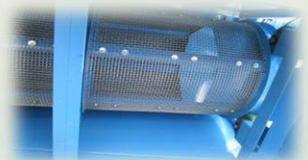




Andela Products Designs and Manufactures Glass Recycling Systems and Equipment



Local Collection and Processing

Recycle waste glass into a safe-handling product with no sharp edges

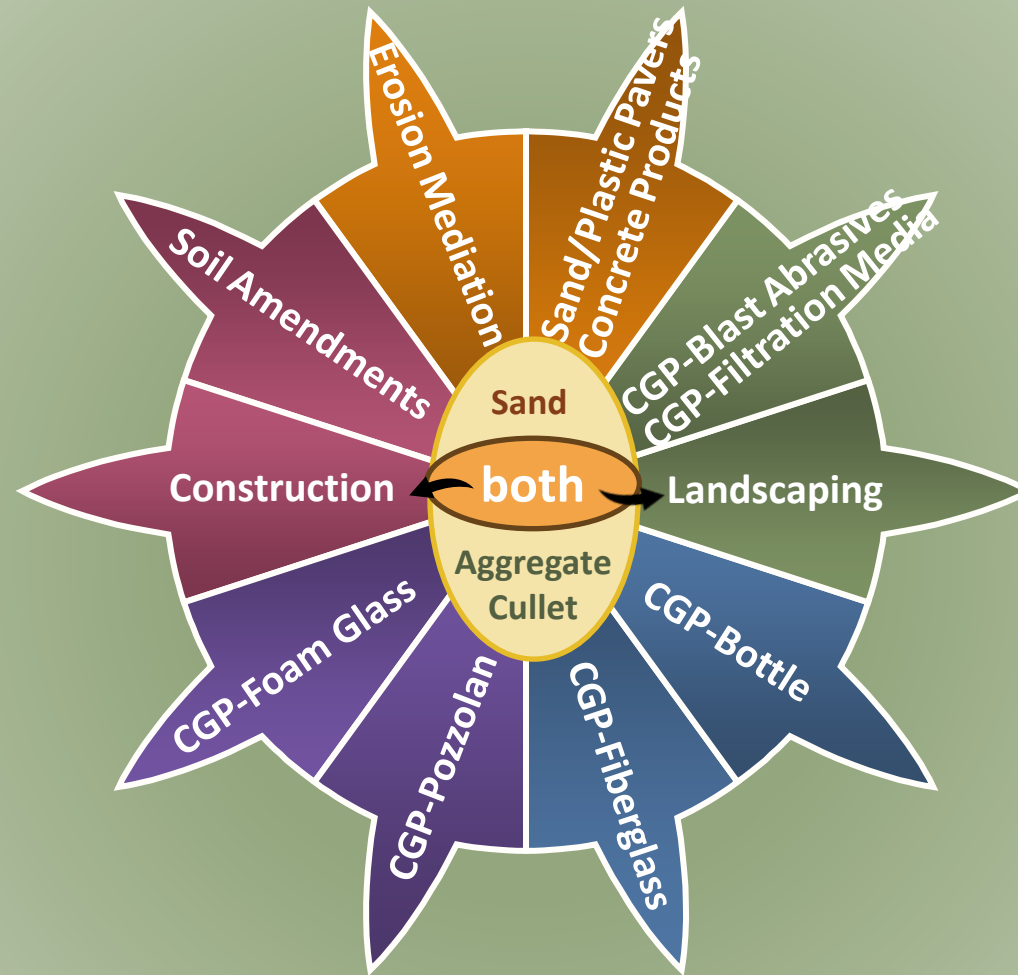
Use as a substitute for sand and cullet/aggregate





Sources of Glass

- Material Recovery Facility (MRF)
- Whole or broken bottles
- Plate glass
- Ceramics
- Any frangible material



GLASS SAND & GLASS CULLET/AGGREGATE USES

SOIL AMENDMENTS

University of Pennsylvania Department of Earth and Environmental Science in conjunction with OLIN Labs performed a life cycle analysis (LCA) on soil made with Andela pulverized glass.

Results: The addition of glass sand to mulches or soils **improves both their mechanical properties, and chemical or nutritional properties. Better water flow** of glass-sand mulch mixes. Leachate analysis met safety standards. Glass-sand **retains water longer** than natural sand. Economic analysis showed **community benefits of diverting glass from landfill.**

How to: Mix glass sand with compost to make a soil blend that includes organic nutrients from the compost, and filtration and water retention from the glass sand.



LANDSCAPING

BOTH GLASS SAND AND CULLET/AGGREGATES are a natural fit for Landscaping applications.

User-friendly with rounded edges, pulverized glass is attractive and doesn't break down like the mined and dredged products they replace.

Bonus: Glass mulch keeps insects, slugs, and other weeds from attacking plants.

And glass mulch creates an insulated layer to protect the plant's roots from extreme temperatures.

In addition, pulverized glass retains moisture on the surface of particles, providing water and available silica for the plant's growth!

GLASS SAND & GLASS CULLET/AGGREGATE END USES

Soil-Landscaping Links

OLIN Labs, Circular Soil: <https://olinlabs.com/soil-less-soil>

OLIN Labs, Resiliency Park: <https://andelaproducts.com/blog/circular-soil-northwest-resiliency-park/>

OLIN Labs/Bottle Underground/Bennett Compost soil mix: glass-sand, food-waste compost, biochar:
<https://olinlabs.com/flowershow>

Olin Labs/Temple University, Soilless Soil: <https://olinlabs.com/blog/2022/9/9/soilless-soil-2020-2022-recap>

University of Texas Rio Grande Valley, Salsa Mix: <https://sustainablebrands.com/read/study-glass-grow-ingredients-protect-coastlines>

Alfred University, Glass as Fertilizer conduit:

<https://www.alfred.edu/about/news/pressreleases/2024/08/alfred-university-undergraduates-research-use-of-waste-glass-in-promoting-plant-growth.cfm>

Colgate University, Tomato study: https://andelaproducts.com/wp-content/uploads/2024/03/Andela-Glass-and-Soil-Amendment-Information-2023_compressed.pdf

Landscaping Tips: <https://andelaproducts.com/wp-content/uploads/2024/01/5-Creative-Ways-To-Use-Recycled-Glass-Outdoors.pdf>

<https://andelaproducts.com/glass-soil-and-mulch/>

CONSTRUCTION SAND AND AGGREGATE

Pulverized Glass & Construction

The angular shape of recycled pulverized glass sand particles makes them interlock more easily which increases their construction strength.

Also, waste glass can be crushed to varying particle sizes.

This is important because engineering characteristics of building materials differ with different particle sizes.

USES:

- Bedding
- Backfilling Material
- Concrete
- Road drainage
- Embankment Fill
- Landscaping



GLASS SAND & GLASS AGGREGATE END USES

Construction Sand and Aggregates

Cano Martin Pena, Puerto Rico: <https://wp.wpi.edu/puertorico/projects/2022-spring/cano-recycling/>

Australia Specifications for Recycled Glass Aggregates: [https://andelaproducts.com/wp-content/uploads/2024/01/Specification for RCG as SAR-compressed.pdf](https://andelaproducts.com/wp-content/uploads/2024/01/Specification%20for%20RCG%20as%20SAR-compressed.pdf)

US FDOT Guidelines for use in Pavement Construction: https://andelaproducts.com/wp-content/uploads/2024/03/Waste-Glass-Material-Description-User-Guidelines-for-Waste-and-Byproduct-Materials-in-Pavement-Construction-FHWA-RD-97-148_compressed.pdf

Other presentations:

<https://andelaproducts.com/wp-content/uploads/2024/01/Andela-Products-Glass-Aggregate-Applications.pdf>

https://andelaproducts.com/wp-content/uploads/2022/08/Applications-for-Using-Pulverized-Glass-Sand_Aggregate.pdf

SAND & PLASTIC PAVERS

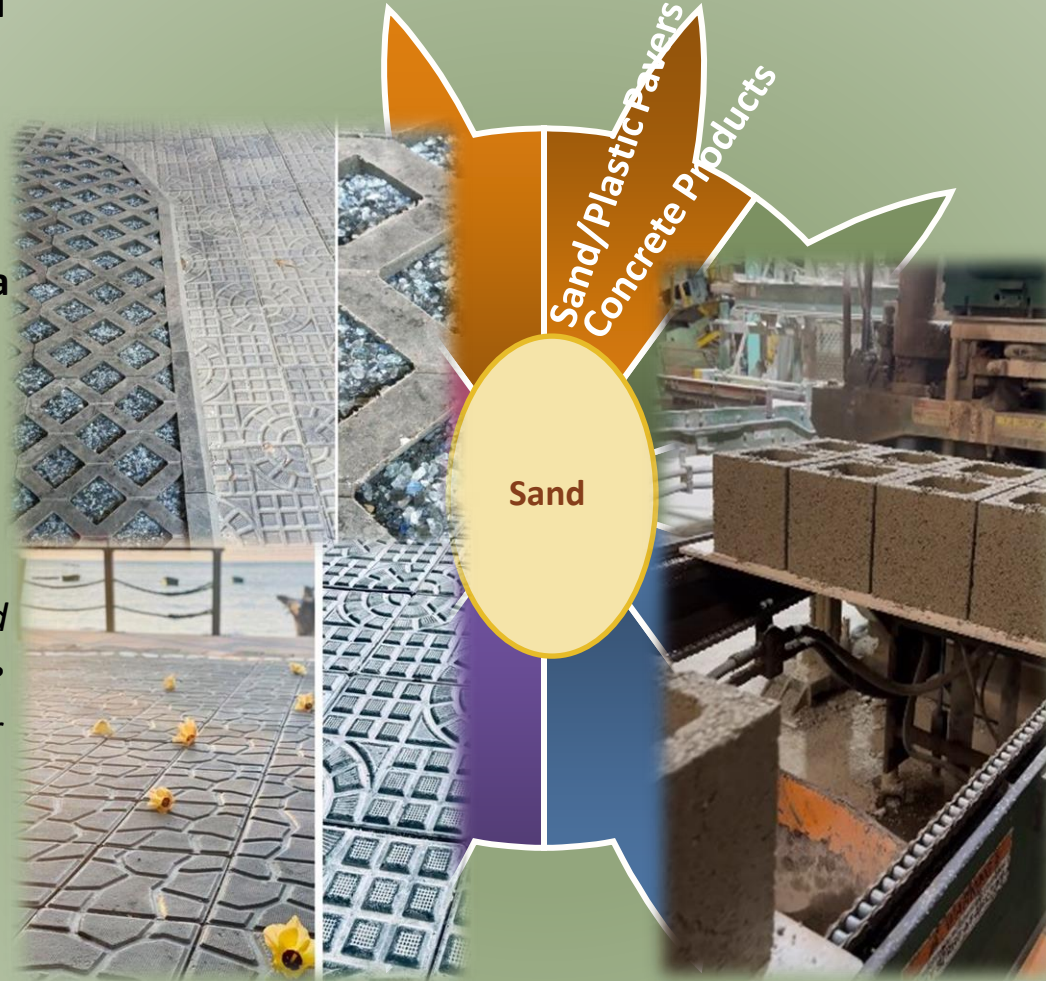
Waste Glass And Plastics Go Unrecycled
In Remote and Island Locations.

There is a solution! Turn them into
products that can be used locally!

How?

Caltech in Timor-Leste uses their Andela
Pulverizer to make sand for Pavers,
Bricks, Building Blocks, and Curb Units.

To create glass and plastic pavers,
follow these steps: 1) Pulverize glass
using the Andela unit or system. 2) Shred
mixed plastics into little chips. 3) Mix the
glass and shredded plastic chips. 4) Pour
them into the heating unit. 5) Press
melted plastics and glass mix into the
Paver mold. 6) Cool molded product in
water and you have PAVERS!



CONCRETE PRODUCTS

Bloques Caribe, a construction company
in Puerto Rico, uses their Andela
Pulverizer to make glass sand for
concrete blocks.

José Mercado Quintana of Bloques
Caribe keeps his company on the
forefront of recycling by using pulverized
glass in the cement mixture for both
environmental and economic purposes.

One report states that Bloques Caribe's
annual savings for substituting glass sand
for natural sand in their cement block
mixture is approximately \$507,892--
based on the weight of an 8" x 8" x 16"
block with the estimated 11% glass in
weight per block.

<https://andelaproducts.com/wp-content/uploads/2024/04/Caltech-Andela-Circular-solution-Pavers-min.pdf>

<https://andelaproducts.com/crushed-glass-concrete-products/>

GLASS SAND & GLASS AGGREGATE END USES

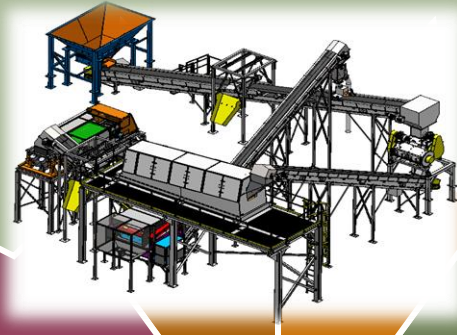
Andela Clean Glass Plant

An Andela Clean Glass Plant includes an **Andela Glass Pulverizer** combined with an **Andela Glass Clean Up System**.

The **Andela CGP, Clean Glass Plant**, includes drying, screening and re-grinding processes to turn **MRF (Material Recovery Facility)** glass into clean glass products for further refinement.

MRF glass includes broken glass, flattened metals, plastics, and shredded paper.

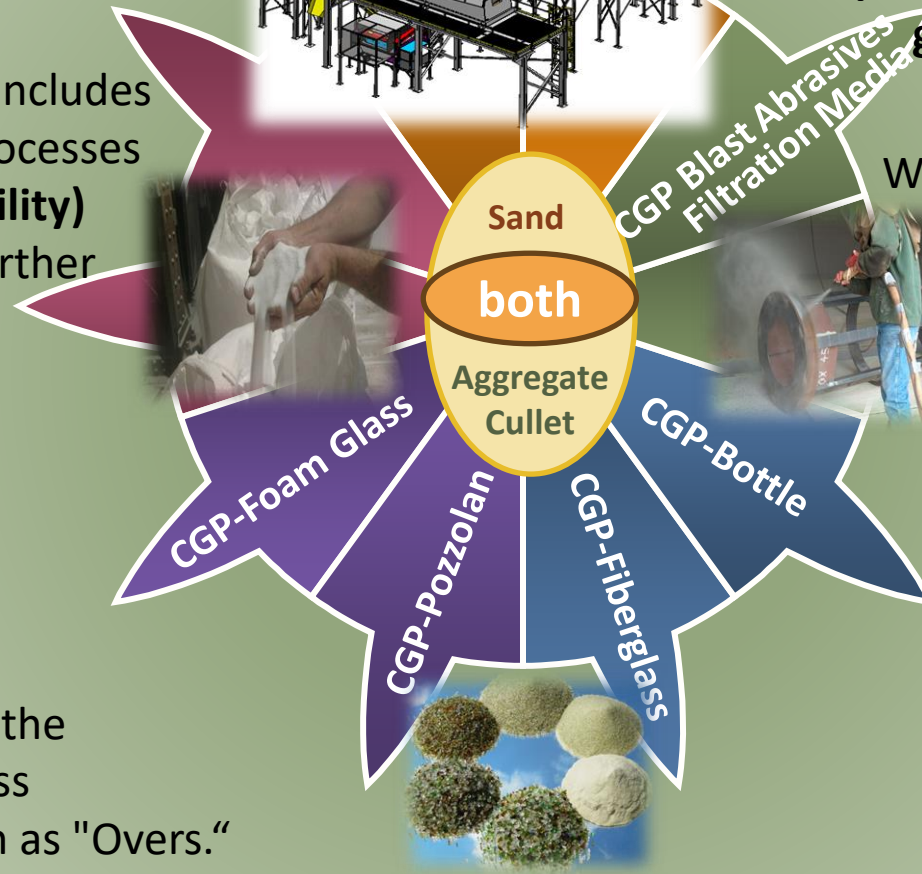
Andela's CGP utilizes our **Selective Reduction Technology** which leaves the non-glass residue typical of MRF glass in a larger form that exits the system as "Overs."



The output of our **CGP** is ready to be shipped to a **bottle, fiberglass, foam glass, or pozzolan manufacturer**. Or it can be used for **glass blast abrasives and filtration media**.

What an Andela customer chooses for their market depends on the location of the end-user relative to their plant, and the highest and best use of the outputs.

Andela Clean Glass Plants include: **Hopper, Pulverizer, Trommel Screen, Blower/Density Separator, Eddy Current, Conveyors, Dryer and Screeners** integrated into a turnkey solution.



<https://andelaproducts.com/blog/what-is-an-andela-clean-glass-plant/>

Clean Glass Sand & Cullet End Markets



Glass Pulverizing, Crushing, And
Cleaning Systems

<https://andelaproducts.com/>