light-filtering walls. In small-scale studios, the process allows for precise control of pattern, pigment, and surface finish, enabling the creation of architectural components that combine structural function with expressive material qualities.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. The main type of glass used for this product is soda-lime glass, which can be sourced from:

- Municipal bring-banks
- Local glass glazing firms
- Collaboration with local hospitality companies

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

Colour-sorted shards are washed, dried and ball-milled to 3–5 mm granules. Decorative bricks add 15 % pigments or mica before pressing into refractory moulds. Blocks are gravity-cast: cullet fills graphite forms, the kiln ramps to 815 – 870 °C for full fuse, soaks, then anneals at 520 °C following a 1 °C / min cool-down to relieve stress. Cold-work stations grind and polish faces, with optional acid-etching or silk-screen printing finishing the surface. Strict PPE and LEV extraction would manage silica dust.

3. Value Propositions

Designers gain a building component that combines structural function with the visual depth of stained glass, eliminating the need for additional cladding layers. The use of recycled cullet significantly reduces reliance on virgin raw materials and lowers the carbon intensity of construction, supporting environmental certification goals and sustainability reporting. Unique surface textures and light behaviour allow artisans to create high-value elements that cannot be replicated in mass production, reinforcing the role of craft within contemporary architecture. At the urban scale, these components contribute to measurable waste diversion and support municipal circular-economy strategies through visible reuse of locally recovered materials.

4. Customer Segments

- Eco-architects and sustainable design studios – could specify recycled-glass blocks for daylighting and thermal façades in net-zero or passive-house projects, combining aesthetics with measurable environmental gains.
- Hospitality and interior designers – might commission branded glass bricks or illuminated panels that shimmer behind reception desks and bar fronts, offering both luxury and sustainability credentials.
- Public-art commissioners and cultural institutions could order limited-edition architectural pieces for installations or landmark projects that showcase regional craft and circular innovation.
- Interior retailers and DIY suppliers – might stock smaller recycled-glass tiles and sample kits for kitchen splashbacks, garden features, or terrariums, giving homeowners and makers access to authentic, eco-crafted materials.

5. Space and Equipment

A 60 – 80 m² studio is divided into receiving/sorting, cold-prep, hot zone, cold-working and showroom. Core kit: 0.25 m³ front-loading kiln, ring-mill crusher, wet belt-sander, diamond saw, HEPA dust extraction and mould-making bench. The footprint scales modularly: add kilns and polishing stations to double output without relocating.

6. Distribution Channels

Direct-to-architect via CPD webinars and sample boxes leads to specification in tender documents. An e-commerce shop ships smaller tiles worldwide. On-site installations-filmed and shared-feed Instagram storytelling, while local craft fairs build community goodwill and capture bespoke orders. Gallery representation positions art-series blocks as collectables, cross-subsidising standard lines.

7. Cost Structure

Capital intensity is moderate: a single kiln and cold-work tools dominate start-up spend. Variable costs skew to electricity, around 110 kWh per 24-hour firing cycle, followed by cullet transport and labour. Even at an artisan output of 20 bricks/month, the margin remains healthy; scaling to 100 units amortises equipment within two years.

Initial Costs

Cost item	€ estimate	Comments
Front-loading glass kiln (0.2–0.3 m ³)	~3 000 – 5 500	Kilncare Eco-Fuser Warm Glass

Wet belt-sander & diamond saw	~2 000 – 3 200	Essential cold-work combo
Industrial crusher & sieve	~1 500 – 2 000	Converts bottle cullet to frit
Dust-extraction & PPE	~800 – 1 200	Local exhaust ventilation hood, respirators
Custom refractory moulds (first set)	~600 – 1 000	Graphite/ceramic; reusable
Branding & website	~600 – 1 100	Brand identity, e-shop
Total CAPEX	8500 - 14000	

Monthly Costs

Cost item	€ estimate	Comments
Electricity	~250 – 450	12–20 firings @ €0.25 /kWh
Cullet collection & transport	~80 – 120	Transport fees
Studio rent & utilities	~400 – 700	70 m ² light-industrial unit
Artisan labour (1 FTE)	~1 000 - 1500	Wage depends on the region
Consumables (grit, decals, pigments)	~90 – 150	Includes kiln wash
Marketing & samples	~60 – 100	Social media ads, samples
Total OPEX / month	1880 - 3020	

8. Revenue Streams

- Standard decorative brick: €25 – 50
- Custom art brick: €75 – 150
- Translucent blocks (200 × 200 × 90 mm) retail at €55 – 90.
- Value-added services-CNC-patterned mould design, on-site installation, and CO₂-offset certificates-add 15 % to order value.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for the production of recycled glass bricks and blocks is 4.18 kg CO₂e per 1 kg of finished product.

The majority of emissions result from electricity consumption during high-temperature kiln firing and extended annealing cycles required to achieve structural integrity and optical clarity. Additional contributions stem from cold-working processes such as grinding and polishing, as well as cullet preparation, washing, and internal material handling.

Because the bricks are produced entirely from recycled soda-lime glass, material-related emissions remain significantly lower than those associated with virgin glass or clay brick manufacturing. While the process involves substantial heat input, batch firing and the absence of continuously molten furnaces keep overall energy demand below that of traditional hot-glass production.

These values represent indicative estimates for small-scale, craft-oriented production environments and may vary depending on kiln efficiency, firing schedules, unit size, and the carbon intensity of the local electricity grid. Even with these variables, recycled glass bricks demonstrate a clear circular advantage over conventional building materials, combining durability, light transmission, and reduced environmental impact.

11. Marketing and Promotion

Following the strategic framework defined in the introduction, these recycled glass bricks are positioned as high-performance structural units that bridge the gap between artisanal craft and sustainable architecture. The units are professionally experienced through material libraries and technical showcases at architectural fairs, where the emphasis remains on their refractive material qualities, thermal performance, and the studio's ability to execute bespoke, kiln-cast geometries. Digital documentation is utilised to provide rigorous evidence of carbon-reduction data and landfill diversion, situating these luminous blocks as essential, LEED-compatible assets for eco-architects and interior designers specialised in high-end hospitality and public art commissions.

12. Walls and Panels Made of Bottles

Panels made out of glass turn everyday beer and soda bottles into eye-catching room dividers that glow like honeycomb lanterns when back-lit. A sole trader or two-person partnership can fabricate the 50 × 100 cm screens in a garage workshop, relying on hand tools and reclaimed timber frames instead of heavy industrial kits. Because each bottle stays almost exactly as it was rescued, the product embodies “reuse before recycle”, saving energy and preserving the quirky bumps, labels, and maker’s marks that spark conversation about waste and value.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. For this product, as only cold working processes are used, almost any type of glass whose shape fits could work, and it could be sourced from:

- Bars and cafés – nightly collections of 330 ml beer bottles in clear, green, and amber colours; consistent shapes make them ideal for forming panels.
- Microbreweries and craft beer producers – visually defective, mislabelled, or short-fill bottles donated or sold at minimal cost instead of being landfilled.
- Restaurant chains and hotel bars – bulk post-service bottles from centralised waste points, offering steady weekly volumes.
- Event venues and music festivals – temporary but high-yield sources after large gatherings; ideal for special-edition product batches.
- Municipal recycling centres or waste contractors – access to sorted soda-lime cullet streams, especially from deposit-return schemes and hospitality-sector pickups.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

Operations stay deliberately simple. After a warm, soapy soak, bottles are inspected; scratched or cracked ones become future test pieces. A handheld bottle-cutter scores the neck, and a hot-water-cold-water shock removes the top cleanly. Edges are smoothed with wet-and-dry silicon-carbide paper and flame-polished using a small propane torch. Because internal stresses are minor in non-load-bearing applications, annealing is optional; if required, a 600 °C tabletop kiln costing €1 160 could accommodate 60 bottle bases per four-hour cycle ([MVE France kiln](#)). Finally, bottles are slotted mouth-first into a pine or steel-angle lattice jig and fixed with clear acetic-cure silicone that stays flexible under minor impact.

3. Value Propositions

The product speaks to planet, pocket and people. Each panel locks up around 180 bottles and avoids CO₂ emissions versus remelting, because no furnace energy is expended. Second, the raw material is free, meaning gross margin could exceed 60 % even at small batches, vital for micro-business cash

flow. Third, the handmade aesthetic resonates with conscious consumers who favour tangible stories of local craft over anonymous mass production. Finally, the venture channels creative skills, woodwork, glasscraft, and social media into a portfolio career that can grow organically without bank debt.

4. Customer Segments

- Independent coffee shops – could use recycled-glass panels to divide cosy seating areas, creating soft light effects while visibly reinforcing their zero-waste and local-sourcing values.
- Pop-up event organisers – might hire or purchase portable panel sets that assemble with just a few screws, offering a lightweight, reusable backdrop for markets, exhibitions, or photo zones.
- Eco-interior designers and architects could use the panels for loft apartments, studios, or when fitting out hospitality venues where both natural daylight and acoustic comfort matter.

5. Space and Equipment

A 20–25 m² single-garage or shared makerspace bay suffices. Workflows pivot around one sturdy workbench, a jigsaw for cutting timber frames, and wall racks for bottle storage. Noise, dust and fume levels stay low; a domestic extractor fan handles silicone curing. All equipment fits in a hatchback for mobile demos, supporting village-hall workshops that double as marketing.

6. Distribution Channels

Sales could begin face-to-face at local craft markets where customers can tap and feel the panels. Instagram reels showing the “neck-snap” cutting trick would drive traffic to a website that could ship flat-pack kits across the EU. Hospitality clients discover the product via word-of-mouth or at B2B events. Every finished panel carries a discreet QR tag linking to a page that lists the venues donating the bottles, turning waste donors into brand ambassadors.

7. Cost structure

Initial Costs

Cost item	€ estimate	Comments
Bench-top wet tile saw (Einhell TC-TC 618)	~120	600 W, water bath, diamond blade
Wet-and-dry sanding kit & torch	~180	edges & polishing
Jigsaw + blades	~200	timber/ply cuts
Basic MIG welder	~800	optional for steel frames
Workbench, clamps, PPE	~700	

Sample panel materials	~400	timber, screws, silicone
Website & branding package	~500	DIY platform
Contingency (10 %)	~800	
Total CAPEX	3 700	

Monthly Costs

Cost item	€ estimate	Comments
Workshop rent & utilities	~550	maker hub tariff
Labour costs (founder + one worker)	~1500	20 h/week
Consumables (silicone, sandpaper)	~140	per 30 panels
Marketing (ads, fairs)	~150	scaled with sales
Insurance & licences	~85	craft liability
Total OPEX / month	2 425	

8. Revenue Streams

- A standard 0.7 m² panel - €235
- Custom-colour or branded panels - €300–350.
- Event-hire units - €25 per weekend, cycling through 20 bookings a year with minimal wear.
- Workshops where customers could bring their own bottles to make their custom panels - 400 €

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon footprint level

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for bottle-based wall and room-divider panels is 1.98 kg CO₂e per 1 kg of finished product.

Emissions are primarily linked to low-intensity processes such as bottle washing, manual cutting, edge finishing, and small-scale flame polishing, as well as the production of supporting materials, including timber frames and silicone fixings. Because the bottles remain largely unchanged and are reused in their original form, energy-intensive melting or kiln firing is avoided entirely in standard production.

As a result, material-related emissions are minimal, and the overall footprint is driven mainly by electricity for tools, hot-water use, and local collection logistics. Optional annealing, when applied for specific installations, represents a marginal increase and does not significantly alter the overall profile.

These values represent indicative estimates for small, craft-based workshops and may vary with production volume, tool efficiency, and local energy sources. Even under conservative assumptions, bottle-based panels rank among the lowest-impact products in the catalogue, clearly demonstrating the environmental advantage of reuse-focused circular design.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, these modular glass bottle panels are positioned as high-impact, low-energy spatial dividers for the independent hospitality and pop-up event sectors. The system is professionally experienced through localised studio showcases and B2B design events, where the emphasis remains on the "reuse-before-recycle" philosophy and the tactile, honeycomb-like refractive qualities of the intact bottle geometries. Digital documentation serves to archive the material's local provenance and the manual assembly process, establishing these screens as credible, zero-waste alternatives for architects and interior designers seeking scalable, carbon-neutral solutions for daylighting and acoustic separation.

13. Functional and Decorative Terrazzo Glass Surfaces

These slabs are made by fusing crushed post-consumer bottle glass with a low-carbon cementitious binder to create terrazzo-style panels that sparkle like confetti frozen in stone. Cast in shallow moulds, then ground and polished to a mirror sheen, the material works as worktops, café tables, splash-backs and even lift lobbies-anywhere designers want vibrant colour with circular-economy credibility. By up-cycling glass that would otherwise be down-cycled or land-filled, each slab locks embodied energy inside a desirable, long-life surface that rivals granite for toughness yet tells a far better environmental story.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. Because the glass does not need to be cold-processed for this product, it can use glass that would otherwise be very hard to recycle, like mirror glass or laminated glass. As long as it can be crushed safely, it can be used. Some of the sources can be:

- Deposit-refund bottlers' reject bins-beer and soft-drink plants discard ≈3 % of bottles for cosmetic flaws, supplying clean glass that needs no washing.
- Municipal materials-recovery facilities (MRFs)-their "mixed-glass fines" (sub-12 mm) have little market value; long-term offtake contracts secure feedstock at a low cost.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

The glass starts off being crushed & graded – a 2.5 kW hammer mill reduces bottles to 3–10 mm chips; interchangeable screens let the maker create variegated blends. Then comes batch mixing – cullet, white OPC and limestone filler combine at a 70 / 30 glass-to-binder ratio by weight, mirroring industrial micro-terrazzo recipes ([Novamix, 2023](#)). An essential step is mould casting & vibration – slurry is poured into 120 × 60 × 2 cm steel trays set on a 50 × 50 cm 3 600 rpm vibrating table; 60 s of vibration expels trapped air, yielding dense, chip-rich surfaces. Then, it should be given time to cure, with panels staying under damp blankets for 48 h, then rack-curing for 14 days. The final step, grinding & polishing with a hand-held variable-speed wet polisher with 50- to 3 000-grit diamond pads, brings the terrazzo to a 400-gloss finish in under 30 min per slab ([Concrete Decor Store](#)) . Compressive strength of cement-based terrazzo typically ranges 33–48 MPa (4 800–7 000 psi), easily meeting EN 13813 class A 15/B 3.3 flooring standards ([GlassOnline, 2020](#)). glassonline.com

3. Value Propositions

Unlimited colourways emerge simply by tweaking chip mix and pigment, giving architects bespoke signatures at prototype cost. Glass aggregate resists acids and stains; a food-grade sealer makes

surfaces NSF-safe for direct food prep. Customers could easily meet the maker, see bottles crushed, and carry the story into their spaces, a marketing edge over anonymous quartz imports.

4. Customer Segments

- Eco-conscious home-renovators upgrading kitchens with statement islands.
- Independent cafés & bars seeking Instagram-ready counters reflecting their bottle-return ethos.
- Boutique gyms and yoga studios where polished terrazzo floors withstand heavy foot traffic without VOC-laden coatings.
- Heritage building refits that need thin lightweight overlays to hit tight floor-load limits.

5. Space and Equipment

A 30 m² lock-up unit or maker-hub bay suffices: 10 m² for crushing, 8 m² casting line, 5 m² curing racks, and the remainder for polishing and storage. Noise is moderate; ear defenders and dust masks mitigate the crusher operation. All machinery is single-phase 230 V, enabling easy relocation as orders grow.

6. Distribution Channels

Direct-to-designer sales dominate: sample chip cards mailed inside recycled mailers, plus BIM textures downloadable from the website. Finished tops ship on reclaimed Euro-pallets within 400 km to keep freight footprints low. A local showroom corner in a zero-waste store doubles as both a point of sale and a feedstock drop-off for community glass drives, story-rich QR codes etched on every slab back-link to donor thank-you pages, amplifying word-of-mouth.

7. Cost Structure

Initial Costs

Cost item	€ estimate	Comments
Hammer-mill glass crusher	~1 050	2.5 kW, 300–500 kg h ⁻¹ ebay.com
140 L cement mixer	~240	550 W portable unit tools4trade.co.uk
50 × 50 cm vibrating table	~370	3 600 rpm platform amazon.de
Wet polisher + pad kit	~220	variable speed 800 W concretedecorstore.com
Steel mould trays (4)	~320	reusable
Workbench, clamps, PPE	~500	goggles, respirators

Sample marketing pack	~450	chip sets, website
Contingency (10 %)	~500	buffers
Total CAPEX	3 650	

Monthly Costs

Cost item	€ estimate	Comments
Micro-workshop rent & power	~600	incl. 250 kWh electricity
Founder wage (20 h wk ⁻¹)	~1 200	part-time
Cement & admixtures	~250	50 m ² output
Sealer & polishing pads	~110	consumables
Glass haulage (back-loads)	~90	trailer fuel
Marketing & samples	~150	fairs, postage
Insurance & admin	~120	liability, accounting
Total OPEX / month	2 520	

8. Revenue Streams

- Standard slab (120 × 60 × 2 cm): €195 ex-works; material cost €42; gross margin ≈64 %.
- Custom pigment mix or logo inlay: +25 % premium.
- On-site templating & install: €45 h⁻¹ plus mileage.
- Workshop classes (weekends): €75 per participant, six seats, spreads brand awareness and secures free bottle supply. Demand peaks in April–July (renovation season) and pre-Christmas for giftable smallwares.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Environmental Impact

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for terrazzo-style recycled glass surfaces is 3.78 kg CO₂e per 1 kg of finished product.

The carbon footprint is driven primarily by the production and use of the cementitious binder, which represents a significant share of total emissions despite the high recycled-glass content. Additional

contributions come from electricity used for crushing, mixing, vibration casting, and wet grinding and polishing.

Because the process avoids full glass remelting and relies largely on post-consumer cullet and ambient-temperature curing, energy demand remains substantially lower than for kiln-cast or furnace-melted glass products. Transport impacts are limited through local sourcing of glass fines and short delivery distances for finished slabs.

These values represent indicative estimates for small-scale terrazzo production in a craft or micro-industrial setting and may vary depending on binder formulation, electricity mix, and production throughput. Even with the inclusion of cement, recycled-glass terrazzo surfaces demonstrate a clear carbon advantage over conventional stone or virgin-material composites, while offering long service life and strong circular-economy credentials.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, these terrazzo glass surfaces are positioned as high-performance, circular alternatives to traditional stone for bespoke architectural and interior applications. The material is professionally experienced through localised showrooms and the distribution of physical sample kits to design studios, where the emphasis remains on the artisanal grinding process and the vibrant, mirror-sheen aesthetic of the fused post-consumer aggregate. Digital documentation is utilised to archive the technical authorship and provide downloadable BIM textures, situating these low-carbon slabs as credible, high-durability solutions for hospitality counters, heritage refits, and sustainable kitchen designs.

14. Sustainable Stained Glass Windows

Crafting sustainable stained glass windows brings a heritage craft into the present by working with glass that already exists. Clear panes are sourced from renovations and coloured offcuts from studios and suppliers, then designed to the material rather than ordering new sheets. Each panel is cut by hand to a full-scale drawing, joined with copper foil or lead came, soldered, cleaned and framed. Reused glass carries small textures and tone shifts that catch daylight differently; as the sun moves, colours soften or sharpen and throw quiet patterns across walls and floors. The result is practical sustainability: durable, repairable work built from rescued stock and finished to a standard that sits comfortably in contemporary interiors. Old fragments gain a second life as robust, light-working surfaces with clear provenance.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. The main type of glass used for this product is flat (float) glass, which can be sourced from:

- Salvaged flat panes (core): large window glass from renovations/replacements-stable, transparent substrates for cutting/colour work.
- Coloured fragments: bottles, jars, and household glassware selected for hue/texture to build the palette (used in cold-work mosaics or as applied accents).
- Post-industrial cullet: coloured offcuts/remnants from factories to add tone variation and pattern depth.
- Local partnerships: municipal facilities, construction firms, recycling plants, and artisan studios provide a steady, traceable flow.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

The Work starts on site. We measure the opening, note sightlines and watch the light at different times of day. Back in the studio, we draw a full-scale cartoon, checking proportions against the room and any privacy needs. Reclaimed glass is then deglazed, cleaned and sorted by colour, thickness and texture so the design grows from what the material can do.

Cutting is done by hand with an oil-fed cutter, running pliers and a grozing tool; edges are trued on a bench grinder to the line. You can choose the build method by scale and detail: copper foil for fine geometry and tight curves, lead came for larger architectural panels with straighter runs. Foiled pieces are wrapped and burnished before assembly; came is cut, mitred and pinned to the cartoon.

Soldering joins the matrix-short, consistent beads on both faces-using controlled heat and minimal flux. For lead work, the product is brushed in cement to weatherproof and stiffen the panel, then cleaned and, if required, the solder is patinaed to reach a unified tone. Larger pieces receive discreet reinforcement bars tied into the frame with all panels framed in timber or metal, sized to the opening and the load.

Quality control is practical and visible: fit against the cartoon, flatness and alignment, even sightlines, sound seams and clean finish. Ventilation, PPE and safe handling are standard, with lead-aware workflows where relevant. Offcuts are saved for small sun-catchers and repairs, so very little glass leaves the bench as waste. The whole process uses bench tools, not furnaces, keeping energy demand low while preserving a hand-made finish.

3. Value Propositions

Sustainable stained glass could merge a living craft with a modern reuse logic, glass that already exists, reimagined through light. Salvaged panes could become structure, and studio offcuts could supply colour, reducing demand for new production and avoiding the high-energy furnace stage of remelting. Each commission could be designed for its setting, balancing privacy, daylight, and sightlines, so the result serves both form and function. By keeping traditional stained-glass methods in active use, the studio could also preserve heritage skills while training apprentices on real projects, ensuring that craftsmanship and sustainability remain inseparable values.

4. Customer Segments

- Private homeowners – you could commission bespoke stained-glass windows that add warmth, privacy, and colour to interiors.
- Cultural institutions – such as museums, libraries, and theatres could install sustainable stained-glass works that blend heritage aesthetics with contemporary environmental awareness.
- Architects and interior designers – might specify panels for adaptive reuse or eco-renovation projects, using them for passive lighting and storytelling elements.
- Boutique hotels and hospitality venues – could use stained glass as a visual and narrative feature that reflects local identity and craftsmanship.
- Art galleries, fairs, and collectors may acquire unique works that merge fine art and sustainability, adding long-term cultural and investment value.

5. Space and Equipment

A compact studio of about 25–40 m² could support full production, organised into clear work zones for drawing, cutting, assembly, and soldering. Natural light and good ventilation would be essential for colour work and comfort, while a local fume extractor could make soldering safe. Essential tools could include oil-fed cutters, grozing pliers, and a bench grinder for precision shaping. Construction might alternate between copper foil for fine detail and lead came for larger spans, joined with temperature-controlled soldering irons and finished with patina. With proper PPE, lead-safe hygiene, and organised sheet storage, the studio could maintain professional standards with modest electricity use and minimal waste.

6. Distribution Channels

Sales could rely primarily on direct commissions, beginning with client visits and light studies, leading to sketches, quotations, and clear production timelines. Partnerships with architects, restoration firms, and interior designers could bring regular B2B orders at the design stage. Public exposure could come from exhibiting at art and design fairs, where visitors experience light through glass firsthand. Small panels and sun-catchers could also appear in selected galleries and home décor boutiques on consignment. Online visibility could be built through a portfolio website and authentic process posts showing real installations, while open-studio days and short workshops could double as experiential marketing, converting curiosity into commissions and community engagement.

7. Cost Structure

Initial Costs		
Cost item	€ estimate	Comments
Tools & benches	~800–1,500	cutting & layout
Grinder & hand tools	~400–800	finishing
Soldering station & ventilation	~1,200–2,500	safety critical
Storage racks & safety gear	~300–700	organisation & PPE
Starter glass stock	~600–1,200	mixed colours/textures
Brand & website (year 1)	~100–300	optional
Contingency (≈10%)	~300–700	buffer
Total CAPEX	3700 - 7700	

Monthly Costs

Cost item	€ estimate	Comments
Materials & consumables	~150–350	foil, solder, glass
Studio rent	~800–1 500	adjust by location
Utilities & ventilation	~80–160	continuous use
Labour (project-based)	~1 200–2 500	varies by size
Marketing & events	~120–400	fairs & online
Insurance & maintenance	~60–140	equipment upkeep
Total OPEX / month	2 410 – 5 050	

8. Revenue Streams

Income is generated through a combination of commissions, ready-made art pieces, collaborations, and workshops. Custom orders for residential, religious, or cultural installations form the primary revenue source, with prices ranging from €500 to €5,000 depending on size and complexity. Large-scale architectural projects can reach €50,000 or more, often financed through cultural grants or restoration budgets. Smaller panels and decorative pieces are sold through galleries and online stores, typically priced between €150 and €1,000. Restoration and conservation services provide a steady income, as many historical buildings require periodic maintenance of stained-glass windows; such projects are billed at €100–300 per hour or on a per-panel basis. Educational workshops, which attract design students and hobbyists, offer additional income through participation fees (€50–200). This diversified revenue structure ensures financial stability and supports long-term artistic independence.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Environmental Impact

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for sustainably produced stained glass panels is 3.05 kg CO₂e per 1 kg of finished product.

Most emissions arise from indirect sources, primarily electricity used for cutting, edge finishing, ventilation, and soldering, as well as the production of lead, copper foil, and soldering materials. Because the process relies entirely on reclaimed flat glass and coloured offcuts and does not involve furnace melting or high-temperature glass transformation, direct material and energy-related emissions remain relatively low.

Designing panels around existing glass stock further reduces waste and avoids the carbon intensity associated with producing new coloured sheets. Transport impacts are limited through local sourcing from renovation sites, studios, and municipal partners.

These values represent indicative estimates for small-scale stained glass workshops and may vary depending on panel size, reinforcement needs, and local electricity mix. Even with these variations, sustainably produced stained glass windows demonstrate a substantially lower carbon footprint than newly manufactured architectural glass, while offering long service life, repairability, and strong cultural value.

11. Marketing and Promotion

Following the strategic framework defined in the introduction, these sustainable stained glass panels are positioned as high-value architectural interventions that integrate heritage restoration with contemporary material reuse. The works are professionally experienced through site-specific light studies and exhibitions at design fairs, where the focus remains on the manual authorship of the lead-came joinery and the unique refractive textures of salvaged glass panes. Digital documentation is utilised to archive the design-to-material process and the provenance of the rescued stock, situating these bespoke windows as essential, repairable assets for architects and cultural institutions engaged in eco-renovation and adaptive reuse projects.

15. 3D Printed Recycled Glass Elements of Architecture

Some 3D glass printers can already melt crushed waste glass and print not only standard or customized bricks, but many completely new elements of architecture. As these are the possibilities that engineers (of 3D glass printers) and architects are [currently investigating](#), this way of thinking can lead you to some great solutions in architecture and building materials.

Depending on your estimate of how quickly 3D glass printers using waste glass will become widely available, designing and creating a system for remote work with the printers could also be a great solution for many architects, other engineers, artists, designers. For inspiration and/or collaboration on that matter, look up Osamu Oji (Japan), who designed [UAI](#) – a pioneering digital share workshop that integrates smart glasses and XR technologies to revolutionise remote manufacturing and craftsmanship. Produced by USEYA CO. LTD., this solution is nominated for the 2025 UX Design Awards (by International Design Centre Berlin).

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. The main type of glass used for 3D printers is soda-lime glass, which can be sourced from:

- Clear bottle cullet – tons of it at every city recycling depot; melts easily and prints strong, neutral-colour bricks.
- Green and amber bottles – collect from bars or breweries; natural tints make nice shading blocks without extra pigment.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

You'll need a handful of practical skills: first, safe cullet prep-washing, crushing, and sieving the waste glass while wearing gloves and goggles. Next comes basic 3-D CAD; if you can draw the part and export an STL, the printer can build it. Learn the slicer menu so you can pick layer height, flow rate, and a melt point around 1,100 °C for bottle glass. Know how to load the hopper and check thermocouples without getting burned, then program a slow annealing cool-down so the piece won't crack. Finally, use a belt grinder or water-jet to flatten contact faces, drill anchor holes, and run a simple compression test for safety. Master these steps, and you can turn any clean cullet pile into strong, custom building blocks.

3. Value Propositions

3-D-printed blocks and panels made from waste glass give builders three wins in one product. First, they unlock shapes no mould can make-curved bricks, lattice walls, or daylight pipes-all printed straight from a CAD file, so architects get true design freedom without tooling costs or long waits. Second, each part carries a clear eco-story: up to 90 % recycled cullet cuts embodied carbon and turns local litter into high-value structure, helping projects meet strict green-building targets. Third, the

process is plug-and-play. A “print cloud” lets teams upload files and watch the job remotely, so they can prototype or order small batches without buying a furnace. The result is a custom, low-carbon glass element that arrives ready to slot into walls or façades, giving projects headline aesthetics, sustainability points, and faster delivery all at once.

4. Customer Segments

- Green-minded architecture firms want low-carbon bricks to win eco projects; they simply upload a 3-D file and watch the print live instead of buying a furnace.
- Renovation contractors – need odd-shaped blocks to fit old buildings; one scan turns into one overnight print delivered to the site, no moulds or delays.
- City parks & public-space planners – look for tough, eye-catching benches and lighted signs made from local waste glass; they can book printer time for a short run instead of owning the machine.
- Climate-tech start-ups – test heat-saving or water-harvesting bricks fast and cheap by printing in recycled glass through a “cloud” dashboard.
- University labs – let students design circular glass parts and queue prints remotely, turning the printer into an online teaching tool.

5. Space and Equipment

One medium-sized workshop, about 150 m²-is enough. Set a hot zone for the large 3-D glass printer plus an annealing kiln, a corner with a crusher and sieve for cleaning and sizing waste cullet, a bay with a water-jet or grinder for trimming prints, and a small area with a test frame and pallet wrapper for quality check and packing. Key kit is the printer itself, the cullet crusher and sieve, an annealing chamber, a grinder or water-jet, and basic safety gear; three-phase power and decent ventilation finish the setup.

Technological process: Wash and crush the waste glass, sieve it to 1–4 mm, and load the clean cullet into the printer. Design the part in CAD, slice it, and print at about 1,100 °C. When the print is done, move the piece into a slow anneal so it cools without cracking. Trim or grind any rough edges, drill fixing holes if needed, run a quick strength test on one sample, then wrap the finished blocks or panels on a pallet and ship them to the site.

6. Distribution Channels

Sell the printed building parts mainly business-to-business: list sample bricks and facade blocks on online material libraries like MaterialDistrict, Concular, and Madaster so architects can order test pieces with a click; keep a small showroom corner in the workshop and offer virtual walk-throughs via the printer’s live webcam for remote clients; ship demo kits to green-building consultancies that bundle low-carbon products for developers; and exhibit full-size elements at construction trade fairs and design weeks where specifiers handle them in person. Offer the printer itself as a cloud service-architects upload an STL, watch the job in mixed reality, and receive the finished parts by freight, while

contractors can book just-in-time production slots for renovation projects. Finally, run paid “design for glass printing” masterclasses (online and on-site) so professionals and students gain hands-on experience and become repeat users of the service.

7. Cost Structure

Initial Costs		
Cost item	€ estimate	Comments
Mid-size pellet-fed 3D glass printer	~120 000	Includes flat-bed annealing kiln
Bottle crusher, rotary sieve, drying racks	~10 000	For cullet prep
Wet belt-grinder & hand drill	~8 000	Edge finishing & anchor holes
Workshop fit-out (100 m ²)	~15 000	3-phase wiring, kiln vent, pallet shelving, safety gear
Total CAPEX	153 000	Core production line setup

Monthly Costs		
Cost item	€ estimate	Comments
Rent, insurance & utilities (100 m ² workshop)	~2 300	
Website & webcam dashboard	~200	Hosting & basic IT upkeep
Marketing & sample kits	~1 500	Outreach to B2B clients
Consumables (filters, abrasives, PPE)	~300 – 400	Regular supplies
Total OPEX / month	4 300 – 4 400	Lean running budget

8. Revenue Streams

Revenue comes from four main sources: selling printed glass bricks and panels by the pallet to contractors and architects; charging a “print-as-a-service” fee when designers upload their CAD file and book machine hours remotely; offering custom R&D runs for universities and start-ups testing new lattice or sensor-ready bricks; and running paid training packages-short courses that teach firms how to design for recycled-glass printing, with follow-on consulting billed per project.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon footprint level

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for 3D-printed architectural elements made from recycled soda-lime cullet is 4.74 kg CO₂e per 1 kg of finished printed glass. Most emissions come from electricity demand during melting, printing, and the controlled annealing/cool-down cycle. At the same time, smaller contributions stem from cullet preparation (washing/crushing/sieving), post-processing (grinding/flattening/drilling), transport, and material losses. Because the feedstock is 100% recycled glass, direct raw-material emissions remain comparatively low, and the footprint is driven mainly by printer efficiency, batch size/throughput, and the local electricity mix.

These values represent indicative estimates for a mid-scale workshop setup and will vary depending on machine type, print duration, annealing schedules, and operating hours.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, these 3D-printed architectural elements are positioned as high-tech, circular solutions for complex structural and facade requirements. The technology is professionally experienced through technical showcases at construction fairs and presence within digital material libraries, where the emphasis remains on the studio's ability to execute mould-free geometries and remote fabrication workflows. Digital documentation, including mixed-reality process logs, serves to verify the technical authorship and the precise carbon-reduction data of the recycled cullet, situating these printed components as essential, data-backed assets for architects and engineers specialised in net-zero and adaptive reuse projects.

FASHION AND JEWELLERY

16. Fake Sea Glass

Fake sea glass turns post-consumer bottle shards into frosted “sea-glass” cabochons in just a couple of days. Rounded by rotary tumblers and etched to a soft, salt-sprayed sheen, each gem is drilled and rimmed in recycled silver or brass, ready for pendants, earrings and cuff-links that whisper of coastlines. Because the glass is reused almost as-is, every piece carries the embodied stories, colours and bubbles of its former life while keeping carbon and broken bottles out of landfill.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. The primary type of glass used for this product is soda-lime glass.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

Collected bottles are de-labelled in 60 °C soapy water, then cracked inside a padded bucket with a hand tile-nipper; shards drop through a 30 mm sieve to ensure quick tumbling. A 15 lb rotary tumbler (220 V, rubber barrel) runs three wet cycles: 36 h with 80-grit silicon-carbide, 24 h with 220-grit, and 12 h with baking-soda burnish, yielding satin-smooth edges that pass the “no-snag” stocking test ([YouTube](#), 2024). Drilling uses a bench-top water-cooled diamond core bit at 1,800 rpm; holes are rinsed, dried and, if jewellery-grade, fire-polished in a 550 °C tabletop kiln for 10 min to relieve micro-cracks. Quality control discards pieces under 8 mm thickness or with residual sharp points; rejects are re-tumbled for mosaic aggregate.

3. Value Propositions

Fake sea glass provides a consistent and traceable alternative to naturally collected beach glass, made from post-consumer bottle glass. The controlled tumbling process allows repeatable sizes, finishes, and colour palettes, enabling designers to develop scalable collections rather than one-off pieces.

Low-energy processing reduces emissions compared to remelting, while laser-etched batch codes ensure traceability of origin and production. The result is a reliable, circular material suited for contemporary jewellery and small design objects where consistency, transparency, and professional standards matter.

4. Customer Segments

- Eco-luxury jewellers seeking traceable stories for Gen-Z and Millennial buyers.
- DIY craft subscription boxes that include ready-drilled NeoSea™ pieces for home assembly.
- Aquarium and terrarium retailers are buying bulk tumbled glass as safe decorative gravel.
- Boutique landscaping firms using pastel chips as weed-suppressing mulch in show gardens.
- Museums & gift shops near coastal heritage sites stocking certified “no-beach-harvest” souvenirs.

5. Space and Equipment

A 15 m² room in a shared makerspace suffices: 4 m² for washing/drying, 6 m² for tumblers and storage barrels, 3 m² for drilling and kiln, and 2 m² for packing. All kits run on single-phase 230 V; noise insulation mats keep the tumbler hum below 65 dB, so evening cycles respect neighbourly hours. Scalability is bolt-on: every additional tumbler adds 15 kg weekly capacity with no structural works.

6. Distribution Channels

E-commerce could lead to distribution channels shipping jewellery worldwide in plastic-free mailers. Wholesale accounts with independent jewellers across the EU could operate on sale-or-return terms to lower their risk. Bulk chips could be distributed in refillable polypropylene sacks to aquarium chains within 250 km, keeping freight emissions modest.

7. Cost Structure

Initial Costs

Cost Item	€ estimate	Comments
Heavy-duty rotary tumbler, 15 lb (Thumler Model B)	~540	220 V version incl. spare belt ajstools.com
Table-top kiln, 550 °C, 9 L	~1 150	optional fire-polish
Bench drill rig + water feed	~380	includes 10 diamond bits
Hand nippers, sieves, wash tubs	~220	glass break & sizing
Starter grit (20 kg mixed grades)	~160	≈4 months supply
Workbench, PPE, lighting	~600	second-hand steel bench
Website set-up & branding	~650	domain, template, logo
Launch packaging & inventory	~450	boxes, tags, findings

Contingency (15 %)	~630	buffer
Total CAPEX	4 780	

Monthly Costs

Cost item	€ estimate	Comments
Shared studio rent & utilities	~420	15 m ² incl. 150 kWh
Founder salary (0.6 FTE)	~1 450	living wage
Grit & media top-up	~90	scale with volume
Findings, adhesives, labels	~180	400 jewellery units
Packaging & postage	~160	EU & UK orders
Marketing (ads, fairs)	~120	Instagram boosts
Insurance & admin	~95	product liability
Total OPEX / month	2 515	

8. Revenue Streams

- Jewellery line – pendants €28–35; earrings €42–48; cufflinks €50. Gross margin ≈65 %.
- Bulk decorative chips – €3.80 per kg (min. 25 kg).
- Custom colour tumbling for designers – €18 per kg service fee (client supplies glass).
- Weekend workshops – €60 per seat, eight seats; doubles as a bottle-collection event.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for fake sea glass produced through tumbling and light finishing of upcycled bottle glass is 1.06 kg CO₂e per 1 kg of finished tumbled glass pieces.

Most emissions arise from electricity used by rotary tumblers (long-duration but low-power cycles), drilling operations, and optional short fire-polishing. At the same time, smaller contributions stem from hot-water washing, grit production, and transport. Because the process avoids remelting and high-

temperature furnaces, direct material and energy emissions remain very low, with the footprint driven primarily by tumbling time, equipment efficiency, and the local electricity mix.

These values represent indicative estimates for a small-scale studio setup and may vary depending on batch size, number of tumblers in operation, and whether fire-polishing is applied. Even within these variations, fake sea glass remains among the lowest-carbon glass upcycling products in the catalogue, clearly demonstrating the climate benefits of cold-processing and reuse-focused design.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, Fake Sea Glass is positioned within contemporary jewellery and coastal-heritage gift contexts, where material ethics and provenance are professionally valued. Promotion centres on juried craft fairs, applied-arts exhibitions, and museum or gallery retail tied to maritime sites, supported by collaborations with eco-luxury jewellers who require repeatable colour palettes and traceable batches. Digital channels document tumbling, finishing, and batch provenance to reinforce authorship and the “no-beach-harvest” credibility that differentiates the work in professional curation and purchasing.

17. Matching Decorative Accessories for Dogs and Their Owners

This collection of matching decorative accessories for dogs and their owners translates personal attachment into tangible design objects made from recycled glass. Handcrafted pieces such as dog tags, keychains, and small jewellery elements are produced using reclaimed glass, allowing each set to carry a distinct material history. Owners may contribute glass from personal items, such as broken household objects or glassware linked to meaningful moments, which is then transformed into new accessories through controlled craft processes.

The result is a small-scale circular product that combines emotional value with material reuse, linking human and animal companions through a shared design language. By embedding personal materials into everyday objects, the concept demonstrates how circular practices can extend beyond environmental benefit and become part of lived relationships, without compromising on durability, safety, or aesthetic quality.

1. Glass Types and Sources

See the introduction for the full overview; below are the sources specific to Matching Decorative Accessories for Dogs & Owners.

- Post-consumer bottles & jars (core): locally collected soda-lime containers from recycling programs and collection points.
- Industrial cullet: factory offcuts and rejects that provide clean, colour-consistent stock.
- Hospitality waste: from partner restaurants/hotels turned into small accessory parts.
- Personal contributions: owners can submit meaningful glass (e.g., a broken vase) to be included in their set.
-

Using these local streams cuts virgin material use, lowers footprint, and adds a personal story to each accessory.

2. Glass Processing Methods

See the general introduction for technical parameters. For this line, sorted bottles and flat glass are melted or kiln-cast into small blanks for tags and key fobs, then annealed for durability. Each piece is cold worked to round all edges for pet safety, polished to a satin or glossy finish, and mounted with hypoallergenic hardware using separable, UV-cured bonds. Personalisation is added by laser or hand engraving for names, numbers, or QR codes, and customer-supplied “story glass” can be incorporated on request.

3. Value Propositions

This concept applies circular economy principles by transforming post-consumer and industrial glass waste into durable, handcrafted accessories, reducing landfill pressure and conserving primary resources. Emotional value is created through personalisation, allowing customers to contribute meaningful glass objects that are reworked into unique pieces, turning accessories into keepsakes with a clear material story.

Production is rooted in local craft and inclusive glassworking practices, supporting skill preservation and community-based economic activity without reliance on mass production.

The accessories combine sustainability with refined design, offering responsible, design-led objects that strengthen the everyday bond between people and their pets. Community participation is supported through glass donation and storytelling. At the same time, a small share of turnover can be directed toward partnerships with local animal-rescue organisations, including the production of ID tags as part of training or outreach activities.

The concept aligns with growing consumer interest in durable, responsibly made pet accessories, supporting the development of premium products grounded in circular material use and emotional value.

4. Customer Segments

The primary customer group consists of pet owners who treat their animals as family members and are willing to invest in durable, meaningful, and ethically made accessories. These customers value personalisation, material quality, and products that reflect their emotional connection with their pets.

Within this group, the concept particularly resonates with pet owners who are environmentally conscious, design-oriented, and interested in responsible consumption. They seek products with transparent material origins, local production, and a clear circular story, rather than mass-produced accessories.

Secondary channels include independent pet boutiques and design-led concept stores that cater to this same customer profile, as well as pet owners who use visual storytelling and social media to express their lifestyle and values. However, the core market remains pet owners motivated by emotional attachment and sustainable design.

5. Space and Equipment

Production can be organised in a compact, well-structured studio of approximately 30–50 m², with clearly defined zones for sorting and cleaning glass, cutting and shaping, melting and forming, polishing, engraving, and final assembly. The space should provide good ventilation, natural light, and

safe material handling conditions. Core equipment includes small glass kilns for melting and forming components, precision cutting and grinding tools, polishing and buffing gear, and engraving tools or a small laser for customisation, along with full personal protective equipment. Optional additions include basic metalworking tools for fittings, UV lamps for adhesive curing, and dedicated extraction for fumes and fine particles.

A typical 40 m² setup can be divided into cullet preparation, hot-working, and cold-finishing bays. Two top-loader kilns (approx. 45 × 45 cm, up to 1,250 °C), a water-fed trim saw, lap grinder, small sandblasting cabinet, and local exhaust ventilation form a complete core line. The layout supports small-batch artisanal production and can be scaled gradually, with each additional kiln requiring around 4 m² and effectively doubling output, or by partnering with a larger manufacturing facility for semi-industrial runs.

6. Distribution Channels

Distribution is centred on direct online sales through a dedicated e-commerce platform that supports customisation, clear visual presentation, and storytelling around material origin and the making process. This channel enables close customer relationships and higher margins while reinforcing the value of handcrafted production.

Physical sales and visibility are achieved through curated craft fairs, sustainability-focused markets, and selected design events, where customers can experience the products directly and engage with the maker. These settings also support networking with retailers and designers.

Retail distribution focuses on carefully selected pet boutiques and sustainable lifestyle stores that prioritise quality, ethics, and narrative-driven products. Selective use of online design marketplaces can support early-stage reach and niche visibility without diluting the brand.

Additional revenue can be generated through small-scale corporate and institutional partnerships for custom gift sets, where the emphasis remains on responsible sourcing, design quality, and controlled production rather than mass promotion.

7. Cost Structure

The cost structure is based on small-scale, craft-led production with low material and overhead costs. Recycled glass is sourced affordably through local partners and customer contributions, while labour reflects fair compensation for skilled artisans working in a flexible workshop setup. Equipment and space requirements remain modest, with shared studios further reducing fixed expenses.

Marketing, distribution, and packaging are kept lean through selective digital channels, curated fairs, and lightweight, recyclable packaging, while overhead costs cover basic administration, insurance, and ongoing design development.

Initial Costs

Cost item	€ estimate	Comments
Two energy-efficient kilns	~5 000	45 × 45 cm, Wi-Fi controllers
Diamond saw & lap grinder	~1 800	wet, variable-speed
30 W laser engraver	~2 500	names, QR codes
Steel & silicone mould sets	~1 200	6 shapes, three sizes
LEV ducting, PPE, fire kit	~1 000	REACH-compliant filters
Brand assets & web shop	~2 200	photo + AR plug-in
Total CAPEX	13 700	

Monthly Costs

Cost item	€ estimate	Comments
Recycled cullet & collection	~200	net of disposal credit
Renewable electricity	~250	Two firings daily
Artisan wages (1.5 FTE)	~3 000	living wage
Studio rent & insurance	~850	urban fringe
Packaging & shipping	~180	recycled pulp boxes
Digital ads & influencer fees	~300	pet/lifestyle channels
Consumables & maintenance	~150	belts, kiln elements
Total OPEX / month	4 930	

8. Revenue Streams

Pricing reflects handcrafted production, sustainable materials, and the emotional value embedded in each piece. Standard matching sets, single accessories, and custom items are positioned in the mid-to-premium range, with higher prices applied to personalised work, owner-supplied glass, and limited artist editions. Premium pricing is justified by bespoke design, small-batch production, and traceable material stories.

Revenue is primarily generated through direct-to-consumer online sales, ensuring higher margins and closer customer relationships, supported by selective boutique retail and artisan markets. Demand is strongest during gifting periods, with limited releases timed accordingly. Additional revenue comes from optional customisation, engraving, and special editions, while future growth can be supported through brand collaborations and small-scale workshops without shifting away from artisanal production.

9. Social Impact & Gender Equality

See the introduction part C for the full overview.

- Women's skills & entry paths: training in glass working, design, and assembly tailored for women from underserved backgrounds.
- Fair, flexible work: equal pay with caregiver-friendly scheduling; zero-tolerance anti-discrimination policy.
- Leadership & mentorship: women encouraged to lead on product design, marketing, and operations, backed by structured mentorship.
- Women-led partners: collaboration with women's cooperatives and NGOs to widen outreach and inclusion, especially in regions with limited green-economy opportunities.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for Matching Decorative Accessories for Dogs and Their Owners is 3.12 kg CO₂e per 1 kg of finished glass accessories.

The largest share of emissions comes from electricity consumption during kiln melting and annealing of small glass blanks, followed by cold-working processes (cutting, grinding, polishing) and laser engraving for personalisation. Smaller contributions stem from cullet collection and cleaning, hardware mounting, and packaging. Because the product uses a high share of recycled glass and very small component sizes, material-related emissions remain low. At the same time, energy intensity is driven mainly by kiln efficiency, firing frequency, and the local electricity mix.

This figure represents a realistic small-studio average for artisanal production with two medium top-loader kilns operating daily. Actual results may vary depending on batch size, kiln loading efficiency, renewable energy share, and the proportion of customer-supplied glass incorporated into each order. Importantly, the ArtGlass Carbon Footprint Calculator has direct practical application for anyone implementing this idea: producers can input their own kiln power, firing schedules, batch weights, transport distances, and electricity mix to obtain a project-specific carbon footprint, making the catalogue both an indicative benchmark and a tool for real-world deployment.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, this idea is promoted through cross-over contexts between wearable craft and lifestyle design, where small objects function as both personal artefacts and giftable design pieces. Visibility is built through curated craft exhibitions, design-led markets, and partnerships with boutique pet retailers and museum shops that frame the sets as contemporary applied glass with emotional provenance (owner-supplied "story glass"). Digital channels are used to document custom commissions, engraving, and material origin, strengthening authorship and trust for professional stockists and collaborators.

18. Cut and Fuse Local Waste Glass into Jewellery and Buttons

Local waste glass shards are transformed into jewellery and small functional objects through simple cutting and fusing techniques. Selected fragments are melted and reshaped into smooth cabochons for rings, earrings, and unique coat buttons, preserving the original colour and character of the glass. Combined with recycled silver settings or upcycled textile cords, each piece becomes a small, wearable object that carries the story of local waste turned into design. The process is suitable for small studios and emphasises craft, circularity, and material reuse rather than heavy industrial processing.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. The only type of glass used for this product is soda-lime glass, with a list of proposed sources.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

Bottles soak in 60 °C detergent, then a hand tile-nipper snaps them into 20–30 mm shards. Selected colours are layered on 10 mm kiln paper circles and fired in a microwave kiln kit ([Pearsons microwave kiln](#)), with a full fuse taking 6–8 min at ~1500 °F (815 °C), followed by a one-hour lid-closed cool down ([Glacial Art Glass](#), 2021). A diamond-coated rotary bit drills shank holes or jump-ring ports under a slow water feed to prevent cracks. Short tack-fuse cycles embed mica flakes or copper foil between glass layers, creating metallic auroras that outshine mined stones. Finished pieces spend 10 min in a 550 °C bench kiln for strain-relief, ensuring gym-floor-level durability. Safety goggles, nitrile gloves and an FFP2 mask guard against glass dust and fumes.

3. Value Propositions

Customers get luxury aesthetics without luxury footprints. Repeatable kiln cycles let designers promise consistent sizes that natural sea glass cannot, while the soft frosting evokes beach-comb nostalgia now that many coasts ban glass gathering. Buttons command fashion-industry attention as brands phase out petro-plastic trims ([Vogue Business](#), 2019).

4. Customer Segments

- Eco-conscious fashion houses could commission branded button runs for limited-edition garments, using recycled glass to reinforce their sustainability credentials.
- Independent jewellers and design studios – might purchase cabochon blanks or tumbled gems wholesale for use in bespoke mounts and small-batch collections.
- Zero-waste craft kit producers – could include pre-drilled glass gems in DIY jewellery or mosaic kits aimed at hobbyists and educational markets.

- Upcycling workshops and creative tourism venues – could offer hands-on sessions where participants make jewellery or buttons from reclaimed glass as sustainable souvenirs.
- Corporate gift agencies and ethical retailers – might source limited jewellery lines or custom cufflinks made from branded bottle glass for promotional campaigns.

5. Space and Equipment

A small 20 m² studio, half garage, half spare-room, could house a sink, two microwaves, a drilling bench and drying racks. Noise stays under 65 dB, and fume levels remain domestic because kilns are closed. All gear plugs into a single 16 A household circuit, making the operation genuinely portable: pop-up shops can demonstrate live fusing with only an extension lead.

6. Distribution Channels

Distribution could combine digital reach, local networks, and live demonstrations, creating multiple entry points for different customer types. Retail sales could begin through Etsy and a Shopify storefront, both offering carbon-neutral or offset shipping options and fully recyclable packaging. Each listing could highlight the glass's origin story, batch colour, and CO₂ savings to strengthen transparency and buyer connection.

For wholesale clients, reusable polypropylene boxes could deliver bulk button or gem packs to designers and boutiques within a 400 km radius, reducing both cost and footprint. Regional hubs or shared logistics with other circular brands could further lower emissions. At slow-fashion fairs and sustainable design events, live "Fuse-a-Button" demonstrations could engage visitors directly, showing how recycled glass is shaped, fused, and polished into final products. These events could double as mobile marketing, building mailing lists and converting onlookers into customers on the spot.

An affiliate partnership scheme could extend the network even further, offering tailors and small ateliers a €1 reward for every upcycled glass button sewn onto a client's garment. Over time, workshops, co-branded pop-ups, and seasonal collaborations with ethical designers could transform distribution into a story-led ecosystem—one that connects artisans, retailers, and wearers through visible acts of circular design.

7. Cost Structure

Initial Costs

Cost item	€ estimate	Comments
2 × microwave kiln kits (Fuseworks)	~180	Around 90 € each Pearson's microwave kiln
Dedicated 23 L inverter microwaves (2)	~260	precise power control
Bench-top annealing kiln 9 L	~1 150	550 °C max
Rotary drill press + coolant pump	~380	incl. 10 diamond bits
Hand nippers, sieves, PPE	~240	safety goggles, masks
Branding & e-commerce set-up	~650	domain, template, logo
Sample metals & findings	~420	recycled silver/brass
Contingency (15 %)	~480	buffer
Total CAPEX	3 780	

Monthly Costs

Cost item	€ estimate	Comments
Studio rent & utilities	~450	12 m ² incl. 180 kWh
Founder salary (0.6 FTE)	~1 500	living wage
Grit, kiln paper, bits	~110	800 units
Metals & findings	~200	recycled silver & copper
Packaging & shipping	~150	plastic-free
Marketing (ads, fairs)	~130	social boosts
Insurance & admin	~95	product liability
Total OPEX / month	2 635	

8. Revenue Streams

- Jewellery-earring pairs €38–48; cocktail-ring cabochons €30.
- Fused buttons-sets of four, €12–16 retail or €7 wholesale to tailors.
- Creative workshops-€55 per seat, eight seats; materials recovered through ticket price. Demand peaks pre-winter coat season and spring bridal commissions.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for cutting and fusing local waste glass into Jewellery and Buttons is 2.48 kg CO₂e per 1 kg of finished glass products.

Most emissions originate from electricity use during microwave kiln fusing and short annealing cycles, followed by drilling and cold-working operations (edge finishing, polishing). Because the process relies on very small batch sizes, short firing times (minutes rather than hours), and a high share of recycled soda-lime glass, material-related emissions are minimal. Contributions from washing, hand breaking, and packaging remain marginal.

This value reflects a typical two-person micro-studio setup using two microwave kilns and one small bench annealing kiln, operating at artisanal scale. Results will vary depending on microwave efficiency, firing frequency, batch loading density, and the local electricity mix, but overall emissions remain significantly lower than conventional jewellery glass melting.

As with other catalogue entries, the ArtGlass Carbon Footprint Calculator can be directly applied by makers who implement this idea: by entering their own electricity consumption, number of firing cycles, batch weights, and transport distances, producers can generate precise, operation-specific carbon footprint values, making the catalogue both an indicative reference and a practical tool for real-world production.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, this idea is positioned at the intersection of jewellery craft and slow-fashion components, where buttons are treated as material signatures rather than accessories. Promotion targets design fairs, craft biennials, and fashion-oriented showcases where designers, tailors, and textile studios source distinctive trims and commission small runs. Digital documentation focuses on colour runs, mould outcomes, and component testing, enabling professional buyers to reference consistent batches while keeping the work rooted in studio-scale authorship.

19. Branded Glass Jewellery from Recycled Bottles

This initiative transforms used beverage bottles, particularly those from iconic or locally loved drink brands, into elegant, handcrafted jewellery. By repurposing broken or discarded glass from beverage companies, such as soda, gin, beer and other bottles, artisans can create earrings, necklaces, pendants, bracelets, rings, and cufflinks that feature distinct colour palettes and brand stories.

The jewellery is not only visually appealing but also carries emotional and narrative value. A piece made from someone's favourite drink symbolises sustainability, locality, and personal taste.

In addition to artisan-led collections, this concept allows for branded collaborations with beverage companies. Brands like Coca-Cola, Heineken, and Beefeater Gin have already commissioned upcycled glass products as part of their sustainability initiatives, paving the way for co-branded jewellery lines, social campaigns, and influencer promotions.

1. Glass Types and Sources

See the introduction for the complete overview; below are the sources specific to Branded Glass Jewellery.

- Drink bottles (core feedstock): green/brown/clear/blue bottles from brands like Coca-Cola, Heineken, Bombay Sapphire, Schweppes, and local craft beers. Colour identity carries into the final pieces and boosts recognisability.
- Limited editions: seasonal or event bottles (e.g., Coca-Cola Olympic runs, Beefeater design collabs) with special embossing/printing - ideal for collector lines.
- Clean-up streams: materials gathered via NGO/student/venue clean-ups (beach, nightlife, festivals); each piece pairs brand nostalgia with an environmental redemption story.
- Brand & hospitality partnerships: formal supply from beverage companies and venues (CSR/co-branding/merch), including simple agreements for regular post-consumer packaging.

These sources provide traceable colours, strong storytelling, and a reliable supply for small-batch jewellery.

2. Glass Processing Methods

See the general introduction for technical parameters. For this line, bottle necks and sidewalls are torch-worked into beads and cabochons, while selected shards are kiln-fused or slumped in ceramic moulds, then annealed for strength. Pieces are cold finished on diamond laps to smooth edges and intentionally preserve or highlight embossing and logos. Components are mounted using recycled-silver bezels or cord, optionally sealed with eco-resin, and each item is packaged with clear branding that credits the drink source and the artisan collaboration.

3. Value Propositions

- For Beverage Brands
 - Strengthens sustainability credentials
 - Offers innovative merchandise or promotional items
 - Aligns with circular economy and EU Green Deal messaging
- For Artisans
 - Provides consistent, colourful, and easily sourced material
 - Enables creative branding and niche market appeal
- For Customers
 - Emotional connection to a favourite drink or night out
 - Unique, handcrafted accessories with narrative value
 - Opportunity to support reuse, local artisans, and environmental efforts
- Glass containers that once held a favourite drink carry a deep emotional significance. Customers receive jewellery with an authentic backstory and a tangible connection to the circular economy. For beverage brands, co-branded product lines extend the lifespan of their offerings and reinforce sustainability goals without requiring new capital investments. Manufacturers benefit from a low-cost feedstock that is already colour-sorted and readily available in urban areas while also developing valuable hot-glass skills.

4. Customer Segments

- For example, Coca-Cola, Heineken, and Craft Beverage Fans
Individuals are loyal to specific brands and seek meaningful memorabilia.
- Sustainability-Oriented Consumers
Seeking accessories with a message and low environmental impact.
- Corporate and Brand Clients
Beverage producers and venues are interested in co-branded merchandise or CSR projects.
- Influencer-Driven Markets
Younger audiences are swayed by lifestyle and eco-fashion creators.

*Eco-conscious millennials are driving demand in e-commerce channels by purchasing gifts that have a "story to tell." Festival-goers and craft beer enthusiasts seek souvenirs that commemorate their favourite brews. Corporate sustainability teams buy co-branded cufflinks for events. Design-forward boutiques in Amsterdam, Berlin, and Copenhagen are incorporating small-batch, provenance-rich accessories into their curated collections. Additionally, early adopters in the £10 billion European sustainable jewellery market, which is growing at an annual rate of 8–10% (LinkedIn Market Insight, 2025), are helping to amplify brand reach.

5. Space and Equipment

- Production Workshop (~30–50 m²)
Requires zones for cold working, kiln firing, torch flameworking, polishing, and metalwork.

- Core Equipment:
- Glass-cutting tools
- Flameworking torches and accessories
- Small electric kiln (up to 1,200 °C)
- Rotary polishers, engraving pens
- Safety equipment: goggles, masks, heat gloves

*A 50 m² studio is designed to accommodate torch stations, a fusing kiln, and a cold-working corner. The essential equipment includes a Skutt Firebox 14 kiln, priced at approximately €1,550 (Warm Glass, 2025) from warm-glass.co.uk, a Minor-class torch, an oxygen concentrator, a diamond lap wheel, a wet-belt sander, a pegboard for tools, and a vent hood rated at 2,500 m³/h. The layout is modular: each additional torch and kiln pair allows for the addition of two artisans without requiring significant rearrangement.

6. Distribution Channels

Primary channel: brand partnerships. Partner breweries, distilleries, and soft drink makers commission limited-edition, co-branded lines distributed via their e-commerce stores, subscription boxes, and in-pack promotions. This turns empty bottles into high-margin story pieces that support sustainability targets.

Ready for retail. The studio supplies finished components with provenance cards and QR-linked videos so partners control pricing, customer interactions, and post-purchase engagement.

Secondary B2B routes. Corporate gift programs and trade show giveaways secure volume orders and predictable production runs, letting the studio focus on design rather than small-parcel fulfilment. Additional outlets. Concept stores and artisan galleries that emphasise upcycling and regional identity. Branded hospitality venues such as partner bars, festivals, and hotels. Online direct-to-consumer via Instagram shops, influencer storefronts, for example, the Heineken Experience in Amsterdam and the World of Coca-Cola in Atlanta, where limited editions tied to brand colours. Sales in brand museums and visitor centers, for example the Heineken Experience in Amsterdam and the World of Coca-Cola in Atlanta, where limited editions tied to brand colors or historic packaging increase perceived value.

7. Cost Structure

- Low Material Cost
Bottles are donated or recovered as waste.
- Labour
Artisans are compensated per piece or batch, depending on the complexity of the technique.
- Branding and Packaging
Custom designs for each brand or series include logo tags and sustainable packaging.
- Marketing and Influencer Fees
Partnerships with eco-influencers may involve gifting or co-promotion agreements.

- Equipment Maintenance
Regular replacement of flameworking tips and safety gear is essential.

A lean, craft-scale model keeps fixed costs low, but energy-intensive hot work drives variable costs. Rent benchmarks utilise the Dutch creative-industry average of €18.79 m²/month (Expatica, 2025) expatica.com; electricity is priced at €0.193 kWh⁻¹ for SMEs (GlobalPetrolPrices, 2024) globalpetrolprices.com; LPG for torches costs €0.78 L⁻¹ (GlobalPetrolPrices, 2025) globalpetrolprices.com.

Initial Costs

Cost item	€ estimate	Comments
Skutt Firebox 14 kiln	~1 550	14-inch chamber
Bench torch & hoses	~350	Minor-class
Oxygen concentrator	~700	Reconditioned medical unit
Diamond lap & sander	~1 200	Shared cold shop
Safety & ventilation	~600	Ducting, masks, and a fire blanket
Small metalsmith kit	~300	Pliers, saws, pickle pot
Branding & packaging print run	~350	1,000 recycled boxes
Rent deposit (2 months)	~1 880	50 m ² studio
Licences & insurance	~600	Craft liability
Total CAPEX	7 530	-

Monthly Costs

Cost item	€ estimate	Comments
Studio rent	~940	50 m ² @ €18.79
Electricity (500 kWh)	~100	Kiln cycles & lighting
LPG / oxygen	~30	~35 L LPG
Consumables & metals	~250	Silver bezel strip, epoxies
Part-time assistant (0.25 FTE)	~550	Fair-wage artisan training
Insurance	~60	Equipment & public liability

Cost item	€ estimate	Comments
Marketing & e-commerce	~100	Shopify, ads
Bottle collection logistics	~120	Cargo-bike lease
Total OPEX / month	2 150	-

8. Revenue Streams

- Co-branded campaigns (primary): Beverage brands commission runs of 500–5,000 units; wholesale prices ~€28–35 for charms and €60–70 for premium pendants. Includes a €1,500 design-origin fee for new bottle styles and a 6% licensing royalty on limited editions.
- Corporate gifting: Breweries purchase mixed sets for bulk orders (>1,000 units) at ~€25 per set, providing steady B2B volume.
- Workshops: “Bottle-to-Bead” sessions at €55 per participant, with 70% of gross proceeds to the studio, building community and marketing content.
- Direct retail sales: Individual pieces and themed series sold online/offline to consumers.
- Merchandise licensing: Exclusive designs for events/fan clubs (e.g., music festivals with Heineken or Coca-Cola).
- Influencer launch collaborations: Limited-edition drops with creators focused on sustainability and youth culture.

Seasonality: Revenues peak during spring product launches and Oktoberfest, while winter gift orders help stabilise cash flow.

9. Social impact & gender equality

See the introduction part C for the full overview

- Women-focused training & flexible work: targeted upskilling; part-time/home-based formats for caregivers and students.
- Joint credit & visibility: equal co-branding for artisans, influencers, and partner brands; youth workshops to open early pathways.
- Respectful workplace charter: a monthly mixed committee monitors anti-harassment commitments.
- Digital wages & inclusion: secure mobile-wallet payouts plus basic financial-literacy support.
- Transparent pay bands: annual dashboard by role/skill; corrective action if the gender pay gap exceeds 5%.
- Seed micro-grants: allocate 5% of annual profits to help former apprentices (priority: women-led teams) start studios.
- Shared governance: craft co-ops (e.g., bottle-embossing specialists) represented on the advisory board.

Possible targets: halve the gender pay gap in 3 years; create 40 skilled roles for migrant women by 2027; distribute €25,000/year in micro-grants.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this product line is 3.12 kg CO₂e per 1 kg of finished recycled-glass jewellery.

Most emissions come from electricity and fuel use during torch work, kiln fusing and annealing, while smaller contributions stem from cold-working and local collection logistics. Because the process relies entirely on post-consumer recycled bottles, material-related emissions remain low, and the footprint is primarily driven by energy use.

These values represent indicative estimates for small artisanal studios and may vary depending on equipment efficiency, production scale and local energy sources. The calculator can be directly applied by brands and studios implementing this idea, allowing them to enter real production data and obtain a project-specific carbon footprint.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, this idea is promoted through co-branded collaborations and venue-based cultural contexts, where provenance and identity are part of the object's value. The work is presented via design fairs, hospitality showcases, and brand-adjacent visitor venues (distilleries, breweries, cultural partnerships), supported by limited-edition lines that foreground both the artisan and the source material. Digital channels document the transformation from bottle to object and formalise attribution, making the collaboration legible to brand partners, curators, and professional retailers.

20. Lampwork Local Waste Glass into Beads and Jewellery

A slender glass rod glows orange in the torch flame, then winds onto a mandrel to become a bead flecked with local beach-sand frit; moments later, the same flame fuses a slice of obsolete CRT into a smoky-green pendant. This micro-studio turns hard-to-recycle household bottles and electronic-waste glass into contemporary jewellery that satisfies Gen Z's hunger for up-cycled self-expression while keeping heritage lampworking skills alive.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. The main type of glass used for this product is soda-lime glass. Colour-sorted bottle cullet (bar, café and kerbside collections) could supply most of the batch, and pre-consumer breakages from a regional drinks distributor could fill in the rest of the supply. Collaboration with a local e-waste recycler could help secure clean CRT panel glass for limited “screen-green” editions, and quarterly community “Bring-a-Bottle” drives top up stock while fuelling brand stories. All arrivals are washed, metal-checked and colour-separated before being cut into 6–8 mm chips for the torch.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

Soft-drink cullet is flame-melted at 900–1,050 °C on a bench-mounted oxy/propane torch, then kiln-annealed at 510 °C for one hour to relieve stress. For beads, molten glass is spiralled onto mandrels, decorated, then batch-annealed in a 9-litre digital kiln. CRT panel shards, high-lead-free and soda-lime compatible, are pre-fused into 8 mm rods before lampworking. Safety kit includes eye protection (didymium filters), leather sleeves and a filtered bench extractor for lead-dust capture.

3. Value Propositions

This venture could turn a once-problematic waste stream into a powerful design statement. Jewellery made from recycled CRT glass would valorise an e-waste material that EU law now classifies as hazardous and expensive to export (USEPA / Basel, 2024), giving it new cultural and economic value. The concept would strongly appeal to Gen Z consumers, a generation that research shows increasingly favours expressive, sustainable pieces over conventionally mined luxury (Vogue Business, 2025). Positioned within a sector already worth more than €10 billion in Europe and growing at 8–10 % annually (Insight Precision, 2025), this line could offer both environmental impact and commercial opportunity, uniting circular design, heritage craftsmanship, and contemporary fashion values.

4. Customer Segments

- Eco-conscious millennials and Gen Z urban consumers could purchase CRT-glass jewellery as expressive, sustainable accessories that align with their values of individuality, reuse, and ethical consumption.
- Zero-waste and sustainable fashion boutiques – might curate small wholesale runs to offer distinctive, story-driven collections that differentiate them from mainstream jewellery lines.
- Museum and science-centre gift shops – could commission exclusive “tech nostalgia” collections, linking digital heritage with environmental renewal.
- Bead artists and glass studios – may buy ready-made recycled CRT-glass rods for their own creations, supporting both material reuse and artisanal experimentation.
- Corporate and tech-sector gift programmes – could order limited-edition pieces made from reclaimed electronic glass as symbolic sustainability tokens for staff or partners.
- Eco-design galleries and concept stores – might feature CRT-glass jewellery as collectable examples of design innovation bridging technology, memory, and circular fashion.

5. Space and Equipment

A 25 m² room splits into a torch bench, a kiln shelf and a tiny cold-finish corner. Core kit: Nortel Minor surface-mix torch, oxygen concentrator, bead-annealing kiln, bench grinder, and HEPA fume hood. Everything runs on single-phase power, making the setup viable in a home garage or shared maker hub. Scalability comes from adding more torches and a larger annealer.

6. Distribution Channels

A direct-to-consumer web shop with traceability QR codes could be made, Etsy and Faire listings for beadmakers, with pop-ups at craft and zero-waste fairs. Collaborations could be started with local e-waste recyclers, who retail “screen-green” pendants in their own showrooms. Instagram reels of bottle-to-bead transformations anchor social reach.

7. Cost Structure

Initial Costs

Cost item	€ estimate	Comments
Nortel Minor torch set-up	~330 – 380	includes hoses & flash-backs
9 L digital bead kiln	~1 800 – 2 500	Paragon BlueBird range
Oxygen concentrator	~1 000 – 1 400	refurbished medical unit
Bench extractor + HEPA	~600 – 900	tabletop laminar hood
Diamond hand tools & mandrels	~250 – 400	scribe, marver, paddles
Branding & e-shop	~600 – 900	domain, photo kit
Total CAPEX	4 580 – 6 480	-

Monthly Costs

Cost item	€ estimate	Comments
Electricity (kiln, concentrator)	~40 – 70	≈ 230 kWh @ €0.30
Propane & oxygen service	~45 – 65	8 kg LPG + maintenance
Studio rent & utilities	~300 – 450	25 m ² co-making space
Consumables (mandrel-release, frit)	~30 – 50	colourants, bead-separator
Marketing & shipping samples	~40 – 60	reels, eco-mailers
Part-time assistant (0.3 FTE)	~600 – 750	living-wage region
Total OPEX / month	1 055 – 1 445	-

8. Revenue Streams

- Standard bead sets (10 mm): €15 – 25 per five-pack
- CRT-pendants: €45 – 70
- Bespoke charm bracelets: €85 – 120
- Two-hour lampwork workshops: €55 pp (winter off-season buffer). Peak sales coincide with Christmas gifting and summer festival circuits, each driving ~40 % of annual turnover.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this product line is 3.08 kg CO₂e per 1 kg of finished lampworked glass jewellery.

The footprint is primarily driven by electricity and fuel consumption during torch work and kiln annealing, while material-related emissions remain low because the process relies entirely on post-consumer recycled glass, including bottle cullet and reclaimed CRT panel glass. Additional contributions stem from cold-working, studio ventilation, and local collection logistics.

This value represents an indicative estimate for small-scale artisanal studios and may vary depending on equipment efficiency, production volume, and local energy sources. The calculator has direct practical application for studios and brands implementing this idea, as they can enter their own production parameters and obtain a project-specific carbon footprint.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, lampworked beads and jewellery are promoted through contemporary glass-art and applied-arts circuits where technique, heritage skill, and material experimentation are central evaluation criteria. Visibility is developed through juried exhibitions, glass events, museum-shop programming, and professional networks that connect studios, beadmakers, and curators, with CRT editions framed as limited material research within craft practice. Digital channels serve as a studio record of making, annealing, and series development, supporting professional reference and collector confidence.

21. Shoe Accessories

A fashion-forward line of shoe accessories made from 100% upcycled glass, including detachable clips, glass-infused heels, strap embellishments, and decorative accents. Developed with local shoemakers, cobblers, and sustainable fashion designers, the collection blends expressive artistry with circular craft. Pieces can be modular add-ons or integrated during shoemaking, adapting from upcycled streetwear to bridal styles. Ethical sourcing and creative material reuse make this ideal for ethical brands, capsule collections, limited editions, and collaborative ventures. Each piece is a testament to the journey from waste to chic, empowering shoemakers and eco-conscious brands to shine in a vibrant marketplace. By combining local glass sources with traditional artisanal kiln techniques, it combines design quality, responsible materials, and a clear material story in each accessory.

1. Glass Types and Sources

See the introduction for the complete overview; below are the sources specific to Shoe Accessories.

- Post-consumer bottles (green/amber/blue): used for small melted or flameworked accents with strong colour identity.
- Window & mirror offcuts: flat/low-iron panes and mirror scraps shaped into geometric elements; edges sealed and mirror backing removed or sealed for wearables.
- Kiln-fused fragments: in-house fuse tiles for heel inserts or embossed strap details.
- Branded/luxury packaging glass: curated perfume, liquor, and cosmetics cullet for premium editions.

Compatibility note: container, float, and mirror glass run in separate streams; all pieces for wearables are smoothed and finished for skin/contact safety.

- Material from clean-ups, processed only as sterilised cullet (not used as intact shards) before fusing/casting
- Mosaic scraps and fused offcuts: Ideal for crafting ends with stunning crushed-glass textures or layered embellishments.

2. Glass Processing Methods

See the general introduction for technical parameters. For this line, cleaned bottle and flat glass are crushed to 3–5 mm frit, then kiln-fused or slumped into small blanks for clips, buckles, or heel inserts using soda-lime schedules, followed by annealing around 520 °C for stress relief. Pieces are cold worked on diamond laps to a safe edge radius of at least 0.5–1 mm, then polished for wearer comfort; optional engraving or layered pairings with cork, recycled leather, or vegan suede add texture and brand motifs. Components are mounted either as detachable clips with custom rivets and clasps or integrated into heels using reusable moulds and neutral-cure silicone or UV adhesives designed for flex and shear. Basic QA includes polarised-light stress checks and a 100 N pull test on findings, and PPE with local exhaust ventilation is used to manage glass dust and silica exposure.

3. Value Propositions

Upcycled glass shoe accessories introduce a durable, light-reflective material into footwear design, expanding the aesthetic and functional possibilities of decorative elements. Glass components can be produced in controlled shapes, colours, and surface finishes, enabling integration into seasonal collections, limited editions, or bespoke footwear without altering the core structure of the shoe.

As glass remains an underused material in wearables, this concept positions designers and brands in a distinctive niche within circular fashion, supporting professional visibility through exhibitions, design platforms, and curated collections. The use of recycled cullet provides a clear and verifiable material origin, reinforcing transparency and traceability in line with contemporary sustainability expectations.

The concept supports collaboration between glass artisans, shoemakers, and designers, enabling cross-disciplinary production models and local value creation. For consumers, it offers accessories that combine visual distinctiveness with responsible material use, while environmentally, the substitution of virgin materials with recycled glass contributes to lower embodied emissions and resource savings across the product lifecycle.

4. Customer Segments

Upcycled glass shoe accessories are primarily intended for fashion and footwear brands that seek distinctive, responsibly sourced materials to differentiate selected lines or limited editions. The accessories can function as integrated elements or detachable details, allowing designers to experiment with material expression while maintaining flexibility in production.

The concept is also relevant for small-scale shoemakers and repair studios, where glass elements can be incorporated into custom work or restoration projects, adding aesthetic value and extending the lifespan of existing footwear. In parallel, it appeals to designers working in couture, bridal, or performance contexts, where originality, craftsmanship, and narrative value are central.

At the consumer level, the products address individuals who value expressive design and sustainability, positioning glass accessories as collectable, statement elements rather than mass-market components.

5. Space and Equipment

Production can be organised in a compact 30–50 m² studio with ventilated zones for cutting, fusing, finishing, and final assembly, allowing safe material handling and flexible collaboration with shoemakers. Core equipment includes glass cutters, grinders and polishers, and a compact low-energy kiln for fusing, slumping, and forming glass elements, along with engraving or laser-etching tools for customisation. Integration tools include moulds and fastening systems for attaching glass to leather, vegan leather, or textile components, supported by materials such as recycled cork, bioplastics, or metal. The studio is completed with appropriate PPE, dust extraction, adjustable workbenches, and

focused lighting. Optional prototyping tools, such as 3D-printed shoe forms and modular mounting kits, support rapid experimentation and co-design without increasing spatial requirements.

6. Distribution Channels

Distribution is primarily organised through direct B2B collaboration with sustainable footwear brands, where glass accessories are integrated as modular or detachable components within seasonal collections. This channel ensures technical compatibility, design coherence, and stable production volumes.

Secondary distribution includes designer-led platforms and slow-fashion boutiques that focus on limited editions and material-led innovation, allowing glass elements to reach design-conscious consumers without mass production.

Professional visibility is built through participation in fashion, material, and circular design events, where prototypes and finished accessories are presented as components rather than standalone products. Selective online marketplaces support international reach and early feedback while maintaining controlled brand positioning.

Additional channels include collaborations with design schools and makerspaces for prototyping and experimentation, as well as small-scale custom commissions for events, press kits, and sustainability-oriented partnerships.

7. Cost Structure

Initial Costs

Cost item	€ estimate	Comments
Digital fusing kiln (40 × 40 cm)	~1 200	Energy-efficient, programmable
Diamond flat-lap grinder	~500	12-inch, variable speed
Wet-belt sander & hand tools	~450	Edge finishing
Ventilation & PPE package	~1 000	Extraction fan, masks, gloves
Workbench & lighting fit-out	~850	Modular, LED task lights
Brand & e-commerce set-up	~1 000	Website, QR-passport SaaS
Total	5 000	

Monthly Costs

Cost item	€ estimate	Comments
Artisan wages (part-time 2 FTE)	~2 400	Fair-pay cooperative rates
Electricity (two kiln cycles day ⁻¹)	~180	Smart-meter off-peak
Consumables (adhesives, findings)	~250	Silver, UV glue, cork
Studio rent & utilities	~600	40 m ² in the Belgrade arts district
Marketing & event fees	~200	Social ads, pop-up stands
Total	3 630	

8. Revenue Streams

Revenue is generated through a combination of direct sales, collaborations, and experience-based offerings. Handcrafted accessories are sold directly to consumers through a dedicated webshop and selected online platforms. At the same time, co-branded collections with sustainable footwear designers provide stable B2B income and enable premium positioning through limited editions.

Additional income comes from commission-based pieces for events, couture, and performance wear, where custom design and ethical production justify higher margins. Experience-driven revenue includes small DIY kits and workshops that support community engagement and material literacy without increasing production pressure.

Public and private grants can support research, design development, and training activities, helping to stabilise early-stage operations. Pricing reflects handcrafted quality and customisation, with higher margins in bespoke and B2B channels. Seasonal demand peaks are balanced by shifting studio capacity toward collaborations, education, and special commissions, creating a diversified and resilient revenue model.

9. Social impact & Gender equality

See the introduction for the full overview

- Women's empowerment: training in sustainable fashion design, kiln techniques, and accessory assembly targeted at women artisans and creative entrepreneurs.
- Flexible work & fair pay: equal pay structure and adjustable working hours suited for caregivers, students, and freelancers.
- Inclusive collaboration: partnerships with women-led shoe studios, designers, and cooperatives to co-create limited editions.
- Career growth: mentorship and leadership tracks enabling women to take lead roles in design, production, and branding.

- Social enterprise links: preference for suppliers and subcontractors that employ or train women from underserved backgrounds.

These measures integrate gender equality and fair employment directly into the circular fashion and sustainable design value chain.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this product line is 2.96 kg CO₂e per 1 kg of finished glass shoe accessories.

The footprint is primarily driven by electricity consumption during kiln fusing, slumping, and annealing, as well as cold-working processes such as grinding and polishing. Material-related emissions remain low because the accessories are produced entirely from post-consumer and post-industrial recycled glass, including bottles, flat-glass offcuts, and fused studio scraps. Smaller contributions arise from adhesives, fittings, and local collection logistics.

This figure represents an indicative estimate for small-scale artisanal production and may vary depending on kiln efficiency, batch size, and local energy sources. The calculator has direct practical application for designers, shoemakers, and brands implementing this concept, as they can enter their own production parameters to obtain a project-specific carbon footprint.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, shoe accessories are promoted within fashion and design-specification contexts where components are evaluated for originality, safety, and integration into collections. The work is introduced through collaborations with shoemakers and sustainable fashion designers, and presented at design weeks, fashion exhibitions, and material-focused showcases where stylists and brands source distinctive modular elements. Digital channels document prototyping, attachment systems, and fitted outcomes in real footwear, supporting professional commissioning while maintaining a craft-led authorship position.

22. Go Thermo-chromic with Beads and Jewellery

Thermo-chromic glass changes colour or opacity in response to temperature shifts, using embedded thermo-chromic pigments or coatings. Reversible thermo-chromic glass returns to its original colour when cooled, while irreversible thermo-chromic glass permanently changes after reaching a threshold (e.g., temperature indicators). You can integrate thermo-chromic (biocompatible) pigments into glass, use surface (low-toxicity inorganic) coatings, and/or laminating films.

While this method can result in beautiful, live and interactive jewellery, glass with embedded thermo-chromic layers is difficult to recycle conventionally (mixed materials complicate separation). That is why you should opt for surface-applied coatings (that don't contaminate glass recycling streams). Non-toxic, bio-based leuco dyes are the best option to make your jewellery thermo-chromic. Inorganic vanadium dioxide (VO₂) coatings are also very good but require high-energy processing (therefore, not so eco-friendly). Such paints or films should be applied in glass post-production, i.e. on already fused or lampworked glass, avoiding high-energy kiln and torch firings. If you are making jewellery by simply cutting flat glass, pre-made thermo-chromic films can be laminated between the glass layers. Circle your offer with accepting returns, out of which you can make mosaic jewellery pieces.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. The main types of glass used for this product are soda-lime and flat glass, which can be sourced from:

- Clear soda-lime bottle glass – easy to melt or torch-work into beads; pick up colour-sorted bottles from local bars or recycling depots.
- Beer-bottle necks (green, amber) – the neck section already has a handy cylinder shape; bar owners will save them if you supply a crate.
- Stained-glass studio off-cuts – small, brilliant shards perfect for flat pendants; most studios toss a box of scraps every week.
- Window-glass off-cuts (float glass) – thin, bubble-free sheets you can cold-cut and laminate with thermo-chromic film; ask glazing shops for their trimmings.
- Broken glass bangles and art-glass trimmings – rescue pieces from flea markets or seconds bins at craft fairs; remelt or slice them into new cabochons.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

You'll need just a handful of craft skills: safe glass handling (gloves, goggles) while cutting or lampworking waste glass into small shapes; basic cold-finishing, fire-polishing, sanding, or edge grinding, to keep pieces smooth; a steady hand for brushing on or laminating a thin, even layer of bio-based thermo-chromic paint or film; an eye for colour-shift testing so you know the change happens at skin

temperature; and simple jewellery assembly using pliers to add jump rings, ear wires, or cord loops. Master these basics, and you can turn almost any clean scrap glass into interactive, colour-changing beads and pendants.

3. Value Propositions

Thermochromic glass jewellery gives buyers a playful, ever-changing look: the beads shift colour with body heat or sunshine, so the same bracelet feels new each time it's worn. Because the colour layer is a thin, non-toxic coating added after the glass is made, the pieces stay fully recyclable and carry a clear "up-cycled from waste glass" story. Customers get interactive fashion, genuine eco credentials, and the option to return worn items for mosaic reuse, turning a simple accessory into a conversation-starting, circular product.

4. Customer Segments

- Fashion trend-seekers – love pieces that shift hue with body heat, making every outfit look different without extra effort.
- Kids and teens – drawn to playful, interactive beads; parents like the safe, non-toxic dyes.
- Festival and cosplay crowds – want eye-catching jewellery that changes under heat from dance or stage lights.
- Eco-conscious gift shoppers choose the surface-coated, recyclable option and appreciate the take-back scheme for old pieces.
- Boutique fashion and craft stores – stock small runs of unique colour-shift accessories to stand out from mass jewellery.

5. Space and Equipment

Space and equipment: A small 15 m² studio, a half bench, half torch corner is enough. Essentials are a propane/oxygen lamp-working torch or a table-top kiln, basic hand tools (glass cutter, small grinder, sanding pads), pliers and findings for jewellery assembly, a fume-hood-style fan for safe solvent use, and a shelf with thermochromic paints or films, clear bio-sealer, alcohol wipes, and gloves. Standard 230 V power and a single gas bottle cover all tasks; no heavy ventilation or three-phase wiring is required.

Technological process: Wash and, if needed, cut the waste glass; flame-shape beads or kiln-fuse flat pieces, then cool them on a fibre blanket or in the kiln's anneal cycle. Cold-sand edges smooth, wipe with alcohol, and brush on a thin coat of bio-based thermochromic paint or laminate a colour-shift film between two flat slices with hand pressure. Let the layer air-cure, add a clear sealer for durability, test the colour change with warm fingertips, and finish by attaching jump rings, ear wires, or cord loops.

6. Distribution Channels

Sell the colour-changing beads and jewellery first through an easy web-shop and linked Instagram/TikTok store, where short “touch-to-change” videos drive impulse buys. List small runs and DIY bead packs on marketplaces like Etsy so crafters worldwide can order. Place limited editions in boutique fashion and gift stores, especially festival pop-ups that thrive on eye-catching pieces. Offer wholesale bundles to school science shops and kids’ museums, which love the simple temperature-change demo. Finally, run Saturday “make-your-own thermochromic bracelet” workshops, tickets sold via Eventbrite and local craft hubs, so customers experience the colour shift in person and leave wearing their creation.

7. Cost Structure

Initial Costs

Cost item	€ estimate	Comments
Propane/oxygen torch kit or tabletop kiln	~1 000 – 1 500	Core glass-working equipment
Hand tools & safety gear	~500	Cutter, mini-grinder, pliers, PPE
Bench-top fume fan, fire-brick pad, gas bottle	~500	Safety + ventilation
Starter supplies	~400	Thermochromic paint/film, sealer, findings
Shelving, workbench, LED lighting	~600	Basic studio setup
Website, photo lightbox, first ads	~300 – 400	Branding & promotion
Total CAPEX	3 300 – 3 900	Lean but complete setup

Monthly Costs

Cost item	€ estimate	Comments
Rent & utilities (15 m ² room/garage)	~200 – 270	
Consumables restock	~100	Paint, sealer, wipes, findings
Marketing & social media	~100	Ads & small promo campaigns
Misc. studio supplies	~50	Cleaning, replacement PPE
Total OPEX / month	450 – 520	Very lean operation

8. Revenue Streams

Income flows from several angles: sell the ready-made colour-shift jewels online and at pop-up stalls; pack loose beads and easy kits for crafters; accept one-off requests from brands who want pieces that change to their logo shade; teach small, ticketed classes where people craft a bracelet and see it glow;

and offer a return-and-credit deal, old items come back, you slice them into tiny tiles, and those scraps become the following pendant line.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this product line is 2.82 kg CO₂e per 1 kg of finished thermochromic glass jewellery.

The carbon footprint is dominated by low-temperature glass forming (lampworking or small kiln fusing) and electricity use for annealing and cold finishing. Additional emissions stem from the production and application of bio-based thermochromic surface coatings and protective sealers. In contrast, material-related emissions remain low because the glass itself is entirely sourced from post-consumer and post-industrial waste streams.

Because thermochromic layers are applied post-production and do not require high-temperature refiring, overall energy demand stays significantly lower than in pigment-doped or fully re-melted glass processes. This value represents an indicative estimate for small-scale artisanal production and may vary depending on batch size, coating method, and local energy mix. The calculator has direct practical application for makers and designers implementing this concept, as they can input their own process parameters to obtain a project-specific footprint.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, thermochromic jewellery is positioned as material-led experimentation suited to design showcases that value interaction, innovation, and responsible surface treatment. Promotion focuses on design fairs, applied-arts exhibitions, and educational or museum contexts where the colour-change property can be experienced directly and assessed as a legitimate material approach rather than a novelty. Digital channels are used sparingly to document transformation and coating methodology, supporting transparency around recyclability choices and reinforcing the studio's material credibility.

HOSPITALITY & EVENT DESIGN

23. Door Accessories

The Door Accessories collection is hand-cast from 100% recycled glass and comprises elegant doorknobs, key fobs, and room number plaques. This collection transforms standard hotel hardware into a narrative of circular hospitality. The profound translucence, subtle colour variations, and cool tactile sensation of glass invite guests to engage with and retain memories of each interaction. The sourcing of materials, originating from bottles, mirrors, and barware that would otherwise contribute to landfill waste, underscores the hotel's commitment to sustainable resource management. Each production batch is uniquely melted, moulded, and finished in small quantities, allowing for the customisation of motifs, colours, and engravings in collaboration with local artists, thereby reflecting the hotel's identity as vividly as its interior decor.

1. Glass Types & Sources

See the introduction for the complete overview; below are the sources specific to Door Accessories.

- Hospitality post-consumer bottles (core feedstock): collected from the hotel's own bars/restaurants and partner venues; turned into knobs, key fobs, and plaques that double as visible branding.
- Flat glass from renovations: window panes and mirrors recovered during refits, repurposed into signage and fixtures.
- Industrial cullet: colour-consistent remnants from nearby factories to support small-batch casting and tight colour control.
- Guest/hotel contributions: broken barware or limited-edition bottles from the property, adding a traceable brand/story element.

Supply is secured through simple take-back agreements (incl. two regional waste firms for clear/amber/green cullet), ensuring traceability and quality control. Bottle glass and flat/mirror glass run in separate melts to avoid CTE mismatch; mirror backing is removed or sealed before use.

2. Processing & Craft Methods

See the general introduction for technical steps. For this collection, sorted post-consumer and flat glass are cleaned and remelted in electric kilns, then cast in reusable silicone or ceramic moulds to form knobs, plaques, and key fobs. Pieces are annealed and then cold worked (cutting, grinding, polishing) to meet ergonomic and safety requirements. Branding elements such as room numbers, hotel logos, Braille, or QR patterns are added by laser or sand etching, and a short fire polish provides a durable satin or glossy finish suitable for high-touch hospitality use.

3. Value Propositions

Turning 100% recycled glass into doorknobs, keychains, and room-number plaques converts post-consumer waste into visible, high-touch design features that signal climate leadership. Each accessory

can contain up to 70% cullet, lowering melting energy by ~17% and avoiding ~0.5 t CO₂ per tonne, with figures suitable for ESG reporting (Vetropack 2024; GPI 2025). Replacing metal or plastic hardware helps reduce Scope 3 emissions, aligns with circular-economy principles, and supports LEED and Green Key targets.

Beyond metrics, pieces are handcrafted with local artists. They can be colour-matched to site-specific cullet -“yesterday’s wine bottle becomes today’s room key” - with logos, themes, or heritage motifs that turn touchpoints into shareable storytelling. Finishes are durable, scratch-resistant, and easy to sanitise for high-traffic hospitality use. Long-term supply contracts provide artisans with a stable income and investment in cleaner electric kilns, while sourcing cullet from the hospitality sector closes the loop. Together, quantifiable savings, custom design, organic publicity, operational durability, and community impact make these a credible premium upgrade with visible, verifiable sustainability.

4. Customer Segments

Eco-friendly hotels and resorts: Properties pursuing green certifications or brand-level sustainability; eco-certified boutiques blend luxury with sustainability to elevate guest experience. Boutique and design-led accommodations: Hotels seeking distinct aesthetics with artisanal flair. Interior designers and architects: Especially adaptive-reuse specialists who must balance conservation aesthetics with circularity KPIs.

Sustainable retail and concept stores: Curated, design-oriented shops for conscious consumers; offer limited-edition key fobs as memorable souvenirs for eco-minded travellers.

Hospitality groups and property managers: Chains standardising sustainable design across multiple locations.

Green certification consultants and suppliers: Partners implementing LEED, Green Key, and similar initiatives through material substitution.

5. Space & Equipment

Compact workshop of ~30–50 m² divided into clear zones for safety and flow.

Layout

- Glass sorting & cleaning: Sinks, tables, storage bins; PPE and good ventilation.
- Kiln zone: One flatbed or top-loading kiln (~90 × 60 cm) with digital control, fireproof floor, and exhaust.
- Cold working: Wet saw for shaping, grinder and lap for edge finishing; water recycling to reduce wastewater.
- Engraving & personalisation: Sandblasting cabinet or laser engraver with fine dust extraction.
- Assembly & hardware install: Clean bench for UV-cured adhesive work, vices, clamps, precision tools.
- Quality control: Dedicated check station before packing.

- Packaging area: Sustainable materials storage, weighing station, inventory shelves.

Essential equipment

Electric kiln (to ~1,450 °C), wet saw, grinders, lap machine, polishing wheels, sandblasting setup, laser or rotary engraver, and full safety kit including heat-resistant PPE and ventilation.

6. Distribution Channels

We prioritise direct partnerships with boutique hotels, eco-resorts, and sustainability-minded hospitality groups. Procurement teams receive mock-up samples and ESG-ready reporting that showcase how local glass waste is transformed, making it easy to align our hardware with property-level sustainability goals.

We activate demand at hospitality design fairs and interior-architecture expos, running live engraving and before/after material demos to attract specifiers seeking story-driven pieces that support European frameworks such as BREEAM, DGNB, and Level(s).

For digital co-design, our e-commerce configurator lets hotel designers collaboratively explore colour palettes and finishes, enabling seamless remote iteration and approval.

To reach high-end retail, narrative POS displays in partner concept stores and museum shops extend visibility. QR codes link to behind-the-scenes videos, sustainability insights, and artisan profiles, blending storytelling, functionality, and environmental ethics for discerning buyers.

7. Cost Structure

Initial investments cover kiln hardware, cold-working tools, and digital engraving equipment, while recurring costs are primarily driven by electricity and skilled labour.

Initial Costs

Cost item	€ estimate	Comments
150 L electric kiln	~12 000	CE-certified, includes a controller
60 L annealing kiln	~6 500	Shares the exhaust stack
Laser engraver (50 W)	~7 800	QR-code & logo capability
Diamond saw & grinders	~4 200	Incl. Water-recycling loop
Sandblasting cabinet	~1 900	With HEPA filtration
PPE & ventilation	~2 200	Masks, gloves, and fume extraction
Total CAPEX	34 600	

Monthly Costs

Cost item	€ estimate	Comments
Electricity (1,400 kWh)	~420	Based on €0.30 /kWh
Skilled artisan wages	~3 600	Two FTE at €18 /h
Cullet washing & transport	~280	After barter credit
Packaging & fulfilment	~150	Recycled fibre boxes
Marketing & web hosting	~120	Site, B2B newsletter
Maintenance & consumables	~200	Kiln elements, belts
Total OPEX / month	4 770	

8. Revenue Streams

Custom hotel orders often include 200–500-piece sets, return €75 – €160 per unit, depending on engraving complexity, while limited-run retail key fobs fetch €35. Collaborative series with guest artists commands up to €250 per signed knob and tends to sell out during design-week events. A half-day “make-your-own-plaque” workshop, priced at €95 per participant, fills low-fire kiln cycles and diversifies income.

Custom Orders for Hotel Projects

Core income comes from B2B contracts for room-specific or brand-specific product lines.

Online Sales for Designers and Small Properties

Higher-margin sales for bespoke items or prototypes via the project’s website.

Limited-Edition and Artist Collaborations

Special runs with signature motifs or local heritage themes increase visibility and unit value.

Gift and Corporate Orders

Branded keychains or tags for events, staff, or corporate gifts provide seasonal spikes.

Workshops and Co-Design Experiences

Optional revenue from educational or tourist engagement sessions\

9. Social Impact & Gender Equality

See the introduction part C for the complete overview

- Hiring & pay: gender-balanced recruitment with transparent pay bands and flexible scheduling for caregivers.

- Apprenticeships: paid route promoted with a local women-in-craft NGO; target 60% female trainee intake.
- Skills in focus: training women in glass cutting, moulding, and engraving (traditionally male-dominated).
- Safe, flexible workspace: ergonomic stations and shift flexibility to widen access.
- Leadership & visibility: women lead product design, hotel collaborations, and branding; community open days showcase role models.
- Fair creative rewards: artist collaborations include 10% royalty on net sales.
- Women-led partners: cooperate with female-run co-ops and micro-enterprises to expand reach and local impact.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this product line is 3.12 kg CO₂e per 1 kg of finished door accessories.

The carbon footprint is primarily driven by electricity consumption during glass remelting and kiln casting, followed by annealing and cold-working processes such as grinding, polishing, and engraving. Additional contributions stem from laser engraving, transport and washing of cullet, and the production of metal mounting hardware.

Because the collection relies on small-batch electric kilns and high-mass solid components (doorknobs, plaques), the footprint per kilogram is higher than jewellery-scale glass objects, yet remains significantly lower than virgin-glass or metal-based architectural hardware. This figure represents an indicative average for artisanal hospitality-focused production and may vary depending on batch size, mould type, and local electricity mix. The calculator has direct practical relevance for hotels, designers, and artisans implementing this concept, as they can input site-specific parameters to obtain a project-level footprint suitable for ESG reporting and green-building documentation.

11. Marketing & Promotion

In accordance with the strategic framework defined in the introduction, door accessories are promoted through hospitality and interior-architecture channels where fixtures are specified, tested, and commissioned at project scale. Visibility is built via interior and hospitality fairs, architectural exhibitions, material libraries, and direct collaborations with boutique hotels and designers, supported by sample sets (knob + plaque + key fob) that enable tactile evaluation and brand customisation. Digital channels document installed references, engraving variants, and batch provenance, providing specifiers with traceable, professionally usable documentation.

24. Broken Glass Bin In-Store Initiative

The Broken Glass Bin Initiative transforms everyday glass waste from cafés and restaurants into a visible circular design loop. Drinking glasses and tableware, which are broken daily in hospitality spaces and are often unsuitable for standard recycling due to additives (lead, boron, heat-resistant compounds), are collected directly on-site through a dedicated in-store bin designed for safe and aesthetic storage.

Instead of being discarded as unrecyclable waste, broken pieces become a local resource for creative reprocessing. Collected glass is transformed into mosaics, terrazzo surfaces (countertops, tables, floors, bricks), resin art, lighting elements, and small design objects. Selected pieces are returned to the same cafés and restaurants as branded decorative items, souvenirs, loyalty gifts, jewellery, or custom interior elements (lamps, wall panels, chandeliers), closing the material loop in a visible and emotionally engaging way.

The initiative turns accidental breakage into intentional design, allowing hospitality venues to showcase their commitment to the circular economy through objects made from their own discarded glass.

1. Glass Types and Sources

See the introduction for the complete overview of glass types and sourcing.

Glass is collected directly from cafés, bars, restaurants, and similar venues, where drinkware and tableware are regularly damaged during daily use. This includes broken glasses, cups, plates, and serving items that are typically discarded due to form, contamination, or handling requirements rather than material quality.

Additional material comes from hospitality maintenance, such as damaged serving trays and thicker glass elements removed during interior updates. Guests may also contribute broken glass items with personal value, which can be transformed into small objects or souvenirs as part of engagement or loyalty activities.

Collected glass is kept in a separate stream and reused exclusively for decorative or non-food-contact applications, ensuring safe handling and controlled material reuse while making the circular process visible to both staff and customers.

2. Glass Processing Methods

Broken drinking glasses and tableware collected through the in-store bin are cleaned, sorted, and safely processed using low-energy, non-industrial techniques that avoid remelting and contamination risks. Glass fragments are polished and assembled into mosaics for branded panels, trays, tabletops, and decorative elements. At the same time, smaller pieces are crushed and embedded into cold-set terrazzo surfaces such as counters, tables, floors, and bricks. Selected fragments are encapsulated in resin or bio-resin to create jewellery, souvenirs, and small design objects, and larger pieces are mechanically assembled into lamps, chandeliers, and sculptural lighting. All edges are carefully finished to ensure safe, durable, customer-facing products, allowing everyday breakage to be transformed into high-value circular design without returning glass to energy-intensive industrial processes.

3. Value Propositions

For cafés and restaurants, the initiative reduces unrecyclable glass waste while turning everyday breakage into a visible circular practice. Glass that would normally be discarded returns to the space as interior elements, branded objects, or small design pieces, strengthening sustainability communication and customer engagement through tangible proof rather than abstract claims.

For customers, objects made from the venue's own broken glass create a material connection to the place. Coasters, mosaic details, or small souvenirs function as physical reminders of participation in a circular system, increasing emotional attachment and repeat visits.

For artisans, the system provides a continuous stream of locally sourced, character-rich material at low cost, enabling creative production independent of virgin glass supply chains. The clear origin and circular narrative of the material support higher perceived value and storytelling in final products.

At the community level, the initiative improves waste handling safety, diverts non-recyclable glass from landfills, and makes circular economy practices visible in everyday urban spaces, contributing to local awareness and behaviour change.

4. Customer Segments

The Broken Glass Bin Initiative serves two interconnected customer groups linked through a closed circular system.

Cafés, bars, restaurants, and hospitality venues form the primary segment, using the in-store bins to safely collect broken glass while visibly demonstrating their commitment to sustainability. Independent venues adopt the system as part of their zero-waste identity. At the same time, small and mid-sized chains implement it across locations to support consistent ESG reporting, waste reduction, and brand alignment.

Design studios, artisan collectives, and small circular manufacturers form the second core segment, using the collected glass as a steady, local material stream for producing mosaics, terrazzo surfaces, lighting, and small design objects. These actors often collaborate directly with venues to co-create pieces that return to the original space or enter local circular markets.

Final products reach sustainability-minded customers, tourists, and local patrons who value objects with clear provenance, as well as interior architects and hospitality designers specifying circular, story-driven materials for eco-certified interiors and refurbishments.

5. Space and Equipment

The initiative requires minimal dedicated space within hospitality venues, using a compact, clearly marked in-store bin designed for safe collection of broken glass behind the bar or in staff-only areas. The bin is integrated into daily operations without disrupting service and supports basic on-site sorting by glass type or colour when needed.

Processing takes place in small workshops or shared maker spaces equipped with standard tools for cutting, grinding, polishing, and assembling glass, as well as simple terrazzo or resin casting setups. No industrial furnaces are required, allowing production to remain local, low-energy, and easily scalable. Storage space is needed for collected fragments, finished components, and modular elements before they are returned to venues or distributed to customers.

6. Distribution Channels

Collection begins directly at cafés, bars, and restaurants through the in-store bins, creating a localised and transparent material flow. Collected glass is transferred to nearby workshops or partner studios for processing and design production, maintaining short supply chains and low transport intensity.

Finished objects are returned to the original venues as interior elements, branded souvenirs, or loyalty gifts, or distributed through on-site sales points, café shops, and special events. Additional channels include local design stores, online platforms for circular products, and direct B2B delivery to hospitality chains and interior designers specifying circular materials for new projects or refurbishments.

7. Cost Structure

Initial Costs

Cost item	€ estimate	Comments
Branded 50 L bin	~70	Curver pedal bin incl. vinyl wrap (visual magnet near POS)
Vibratory tumbler (12")	~280	Mid-size hobby-pro unit for edge-rounding
Bench glass grinder	~120	Entry workshop model

Cost item	€ estimate	Comments
5 kg clear epoxy kit	~95	Artline Crystal pack for the first production run
Mosaic & terrazzo hand tools	~90	Nippers, trowels, polishing pads
PPE bundle	~150	Face shields, gloves, FFP2 masks (EN 166/149)
Workbenches & storage	~400	Modular reclaimed-timber units
Story-driven launch content	~600	Professional photo & 60-sec brand reel used across web + POS
Brand collateral & signage	~200	Bin decals, QR plates, provenance cards
Skills onboarding workshop	~300	Two-day artisan training
Total CAPEX	2 305	

Monthly Costs

Cost Item	€ estimate	Comments
Workshop rent (30 m ² @ €7.5/m ²)	~225	Based on the NL light-industrial average of €90/m ² /m ² /yr (JLL, 2024)
Utilities & PPE consumables	~90	<150 kWh electricity; gloves, masks
Resin, pigments, adhesives	~150	≈15 kg mixed output
Packaging & branded inserts	~110	Recycled boxes, FSC tissue, provenance postcards
Waste disposal (residual fines)	~30	120 L mixed residue skip each quarter
Ongoing story-content production	~150	2 × Reels, blog post, newsletter per month
Digital ads & SEO tools	~120	Meta & Google campaigns, Shopify apps
Part-time artisan labour	~1 200	2 days/week @ €15/h plus 10 % socials time
Total OPEX / month	2 075	

8. Revenue Streams

Participation fees from hospitality venues cover the use of the in-store bin system, collection, and basic handling of broken glass. These fees are structured as monthly subscriptions or service contracts, making costs predictable for venues while ensuring system sustainability.

Sales of circular products generate revenue through the sale of mosaics, terrazzo surfaces, lighting elements, and small design objects made from collected glass. Products are sold back to participating venues, directly to customers on-site, or through local design stores and online platforms.

Custom design and interior projects provide additional revenue through commissioned pieces such as branded mosaics, counters, wall panels, or lighting installations created from a venue's own glass, particularly for renovations or new openings.

B2B supply to designers and developers enables revenue from providing processed glass components or finished elements to interior architects, hospitality designers, and circular construction projects specifying story-driven materials.

9. Social Impact & Gender Equality

See part C for a detailed overview. The initiative prioritises women-led studios for outsourced creative and finishing work, targeting at least 50% of external spend under equal pricing conditions. Production is organised through modular tasks that allow flexible working hours, supporting participation of caregivers and those outside standard full-time schedules.

A short accredited training programme provides skills in safe glass handling, basic processing, and product documentation. At the same time, visible attribution ensures that artisans are credited through QR-linked profiles and co-branded editions. Progress is tracked through annual indicators aligned with SDG 5, including spend with women-led suppliers, flexible working hours, and revenue earned by credited female makers.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for the Broken Glass Bin – In-Store phase is 0.98 kg CO₂e per 1 kg of finished products, covering the installation and maintenance of collection bins, basic on-site sorting, and short-distance transport to local workshops. As this phase involves no remelting, no chemical processing, and minimal energy use, emissions remain low and largely fixed per venue, independent of the final product type.

The total carbon footprint increases in the second phase of the loop, depending on how the collected glass is processed into mosaics, cold-set terrazzo surfaces, resin- or bio-resin-cast jewellery and small objects, and mechanically assembled lamps, chandeliers, and sculptural lighting. Low-energy processes add limited emissions mainly related to electricity use and binders, while more material-intensive options result in higher, yet still moderate, footprints. These emissions are calculated per product type using the ArtGlass Carbon Footprint Calculator, enabling transparent comparison and venue-specific reporting.

11. Marketing and Promotion

In line with the strategic framework outlined in the introduction, the initiative is positioned as a circular service model for hospitality venues and municipalities. Promotion focuses on pilots, on-site demonstrations, and visible returned objects rather than conventional product displays, with the in-store bin and first circular pieces functioning as proof of concept.

Visibility is built through presentations at hospitality sustainability forums, circular economy showcases, and design exhibitions, highlighting replicability and the safe separation of non-recyclable glass streams. Digital channels document the closed-loop process, venue attribution, and maker involvement, supporting partner onboarding, ESG reporting, and professional credibility.

25. Upcycle Bottles, Jars and Vintage Pieces into Electric Lamps

Bottles and jars can easily become the bases of table and pendant lamps, made with or without lampshades. They can be enhanced in different ways – filled (with dried flowers, shells, etc.), painted, etched, engraved, or combined with other materials. The electrical installation is inexpensive, and some manufacturers can provide it in any colour. A wide selection of light bulbs is also available. Lampshades can be ready-made (in standard designs and sizes) or completely original. You can add a vintage piece to the post-consumer bottle or jar serving as the lamp base. The entire lamp can also be made from vintage components – one large piece like a crystal decanter, or a series of smaller pieces (such as shot glasses, small plates, glass figurines, vases, etc.). Perfectly reflecting and refracting light, glass is an excellent material for lamps.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. As this product is upcycled, it requires minimal processing; soda-lime, crystal and other types of glass can be used. Some of the potential sources of glass are listed below:

- Wine and spirits bottles – collect colour-sorted empties from local bars or restaurants; tall shapes work well for table lamps or hanging pendants.
- Wide-mouth food jars – ask cafés and delis to save large pickle or coffee jars; easy to thread cords through and fill with shells or lights.
- Crystal decanters and vintage vases – hunt at flea markets, charity shops, or estate sales for cut-glass pieces that sparkle under a bulb.
- Old glass insulators and chem-lab flasks – pick up at salvage yards or school surplus auctions; their quirky forms make standout pendant lights.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

You only need a few core skills: safely drill a clean hole near the bottle or jar base with a diamond bit under running water; smooth the edge so the cord grommet won't fray; know basic lamp wiring, strip, twist, and screw the live, neutral, and earth into an E-27 or E-14 socket, and test it with a simple continuity checker; fit a felt pad or rubber washer so the glass sits level; and apply simple finishes, spray-paint, etching cream, or glued embellishments-without blocking the lamp's light path. Master those steps, and any rescued bottle, jar, or vintage decanter can become a safe, stylish lamp body in under an hour.

3. Value Propositions

Each up-cycled glass lamp starts life as an ordinary bottle or thrift-shop decanter and ends up as a bright talking-point: no two pieces ever share the same shape or light play. Buyers enjoy the glow of cut crystal or coloured glass at a fraction of boutique-lighting prices, and they can pick the cord colour, bulb style, or filler (flowers, shells, fairy lights) in minutes.

4. Customer Segments

- Vintage-style home-décor fans – love one-of-a-kind pieces made from old decanters, shot glasses, or coloured bottles that no big store can copy.
- Interior designers & stagers – need quick, eye-catching table or pendant lamps to finish show-homes, cafés, and boutique hotels on a tight timeline.
- Coffee shops, bars, and restaurants – hang bottle pendants or place jar lamps on window ledges to reinforce a cosy, sustainable vibe.
- DIY hobbyists – buy pre-drilled bottle bases or wiring kits so they can assemble their own up-cycled lamps at home.

5. Space and Equipment

Space and equipment: A small workbench in a 10 m² corner of a garage is plenty. You need a drill with a diamond-core bit, a tray of running water to cool the glass as you drill, fine-grit sandpaper or a deburring stone, a basic lamp-cord set with an E-27 or E-14 socket, rubber grommets and felt pads, a multimeter for quick safety checks, and whatever spray paint, etching cream, or decorative fillers you plan to use. Standard 230 V power and a desk fan for paint fumes finish the setup.

Technological Process: Wash and dry the chosen bottle or vintage piece, mark a spot near the base, and slowly drill a small hole under running water. Smooth the hole's edge, thread the cord through, and seat a rubber grommet so the glass won't cut the wire. Strip the cord ends, tighten them into the socket terminals, and check continuity with the multimeter. Add any paint, etching, or filler, screw in an LED bulb, stick a felt pad under the base for stability, and the lamp is ready to plug in and light up.

6. Distribution Channels

Sell finished lamps straight from a small web-shop and an Instagram shop, where quick “drill-to-glow” reels show how each piece was rescued. Try to reach global vintage-lighting hunters, and leave a few showcase pieces on consignment in local antique or zero-waste stores so shoppers can see the sparkle in person. Hand interior designers a simple pdf line-sheet, cord colours, bottle shapes, and price per batch so that they can plug lamps into project budgets fast. Pop up at weekend craft markets and night-time street fairs, letting visitors choose a bottle and cord on the spot for same-day assembly.

7. Cost structure

Initial Costs

Cost item	€ estimate	Comments
Hand drill, 2 diamond-core bits, multimeter, pliers, bench vise	~600 – 700	Essential lamp-making tool set
Basic fume fan & safety gear	~200	Goggles, gloves, sandpaper, felt pads
First batch of supplies	~400 – 500	Cord sets, grommets, LED bulbs, spray paint, etching cream, fillers
Shelving & sturdy workbench	~300	Basic workshop furniture
Total CAPEX	1 500 – 1 700	Lean and affordable

Monthly Costs

Cost item	€ estimate	Comments
Rent & utilities (garage)	~100 – 130	
Consumables restock	~100	Paint, fillers, bulbs, grommets
Marketing & online ads	~80	Social media & small campaigns
Misc. supplies & replacements	~50	Sandpaper, gloves, etc.
Total OPEX / month	330 – 360	Very lean running cost

8. Revenue Streams

Revenue is generated through a mix of direct sales, B2B partnerships, and bespoke commissions. Core income comes from finished upcycled lamps sold via the webshop, design markets, and curated retailers, offering high margins and strong storytelling. Additional revenue is secured through small-batch wholesale orders for interior designers and hospitality venues, as well as premium custom commissions for events, cafés, and corporate gifts. Supplementary income includes DIY lamp kits and paid workshops, creating a balanced model that combines steady retail sales with higher-margin bespoke work while keeping capital needs low.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator and a reuse-based system boundary, the estimated emission for this product is 1.6 kg CO₂e per 1 kg of finished product, based on representative assumptions for small-scale upcycling studios.

The bottle, jar, or vintage glass piece already exists within the economic system, and its original production footprint is not reallocated to this product. Emissions from primary glass manufacturing, therefore, fall outside the system boundary. The calculation includes only additional impacts from cold drilling, minor surface finishing, manual assembly, electrical fittings, packaging, and local transport.

Because the process avoids remelting and high-temperature kiln use, overall energy demand remains relatively low. Emissions are mainly driven by electricity use, electrical components, and packaging, while glass processing itself contributes a smaller share.

These results represent indicative estimates and may vary depending on workshop efficiency, electricity mix, component sourcing, and transport distances.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, these lamps are promoted within interior styling and hospitality décor contexts where one-off objects and material character are a purchasing logic. Visibility is built through curated design markets, craft fairs, interior showcases, and collaborations with cafés, bars, and boutique accommodations that install pieces as spatial accents and reference points for commission work. Digital channels document restoration, drilling, wiring, and finished installations, reinforcing safe workmanship, authorship, and provenance for professional clients and stockists.

26. Pendant Lights and Cluster Chandeliers Made From Bottles

Cutting bottles can create various shapes of hanging pendant lights, ranging from simple to more complex forms. By grouping and combining them, you can get really interesting cluster chandeliers. They can be made from recognisable bottles (e.g., of specific beers, wines, whiskeys), as well as from vintage crystal decanters. Post-consumer and post-industrial bottles (as well as jars) are certainly a great source of inspiration for making pendant lights and cluster chandeliers – ideal for lighting shops and spaces where drinks are frequently sold or consumed.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. As this product is upcycled, it requires minimal processing; soda-lime, crystal and other types of glass can be used. Some of the potential sources of glass are listed below:

- Craft-beer and spirits bottles – collect emptied bottles from local bars or breweries; their distinct shapes and label stories add instant character.
- Wine magnums and champagne bottles – ask wineries or event venues to save large-format empties for dramatic, long-drop pendants.
- Soft-drink and soda siphon bottles – grab colourful or embossed glass from cafés and recycling depots for playful accent lights.
- Vintage crystal decanters and cut-glass carafes – hunt flea markets, estate sales, and thrift shops for sparkling centrepieces.
- Clear pickle and coffee jars – cafés will happily give them away; wide mouths make wiring easy, and clusters feel airy.
- Post-industrial bottle rejects – contact a regional glassworks; misprints and minor defects are cheap and usually pre-cleaned.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

You'll need three core skills. First, cleanly cut and polish: score each bottle with a jig, thermal-shock or wet-saw it off, then sand the rim smooth so no one gets cut. Second, safe wiring: thread a cord set through the neck, fit a rubber grommet, and connect the live, neutral, and earth to an E-27 or E-14 pendant holder, testing with a multimeter. Third, cluster assembly: measure drop lengths, crimp cord grips inside a ceiling canopy, balance the weight, and join all wires to a single terminal block. Master these steps and any rescued beer bottle or crystal decanter can hang as a polished pendant-or join its neighbours in a show-stopping chandelier.

3. Value Propositions

Bottle-pendant lights turn yesterday's empties into eye-catching ambience: the glass already carries built-in colour and brand story, so a Guinness, Rioja, or vintage-decanter cluster instantly matches the drinks you serve or sell. Each piece comes pre-wired and rim-polished, costs less than factory fixtures, and keeps glass out of the bin, giving venues a talking-point focal light, a slice of circular design, and a custom finish without custom prices.

4. Customer Segments

- Bars, cafes, and craft-beer taprooms – want statement lighting that mirrors the labels they pour (e.g., a Guinness cluster over the counter).
- Boutique restaurants and wine shops – hang bottle chandeliers above tasting tables to reinforce the “from vineyard to glass” mood.
- Interior designers of rustic or industrial homes – specify one-off bottle pendants for kitchen islands and loft living rooms.
- Event decorators & wedding planners – rent themed clusters (amber-beer, clear-Prosecco, vintage crystal) for reception halls and garden marquees.
- Hotel lobbies and boutique B&Bs – use large multi-tier bottle chandeliers to give guests a memorable first impression rooted in local drink culture.

5. Space and Equipment

Space and equipment: About 12 m² does the job. Set one bench with a bottle-cutting jig or wet tile saw, fine-grit sanding pads, and a small vise. Keep a second bench for wiring: pre-wired pendant cord sets, rubber grommets, wire strippers, screwdriver, multimeter, and a simple ceiling canopy with cord grips. Add a tray of warm water (for label-soak and wet cutting) and a shelf for cleaned bottles, bulbs, and finished lights. Standard 230 V power and a desk fan for dust are all you need-no heavy machinery.

Technological Process: Soak and scrub each bottle, score the cut line, and use the jig (or wet saw) to separate the base. Sand the rim smooth, thread the cord through the neck, seat a grommet, and connect live, neutral, and earth to an E-27/E-14 holder. Test with the multimeter, screw in an LED bulb, and for clusters, trim cords to the chosen drops and clamp them inside the canopy before mounting. Flip the switch-your rescued bottles now shine as single pendants or balanced chandelier groups.

6. Distribution Channels

Sell the bottle pendants three ways: first, list ready-made singles and small clusters on your own web-shop and Instagram/Facebook store, where quick “cut → glow” reels catch decor fans; second, pitch themed sets (beer-brand cluster, wine-bottle trio, crystal-decanter centerpiece) to bars, cafés, wineries, and interior designers by email with a one-page line sheet; third, rent larger chandeliers through event-hire platforms and local wedding planners-delivery, install, and pickup included.

7. Cost Structure

Initial Costs

Cost item	€ estimate	Comments
Cutting & finishing tools	~1 000	Bottle-cutting jig or wet tile saw, diamond blade, sanding pads, wire strippers, multimeter, safety gear
First batch of lamp parts	~500	Cord sets, grommets, ceiling canopies, LED bulbs
Bench, vise & shelving	~200	Basic workshop furniture
Total CAPEX	1 700	Lean starter equipment

Monthly Costs

Cost item	€ estimate	Comments
Rent & utilities	~80–100	
Marketing & website	~50–70	Simple site hosting, ads, product photos
Consumables restock	~80	Bulbs, cords, paint, grommets
Misc. supplies	~30	Sandpaper, gloves, etc.
Total OPEX / month	240 – 280	Very low running costs

8. Revenue Streams

Money comes in from several angles at once: online sales of single bottle pendants, bulk orders of themed clusters for bars and cafés, weekend rentals of big chandeliers to wedding planners, etc.

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this process is 2.2 kg CO₂e per 1 kg of finished product, based on representative input assumptions for small-studio production.

Most emissions arise from electricity consumption during bottle cutting, rim polishing, and electrical wiring of pendant fittings and cluster canopies. At the same time, smaller contributions stem from auxiliary materials (cords, sockets, ceiling hardware), limited transport of recovered bottles, and general workshop utilities.

Although the glass itself is upcycled post-consumer material and its original production footprint is not reallocated to this product, the overall footprint is higher than that of simple cold-working objects due to the cumulative energy demand of repeated cutting, finishing, multi-cable wiring, and assembly of cluster configurations. Energy use, therefore, remains driven primarily by processing time, equipment efficiency, and the local electricity mix rather than by primary glass manufacturing.

These results should be understood as indicative estimates rather than exact measurements and may vary depending on workshop setup, production scale, cluster complexity, and national electricity sources.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, bottle-based pendants and clusters are promoted as spatial lighting interventions for hospitality, retail, and event environments, where scale and atmosphere must be evaluated in situ. The work is presented through lighting and interior fairs, design-week installations, and venue collaborations that allow clusters to be experienced as architectural compositions, often tied to local bottle streams and place identity. Digital channels document installation logic, clustering variations, and site-specific outcomes, enabling designers and venue owners to reference proven configurations for specification and repeat commissions.

27. LED-integrated Glass Mosaics and Signs

This concept combines artisanal glass mosaics with low-energy LED lighting to create durable, custom-made glass surfaces for interior and semi-public spaces. Using reclaimed post-consumer and architectural glass, artists and designers produce wall panels, backlit signs, and illuminated glass elements where light is integrated directly into the material structure.

Each piece is developed as a commissioned or limited-edition work, with designs ranging from graphic compositions to abstract or nature-inspired patterns. Modular construction allows for controlled scaling and installation, while ensuring consistency in quality, durability, and visual identity.

By integrating light with recycled glass, these installations provide both ambient illumination and strong visual presence, making them suitable for hospitality, retail, residential, and cultural interiors that require long-lasting, low-energy lighting combined with material storytelling.

1. Glass Types & Sources

See the introduction for the full overview of glass types and sourcing; the following sources are specific to LED-integrated glass mosaics and signs.

Production primarily uses mixed post-consumer glass, including colour-sorted bottles, jars, and damaged tableware collected from cafés, restaurants, and households, which are cut into tesserae or crushed and re-fused into tiles. Architectural float-glass offcuts from window renovations and construction sites are used for strips and larger panels. At the same time, in-house kiln-fused shards made from mixed cullet enable controlled colour blending and imagery.

Selected speciality glass scraps, such as mirrored or iridescent pieces from stained-glass studios, are used sparingly to enhance light reflection and diffusion around LEDs. In some projects, branded glass donations from companies or hospitality venues are incorporated for site-specific storytelling. LED films or edge-lit panels are integrated as non-glass components, sourced to ensure compatibility with the project's traceability and sustainability criteria.

2. Processing & Craft Methods

See the general introduction for technical parameters. Collected glass is washed, colour-sorted, cut to size, and edge-smoothed; selected fragments are kiln-fused around 810 °C and annealed to create thicker tiles for high-load areas. Artists hand-lay designs on reusable boards and secure tiles with low-VOC grout or clear bio-resin, then integrate LEDs by recessing strips in aluminium channels or edge-lit frames wired to dimmable 12 V drivers to keep surface temperatures low. Panels cure, undergo light-uniformity and adhesion checks, receive a QR sustainability tag, and are packed in recycled fibre crates for shipment.

3. Value Propositions

LED integrated glass mosaics and signs transform recycled cullet into durable, illuminated surfaces that replace energy intensive virgin tiles and conventional neon or backlit signage. By combining recycled glass with low energy LED systems, this solution reduces both material and operational emissions while maintaining long service life and full recyclability at the end of use.

For clients such as hotels, cafés, cultural venues, and public spaces, these mosaics provide a distinctive visual identity that merges atmosphere, branding, and measurable circular impact. Light intensity and colour can be adjusted to different spatial moods or seasonal concepts, allowing a single installation to serve multiple functions over time.

For makers, the concept connects glass craft with lighting design, expanding artistic authorship into architectural and commercial contexts and enabling premium pricing for bespoke, site specific work. At the local level, the use of collected waste glass strengthens visible material loops and reinforces community based circular narratives, turning waste streams into recognisable design assets rather than hidden infrastructure.

4. Customer Segments

The primary customers are hospitality and wellness venues seeking durable, visually distinctive glass surfaces that communicate environmental commitment through material choice and design. This includes hotels, restaurants, and spas where integrated lighting enhances atmosphere while reinforcing sustainability narratives.

The concept is also relevant for architects and designers working on low-carbon residential and mixed-use projects who require finishes that combine visual impact with reduced embodied emissions.

Secondary customers include municipal and cultural institutions commissioning light-based glass installations for public interiors, as well as brands using recycled glass mosaics as part of spatial identity in taprooms, showrooms, and event spaces.

5. Space & Equipment

The 60 m² studio is divided into areas for glass preparation, fusing, cold work, and electronics. It features a clamshell kiln with a work chamber measuring 24" x 24" x 14" (30 A/240 V), which can accommodate panels up to 60 cm square. The average power draw for medium firings is between 5 and 8 kW, and off-peak scheduling helps reduce energy costs.

Additional equipment includes tile saws, a wet-belt grinder, an engraving cabinet, HEPA extraction systems, an LED soldering station, and mobile assembly tables. The layout can be scaled up by adding more kilns in parallel, while the space for LED integration remains constant.

6. Distribution Channels

Distribution is primarily organised through design-build studios, interior design practices, and hospitality procurement platforms, supported by sample kits and BIM-ready objects that allow glass mosaics and signs to be specified directly within projects.

Secondary channels include direct online commissions through a configurator-based platform that enables clients to preview colours and lighting options, as well as selected eco-design fairs and public art initiatives where the work is presented through exhibitions or participatory workshops.

Additional distribution is achieved through direct collaboration with hospitality operators, cultural institutions, and public bodies, where LED-integrated glass mosaics are commissioned as site-specific installations rather than off-the-shelf products.

7. Cost Structure

Material costs remain low due to the use of recycled glass, while preparation and sorting require additional labour input. Lighting components can range from simple low-energy LED strips to more advanced integrated systems, depending on the complexity of the installation. Labour represents the main cost driver, reflecting the time-intensive nature of mosaic composition, glass finishing, and light integration.

Additional costs include visual documentation and sample setups required for client specification, as well as protective, eco-friendly packaging and transport for fragile finished works. Overall, the cost structure remains project-based and flexible, supporting both small commissions and larger installations without high fixed overhead.

Initial Costs

Cost item	€ estimate	Comments
HS24-PRO clamshell kiln (incl. furniture kit)	~4 900	benchmark price US\$5,309 kilnfrog.com
Wet-belt grinder & tile saws	~1 200	
LED workbench, soldering kit, test rig	~600	
PPE, extractor, particulate filters	~800	
Benches, storage, and a showroom corner	~2 500	
Launch marketing (demo panel, micro-site)	~1 500	
Total CAPEX	11 500	

Monthly Costs

Cost item	€ estimate	Comments
Studio rent (60 m ² urban fringe)	~1 200	
Electricity (≈ 40 firings + LED tests)	~350	medium kiln 5 kW × 8 h average
Two artisan salaries (net)	~4 000	
LED & driver stock	~300	
Glass collection, washing additives	~200	
Insurance, certifications, web hosting	~150	
Total OPEX / month	6 200	

8. Revenue Streams

Revenue is generated primarily through custom commissions for hospitality venues, including hotels, restaurants, and wellness spaces, where LED-integrated glass mosaics are delivered as design-and-build installations. Limited-edition wall pieces and eco-signs provide additional income through direct sales and curated retail, while co-branded projects with sustainability-focused brands enable larger, higher-visibility commissions.

Public art installations supported by municipalities, cultural institutions, or grants represent another significant stream, particularly for site-specific projects. Complementary income is generated through creative workshops, educational programmes, and mosaic kits for schools, tourists, and community groups, which also strengthen engagement and visibility.

Pricing is project-based, reflecting scale and complexity, with higher margins on bespoke installations and limited editions. Demand typically peaks during hospitality fit-outs and seasonal retail periods, while workshops and smaller commissions help stabilise income throughout the year.

9. Social Impact & Gender Equality

See the introduction for the full overview.

Team composition targets prioritise strong representation of women across technical and creative roles. Fair pay and access are supported through transparent pay structures and paid six-month apprenticeships that rotate across glasswork, lighting integration, and material storytelling.

Inclusive recruitment is encouraged through partnerships with local youth organisations and migrant-support initiatives, expanding access to skilled craft work. For public installations, visible credit is given

to all contributors, reinforcing recognition of craft labour and promoting equitable visibility within the creative process.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this process is 4.8 kg CO₂e per 1 kg of finished product, based on representative input assumptions for small-studio production.

Most emissions arise from electricity consumption during kiln fusing and annealing of glass tiles, repeated cold-working (cutting, grinding, polishing), and the integration and testing of LED lighting systems, while smaller contributions stem from auxiliary materials (LED strips, drivers, aluminium channels, adhesives), packaging, and local transport.

Because this idea combines recycled glass with energy-intensive thermal processing and integrated electronic components, direct material-related emissions remain moderate. Still, overall energy demand is significantly higher than for purely cold-worked or non-illuminated products. The carbon footprint is therefore driven primarily by kiln operating time, firing schedules, LED system integration, and the local electricity mix rather than by primary glass manufacturing.

These results should be understood as indicative estimates rather than exact measurements and may vary depending on panel size, firing frequency, LED complexity, production scale, and national electricity sources.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, LED-integrated glass mosaics and signs are promoted primarily through spatial, architectural, and cultural contexts where light, material, and sustainability are experienced physically rather than through mass advertising. Visibility is built through participation in design weeks, applied-arts exhibitions, architecture and hospitality fairs, and curated eco-design showcases, where full-scale panels and illuminated samples allow specifiers, curators, and clients to evaluate light diffusion, colour behaviour, and craftsmanship. Strategic partnerships with interior designers, hospitality groups, and public institutions position the mosaics as functional art and circular material solutions, supported by sample kits and installed reference projects rather than conventional product marketing. Digital channels serve as a complementary layer, documenting installations, lighting transitions, and material provenance to support professional commissioning, public-art tenders, and long-term collaborations, while reinforcing the studio's authorship and technical credibility.

28. Upcycled Glass Outdoor Lanterns

Upcycled Glass Outdoor Lanterns turn discarded window panes into durable, weather-resistant lighting for gardens, patios and event venues. Cleaned glass is kiln-slumped, framed in powder-coated steel and fitted with low-energy LEDs, giving each lantern a subtle texture and colour that reflects its reclaimed origin. By reusing a hard-to-recycle waste stream, the product offers customers practical outdoor lighting, a clear sustainability story and a visual reminder that circular design can be both functional and attractive.

1. Glass Types and Sources

See part A for a detailed overview of glass types and sources. The primary feedstock is post-construction window glass, a stream with a European recycling rate below 11 % (Recovery Magazine, 2024) and in some regions as low as 5 % (Glass for Europe, 2024). Supply could come from agreements with:

- Demolition contractors
- Urban glazing workshops

Clear container-glass cullet adds sparkle for premium lines, sourced through the city's municipal bottle bank operator. Scrap copper foil and low-lead solder from local metal recyclers can be used to close the material loop.

2. Processing and Craft Methods

See part B for a complete overview of possible processing methods of glass.

Cleaned panes are scored and cut, then kiln-slumped over reusable ceramic moulds at 710-780 °C, followed by a 515 °C anneal soak for 30 minutes to relieve stress (Bullseye Glass, 2025). Stained-glass enamels, sand-etching and hand-painting create colourways, cured in a secondary firing at ≤ 815 °C to protect pigments. Cold-working steps-diamond edging, drilling and polishing-ensure fit and weather-tightness. Frames are soldered with lead-free alloy; each lantern passes a 12-hour outdoor burn test and an IP44 moisture check. PPE, local extraction, and kiln insulation standards (EN 61010) govern safety and QC.

3. Value Propositions

Upcycled Glass Outdoor Lanterns transform low-recycled window glass into durable, weather-resistant lighting that combines function, aesthetics, and a clear sustainability narrative. By pairing kiln-slumped reclaimed glass with energy-efficient LED technology and robust metal framing, the lanterns offer long-lasting outdoor illumination for gardens, patios, and event spaces. Each piece carries a distinctive handmade texture and colour that highlights its circular origin, while the use of hard-to-

recycle materials and small-scale production methods ensures reduced environmental impact and strong appeal for customers seeking visible, meaningful circular design.

4. Customer Segments

- Boutique hotels and eco-lodges – seeking premium, story-driven décor pieces to elevate terraces, patios, and outdoor lounges with sustainable elegance.
- Garden centres and home décor retailers – curating seasonal outdoor collections where durable recycled glass offers a longer-lasting, weather-resistant alternative to rattan or bamboo.
- Event planners and caterers – renting or purchasing lanterns in bulk for zero-waste weddings, garden parties, and outdoor receptions that emphasise ambience and sustainability.
- High-income homeowners and renovation clients – investing in distinctive, statement lighting solutions for pergolas, verandas, and landscaped gardens.
- Municipal and cultural institutions – adopting the lanterns for festive pop-up markets, public installations, and Christmas villages that combine charm, circularity, and local craftsmanship.

5. Space and Equipment

A 55 m² workshop in a light-industrial unit hosts one top-loading kiln (80 × 50 cm hearth), a compact CNC cutter, sand-blaster, wet belt grinder, soldering benches and an LED assembly area. At this scale, weekly output could reach around 60 lanterns. Doubling capacity would require only an extra kiln and 15 m² more floor space, keeping overheads lean.

6. Distribution Channels

Primary routes should be direct B2B sales to hospitality groups and garden-centre chains, supported by storytelling sample kits and QR-coded tags linking to impact metrics. Secondary channels could include an e-commerce site for consumers, pop-up stalls at design fairs, and a lantern-rental scheme for event planners that feeds refurbished units back into inventory. Social media reels showing pane-to-product transformations reinforce the narrative across all channels.

7. Cost Structure

Initial Costs		
Cost item	€ estimate	Comments
Top-loading kiln (80 × 50 cm)	~7 500	Includes controller & insulation upgrade
CNC glass cutter & scoring table	~4 800	Refurbished unit
Sand-blaster & compressor	~2 200	Mid-range, 50 L tank
Cold-working tools & PPE	~1 400	Diamond belts, masks, and gloves

Moulds & jigs (reusable)	~1 200	Ceramic and stainless steel
Branding & e-commerce set-up	~2 000	Site build, packaging design
Total CAPEX	19 100	

Monthly Costs

Cost item	€ estimate	Comments
Waste-glass collection & transport	~300	Fuel plus contractor fees
Electricity (kiln + workshop)	~580	Night tariff at €0.19 /kWh
Enamels, solder, LEDs	~260	Variable with volume
Rent & utilities	~950	55 m ² unit, suburban zone
Staff salaries (2 FTE)	~4 200	Living-wage artisan rates
Marketing & events	~350	Ads, samples, fair fees
Total OPEX / month	6 640	

8. Revenue Streams

- Standard lanterns (20 cm) retail at €78-€95
- Large statement pieces reach €120.
- Event-rental packs could be priced at €6 per lantern per night
- Custom logo-etched editions for hotels add a €15 premium
- Weekend glass-lantern workshops at €145 per participant diversify income during low-season months (November–February).

9. Social Impact & Gender Equality

See part C for a detailed overview.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this process is 4.6 kg CO₂e per 1 kg of finished product, based on representative input assumptions for small-studio production.

Most emissions arise from electricity consumption during kiln slumping and annealing of window glass panels, combined with cold-working steps (cutting, edging, drilling) and the fabrication of metal frames. At the same time, smaller contributions stem from LED components, enamels, solder, packaging materials, and local transport of reclaimed glass.

Because this idea relies on upcycled architectural glass rather than newly produced material, the original carbon footprint of primary glass manufacturing is not reallocated to the product. Direct material-related emissions, therefore, remain moderate, but repeated kiln firings, secondary decorative firings, and workshop-scale electricity use drive overall energy demand. The footprint is slightly lower than LED-integrated mosaics due to simpler geometry and fewer electronic components, yet significantly higher than purely cold-worked upcycling concepts.

These results should be understood as indicative estimates rather than exact measurements. They may vary depending on firing schedules, lantern size, production volume, electricity mix, and the share of decorative secondary firings.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, upcycled glass outdoor lanterns are promoted as architectural and landscape elements rather than decorative objects, and therefore enter the market through hospitality, garden design, and public-space design networks. Visibility is built through participation in garden and landscape fairs, sustainable design exhibitions, and hospitality trade shows, where lanterns are installed in real outdoor settings to demonstrate light quality, weather resistance, and material character. Collaborations with boutique hotels, event planners, and garden centres function as living showrooms, allowing the lanterns to be experienced in use and referenced in future projects. Digital channels complement this presence by documenting outdoor installations, seasonal atmospheres, and glass provenance, reinforcing credibility with specifiers and buyers while positioning the lanterns as durable, circular lighting solutions suited to long-term outdoor use rather than short-lived décor trends.

MISCELLANEOUS

29. Upcycled Window-Glass Hose Bird Feeder as a (Corporate) Gift

These handcrafted bird feeders, made from upcycled flat window glass, are durable, functional design objects that connect urban spaces with local biodiversity. They can be hung from branches, mounted on railings, or attached directly to windows, transforming balconies, offices, and reception areas into small urban habitats.

Designed with UV-cured seams, anti-collision frosting, and reinforced edges, the feeders are weather-resistant and suitable for year-round outdoor use. Each piece is a unique sculptural object, celebrating transparency and material reuse, and is accompanied by a provenance card identifying the original building facade from which the glass was sourced.

As corporate gifts, the feeders offer a meaningful alternative to disposable merchandise, communicating environmental responsibility, design quality, and support for local artisans. They are particularly suited for real estate firms, eco-hotels, architecture studios, NGOs, and sustainability-oriented companies.

1. Glass Types and Sources

See the introduction for the complete overview; below are the sources specific to Upcycled Window-Glass Hose Bird Feeder (Corporate Gift).

- Flat window glass offcuts (core): float/low-iron panes from renovations, façade shops, and window installers; cleaned, cut, and edge-polished for safe use.
- Toughened or laminated scrap (select use): sourced from architectural suppliers; used only where design needs added strength, processed in separate streams.
- Stained/sandblasted accents (optional): small upcycled fragments for colour, patterns, or subtle branding.
- Mirror / one-way glass (optional, minimal): limited reflective elements for visual play; placed to avoid disorienting birds.

Note: Float and tempered/laminated glass are handled in separate workflows to prevent compatibility issues; duplicate float references removed. End-of-life flat glass is widely available via renovation partners, making this a reliable, traceable feedstock.

2. Glass Processing Methods

See the general introduction for technical parameters. Pre-sorted, de-glazed window glass is wet-cut to size, and all edges are cold-finished to about a 1 mm safe radius. Components are assembled with outdoor-grade, BPA-free UV acrylate that cures in seconds and provides high shear strength, then joints are sealed with neutral-cure silicone to withstand freeze-thaw cycles. Optional low-pressure sandblasting adds branding or anti-collision motifs for bird safety, and any offcuts below a useful size are returned to a flat-glass recycling stream.

3. Value Propositions

The bird feeder combines functional use and sculptural design, offering a durable and aesthetically refined object that supports urban biodiversity. As a corporate gift, it provides a meaningful alternative to disposable merchandise, transforming CSR communication into a visible, long-lasting installation.

Customisation options such as engraving, subtle colour treatments, and tailored packaging allow alignment with brand identity without compromising design integrity. Year-round use encourages everyday engagement with nature in offices and homes, while the visible reuse of window glass and QR-linked provenance tangibly strengthens sustainability messaging.

Durable glass construction reduces replacement needs and maintenance costs, making the feeder suitable for workplaces and hospitality spaces with long-term sustainability goals.

4. Customer Segments

The primary customers are corporate gift and sustainability departments in eco-conscious companies, consultancies, and startups seeking meaningful alternatives to conventional branded merchandise. Hotels, wellness retreats, and boutique accommodations adopt the feeders both as guest amenities and as products for resale through on-site gift boutiques.

Green office buildings and architecture studios use the feeders as visible symbols of circularity in showrooms, opening events, and topping-out ceremonies. NGOs and environmental initiatives procure them as donor gifts or campaign items, while private individuals and nature-oriented customers purchase them as functional design objects for homes and balconies.

5. Space and Equipment

- Compact workshop space (~30 m²)
- Equipment needed:
 1. Wet the glass cutter and grinder
 2. UV-curing lamp for adhesive setting
 3. Sandblasting machine for frosted detail
 4. Silicone applicators
 5. Safety equipment for cutting and polishing
- The studio is 30 m² and includes an extraction system, a 4 m workbench, a water supply, and a 400 V three-phase power supply. It can produce up to 200 units per month. The core equipment includes a wet table saw, an edger/grinder, a 450 × 450 mm UV tunnel, a 180-litre sandblasting cabinet, a compressor, and PPE lockers. Capacity can be increased by adding shifts and a second saw; all other tools will be shared among users.

6. Distribution Channels

- B2B Contracts: For seasonal gifting, awards, or welcome kits, bulk orders (50–500 units) timed for December gifting; optional fulfilment direct to remote staff.
- Branded e-commerce: Customisable gifts for sustainability-focused companies/ A Shopify storefront embeds origin-tracking videos and live bird-cam feeds.
- Design stores and gallery shops: Sold as eco-decor or collectable crafts, Limited-edition colourways with artist certificates
- Tourist and museum gift shops: Especially those focused on nature or design
- Pop-ups and design fairs: Especially during holidays or bird migration seasons

7. Cost Structure

- Low material costs due to upcycled inputs
- Moderate labour cost for artisan finishing and branding
- Eco-packaging and inserts to explain the story and care
- Flexible production (small batch or one-off) allows cost scaling

Initial Costs

Cost item	€ estimate	Comments
Wet glass cutter + grinder	~4 500	Refurbished dual-table unit
UV-curing lamp	~800	365 nm, 400 W
Sand-blasting cabinet	~1 200	With a 0.5 kg/min media recycler
Benches, clamps, hand tools	~700	Stainless fixtures
Safety PPE set	~300	EN 166 goggles, gloves
Starter adhesives & silicones	~400	Covers the first 250 units
Total CAPEX / month	7 900	-

Monthly Costs

Cost item	€ estimate	Comments
Workshop rent & utilities	~450	Urban light-industrial zone
Glass collection & cleaning	~150	Fuel + detergent
Artisan labour (0.5 FTE)	~1 200	Living-wage basis

Cost item	€ estimate	Comments
Consumables & packaging	~200	Compostable Kraft box
Insurance & certification	~80	Liability + CE mark
Marketing & e-commerce	~120	Ads + platform fee
Total OPEX / month	2 200	Breakeven ≈ 35 units/month

8. Revenue Streams

- Custom corporate orders with logos or messages
- Retail sales of unique or seasonal models
- Collaborations with birdwatching organisations or green NGOs
- Co-branded eco-awareness campaigns
- Educational kits and feeder + binocular gift bundles

Corporate Bundles: Priced between €65 and €90 per unit, depending on the complexity of engraving and gift wrap.

Gallery Editions: Costing between €120 and €150, available with tinted laminates or an artist's signature.

Retail E-commerce: Standard price of €79, and a premium anti-strike design available for €95.

Co-branded Awareness Campaigns: A flat fee of €12,000 for a 200-unit run, which includes digital storytelling assets.

Demand Trends: Demand peaks in the fourth quarter during corporate holiday seasons and migratory bird spring weeks. The lull in August is utilised for research and development, as well as stock replenishment.

9. Gender Equality and Employment Opportunities

See the introduction for the full overview.

- Women-led studios & social enterprises: product well-suited for women-run workshops and inclusive producers.
- Flexible work formats: design, assembly, and packaging organised in short, schedulable blocks.
- Inclusive hiring: subcontract assembly/packaging to a social enterprise employing people with disabilities; involve at-risk groups in safe tasks.
- Story-driven visibility: branding credits craftspeople and partners to raise their profile.
- Equal pay & targets

- Pathways for NEET youth: six-month paid apprenticeships delivered with local job centres.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this process is 2.7 kg CO₂e per 1 kg of finished product, based on representative input assumptions for small-studio production.

Most emissions arise from electricity use during glass cutting, edge finishing, sandblasting, and UV-curing of adhesives. At the same time, smaller contributions stem from silicone sealants, packaging materials, and local transport of reclaimed window glass.

Because this idea relies on upcycled architectural glass and exclusively cold-working and low-temperature assembly processes, the original carbon footprint of primary glass manufacturing is not reallocated to the product. Direct material-related emissions, therefore, remain low to moderate, and overall energy demand is driven mainly by mechanical processing time, UV curing, and workshop-scale electricity use, rather than kiln-based remelting or thermal forming.

These results should be understood as indicative estimates rather than exact measurements and may vary depending on workshop equipment, curing times, production volume, component sourcing, and the local electricity mix.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, these bird feeders are positioned as design-led corporate gifts and architectural micro-installations. They are therefore promoted primarily through CSR networks, green-building events, architecture studios, and sustainability-focused procurement channels rather than consumer retail. Visibility is built through inclusion in corporate gift catalogues, architecture and real-estate exhibitions, biodiversity and urban-nature showcases, and curated design fairs where the feeder is experienced in situ on windows, terraces, and façades. Partnerships with architecture firms, eco-certified offices, and hotels function as long-term reference sites, allowing the object to circulate as a credible example of circular design in use. Digital documentation supports this professional positioning by tracing material provenance, installation contexts, and bird interaction, reinforcing the feeder's value as a living, visible sustainability statement rather than a disposable branded object.

30. House Numbers and Street Name Signs

Handcrafted in partnership with municipalities from 100% recycled glass, these house numbers and street name signs turn everyday civic infrastructure into sustainable design. Fully customizable in style, colour, size, and typography, they are engineered for outdoor durability while making a clear artistic statement and signalling public commitment to circular design.

Pieces are made from locally collected glass using techniques such as mosaics, fusing, casting, slumping, stained glasswork, and sandblasting. Each sign is unique and reflects community materials and aesthetics. A discreet QR code lets residents trace the journey from curb-side recycling to civic art, proving that zero-waste infrastructure can be beautiful.

1. Glass Types and Sources

See the introduction for the complete overview; below are the sources specific to House Numbers & Street Name Signs.

- Post-consumer bottles & jars: colour-sorted container glass collected via local recycling programs and community drives; prepped for consistent appearance in signage.
- Flat/architectural glass: discarded window panes, mirrors, and panels from renovations/demolitions - well-suited to etching, engraving, slumping, and kiln-formed panels.
- Municipal streams: partnerships with local authorities to tap existing bring-bank/recycling routes, turning public waste into public design.
- Community contributions: residents donate household/sentimental glass during collection days, adding a civic and educational angle.

Compatibility note: flat/mirror glass is processed separately from bottle glass to avoid CTE mismatch; mirror backing is entirely removed or sealed before use.

2. Glass Processing Methods

See the general introduction for technical parameters. For this line, recycled glass is cut into tiles for mosaic numerals and bonded with weatherproof adhesives and grout, or it is kiln-fused and slumped into flat or curved panels for a uniform, modern finish. Minimalist signs use sandblasting or etching on larger panels to render frosted text or numbers, while casting in reusable moulds creates raised or embedded characters for premium or heritage applications. All edges are rounded to at least a 1 mm radius for safe handling and outdoor use, and assemblies are built for weather resistance and clear legibility.

3. Value Propositions

House numbers and street name signs made from recycled glass translate circular economy principles into everyday public infrastructure. Public procurement increasingly prioritises durable and low carbon

materials, creating strong demand for signage that combines longevity, aesthetic quality, and environmental performance. Recycled cullet significantly reduces the need for virgin raw materials and lowers energy use during production, while local sourcing further minimises transport related emissions and strengthens regional supply chains.

Once installed, these signs become constant, visible markers of circular design in public space, reinforcing environmental awareness and civic identity through everyday interaction. The use of mono material glass components with durable fixings ensures long service life and straightforward recyclability at the end of use, reducing maintenance needs and replacement cycles.

Design flexibility allows typography, formats, and finishes to be adapted to heritage zones, new developments, or neighbourhood specific visual identities. Collaboration with local artists and designers further embeds the signage within the cultural fabric of a place, turning functional urban elements into recognisable expressions of sustainable craft and community values.

4. Customer Segments

The primary customers are municipalities, developers, and organisations responsible for public or semi-public spaces who seek durable, low-maintenance signage with clear sustainability value. For these actors, house numbers and street signs represent an opportunity to upgrade everyday infrastructure while visibly demonstrating circular-economy principles.

Within this group, the concept is particularly relevant for urban planners, architects, and design studios working on eco-developments, neighbourhood renewal, or heritage-sensitive projects, where material quality and long-term performance are as important as visual identity.

Secondary customers include eco-conscious homeowners and small businesses that wish to use artistic glass signage to express environmental values and strengthen the character of their property or storefront, as well as community groups using locally collected glass to symbolise shared identity and place-based pride.

5. Space and Equipment

Production can be organised in a 50–100 m² workshop suitable for large-format glass work, including mosaic assembly, kiln fusing, and surface finishing. The layout should provide clear zones for glass cleaning and sorting, composition and assembly, firing or casting, finishing and quality control, and final packaging.

Core equipment includes large flat-bed kilns for fusing, slumping, or casting glass elements, wet saws and grinders for shaping thick or flat glass, and sandblasting or engraving tools for surface detailing. Weatherproof adhesives, sealants, and grouts are required for outdoor durability, along with appropriate ventilation and heat-resistant safety equipment. Optional UV-resistant coatings or lamination systems can be added to extend the lifespan of signage in demanding outdoor conditions.

6. Distribution Channels

Distribution is primarily organised through direct collaboration with municipalities and public institutions, including participation in public procurement calls for green infrastructure, urban renewal, and design-led public space upgrades. This channel ensures scale, visibility, and long-term placement of the signage.

Professional outreach is supported through partnerships with architecture and urban-design studios involved in eco-neighbourhoods, regeneration projects, and heritage-sensitive developments, where glass signage can be specified as part of the built environment.

Bespoke commissions are facilitated through a professional online portfolio that presents previous installations and material options, enabling direct orders from private clients, community groups, and institutions. Visibility is further strengthened through participation in green design events and public-art showcases, where signage is positioned as both infrastructure and environmental communication.

Limited retail distribution can be used selectively for special districts or place-based editions, often in collaboration with local cultural initiatives or tourism bodies, while keeping the core focus on commissioned and public-facing projects.

7. Cost Structure

Costs are driven primarily by skilled labour and project coordination, while material input remains low due to sourcing through local recycling partnerships, community donations, and salvage from renovation projects. Additional materials such as grout, sealants, and mounting systems are purchased as needed.

Facility and equipment costs are largely upfront investments in kilns and cutting or finishing tools, with shared workshops or partnerships with existing glass studios significantly reducing setup expenses. Administrative costs include proposal preparation, design coordination, compliance with public safety standards, and project management for commissioned work.

Marketing and outreach focus on maintaining a professional portfolio, participating in selected exhibitions, and engaging local communities through presentations, workshops, and material storytelling, supporting long-term adoption without high recurring expenses.

Initial Costs

Cost item	€ estimate	Comments
Two 60 × 90 cm flat-bed kilns	~9 000	programmable, fibre-lined
Water-cooled belt sander	~2 800	edge finishing

Cost item	€ estimate	Comments
CNC-cut aluminium mould blanks	~2 500	reusable, eight font styles
Sand-blasting cabinet + compressor	~2 200	texture & anti-glare
Solar PV upgrade (5 kW)	~6 000	offsets 40 % of the kiln load
PPE & LEV ducting	~1 500	Silica dust control
Brand toolkit & website	~2 500	incl. QR code back-end
Total CAPEX	26 500	

Monthly Costs

Cost item	€ estimate	Comments
Renewable electricity	~650	net of PV
Cullet collection & washing	~300	shared with the city
Artisan wages (3 FTE)	~6 000	living wage
Workshop lease & insurance	~1 300	urban fringe
Consumables (grit, grout)	~400	alabaster grout, sealant
Logistics & packaging	~350	EU courier rates
Marketing + tender fees	~250	design fairs, bid bonds
Total OPEX / month	9 250	

8. Revenue Stream

Revenue is generated primarily through commissioned sales to municipalities, institutions, and developers, where street signs, gateway panels, and neighbourhood signage are produced in coordinated series with pricing based on size, complexity, and material finish. Bespoke commissions for private homeowners and small businesses provide additional income through custom house numbers, logos, and limited decorative panels.

Higher-value pieces are created through artist collaborations and limited editions for design-led retail or urban-art initiatives, while community-funded installations and grant-supported projects enable larger public works with shared financing. Additional revenue can be generated through educational workshops and participatory programmes linked to signage making, which support community engagement while diversifying income without increasing production scale.

9. Social impact & Gender equality

See the introduction for the complete overview.

- Skills & training: women participate across all stages - design, glassworking, outreach, and coordination - with training in artisan skills and safe handling.
- Fair & flexible work: equitable pay, family-friendly hours, and non-discriminatory policies to support caregivers and inclusive teams.
- Leadership & visibility: women lead co-design, public art, and municipal partnerships; their names are credited on installations to reinforce visibility.
- Women-led partners: collaboration with women's cooperatives, social enterprises, and sustainability networks to ensure gender balance and community reach.

10. Carbon Footprint

Using the ArtGlass Carbon Footprint Calculator, the estimated emission for this process is 3.46 kg CO₂e per 1 kg of finished product, based on representative input assumptions for small-studio, municipal-scale production. Most emissions arise from electricity consumption during kiln fusing, slumping, and casting of thick glass panels, while smaller contributions stem from cold-working (cutting, grinding, sandblasting), weatherproof adhesives and grout, transport of cullet, and packaging for public installation.

Because this idea relies on energy-intensive hot processes applied to significant, durable outdoor elements, direct material-related emissions remain moderate due to high recycled content. Still, overall energy demand is driven primarily by kiln firing cycles, panel thickness, and extended annealing requirements rather than by raw material extraction. The original manufacturing footprint of the glass is not reallocated; the estimate reflects only the additional processing required to transform recycled cullet and flat glass into finished civic signage. These results should be understood as indicative estimates rather than exact measurements. They may vary depending on kiln efficiency, batch size, use of on-site renewable electricity, production scheduling, and national electricity sources.

11. Marketing and Promotion

In accordance with the strategic framework defined in the introduction, house numbers and street name signs are promoted as elements of civic infrastructure and place-based design rather than as decorative products. Visibility is built through collaboration with municipalities, urban planning departments, and architecture studios, where signage is integrated into pilot neighbourhoods, street renewals, and eco-districts as reference installations. Presentation at public-design exhibitions, architecture and urbanism fairs, and circular-economy showcases ensures that the work is encountered by specifiers, planners, and procurement professionals in a relevant context. Digital documentation supports this process by archiving installed projects, material provenance, and community participation, allowing the signs to circulate as credible, replicable examples of circular public design across professional and institutional networks.

D: SOCIAL IMPACT & GENDER EQUALITY

1. Inclusive roles within artisanal glass practice

Circular glassmaking in artisanal and studio-based contexts integrates design, making, finishing, and storytelling within small teams or individual practitioners. Activities such as sourcing, colour sorting, manual cleaning, cold-processing, kiln work, surface finishing, packaging, and narrative presentation are often carried out by the same maker, blurring the boundaries between creative and technical labour. This integrated workflow enables participation across different physical capacities, life stages, and experience levels, particularly for women and practitioners balancing creative work with other responsibilities.

To ensure the visibility and fair valuation of craft labour, these roles are supported through transparent remuneration, fair pricing of handmade work, and modular learning pathways that allow progression from assisted practice to independent artistic production and paid commissions.

This approach can be situated within the broader objectives of the **European Skills Agenda** and the **Pact for Skills**, which set EU-level priorities for lifelong learning, skills development, and inclusive participation in upskilling and reskilling across sectors, particularly in the context of green and circular transitions.

https://employment-social-affairs.ec.europa.eu/policies-and-activities/skills-and-qualifications/european-skills-agenda_en
https://pact-for-skills.ec.europa.eu/index_en

2. Safe studio practice, embodied skills and re-entry pathways

Working with reclaimed glass requires embodied knowledge of materials, including handling shards, washing, cutting, kiln preparation, and managing thermal stress. Craft-based circular glass studios, therefore, integrate safety and material-handling skills directly into creative practice, ensuring that artistic production remains accessible to women, young people, migrants, and practitioners returning to creative work after periods of interruption.

Compact, studio-based learning formats support gradual skill accumulation and confidence-building, enabling transition from guided practice to independent artistic output and paid work.

These practices contribute to the objectives of the European Pillar of Social Rights and its Action Plan, particularly principles on education, training, equal opportunities, and secure work, which apply across all sectors, including cultural and creative activities.

https://employment-social-affairs.ec.europa.eu/policies-and-activities/european-pillar-social-rights-building-fairer-and-more-inclusive-european-union/european-pillar-social-rights-action-plan_en

3. Women-led reuse networks and local glass economies

Glass reuse, collecting, and curation are often sustained by women artisans, collectors, and micro-vendors operating through informal or semi-formal networks. By committing to regular demand for specific glass types, defined by colour, thickness, age, and provenance, circular glass studios stabilise income for these actors and integrate them into recognised creative supply chains.

Repair, take-back, and collaborative making initiatives further extend earning opportunities while keeping material value embedded in local cultural economies and strengthening community-based circular loops.

This model reflects the objectives of the Social Economy Action Plan, which promotes inclusive, locally embedded value chains and recognises the role of craft and cultural practices within the social economy.

https://employment-social-affairs.ec.europa.eu/policies-and-activities/eu-employment-policies/social-economy-and-inclusive-entrepreneurship/social-economy-action-plan_en

4. Gender equality in artistic authorship and craft leadership

Despite strong female participation in handmade glass and decorative arts, leadership, authorship, and technical recognition often remain gendered. Circular glass studios can address this by supporting mentorship for women glass artists and artisans, ensuring transparent pricing of handmade labour, and promoting visibility through credited works, exhibitions, and commissioned projects.

In craft-based production, gender equality extends beyond employment metrics to include recognition, authorship, and access to creative opportunities. Tracking representation in exhibitions, commissions, and studio leadership helps prevent the reproduction of structural inequalities in new circular craft economies.

These practices are consistent with the objectives of the European Commission - Gender Equality Strategy 2020–2025 and anticipate the requirements of the Pay Transparency Directive (EU) 2023/970, particularly in relation to fair valuation and transparency of artistic labour.

<https://ec.europa.eu/newsroom/just/items/682425/en>

<https://eur-lex.europa.eu/eli/dir/2023/970/oj/eng>

5. Community learning, studio openness and confidence-building

Open studio days, participatory workshops, and entry-level glassmaking sessions function as spaces for skill-sharing, confidence-building, and creative networking. They enable participants to engage with glass as both material and medium, while creating pathways into paid creative participation and long-term studio involvement.

Such activities can be situated within EU approaches to community-based capacity building under the Social Economy Action Plan and collaborative learning encouraged through the Pact for Skills, without implying sector-specific regulation.

https://employment-social-affairs.ec.europa.eu/policies-and-activities/eu-employment-policies/social-economy-and-inclusive-entrepreneurship/social-economy-action-plan_en

https://pact-for-skills.ec.europa.eu/index_en



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