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Integrating Reuse Into California's Beverage Container Deposit System

A Feasibility Study

eunomia ReSim THE STORY OF STUFF PROJECT

Executive Summary

The Case for Reusable Beverage Containers in California

Despite its environmental and human health impacts, plastic production and plastic waste are rising at a meteoric level: **the global generation of plastic waste is on track to virtually double, from 240 million tons in 2016 to over 470 million tons per year by 2040**.[1] More than 33 billion pounds of plastic are estimated to enter the ocean each year,[2] equivalent to two garbage trucks per minute.[3] It is critical that action is taken now to reverse this trend.

As the fifth largest economy in the world, California has the potential to slow the rapid acceleration of plastic waste generation and model a scalable system of reusable packaging. From a policy and regulatory perspective, actions taken in California have significant national and global impact and influence.

There is certainly precedent for reuse: reusable beverage containers have been used worldwide for hundreds of years. **In 1960, 95% of packaged soft drinks and 53% of packaged beer were sold in reusable containers in the U.S., while today only 1% of beverages are sold in reusable containers.**[4]

The recent passage of Senate Bill 54 (SB 54) in California mandates that non-beverage plastic packaging production be reduced by 25% by 2032, with a portion of this reduction achieved through reuse and refill.[5] The time is ripe to implement a reusable target for beverage containers. **A Californian beverage container reuse target can have significant positive impact as the state's 28 billion annual container sales are equivalent to 12% of national sales**. Approximately half of these are single-use plastic.[6] Furthermore, successful beverage reuse systems around the world have demonstrated the potential to reduce the environmental and social impacts from the beverage sector and strengthen the economy.

California has operated a Beverage Container Recycling Program (BCRP) coupled with a deposit also known in the state as the California Redemption Value (CRV) for applicable single-use beverage containers since 1986; at that time 14% of glass containers and 4% of all containers were still sold in reusable containers.[7] This BCRP provides part of the infrastructure needed and establishes cultural norms of return that a beverage reuse system could build on.[8,9] In the past few years, California has further laid the foundation for a reusable beverage program by passing legislation that allows reusable glass containers to operate in the return

1 Pew Charitable Trust & Systemiq. *Breaking the Plastic Wave*. 2020. https://www.pewtrusts.org/-/media/assets/2020/07/breakingtheplasticwave_report.pdf
2 Oceana. *Factsheet: Plastic Is a Growing Threat to Our Future*. 2019. https://usa.oceana.org/wp-content/uploads/sites/4/263943_FactSheet_v2-1.pdf.
3 Oceana. "Tackling the Plastic Crisis at the Source." August 14, 2023. https://usa.oceana.org/our-campaigns/plastic/.
4 Container Recycling Institute, "The Decline of Refillable Beverage Bottles in the U.S.," Container Recycling Institute. https://www.container-recycling.org/index.php/refillable-glass-bottles/53-facts-a-statistics/glass/428-the-decline-of-refillable-beverage-bottles-in-the-us#:~:text=Today%20less%20than%201percent%20of,way%2C%20disposable%20cans%20and%20bottles.
5 "SB-54 Solid waste: packaging and products." California Legislative Information. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201920200SB54#:~:text=The%20bill%20would%20require%20the%20regulations%20department%20to%20achieve%20and,through%20source%20reduction%2C%20recycling%2C%20or
6 2018 Beverage Market Data Analysis, Container Recycling Institute, 2021.
7 CalRecycle. Biannual Report of Beverage Container Sales, Returns, Redemption, and Recycling Rates. 2024
8 CalRecycle. *SB 1013 Addition of New Beverage Containers Informal Rulemaking Workshop* [PowerPoint slides]. 2024. https://www2.calrecycle.ca.gov/PublicNotices/Details/5299
9 CalRecycle. Beverage Container Recycling Program. 2024. https://calrecycle.ca.gov/bevcontainer/programinfo/

system,[10] investing in a grants program to fund the development of reuse infrastructure,[11] and passing legislation to improve the convenience of beverage container returns for consumers.[12]

The Design of a Reusable Beverage Container System

This study compares the environmental performance of the current single-use beverage sector[13] to a system that includes beverages sold in reusable containers. Both single-use and reusable containers will have a deposit attached at the point of sale and that deposit will be redeemable when the container is returned to a conveniently located local recycling, redemption center, or through other return methods.

In a single-use system, a beverage container is manufactured, filled, sent to a distribution center, transported to a retailer, emptied by the consumer, and finally returned for recycling or disposal. A reusable system contains these same elements, but after being returned, containers are instead sorted, washed, sanitized, and checked and then refilled before being delivered to the point of sale.

There are many ways to build a return-on-the-go beverage reuse system. This report considers one possible approach, which is based on the following system factors:

- **25% reuse market share:** Reaching a 25% reuse market share means one in four beverage containers purchased by consumers will be sold in reusable containers. This includes carbonated and non-carbonated soft drinks, water, beer, wine, spirits, juices, and ready-to-drink teas and coffees.
- **75% redemption rate:** Based on the expected impact of SB 1013 requiring all convenience zones be serviced, the deposit remaining at the same level as the current single-use system, and reusable containers reaching return rates seen in other reuse programs (which are typically higher than single-use programs), this system is estimated to have a 75% redemption rate for reusable containers.
- **16 reusable container designs:** Although there are thousands of different bottle types for different beverages, this system considers a harmonized approach where producers collaborate on shared container designs. The system designed includes 16 different bottle designs (replicated across materials and sizes) based on an analysis of producer market share and other systems globally. These designs can realistically cover the needs of producers based on the number of different product types and the market size of large producers.
- **Today's energy system:** Unless otherwise stated, greenhouse gas (GHG) results in this report assume no future decarbonization of electricity, heat, or transport. Although changes in the energy system may happen, they are difficult to predict and likely to impact both single-use and reusable systems in a similar way, therefore limiting impact on the results of this analysis.
- **A mixture of reverse and dedicated logistics routes:** Beverages consumed in the hospitality sector (e.g., restaurants) can be 'backhauled' via reverse logistics to distribution centers, then via dedicated logistics for washing at bottling sites. Beverages returned 'on the go' from the retail sector will be transported using dedicated vehicles from local redemption

10 "AB-962 California Beverage Container Recycling and Litter Reduction Act: Reusable Beverage Containers." California Legislative Information. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202320240AB962.
11 California Department of Resources Recycling and Recovery (CalRecycle). " Reusable Beverage Containers Infrastructure Grant Program" 2024. https://calrecycle.ca.gov/bevcontainer/grants/rbi/
12 "Bill Text - SB-1013 Beverage Container Recycling." California Legislative Information. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202320240SB1013.
13 Beverage sectors include those covered under the BCRP carbonated and non-carbonated soft drinks, water, beer, wine, spirits, juices, and ready-to-drink teas and coffees

points to sorting sites following a hub-and-spoke model. From the sorting sites the bottles are taken via dedicated logistics for washing at bottling sites.

This system design was used to estimate the cost and benefits of a reusable beverage container target in California.

The Investment Needed for a Reusable Beverage Container System

Eunomia used its ReSim modeling tools to determine how much infrastructure will be needed across the sector to support a reusable beverage container target. Achieving a reuse market share of 25%, in which 7.1 billion beverages would be sold in reusable containers each year, requires approximately $1.9 billion in capital investment over 12 years. This will require a large-scale shift from single-use to reuse business models. To make this transition, reconditioning lines, container washing facilities, and local and more centralized return and sorting facilities all need to be built, while brands and bottlers need time to design reusable bottles.

The physical infrastructure, where possible, would be invested locally within California to minimize travel distances (for example) between sorting, washing, filling, and distribution facilities and to convert existing filling lines. Observing systems in other jurisdictions and taking into account the time it takes to implement system changes, **a 25% target within 10 years of a reusable program starting is ambitious but achievable**. Interim targets of 5% within 5 years and 10% within 8 years serve as intermediary goals to measure and monitor progress. Producers may choose to meet the target based on different strategies. Across the entire BCRP in California, the hospitality sector (e.g., restaurants, hotels, and closed campuses for education, sports,

Figure E-1: Single-use beverage container life cycle

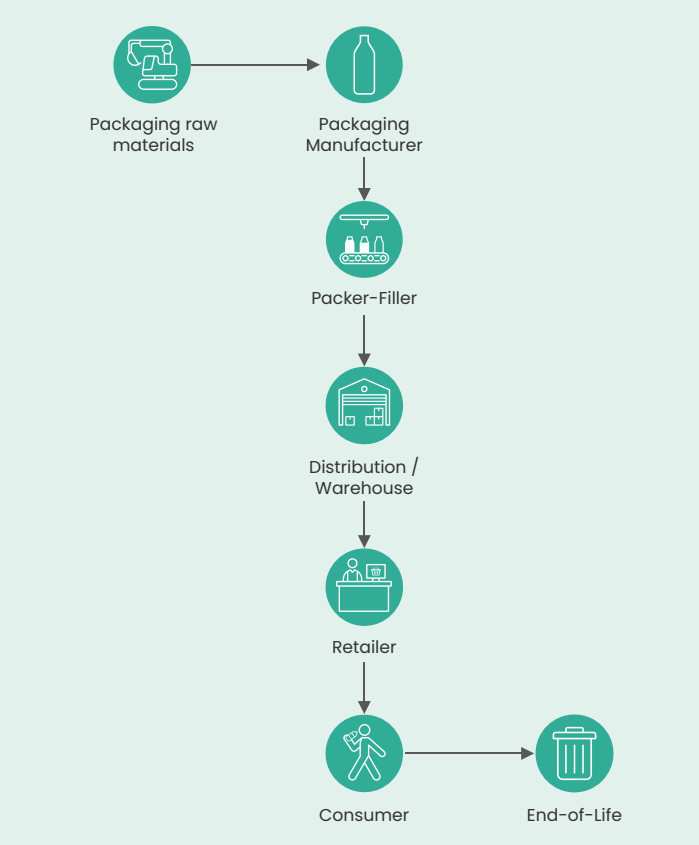
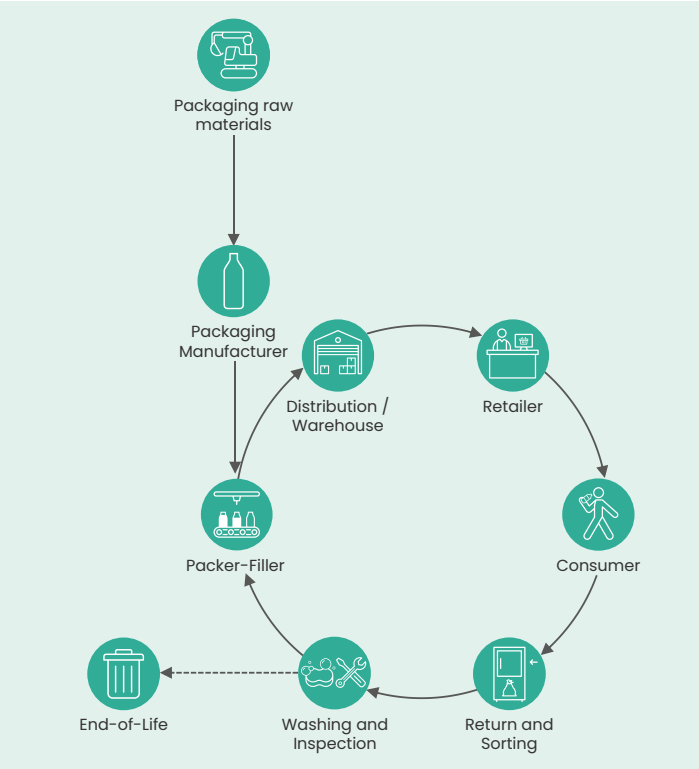


Figure E-2: Reusable beverage container life cycle



events, and corporations) accounts for 18% of sales; by focusing first on scaling significant infrastructure for reuse in the hospitality sector, the industry could meet the lower interim targets by focusing on implementing reuse in the hospitality sector first and moving to retail after several years.

Within a 10-year period, a significant proportion of bottling plant equipment can be expected to be replaced based on their average lifecycle. Therefore, a 25% transition to reusable containers is unlikely to lead to any stranded assets or balance sheet write-offs. The annual net cost of the reuse system, at 25% market share and 75% return rate, is estimated to be approximately $520 million per year. There is increased annual cost associated with the return, sorting, washing, and inspecting of reusable containers, while savings result from lower raw material inputs and end-of-life treatment. This additional cost, representing a 10% uplift in annual investment, will help drive green investment in California's economy. Note that the costs of reuse are modeled *as today* and they do not consider any possible cost reductions as technology matures; the single-use beverage business model has been hyper-optimized over the last six decades, while the reuse system modeled here has significant room for cost reductions.

Although total beverage sector revenue in California is difficult to estimate, it is likely to be at least $50 billion per year across the 28 billion containers sold; the total revenue from soft drinks, beer, and wine in the U.S. is over $500 billion.[14,15,16] **The net cost of reuse equates to less than 1% of Californian beverage industry annual revenue.** Note that the costs of reuse are modeled as today and they do not consider any possible cost reductions as technology matures. The single-use beverage business model has been hyper-optimized over the last six decades, while the reuse system modeled here has significant room for cost reductions.

Table E - 1: Infrastructure and investment requirements for a 25% reuse target

Infrastructure Type	Infrastructure Required	Gross CAPEX ($ million)
Reusable Beverage Washing & Refilling Lines	143	$1,000-1,200
Local Redemption Points	730	$1-2
Sorting Technology at Distribution Centers	70	$10-20
Sorting Centers	365	$750-800
Haulage Vehicles	222	$25-35
Total	**n/a**	**$1,750 - 2,000**

Note: These investments will be made over 12 years and the annual net cost of the system equates to less than 1% of Californian beverage industry annual revenue.

14 Grand View Research. *U.S. Non-alcoholic Beverages Market Size, Share & Trends Analysis Report By Product*. 2022. https://www.grandviewresearch.com/industry-analysis/us-non-alcoholic-beverages-market-report
15 National Beer Wholesalers Association. Industry Fast Facts. https://nbwa.org/resources/fast-facts/
16 Thach. L. *U.S. Wine Industry Surpasses $107 Billion In 2023 Sales, Report Reveals*. 2024. Forbes. https://www.forbes.com/sites/lizthach/2024/05/15/wine-triumphs-us-wine-industry-surpasses-107-billion-in-2023-sales-report-reveals/

The Benefits of a Reusable Beverage Container System

Eunomia's research and modeling shows that building on California's expanding BCRP infrastructure is a logical and cost-effective approach to delivering significant environmental and economic benefits.

A 25% reusable beverage container target in California is estimated to yield significant environmental and economic benefits for the state.

Increasing the redemption rate could further maximize environmental benefits. A 90% redemption rate, common in many systems, could be achieved if the deposit level were raised to at least $0.10 and there was even greater access to redemption centers.

A 90% beverage container redemption rate will further boost the environmental and economic impact of the system, without needing to increase the overall reuse market share of 25%.

The redemption rate improves the environmental and economic impact of the system: a higher redemption rate keeps the containers in use for longer reducing the need for additional material use. At a 25% reuse market share, an increase in redemption rate from 75% to 90% would roughly double GHG reductions to 403,000 metric tons of CO2e and further reduce plastic bottle production to 3.5 billion fewer bottles.

Benefits of a 25% Reusable Beverage Container Target with a 75% Redemption Rate

2.9 billion

fewer plastic bottles produced each year

which is a 20% reduction and nearly double the total number of PET bottles purchased in Oregon each year.

8%

reduction in the beverage industry's annual packaging-related GHG emissions.

This reduction is equivalent to 225,000 metric tons of CO_2e/year avoided, or taking 49,000 cars off the road.

1.1 billion

gallons of water saved

each year, equilvelant to the annual use of around 10,000 American households.

$75 million

annual waste management cost savings

which could help fund additional local programs.

32 million

fewer containers littered

into the environment each year. These would fill more than 7 Olympic swimming pools.

11,800

new green jobs

in manufacturing, sorting, transport and bottle washing would be created. This is almost as many people as work at Apple HQ.

The Time for Reuse is Now

In 2024, Earth reached the global warming tipping point of 1.5 degrees above preindustrial levels, driving home the urgent and unprecedented need to identify solutions to climate change. For too long, California has focused on addressing waste by managing it once it's created. As the 3Rs of the waste management hierarchy (Reduce, Reuse, Recycle) has long recognized, Reduce and Reuse are better ways to address the ever-increasing quantities of single-use packaging waste.

Implementing a reusable beverage container system in California – one that builds on and utilizes the expanding BCRP infrastructure – will displace single-use plastic containers, reducing both the amount of fossil fuel inputs needed to produce this packaging as well as the end-of-life pollution they create, while creating economic benefits for the state.

Voluntary commitments from industry have not meaningfully reduced plastic or GHG emissions; therefore, ambitious legislation is required to effectively tackle these challenges. Recent legislative action – SB 54's mandates on reuse for non-beverage packaging, policies aimed at the improving the accessibility of beverage return infrastructure, and funding reusable beverage infrastructure – mean that now is an opportune time to reprioritize reuse.

Below: Bottle inspection in alcohol bottling facility

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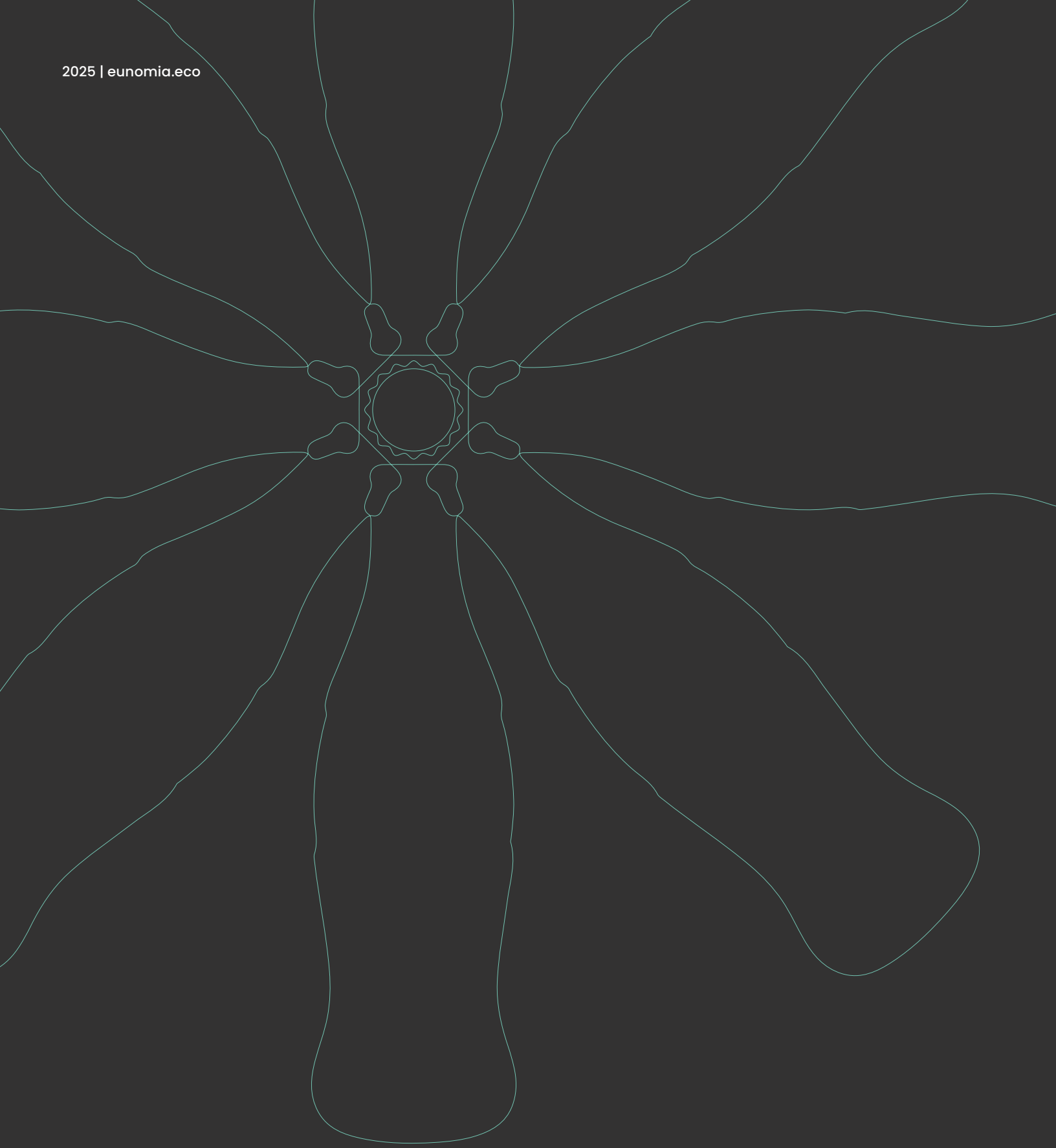

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