



ASSESSING THE ENVIRONMENTAL PERFORMANCE OF GLASSIA WATER

Is refilling truly a more sustainable option for the planet?

A 2024 CASE STUDY BY



GLASSIA



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GLASSIA

P. 03

Research Highlights

- Background
- Methodology

P. 06

Glassia Introduction

- About Glassia
- Partners
- Service Explain
- Impact numbers

P. 09

Glassia's Life Cycle Assessment

- What is Life Cycle Assessment & How did we apply this method?
- The Life Cycle of Reusable Glass Bottles

P. 13

Glassia's Environmental Performance

- Environmental Performance
- Takeaways from our LCA
- Looking ahead

1

Research HIGHLIGHTS



Research highlights

01

Glassia Water conducted a life cycle assessment (LCA) study of its reusable glass bottled water service to establish a baseline of comparison against other packaging options for drinking water in Vietnam.

02

The LCA study compared reusable glass bottled drinking water versus single-use plastic bottles, bioplastic bottles, one-way glass bottles, and aluminum cans.

03

The LCA study compared the environmental impacts in six different categories: climate change, non-renewable energy use, water use, particulate matter formation, mineral/metal resource consumption, and agricultural land use.

04

Glass bottles should be reused at least four times to have lower impacts than single-use PET bottles in all impact categories. Glassia's glass bottles have already achieved an average of 10 reuses per bottle up until today.

05

The majority of GHG emissions from reusable glass bottles (up to 80%) come from raw material extraction and the manufacturing process.



Research highlights

06

Distribution of glass bottles to customers, collection, and maintenance of glass bottles makes up between 5-22% of the total GHG emissions with the percentage increasing as the bottles are reused more frequently.

07

Glassia's reusable glass bottled water service had the lowest impacts compared to all other single-use packaged water options across five of the six categories examined in this study: climate change, energy resource depletion, particulate formation potential, water use, and agricultural land use.

08

Substituting plastic bottles with one-way glass bottles still has the highest environmental impact out of all the other packaging options.

09

Glassia's commendable environmental performance was largely a result of the frequent reuse of its bottles and short distances to customers of no more than 50 kilometers.

10

The careful design of reusable beverage packaging services is an example of how circularity can decouple economic growth from environmental degradation.



2

GLASSIA Introduction



ABOUT GLASSIA

Introducing Glassia: The Future of Bottled Water

Glassia is a pioneering Vietnamese social enterprise committed to producing and promoting plastic-free bottled water by introducing purified water in reusable glass bottles.

Our solution is both cost-effective and environmentally friendly, as we collect, sterilize, and refill the bottles, offering full circularity and eliminating plastic waste.

Our Danang decentralized refill facility, established in 2021, revolutionized single-use plastic bottling with a circular model. We launched our second refill site in Ho Chi Minh City in early 2023, with a third one set to launch in early 2024. Our goal is to enable local refilling across Vietnam for accessible, affordable, sustainable products in every city and region.



Positive consumer behavior change



Customized glass bottle designs



Post-consumer collection



Affordable



Plastic-free, zero-waste consumption



Locally produced



HACCP and ISO 22000 certified



Fully transparent production and management



PARTNERS

NEW WORLD
SAIGON HOTEL

NOVOTEL
HOTELS & RESORTS

Marriott

SHERATON
EST. 1937

HOIANA

HYATT®

WINK

SOFITEL
HOTELS & RESORTS

PULLMAN
HOTELS AND RESORTS

Radisson

IHG
HOTELS & RESORTS

ACCOR

GRAND MERCURE
HOTELS AND RESORTS

Hilton

What do we offer?



Environmentally friendly,
plastic-free water service



Full-service delivery
and pick-up



Reusable glass bottles and
recyclable aluminum caps



Own branded
bottle

*Wondering how **Glassia**
is making an impact?
Look below!*



IMPACT NUMBERS



+40
businesses participated



+3,000,000
bottles refilled



3 refill locations
across Vietnam

3

GLASSIA

life cycle assessment



What is *Life Cycle Assessment* & How did we apply this method?

To understand whether our reusable glass bottled drinking water service offers environmental benefits in comparison to existing single-use packaging options for drinking water, we commissioned PXP Sustainability to conduct a life cycle assessment (LCA) study. LCA is an internationally recognized science-based method that is used to measure the potential environmental impacts throughout a product or service's life cycle from raw material acquisition through production, distribution, use, and end-of-life treatment (e.g., landfill, incineration, recycling). LCA is the state-of-the-art method when it comes to measuring the environmental performance of circular business models and determining whether they offer environmental benefits compared to traditional linear business models.

We used LCA to compare the life cycle environmental impacts of our reusable glass bottled drinking water service versus five different single-use packaged water options in Vietnam which were polyethylene terephthalate (PET) bottles, bioplastic bottles (polylactic acid and bioPET), one-way glass bottles, and aluminum cans. This study measured the environmental impacts in six different categories which were climate change, non-renewable energy use, water use, particulate matter formation, mineral/metal resource consumption, and agricultural land use. Through this LCA study, Glassia aimed to establish a baseline of its current environmental impacts in comparison to other single-use packaging options for water and understand the key factors of our business across the entire supply chain that strongly influence the environmental impacts of reusable glass bottled water services.



The Life Cycle of Reusable Glass Bottles

Our reusable glass bottles are produced once and reused multiple times through a circular system.

Glass bottle production

01

Our production process begins with sourcing raw materials, including recycled glass (cullet), silica sand, limestone, soda ash, and other necessary materials. Aluminum ingots are crafted for the caps, while logos are thermally printed onto the glass bottles.

02

Production process

At Glassia's facility, each bottle undergoes water filling and sealing, capped with aluminum, and readied for distribution.



03

Distribution Logistics

Our bottles are transported to customers via truck, with distances ranging between 13 to 50 km (one-way).

04

Consumption and Collection Procedures

After the drinking water is consumed, Glassia collects the empty bottles to bring them back to the facility to be washed and refilled.

05

End-of-life

Less than 5% of our bottles are prone to breakage or loss and therefore cannot be reused. These broken or lost bottles are either sent to a landfill or recycled.

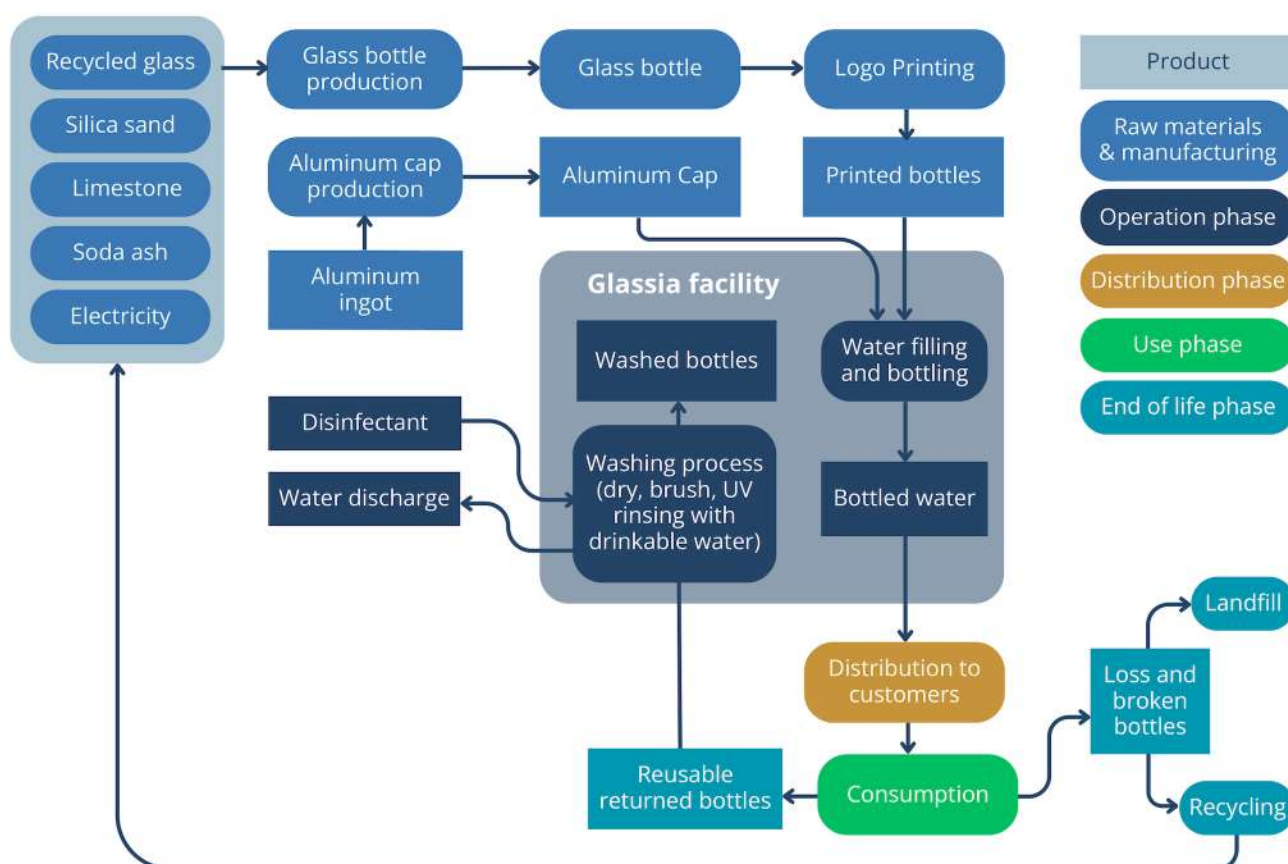


Figure 1.1: Activities in the Life Cycle of Glassia's Reusable Drinking Water Service

4

GLASSIA'S

environmental performance



GLASSIA'S Environmental Performance

The Life Cycle Assessment (LCA) has unveiled significant insights into the environmental performance of Glassia. These findings serve as a crucial guide for assessing the ecological footprint associated with different packaging materials and practices.

01 **The Power of Reuse: Glassia Bottles Minimize Environmental Footprint**

Glassia's reusable glass bottled water service had the lowest impacts compared to all other single-use packaged water options in five out of the six categories analyzed in this study (climate change, energy resource depletion, particulate formation potential, water use, and agricultural land use).

02 **One-Way Glass Bottles: Worst Choice for Sustainability**

Across all impact categories and drinking water packaging options, one-way (single-use) glass bottles had the highest environmental impacts.

03 **Reuse Your Glassia Bottle 4 Times to Outperform Plastic**

New glass bottles should be reused at least four times to have lower impacts than single-use PET bottles in all impact categories.



04 Glassia Optimizes Operations: Minimizing Emissions from Bottle Production

The majority of the greenhouse gas (GHG) emissions of reusable glass bottles (up to 80%) come from raw material extraction and manufacturing of glass bottles.

05 Minimizing the Journey: Glassia Optimizes Delivery and Collection for Lower Emissions

Distribution of glass bottles to customers, collection, and maintenance of glass bottles makes up between 5-22% of the total GHG emissions.

06 Mineral vs. Agricultural: Glassia Identifies Resource Use Trade-Off

In the impact category of mineral resource depletion, Glassia's reusable glass bottled water service had a higher impact than the bioplastic bottles. This is because glass requires more mineral resources compared to bioplastic bottles which require more agricultural resources.

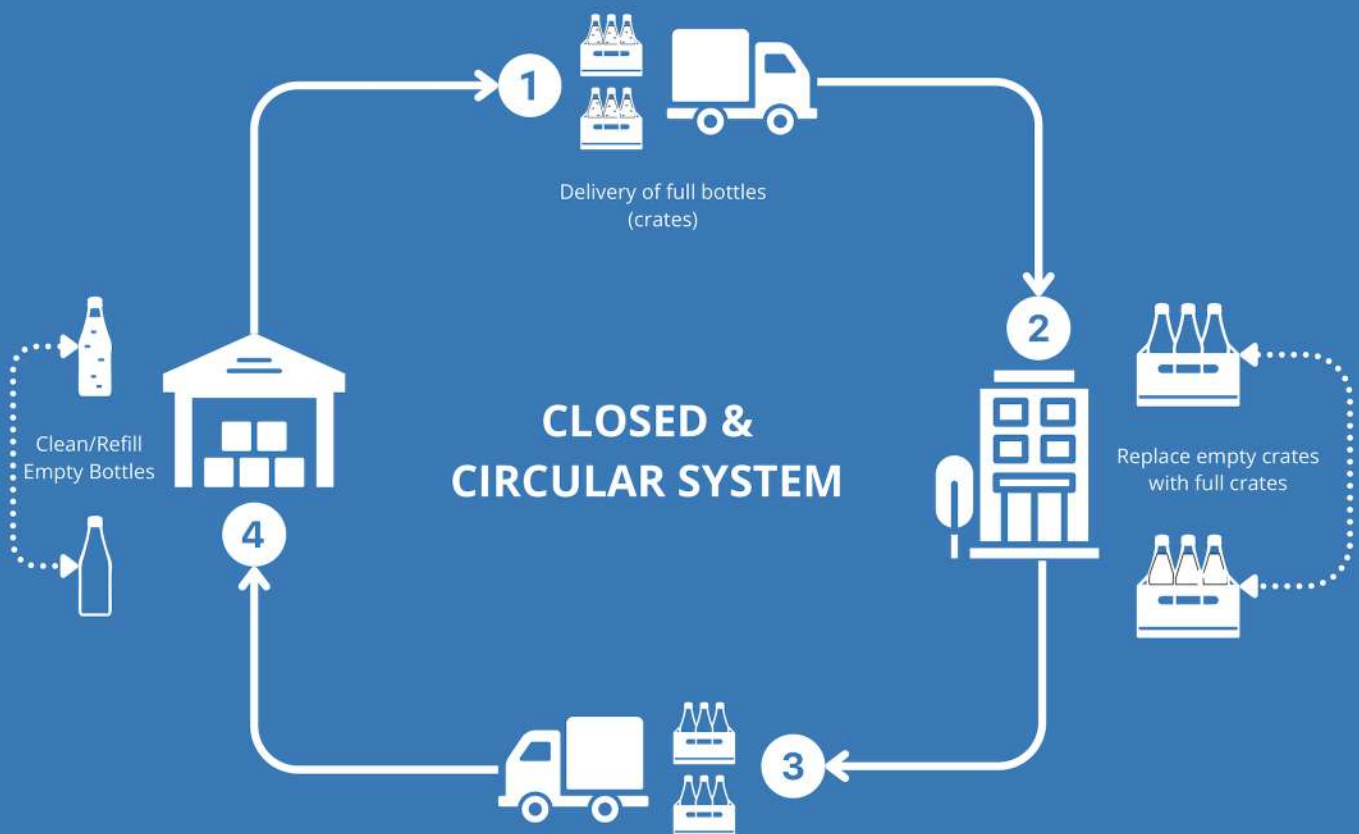


Figure 1.2: Glassia operation process

Takeaways from our LCA

The importance of business design to achieve circularity

It took much more than material substitution to enable our business model to perform environmentally better than plastics and other single-use packaging options. The LCA we conducted showed that **simply switching from plastic bottles to single-use glass bottles with recycling has the highest environmental impact out of all the other packaging options.**

- **Reuse is Key:** We recognized that reusability is the path to environmental sustainability. Our glass bottles when reused extensively, outshine other single-use packaging alternatives in terms of environmental impact due to the high levels of reuse of our bottles in stock.
- **Streamlined Reuse Processes:** To maximize the lifespan of our glass bottles, we employ a single-line system at our facility, eliminating the friction that can lead to premature wear and tear. This ensures prolonged usability and minimizes disposal rates.
- **Community Engagement:** Unlike relying on consumers to return bottles, which often results in confusion or non-compliance, we take charge of distribution and collection. This guarantees a seamless cycle of reuse, sparing our customers the burden of figuring out where and how to return our bottles.
- **Proximity Matters:** Our facility locations are situated close to our customer base, and are a choice aimed at minimizing transportation distances. This proximity not only reduces carbon emissions associated with distribution but also enhances efficiency in bottle collection.



Looking AHEAD

Plastic and other single-use packaging waste continues to pile up in landfills and rivers in Vietnam and the management of this waste has not shown significant improvement over the years. Implementing **reusable product-as-a-service** business models will help reduce the amount of waste generated at the source. Our business operations and the findings from the LCA demonstrate how circular production systems can decouple economic growth from environmental degradation.

As Glassia continues its business in Da Nang, Ho Chi Minh, and new locations in Vietnam, we will regularly collect new data regarding our operations. Through an **LCA calculator tool** that **PXP** developed as part of this study, we will be able to monitor Glassia's environmental impacts each year and explore potential improvements to the business model that could further reduce our environmental impacts. Through this process, we remain dedicated to pioneering sustainable solutions in the Vietnamese market and beyond.





GLASSIA

BE PART OF THE CHANGE.

Contact our team to explore how:



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