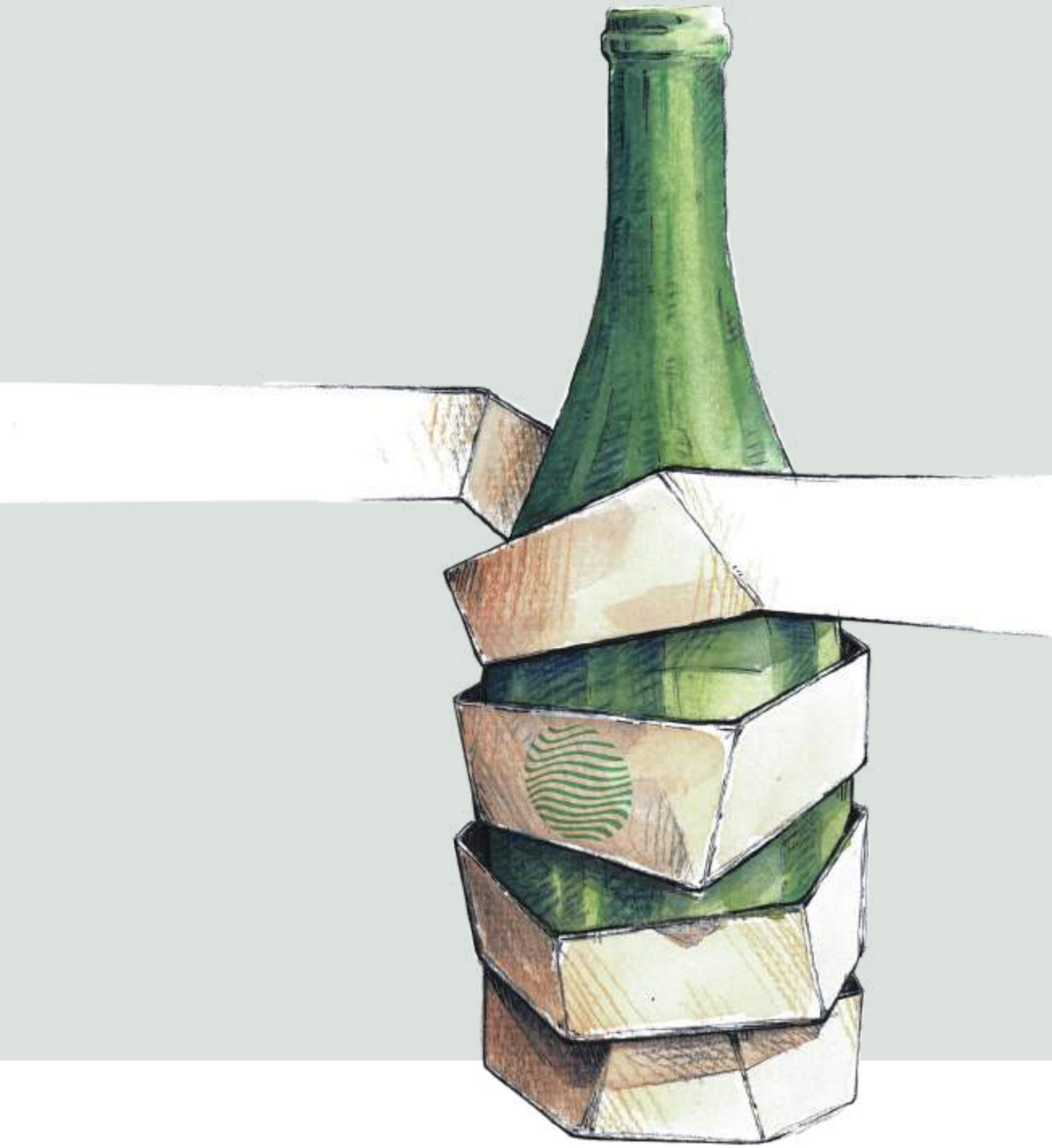

UNPACKING WINE

A Practical Journey Through the Environmental Landscape of Packaging

the PORTO PROTOCOL

made possible by TAYLOR'S PORT omdesign

This guide was developed with the collaboration of Omdesign®, which played a key role in both the design, content curation and development of this publication.

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A Pour of Insight by JANCIS **ROBINSON**

"I think this book is such a good idea that I am prepared to break my rule of never providing forewords or blurbs. (The rule evolved because I simply don't have time to accept all the many invitations to do so that come my way; I even refused my friend of 30 years Michael Broadbent MW).

As I know so well, the question of wine packaging is hugely important – most wine professionals realize by now, I hope, that glass bottle production and transportation are the principal contributors to wine's carbon footprint. Yet the subject is so much more intricate and ramified than that simple and unavoidable fact.

Thank goodness the Porto Protocol team has taken the trouble to hack through the jungle to provide truly useful packaging guidance to wine producers, importers, exporters, retailers and wholesalers."

Jancis Robinson
Wine Critic, Journalist and Writer

Introduction by ADRIAN **BRIDGE**

In an industry deeply rooted in tradition, the way we package wine often goes unquestioned. Yet, as the world shifts toward a more mindful approach to production and consumption, it's time for wine packaging to do the same. The Unpacking Wine Guide is a response to this need—a practical, informed resource for wine producers who understand that packaging decisions shape more than just their product; they influence the environment, consumer perception, and, ultimately, the legacy of our industry.

The Porto Protocol created this guide with one simple goal: to guide informed decisions that consider environmental impact at every step. This isn't a directive but an invitation—an invitation to rethink, innovate, and reimagine. We've packed it with practical insights, real-world examples, and actionable steps, knowing that true change begins when knowledge meets practice.

I hope that as you delve into these pages, you feel inspired to make choices that resonate with purpose. Together, we can redefine what it means to package wine responsibly and amplify our industry's commitment to a sustainable future.

Adrian Bridge
CEO and Founder of The Porto Protocol, and The Fladgate Partnership

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INTRODUCTION

CONCLUSION

Welcome
INTRODUCTION

Why THIS **GUIDE**

On May 7th, 2020, we held our first Climate Talk, titled "The Elephant in the Room: Sustainable Packaging in Wine". At the time, wine packaging was still an overlooked issue in the industry. Today, that is no longer the case. Influential voices like Jancis Robinson, Dr. Richard Smart, Muriel Chantel, Melissa Saunders, and Jason Haas have led the charge in challenging the industry's status quo.

For example:

2021

Jancis Robinson announced that she and her team would publish bottle weights in tasting notes on JancisRobinson.com whenever possible.

2023

Jason Haas (Tablas Creek) launched a $95 Bag-in-Box wine. The conversation shifted and the industry began to act.

2024

US wine writer Karen MacNeil said she would no longer review wines in heavy bottles.

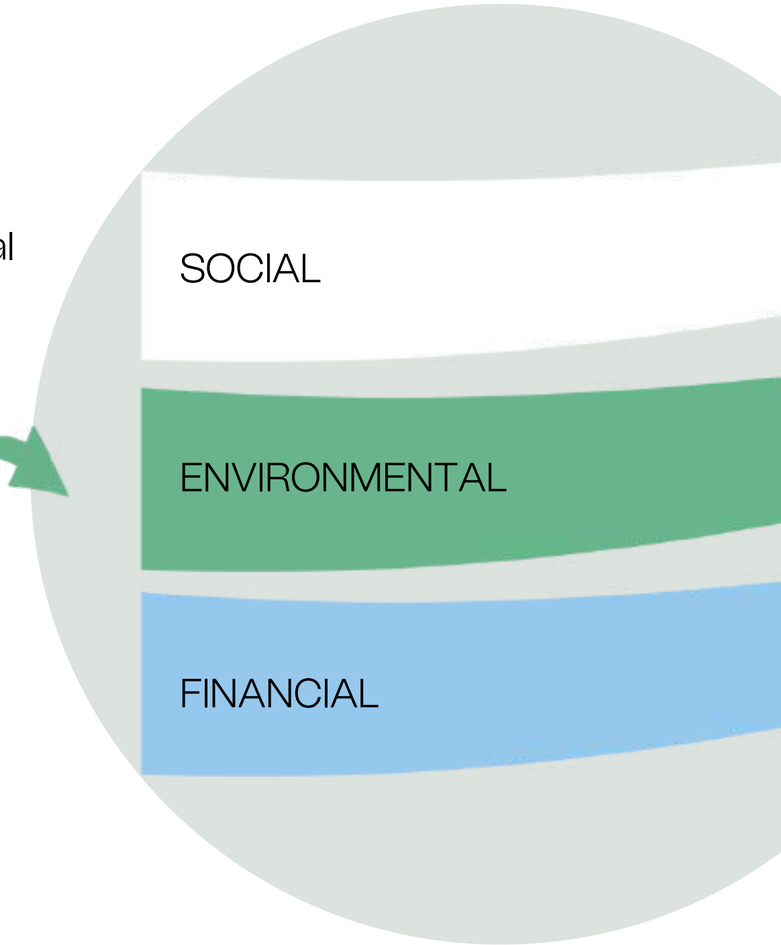
Our own approach

HAS EVOLVED, **TOO:**

We no longer use the term "sustainable packaging." **WHY?**
Because sustainability encompasses far more than environmental concerns.

~~SUSTAINABLE~~

IMPACT OF **PACKAGING**



Instead, we focus on the environmental impact of packaging.

More importantly:

Wine producers are **experts** in wine *not packaging.*

How will this Guide HELP**YOU?**

This guide will equip you with practical, actionable steps, whichever path you choose to take in your packaging journey.

Our balanced perspective provides the tools you need to make informed, confident decisions that align with both your environmental goals and business priorities—whether you're exploring new packaging options or refining your current approach.

What you will **NOT** FIND IN THIS GUIDE

We will not prescribe a “best” solution.

There’s no one-size-fits-all answer.

Instead, we’ll offer the information and perspective needed to help you weigh trade-offs and choose the path that works best for you.

A purely scientific methodology or approach

As with everything at the Porto Protocol, this guide is shaped by the practical solutions and best practices shared by our members, drawing heavily from their real-world experiences.

What you will **FIND** IN THIS GUIDE

Key Factors

to consider when making packaging decisions.

An in-depth look

at the environmental impacts of different packaging materials.

Practical steps and actionable guidance

Practical steps and actionable guidance to reduce the environmental footprint of your wine packaging choices.

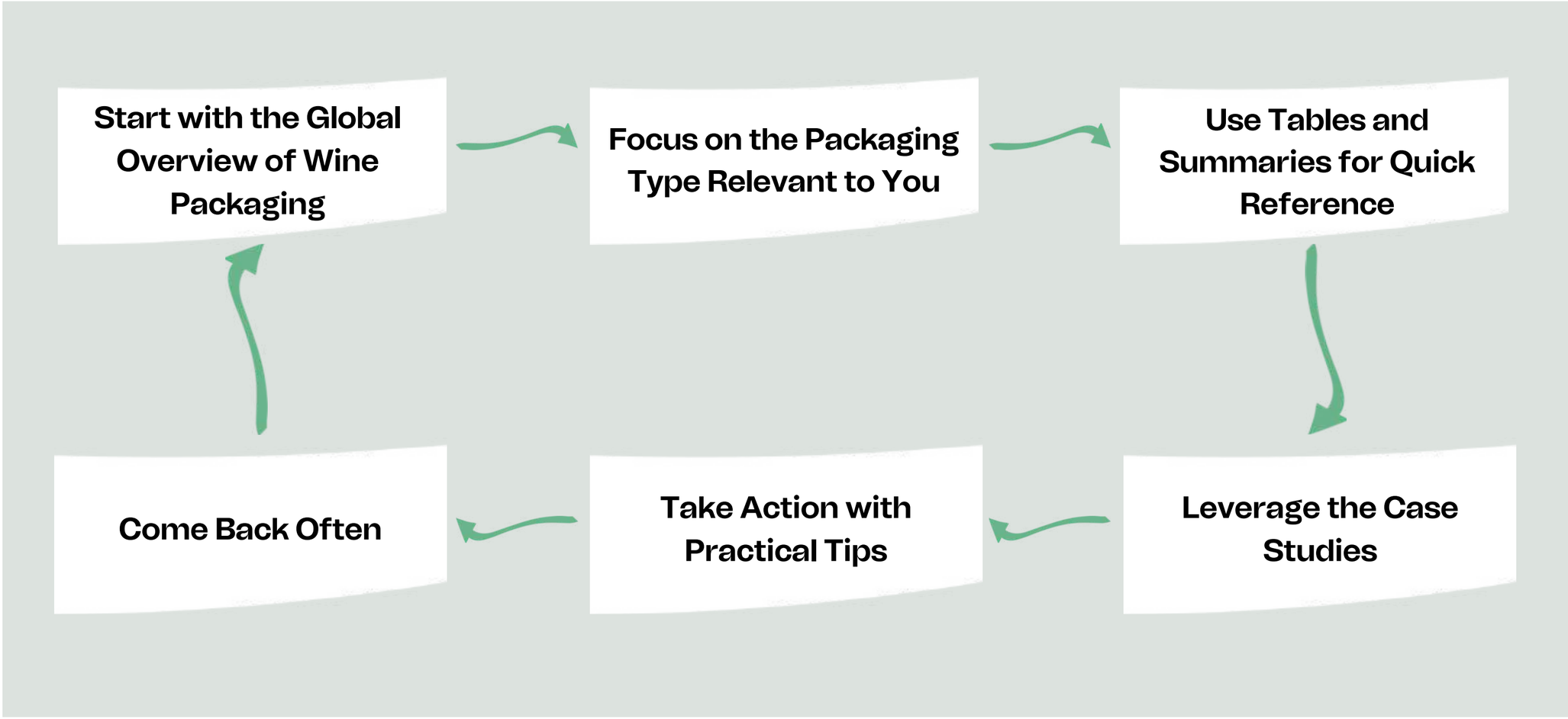
First-hand testimonials

from wine producers who have implemented these solutions, giving you real-world examples to learn from.

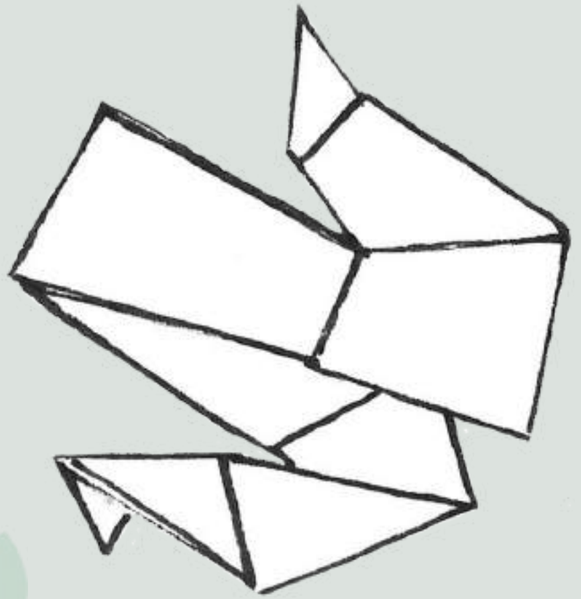
How to **USE** THIS GUIDE

This guide is designed to be practical and flexible, offering you the freedom to explore the sections most relevant to your needs. Our approach is organized by materials, enabling you to dive deeper into the specific environmental impacts and benefits of each packaging option.

Here's how you can make the most of it:

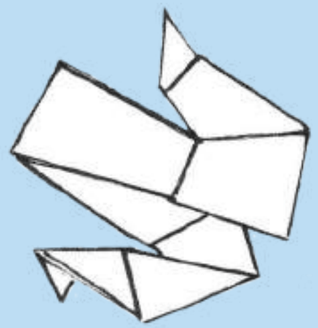


I. Global Overview of Packaging



Chapter Summary:

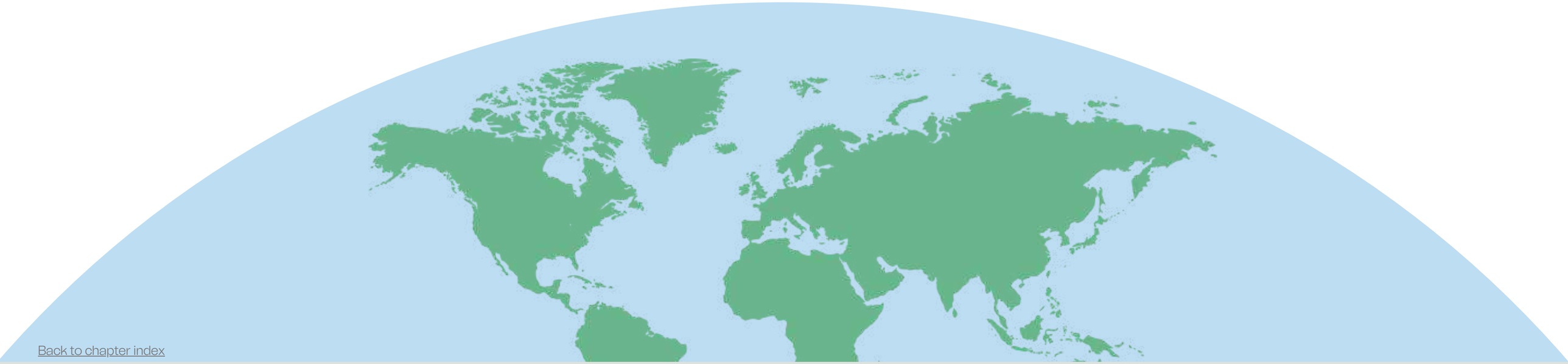
In this chapter, we step back to take a broad look at the world of wine packaging. We'll explore the shifting regulatory landscape, from Europe's recyclability mandates to the U.S. Bottle Bills, and highlight emerging trends like upcycling and creative, eco-friendly designs. Along the way, we'll walk you through the critical factors shaping packaging choices, helping you stay ahead of industry challenges while aligning your brand with consumer expectations and environmental goals.



TOPICS WE WILL EXPLORE:

1. GLOBAL REGULATORY TRENDS: A PATCHWORK OF REGULATIONS

As a wine producer, you're probably already juggling enough without having to keep track of every packaging law across the globe. However, as eco-consciousness grows, packaging legislation is tightening. Here's an overview of key regulations from the world's top wine-consuming markets, so you can stay ahead of the curve and avoid surprises.



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Global Regulatory Trends:
A PATCHWORK OF **RULES**

EUROPEAN UNION

According to the The Packaging and Packaging Waste Regulation (PPWR), currently awaiting its final approval, as of 2030, all packaging must be designed for recyclability, with recycling targets based on weight. Not only that, plastic packaging needs to include a certain percentage of recycled content derived from post-consumer waste. Any excessive packaging designed to make your wine appear larger will be banned.

From 2030, empty space in grouped packaging, e-commerce, and transport packaging must be less than 50%, meaning bubble wrap and Styrofoam chips are out. Harmonized labels, extended producer responsibility (EPR), and deposit return systems (DRS) round off the strict requirements, though for the moment, wine producers are granted some exemptions under the DRS .

FRANCE

As of January 2024, an eco-tax under the Extended Producer Responsibility (EPR) principle applies to all products, including those sold to the On-Trade sector. This is significant as reused bottles will be exempt from this tax, making reusability a cost-effective choice. The AGEC law set packaging reuse targets of 5% by 2023 and 10% by 2027, aiming to reduce waste, stabilize bottle prices and supplies, and foster a positive environmental impact.

SPAIN

is also following suit with its Law on Waste and Contaminated Soils, which encourages reducing single-use packaging and introduces stricter EPR rules. [2[

GERMANY

is doubling down on extended producer responsibility (EPR) with its Packaging Act (VerpackG), which imposes strict rules on wine producers to register with the national packaging register and ensure compliance with waste management obligations. Germany also enforces deposit return systems (DRS) for glass and plastic bottles, though wines are currently exempt.[1]

UK

As of 2025, according to the Extended Producer Responsibility (EPR), wine producers (and other businesses) will be required to pay fees based on the amount of packaging they place on the market. Different materials will have different and modulated rates. For example, glass fees are based mostly on recycling costs due to the high levels of glass recycling. For the wine industry, this means that producers need to adapt their packaging strategies, favouring recyclable and low-impact materials to avoid higher fees. Additionally, the system could encourage more reuse initiatives (e.g., refillable bottles) and greater alignment with recycling infrastructure in key markets. Failing to comply could result in significant cost increases or fines. [3]

UNITED STATES OF AMERICA

IAs of January, 2024, the California Bottle Bill, which now includes wine and spirits, mandates that wine bottles be included in the state's container deposit program. Distributors and importers will need to pay a redemption fee (5 or 10 cents depending on bottle size) for every qualifying wine container sold in California. This applies to both standard glass bottles and alternative containers like pouches and boxes, which will have a higher refund value of 25 cents. Wine producers selling directly to California residents will also need to register with the California Department of Resources Recycling and Recovery (CalRecycle).

This law impacts wine producers by requiring them to adjust their packaging to meet recycling standards and labeling requirements, as well as engage in compliance with deposit payments. It could increase operational costs but also incentivizes sustainable packaging. Additionally, reusable wine kegs or draft systems may qualify for tax benefits under the Cheers Act. [4]

Global Regulatory Trends:
A PATCHWORK OF **RULES**

AUSTRALIA

The National Plastics Plan in Australia is a significant environmental initiative that wine producers need to consider if exporting there. The plan aims to phase out problematic single-use plastics by 2025 and mandates that 50% of all packaging must contain recycled content.

For wine producers, this means that any plastic packaging used—whether it's in labels, closures, or any part of the wine's secondary packaging—must meet these recycled content targets. Additionally, ensuring that packaging is recyclable or reusable will become a compliance requirement. This impacts production processes, packaging design, and may increase costs due to the need for sourcing recycled materials. [5]

ASIA

Packaging regulations in Asia vary widely. China's EPR policies lack consistent enforcement, while Japan has stringent recycling and packaging minimization rules. South Korea's robust EPR system mandates a certain percentage of packaging waste be recycled, with penalties for non-compliance.

Wine producers exporting to these markets must adapt their packaging strategies to meet these evolving regulations, particularly in countries with stricter standards like Japan and South Korea. [6]

SCANDINAVIAN COUNTRIES

Countries like Norway, Sweden, and Denmark have implemented advanced recycling and deposit return systems, with strict regulations on single-use packaging and ambitious targets for packaging waste reduction.

2. TRENDS INFLUENCING PACKAGING IN TODAY'S LANDSCAPE

2024 has seen the continuation of several core packaging trends: premiumisation, sustainability and personalisation. However there are other potentially more interesting and engaging trends that are gradually emerging which are impacting how brands are being designed, and how consumers are interacting with them.

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Embracing Imperfection

Imperfections from the past

Pulp boxes

Pitting in glass

Hand-drawn Typography

Signal of Environmentally sensitive pack or proposition
+
Sign of quality

This trend aligns with the broader consumer trend of authenticity as consumers seek those brands that appear genuine and relatable. The embracement of imperfection also aligns to consumers' growing desire for products and brands that connect to nature. We can see this playing out in the proliferation of pulp packaging such as Ruinart's Second Skin and Veuve Clicquot's gift box made from hemp and recycled wood fiber which is significantly different from its traditional glossy varnished boxes. Estal's Wild Glass has natural pitting in its glass which sets it aside from its counterparts and communicates its recycled nature through the semiotics of the glass. As consumers become more eco-conscious, the use of imperfect packaging reflects their own commitment to sustainability.

Wild Glass - 100% recycled glass with some imperfections

Environmental Sensitivity

Similar to the above trend, consumers are becoming more aware of the choices they make. Brands that demonstrate environmental sustainability are winning. This can come in many forms – not just in the standard solutions of recycled paper stock or lightweighting of bottles. Different formats such as Bagnums and Frugalpac are now being embraced by consumers faster than ever before. The Bagnum has seven times less COST-per-liter emissions than a typical 540g glass bottle. Tread Softly is an excellent example of a bagnum (magnum in a bag/pouch) that arguably looks as premium as its bottled counterpart, and its clever use of finishes and graphics convinces the consumer of the brand's quality when considering this new form.

Minimalism and Maximalism co-existing side by side

We're seeing both minimal designs with restrained typography and graphics, succeed at the same level as maximalist designs with their vibrant colors and impactful graphics. Co-existing side by side, each is dialing into the overarching consumer trend of self-expression. As consumers seek ways to express their individuality, bold and eclectic designs such as Cockburn's Tails of the Unexpected allow them to do just this. They create a rich narrative that engages consumers and enhances their emotional connection to the brand. On the other hand, brands like On the Fringe and NOW, are stripped back of all superfluous graphics and copy. The label on On the Fringe is devoid of anything in the top 90% of the label, with a single line of hand-written text running along the torn base. The tension and mimimalism brings modernity and premiumness which align to some consumers' Japanese-like sensibilities.

This section is authored by Rowena Curlewis, CEO at Denomination.

3. CONSUMER AND MARKET PERCEPTIONS OF WINE CONTAINERS: DOES SIZE (OR WEIGHT) MATTER?

Consumers and merchants hold key perspectives that influence the future of wine packaging.

"The consumer plays a central role in this whole system. We can have the best ideas for sustainability, but if consumers have preconceived ideas about a certain packaging, it's an uphill battle."

Prof. Dr. Rainer Jung / Geisenheim University

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Consumer's perspective:

What do consumers think about the changes in wine packaging?

A study conducted by Dr. Armando Corsi and Dr. Andrea Dominici, together with Prof. Liz Thach, Prof. Larry Lockshin and Prof. Leonardo Casini focusing on wine drinkers in Australia, Italy, and the U.S., explored their perceptions of various packaging types and the importance of packaging weight.

Despite growing interest in sustainable packaging, the research shows that packaging weight is one of the least important factors influencing wine choices for consumers in all three countries.

The most significant drivers continue to be more traditional, such as having tried the wine before, price, and recommendations from trusted sources. This said, it is not all lost. When consumers were presented with marketing messages emphasizing the environmental or quality benefits of alternative packaging solutions, some shifts in perception occurred, suggesting that education and awareness campaigns can play a role in changing consumer behavior over time.

Credit: Thomas Skovsende #sid24

Different Packaging Types

the study found that consumers still strongly associate glass bottles, regular or lightweight, with higher quality and suitable for formal occasions or gifting.

Cans and recycled PET flat bottles, are appreciated for their lightweight and ease of recycling, making them popular for informal occasions or portion control.

In contrast, formats like bag-in-box and cartons are more linked to convenience and good value for money.

Interestingly, bag-in-box packaging was perceived as heavier—likely due to the larger volume it typically holds—despite being lighter than glass on a per-liter basis.

Lastly, packaging doesn't seem to be associated with any type of wine (i.e., red wine, white wine, or rosé wine), with the exception of sparkling wines, which have been more associated with lightweight bottles.

This suggests that producers can take some risks in deciding what types of wine could go in alternative formats. This decision should primarily revolve around determining the wine quality suitable for glass versus other packaging options and addressing technical considerations related to the wine's shelf life when packaged in alternative formats.

Another organization, the Sustainable Wine Roundtable, highlights in its Report "Reducing Wine Bottle Weight 2023", that the common belief that heavier bottles indicate higher quality wine, presents a challenge for adopting lighter bottles. However, the report found no substantial evidence that consumers would resist lighter bottles and successful examples of brands that transitioned to lighter bottles without a decline in sales are highlighted.

Through our conversations with hundreds of producers, we have found that the belief linking bottle weight to quality is more deeply held by producers than by consumers. This insight highlights an opportunity for the industry to shift towards lighter, more sustainable packaging, without compromising on perceived quality.

In conclusion, while packaging weight is not yet a key factor in consumer choice, promoting sustainability through targeted messaging can help change perceptions over time. Wine producers should consider how packaging narratives might vary across markets and consumer segments, particularly when targeting environmentally conscious buyers.

This section was primarily authored by Assoc. Prof. Armando Maria Corsi, Adelaide Business School, The University of Adelaide

Market's perspective

Much like consumers, merchants play a pivotal role in the shift towards sustainable packaging.

> "Monopolies in Scandinavia have demonstrated the significant influence retailers can exert on consumer choices by promoting sustainable alternatives and actively educating consumers."
>
> Prof. Dr. Simone Loose / Geisenheim University

ProWein Business Report 2023

conducted by the Department of Wine and Beverage Business at Geisenheim University [7]

16 COUNTRIES

Including
Scandinavia, the UK, Canada, France, Spain, the USA, and Germany.

2500 MERCHANTS

explore their views on alternative packaging formats and their potential market adoption.

> "Our findings revealed that the strongest catalyst for retailers' innovation in alternative packaging is their confidence in non-glass options. This is the critical point where we should concentrate our leverage for change."
>
> Prof. Dr. Simone Loose / Geisenheim University

Merchants provided valuable insights

into which packaging formats are likely to gain consumer acceptance, with bag-in-box emerging as the most accepted alternative, largely due to its established presence. Formats like aluminum cans, PET bottles, and paper-based bottles face challenges due to lower consumer familiarity.

Merchants in innovative markets stressed that communicating the environmental benefits of these alternatives is crucial to fostering consumer acceptance. Moreover, price remains a barrier, as merchants noted that consumers are less likely to adopt alternatives that are priced higher than traditional glass.

> "In some markets, like Scandinavia, the perception of bag-in-box wine is much better because they recognize its sustainability benefits. Expensive wines are even sold in this format, challenging the idea that good wine only comes in glass."

Prof. Dr. Rainer Jung / Geisenheim University

"Price emerged as the most powerful driver in steering consumers towards sustainable choices. As regulatory carbon prices rise and emissions-related externalities are internalized, consumers will be more incentivised to opt for low-emission packaging solutions."

Prof. Dr. Simone Loose / Geisenheim University

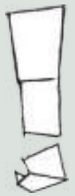
Regional differences in adoption are also significant.

Scandinavian countries and Canada are leading the charge, driven by national sustainability goals and a focus on reducing carbon footprints,

while Germany, Austria, and Switzerland show more resistance, preferring to stick with traditional glass bottles.

Merchants in innovative markets believe that rising energy costs for glass production will push more producers to adopt alternative packaging.

They also emphasized that long-term commitments from both merchants and producers are necessary to make these packaging alternatives viable.



To bridge the gap between consumer and merchant perspectives and the practical aspects of packaging decisions, it is important to understand the various factors that shape these choices.

With the growing demand for sustainability and the challenges of adoption, we turn to Key Factors Influencing Decision-Making in Packaging, where we explore the practical considerations that guide producers in selecting the most suitable packaging solutions.

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4. KEY FACTORS INFLUENCING DECISION-MAKING IN PACKAGING

The Porto Protocol has identified five key considerations that should shape your approach, balancing consumer trends with the practical and environmental challenges faced by producers today.

1. Environmental Impact

- Resource use and emissions
- Recyclability and End-of-Life

2. Wine Preservation

- Oxygen Sensitivity:
- Shelf Life
- Intended Consumption Window

3. Cost

- Production Cost
- Shipping and Handling

5. Target Market

- Demographic Preferences
- Market Trends:
- Compliance and Regulations:

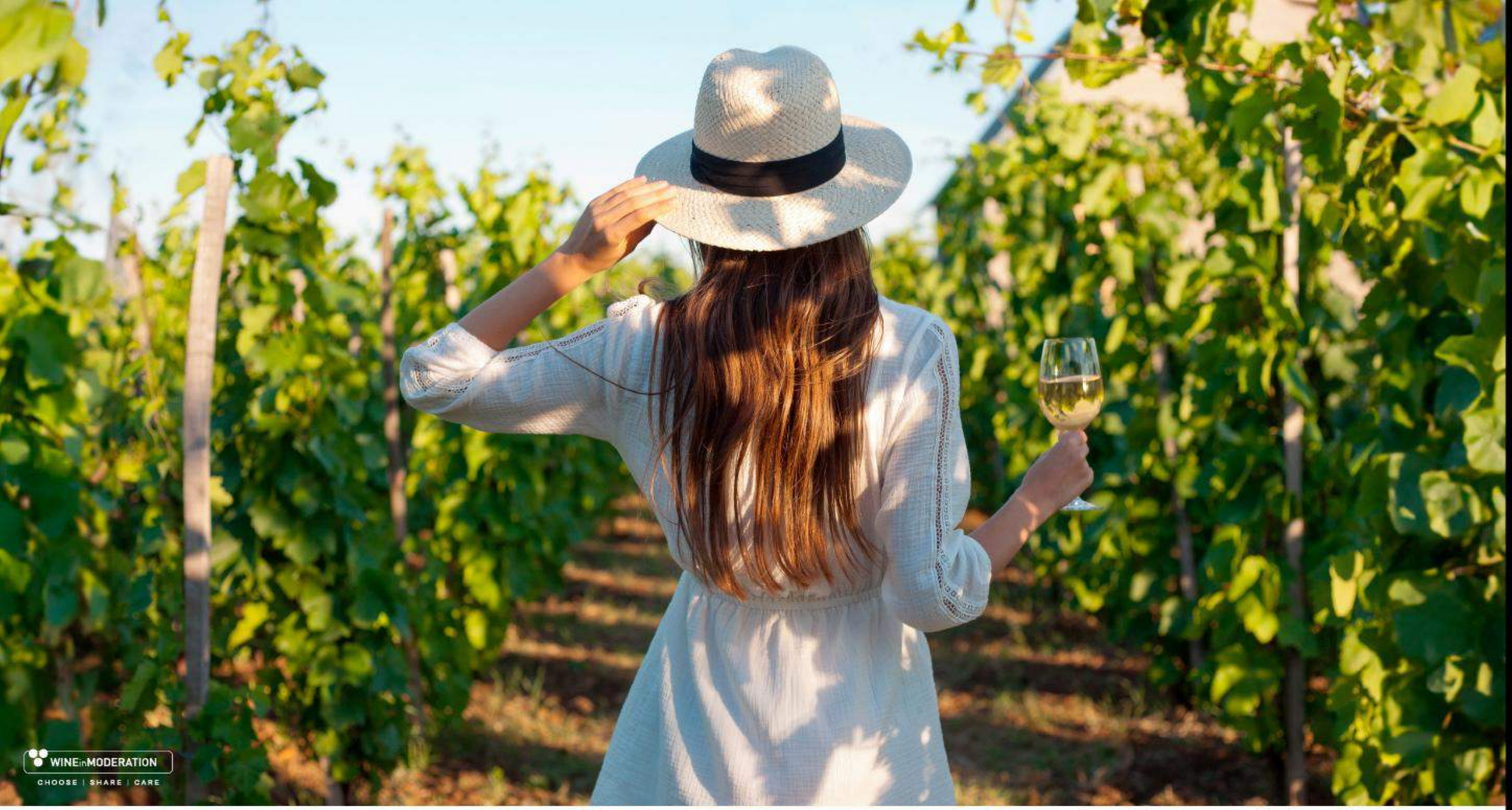
4. Consumer Perception

- Brand Image and Quality Perception
- Convenience

CONNECTING THE DOTS
What Does it Mean to You?

With tightening regulations, shifting trends, and evolving consumer preferences, the future of wine packaging lies in practical sustainability. Wine producers need to stay ahead by adopting flexible, creative, and compliant packaging solutions that can meet the demands of a global market.

Whether it's lightweight packaging, reusable bottles, or eco-friendly materials, your choices must not only comply with regulations but also align with consumer expectations. The good news? By embracing the trends and understanding the factors influencing packaging decisions, you can build a future-proof brand that balances sustainability with luxury, functionality, and consumer appeal.



DISCOVER A WORLD OF *difference*

Portugal offers more opportunities for discovery than you could ever imagine, given the diversity of its 14 wine regions and their unique wines.

One of the oldest European countries, Portugal is distinguished by a multiplicity of terroirs, which are developed due to the geographical characteristics and its location on Europe's west coast. From its coastline along the Atlantic, the country unfolds gently into sloping, colorful hills to the North, extends through the vast timeless plains to the South, and crosses Atlantic waters to reach its islands. The country is in a unique geographical position between two continents.

From north to south, throughout all of the country's wine regions, allow Wines of Portugal to open you the door to a world of difference.

wines of portugal
a world of difference

Valentina Lira

WORKING WITH SUPPLIERS ON PACKAGING

At Concha y Toro, sustainability is guided by our strategy, Uncork a Better Future, which is built around key pillars representing different stakeholders. Packaging is one of our main initiatives in which we work internally with our marketing departments in order to impact our consumers. Externally we engage with our main suppliers, as they are the experts who understand the details of packaging, offer alternatives, and provide solutions to reduce its environmental impact. We collaborate with them to implement meaningful actions and innovative ideas.

In 2012, along with the beginning of our Sustainability Strategy , we started with our "Responsible Sourcing Program". This long-term initiative began with an alliance that helped suppliers measure their carbon footprint. Then, establishing goals for emissions reductions and so on.

Today, we work with a selected group of key suppliers to align with Science-Based Targets and reduce emissions through packaging materials, a significant contributor to our carbon footprint. Currently, this group, responsible for primary and secondary packaging, accounts for 38% of our total carbon footprint—down from 56% in 2011—highlighting the remarkable progress we've achieved together in reducing our impact.

Valentina Lira, Sustainability Director at Concha Y Toro

5. THE ROLE OF EACH STAKEHOLDER DRIVING INDUSTRY CHANGE

Packaging Suppliers

provide materials like glass, PET bottles, corks, and innovative eco-friendly solutions to reduce environmental impact.

Packaging Manufacturers

convert materials into packaging, focusing on sustainability and adopting practices like using recycled content and lightweight materials.

Design Agencies

collaborate with producers by creating and proposing functional, eco-friendly solutions that align with brand identity, incorporating minimalist designs or innovative labels. They assist the producer to rethink packaging design with the whole lifecycle in mind, while maintaining aesthetics and brand identity.

Recyclers

process used materials like glass, paper, metals and plastic.

Distributors & Logistics Providers

manage transportation, using lightweight packaging to reduce emissions and ensuring product protection.

Retailers

influence eco-friendly packaging by incorporating these criteria in their buying decisions, and educate consumers about their environmental benefits.

Consumers

drive packaging decisions with their demand for eco-friendly options and play a critical role in recycling and disposal, reducing packaging's environmental impact.

Regulatory Bodies

enforce packaging guidelines, setting standards for labeling, recycling and reuse rates, and material use, mandating environmental practices through legislation.

Environmental, Industry Organizations and Certification Bodies

promote eco-friendly packaging, offering certifications and driving initiatives like reducing carbon footprints and promoting circular systems.

Media, Wine Writers, and Influencers

shape public perception by promoting sustainable packaging, raising awareness, and influencing both producers and consumers toward greener choices.

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Rita Gama Rocha on
THE ROLE OF DESIGN AGENCIES

Design agencies are at the forefront of

shaping a sustainable future

using the transformative power of creativity to drive packaging innovation. As we sit at the intersection of wine producers, the packaging industry, and the final consumer, it is our responsibility to

think ahead and challenge

every player to embrace more eco-friendly practices and mindsets. Beyond aesthetics, our work involves seeking and developing innovative, sustainable solutions that balance functionality with environmental responsibility, encouraging all stakeholders to adopt a

forward-thinking approach.

Rita Gama Rocha | OMDESIGN®

6. TURNING INSIGHTS INTO ACTIONS

Stay Ahead of Regulatory Changes:
Keep up to date with the ever-evolving global packaging regulations. Compliance is non-negotiable, but it's also an opportunity for innovation.

Tailor Packaging to the Market:
Different markets have different demands. Ensure your packaging choices reflect both the local regulations and consumer preferences of each market.

Design with Purpose:
Sustainability doesn't mean letting go of aesthetics and functionality. Radical reuse, minimalism, and creative collaborations are key ways to make eco-friendly packaging appealing.

Collaborate with Merchants:
Strengthen partnerships to reduce packaging impact by ensuring supply consistency and marketing support. Educate the market on sustainable benefits, address consumer concerns, and keep pricing competitive to boost eco-friendly packaging adoption.

Communicate Your Sustainability Efforts:
Use your packaging to tell your story. Consumers—especially younger ones—want to know the environmental benefits of your choices.

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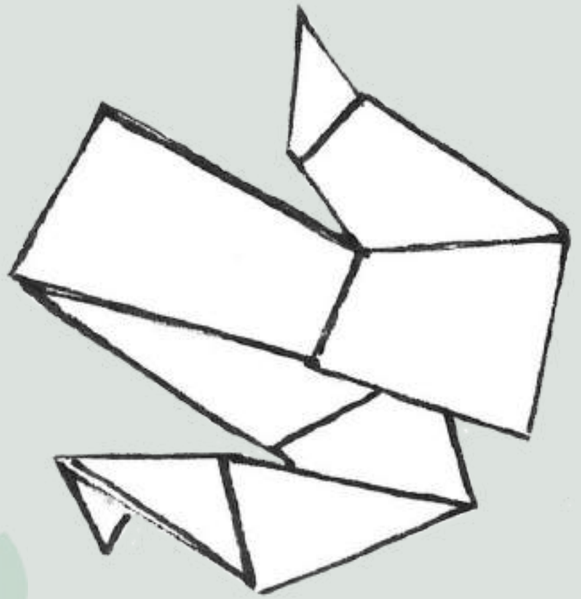
KEY TAKEAWAYS

- **The wine industry** is under pressure from evolving regulations, environmental concerns, and shifting consumer demands, all while managing economic and climate-related challenges.
- **Packaging** is not just a container; it is a powerful communication tool that reflects a brand's commitment to sustainability and influences consumer perception.
- **Packaging regulations** are becoming stricter globally, with countries like the EU, France, Germany, the UK, the US, and Australia implementing measures that focus on recyclability, reuse, and reducing waste.
- **Trends** such as embracing imperfection, environmental sensitivity, and co-existing minimalism and maximalism in design are shaping how brands communicate sustainability through packaging.
- **Consumers** still associate glass bottles with higher quality, but there is room to shift perceptions through education.
- **Merchants** see bag-in-box as the most accepted alternative packaging, but formats like cans and PET bottles face challenges. Price remains a significant barrier to the adoption of alternative containers .
- **Producers** must consider environmental impact, wine preservation, cost, consumer perception, and regulatory compliance when selecting packaging.
- **Wine producers**, suppliers, recyclers, merchants, consumers, and regulatory bodies all play a role in driving sustainable packaging practices across the industry.
- **Producers should stay ahead** of regulatory changes, design with purpose, and collaborate with merchants to drive the adoption of eco-friendly packaging solutions while maintaining brand appeal and functionality.

II. The Environmental Impact of Packaging Materials



Chapter Summary:

In this chapter, we zoom out to explore the big picture of packaging materials. We break down the environmental footprint—from resource depletion to carbon emissions—and guide you through the frameworks that help us understand their full impact on our planet.

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Picture this:

The packaging of the wine you hold in your hands—whether it's sleek glass, recycled cardboard, or lightweight plastic—has already been on a long journey. And it's not just your bottle;

globally, there are over 30 billion wine bottles produced each year. (1)

But the real story starts much earlier.

The environmental toll begins with the extraction of raw materials, continues through energy-intensive production, and extends far beyond when the wine is enjoyed, and the packaging is discarded.

(1) The average global wine production is estimated to be around 260-270 million hectoliters per year, according to the International Organisation of Vine and Wine (OIV) converted into standard wine 0.75 liters bottles. This is a rough estimate, not an accurate number as many other containers are used, from bag-in-boxes to pouches.

1. KEY FACTORS SHAPPING THE ENVIRONMENTAL IMPACT OF PACKAGING MATERIALS

To fully grasp the environmental footprint of your packaging, it's crucial to evaluate the entire lifecycle. Here's what to consider:

Water Usage:
Water is consumed during production, reprocessing, and recycling. In water-scarce regions, this adds to environmental stress.

Carbon Emissions & Emissions:
Energy consumed across the packaging lifecycle increases carbon footprints—especially when non-renewable sources are used.

End-of-Life Processing (Circularity Potential):
In a circular economy, products and materials are kept in circulation through processes like maintenance, reuse, refurbishment, remanufacture, recycling, and composting. Non-circular packaging leads to landfill buildup and microplastic contamination.

Transportation and Logistic Impacts:
Heavier or bulkier packaging increases fuel consumption and emissions, while lighter designs improve transport efficiency.

Waste Generation:
Packaging waste, from extraction to manufacturing scraps, to post-consumer disposal, particularly non-recyclable materials, contributes to landfill pollution, marine debris, and microplastics.

Chemical Impact:
Chemicals in packaging (inks, dyes, adhesives) can leach into ecosystems, causing pollution if not managed carefully.

Biodiversity Impact:
Raw material extraction (e.g., mining for glass, bauxite for aluminum, oil extraction for plastic, deforestation for paper) harms ecosystems and contributes to habitat loss and biodiversity decline.

These factors were developed with two key frameworks in mind:

- **The Planet Boundaries**
- **The Sustainable Development Goals** [2]

As a result, they form a cohesive set of principles that specifically address the challenges of (wine) packaging materials, offering a holistic approach to reducing its environmental impact.

2. ASSESSING THE ENVIRONMENTAL IMPACT OF PACKAGING

Here are three key methods that look at different impact categories:

- Water Footprint (WF) Tracks the amount of water used to make each product.
- Carbon Footprint (CF) measures the greenhouse gas emissions (CO2) associated with a product, process or company.
- Life Cycle Analysis (LCA) [3], standardized with ISO 14040/44, evaluates the full range of environmental impacts, from raw material extraction to end-of-life. Think of it as the all-in-one tool that shows the big picture.

Carbon footprint and water footprint are part of a larger LCA, giving you specific lenses through which to measure your packaging's impact.

"The water footprint is an environmental assessment of the water usage and degradation due to human activities. The wine sector is a major user of water, either in field activities and in wine transformation operations. Main impacts on water comes from the direct usage of irrigation water in location where it is mainly needed and from the production of packaging material, which, as for climate change emissions, maximises the footprint in this sector. Making constantly and seriously a water footprint assessment during the company lifetime is an essential method to measure its performances on water use and identify operations and procedures which impact the most. This is the only way to introduce improvements where they are best suited."

Andrea Di Guardo | Member of the Equalitas Technical Scientific Comittee

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A real case on Water Footprint

In this WF analysis, packaging contributes 0.55% to direct water use but has more impact on aquatic acidification (2.36%) and freshwater ecotoxicity (1.08%).
While its direct water footprint is small, improving packaging can still help reduce broader water-related environmental impacts.

Processes (percentages)	Water Use (m3eq)	Aquatic Acidification (kgSO4eq)	Freshwater Ecotoxicity (CTUe)	Human Toxicity (cancer) (CTUh)	Human Toxicity (non-cancer) (CTUh)	Freshwater Eutrophication (kg Peq)
Stationery fuel combustion	0.10%	1.58%	2.49%	0.10%	0.27%	0.36%
Mobile fuel combustion	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%
Electricity production	0.84%	53.88%	0.09%	16.09%	1.07%	65.51%
Transport of goods in input	0.07%	0.89%	1.77%	0.06%	0.25%	0.19%
Transport of wastes	0.01%	0.13%	0.41%	0.01%	0.04%	0.02%
Direct water consumption	0.43%	0.00%	0.00%	0.00%	0.00%	0.00%
Electricity transmission	0.05%	3.23%	0.01%	0.97%	0.06%	3.93%
Phosphorous from fertilization	0.00%	0.00%	0.00%	0.00%	0.00%	1.98%
Fertilizers and pesticides production	0.07%	1.07%	0.31%	0.04%	0.04%	0.08%
Enological products	92.17%	23.31%	10.31%	0.60%	2.49%	3.08%
Packaging material	0.55%	2.36%	1.08%	0.08%	0.34%	0.47%
Waste disposal	5.63%	13.36%	80.68%	5.32%	5.55%	24.30%
Grape from external producers	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Wine from external producers	0.07%	0.18%	2.86%	76.75%	89.89%	0.06%

Image Source: An example from a case study in the Prosecco area", authored and kindly shared by Andrea Di Guardo | Member of the Equalitas Technical Scientific Comittee

As for carbon, the Greenhouse Gas Protocol divides emissions into three categories—Scopes 1, 2, and 3—covering everything from direct company emissions to those sneaky, indirect emissions from business travel or purchased goods: [4]

- SCOPE 1: Direct emissions from activities under a company's control.
- SCOPE 2: Indirect emissions related to a company's purchase of electricity, steam, heat, or cooling .
- SCOPE 3: Indirect emissions derived from the company's activity: that is, any emissions not under the direct responsibility of the firm that are spread across the company's value chain. These often make up the largest share of a wine producer's carbon footprint, particularly due to packaging and transportation.

Image Source: Courtesy of IWCA, this image illustrates the breakdown of Scope 1, 2, and 3 emissions for an average wine producer."

DID YOU KNOW?

Packaging for beer, wine, and spirits accounts for 20% of the packaging impact in an average UK supermarket. [5]

CLICK HERE

For the IWCA GHG Emissions Calculators

TWO CASE STUDIES FROM OUR MEMBERS:

The Carbon Footprint breakdown for a bottle of Saturnia Bianco wine (from Fattoria La Maliosa).

CLICK HERE

to see member Salcheto's calculation of global CO2 emissions (scope 1, 2 and 3).

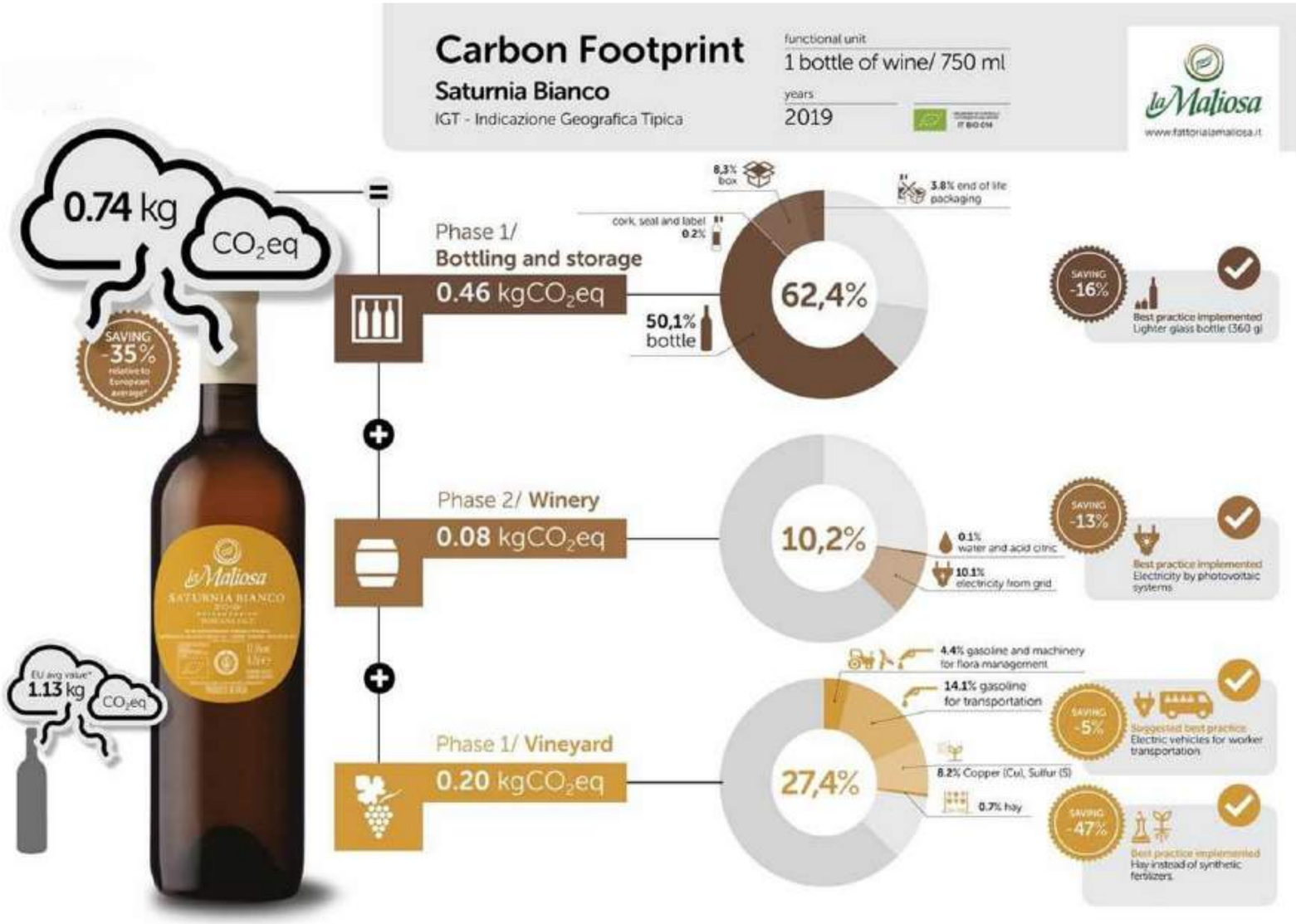


Image Source: Courtesy of Fattoria La Maliosa, the image showcases the breakdown for a bottle of Saturnia Bianco wine's carbon footprint

3. THE WASTE HIERARCHY: A STRATEGIC TOOL FOR REDUCING ENVIRONMENTAL IMPACT

While frameworks like CF, WF and LCA help assess environmental impacts, the Waste Hierarchy is a strategic tool that prioritizes waste management practices to reduce those impacts.
Ranked from the most to least environmentally beneficial, it provides a guide to making more eco-conscious decisions:

Refuse, and Reduce
the amount of packaging material used (Prevention).

Reuse
the same item multiple times, before discarding to recycle.

Recycle and Compost
If materials can't be reused, ensure they are recycled or composted.

Energy Recovery
Incineration with energy capture is preferable to landfill.

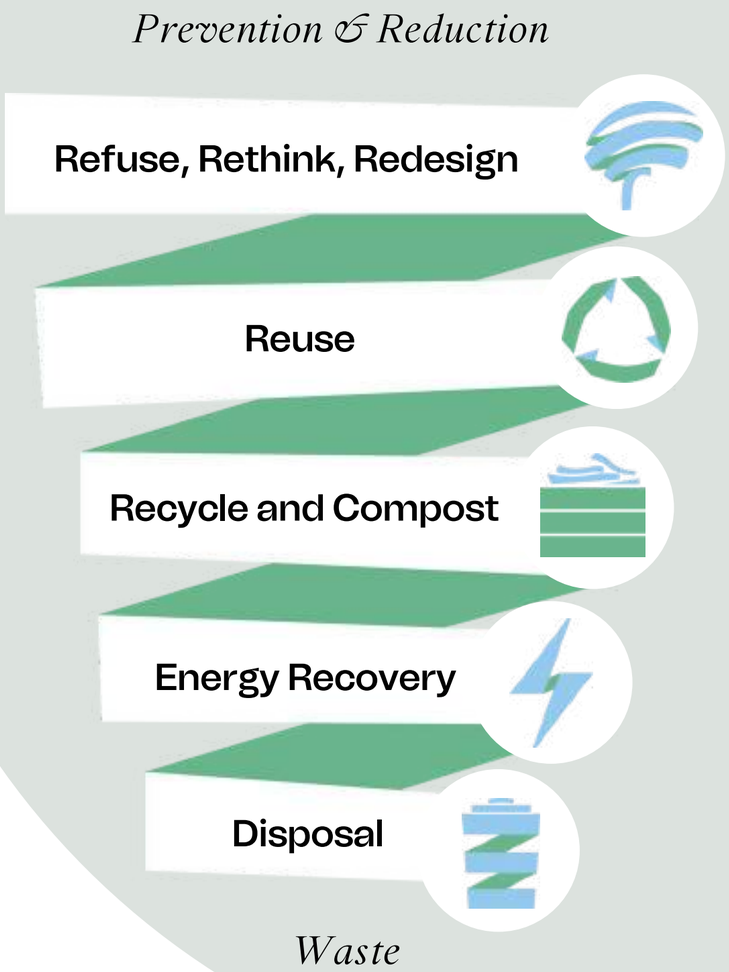
Disposal (Landfill/Incineration)
The least preferred option.

By applying this hierarchy, you are ensuring that reduction and reuse are prioritized over recycling and disposal, minimizing waste and resource use . There's a better way than to throw-away.

DID YOU KNOW?

Extraction and processing of material resources (fossil fuels, minerals, non-metallic minerals and biomass) account for over 55 per cent of greenhouse gas emissions (GHG) [6]

ZERO WASTE HIERARCHY



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REUSE VS RECYCLE

	Reuse	Recycle
What it is	Multiple use of the same material/item without transformation. Focus on extending the lifespan of an item, avoiding waste and the need for new materials.	Transformation of waste materials into new products or raw materials. Focus on reducing new raw material.
Benefits	• No Raw Material Extraction. It extends the material lifespan, reducing or eliminating the need for new raw materials, promoting circularity. • Significantly lower Energy and Greenhouse Gas Emissions. Since the material isn't altered or reprocessed, emissions are mainly limited to cleaning and transportation. • Waste Minimization: Reuse generates the least waste since the material is not discarded. • Reduced Need for New Manufacturing, minimizing the need to produce new products, cutting down on resource use and energy-intensive processes.	• Lower Raw Material Extraction, reducing the need for virgin materials. • Less Energy and Greenhouse Gas Emissions: Recycling materials generates fewer emissions than producing from virgin raw material. • Waste Reduction: Diverts waste from landfills and ecosystems.
Challenges	• Logistics: Collection and redistribution can increase emissions if not optimized. • Consumer Engagement: Success depends on consumers returning packaging for reuse. If consumers are not sufficiently engaged or motivated to participate, reusable packaging may not complete enough cycles to achieve environmental benefits. • Water Usage for cleaning and sanitization processes of reuse packaging.	• Environmental Pollutants: reuse can generate wastewater flows or leave residues, like microplastics, that harm both marine and terrestrial environments. • Inconsistent Recycling Infrastructure, varying widely by country and region. • Downcycling: Some materials degrade in quality over multiple cycles. • Contamination: Food or material contamination can prevent recycling. • Water Consumption needed in the sorting and cleaning stages. • Energy use, especially for remelting and reforming.

4. UNDERSTANDING PACKAGING MATERIALS' IMPACT

Now that we've explored the ins and outs of reusability and recyclability, it's time to dive into the core materials that make up wine packaging: Glass, Metal (aluminum and steel), Paper, and PET. While these materials are integral to the packaging process, it's important to note that we're still focusing on their broader environmental profiles—not yet the specific packaging solutions for wine. This perspective allows us to understand the fundamental impact of each material before narrowing our focus to wine-specific applications.

Each Material's Environmental Story

Each of these materials has its own environmental story to tell—none is inherently good or bad, nor entirely "green." Instead, each offers a mix of challenges and opportunities when it comes to reducing environmental impact. Recognizing these nuances is key to making informed, mindful decisions.

Reusability & Recyclability – The Dynamic Duo

Reusability and recyclability are key factors. But recycling infrastructure varies globally.

Before you commit to a packaging material, consider whether your target market can actually recycle it.

Not everything that can be recycled gets recycled; not all reusable items get reused.

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COMPARING MATERIALS' RECYCLABILITY RATES ACROSS COUNTRIES

To illustrate this point, we've compiled the following table, highlighting the recycling performance in the 10 largest wine-consuming countries, along with some recycling pioneers.

Although some data is anecdotal, this offers a clear overview for producers making packaging decisions based on where their wines are sold. [7], [8] [9] [10] [11] [12]

COUNTRY	GLASS	PAPER	PET	ALUMINIUM
USA	33%	68%	29%	50%
France	81%	65%	49%	47%
Italy	81%	57.8%	45%	70%
Germany	80%	84%	93%	91%
UK	76%	79%	74%	69%
Spain	72%	78.9%	51%	52%
Russia	Low, limited data	43%	Below 10%	70%
Argentina	40-50%	60%	20-30%	90%
China	28%	47%	22%	60%
Portugal	57%	71%	52%	48%
Australia	64%	60%	16%	63%
Canada	86%	73%	37.8%	66%
South Africa	41%	38%	21%	43%
Brazil	47%	66.9%	55%	98.7%
Netherlands	79%	81%	56%	93%

Arthur Erdem

THE NEED FOR A SUSTAINABLE APPROACH TO PACKAGING

Sustainability in the packaging industry is a complex issue that requires far more than isolated measures or short-term optimizations. Every decision - be it the choice of a particular material or the adaptation of a production method - has an impact that extends along the entire value chain and beyond.

Arthur Erdem, Head of Integrated Sustainability Strategy & Business Reframing at IPEF GmbH

A HOLISTIC APPROACH TO PACKAGING: BALANCING ECOLOGY, ECONOMY, AND FUNCTION

Every decision - be it the choice of a particular material or the adaptation of a production method - has an impact that extends along the entire value chain and beyond. In order to make packaging truly sustainable, ecological, economic and functional aspects must be considered holistically, taking global trends and social changes into account. This is the only way to prevent supposedly sustainable solutions in one area from creating unexpected problems in another.

A central starting point is life cycle analysis (LCA), as shown, looks at the entire life cycle of packaging, from raw material extraction to disposal. However, sustainability does not end with the ecological key figures of a product. The analysis of material flows and mass balances shows how important it is to keep an eye on the use of primary and recycled materials.

At the same time, the functionality of the packaging must not be disregarded, as its main task - protecting the product - remains crucial to minimizing losses and the associated environmental impact.

In addition, packaging decisions always have a systemic impact on the supply chain and are influenced by global social and environmental trends. Whether it is climate change, the availability of resources or consumer expectations, a sound analysis must take all these levels into account.

Only by taking a comprehensive look at these different perspectives can packaging solutions be developed that not only meet short-term requirements but are also sustainable and future-proof in the long term.

Determining the most environmentally friendly packaging for wine requires a multi-level approach that goes far beyond the mere life cycle of the packaging.

A systemic approach makes it possible to understand the numerous interactions between ecological, social and economic factors and to make well-founded decisions.

II. The Environmental Impact of Packaging Materials

The following levels of consideration illustrate the necessary scope:

1.
direct level:
life cycle analysis (LCA)

The basic level of consideration covers the entire life cycle of the packaging - from raw material extraction, production and transport through to use and disposal. The ecological effects such as CO_2 emissions, water consumption and energy consumption must be recorded for each phase. For example, although glass bottles are highly recyclable, their weight causes significantly higher transport emissions. Plastic is lighter but increases dependence on fossil resources and creates complex challenges when it comes to recycling. Only a broad-based LCA with clearly defined and broad system boundaries can avoid shifting effects to other phases and provide a holistic picture of the ecological impact.

2.
Material flows
and mass balances

The second level involves analysing material flows and mass balances. This concerns not only the quantity of recycled materials, but also the proportion of primary materials that are still required. For example, plastic recycling often requires the addition of primary plastic, which leads to an increase in the total amount of plastic in the long term. Paper as an alternative harbours other risks: The increasing demand for pulp due to the substitution of plastics meets a dwindling availability of wood, particularly due to climate-related shifts in biomes such as that of spruce. These systemic shifts can lead to short-term solutions creating long-term problems.

3.
Product quality
and funcionality

Sustainability must not be considered in isolation, but must always be linked to the functionality of the packaging. Packaging that is ecologically optimised but does not fulfil the protective function for the wine leads to product loss and avoidable waste. This would cancel out the original ecological advantages. The packaging must therefore also be assessed from a functional point of view, such as shelf life, barrier properties and durability.

4.
Sistemic interactions
in the supply chain

The fourth level comprises the interactions within the supply chain. Every decision regarding packaging has an impact on other players in the value chain. For example, the choice of packaging materials influences logistics, recycling and waste management as well as retail requirements. A broad scope must ensure that all relevant stakeholders are taken into account and that systemic shifts are minimised.

5.
Social and ecological
macro trends

The fifth level goes beyond the direct supply chain and looks at global social and ecological trends. Climate change, resource scarcity and changes in ecosystems such as forests or marine biomes influence the long-term availability and sustainability of materials. Decisions made today must be placed in the context of these macro trends in order to assess their long-term impact. One example is the increasing demand for paper, which competes with other applications such as the construction industry or energy production.

6.
Market and consumer level

Perception also plays a role at market and consumer level. Sustainability is increasingly becoming a competitive factor, but there is a risk that market-hyped measures will crowd out actual sustainability. Companies need to ensure that their decisions are based on sound data and systemic analysis, rather than reacting to short-term trends that could be harmful in the long term.

In reference to Materials

In order to determine the most sustainable packaging for wine, a differentiated consideration of the common materials - glass, aluminium, PET (polyethylene terephthalate) and paper - is necessary. Each of these materials offers specific advantages and disadvantages that need to be analysed on several levels in the context of a comprehensive sustainability assessment.

1. DIRECT LEVEL: LIFE CYCLE ANALYSIS (LCA)

The environmental impact of materials varies greatly over their life cycle:

- Glass is highly recyclable and reusable, but requires large amounts of energy to produce and recycle. Its high weight also causes considerable CO_2 emissions during transport.
- Similar to glass, aluminium has a high recycling rate, but the energy-intensive primary production and the associated ecological footprint are problematic, although recycled material is significantly more environmentally friendly.
- PET is lightweight and reduces transport emissions, but is problematic due to its dependence on fossil raw materials. Recycling often does not work in closed cycles and the demand for primary materials remains high.
- At first glance, paper appears to be sustainable, but the growing demand for pulp and the dwindling supply of spruce are causing increasing environmental challenges. In addition, paper is only suitable for liquids if it is coated, which can limit its recyclability.
- Stainless Steel: Very durable, corrosion-resistant and theoretically infinitely recyclable, as steel can be melted down as often as required without losing quality. However, the primary production of stainless steel is resource- and energy-intensive (extraction of chromium, nickel, etc.). Over its entire life cycle, however, stainless steel can score points thanks to its long utilisation cycles and reusability.

2. MATERIAL FLOWS AND MASS BALANCES

The focus is on the availability and recyclability of the materials:

- Glass can be recycled almost indefinitely, but the material flow is sluggish because the high energy required for melting slows down the cycle.
- Aluminium scores highly in terms of efficient recycling, with over 90% of the material being reused. Nevertheless, the primary requirement remains high in order to meet the increasing demand.
- PET generates a constantly growing plastic stream through its recycling, as primary materials are often required to guarantee the material properties.
- Paper is facing the challenge that global wood resources are decreasing due to climate change, while the demand for packaging is increasing. This leads to competition between short-term packaging solutions and the long-term safeguarding of ecosystems.
- Stainless Steel: The material cycle for stainless steel is well established. Existing stainless steel scrap is a valuable resource for new production. The material is attractive due to its high scrap value and the good infrastructure for steel scrap recycling. The main obstacle is the primary demand for chromium, nickel and other alloying elements as long as there is not enough scrap available. Nevertheless, established material cycles can enable a steady flow of material.

3. PRODUCT QUALITY AND FUNCTIONALITY

The packaging must protect the wine from light, oxygen and temperature changes:

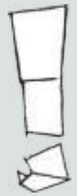
- Glass is unrivalled in its barrier function, as it is completely opaque and inert.
- Aluminium offers similar advantages, but is usually only used for smaller packaging formats such as cans, which are less suitable for wine.
- PET is light and break-resistant, but has lower barrier properties, which can lead to a loss of quality during longer storage.
- Paper does not provide sufficient protection for wine and requires additional layers, which increases the variety of materials and reduces recyclability.
- Stainless Steel: Almost perfect barrier against oxygen, light and temperature fluctuations. Stainless steel is inert, does not release any substances into the wine and protects flavour and quality in the long term. However, stainless steel packaging is unusual and more expensive for end consumers, which is why it has so far been used more in reusable systems (e.g. kegs for the catering trade). Hardly established for the mass market so far.

4. SYSTEMIC INTERACTIONS IN THE SUPPLY CHAIN

- Glass causes high logistics costs and emissions due to its weight, while its recyclability requires regional infrastructures.
- Aluminium offers advantages in transport due to its lower weight, but is heavily dependent on the energy mix of the producing countries.
- PET significantly reduces transport emissions, but exacerbates the global environmental problem through plastic waste and microplastics.
- Paper has comparatively low transport emissions, but requires complex production and recycling processes if it is used for liquids.
- Stainless steel: Higher purchase costs and weight than aluminium and PET, but with reusable systems (e.g. reusable kegs or larger containers for catering) these disadvantages are amortised over a long service life. Transport emissions may increase due to higher material density, but the reusability concept reduces the overall carbon footprint compared to disposable packaging.

5. SOCIAL AND ECOLOGICAL MACRO TRENDS

- Glass can be used in the long term, but its energy intensity conflicts with global CO_2 reduction targets.
- Aluminium benefits from circular economy programmes, but is under pressure due to the increasing demand for raw materials.
- PET and paper are strongly influenced by social trends, with the increasing focus on plastic avoidance positioning paper as a "green alternative", although this could exacerbate resource utilisation in the long term.



Conclusion and recommendations for action

The choice of material should depend on the specific use:

- Glass is suitable for high-quality, durable products that can be reused.
- Aluminium can be useful for smaller, transport-optimised packaging.
- PET should be limited to short-life applications with a good recycling approach.
- Paper is conceivable for alternative packaging solutions, but not without innovations in material design to improve barrier properties and recycling.

Sustainability requires a comprehensive consideration of all aspects in order to develop packaging that is ecologically, economically and functionally balanced in the long term.

KEY ENVIRONMENTAL IMPACTS OF PACKAGING MATERIALS

MATERIAL	ALUMINIUM (AL)	GLASS	PAPER	PET	STEEL
Water Usage	Primary Production: Around 2,000-4,000 litres required p/ 1 tonne of Aluminium. ♻: <5% of the water consumption of primary production.	Production: Around 200-500 litres are required for 1 glass tonne, depending on the production process. ♻: Minimal consumption, as cleaning the cullet requires less water.	Around 10,000-20,000 litres of water are needed to produce 1 tonne of virgin fibre paper. ♻: Reduces water consumption by up to 50%.	Primary Production: 2,000-3,000 litres p/ 1 tonne of PET ♻: Reduced water consumption, about 20-30% less, as mainly used for cleaning.	Primary Production: ≃ 60,000-90,000 litres p/ tonne, primarily for cooling and cleaning processes. ♻: Significantly reduced water consumption as no raw material preparation is necessary.
CO2 Emissions	Primary Production: 16-17 tonnes of CO_2 p/ Al tonne. ♻: Reduces emissions by up to 95% [13]	Primary Production: 0.5-0.8 tonnes of CO_2 per tonne of glass, depending on energy mix. ♻: Reduces CO_2 emissions by up to 50% [14].	Primary production (virgin fibre): 1.5-3 tonnes of CO_2 p/ tonne. ♻: Reduces emissions by up to 50%.	Primary Production: 2-3 tonnes of CO_2 per tonne of PET. ♻: Reduction of emissions by 50-60%, to around 1-1.5 tonnes of CO_2.	Primary Production: 2-6 tonnes of CO_2 p/ tonne, depending on energy source and production process. ♻: Reduces emissions by up to 70%, around 0.6-1.8 tonnes of CO_2 per recycled tonne.
Energy Use	Primary Production: 14,000-15,000 kWh of energy p/ AL tonne. ♻: Requires only around 700 kWh per tonne.	P: 4,000-8,000 kWh per tonne, depending on melting processes. ♻: Reduces energy consumption by up to 30%, as used glass requires lower melting temperatures.	Production: virgin fibre paper requires around 7,000-10,000 kWh per tonne. ♻: energy requirements reduced by up to 40% [15]	Primary Production: 84-100 GJ (23,000-28,000 kWh) energy consumption p/ tonne. ♻: energy need drops to around 40-50 GJ (11,000-14,000 kWh).	Production: 20-30 GJ (5,500-8,300 kWh) per tonne of stainless steel. ♻: Energy savings of up to 60% compared to primary production.
End-of-life processing	100% recyclable without any loss of quality. Also reusable. ♻: saves up to 95% energy and reduces waste.	100% recyclable and Reusable, without any loss of quality. ♻: saves raw materials (quartz sand, soda,d limestone). A 10% increase in recycled glass cuts energy use by ~3%.	♻: Over 72% rate in Europe. Paper can be recycled up to 7 times before the fibres become unusable	♻: ≃ 48% rate across Europe. 1 tonne of recycled PET saves 1.5 tonnes of CO_2 and 50% energy. If disposed of improperly, it breaks down into microplastics that end up in soil, water and food chains.	100% recyclable without any loss of quality. Recycled stainless steel often contains 60-80% secondary material.
Waste Generation	Bauxite mining generates yearly around 150 million tonnes of residues (red mud) yearly ♻: completely reduces mining waste.	Primary Production: Waste from raw material processing (sand, soda, lime). ♻: Practically no waste, used glass is fully utilised.	Primary Production: Waste is generated by chemical residues (e.g. lignin) and process sludge ♻: The proportion of waste is low, but printing ink residues can be problematic.	Improper disposal of PET is the main cause for 3 million tonnes of plastic in the oceans every year. ♻ minimizes waste and closes material cycles.	Primary Production: Waste products such as slag and dust are produced, but can be reused. ♻: Minimised waste, virtually closed material cycle.
Chemical Impact	Degradation: Use of caustic soda and other chemicals in the Bayer process, with environment and health. Red sludge contains toxic substances such as heavy metals.	Production: Use of soda (sodium carbonate), no significant toxic substances. Waste: Waste glass does not harbour any chemical hazards.	Primary paper: use of bleaching agents such as chlorine (reduced in modern processes); R: use of more ecological methods, but residues of colours and adhesives require additional chemicals.	Prod: No toxic chemicals required; but, improper disposal can release chemicals into the ecosystem. ♻: Problematic with additives such as plasticisers or barrier coatings.	Production: Use of chromium and nickel, which can be toxic if handled incorrectly. ♻: No significant chemical risks as it is processed in closed cycles.
Biodiversity Loss	Bauxite mining destroys tropical rainforests and ecosystems, especially in regions such as Brazil and Australia. Recultivation is cost-intensive and often inadequate.	Primary Production: quartz sand extraction can affect local flora and fauna. ♻: no impact on biodiversity.	Timber harvesting: Deforestation can jeopardise biodiversity, especially in non-certified forests. ♻: No direct impact on biodiversity, as fewer primary raw materials are required.	Primary Production: Indirect effects through crude oil extraction. Microplastics impair marine ecosystems and jeopardise biodiversity in the long term.	Primary production: Mining of iron ore, chromium and nickel can affect biodiversity locally. ♻: No direct impact on biodiversity.

KEY ENVIRONMENTAL IMPACTS OF PACKAGING MATERIAL

	ALUMINIUM	GLASS	PAPER	PET	STEEL
SUMMARY FOR PRAGMATIC DECISIONS	Promote recycling: As recycling saves up to 95% energy and emissions, this should be a priority. Alternative sources: Using secondary aluminium or aluminium from certified extraction (e.g. ASI-certified) minimises environmental impact. Use in durable products: Aluminium's durability makes it particularly suitable for applications that facilitate recycling.	Maximise recycling: Glass can be recycled endlessly. A higher proportion of used glass significantly reduces energy consumption and emissions. Alternative energy sources: Utilising renewable energy in the melting process can further improve the CO_2 balance. Optimise packaging design: Glass should be suitable for return systems to promote recycling (e.g. reusable systems).Avoiding composite materials: Labels and coatings that make recycling more difficult should be avoided or standardised.	Favour recycled materials: Using FSC or PEFC-certified paper and recycled materials reduces the environmental impact. Efficient design: Using less material (e.g. thinner cardboard boxes) and single-origin packaging promotes sustainability. Chemical-free printing: Environmentally friendly printing processes and solvent-free inks facilitate recycling. Regional raw materials: Reduces the carbon footprint of the supply chain.	Promote recycling: Recycling reduces the primary consumption of raw materials and cuts emissions by up to 60%. At the same time, it minimises the entry of microplastics through improper disposal. Avoid microplastics: Improper disposal leads to environmental pollution. PET decomposes over decades into microplastics, which accumulate in soil, water and organisms. Estimates: Up to 1.5 million tonnes of microplastics from plastics are released into the environment every year (source: UNEP). Optimise design: Mixed materials and barrier coatings make recycling more difficult. Create recycling incentives: Promoting deposit systems and closed material cycles reduces waste and improves the collection rate.	100% Recyclable. The recycling process saves up to 70% CO_2 and 60% energy compared to primary production. Durability: Stainless steel has an extremely high durability and corrosion resistance, which makes it ideal for reusable wine containers, such as barrels, tanks or innovative packaging. High energy consumption in primary production: Energy requirements and CO_2 emissions are high, but this is offset by durability and recyclability. No microplastic problem: Stainless steel does not decompose in the environment and does not generate microplastic pollution. Design for the circular economy: Stainless steel products should be designed in such a way that they can be easily dismantled and recycled.

KEY TAKEAWAYS

- **Packaging materials** have environmental impacts throughout their lifecycle, from raw material extraction to disposal or recycling, so considering all phases helps make more informed, eco-conscious decisions.
- **Reusability and recyclability** are important for reducing environmental impact, but their success depends heavily on infrastructure and consumer behavior.
- **Choosing materials** with lower water and energy footprints like recycled aluminum or lightweight plastics such as PET offers significant energy and carbon savings, though it's important to consider broader environmental impacts such as water use and pollution.
- **Lighter materials** can reduce transportation-related carbon emissions, but it's important to weigh the trade-offs between heavier materials like glass and lighter alternatives, especially for long-distance shipping.
- **Minimizing waste generation** by focusing on circularity involves designing for recyclability, reducing contamination, and avoiding materials that are difficult to recycle.
- **Recycling infrastructure** varies by region, so ensure that your chosen packaging material aligns with the recycling capabilities of your target markets.
- **Using data-driven tools** like Life Cycle Analysis (LCA) and carbon/water footprints provides valuable insights into the environmental impact of your packaging and can guide your decision-making process.
- **Collaborating with responsible suppliers** who prioritize sustainability can help lower your packaging's overall footprint by opting for recycled content or sustainably sourced materials.
- **Considering biodiversity and pollution impacts** helps to reduce negative effects on ecosystems, minimize habitat destruction, chemical leaching, and microplastic generation.
- **Actively educating consumers** about the environmental benefits of your packaging and providing clear information on recycling practices helps empower them to make informed decisions that align with your sustainability goals.

5. BUILDING TOMORROW'S SOLUTIONS

Advancements in packaging technology are transforming the industry, with innovations that significantly reduce emissions and waste. For example, traditional glass furnaces, powered by natural gas, are evolving to electric alternatives, drastically cutting carbon emissions in glass production.

Waste products are being repurposed, as sub-products from one industry are being used as raw material in other sectors, creating labels, inks, leathers, and packaging components, further closing the loop.

AI-driven sorting technologies are revolutionizing recycling by efficiently identifying and separating materials, such as PET and HDPE plastics, ensuring more materials are recovered and contamination is minimized.

Additionally, biodegradable and compostable packaging made from renewable resources like cornstarch and sugarcane is emerging as a viable alternative to traditional plastics, though they require industrial composting facilities.

Alternative raw materials that can replace virgin raw and carbon-based materials such as sand, limestone, and soda ash are already being produced and tested.

Reusable packaging systems are gaining traction by encouraging circular use, where containers are returned, cleaned, and reused. Blockchain technology is also being leveraged to track the entire packaging lifecycle, ensuring accountability and transparency in recycling. AI can help optimize decisions in production processes.

These developments, along with innovations like waterless cleaning for recyclables and eco-friendly additives for plastics, are leading the shift towards a more environmentally sustainable and circular packaging economy.

By embracing these innovations today, you are not only reducing your current environmental footprint but also future-proofing your packaging strategy in an increasingly circular economy.

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SCENARIO 2035:

RENEWABLE ENERGIES DOMINATE ENERGY SUPPLY IN EUROPE

Europe has largely completed its energy transition:

Over 80% of energy comes from renewable sources such as wind, solar, hydropower, and geothermal energy. This development has drastically reduced CO_2 emissions in production and recycling.

The focus is now on optimising sustainable material cycles, securing scarce resources and strengthening social and environmental aspects in the supply chain. With this in mind, the assessment of packaging materials for wine is being fundamentally redefined.

Extraction and processing of material resources (fossil fuels, minerals, non-metallic minerals and biomass) account for over 55 per cent of greenhouse gas emissions (GHG) (7)

SCENARIO 2035:

GLASS

Assessment:

Glass benefits greatly from the availability of renewable energies, as energy-intensive production and recycling are now much more climate-friendly. The almost unlimited reusability of glass bottles in returnable systems is becoming a key strength. As glass is inert, it remains the preferred choice for high-quality and long-lasting products such as wine.

Trends (2035):

- Regional reusable systems are being expanded in order to minimise transport emissions.
- Lighter glass bottles (lightweight glass) are being developed to further reduce resource consumption and emissions.
- Automated take-back and cleaning systems strengthen the cycle.

ALUMINIUM

Aluminium also benefits greatly from renewable energy, as primary production - previously the biggest ecological weak point - is being decarbonised. Its low weight remains an advantage for transport, and the recycling rate is already high (>90%). However, the demand for raw materials remains critical, as aluminium is under pressure due to the high demand in other industries (e.g. electromobility).

- More closed recycling loop ("closed-loop recycling").
- Research into alloys that require less primary aluminium.
- Use of aluminium primarily for smaller containers or premium products.

PET

PET will not become fundamentally more sustainable through renewable energies, as the challenge of plastic waste and dependence on fossil raw materials remains. Even with optimal recycling, the need for primary materials to compensate for quality losses remains. Bio-based alternatives could provide a remedy, but are not yet technologically mature.

- Bio-based PET made from renewable raw materials is gaining in importance, but remains a niche solution.
- Improved recycling technologies (e.g. chemical recycling) enable higher recycled content.
- Restriction of PET packaging in regulated markets due to plastic directives.

PAPER

Paper packaging benefits indirectly from renewable energies, as pulp production is energy-intensive. However, the limited raw material wood remains a critical point. The increasing demand for paper as a substitute for plastic is leading to competition for wood resources, especially as biomes such as spruce are endangered by climate change.

- Innovative paper layers with an improved barrier effect enable liquid packaging, but often in combination with plastics.
- Certified and regeneratively managed forests are becoming the standard.
- The focus is shifting towards reusable paper packaging (e.g. coated systems).

SUMMARY OF DEVELOPMENTS AND TRENDS (2035)

Technological innovations and choice of materials:

- Glass is becoming the preferred choice for high-quality wines thanks to regional reusable systems and innovations in lightweight construction.
- Aluminium remains competitive for smaller packaging formats, but the shortage of material limits its use.
- PET will become less important unless bio-based alternatives prevail.
- Paper is mainly used for combined materials and niche solutions, but remains resource-intensive.

Resource management and circular economy:

- Closed loops are the key, with glass and aluminium leading the way.
- Paper is heavily dependent on sustainable forestry.
- Plastic continues to be under pressure from regulatory restrictions and waste problems.

Regulatory and social framework conditions:

- The EU is increasingly focussing on extended producer responsibility (EPR) in order to promote closed cycles.
- Plastic taxes and stricter recycling quotas for all materials influence market availability.
- Consumer preferences are shifting towards locally produced and reusable packaging solutions.

Winners and Prospects 2035

In a Europe with renewable energy, glass is the clear winner for wine packaging, especially in returnable systems.
Aluminium remains an efficient option, especially for smaller formats, but is limited by competition for raw materials.
PET is becoming less attractive in favour of bio-based alternatives, although these still require development time. Paper faces challenges due to limited resources, but offers potential for innovative niche applications.
The next ten years will be decisive in orienting the packaging industry towards a genuine circular economy and resource-saving solutions.

This section is authored by Arthur Erdem, Head of Integrated Sustainability Strategy & Business Reframing at IPEF GmbH

6. TURNING INSIGHTS INTO ACTIONS

Optimize Material Sourcing:
Use locally abundant, eco-friendly materials like recycled or bio-based options to cut down on CO_2, water pollution, and transport impacts.

Minimize Water and Energy Use:
Choose materials and processes with low water and energy demands, especially in water-scarce regions and adopt water-efficient practices in cleaning and recycling.

Choose Lightweight Packaging:
Reduce transport emissions by choosing lighter materials, particularly for long-distance exports.

Leverage Circular Packaging Solutions:
Consider refillable bottle programs or bulk options to cut waste. Partner with local recyclers to ensure efficient processing in key markets.

Look Beyond Carbon Metrics:
Use Life Cycle Analysis (LCA) to measure impacts on water use, biodiversity, and pollution, not just carbon footprint. Also, track circularity with ISO 59020 standards to ensure alignment with industry-specific needs.

Reduce Waste Generation and Improve Recycling:
Design packaging for easy recycling; avoid mixed-materials. And use cleaner adhesives to minimize contamination in recycling.

Ultimately, your values will guide your final decision. Is carbon footprint the priority? Or the amount of water used or the packaging's recyclability in key markets? The choice is based on data and what matters most to your business.

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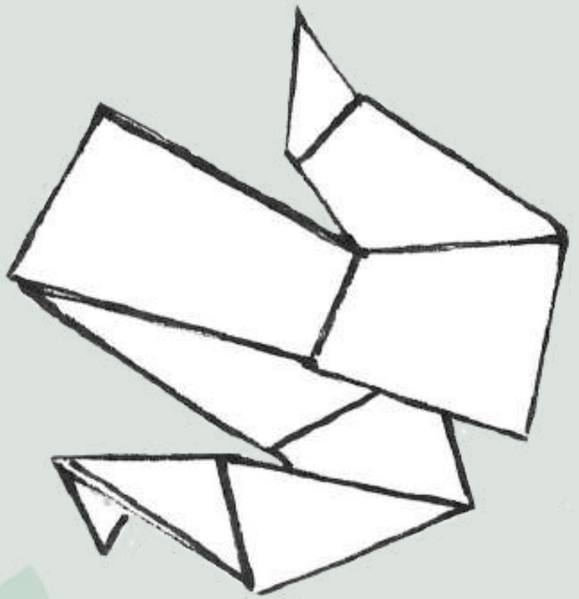
III. Primary Packaging



Lanchester Wines

BECAUSE SUSTAINABILITY MEANS LOOKING AT THE FULL PICTURE.

THE GREEN AWARDS drinks business 2023 WINNER

THE VINLOG GREEN IMPORTER/DISTRIBUTOR AWARD
WINNER
Lanchester Wines

IWSC TROPHY iwsc.net • 2024 GREEN WINE INITIATIVE

IWSC TROPHY iwsc.net • 2025 GREEN WINE INITIATIVE

We believe every business has a duty of care to minimise its impact on the environment, which is why Lanchester Wines has worked tirelessly over the last decade to ensure sustainability is at our core.

Over the past decade, we've invested over £13 million in renewable energy, making our operations in the North East of England nearly 100% wind and solar powered.

We partner with wine producers who share our commitment to sustainability, ensuring expert care and attention at every stage of wine production. From water conservation to vineyard grazing, our suppliers prioritise quality and environmental stewardship.

Around half of our wine is shipped to the UK in bulk, saving around 38% CO_2 compared to shipping in bottle. This wine is bottled at Greencroft Bottling which is powered by clean renewable wine and solar energy.

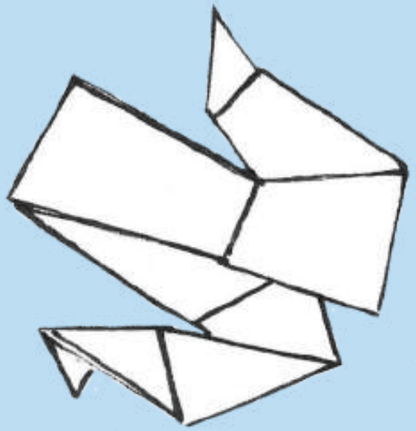
And we've recently introduced the UK's lightest wine bottle, the Verallia Bordelaise Air. This 300g bottle, made with 30% recycled glass, reduces the carbon footprint by 25% compared to standard 400g bottles and removes 3.2tonnes of bottle weight per 24,000 litres of wine.

Because being carbon neutral is just the beginning.

*300g bottle vs UK standard 400g bottle

www.lanchesterwines.co.uk
01207 52 1234
sales@lanchesterwines.co.uk

Chapter Summary:



This chapter builds on your understanding of the environmental impact of wine packaging and offers practical steps to help you make eco-conscious choices about primary packaging. It focuses on key elements such as containers, closures, capsules, labels and inks. Through first-hand testimonials from Porto Protocol members, you will gain actionable insights to align your primary packaging with sustainability goals.

Environmental benefits and challenges of various packaging materials are explored—from glass to PET bottles, aluminum cans to corks, and water-based inks—emphasizing the importance of evaluating the entire lifecycle of each option, from raw material sourcing to end-of-life disposal.

The categories listed on the side table will be examined further.

- **Containers**
- **Closures**
- **Capsules**
- **Labels**
- **Inks**
- **Bulk Shipping**
- **Generable Actionable Steps for Primary Packaging**

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Wine Packaging

Three key types:

Primary Packaging:
The container and components that directly touch the wine, like bottles, labels, closures, and capsules.

Secondary Packaging:
Presentation layers such as boxes or gift packs.

Tertiary Packaging:
Used for safe transport, like pallets and crates.

No one-size-fits-all solution, but here's a simple CHECKLIST for your next discussion with suppliers:

Material Sourcing:
How are the materials sourced? What are they made of?

Waste Reduction:
Can the packaging be minimized without affecting quality?

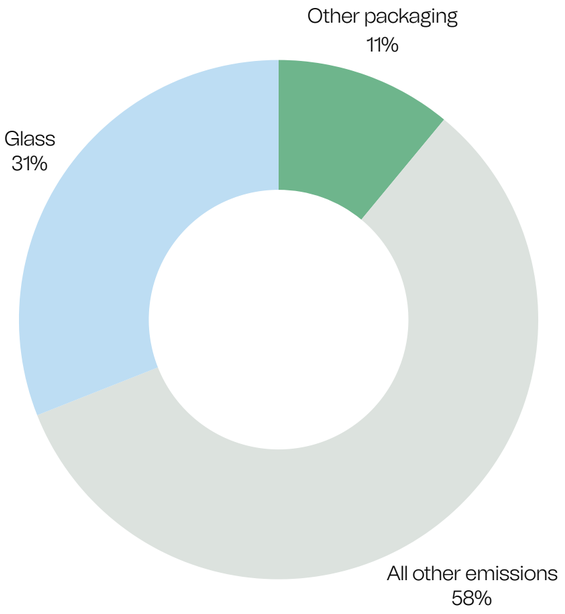
Lightweighting:
Is there potential to reduce weight for better transport efficiency?

Afterlife:
Can it be recycled or reused?

Decomposition:
How long does it take to break down? What are its environmental impacts?

Containers:

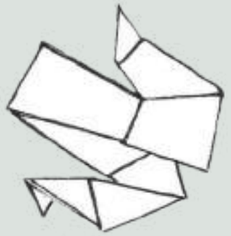
As highlighted in the previous chapter, assessing the environmental impact of wine packaging involves several key factors. However containers are central to primary wine packaging. Their environmental impact is consistently scrutinized by stakeholders across the industry, from producers to regulators and the trade.



Let's take a closer look at the options available and the actionable steps that will guide you toward more mindful choices.

On the side, you'll find the containers we'll be exploring.

Image 1: Wine Society's Carbon Footprint Where packaging represents 42% of the total 1, 2 and 3 emissions [1]



CONTAINER TYPES

- Single-Use Glass Bottle
- Reusable Glass Bottle
- PET Bottles
- rPET Flat Bottles
- PET Kegs
- Aluminum Cans
- Reusable Aluminum Bottles
- Stainless Steel Kegs
- Bag-in-Box
- Paper Bottle
- Wine Pouches
- Tetra-Pak
- Flexikegs
- Summary Table

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The graph is based on LCA studies in the Nordic countries, where there are deposit schemes for cans, PET, and certain glass bottles, with high return rates. Also, glass outside of the deposit schemes is collected for recycling of the raw material. Hence in a different geography the numbers may be different.

This image shows the climate footprint of various types of packaging (expressed as grams of CO2 emitted) during the manufacturing process. The figures state the average emissions for each type of packaging.

The calculations are based on material consumption for the packaging size of each respective type of packaging with the largest sales.
For comparison, all data were converted to carbon dioxide emissions per litre.

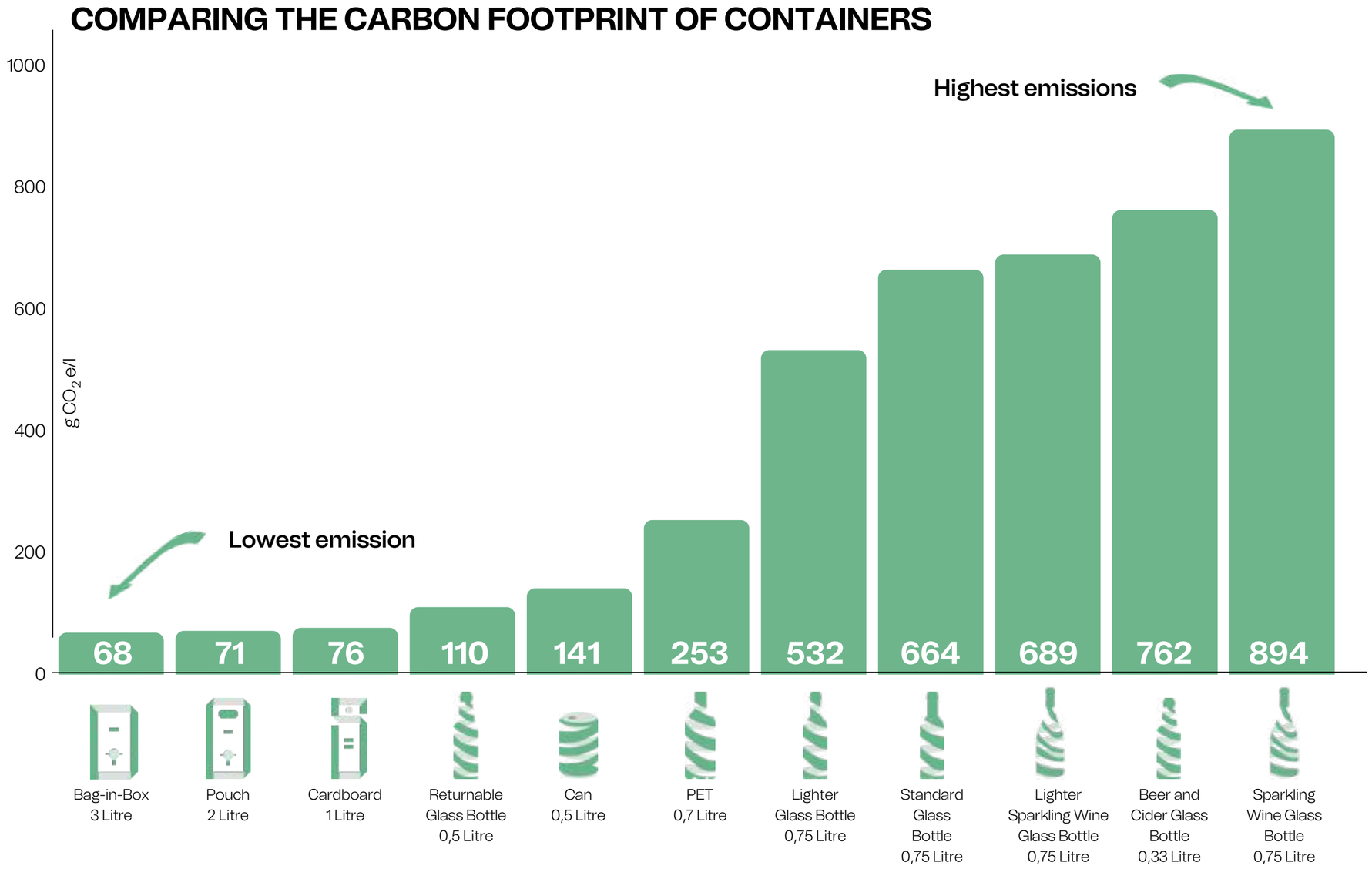

Image 2- adapted from (The calculations of carbon dioxide emissions from packaging were made in 2018 and 2019 on behalf of Alko (the Finnish alcoholic beverage retailing monopoly) in collaboration with Systembolaget and Vinmonopolet (the Norwegian wine monopoly). [2]

Anne Bousquet on ALTERNATIVE PACKAGING

From the very beginning, we embraced sustainability by adopting lightweight bottles, aligning with Nordic monopoly recommendations. We have achieved a significant increase in the use of lighter bottles. In 2023, 74% of our bottles weighed 400 grams or less. By 2024, this percentage rose to 94%, also considering sparkling wines. Our commitment to reducing our environmental footprint extends to exploring alternative packaging solutions:

- Bag-in-Box: Introduced in 2007 for efficient, lower-impact packaging.
- Keg: Adopted in 2017, perfect for on-premise consumption with minimal waste.
- PET: adopted on 2020. Lightweight and recyclable.
- Pouch: Launched in 2020, offering convenience and reduced packaging weight.

With a 20% increase in the use of lightweight bottles from 2023 to 2024, we have reduced glass-related emissions by 60 tons of CO2e, despite increasing our bottle sales by 13,000 units. Additionally, by transitioning our reserve line to bottles weighing 400g or less, we have achieved cost savings of approximately USD 25,000.

This journey of learning and innovation is ongoing, as we strive to balance functionnality, sustainability, and market demands while reducing waste and supporting recycling systems.

Dr. Laura Catena | Founder, Catena Institute of Wine

1. Glass Containers

The glass bottle has been a wine industry favorite for over 300 years due to its inert nature and recyclability, though its weight and shape present environmental challenges.

- **Single-Use Glass Bottle**
- **Reusable Glass Bottle**

DID YOU KNOW?

After water, sand is the most used resource globally. [3]

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1.1 *Single Use* GLASS **BOTTLE**

COMPOSITION AND CHARACTERISTICS

Made from sand, soda ash, and limestone, glass bottles typically contain about 50-60% recycled content (in Europe).

ENVIRONMENTAL BENEFITS

- Glass is infinitely recyclable without quality loss.
- Glass production uses significant amounts of recycled cullet, reducing virgin material usage.
- Inert, meaning no chemicals leach into the wine.

ENVIRONMENTAL CHALLENGES

- High energy demand and carbon footprint from production due to melting at high temperatures.
- Heavy and inefficient to transport
- Round bottle shape is space inefficient for transport.
- Significant use of non-renewable sand.

A 300g bottle has just been launched in the market. It offers a 25% CO2 reduction compared to a standard 400g bottle, has around 30% recycled glass, and has similar aesthetics of the Bordeaux wine bottle.

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SINGLE-USE BOTTLE ACTIONABLE STEPS:

Use Existing Stock:
Allocate any heavier bottles for local or specific orders to minimize transport impact.

Lightweight the bottle
Switch to lighter bottles (e.g., 420g instead of 600g) to reduce carbon emissions without compromising quality. No, you will not lose distinctiveness. There is already some standardization in place: 70% of wine bottles sold are Burgundy or Bordeaux. Furthermore, would a 1cm higher or lower be a differentiating enough factor on the shelf? Will it be distinct enough to be perceived by the consumer?

Switch to Green or Amber Glass:
Due to its scarcity, replacing flint cullet with green or amber glass will result in approximately 25% lower CO2 (according to BAGlass).

Advocate for Container Deposit Schemes:
They make it more difficult to match the required standard shades in recycled glass again.

Experiment with transitional glass
If you have a limited edition, work on its distinctiveness using transitional glass. These are wasted glass bottles, created when changing glass colors in glass manufacturing, considered imperfect due to slight discoloration or cosmetic faults.

(Re)evaluate Transportation
Review your bottle supply chain and shipping routes to reduce transportation emissions. A lighter footprint is not just about lightweight bottles; it is also about bottle shape as well as where those bottles are shipped to and from.

Collaborate for regional advocacy
with other vintners, regional stakeholders, and the Porto Protocol, to push for industry-wide changes.

Advocate for Container Deposit Schemes:
Crucial in boosting recycling and reusing rates and reducing waste.

the PORTO PROTOCOL

Dr. Laura catena on
LIGHTENING UP THE BOTTLE WEIGHT

> Heavy bottles often give the impression of luxury, much like perfume, cognac, and champagne bottles. However, many consumers are unaware that these heavier bottles come with a significantly higher carbon footprint. We credit our long-standing partner, Verallia Argentina, for playing a crucial role in helping us reduce substantially our bottle weight over the past decade. My personal mission now is to convince consumers that the wine they love remains just as beautiful in a lighter bottle. Achieving this requires industry-wide change and strong campaigns from retailers to consumers. Our goal is for a future where consumers demand that even luxury cuvées be bottled in lightweight glass, just as they expect their luxury luggage to be ultra-light.

Dr. Laura Catena | Founder, Catena Institute of Wine

Ceri Parke on the 300G BOTTLE

> The 300g bottle behaved the same as heavier glass bottles in our bottling line. To the eye there is little discernible difference and therefore it is surprising to me why the whole industry is not moving to these bottles.

Ceri Parke, CEO and Founder at Cantina Goccia

Image 3 - Common Wine Bottle Types

DID YOU KNOW?

How wine & glass is transported can have a greater influence on the Carbon Footprint than how far it is transported.

DID YOU KNOW?

70% of wine bottles sold are Burgundy or Bordeaux.[4]

New and lighter bottle on the left,
Heavier and older bottle on the right.

Success Story

Since 2018 Crimson Wine Group reduced glass weight across its entire portfolio by 22% .

Average bottle weight reduced from 503g to 479g; now working to reduce to 449g.

- Between transportation, glass cost, and change in packware (we do bulk glass now that we have consolidated bottling at one location), we have financial savings of more than $500K/yr.
- Sales opportunities in cruises, airlines and certain monopolies.
- Reduced number of suppliers.
- Reduction in Carbon Footprint.
- Good story for environmentally friendly retailers or third parties.

> There's that assumption there's going to be consumer pushback, [but] even at the highest level of wine price, there's been zero pushback.
>
> Nicolas Quillé / Crimson Wine Group

Nicolas Quillé MW on
RETHINKING PACKAGING & TRANSPORTATION

Since 2018, we have reduced the average weight of our bottles by 24%, intending to reach an average of 400 grams by 2028. Our lightest bottle currently weighs 397 grams. This initiative is part of a broader effort that also includes increasing recycled content and improving transportation efficiency.

Furthermore, we have consolidated 92% of our bottlings to a facility closer to the glass plant and warehouse in California, significantly cutting transportation emissions. These actions have been instrumental in reshaping our packaging strategy to meet both environmental and operational objectives.

Between transportation, glass cost, and change in packware (we do bulk glass now that we have consolidated bottling at one location), we have financial savings of more than $500K/yr.

Nicolas Quillé MW | Chief Winemaker and COO at Crimson Wine Group

I commit to:

#stopheavywinebottles

GOAL:

Reduce my bottle weight by [_____ grams]
by the end of 2025.

STATUS:

Average weight of my Bottles [_____ grams]
in 2024.

Your Action

OUR COLLECTIVE IMPACT

Together, small actions lead to big results.

Company

Date

Signature

Send a screeshot of this page to:
together@portoprotocol.com

100% Recycled Glass (wild glass)

SYMINGTON

BENEFITS:

- The bottle's unique aesthetics and original shape, resembling a cocktail shaker silhouette, have received highly positive feedback from consumers.
- Likewise, the texture of the bottle is distinctive and has received positive feedback.
- The use of Wild Glass is an eco-friendly feature, offering an environmental benefit, and can be communicated to the trade even if it isn't immediately visible to the consumer.
- Despite its premium design, the bottle maintains a relatively low weight (500g).

CHALLENGES:

- The textured glass surface can make it challenging for large labels to adhere.
- The pronounced troncoconic shape of the bottle can cause difficulties on bottling lines.

"We selected the Wildy Crafted Primal 75cl bottle for our Tails of the Unexpected Ports because its innovative design and sustainability credentials align perfectly with our vision for a ground-breaking range offering easy-to-understand Ports specifically crafted for mixing in the on-trade. The reaction from our customers has been great and in 2023 we shipped the range to 11 markets around the world."

Andrew Langton May / Symington Family Estates

1.2 *Reusable* GLASS **BOTTLE**

Remember when milk bottles were returned for reuse? The wine industry is adopting a similar approach to reduce energy-intensive production, single-use and (just) recycling.
With the right infrastructure and consumer support, this shift could greatly enhance the sustainability of wine packaging.

CLICK HERE

To discover the latest advancements in reusable wine bottles in our London Wine Fair Bottle Initiative

COMPOSITION AND CHARACTERISTICS

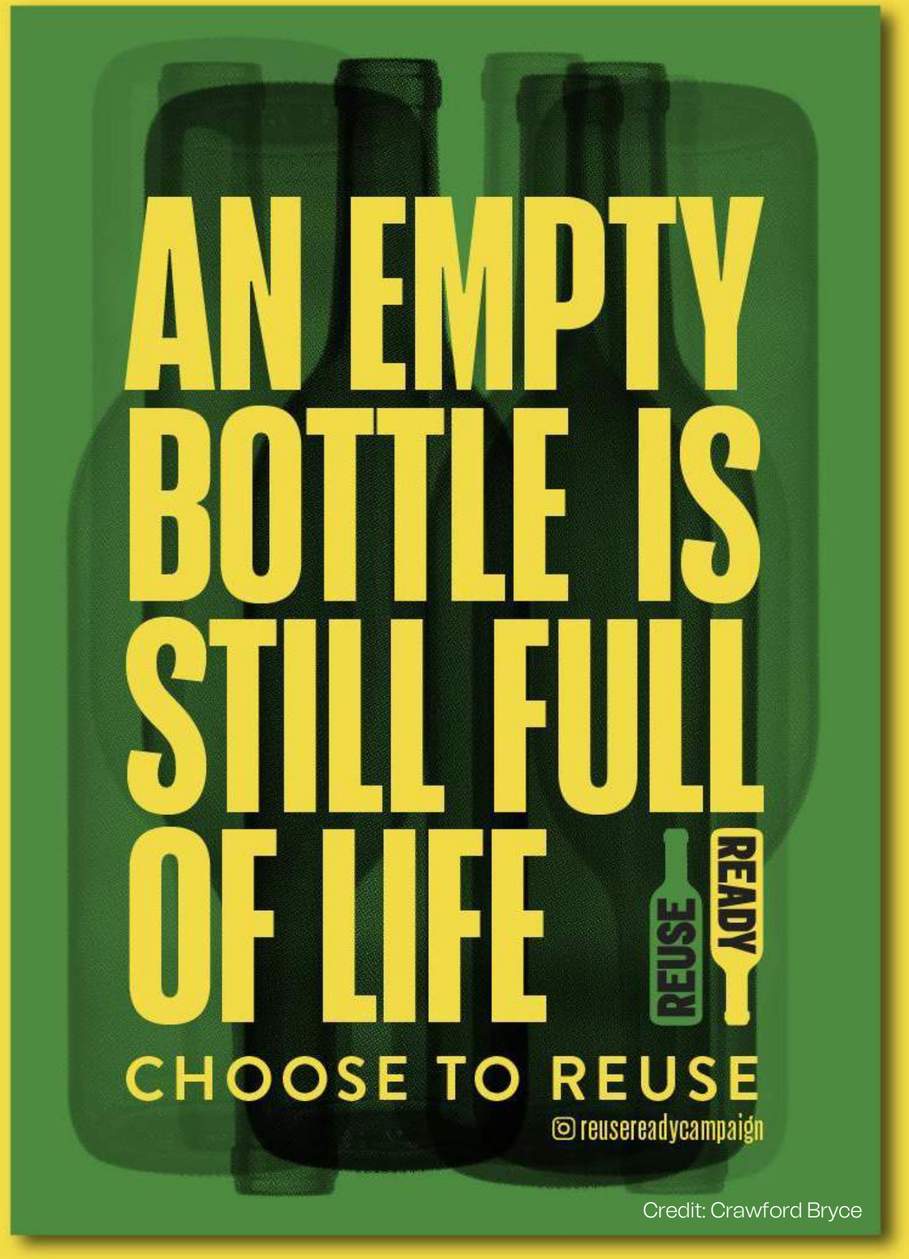
Reusable glass bottles are made from the same materials as single-use glass. They can withstand multiple washing and sterilization cycles, lasting at least 20 uses. Glass is naturally reusable, though, in some reuse schemes, bottles are specifically certified for this purpose.

ENVIRONMENTAL BENEFITS

- Reusing bottles 20 times can reduce carbon emissions by up to 80% compared to single-use alternatives. [5]
- Reuse cuts raw material use by 99% and reduces energy and water consumption by 60%. [5]

ENVIRONMENTAL CHALLENGES

- Effective reuse systems rely on local infrastructure and logistics.
- Consumer participation is critical—bottles must be returned to achieve the environmental benefits.



Credit: Crawford Bryce

Click in the image to learn more about the Reuse Ready Campaign

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REUSABLE BOTTLES ACTIONABLE STEPS:

- **Choose a used bottle**
  over a new one.
- **Collect and reuse bottles**
  directly at your winery and tasting room.
- **Reduce chemical treatments when washing**
  or use non-toxic options to lower the environmental footprint and keep biodegradability intact.
- **Implement Collection Systems**
  or join a local bottle collection network. If non-existent, work with other wineries or regional stakeholders to develop shared reuse programs.
- **Avoid embossing or screen printing**
  to ensure bottles can be cleaned and reused more easily.
- **Be Reuse-Ready:**
  When bottling your wine, ensure that your packaging (bottle, closure, label) is designed for reuse.
- **Avoid wax seals or non-removable labels**
  as they prevent the reuse of bottles and make recyclability more difficult.
- **Avoid Screw Caps with aluminum content:**
  If reusing bottles was not on your radar up to this very moment, choose to be reuse-ready!

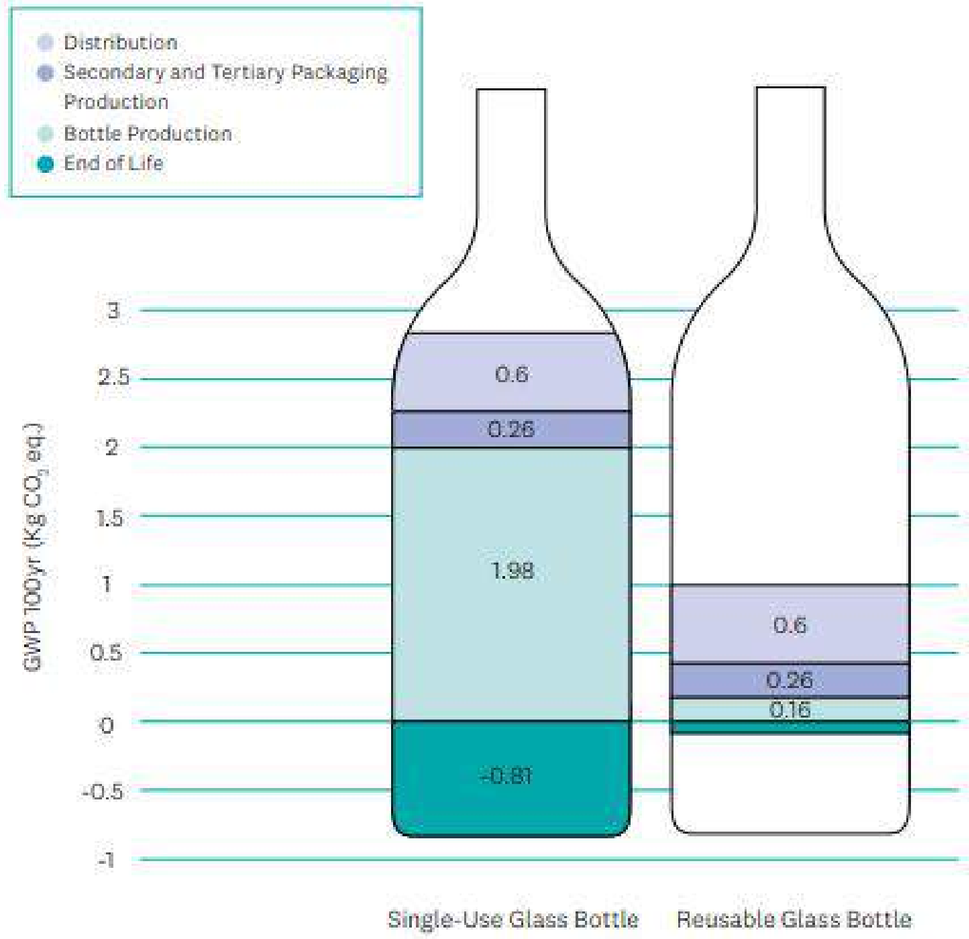
Innovators Shaping the Future OF REUSABLE WINE BOTTLES

DID YOU KNOW?

A refillable wine bottle can reduce the carbon footprint by up to 80% [5]

Companies/organizations like Sustainable Wine Solutions, Styria Bottle, La Tetue, Boutey, Oé for Good, Grafé Le Coq, Prior Lucas, City Winery, Barton Family Wines, Maison Chapoutier, Snowden Vineyards, Chateau Maris are working across different countries and in different ways to overcome reusable bottle systems challenges. Revino, a reusable wine bottle company in Oregon, went the extra mile and had its bottle "certified reusable" by the glass manufacturer.

By thinking beyond the closed-loop approach, La Bande Vert is launching a one-of-a-kind solution for the French Market: a marketplace for reused wine bottles. This could be your first stop on this journey, one that provides an easy way to access reused wine bottles.



Emissions by stage of life-cycle

Based on a 750cl wine Bottle (Zero Waste Europe 2020) [5]

Diana Snowden Seysses on GLASS AND REUSABLE BOTTLES

"As an oenologist/biologist, glass' inertia makes a glass bottle non-negotiable as a container. Wine is chemically reactive (not inert)". Reusable glass is a Zero-Waste option for wine and presents a natural opportunity for our industry"

Diana Snowden Seysses | Winemaker Domain Dujac and Proprieter and Snowden Vineyards

Adam Rack on REUSABLE BOTTLES

Rebuilding a reusable packaging program is difficult anywhere in the world, but the United States poses unique challenges. With bottle (and wine) supply coming from around the world, wide variations exist in glass wine bottles, and causing complexity in sorting and reusing standard glass.

Adam Rack | Co-Founder at Revino

Reused Glass Bottle

PRIOR LUCAS

BENEFITS:

- Reduces energy consumption.
- Reduces water consumption.
- Lowers the environmental footprint of wine.

CHALLENGES:

- Different bottle formats.
- Difficulty in mechanizing processes.
- Challenges with removing labels.
- No control over the weight of the bottles.
- Difficulty in removing capsules.
- Need for advanced technology for bottle sanitation.

"We all need to recognize that the planet doesn't have unlimited resources to sustain this level of consumption. Based on this premise, we must take action. In my case, among the various practices I have implemented to reduce my environmental impact, one of them is reusing wine bottles, which we know accounts for a significant part of the wine's ecological footprint."

Rui Lucas / Prior Lucas

Reusable Glass Bottle

REVINO

BENEFITS:

- A reusable bottle design shows consumers that the winery cares about sustainability.
- If collections are unavailable in end markets, we encourage our brands to provide resources on how consumers can support other types of reuse locally (coffee cups, food containers, ect.,) and how to find glass recycling locations near them. Only 31% of glass is recycled in the US.
- The bottles are 'eco' weight for the US market at 495 g yet durable enough for reuse. This is lighter than many 'premium' weight bottles while maintaining a 'premium' feel and look and offering sustainability benefits.
- By using a distinctive design, bottling operators can trust that glass is uniform and will not cause issues on high-speed bottling lines.

CHALLENGES:

- Wider adoption of reusable bottles is needed to bring collection services to other markets beyond concentrated wine regions and population centers due to the long transport distances in the US.
- Some wineries hesitate to use a shared bottle design. This is a new visual design in a slow-moving industry.
- Reusable bottles must be made to a very high standard to ensure they last.
- Rebuilding a reuse economy requires collaboration with a constant focus on the future opportunity for the industry.

"We had plenty to learn from failed attempts at reuse in the recent past. Due to incredible pressure to lightweight glass, connect with younger generation of consumers and 'Race to Zero' emissions, we believe now is the time for a paradigm shift in the 'generic' bottle market. The Revino team knew the support of the glass industry was integral to a viable long-term reuse system and found a strong manufacturing partner in O-I Glass. From the initial stages of development, Revino asked for feedback and 'buy-in' of Oregon's wine industry, developing a bottle design that wineries felt confident using, that could be sourced domestically and reused in a strong local supply chain. Over 75 wineries, primarily from the Pacific Northwest, participated in the design process to ensure interest and adoption from the time of bottle design. Local bottle deposit return system (DRS) operators provided feedback to ensure compatibility with AI based optical sorting equipment should collections expand to DRS systems using this type of processing equipment."

Adam Rack / Revino

Reuse System

LJ Crafted Wine

BENEFITS:

- Environmental: Our carbon footprint is significantly lower because traditional single-use bottles are the major contributor to the wine industry's carbon emissions.
- Economic: This model allows us to bypass costs associated with bottling, packaging, warehousing, and distribution.
- Customer Loyalty: Branded refillable bottles encourage customers to return to us for more wine.
- Minimal Investment: For winery tasting rooms and events, our system requires minimal start-up investment while promoting an eco-friendly message.
- **Customer Preference: Initially, we were concerned that customers might hesitate to buy high-end wines in refillable bottles. To test this, we bottled half of our first vintage in traditional 750ml corked bottles and offered them at the same price as the 1-liter refillable bottles because we saved on bottling and packaging costs. Customers overwhelmingly chose the 1-liter option, proving they were buying the wine, not the packaging! Since then, we have exclusively used refillable bottles.**
- Customer Satisfaction: Customers appreciate the concept and feel they are contributing to an authentic, eco-friendly initiative.

CHALLENGES:

- Barrel Weight: Full barrels weigh 270 kg, requiring a forklift or pallet truck for handling.
- Convenience: The model relies on repeat customers who find it convenient to return their bottles.
- Scaling: While the concept is difficult to scale, it is easy to replicate.
- Skills: Someone with a basic understanding of winemaking needs to be available on short notice.

"Since opening 8 years and 8 months ago, we have issued 13,942 new 1-liter bottles and sold 135,675 liters of wine. This means that each bottle has been reused an average of 9.7 times."

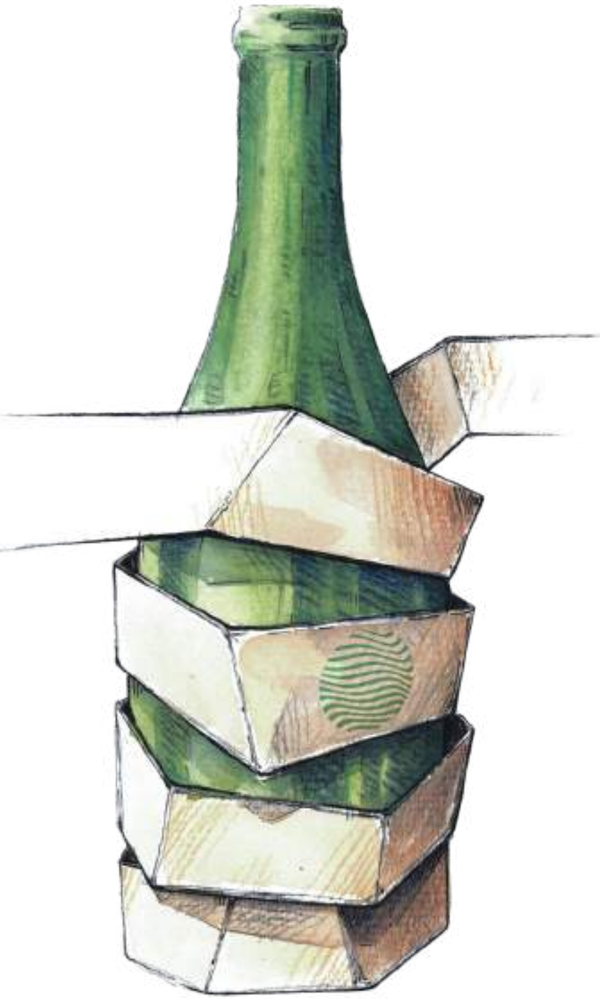
Lowell Juste / LJ Crafted Wines

Melissa Saunders MW on REUSABLE BOTTLES

"I see a great future in the ability to reuse glass that has already been used. I like to call it "vintage" glass. Unfortunately, we do not yet have a robust marketplace for vintage glass in the US at this time. This is in contrast to France, where companies like Eco in Pack are leading the charge in this space. Thankfully, I work with a number of French producers that are willing to explore bottling their wine in this vintage glass, reducing emissions and energy use by 79% and water use by 33%. To my mind, this is the future and I look forward to more options being available outside of France.

Through our partnership with Oè for Good, we are bringing best practices for importing wine in glass to live. The Oè bottles are optimized for reuse, in a standard shape, with wash off labels, no capsule, cork closure and shipped on the Grain de Sail sailboat in reusable crates, rather than disposable cardboard. We have a great recipe for reducing the environmental impact of packaging for wine. The missing ingredient is consumer willingness to bring the bottles back rather than throwing them away. Consumer motivation to shift from waste management rooted in the convenience of disposability will require an intense level of education. Until consumers truly understand that "recycling" is not enough and why, it will be the status quo."

Melissa Saunders MW | Founder and CEO at Communal Brands



I commit to:

#stopsingleusebottles

GOAL:

Reuse bottles for [_____ %] of my portfolio by the end of 2025.

STATUS:

[_____ %] of reused bottles in my portfolio in 2024.

Your Action

OUR COLLECTIVE IMPACT

Together, small actions lead to big results.

Company

Date

Signature

Send a screeshot of this page to:
together@portoprotocol.com

2. PET Containers

Lightweight, shatterproof, and recyclable—PET bottles are making waves as a more eco-friendly alternative to glass.

But do they really measure up? PET has its advantages in reducing emissions from transportation, but recycling limitations and microplastic concerns remain.

In this section we'll explore the following options:

- PET Bottle
- rPET Flat Bottle
- PET Keg

> "We (Casa Relvas) bottled our first wine in PET in 2012. It is a packaging that is fully adapted to a new type of consumption, particularly for young wines and those consumed outside the home. This material has an infinite molding capacity, allowing producers to create highly distinctive packaging for their products.".

Alexandre Relvas / CEO & Partner

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2.1 *PET* BOTTLE

PET bottles are a popular choice for mass-market wines, particularly for on-the-go and casual consumption.

COMPOSITION AND CHARACTERISTICS

PET bottles are made from Polyethylene Terephthalate, a lightweight, durable polymer widely used in beverage packaging. PET is flexible, colorless, and semi-crystalline in its natural state. It can be processed to range from semi-rigid to rigid offering good dimensional stability and resistance to impact, moisture, alcohols, and solvents.

ENVIRONMENTAL BENEFITS

- Fully recyclable.
- Lightweight design lowers transportation emissions and significantly reduces the carbon footprint.

ENVIRONMENTAL CHALLENGES

- Recycling is limited to a few cycles before the material degrades, leading to downcycling.
- PET is derived from fossil fuels.
- Improper disposal contributes to microplastic pollution.

ACTIONABLE STEPS:

- **Use innovative barrier technologies** to preserve wine quality.
- **Opt for single-material PET bottles** to improve recyclability.
- **Opt for local wood sources** to minimize transportation emissions and support regional economies.
- **Source recycled PET** content for bottle production, which can significantly reduce the environmental impact of the packaging.
- **Ensure that markets where you sell have PET recycling infrastructure.**

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PET Bottle

PIERRE CHAVIN

BENEFITS:

- PET bottles are much lighter than glass bottles, which lowers transportation costs and reduces the carbon footprint associated with logistics.
- PET is 100% recyclable, allowing the material to be reused multiple times in industrial processes.
- PET bottles are less fragile than glass, making them less likely to break, which reduces losses during transportation or in-store handling.
- Producing and transporting PET bottles requires less energy, contributing to a smaller carbon footprint.

CHALLENGES:

- Wine is often associated with tradition and elegance, which means PET bottles may be seen as less prestigious than glass bottles by some consumers.
- There are few manufacturers and limited bottling facilities for PET bottles.

"The consumers really accepted it (PET Bottle) in a great way. The wine sold in Norway is actually one of the top best sellers in the French rosé category. It competes with regular glass bottles. I must say that in 10 years, PET aesthetics has very much improved. Looking at the shelf, it is not easy to say, without touching the bottle, that it is not made of glass. Since it does not make any difference esthetically at first, it does not create any doubt in customers' mind. On some markets, it is important to consume in a sustainable way. Consumers, especially in northern Europe, totally understand the decision-making behind such packaging. They clearly see the impact it has when it comes to carbon emissions. On top of it, they are used to manage their waste. Putting a wine PET inside a recycling machine, and receiving a 1NOK benefit for this ecofriendly gesture is definitely very well perceived. For us, a product is not only the wine and the bottle. It is, of course, a full set concern: cork, label, ink, glue, metal in the foil, ... and wrapping packaging, and so on... We use FSC recycled paper for all our carton boxes. We want to guarantee solidity and stability for transport, and at the same time pay attention to details."

Mathilde BOULACHIN / Pierre Chavin

2.2 *Recycled (r)PET* FLAT BOTTLE

Recycled PET (rPET) is made from post-consumer PET products, offering a more circular approach to wine packaging. These lightweight, flat bottles challenge the inefficiencies of traditional bottles offering a lower carbon footprint and design.

COMPOSITION AND CHARACTERISTICS

rPET retains the strength and flexibility of virgin PET but reduces reliance on new plastic, supporting a closed-loop system.

ENVIRONMENTAL BENEFITS

- Reduces the need for virgin plastic and decreases energy consumption.
- Overall lower carbon footprint due to recycled content, lightweight and flat design resulting in transport efficiency.

ENVIRONMENTAL CHALLENGES

- rPET quality degrades after multiple cycles, leading to eventual downcycling.
- rPET is more prone to contamination during recycling, reducing quality.
- Improper disposal contributes to microplastic pollution.

ACTIONABLE STEPS:

- **Ensure that markets where you sell have rPETrecycling infrastructure.**
- **Educate consumers** to dispose of the bottle in appropriate recycling streams, by including clear messaging on the bottle and communication materials.
- **Ensure that labels, closures and caps are compatible** with PET recycling systems to avoid contamination.
- **Use recyclable materials for all packaging elements.**

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rPET Bottle

THE WINE SOCIETY

BENEFITS:

- The flat design and lightweight compared to glass (63g vs Wine Society glass average of 453g) of the bottle means significant carbon emissions savings can be made in relation to production, transport, and recycling.
- A standard pallet can hold 100 cases of these rPET bottles as opposed to 48 to 56 cases of standard glass bottles.
- 100% recycled plastic used in bottles and 100% recyclable. In the UK, this is possible through kerbside collection in 99% of local authority areas.
- Prevented Ocean Plastic options available (our two white wines are packaged in this option).
- Unlike glass, clear bottles contain a UV inhibitor thus reducing the likelihood of light strike affecting wine.
- Lower breakage rate than glass.
- Practical for picnics and festivals where glass is inconvenient and, in many cases, banned.
- Unlike cans and Bag in Boxes (BiB's), the 75cl size is understood by consumers and already fits into their lives.

CHALLENGES:

- Limited bottling options, particularly at small scale, limiting opportunities for trials and experimentation.
- Oxygen permeability over time. Oxygen scavengers slow this process but are still not suitable for the long-term maturation of wine.
- Skepticism from consumers around plastic being a "better" option than glass.
- Requires additional plastic in the form of closure and label. Both are recyclable with the bottle but are not previously recycled.
- Specific and limited options for label material and finish.
- Flat shape less stable in some settings.
- Less premium appearance than glass (particularly the flint bottles which appear slightly cloudy).

Whilst no independent research has yet been done to directly compare the full life-cycle emissions of a typical glass bottle with the plastic bottle we are trialing, publicly available studies suggest that carbon emissions for PET plastic bottles could be less than half the equivalent of glass bottles.

"We were delighted with the response to our rPET trial last year. Our trial volumes of four wines sold out well within our expected timeline and feedback from our members (customers) was largely positive. Following the trial of these bottles and a number of new Bag-in-Box wines, we surveyed purchasers and received over 1,300 responses. 72% were satisfied with the quality of wine from glass-free. Over 90% were likely to repurchase glass-free formats and 80% would recommend it to family and friends. In response to this, we have now added a permanent rPET option for four of our best-selling Society range wines as well as a gift pack of the four for Christmas.

Simon Mason / The Wine Society

Prof. Dr. Rainer Jung on CONTAINERS

"The container choice depends on several factors:

- If you have a wine that is consumed within a year, I'd say the best choice is the bag-in-box.
- For air travel, PET bottles make a lot of sense. We had a joint project with Lufthansa a few years ago, and they found that switching to PET bottles saved them hundreds of thousands of euros in fuel costs due to the reduced weight. When you hold the bottle, you hardly notice the difference in material.
- If a winery is able to take back, wash, and reuse bottles, that's a great option. However, this depends on how far the customers are from the winery and how long it takes to return the bottles. But it makes complete sense when you can reuse them multiple times."

Prof. Dr. Rainer Jung / Deputy Head of Department at Geisenheim University

2.3 *PET* KEG

PET kegs, made from the same material as PET bottles, are gaining popularity in hospitality settings as an alternative to traditional glass bottles and stainless steel kegs.
The weight of a keg is far less than the equivalent 32 heavy glass bottles drastically reducing the carbon footprint.

COMPOSITION AND CHARACTERISTICS

PET kegs are made from the same material as PET bottles, often with added barrier layers like Ethylene Vinyl Alcohol (EVOH) for enhanced oxygen resistance. Lightweight and durable, they are designed for bulk wine storage and transport, typically used as single-use containers in large-scale venues like bars and restaurants.

ENVIRONMENTAL BENEFITS

- Lower carbon footprint compared to traditional metal kegs.
- Lightweight design improves transport efficiency.

ENVIRONMENTAL CHALLENGES

- Multilayer structures complicate recycling.
- Single-use design limits the environmental benefits.
- PET is derived from fossil fuels.
- Improper disposal contributes to microplastic pollution.

ACTIONABLE STEPS:

- **Choose Mono-Material PET kegs** to improve recyclability.
- **Reuse where possible:** Set up collection systems to clean and reuse PET kegs.
- **Ensure local recycling infrastructure supports PET kegs.** So they don’t end up in a landfill.

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3. Metal Containers

Metal containers, such as aluminum cans, reusable aluminum bottles, and stainless steel kegs, are gaining traction in the wine industry, addressing the growing demand for ready-to-drink formats.

In this section we'll explore the following options:

- Cans
- Reusable Aluminum Bottles
- Staineless Steel Kegs

DID YOU KNOW?

Recycling a single aluminum can save enough energy to power a TV for three hours [6].

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3.1 *Aluminum* CANS

As the number of one-person households continues to rise, aluminum cans are gaining popularity. A growing trend, particularly in millennial and outdoor markets, they're popular for casual, on-the-go consumption. Often used for sparkling wines, rosé, and young whites or reds.

COMPOSITION AND CHARACTERISTICS

Aluminum cans are made from bauxite ore and typically feature a food-grade polymer lining (such as lacquer or epoxy) to prevent interaction between the wine and metal. Lightweight, corrosion-resistant and versatile, aluminum cans are ideal for single-serve,casual consumption.

ENVIRONMENTAL BENEFITS

- Infinitely recyclable, saving up to 90% of the energy needed to produce new aluminum.
- Lightweight, reducing transportation emissions and reduces carbon footprint.

ENVIRONMENTAL CHALLENGES

- Energy-intensive extraction from bauxite, which disrupts ecosystems and emits greenhouse gasses.
- Polymer liners complicate recycling.

ACTIONABLE STEPS:

Use Recycled Aluminum:
Reduce reliance on energy-intensive bauxite extraction by prioritizing recycled materials.

Check Local Recycling Infrastructure:
Confirm that regions where your wine is sold have adequate recycling infrastructure for aluminum.

Educate Consumers
by providing clear recycling instructions.

Choose BPA-Free or Eco-Friendly Linings
to avoid chemical contamination and simplify the recycling process. There has been research into more eco-friendly coatings, including bio-based or less toxic alternatives to traditional plastic linings.

Some companies are experimenting with recyclable coatings that have a smaller environmental footprint.

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Aluminum Can

TAYLOR'S PORT

BENEFITS:

- Significantly reduced carbon footprint compared to traditional glass bottles.
- Lower packaging costs and reduced shipping costs.
- Convenient and portable: easy to take to outdoor events such as picnics, hikes, or boat trips.
- The cans are recyclable, making waste management easier.
- Easy to open, with no need for special equipment (such as a corkscrew).
- Ideal for individual servings, reducing waste.
- Aligned with current consumption trends, meeting the growing demand for lower-alcohol beverages and single-serving options, perfectly suited for modern and more mindful lifestyles.
- An innovative way to attract new consumers to Port wine, breaking the strong seasonal association with Christmas and festive occasions, and promoting consumption throughout the year.

CHALLENGES:

- Consumer perception of canned wine as high-quality remains a barrier.
- Cans, although recyclable, use internal coatings that can be difficult to separate during the recycling process.
- Challenges in the premium wine market, where glass bottles are still strongly preferred due to image considerations.
- Difficulties negotiating listings with large retail chains, as they often require significant financial support, while the product's margin is relatively low.

"Since the launch of Taylor's Chip Dry & Tonic in a can, the reception has been surprisingly positive. Consumers love the convenience of having a premium ready-to-drink cocktail wherever they are, without worrying about preservation or needing any accessories. Moreover, the sustainable approach and individual servings align with current consumption trends, particularly for those seeking lower-alcohol options and greater practicality. This solution also allows us to bring new consumers into the world of Port wine, reducing its seasonality. This innovation reflects our commitment to mitigating environmental impact, while maintaining the quality for which we are renowned."

Tânia Oliveira | Taylors Port

3.2. *Reusable* ALUMINUM BOTTLES

COMPOSITION AND CHARACTERISTICS

Reusable aluminum bottles are lightweight, durable, and corrosion-resistant, with a food-grade liner to prevent any interaction with the wine. Designed for multiple uses, they provide an option that supports a circular economy by minimizing single-use packaging waste.

ENVIRONMENTAL BENEFITS

- Reusable, significantly reducing the need for virgin materials.
- Lighter than glass, making transportation more energy-efficient with a lower carbon footprint.

ENVIRONMENTAL CHALLENGES

- Energy-intensive extraction from bauxite disrupts ecosystems and aluminum production process emits strong greenhouse gasses.
- Requires an effective reuse system for collection and cleaning.
- Liner removal can complicate recycling.

ACTIONABLE STEPS:

- **Implement refill systems** to encourage bottle returns.
- **Ensure proper maintenance and cleaning** for extended use.
- **Educate consumers** on returning and reusing bottles to maximize the benefits.

DID YOU KNOW?

Extracting bauxite, the primary ore for aluminum, requires large-scale open-pit mining that disrupts ecosystems, causes deforestation, and results in significant soil and biodiversity loss. [7]

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Refillable Alumium Bottles

MALLARD POINT

BENEFITS:

- A complete closed loop / end to end system - No purchases of Single Use Bottle
- No manufacturing of new corks, caps or other closure for every newly made or recycled bottle - as the swing top is already attached.
- Wine tastes absolutely great!
- No air sacs or over-the-top packaging- (which is single-use) is required to protect the bottle when shipping.
- Super lightweight at 205g / bottle and will not smash if dropped!
- Unique and eye-catching against all other bottle types - a conversation starter.
- Is truly reusable. In B2B and B2C no other product exists to do both efficiently and with no breakages.
- 1 bottle works for Red, White, Rose, and Sparkling- so huge decrease in footprint.
- Easy for people to adopt. With no knowledge of our new concept we are at 61% returns rate.
- Where glass is an issue e.g. Events / Stadiums or for travel, this format has opened up new avenues for supply.
- No light strike issues.
- Aluminum properties of bottle keep the content chilled.
- Resealable so wine stays fresh if not finished.
- Exempt from DPS Charges.
- No cage closure needed for sparkling wine production which would be discarded. as single use by the consumer.

CHALLENGES:

- Attractive bottles - so losses / non returns as it is desirable!
- Postage cost back and incentive is all off the bottom line as retail won't take the bottles back.... yet.
- New unproven "technology" to retail , so a lot of work required to prove it works.
- No bottles out there to create a returns system. So you have to front load and purchase stock to create the ability to have bottles returning.
- Labeling lets down the loop. No labels without the plastic covering can survive the ice bucket. challenge. An easy peelable off (no residue) Without plastic coverings and compostable (if ending up in landfill) is yet to exist....!
- Some foaming can occur at filling - but more sophisticated fillers can deal with this.
- Putting swing tops on in a smaller scale is time consuming (there are machines that do this!) But means when filling sealing is quicker.

"To see no rival for glass bottles, and there footprint being if we were to use them the main culprit in our organization's desire to be a good guest on earth. Why keep manufacturing new? Why does so much recycled content never get recycled? We set 2 pillars of Pre existing and Reuse in our Unblinkered Solution to challenge what alcohol can be bottled in. To bottle better through reuse. From concept to reality as a producer, not a packaging firm, with an unwavering commitment to challenge the status quo, our now widely accepted and acknowledged creation stands at a 61% returns rate" in B2C and 98% in B2B.

Andrew Bamish | Mallard point

3.3. Stainless Steel KEGS

COMPOSITION AND CHARACTERISTICS

Stainless steel kegs are made from corrosion-resistant steel, typically containing chromium, nickel, and other alloys. Designed for reuse, they can last hundreds of cycles. Stainless steel kegs are chemically inert, preventing interaction with the wine and maintaining its quality.

ENVIRONMENTAL BENEFITS

- Highly reusable, replacing up to 26 glass bottles per keg.
- Fully recyclable.

ENVIRONMENTAL CHALLENGES

- Energy-intensive steel production and transport logistics due to weight.
- Ore mining and processing require large quantities of freshwater with high contamination risk.
- Requires a reverse logistics system for collection and cleaning.

ACTIONABLE STEPS:

Enhance Reusability Potential
by ensuring frequent reuse to offset their high initial environmental cost.

Set up reverse logistics
to collect and reuse kegs efficiently.

Optimize transport routes to reduce emissions.

Use eco-friendly cleaning systems
to reduce water and energy consumption.

Use reusable steel kegs in your tasting room.

Partner with Local Recycling Facilities:
When kegs reach the end of their life, ensure they're properly recycled.

Educate Customers and Partners:
Engage with distributors, retailers, and consumers to emphasize the environmental benefits of using steel kegs over traditional packaging; ensure that kegs are returned promptly for cleaning and reuse.

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Reusable Steel Kegs

TABLAS CREEK

BENEFITS:

- The stainless steel kegs are infinitely reusable and eliminate 100% of packaging.
- Each keg saves the cost of 26 bottles, capsules, corks, and labels, plus 2.1 cases worth of cardboard, as well as the costs of recycling those materials.
- We recouped the cost of the kegs and the systems in about a year.
- One keg takes up about half the storage space of the 2.1 cases it replaces.
- Kegs stay fresh essentially forever, which means less wasted wine from poured-out ends of bottles.
- No chance of corked wines.

CHALLENGES:

- Initial investment of keg dispensing systems starts around $10,000.
- The keg systems are fairly bulky and take up space and require power for refrigeration and nitrogen tanks for replacing poured wine.
- You need to estimate the amount of wine you're pouring as samples at bottling, which can be tricky.
- You need to account for inventory of both full and empty kegs and then allocate time to wash and sterilize the kegs before refilling.
- You don't have the bottle to present to customers (though it's easy enough to show them full bottles).
- After about 6 months, the wine in keg while still good starts to taste different from a wine bottled under cork.

"I can't think of any glass bottle that less justifies its costs than one that holds wine that never leaves the building in which it was made. Moving to kegs in our tasting room has been a great decision from all perspectives: wine quality, cost, waste, and convenience. The environmental benefits are great, and easy to explain to customers. We covered the costs of our initial investment in about a year. It's an idea I wish I'd had a decade earlier."

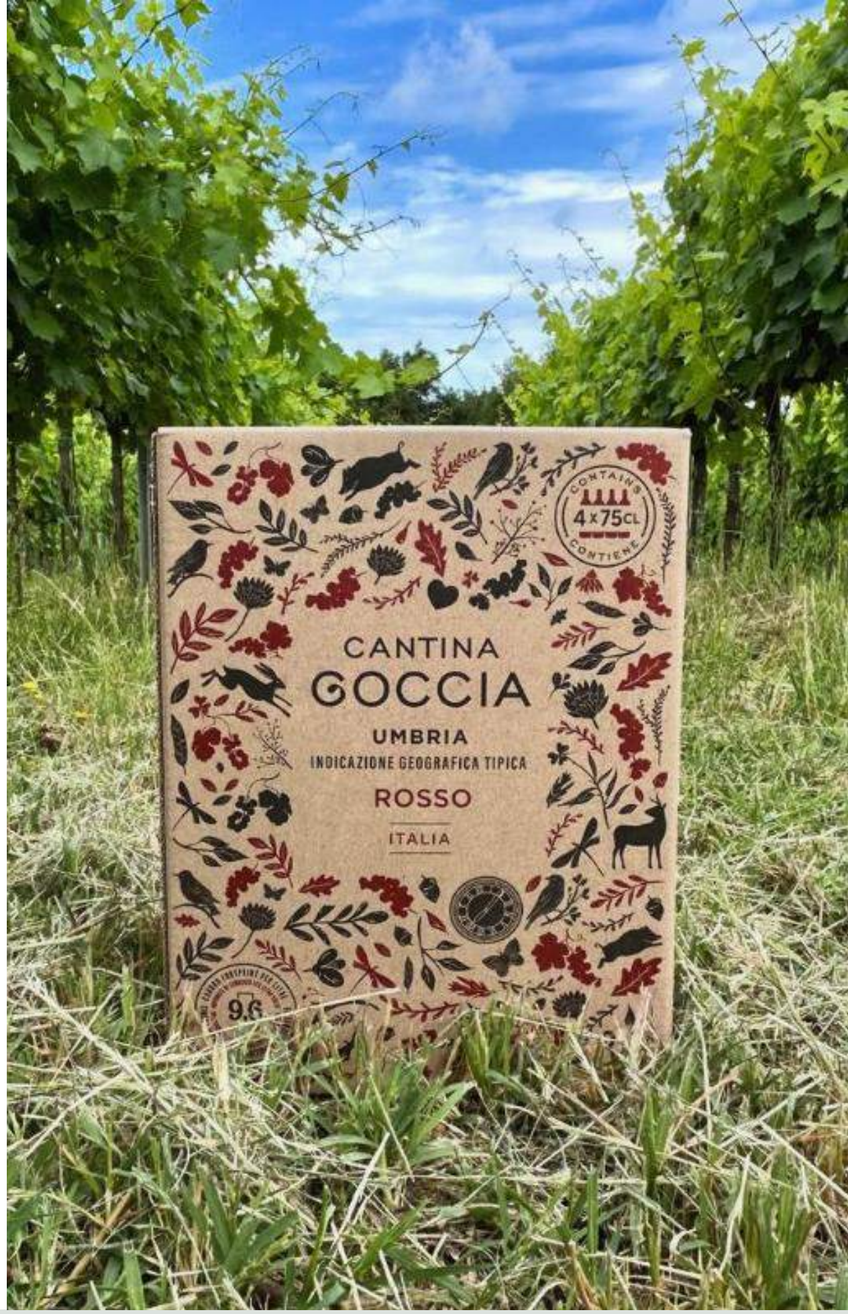
Jason Haas / Tablas Creek

4. Mixed Material Containers

Multi-material containers use a combination of materials to offer durability, barrier protection, and aesthetics, preserving wine quality and enhancing packaging strength. However, recycling and disposal can be complicated due to the mix of materials. Here are some common multi-material wine containers:.

In this section we'll explore the following options:

- Bag-in-Box
- Paper Bottle
- Tetra-Pac
- Wine Pouches
- Flexikegs



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4.1 Bag-in-Box (BiB)

COMPOSITION AND CHARACTERISTICS

BiB consists of an outer cardboard box, usually made from 50-100% recycled cardboard, and an inner plastic bag made of polyethylene (PE) and metallized polyester (PET). The outer box supports stacking and transport, while the inner bag preserves freshness by limiting oxygen exposure. BiB's inner bag can be made of different materials, depending on the manufacturer.

ENVIRONMENTAL BENEFITS

- BiB has the lowest carbon footprints of all container options.
- The outer cardboard box is easily recyclable.

ENVIRONMENTAL CHALLENGES

- Inner bags are difficult to recycle, especially multi-layered versions.
- Recycling potential depends heavily on consumers properly separating the multiple materials.
- Inner bag is made from fossil fuel-derived materials.
- Improper disposal can contribute to microplastic pollution.

ACTIONABLE STEPS:

Evaluate BiB Suitability
Ensure the wine is intended for short-term consumption, as BiB packaging is best suited for wines consumed within 6 to 12 months.

Choose recycled cardboard and mono-material inner bags
to optimize recyclability.

Conduct trials to assess shelf life and quality over time.

Communicate benefits to consumers
emphasizing its reduced carbon footprint and longer shelf life once opened.Provide clear recycling instructions.

Educate consumers
to do their part to optimize the environmental benefits of BiBs.

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Bag-in-box
TABLAS CREEK

BENEFITS:

- Much lower carbon footprint (an estimated 84% lower than 4 glass bottles).
- Savings both in packaging cost (fewer materials) and shipping cost (lighter weight).
- Takes up less space: roughly the same volume as two glass bottles, but contains the same volume as 4.
- Stays fresh after opening for 6 weeks or longer in your fridge.
- Lightweight and unbreakable and therefore portable.
- No special equipment needed, not even a corkscrew.
- Cardboard box is easily recyclable.
- There is now finally a filling partner in California (Infinity Bottling) that will do small custom runs of boxes if you ship the wine to them in bulk.

CHALLENGES:

- Consumer perception of boxes is still mostly that they're for cheap wines.
- The bag is plastic and essentially non recyclable in the United States.
- At the moment there are no mobile bottling lines that are capable of filling boxes.
- The bag has a higher oxygen permeability than a bottle, which means that shelf life is only 6-12 months.
- High end boxes are still a difficult category in wholesale/retail.

"It's been a revelation for us since we released our first boxed wine in 2022. That release sold out in four hours. And the demand has stayed strong, even as we've doubled our production in 2023 and doubled it again in 2024. People love the convenience of having a high quality wine in their fridge and pouring themselves a glass whenever they want without worrying the rest of the bottle will start to oxidize. We've found it very easy to turn customers onto this new packaging. The convenience and cost savings are the draw, and the environmental benefits are gravy."

Jason Haas / Tablas Creek

About Bag-in-Box
FROM OUR COMMUNITY

BENEFITS:

- Lowest carbon footprint compared with other single-use packaging types for wine by a mile.
- The potential for instant impact and cost reductions as switching to Bib does not require infrastructural changes as in the case with reuse schemes (bottles and kegs).
- Ancillary benefits, which include longer shelf life, better quality for less money due to its efficiencies, minimal waste for everyday wines that are not sparkling and do not benefit from long(er) term aging, and protection from glass and other dry goods shortages.

CHALLENGES:

- Negative perception of the Bib format: It is typically associated with cheap wine of lesser quality and lacks the cache of glass.
- Negative perception of plastic: The Bib format is often perceived as 'bad' for the environment because its liner is made of plastic.
- Misperception that glass is actually recycled in the US, that recycling is the most important factor when it comes to evaluating environmental credentials and an overall misunderstanding of what behaviors are truly beneficial for the environment.The biggest challenge, hands down, is the "throw-away" mindset of the modern world. We dispose of packaging without thinking about where it will go. Changing this behavior and shifting to reusability is a massive challenge as it requires a giant shift in behavior.

"BiB is the packaging type for wine with the lowest carbon footprint and significantly less waste than other packaging types for wine. One 3L Bib is the equivalent of four 750ml bottles. The Bib is lightweight, 75% recycled cardboard and a single plastic liner. Bib is ideal for wines to be consumed within a year. The majority of wine is consumed on the same day it is purchased."

Melissa Saunders / Communal Brands

4.2. Paper BOTTLE

The paper bottle reimagines the traditional wine bottle, offering a lighter-weight option with the added advantage of full-surface branding potential.

COMPOSITION AND CHARACTERISTICS

Paper bottles have a 94% recycled paper outer shell and a mono-material polyethylene pouch. The outer shell is lightweight and reduces raw material use, while the liner provides structural integrity.

ENVIRONMENTAL BENEFITS

- Paper bottles produce 84% fewer emissions than glass bottles.
- Use significantly less water during production compared to glass bottles.
- The outer paper shell is 94% recycled and recyclable. [8]

ENVIRONMENTAL CHALLENGES

- The inner plastic liner complicates full recyclability (though mono-material constitution has just been announced).
- Polyethylene pouches are made from fossil fuel-derived materials.
- Improper disposal of the liner can lead to microplastic pollution.
- Recycling depends heavily on consumers properly separating multiple materials.

ACTIONABLE STEPS:

- **Partner with local producers to share bottling equipment and costs.**
- **Use the bottle's print-friendly surface for bold branding and environmental messaging.**
- **Ensure consumers understand how to separate materials for recycling.**
- **Keep an eye out for dedicated tenders/bids** from international retailers interested in low-carbon packaging solutions. For example, Nordic monopolies are opening tenders specifically for paper-based packaging.
- **Explore emerging solutions** for biodegradable or compostable liners that could further reduce or eliminate plastic usage and simplify recycling.

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Paper Bottle
CANTINA GOCCIA

BENEFITS:

- The paper bottle is definitively a product for the future but it takes time to convince consumers .
- Much lower carbon footprint than glass and that alone is enough .
- No impact on the quality of wine which is consumed within 18 months from bottling .

CHALLENGES:

- Expensive relative to glass because less supply .
- Requires a different filling line, production is still based in UK and we need supply closer to us in Italy.
- Consumers still see bottle as a novelty because the glass industry has captured the narrative and convinced consumers that glass is fine because it gets “recycled “ & there is no penalty for packaging producers to be responsible for reducing their carbon footprint or a positive incentive for consumers to buy responsible packaging .

“Our decision to use the low carbon footprint paper Frugal bottle was simply because packaging in our industry accounts for on average more than 50% of our carbon footprint. This far exceeds the carbon footprint generated by the vineyard or the conversion of grapes into wine in the winery. Reducing the carbon footprint of our packaging is far easier and less costly for wine producers than reducing carbon footprint in the vineyard or winery. Packaging is the elephant in the room when it comes to the wine industry. Equally we were seeking a packing solution which was not high in PET.
Consumer acceptance has been mixed. Initially there was a lot of curiosity and certainly the more sustainability-conscious consumer is very accepting. To gain wider acceptance, consumers need to see this type of packaging for wines other than aged wines, as a norm and not a novelty. This requires education, wider distribution of this type of packaging and positive incentives for consumers to be more responsible in terms of the packaging they use and producers more responsible for high carbon footprint packaging that they use”.

Ceri Parke | Cantina Goccia

4.3. Wine POUCH

COMPOSITION AND CHARACTERISTICS

Made from multiple layers of plastic, primarily polyethylene (PE) or polypropylene (PP), with oxygen barrier layers like Ethylene Vinyl Alcohol (EVOH).

Pouches are flexible, lightweight, and minimize oxygen exposure, preserving wine quality.

ENVIRONMENTAL BENEFITS

- Low carbon footprint due to lightweight design.
- Uses fewer raw materials than traditional containers.

ENVIRONMENTAL CHALLENGES

- Multi-layered plastics complicate recycling and are often not processed in regular facilities.
- Pouches are made from fossil fuel-derived materials.
- Improper disposal can contribute to microplastic pollution.

ACTIONABLE STEPS:

Reduce material usage
while still ensuring product safety and quality.

Opt for Mono-Material Pouches
and explore fully recyclable options made from single materials (e.g., polyethylene).

Educate Consumers
Provide clear recycling instructions.

Advocate for Industry Innovation
Support industry initiatives aimed at developing and scaling alternatives to current multi-layer pouches.

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Pouches
CASA RELVAS

BENEFITS:

- Lightweight
- More efficient transportation: more wine transported by full-load (container or lorry).
- Portability: Consumer carries less weight buying the same amount of glass .
- It doesn't break.

CHALLENGES:

- Shorter shelf-life compared to bottle (9 to 12 months maximum).
- High price compared to other alternative packaging, such as BiB.
- Cost of personalization.
- Several materials in the same pack that require pre-print sorting.
- Delicate and slow filling line.

Casa Relvas packaged its first wine in a Pouch in 2019. This project didn't go as well as it could have due to the costs involved in this packaging

Alexandre Relvas | Casa Relvas

4.4 Tetra PAK

COMPOSITION AND CHARACTERISTICS

Tetra Pak uses 75% paperboard for structure, 20% polyethylene for moisture barriers, and 5% aluminum for oxygen protection. Its compact, lightweight design optimizes transport and storage.

ENVIRONMENTAL BENEFITS

- Lightweight and resource-efficient, Tetra Pak has a lower carbon footprint than most other container options.
- Recyclable in specialized facilities.

ENVIRONMENTAL CHALLENGES

- Multi-material structure (paper, plastic, aluminum) makes recycling difficult.
- May end up in landfills if proper recycling infrastructure is not available.
- Improper disposal can contribute to microplastic pollution.

ACTIONABLE STEPS:

- **Choose Tetra Paks made from certified paperboard by the Forest Stewardship Council (FSC)**
  or other responsible forestry certification.
- **Where possible, choose Tetra Paks that use bio-based polyethylene (plant-based plastic)**
  reducing reliance on fossil fuels and minimizing environmental impact.
- **Take advantage of Tetra Pak's lightweight structure**
  to optimize transportation routes, reduce fuel consumption, and lower carbon emissions.
- **Maximize storage efficiency**
  by using the stackable nature of Tetra Paks.
- **Educate consumers**
  on how to properly recycle Tetra Pak containers to minimize waste and microplastic pollution.

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4.5. Flexi KEGS

COMPOSITION AND CHARACTERISTICS

Flexikegs consist of two pouches—one for the beverage and one for gas—connected by metal components. Designed for multiple uses, 95% of the keg can be reused, with only the food-grade pouch being replaced.

ENVIRONMENTAL BENEFITS

- Flexikeg's outer shell can be reused 95% of the time, reducing raw material use.
- Lightweight design lowers shipping emissions.

ENVIRONMENTAL CHALLENGES

- Single-use polyethylene bags inside generate small but consistent waste.
- Recycling infrastructure may not support all materials used in Flexikegs.

ACTIONABLE STEPS:

- **Ensure Local Recycling infrastructure supports polyethylene processing.**
- **Maximize Reusability** by tracking usage and extending Flexikeg life cycle (100 uses).
- **Optimize Transport Logistics** leverage its collapsibility and light weight to reduce transportation emissions.
- **Communicate recycling and disposal instructions to customers.**

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Flexikegs

SUSTAINABLE WINE SOLUTIONS

BENEFITS:

- Plastic is all one material, and fully recyclable connectors are very simple to use and cheap.
- They can be hung up, put in a stand, laid on the floor or stacked in a pyramid.

CHALLENGES:

- There is 110g equivalent plastic for each fill.
- Need different connectors to most beer setups.
- They don't stack vertically, or roll, so handling and storage requires a diff.

Flexikegs are a fantastic alternative, or upgrade, to a single use plastic keg, marrying the benefits of simple dispense & outbound logistics seen with single use containers (with whichever gas setup the customer wants), with the reduction in waste. Compared to a traditional solid, steel keg, the return logistics is the absolute winner here, once empty they can be flattened, and several can be posted back together in a small efficient parcel. These are ideal for customers outside a normal direct delivery area where we'd be able to retrieve our traditional kegs easily, or for large events etec, as storing the empty keg takes up little room, and the end customer doesn't have the issue of disposing of lots of single use glass or plastic.

Muriel Chatel | Sustainable wine Solutions

ecoSIP Sample Containers

THE WINE SOCIETY

BENEFITS:

- Very low material use (2.5g), reducing CO_2 emissions, waste, and energy use.
- Light weight lowers transportation CO_2 emissions.
- Strong and damage-resistant, reducing product loss and need for extra packaging.
- Oxygen transfer rate similar to glass bottles with cork.
- Made mostly of aluminum, with minimal plastic (under 1.25g).
- Protects wine from light exposure.
- Better barrier than cans, avoiding reductive wine issues.
- One pallet holds up to 220,000 containers' worth of film.
- Allows full branding on the film or optional printed carton.
- Stable for preservative-free or low-SO_2 wines.
- Supports portion control for healthier drinking

CHALLENGES:

- Recycling of the film material is not available in all countries
- Single-use, no resealing, limited to single-serve portions.
- Difficult to open without scissors.
- Low consumer awareness.
- Could be seen as less premium than glass bottles.
- Consumer skepticism about the plastic component.
- Virgin Aluminium is currently used

As part of our overall move to lower carbon packaging, we have adopted ecoSIP containers as a carbon efficient way to get wine tasting samples to our members (customers). These have a lower footprint than miniature glass bottles and ship in a smaller and lighter package – with fewer breakages. We have been delighted with the quality of wines in the ecoSIP packaging with even fine wines showing well after some months in pack.

Simon Maison ! the Wine Society

Wine Packaging Beyond the Bottle

Materials Matter:

Glass, PET, and aluminum each have their Benefits and challenges. Glass is inert but heavy, energy-intensive to produce, and requires significant amounts of non-renewable sand, which impacts ecosystems through extraction. PET is lightweight and reduces transport emissions, but poses challenges in recycling, and improper disposal can lead to microplastic pollution that harms ecosystems. Aluminum offers infinite recyclability and lower transport costs due to its lightness, but extracting bauxite for aluminum production is energy-intensive and can lead to significant ecosystem disruption through mining.

Lightweighting and Design for Transport:

Reducing the weight of containers and optimizing packaging for transport (e.g., choosing lighter or more efficient designs) can drastically reduce carbon footprints, especially when paired with regional bottling.

Consumer Education is Crucial:

Clear labeling and consumer guidance can help ensure proper recycling or reuse of packaging, improving the environmental benefits of each material.

Recycling & Reusability Depend on Infrastructure

Materials like reusable glass, rPET, and aluminum need the right infrastructure to achieve their full environmental potential. Consumer participation and efficient systems are key to maximizing reuse and recycling efforts.

Primary Packaging Impacts:

Wine packaging is more than just bottles. Understanding the role of primary packaging (containers, labels, closures) is critical in balancing environmental impact and product protection, amongst other factors..

Actionable Steps

Work with suppliers to increase recycled content, lightweight containers, optimize packaging for reusability and recyclability, and push for better recycling infrastructure.

CONTAINERS SUMMARY

TYPE	MATERIAL	Environmental Benefits	Environmental Challenges	Practical Steps
Single-Use Glass	Sand, Soda Ash, Limestone	100% recyclable, no leaching.	Heavy, high carbon footprint.	Optimize transport, encourage recycling.
Reusable Glass	Sand, Soda Ash, Limestone	Reusable, cuts emissions.	Collection infrastructure needed, heavy.	Implement collection/washing systems.
PET Bottles	Polyethylene Terephthalate (PET)	Lightweight, lower transport emissions.	Limited recyclability, fossil fuel-based.	Use for short-term, casual wines.
Recycled PET (rPET)	Recycled PET	Low carbon footprint, reduces virgin plastic.	Degrades with cycles, contamination risk.	Emphasize recycled content for eco branding.
PET Kegs	PET + Oxygen Barriers	Reduces packaging waste, lightweight.	Difficult to recycle, single-use waste.	Target large-scale venues, consider take-back.
Aluminum Cans	Aluminum + Polymer Coating	Fully recyclable, lightweight.	Energy-intensive production, coatings complicate recycling.	Use for single-serve, promote recycling.
Stainless Steel Kegs	Steel + Chromium (10.5%)	Highly reusable, recyclable.	Energy use for cleaning, heavy.	Set up return and refill systems.
Bag-in-Box (BiB)	Cardboard + Plastic (PE, PET, EVOH)	Low carbon footprint, efficient for transport.	Hard to recycle multi-layer plastic.	Use for bulk, casual wines, ensure recycling info.
Paper Bottles	Recycled Paperboard + Plastic (PP, PET)	84% fewer emissions than glass, recyclable shell.	Inner liner complicates recycling.	Target eco-conscious markets, educate on disposal.
Tetra Pak	Paperboard + Polyethylene + Aluminum	Lightweight, low carbon footprint.	Complex recycling, limited facilities.	Use for short-term, ensure recycling info.
Flexikegs	Metal Sheath + Recyclable Plastic (PE)	Reusable, collapsible for transport.	Varies by recycling infrastructure.	Use for large venues, promote reusability.
Wine Pouches (Flexible)	Polyethylene or Polypropylene + EVOH	Lightweight, low transport emissions.	Multi-layer, hard to recycle.	Ideal for casual use, add disposal instructions.

Did you KNOW?

Eurostat has calculated that individual EU inhabitants generated an estimated 177.9kg of packaging waste in 2020.

Packaging is the source of 40% of the planet's plastic waste. [9]

Recycling steel saves 72% of the energy needed for primary production (i.e., 4,697 kWh per tonne). [12]

Producing one ton of raw aluminum results in up to four tons of toxic waste, which has a distinctive red color due to the iron-rich compounds it contains. [10]

Recycling plastic takes 88 per cent less energy than producing plastics from new raw materials [11]

5. BULK SHIPPING

Bulk wine shipping, which involves transporting large volumes of wine in specialized containers to be bottled at the destination, has a significant impact on lowering the carbon footprint of wine.

These containers, while essential for efficient logistics, come into direct contact with the wine which is why we classify this option as primary packaging.

In this section we'll explore:

- Flexi Tanks
- ISO Tanks
- Intermidiate Bulk Containers

Back to containers index

DID YOU KNOW?

Shipping in bulk and bottling at the destination market saves up to 40% of the carbon footprint. [13]

5.1 *Flexi* TANKS

COMPOSITION AND CHARACTERISTICS

Flexitanks are single-use containers made from flexible polyethylene or polypropylene, designed to fit inside standard shipping containers and hold 20,000–24,000 liters of liquid.

ENVIRONMENTAL BENEFITS

- Their lightweight design reduces transportation emissions, and they require minimal additional packaging for transport.

ENVIRONMENTAL CHALLENGES

- Flexitanks are typically single-use, contributing to plastic waste, and their recyclability varies by region.
- Improper disposal contributes to microplastic pollution.
- They're derived from fossil fuels.

5.2 *ISO* TANKS

COMPOSITION AND CHARACTERISTICS

ISO tanks are reusable containers made from stainless steel, capable of carrying around 25,000 liters of wine, with high durability for long-term use.

ENVIRONMENTAL BENEFITS

- ISO tanks are reusable over multiple trips, significantly reducing the need for new material production.
- Long lifespan.

ENVIRONMENTAL CHALLENGES

- They are energy-intensive to produce due to their stainless steel construction.

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Chris Smith on BULK SHIPPING

The Lanchester Group is a pioneer of renewable energy and comprises businesses including Lanchester Wines and Greencroft Bottling.

Greencroft Bottling, which is predominantly powered by renewable wind and solar energy generated by our on-site wind turbines and solar panels, is where all bulk wine shipped by the group is filled. 90% of wine bottled at Greencroft Bottling arrives via North East ports which minimizes road travel time, and therefore reduces CO2 per journey:

- Saves around 45% in carbon emissions using north-eastern ports compared to transporting by rail from the south of England.
- Saves 68% in carbon emissions compared to bringing products by road to Greencroft Bottling from Felixstowe.

Shipping wine in a Flexitank can prove advantageous in comparison to shipping in bottles, the most obvious benefit being you can transport 2.5 times the volume shipped per container. With this comes a significant win on the environmental front with CO2 savings of up to 38%. Our transport partner Hillebrand Gori worked it out as approximately 2kg of CO2 per km travelled. Using this calculation, in 2023 Greencroft Bottling's customers combined saved 124.5 million kg CO2 shipping wine in bulk from global ports to Durham.

There's a quality benefit too. Depending on where the wine is shipped from, the journey to the UK could be as long as nine weeks, during which the climatic conditions can be extreme, causing the temperature of the wine to vary from 7 ^{O}C (45 ^{O}F) to 32 ^{O}C (90 ^{O}F). However, if the wine is transported in a 24k/26k litre FlexiTank, the variation of the wine's temp is vastly reduced compared to in a bottle due to the sheer volume of liquid.

Chris Smith / Renewables Manager at The Lanchester Group

5.3 *Intermidiate Bulk* CONTAINERS

COMPOSITION AND CHARACTERISTICS

IBCs are smaller reusable containers made from plastic or metal frames with plastic liners, typically holding around 1,000 liters, suitable for shorter distances or domestic transport.

ENVIRONMENTAL BENEFITS

- Their reusability reduces the need for frequent new container production, and they offer flexibility for smaller shipments.

ENVIRONMENTAL CHALLENGES

- Due to their smaller capacity, more trips are required for long-distance transport, increasing overall emissions.
- Plastic liners improper disposal contributes to microplastic pollution.

GENERAL ACTIONABLE STEPS:

Optimize Transport Conditions
by investing in containers with reliable temperature control to ensure quality during transport.

Choose Reusable Options
whenever possible, reducing material waste.

Consider the lifecycle impact
of the chosen container and prioritize those that align with environmental goals.

Partner with wineries in different regions
to establish mutual agreements for bottling at each other's facilities, improving efficiency in various markets.

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Bulk Shipping
DOMAINE BOUSQUET

BENEFITS:

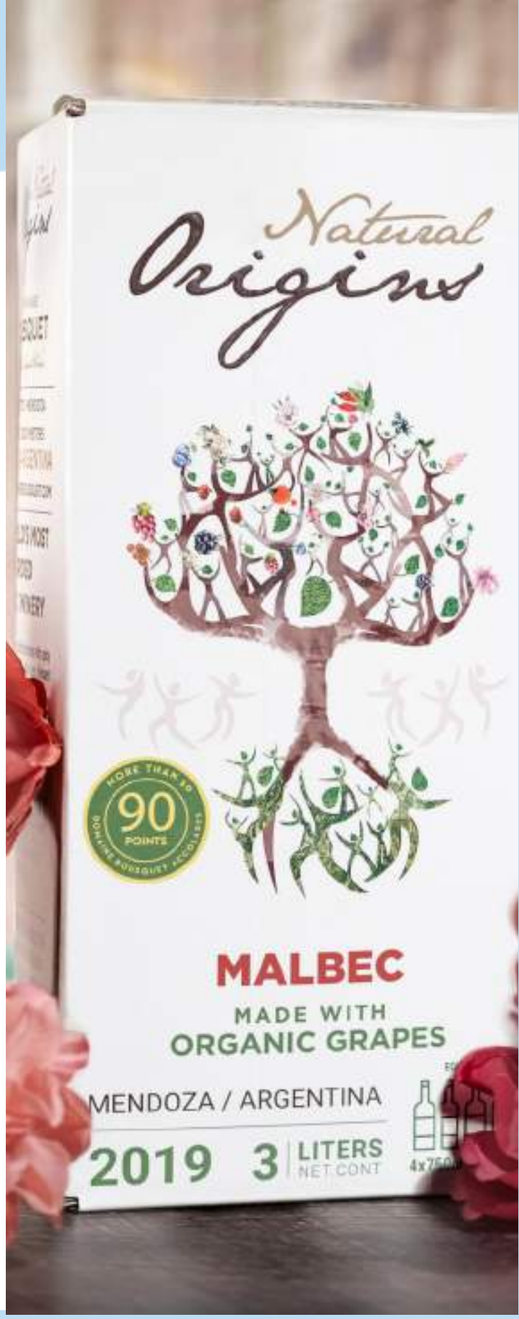
- Bulk transportation is significantly more efficient in terms of space utilization and also reduces the need for additional national transportation to procure products.
- Currently, 30% of our wines are sent for bottling or filled into various types of packaging, tailored to local market demands and the recyclability of those packaging materials.
- A standard 20-foot container can transport only 10 pallets of seventy 9L boxes, equivalent to just 6,300 liters of wine. In contrast, the same container size can hold up to 24,000 liters when using a flexitank.
- This means we avoid three additional container trips every time we ship using a flexitank. As a result, this method cuts our transportation-related carbon emissions in half, making it the most efficient way to transport wine.
- Furthermore, bulk shipping offers flexibility, enabling us to use the most suitable and recyclable packaging at the destination.

CHALLENGES:

- Recycling the bags are more feasible in regions with advanced plastic recycling systems but may be difficult in areas with limited infrastructure.
- Contaminated flexitanks (e.g., residual wine or other liquids) may require cleaning before recycling, which adds complexity and cost.
- Integrate a system for reusable flexitanks to improve the circularity of this kind of chain.
- Infrastructure Requirements: Requires specialized facilities for filling and emptying the flexitank.
- Perception Issues: Bulk shipping may be seen as lower quality compared to bottled wine

"Shipping wine in bulk using flexitanks opens up significant opportunities for our winery. It allows us to reduce our carbon footprint, minimize packaging waste, and deliver wine to markets more cost-effectively. With the ability to transport 24,000 liters per container, we maximize efficiency while maintaining the quality our customers expect. This approach also offers the flexibility to bottle in destination markets, enabling the use of alternative packaging solutions better suited for reuse or recycling, tailored to the preferences and infrastructure of each region."

Anne Bousquet / Domaine Bousquet



Hexagon-shaped bottles, Ecototes, and the Green Gen Flax Bottle are just a few of the emerging innovations in the container market.

This is a living document, and we'll continue to update you on these exciting new options.

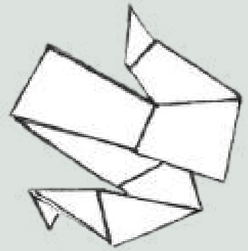
For now, let's move on to the other key components of wine's primary packaging: closures, capsules, labels, and inks.

Wine Closures

Choosing the right wine closure is not only essential for preserving flavor; it's also an opportunity to make thoughtful choices that align with environmental goals. Each type—natural cork, screw caps, and synthetic options—carries distinct environmental impacts, recyclability, and carbon footprint considerations.

In the marketplace, many closure options are patented by specific companies, offering unique compositions, characteristics, and performance benefits.

> "Closures play a critical role in bottle recyclability"
>
> Prof. Dr. Rainer Jung / Geisenheim University



WINE CLOSURE TYPES

- Natural cork
- Agglomerated cork
- Technical Cork
- Screw Cap
- Crowncap
- Glass Stopper
- Bio-Based Synthetic Closure
- Synthetic Stopper
- Swing Top
- T-Stopper
- Summary Table

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1. CORK

Cork, a wine closure choice dating back to ancient amphorae, is rooted in a rich environmental and cultural legacy. Beyond sealing wine bottles, the cork oak tree offers essential ecological benefits: it stabilizes soil, enhances water retention, and provides a natural barrier against desertification. Mediterranean cork oak forests, with one-third in Portugal (spanning roughly 720,000 hectares), are biodiversity hotspots teeming with life.

With its unique chemistry, cork is impressively versatile—lightweight, elastic, impermeable, insulating, fire-resistant, and sustainable. Harvested from the bark of cork oaks every 9–12 years without harming the trees, cork is a renewable resource that maintains biodiversity and offsets carbon, making it an eco-friendly choice for wine closures.

In this section we'll the explore the following options:

- Natural Cork
- Agglomerated Cork
- Technical Cork

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DID YOU KNOW?

According to a study conducted by PricewaterhouseCoopers for Amorim Cork, a natural cork stopper has an average carbon balance of approximately -288g.

1.1 *Natural* CORK

COMPOSITION AND CHARACTERISTICS

Natural cork closures are sourced directly from the bark of cork oak trees, offering a fully renewable and biodegradable option for wine.

While some natural corks are left completely unaltered, others are colmated—filled with cork dust and a small amount of adhesive to smooth out surface imperfections. Both options retain cork's traditional qualities, though colmated corks have slightly reduced biodegradability due to the adhesive used.

ENVIRONMENTAL BENEFITS

- Carbon Positive, helping to offset the carbon footprint of glass.
- Naturally biodegradable, compostable and recyclable. Can be repurposed into products like flooring or insulation.
- No deforestation - Cork oaks are not cut down.
- Cork Forests are biodiversity hotspots supporting ecosystems.

ENVIRONMENTAL CHALLENGES

- Cork's reliance on geographically restricted oak forests limits its availability.
- Cork collection circuits for recycling are not always available.

ACTIONABLE STEPS:

- **Encourage cork recycling programs** to extend its life cycle, since it can be repurposed for various products.
- **Opt for FSC-certified cork to ensure sustainable forestry practices.**
- **Educate consumers** on the ecological importance of cork forests to support their preservation.

DID YOU KNOW?

The cork industry is unique among forestry industries because it doesn't require trees to be harmed during cork harvest or cut down.

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1.2 *Agglomerated* CORK

COMPOSITION AND CHARACTERISTICS

Agglomerated corks are made from compressed cork granules rather than solid pieces of natural cork. They're bonded with food-grade adhesives. These are typically used for wines with shorter aging periods.

There are different types in the market, varying in performance.

ENVIRONMENTAL BENEFITS

- Promotes material efficiency by using leftover cork.
- Some biodegradability remains, even with adhesives.

ENVIRONMENTAL CHALLENGES

- Synthetic adhesives may hinder full biodegradability.
- Recycling limitations due to adhesives.

ACTIONABLE STEPS:

- **Opt for agglomerated cork for shorter-lifespan wines.**
- **Support cork recycling initiatives,** where agglomerated corks can be collected and repurposed.
- **Ensure that the adhesives are environmentally friendly** Opt for bio-based or low-impact glues.
- **Choose products with a higher percentage of natural, biodegradable components.**

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1.3 *Technical* CORK

COMPOSITION AND CHARACTERISTICS

Technical corks are engineered closures made by combining natural cork granules with a binding agent, often a food-grade polymer or adhesive. These cork granules are derived from leftover bark material during the production of natural corks, ensuring maximum use of the raw cork oak resource. Depending on the manufacturing process, they may also include micro-agglomerated cork or other treated cork composites.

ENVIRONMENTAL BENEFITS

- Usage of cork granules, a renewable resource, reducing the need for new raw materials and repurpose leftover cork materials, minimizing waste in the cork industry.
- Advanced technical corks like Diam prevent cork taint, helping reduce wine spoilage and associated resource waste.

ENVIRONMENTAL CHALLENGES

- Advanced corks like Diam require extra energy and resources due to treatments like TCA removal and microsphere addition.
- Adhesives and microspheres can reduce biodegradability and complicate recycling, increasing landfill waste if not handled through specialized programs.

ACTIONABLE STEPS:

Opt for technical corks made from sustainably harvested cork forests certified by bodies like the Forest Stewardship Council (FSC).

Engage in Cork Recycling Initiatives: Encourage participation in cork recycling programs to manage disposal responsibly, helping to offset some of the end-of-life environmental impacts.

Stay Informed on Eco-Friendly Innovations: Look for advancements, such as biodegradable adhesives or improved recycling options, that make technical corks even more sustainable in the future.

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DIAM
BROOKS WINE

BENEFITS:

- DIAM actively has measures in place throughout their manufacturing process such as limiting energy use and recycling cork by products such as dust that help to reduce their carbon footprint.
- DIAM has a thorough long-term plan to continue to improve its sustainability impact, which is not at the forefront of many packaging companies' philosophies or plans.
- There are multiple useful life ranges for their cork products, allowing us to put a cork in a bottle that matches the ageability of the wine.

CHALLENGES:

- DIAM does cost more than most corks, but we have always been willing to use our financial resources to support partners who share our common short-term and long -term philosophies for sustainability.

> In 2018 we moved from regular cork to the DIAM cork for a few reasons. At the time, while we had little TCA problems, their product eliminates TCA as an issue preventing waste of wine and packaging should a bottle have TCA. We have always supported cork because it is a natural product.

Janie Heuk I Brooks Wine

2. METAL

Metal closures, like aluminum screw caps and crown caps, are popular for their durability, light weight, and recyclability. Often used for wines meant to be enjoyed young, they provide a strong seal and are easy to recycle, making them an eco-friendly choice.

In this section, we'll explore the following closures:

- Screw Cap
- Crown cap

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2.1 *Screw* CAP

COMPOSITION AND CHARACTERISTICS

Made from aluminum with a plastic lining to ensure an airtight seal. Offers excellent wine preservation, particularly for fresh, young wines.

ENVIRONMENTAL BENEFITS

- Aluminum is fully recyclabile and lightweight, reducing transport emissions.
- Eliminates cork taint, ensuring no wine spoilage and reducing waste.

ENVIRONMENTAL CHALLENGES

- Inner plastic linings complicate recycling.
- Energy-intensive and bauxite mining extraction impacts ecosystems.
- When discarded in a landfill, it can take hundreds of years to decompose.

ACTIONABLE STEPS:

- **Opt for screw caps made from recycled aluminum.**
- **Explore eco-friendly liners to improve recyclability.**

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2.2 *Crown* CAP

COMPOSITION AND CHARACTERISTICS

Metal with a plastic or rubber seal, commonly used for sparkling wines.

ENVIRONMENTAL BENEFITS

- Metal is recyclable and lightweight, reducing transport emissions.

ENVIRONMENTAL CHALLENGES

- Mixed materials (metal and plastic) compromise recyclability.

ACTIONABLE STEPS:

Source crown caps made from recycled materials
and improve consumer education on proper disposal.

Implement a Recycling Plan,
ensuring collection and recycling properly by partnering with facilities that can handle both components.

Consider Alternatives
for regions with limited recycling capabilities, explore more easily recyclable or biodegradable closures.

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3. OTHER MATERIALS

Metal and mixed-material closures bring durability and versatility to wine packaging. From aluminum screw caps to composite stoppers, these closures offer a range of benefits, including reusability and airtight sealing. Yet, their environmental impact varies widely depending on materials and recyclability, making them a key area to consider when assessing sustainable choices in wine packaging.

In this section, we'll explore the following closures:

- Glass Stopper
- Bio-Based Synthetic Closure
- Synthetic Stopper
- Swing Top
- T-Stopper

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3.1 *Glass* STOPPER

COMPOSITION AND CHARACTERISTICS

Made from glass with a plastic or rubber seal, often used for premium wines.

ENVIRONMENTAL BENEFITS

- Glass is fully recyclable, and inert, preventing contamination.
- No risk of cork taint, ensuring minimal spoilage and waste.
- Resealable, encouraging reuse and reducing the need for disposable wine stoppers.

ENVIRONMENTAL CHALLENGES

- The plastic or rubber seal can compromise recyclability.
- Higher emissions due to heavier weight of glass.

ACTIONABLE STEPS:

- **Promote the recycling of both the glass stopper and its components.**
- **Encourage the development of biodegradable or fully recyclable seals** to enhance the environmental benefits of the closure.

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3.2 *Bio-Based* SYNTHETIC STOPPER

COMPOSITION AND CHARACTERISTICS

Plant-based closures are evolving and emerging, with the most widely adopted options being sugarcane-based synthetic corks like Nomacorc, due to their availability, performance, and lower carbon footprint.

ENVIRONMENTAL BENEFITS

- Bio-based (sugarcane) material reduces carbon footprint; Sugarcane absorbs CO2 as it grows, making it carbon-positive.
- Recyclable in specific facilities.
- Sugarcane is a renewable source.

ENVIRONMENTAL CHALLENGES

- While designed to be recyclable, many recycling facilities are not equipped to handle plant-based polymers, limiting its end-of-life processing in certain regions.

ACTIONABLE STEPS:

Encourage Proper Recycling and partner with recycling facilities.

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3.3 *Synthetic* STOPPER

COMPOSITION AND CHARACTERISTICS

Made from plastic polymers, synthetic corks replicate the look and feel of natural cork.

ENVIRONMENTAL BENEFITS

- Synthetic corks eliminate the risk of cork taint (TCA contamination), preventing wine spoilage and reducing waste from spoiled products.

ENVIRONMENTAL CHALLENGES

- Made from fossil fuels.
- Limited recyclability, especially in regions without suitable facilities.
- Improper disposal contributes to microplastic pollution.

ACTIONABLE STEPS:

- **Opt for plant-based synthetic corks** to reduce reliance on fossil fuels.
- **Encourage recycling initiatives** where synthetic corks can be collected and repurposed.
- **Opt for (emerging) synthetic stoppers with a high percentage of recycled content.**

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3.4 *Swing* TOPS

COMPOSITION AND CHARACTERISTICS

Swing tops combine glass, metal, and plastic or rubber, with a lever mechanism that creates an airtight seal. They're durable, resealable, and often found on reusable bottles, ideal for carbonated beverages.

ENVIRONMENTAL BENEFITS

- Designed for multiple uses and paired with reusable bottles, help reduce waste.
- Most components are recyclable if separated properly.
- Materials like glass or ceramic extend product life cycles.

ENVIRONMENTAL CHALLENGES

- The combination of materials —metal, glass, and plastic— complicates recycling .

ACTIONABLE STEPS:

Promote swing top bottles
as part of a reusable packaging system, especially in tasting rooms and on-premise venues where they can be refilled.

Improve Recycling
by working with recycling facilities to ensure that all components can be separated and properly processed.

Focus on Local Transport:
Given their weight, use swing top bottles for local markets to reduce the transportation footprint.

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3.5 T-STOPPER

COMPOSITION AND CHARACTERISTICS

A cork or synthetic cork body with a plastic, wood, or metal top.

ENVIRONMENTAL BENEFITS

- Reusable, and partially recyclable depending on the material.

ENVIRONMENTAL CHALLENGES

- Recyclability limitations due to mixed materials.
- Improper disposal can contribute to microplastic pollution.

ACTIONABLE STEPS:

- **Opt for T-stoppers with natural cork components and biodegradable** or easily recyclable tops (e.g., wood or metal).
- **Encourage proper disposal and recycling** focusing on material separation.
- **Consider partnering with suppliers to source eco-friendlier versions of T-stoppers using renewable or recycled materials.**

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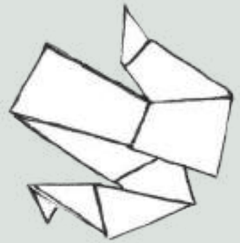
CLOSURES SUMMARY

CLOSURES	MATERIAL	PROS	CONS	COMMON USE
Natural Cork	Cork Bark	Biodegradable, carbon-positive, renewable, supports biodiversity.	Limited availability, susceptible to cork taint (TCA).	Premium and aging wines.
Agglomerated Cork	Granulated Cork	Uses by-products, biodegradable in some contexts, cost-effective.	Adhesives limit biodegradability, shorter lifespan.	Inexpensive wines, short-term aging.
Technical Cork	Cork Granules + Synthetic	Consistent, cork taint-free, partially recyclable.	Synthetic components complicate recycling, less biodegradable.	Mid-range wines, wines needing oxygen management.
Screw Cap	Aluminum	Fully recyclable, lightweight, prevents spoilage.	Plastic liner complicates recycling, lacks traditional appeal.	Inexpensive to mid-range wines.
Crown Cap	Metal + Plastic Liner	Inexpensive, airtight, recyclable.	Plastic liner complicates recycling, potential landfill impact.	Sparkling wines, casual wine styles.
Bio-based Synthetic Stopper	Sugarcane-based Polymers	Low carbon footprint, controlled oxygen ingress, renewable materials.	Limited recycling infrastructure, contamination risks in recycling.	Mid-range to premium wines.
Glass Stopper	Glass + Synthetic Seal	Reusable, fully recyclable, aesthetic appeal.	Expensive, heavier, requires synthetic seal which complicates recycling.	Premium wines, short- to medium-term consumption.
Synthetic Cork	Plastic Polymers	No cork taint, consistent quality, some plant-based options available.	Non-biodegradable, plastic pollution, limited recyclability.	Short-term wines.
Swing Top	Glass + Metal + Rubber	Resealable, reusable, durable, nostalgic appeal.	Complex recycling due to mixed materials, heavier for transport.	Premium wines, reusable bottle systems.
T-Stopper	Cork + Plastic/Wood	Resealable, easy to open, good for fortified wines.	Not suitable for long-term aging, appearance may not suit premium wines.	Fortified wines (Port, Sherry), some dessert wines.

Wine Capsules

Wine capsules, also known as foil or neck capsules, cover the top of a wine bottle and the cork. While they are a common element in traditional wine packaging and play a role in the overall consumer experience, they are not essential for wine preservation.



WE WILL EXPLORE:

- **No capsule/foil**
- **Paper**
- **Aluminum**
- **PET**
- **PLA**
- **Polylaminate** (a mix of aluminum and plastic)
- **Wax**
- **Capsules' Summary Table**

Back to chapter index

1.1 No CAPSULE

COMPOSITION AND CHARACTERISTICS

This option eliminates the use of capsules entirely, leaving the cork or screw cap exposed.

ENVIRONMENTAL BENEFITS

- Without an additional material to remove, recycling the bottle becomes easier.
- Eliminating capsules reduces material waste and resource use entirely.
- No change required in existing bottling line operation, just elimination of one step.

ENVIRONMENTAL CHALLENGES

- none.

ACTIONABLE STEPS:

Eliminate capsules!
(there's no environmental challenge).

Educate consumers
on the environmental benefits of forgoing capsules and embrace this minimalist approach as part of a larger eco-friendly narrative.

"Though handsome, bottle foils contribute to carbon buildup in the arena of manufacturing and of waste. Lail Vineyards no longer uses foil capsules on our bottles.
As we make changes to reduce carbon production, many old customs will disappear.

Robin Lail | CEO and Co-Founder Lail Vineyards

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NO Capsule
HONIG

BENEFITS:

- Less material being used in the package – a slight decrease in weight.
- Lowers the carbon footprint of the package by not using foils…the carbon footprint of the foils would include the mining and processing of the ore, manufacturing of the capsules and all of the transportation costs to go with those activities.
- Over 4000 pounds of metal that will not need to be recycled or end up in land fill. Not all capsules are recyclable and there is little infrastructure for that, so most would end up in landfill.
- One less thing to do when opening a bottle of wine…no foil to cut or remove.
- Cost saving of at least $6000 per year.

CHALLENGES:

- Some export markets require a sticker or seal over the cork.

The ends of the bottles were first covered by tar or wax starting in the 1700s. Metal capsules made of lead or tin/lead were introduced in the mid 1800s. Capsules were originally used to identify wine and prevent deterioration of the cork, typically by insects or rodents. With modern shipping and storage practices, deterioration of the cork closure is no longer an issue. With that in mind and the knowledge that we need to conserve resources and limit waste, we decided to eliminate capsules from all of our wines. This is one of the many, and sometimes small, steps that Honig is taking to shrink our impact on our planet. We have had nothing but positive responses by eliminating capsules from our packaging. By being one of the leaders of the "no capsule movement", other wineries are starting to follow in our footsteps after seeing our success. We have had a little pushback from one export market, due to their regulatory requirements, but have been able to work out a solution by using a simple sticker over the top of the cork. A quick calculation shows that we are eliminating over 4,000 pounds (1800 kg) of metal from our packaging annually. Most, if not all of this metal (tin and aluminum) would otherwise end up in landfill.

Kristin Belair | Hong Vineyards & Winery

1.2 *Paper* CAPSULE

COMPOSITION AND CHARACTERISTICS

Paper capsules are made from a layer of paper.

ENVIRONMENTAL BENEFITS

- Without an additional material to remove, recycling the bottle becomes easier.
- Eliminating capsules reduces material waste and resource use entirely.
- No change required in existing bottling line operation, just elimination of one step.

ENVIRONMENTAL CHALLENGES

- Paper production still requires a significant amount of water and energy.
- Less durable.

ACTIONABLE STEPS:

- **Opt for uncoated, recyclable paper capsules.**
- **Source from suppliers using recycled content or non-tree fibers like hemp or sugarcane.**

Back to capsules index

Paper capsules (strype)

MANINCOR

BENEFITS:

- No plastic.
- There is also no sealed humid space above the cork, so no possibility for mould between capsule and cork.

CHALLENGES:

- na

> We at Manincor decided on the paper ribbon instead of the aluminum capsule, to avoid metal-plastic use.

Michael Goess-Enzenberg | Manincor

1.3 *Aluminum* CAPSULE

COMPOSITION AND CHARACTERISTICS
Lightweight metal, durable, and easy to shape.

ENVIRONMENTAL BENEFITS

- Fully recyclable.
- If recycled aluminum is used, only a fraction of the energy is required in comparison to virgin materials.
- Its lightweight nature helps reduce transportation emissions.

ENVIRONMENTAL CHALLENGES

- Capsules can be difficult to recycle if not properly separated from the bottle, particularly if combined with plastic components.
- Energy-intensive extraction from bauxite, which disrupts ecosystems and emits greenhouse gasses..

ACTIONABLE STEPS:

Work with suppliers
to ensure that the aluminum used is from recycled sources.

Educate consumers
on proper recycling practices for aluminum capsules.

Back to capsules index

1.4 *PET* CAPSULE

COMPOSITION AND CHARACTERISTICS

PET capsules are lightweight, durable plastic alternatives.

ENVIRONMENTAL BENEFITS

- Recyclable in regions with proper recycling infrastructure.
- Its light weight reduces transportation emissions compared to heavier materials like aluminum.

ENVIRONMENTAL CHALLENGES

- PET recycling infrastructure varies by region, and capsules may not always be processed properly, especially if mixed with other materials.
- Derived from fossil fuels.
- Improper disposal contributes to microplastic pollution.

ACTIONABLE STEPS:

- **Prioritize recycled PET (rPET) .**
- **Educate consumers** on recycling procedures.

Back to capsules index

1.5 *PLA* CAPSULE

COMPOSITION AND CHARACTERISTICS

PLA (Polylactic Acid) capsules are derived from renewable resources such as corn starch or sugarcane.

ENVIRONMENTAL BENEFITS

- PLA composts in industrial facilities, breaking down into water and CO2 without harmful residues.

ENVIRONMENTAL CHALLENGES

- PLA requires specific composting conditions not available in many regions, meaning it could end up in landfills, where it behaves similarly to traditional plastics.

ACTIONABLE STEPS:

- **Opt for PLA capsules only in regions with industrial composting infrastructure.**
- **Include clear consumer information on proper disposal practices.**

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PLA Capsule
FATTORIA LA MALIOSA

BENEFITS:

- Avoiding plastic and microplastic pollution in the environment.
- Avoiding carbon emissions when burned in waste plants.
- Same quality look as the plastic capsule.
- Made of vegetal material entirely recyclable in the environment!

CHALLENGES:

- A little bit pricier.
- We couldn't find a national producer and had to import from Portugal.
- Shipping costs are substantially higher.

"The use of compostable capsules fits in our overall packaging strategy based on "eliminate" and "recycle".
ELIMINATE: secondary packaging, excessive weight of the glass bottle, colored paint for the boxes
RECYCLE: use of recycled glass for the bottle and other recyclable materials for the rest. Ex. Cork, compostable capsules, recycled cardboard for the boxes
Of course, this fits into our overall agronomic management, which is based into a complete closed vegetal cycle of production, Metodo Corino (low intervention And use of vegetal own produced mulches in the vineyards)"

Antonella Manuli | Fattoria La Maliosa

1.6 *Polylaminate* CAPSULE

COMPOSITION AND CHARACTERISTICS

A mix of aluminum and plastic, durable but difficult to recycle.

ENVIRONMENTAL BENEFITS

- The aluminum layer can be recycled if properly separated, though this can be difficult.

ENVIRONMENTAL CHALLENGES

- Polylaminate capsules are hard to recycle due to their multi-material layers.
- The plastic content relies on non-renewable resources.
- Improper disposal contributes to microplastic pollution.

ACTIONABLE STEPS:

Explore alternative materials
that minimize plastic use without sacrificing performance.

Educate consumers
and work with recyclers to improve the separation and recycling process for polylaminate capsules.

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1.7 *Wax* CAPSULES

COMPOSITION AND CHARACTERISTICS

Wax capsules are made from a pliable wax material applied over the neck of the bottle and cork, often giving a traditional or artisanal appearance.

ENVIRONMENTAL BENEFITS

- Wax capsules use fewer resources compared to more complex multi-layered capsules like polylaminate.

ENVIRONMENTAL CHALLENGES

- Wax cannot be recycled easily, and if not disposed of properly, it can contribute to waste in landfills.
- Some waxes include synthetic components or dyes, complicating their environmental impact.

ACTIONABLE STEPS:

Use natural waxes
derived from eco-friendly or biodegradable materials rather than synthetic alternatives.

Educate consumers
to properly dispose of wax capsules, or explore reusable alternatives that do not require disposable capsules.

Minimize Wax Use
or an alternative decorative element to reduce material use and waste.

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CAPSULES SUMMARY

Capsule Type	Composition & Characteristics	Environmental Benefits	Environmental Challenges	Actionable Steps
Paper Capsules	Recycled or virgin paper pulp. Lightweight and often used for aesthetic purposes.	Biodegradable: Paper decomposes quickly in composting facilities. Easily recyclable if uncoated. Lower Carbon Footprint: Less energy-intensive than metal or plastic.	Water & Energy Intensive: Paper production requires significant resources. Durability: May need additional resources for protective coatings, impacting sustainability.	Opt for uncoated, recyclable paper from recycled or non-tree fibers like hemp or sugarcane.
Aluminum Capsules	Lightweight, malleable, premium-looking metal capsules.	Aluminum is infinitely recyclable. Lightweight: Reduces transportation emissions.	Recycling Infrastructure requires proper separation from bottles. Energy-intensive production: High environmental impact from mining and refining bauxite for aluminum.	Source recycled aluminum and educate consumers on proper recycling methods.
PET Capsules	Made from Polyethylene Terephthalate (PET), a durable, lightweight plastic commonly used for cost-effective packaging.	Recyclability: Recyclable where PET recycling facilities exist. Lightweight: Lowers transportation emissions.	Fossil Fuel-Based: PET comes from petroleum, adding to carbon emissions. Recycling infrastructure for PET varies, and not all regions can process PET effectively.	Prioritize the use of recycled PET (rPET) and encourage consumers to recycle properly.
PLA Capsules	Made from Polylactic Acid, a bio-based plastic derived from corn starch or sugarcane, offering a biodegradable alternative.	Compostable: Decomposes in industrial composting facilities. Renewable resource, made from plants.	Requires industrial composting not available in all regions. May behave like plastic if sent to landfills.	Use only in regions with industrial composting facilities and educate consumers on proper disposal.
Polylaminate Capsules	A blend of aluminum and plastic layers, often used for premium and mid-range wines for durability and appearance.	Partial recyclability: The aluminum layer is recyclable if separated from plastic.	Difficult to Recycle: The mix of materials complicates recycling. Uses non-renewable resources like plastic and aluminum, adding to environmental impact.	Work with recyclers on separation processes and explore materials that minimize plastic use.
No Capsule	No capsule is used, leaving the cork or screw cap exposed. A minimalist or eco-friendly approach.	Eliminates the need for additional material, reducing waste. Recyclability: Eases recycling as there is no additional material to remove.	Some consumers may see the lack of a capsule as less premium or traditional.	Educate consumers on the environmental benefits of no capsule and build it into your sustainability narrative.

Janie Brooks on NO FOIL

We continually review our environmental impact as a Company and prioritize stripping away all unnecessary waste and consumption.... Thus, we decided to eliminate capsules in our packaging. We find end branding on our corks just as distinctive for bottle identification in cellaring. Furthermore, it reduces the carbon footprint of our packaging supply chain and reduces packaging costs.

Since 2018, we have eliminated 216,000 capsules across our 18,000 case portfolio of wines, including sparkling, SAVING $15,000.

Additionally, consumers and trade appreciate environmental considerations in packaging. Removing capsules is another way wine brands can communicate sincerity in their efforts. We have only had positive feedback from our direct customers and trade that this decision aligns with our Company ethos of sustainability.

Janie Brooks Heuck and Claire Jarreau / Brooks Wine

I commit to:

#foilfree

GOAL:

Eliminate foil from [_____%] of my portfolio .
by the end of [year_____].

STATUS:

[_____ %] of my portfolio foil free
in 2024.

Your Action

OUR COLLECTIVE IMPACT

Together, small actions lead to big results.

Company

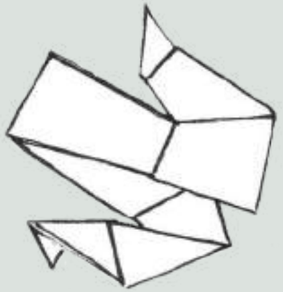
Date

Signature

Send a screeshot of this page to:
together@portoprotocol.com

LABELS

Wine labels serve multiple purposes beyond just aesthetics. They provide crucial information for consumers and help distinguish brands in a competitive market. They also play a regulatory and compliance role, such as specifying alcohol content, grape variety, region of origin, vintage, and producer details. Also, enables tracking.



WE WILL EXPLORE:

- Paper Labels
- Wash-off labels
- Plastic / Synthetic
- Foil/metallic
- Biodegradable Labels (plant-based)
- Screen Printing
- No Label
- A summary table
- General Actionable Steps for Labels

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1.1 *Paper* LABELS

COMPOSITION AND CHARACTERISTICS

Paper labels are the most commonly used, typically made from wood pulp or recycled materials.

ENVIRONMENTAL BENEFITS

- Paper labels decompose faster in the environment, reducing long-term waste.
- Easily recyclable when not coated with plastic or adhesive films.

ENVIRONMENTAL CHALLENGES

- Paper production requires significant water and energy.
- Bleaching and processing involve harmful chemicals that can pollute.
- The more finishings applied, the harder they become to recycle.
- Strong adhesives can disrupt recycling if not removed.

ACTIONABLE STEPS:

Switch to recycled paper or non-tree fibers like hemp or sugarcane.

Simplify by avoiding mixed materials
The more finishings you add to your label, the more recyclability will be compromised. For example, paper labels with plastic coatings or other non-paper finishes are more difficult to recycle.

Request FSC-certified paper
Ensuring sustainably managed forests.

Reconsider the origin of your paper label.
For example, while Italian premium paper may offer aesthetic value, it adds a significant carbon footprint due to long-distance shipping if you're bottling in the U.S..

Choose eco-friendly adhesives
Like water-soluble or biodegradable adhesives that won't interfere with recycling.

Talk to your supplier
To ensure maximum efficiency in terms of paper waste in production.

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1.2 *Wash-Off* LABELS

COMPOSITION AND CHARACTERISTICS

Designed to detach easily in water, making them ideal for reusable bottles.

ENVIRONMENTAL BENEFITS

- Perfect for reusable bottles since they simplify cleaning and re-labeling.
- Designed to wash off easily during the bottle cleaning process, improving the recyclability of bottles.

ENVIRONMENTAL CHALLENGES

- Less common in the market, and specialized adhesives may still leave traces on bottles.

ACTIONABLE STEPS:

Adopt wash-off labels for reusable bottles.

Encourage consumer awareness:
Label products with recycling instructions for consumers, particularly in reuse programs.

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Wash-off labels
SNOWDEN VINEYARDS

BENEFITS:

- Using a hydrosoluble label positions a producer to be "reuse ready" as logistics to a circular economy are put in place.
- Puts pressure on the paper market to evolve in the direction of removable labels.
- Less water, heat and chemicals are required to remove the label.

CHALLENGES:

- Currently only a few options of hydrosoluble labels.
- Without the UV coating the label smudges more easily.

Why use hydrosoluble adhesive on our labels?
To get the wine industry to meet Paris Agreement goals, bottle reuse is a key part of the puzzle. There are many practical and logistical hurdles to get our industry reusing bottles. One of the most powerful first steps a producer can take is to ask their printer for a hydrosoluble label, with no UV protection. The more hydrosoluble labels are requested, the more paper stock choice and availability we will see. Then, using a hydrosoluble label makes the job of getting the label off to reuse the bottle much easier.

Diana Swonden Seysses | Swonden Vineyards

1.3 *Plastic/Synthetic* LABELS

COMPOSITION AND CHARACTERISTICS

Made from polymers like polyethylene (PE) or polypropylene (PP), synthetic labels are highly durable and resistant to moisture and tearing.

ENVIRONMENTAL BENEFITS

- Some synthetic labels are recyclable, especially if made from polypropylene (PP) and properly separated.

ENVIRONMENTAL CHALLENGES

- Synthetic labels often complicate the recycling.
- derived from fossil fuels.
- Improper disposal contributes to microplastic pollution.

ACTIONABLE STEPS:

Reduce usage
or use thinner materials to decrease overall plastic consumption.

Use recyclable synthetics
like polypropylene (PP), ensuring they are easy to separate and process.

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1.4 *Foil/Metalic* LABELS

COMPOSITION AND CHARACTERISTICS

Metallic labels are made from thin layers of foil, often combined with plastic or paper substrates. They are used for premium aesthetics.

ENVIRONMENTAL BENEFITS

- Some metallic labels are recyclable if separated properly from the bottle.

ENVIRONMENTAL CHALLENGES

- The production of metallic and foil labels consumes a large amount of energy.
- Difficult to recycle, especially when combined with adhesives or plastic films, are difficult to separate during the recycling process.

ACTIONABLE STEPS:

Reduce metallic use:
Limit metallic accents to small portions of the label to reduce energy consumption and waste.

Work with recyclers to ensure proper handling.

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1.5 *Biodegradable* LABELS

COMPOSITION AND CHARACTERISTICS

Biodegradable labels are made from plant-based materials like sugarcane or PLA (polylactic acid), designed to break down naturally.

ENVIRONMENTAL BENEFITS

- Plant-based materials typically have a lower carbon footprint compared to synthetic options.
- Made from renewable sources, such as sugarcane or corn.

ENVIRONMENTAL CHALLENGES

- Requires specialized industrial composting facilities, which are not widely available.
- May degrade faster in certain storage conditions, potentially reducing their usability over time.

ACTIONABLE STEPS:

Partner with composting facilities
Work with local composting providers to ensure proper disposal of biodegradable labels.

Educate consumers
Include information on composting or eco-friendly disposal on the label.

Ensure Compostability and biodegradability
by collaborating with suppliers to ensure that they meet the necessary certifications (e.g., EN 13432 for industrial compostability).

Provide clear instructions
on how consumers can dispose of them properly in composting systems.

Test for Durability and Performance
Ensure that non-paper labels maintain durability and clarity throughout the product's lifecycle, including during shipping, storage, and retail display.

Work with Local Recycling and Composting Facilities
Collaborate with local waste management facilities to ensure that non-paper labels are processed properly, especially in regions where infrastructure may not be set up for handling alternative materials.

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Label with 15% grape waste and 40% post-consumer recycled fibres

CHURCHILL'S PORT

BENEFITS:

- Reduces environmental impact by repurposing grape waste, a byproduct of winemaking.
- Supports a circular economy by using recycled materials in label production.
- Enhances brand commitment to eco-friendly practices, appealing to environmentally conscious consumers.

CHALLENGES:

- Higher production costs due to specialized materials and processes for creating eco-friendly paper, exceeding those of conventional labels or capsules (but aligns with Churchill's boutique and niche positioning, justifying the additional costs).
- Variability in paper stock color caused by using recycled materials, potentially affecting the visual consistency.

"At Churchill's, our commitment to sustainability extends to every aspect of our packaging. Choosing labels made from grape waste and recycled fibers, 100% recyclable capsules (bar-top) as well as our move to lighter-weight bottles contribute to a circular economy and reduce our carbon footprint within our industry. We initially reduced our glass bottle weight by 12% across our wines in 2022 and we are implementing new changes this year on our fine port bottles, reducing to 420 grams, our lightest bottle ever. This is an ongoing commitment and what has been most encouraging is the overwhelmingly positive response from our consumers—people love knowing their purchase supports a more sustainable future."

Zoe Graham | Churchill's Port

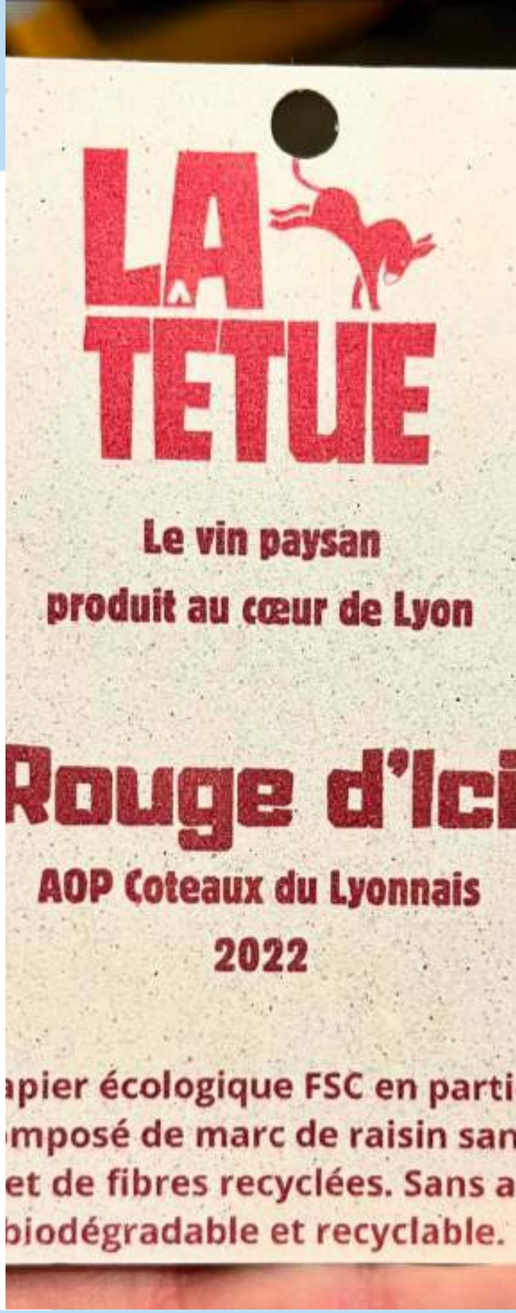
Bio Sourced Label
LA TETUE

BENEFITS:

- Bio-based, biodegradable, and compostable paper.
- No tree-derived components.
- Repurposed grape marc.
- No glue or acid.
- Originality.

CHALLENGES:

- Extended labeling time.
- Manual labeling.



"Today I use labels whose biosourced paper is produced from grape marc. In fact, my labels are not stuck to the bottle in order to facilitate reuse, I wanted to use a paper that is entirely compostable, biodegradable and which does not require cutting down trees for its production."

Geraldine Dubois | La Tetue Vins

1.6 *Screen Printing or* ETCHING

COMPOSITION AND CHARACTERISTICS

Use of Ink or etching directly on the glass surface.

ENVIRONMENTAL BENEFITS

- With no additional material to remove, recycling is easier.
- Eliminates the use of adhesives and label material.

ENVIRONMENTAL CHALLENGES

- Certain inks may introduce contaminants that affect recycling.

ACTIONABLE STEPS:

Use energy-efficient equipment
like LED curing systems and optimize processes like batch printing..

Use Eco-Friendly Inks
Opt for biodegradable, water-based, or soy-based inks to minimize environmental harm.

Reuse Printing Materials
Reuse screens, stencils, and ensure chemicals are handled responsibly.

Ensure Recycling Compatibility
Use inks and methods that don't hinder glass recyclability.

Optimize Reusability
Design prints that work on reusable bottles to avoid reprinting.

Sustainable Suppliers
Source from vendors with environmentally sound practices.

Consider Laser Etching
A chemical-free, precise, and low-waste alternative with reduced environmental impact..

Back to Labels index

1.7 No LABEL

COMPOSITION AND CHARACTERISTICS

This option eliminates the use of labels entirely, leaving the information only on the capsule!

ENVIRONMENTAL BENEFITS

- Recycling the bottle becomes easier.
- Eliminating capsules reduces material waste and resource use entirely.

ENVIRONMENTAL CHALLENGES

- Aluminum closure may be required, with its own environmental challenges.

ACTIONABLE STEPS:

Minimize or eliminate label Size:
Reduce the size of the label to use less material. Focus on essential information and eliminate unnecessary design elements that take up extra space.

Use a QR code on the capsule
to place the needed information.

Educate consumers
on the environmental benefits of forgoing labels and embrace this minimalist approach as part of a larger eco-friendly narrative.

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LABELS SUMMARY

TYPE	MATERIAL	ENVIRONMENTAL BENEFITS	ENVIRONMENTAL CHALLENGES	ACTIONABLE STEPS
Paper Labels	Wood pulp or recycled paper.	Biodegradable, recyclable, reduced environmental impact if FSC-certified.	Water and energy-intensive, chemical processing, adhesives can hinder recycling.	Opt for recycled or non-tree fiber paper (hemp, sugarcane), FSC-certified, and eco-friendly adhesives.
Wash-Off Labels	Water-soluble adhesives on paper.	Improves bottle recyclability, reusable bottle compatibility.	Limited availability, higher costs, potential adhesive residue.	Adopt for reusable bottles, educate consumers about their environmental benefits.
Synthetic Labels	Polyethylene (PE), Polypropylene (PP).	Durable, extends product life, some are recyclable.	Derived from fossil fuels, low biodegradability, complicates bottle recycling.	Use recyclable synthetics like PP, minimize plastic use by reducing label size.
Biodegradable Labels	Plant-based (PLA, sugarcane).	Compostable, lower carbon footprint, renewable resources.	Requires industrial composting facilities, shorter shelf life.	Partner with composting facilities, educate consumers on composting and disposal.
Foil/Metallic Labels	Thin foil with plastic or paper.	Some recyclability (if separated), aesthetic value.	Energy-intensive production, difficult to recycle due to multi-material composition	Limit metallic accents, collaborate with recyclers to process metallic labels.
Hemp Paper	Hemp fibers.	Grows faster than trees, less water-intensive, high yield per acre.	Limited availability, can be more expensive.	Opt for hemp paper labels to reduce reliance on wood-based products and enhance sustainability.
Sugarcane Paper	Bagasse (sugarcane by-product).	Repurposes waste from sugar production, renewable resource, compostable.	Requires energy for processing, regional availability varies.	Choose sugarcane paper to support agricultural by-product use and reduce waste in sugarcane-producing regions.
Stone Paper	Limestone and resin.	No trees, water, or bleach required, durable, waterproof, recyclable (PP).	Difficult to recycle in standard streams, requires special facilities.	Use for durability and water resistance, but ensure end users have access to appropriate recycling systems.
Grape Waste Paper	Grape pomace (by-product of winemaking).	Reduces agricultural waste, renewable resource, compostable.	Limited availability, cost considerations due to niche production.	Incorporate grape waste paper to highlight closed-loop sustainability in wine production.
Cotton Paper	Cotton linters (short fibers).	Repurposes textile waste, durable, biodegradable.	Water-intensive cotton production, high cost.	Use cotton paper to reduce dependency on virgin tree pulp and promote recycling of textile waste.

GENERAL ACTIONABLE STEPS FOR LABELS

Use Responsible Materials:
Choose labels made from recycled paper, non-tree fibers, or agricultural waste to reduce reliance on virgin resources and lower the environmental impact of sourcing.

Select Compatible and Recyclable Materials:
Opt for labels that can be recycled alongside the primary packaging, such as paper-based labels for glass and plastic, to simplify the recycling process.

Design for Easy Removal:
Use labels with removable adhesives, like wash-off, pressure-sensitive (PSA), or water-soluble adhesives, to ensure labels detach easily during recycling or reuse, improving the recyclability and reusability of the packaging.

Optimize Label Size and Layout:
Minimize label size to include only essential information, conserving materials and reducing waste. Where possible, replace multi-panel or wrap-around labels with a single, smaller label.

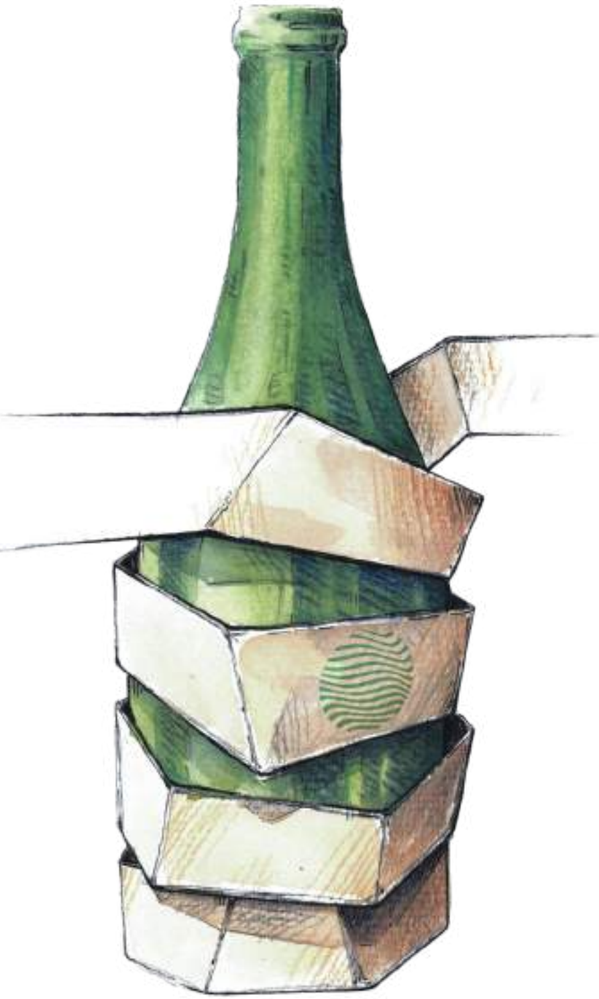
Choose Eco-Friendly Finishes:
Use matte finishes or water-based varnishes that are less harmful to the environment.

Implement Digital and On-Demand Printing:
Use digital printing for smaller print runs, avoiding the waste of excess labels and eliminating the need for printing plates. On-demand printing further reduces overproduction and waste.

Limit Ink Coverage and Use Low-Impact Inks:
Minimize ink use and select eco-friendly inks, such as soy-based, water-based, or algae-based inks, to reduce the environmental impact of printing.

Use FSC-Certified Paper Labels:
Ensure that paper labels are sourced from FSC-certified forests to help protect ecosystems and maintain responsible forestry practices.

Avoid Complex and Mixed-Material Labels:
Steer clear of laminates, metallic inks, plastic coatings, or other mixed materials that complicate recycling and contribute to waste.



I commit to:

#localsourcing

GOAL:

Sourcing [_____%] of packaging materials locally by the end of [year_____].

STATUS:

[_____ %] of packaging materials sourced locally in 2024.

Your Action

OUR COLLECTIVE IMPACT

Together, small actions lead to big results.

Company

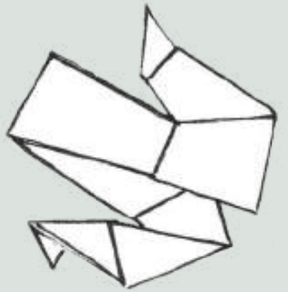
Date

Signature

Send a screeshot of this page to:
together@portoprotocol.com

INKS

Ink transforms blank surfaces into vibrant designs and essential information, but it often relies on chemicals and non-renewable resources that harm the planet. Fortunately, innovations like algae-based pigments and water-friendly inks are paving the way for more eco-friendly options. Let's explore how small changes in ink can make a big environmental impact.



WE WILL EXPLORE:

- Vegetable Based Inks
- Algae Inks
- Natural pigments
- Water Based Inks
- UV Inks
- Recycled Inks
- Petroleum Inks
- Table Summary

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1.1 *Vegetable-Based* INKS

COMPOSITION AND CHARACTERISTICS

Vegetable-based inks provide a sustainable alternative to traditional petroleum-based inks, offering reduced environmental impact and high-quality print results. Made from various plant oils, such as soybean, linseed, and corn, these inks deliver vibrant colors and are easy to remove during recycling, which enhances recyclability. Biodegradable and emitting fewer volatile organic compounds (VOCs), vegetable-based inks are an excellent choice for eco-friendly printing and packaging.

ENVIRONMENTAL BENEFITS

- Vegetable-based inks break down more easily than synthetic inks.
- Made from plants, reducing reliance on fossil fuels.

ENVIRONMENTAL CHALLENGES

- Growing crops for ink production requires land and water, although the impact is lower compared to petroleum products.

ACTIONABLE STEPS:

Opt for Certified Inks:
Choose vegetable-based inks certified for low VOC emissions and renewability (e.g., soy-certified or FSC-approved inks).

Partner with Eco-Friendly Printers:
Work with printing companies that specialize in vegetable-based inks to ensure environmentally responsible practices.

Specify Bio-based Adhesives:
Use these inks alongside bio-based adhesives to maintain overall recyclability.

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1.2 *Algae* INKS

COMPOSITION AND CHARACTERISTICS

Algae Ink is made from algae biomass, offering a carbon-positive solution that absorbs more CO2 than it produces during production.

ENVIRONMENTAL BENEFITS

- Carbon Positive: Algae ink helps remove more carbon from the atmosphere than it emits.
- Uses a renewable, fast-growing resource.

ENVIRONMENTAL CHALLENGES

- Limited Availability: Algae Ink is still an emerging technology and may not be widely available.

ACTIONABLE STEPS:

Look for Certified Algae Inks:
Ensure the ink is certified as biodegradable and low-carbon to maximize environmental benefits.

Test for Color Consistency:
Algae inks may vary slightly in color; testing batches on packaging materials ensures uniformity.

Consider Application for Small Batches:
As algae ink production is still emerging, start with smaller batch applications, where available, to assess suitability and durability for broader use.

Partner with Eco-Friendly Printers:
Work with printing companies that specialize in vegetable-based inks to ensure environmentally responsible practices.

Back to Inks index

1.3 *Natural Pigments* INKS

COMPOSITION AND CHARACTERISTICS

Made from naturally derived pigments, such as minerals, plants, or insects., these inks are biodegradable and non-toxic, offering a natural, low-impact option for sustainable packaging.

ENVIRONMENTAL BENEFITS

- Natural pigments break down easily in the environment.
- Free from harmful chemicals found in synthetic inks.

ENVIRONMENTAL CHALLENGES

- Not all print services offer recycled ink options, making it less accessible.

ACTIONABLE STEPS:

Source from Ethical Suppliers:
Ensure pigments are sustainably and ethically sourced, whether mineral, plant, or insect-derived, to avoid environmental degradation.

Consider Compatibility with Substrates:
Some natural pigments may not adhere well to all materials, so test them on packaging to ensure durability.

Prioritize Lightfastness:
Select pigments with strong lightfastness (resistance to fading) to maintain label quality, reducing the need for reprints or replacements.

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1.4 *Water Based* INKS

COMPOSITION AND CHARACTERISTICS

Water-based inks use water as a solvent instead of chemicals, drastically reducing VOC emissions.

ENVIRONMENTAL BENEFITS

- Reduces environmental hazards and VOC emissions, making it safer for workers and the environment.

ENVIRONMENTAL CHALLENGES

- Wastewater treatment is necessary after production to avoid contamination.

ACTIONABLE STEPS:

Select Water-Based Inks with Minimal Additives:
Choose formulations without harmful additives to keep them as environmentally friendly as possible.

Check for Substrate Compatibility:
Since water-based inks don't always adhere well to non-porous materials, test on specific packaging surfaces (e.g., glass or plastic).

Optimize Curing Conditions:
Ensure water-based inks are cured in low-energy conditions, such as air-drying, to minimize the carbon footprint.

Ensure proper wastewater treatment is in place.

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1.5 UV INKS

COMPOSITION AND CHARACTERISTICS

UV inks cure using ultraviolet light, which reduces the drying time and prevents solvent emissions during the process. Some are solvent-free, though not all are biodegradable.

ENVIRONMENTAL BENEFITS

- Faster drying times mean less energy is required for printing.
- Fewer solvents are needed, leading to a reduction in harmful emissions.

ENVIRONMENTAL CHALLENGES

- Growing crops for ink production requires land and water, although the impact is lower compared to petroleum products.

ACTIONABLE STEPS:

Choose Low-Impact UV Formulations:
Some UV inks are solvent-free; select these versions to reduce chemical impact and VOCs.

Ensure Safe Disposal Practices:
Work with recyclers or printers that handle or use UV-cured materials.

Adjust Printing Settings for Efficiency:
Minimize UV curing times and energy use by optimizing the intensity of UV light used in the curing process.

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1.6 *Recycled* INKS

COMPOSITION AND CHARACTERISTICS

UV inks cure using ultraviolet light, which reduces the drying time and prevents solvent emissions during the process. Some are solvent-free, though not all are biodegradable.

ENVIRONMENTAL BENEFITS

- Helps reduce waste and decrease demand for virgin materials, cutting down on the resources needed for new ink production.
- Divert waste ink from landfills.

ENVIRONMENTAL CHALLENGES

- Often blended from leftover ink batches, can lack color consistency, making them less ideal for precise or high-quality printing.
- These inks are less widely available than other types, especially for specialized print jobs.
- Recycled inks may contain residues from prior use, impacting print quality and recyclability.
- Filtering and repurposing waste ink requires resources, though less than producing new petroleum-based inks.

ACTIONABLE STEPS:

Source Responsibly:
Choose recycled inks from certified eco-friendly suppliers.

Use for Low-Priority Printing:
Apply recycled inks to less critical packaging areas, like internal labels.

Pair with Recyclable Materials:
Use recyclable substrates to maximize packaging sustainability.

Promote Transparency:
Label packaging with information about recycled ink use for eco-conscious consumers.

Partner with Green Printers:
Work with printers who specialize in sustainable practices to reduce waste.

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1.7 *Petroleum-Based* INKS

COMPOSITION AND CHARACTERISTICS

Traditional inks derived from petroleum; generally contain higher VOCs.

ENVIRONMENTAL BENEFITS

- Known for their durability and resistance, especially in harsh conditions (e.g., exposure to moisture, sunlight, and chemicals). This durability can reduce the need for frequent reprinting, indirectly saving resources in certain applications.
- Perform consistently on a wide range of materials, making them a go-to option for packaging that might otherwise require multiple types of inks.

ENVIRONMENTAL CHALLENGES

- Release volatile organic compounds (VOCs) during printing and drying. These VOCs contribute to air pollution, health risks, and ground-level ozone formation.
- Derived from fossil fuels.
- Generally not biodegradable, and improper disposal can lead to soil and water contamination.
- Removing from paper during recycling can be difficult, potentially reducing the quality of recycled paper or requiring more intensive processing.

ACTIONABLE STEPS:

Limit Use to Essential Applications:
Reserve petroleum-based inks only for products where no other ink can meet specific durability or resistance needs. Ideally, avoid them.

Seek Low-VOC Petroleum Inks:
If petroleum inks must be used, select low-VOC options to reduce emissions during printing and handling.

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INKS SUMMARY

INK TYPE	COMPOSITION & CHARACTERISTICS	ENVIRONMENTAL BENEFITS	ENVIRONMENTAL CHALLENGES	ACTIONABLE STEPS
Vegetable-Based Inks	Derived from renewable oils like soy, linseed, or corn.	Biodegradable, renewable, and lower VOC emissions.	Agricultural impact from oil production, especially if not sustainably sourced.	Source from certified suppliers; prioritize sustainably farmed oils; use for compostable packaging.
Algae Inks	Made from algae biomass; carbon-negative, biodegradable, and one of the most sustainable options.	Carbon-negative, biodegradable, and non-toxic.	Limited availability and higher cost due to innovative production.	Request from sustainable printers; use for black or standard colors to support eco-initiatives.
Natural Pigment Inks	Derived from natural pigments such as minerals and plants; biodegradable and non-toxic.	Biodegradable and non-toxic, safe for both users and ecosystems.	Limited color availability and scalability for large print jobs.	Choose for limited-color packaging; source from suppliers with sustainable extraction practices.
Water-Based Inks	Uses water as the primary solvent, reducing harmful chemical emissions and improving safety.	Lower VOC emissions, safer for workers, and easy to clean up.	Less durable, may require additional coatings on certain materials.	Best for short-term use products; combine with eco-friendly coatings for durability.
UV Inks	Cured with UV light for instant drying, reduces VOC emissions and allows faster production times.	Fast drying with low VOC emissions, reducing production waste.	Energy-intensive curing process; may complicate recycling on some substrates.	Use in high-speed, efficient settings; select recyclable substrates compatible with UV inks.
Recycled Inks	Repurposes leftover inks or pigments, minimizing the need for new raw materials.	Reduces waste by reusing materials and lowers demand for new resources.	Quality variability and limited availability of recycled materials.	Apply to low-priority areas; partner with suppliers offering consistent recycled ink options.
Petroleum-Based Inks	Derived from petroleum; durable and versatile, but high in VOC emissions and non-renewable.	Durable and versatile; used where high-quality, long-lasting inks are essential.	High VOC emissions, low biodegradability, and reliance on fossil fuels.	Reserve for applications requiring durability; seek low-VOC options to minimize impact.

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GENERAL ACTIONABLE STEPS FOR PRIMARY PACKAGING

Set Clear Environmental Goals:
Define specific environmental goals for the new packaging initiative to guide all subsequent steps and ensure alignment.

Engage Key Stakeholders:
Collaborate with winemaking, design, packaging, buying, sales, and marketing teams to explore and evaluate packaging alternatives.

Review Supplier Contracts and Supply Plans:
Coordinate with buying teams to understand current supplier contracts and the future supply plan.

Coordinate with Supply Chain Partners:
Liaise with transportation and supply chain teams to account for logistics needs and potential adjustments.

Conduct Internal Testing:
Ensure product quality, safety, and freshness with the new packaging through comprehensive testing.

Evaluate Environmental Impact:
If testing is positive, calculate the potential environmental footprint improvements using lifecycle thinking. An ISO-compliant LCA is recommended for accurate, public-facing claims.

Develop a Rollout Strategy:
Create a strategy and roadmap for introducing lighter packaging, aligning with buying plans to prevent surplus, and setting trial and review periods with a marketing strategy.

Secure Leadership Approval:
Build a business case and secure necessary approvals from leadership teams.

Launch and Measure:
Initiate a trial with clearly defined timelines, KPIs, and data collection methods.

Expand Based on Results:
If trials meet quality and environmental standards, expand the program in alignment with defined goals.

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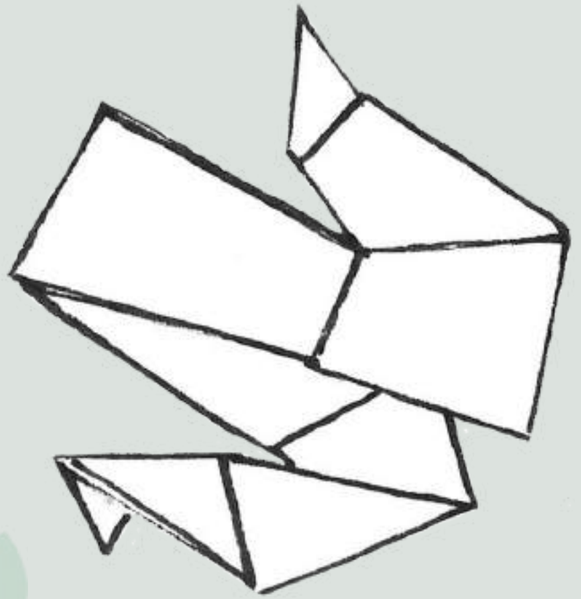
KEY TAKEAWAYS

- Reduce, Reuse, Recycle, Compost: Start with this mindset as you begin your journey to rethink your packaging choices. Reduce the amount of natural resources/raw materials you are using, as well as the travel miles, between the beginning and end of life.
- Consider Refillable Options: There has to be a better way than throwaway. Some wineries are experimenting with refillable glass bottles or offering wine in bulk to be dispensed at local retailers.
- Ask for help: Remember, you're the wine specialist, not the packaging expert. Start the conversation with your suppliers on where efficiencies, replacements, and reductions can be found.
- Opt for lighter packaging options like thinner glass bottles, PET, or cans. These reduce both material use and shipping-related carbon emissions.
- Use eco-friendly labels made from recycled paper or biodegradable materials. Digital printing can also help reduce ink waste.
- Opt for minimalistic designs that use fewer materials. Avoid use of capsules, foils, or heavy closures whenever possible.
- Design your packaging with recycling in mind. Make sure all components (bottles, closures, labels) are easy to recycle and clearly marked for consumers. Choose biodegradable alternatives like compostable corks and paper labels.
- Choose natural corks with a lower environmental impact.
- Communicate your endeavors: Use your packaging to tell a story. Include your eco-friendly practices or certifications directly on the label, showing consumers that reducing your environmental footprint is a priority. Educate consumers on doing their part: recycling, composting, reusing, and choosing brands that follow these practices.

IV. Secondary & Tertiary Packaging



Chapter Summary:

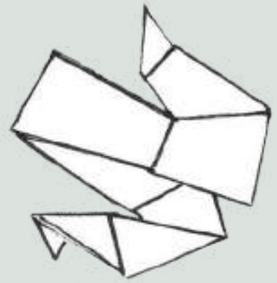
Secondary and tertiary packaging play a crucial role in the overall lifecycle of packaging.

This chapter addresses their impact on waste reduction, transport efficiency, and product protection.

Secondary packaging, like gift boxes and crates, serves both functional and branding purposes, while offering opportunities for sustainable material choices, such as recycled cardboard and plant-based alternatives.

Tertiary packaging, including pallets and wraps, is essential for securing products during transit and directly affects carbon emissions.

By opting for reusable or eco-friendly materials, producers can reduce the environmental footprint that secondary and primary packaging contributes.



WE WILL EXPLORE:

- Gift Packs
- Crates
- Outer Cases
- Protective Packaging
- Pallets
- Securing and Protecting
- Shipments

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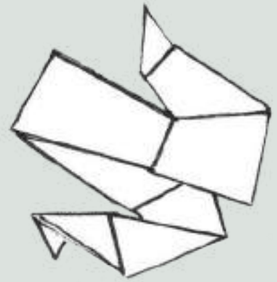
Secondary PACKAGING:

Welcome to the world of secondary packaging in wine, where the real heroes don't wear capes but rather sturdy cardboard and sleek wooden crates!

While your favorite vintage gets all the glory in the bottle, it's the clever packaging that ensures it arrives at your doorstep intact, ready to dazzle.

Think of it as the charming bodyguard to your wine, warding off bumps, bruises, and the occasional clumsy delivery driver.

So, here's to secondary packaging: the unsung guardian of your pour, making sure every sip is as delightful as the last!



WE WILL EXPLORE:

- Gift Packs
- Wood Crates
- Plastic Crates
- Corrugated Cardboard Cases
- Solid Cardborad Cases
- Recycled Cardboard Cases
- Styrofoam
- Bubble Wrap
- Air Cushons
- Algae-Based Inserts
- Molded Pulp Inserts
- Foam Inserts
- Mycelium Inserts
- Seaweed Inserts
- Honeycomb Inserts
- Inflatable Inserts
- Summary Table

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1. GIFT PACKS

Gift Packs are an integral and unique aspect of secondary packaging that warrants special attention. These boxes hold significant importance for wine producers, particularly in key markets such as China, during gifting seasons like Christmas, for limited-edition releases or for premium wines.

Typically made from a variety of materials, often in combination, gift boxes not only enhance one's branding's premiumness but also elevate each bottle into a special, memorable present.

From an environmental standpoint, they represent both a challenge and an opportunity. While they can generate substantial waste, they also offer a chance for innovation and eco-conscious design. Although the environmental impact of these boxes varies, here are some actionable steps to consider when developing your next gift box.

> "Our secondary packaging is now optional for our customers and they can choose from generic boxes in order to reduce references by product. This allowed our partners to also think sustainably and encourage their clients to reduce waste at the point of sale."

Zoe Graham / Churchill's Port

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Recycled, Reusable, Replants, Tells a Story

THE OMDESIGN® ACORN:

BENEFITS:

- Eco-friendly packaging made from wood and cork, free of oil derivatives.
- Includes a real acorn and soil, encouraging consumers to plant cork oaks.
- Supports ecosystems, prevents desertification, and absorbs CO_2.
- Reusable, designed to collect and plant additional acorns, fostering a cycle.

CHALLENGES:

- Budget Constraints: limits its application to higher-priced, superior positioning products.
- Project Complexity: developing reusable, recycled, and replanting project, while maintaining functionality and design appeal.
- Consumer Engagement: The difficulty to encouraging consumers to actively participate in the cycle and contribute to cork oak reforestation efforts.

"The future is shaped by the actions we take today. This initiative not only raises awareness but also gives back to nature what we take from it every day. By planting cork oaks—a process that takes 30 years—we are creating a sustainable cycle. These trees will provide raw cork material, wine stoppers, and packaging for future projects, all while capturing CO_2 and fostering biodiversity. More importantly, this action emotionally connects everyone involved to an inescapable reality: the need for collective action to protect our planet. This is one of the many seeds of our commitment to a sustainable future."

Diogo Gama Rocha / Omdesign®

GIFT PACKS ACTIONABLE STEPS

Choose Low-Impact Materials:
Use recyclable, biodegradable, or compostable materials, such as FSC-certified paper, recycled cardboard, or plant-based alternatives, and avoid plastic or hard-to-recycle components.

Experiment with Limited Editions:
Create small-batch editions featuring plant-based, biodegradable, or unique materials. Use these editions to engage consumers and incorporate eco-friendly storytelling.

Minimize Material Use:
Design gift boxes that use only the essential materials for structural integrity and visual appeal. Consider slimmer or single-layered designs to reduce resource use.

Use Single-Material Construction:
Opt for single-material gift boxes to simplify recycling, reduce waste, and minimize production costs.

Offer Optional Gift Packaging:
Allow customers to choose whether to include the gift box, reducing unnecessary packaging for those who prefer minimalism.

Select Eco-Friendly Inks:
Use vegetable-based or water-based inks, such as algae ink, to lower the environmental impact of printing.

Incorporate Repurposable Designs:
Design gift boxes that can be reused by consumers for storage or decoration, to extend the packaging's life and reduce waste.

Optimize for Transport Efficiency:
Consider easily disassembled or flat-pack designs to save storage and transport space, cutting emissions and resource use.

Highlight Eco-Friendly Features:
Clearly communicate the gift box's environmentally friendly qualities, guiding consumers on reuse or proper disposal.

2. CRATES

Crates, whether plastic or wood, offer durable and efficient solutions for wine packaging.

- Plastic crates, typically made from HDPE or PP, are lightweight, reusable, and moisture-resistant, with sustainability dependent on recycling and reuse.
- Wooden crates provide a sturdy, premium option, offering strong protection and a rustic aesthetic. However, they are heavier and require more resources to produce and produce higher transport emissions.

Both types of crates play a key role in logistics, with their environmental impact shaped by material choice, reusability, and disposal methods.

In this section, we'll look into:

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2.1 *Wooden* CRATES

COMPOSITION AND CHARACTERISTICS

Corrugated fiberboard is made from three layers of paper: an inner liner, an outer liner, and a fluted middle layer for strength.

ENVIRONMENTAL BENEFITS

- Wooden crates can be reused multiple times, especially in long-term storage or bulk transport.
- Wood is biodegradable and can be recycled into new wood products or biomass energy.
- They last longer than cardboard or plastic, reducing the need for frequent replacements.

ENVIRONMENTAL CHALLENGES

- Less widely recycled than cardboard.
- Production consumes significant energy and water.
- Chemical treatments can harm the environment.
- Unsustainable harvesting may lead to deforestation.
- Heavier weight increases transportation emissions.

ACTIONABLE STEPS:

Use recycled or FSC-certified wood
for packaging to reduce virgin material use.

Design crates for reuse,
especially in logistics systems where repeated use reduces environmental impact.

Opt for local wood sources
to minimize transportation emissions and support regional economies.

Reduce chemical treatments or use non-toxic options
to lower the environmental footprint and keep biodegradability intact.

Talk to your supplier
To optimise wood-cutting methods, promote the use of non-toxic adhesives and coatings, and the installation of energy-efficient machinery.

Ultimately, rethink the need for wooden crates
Or make them optional for your customers, thus decreasing waste and emissions and realize savings..

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2.2 *Plastic* CRATES

Plastic crates are commonly used in wine logistics due to their durability, reusability, and lightweight nature. Here's a brief overview of their characteristics:

COMPOSITION AND CHARACTERISTICS

Plastic crates, typically made from HDPE or PP, are durable, lightweight, and moisture-resistant. Recycled plastic is often used to reduce environmental impact. Ideal for reusable wine packaging, their sustainability depends on reusability and proper recycling, as they are non-biodegradable.

ENVIRONMENTAL BENEFITS

- Reusable, minimizing waste.
- Lighter weight reduces transportation emissions.
- Durable, lowering replacement frequency.
- Made from fossil fuels, but recycled plastic reduces landfill waste and virgin plastic demand.

ENVIRONMENTAL CHALLENGES

- Limited recyclability due to facility requirements.
- Reliance on non-renewable fossil fuels increases carbon footprint.
- Non-biodegradable, contributing to plastic pollution if not properly disposed of.

ACTIONABLE STEPS:

- **Use recycled or FSC-certified wood** for packaging to reduce virgin material use.
- **Prioritize Recycled Materials:** Opt for crates made from recycled plastic to minimize reliance on virgin materials and reduce their carbon footprint.
- **Implement Reuse Systems:** Engage in closed-loop systems to maximize the reuse potential and ensure crates are recycled at the end of their life.
- **Ensure Proper Disposal:** Label crates with clear recycling instructions to facilitate correct disposal and minimize environmental harm.

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Plastic Crates

SUSTAINABLE WINE SOLUTIONS

BENEFITS:

- Zero waste.
- No secondary packaging for customer.
- Robust, keeps bottles secure.

CHALLENGES:

- Slightly bulkier than cardboard outers.
- Need tracking / deposits to secure the investment.
- Can't be sent via parcel courier.

> Our customers love not having any secondary packaging like cardboard to dispose of. The robust crates keep our lightweight returnable bottles safe and reduce breakages. They look great too and have enough space to share our "Six Steps of Return Logic" so it's visible to the whole team in any of our ontrade customers.

Mitch Adams / Sustainable Wine Solutions

2. OUTERCASES

For wine specifically, outer cases are often designed to provide protection during transportation and storage while also supporting branding efforts.

Here are some common materials used for wine outer cases, that we'll explore in the next pages:

- Corrugated Cardboard Cases
- Solid Cardborad Cases
- Recycled Cardboard Cases

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2.1 *Corrugated Cardboard* CASES

COMPOSITION AND CHARACTERISTICS

Corrugated fiberboard outer cases consist of three paper layers—an inner liner, outer liner, and a fluted middle layer. Strong, lightweight, and shock-absorbent, they effectively protect wine bottles during shipping. Available in various thicknesses for different strength needs, they provide reliable protection but may weaken if exposed to moisture.

ENVIRONMENTAL BENEFITS

- Biodegradable if not recycled.
- Recyclable multiple times, supporting a closed-loop system.
- Often contains recycled fibers, lowering virgin material demand.
- Lighter weight reduces transportation emissions.

ENVIRONMENTAL CHALLENGES

- Fiber quality weakens with each recycling cycle.
- Plastic or wax coatings and non-recyclable inserts hinder recycling.
- High water, energy, and raw material use, especially with virgin pulp.
- Can contribute to deforestation if not sustainably sourced.

2.2 *Solid Cardboard* CASES

COMPOSITION AND CHARACTERISTICS

Made from dense, smooth layers of compressed wood pulp, often with virgin or recycled fibers, this material is thicker and more rigid than paperboard. Coatings may be added for durability or aesthetics, making it ideal for premium wine packaging and gift boxes due to its superior protection and sturdy feel.

ENVIRONMENTAL BENEFITS

- Can be recycled if free of non-recyclable coatings or finishes.

ENVIRONMENTAL CHALLENGES

- Plastic or metalized finishes hinder recyclability.
- Virgin pulp production requires significant energy, water, and raw materials.
- Sourcing virgin materials can lead to deforestation if not FSC-certified.

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No Tape Outercase

MANINCOR

BENEFITS:

- Natural Cardbord~.
- Less use of color.
- With no adhesive residue, packaging can be more easily recycled, especially cardboard, which often faces contamination issues from conventional tape.
- Eliminates the need for single-use tape, cutting down on waste and reliance on plastic or adhesives.

CHALLENGES:

- Not sealed.

> We at Manincor decided on this case, because the natural look fits better to our image, there is a reduction of use of colors, we don’t need to tape or glue it, is easy to close and reopen.

Michael Goess-Enzenberg | Manincor

2.3. *Recycled Cardboard* CASES

COMPOSITION AND CHARACTERISTICS

Made from post-consumer or post-industrial recycled paper and fibers, often mixed with some virgin material for added strength, this packaging resembles corrugated cardboard or solid cardboard but has slightly lower strength due to fiber weakening after multiple recycling processes. It is commonly used by eco-conscious wine producers looking to reduce their environmental footprint.

ENVIRONMENTAL BENEFITS

- Recyclable, keeping it in the material life cycle.
- Reduces need for virgin wood pulp, supporting a closed-loop system.
- Lower carbon footprint, requiring less energy and water than virgin materials.

ENVIRONMENTAL CHALLENGES

- Lower structural integrity than virgin materials, limiting use for heavy or fragile products.
- Recycling process may introduce impurities, affecting product quality.

"We reuse any boxes for wine that is sold or poured in our tasting room. We purchase our glass in bulk, so we can purchase boxes as-needed. We do not have a box for every 12 bottles that we purchase from our glass supplier. That means we can re-use our boxes, often several times, before recycling them or sending them off to our distributors. It also gives us the opportunity to avoid boxes altogether when we are building our wine club orders. In that case, we simply load our finished bottles into cages off of the labeling line, and build our wine club orders from the cages instead of going into and back out of a box."

Peter Laing / Mawby Wines

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Success Story

Old Box

Less than 13% of paper consumption

=Less 13 tons, with a substantial impact on forest management

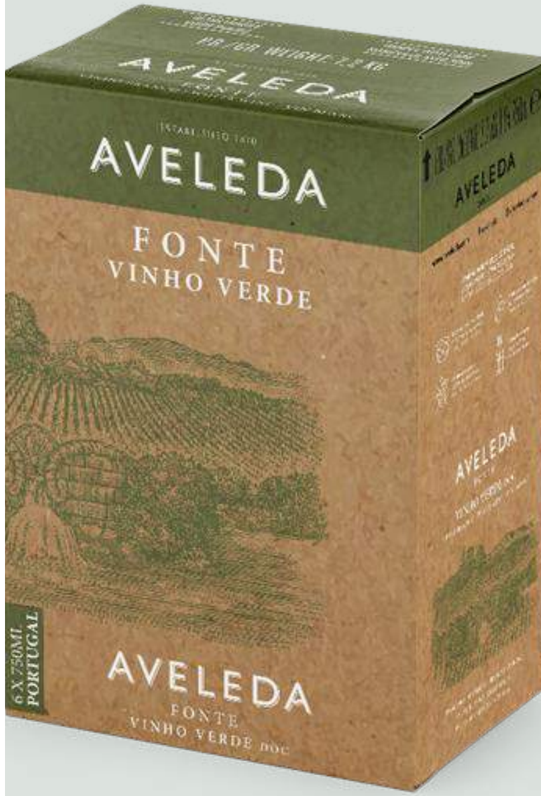
13% less CO2 emissions (-6.3 Tonnes) ensuring optimization and functionality of the logistics chain

Cost Savings: +19K€

Different principles

100% recycled paper
Reduction of the number of colors
Using water-based dyes
0% Use of paint

New Box



OUTERCASES ACTIONABLE STEPS

Use Foldable, Minimal-Tape Designs:
Choose outer cases with foldable designs that require little or no tape, reducing waste and simplifying recycling. If tape is necessary, apply it only on one side or use eco-friendly options, such as water-activated or biodegradable tape.

Incorporate Reusable Outer Cases:
Implement a system to reuse outer cases in your operations, such as transporting cases between warehouses, tasting rooms, and local customers.

Opt for Recyclable and Certified Materials:
Choose materials that are fully recyclable and, when possible, certified by sustainable organizations like the FSC. Prioritize options that align with your environmental commitments.

Minimize Material Use:
Streamline case designs to reduce excess material without compromising strength. Right-size packaging to fit products more closely, which reduces resource use and shipping volume.

Promote Circular Practices:
Include clear recycling and reuse instructions on outer cases, encouraging retailers, local customers, and consumers to recycle or repurpose them.

Select Lightweight Options:
Lighter outer cases reduce transport emissions and overall carbon footprint. When possible, balance durability with weight efficiency to minimize environmental impact.

3. PROTECTIVE PACKAGING

Protective Packaging are all the materials used to safeguard wine bottles during transit, especially in small, direct-to-consumer shipments. It includes both eco-friendly options like corrugated inserts and molded pulp, as well as styrofoam and bubble wrap which are harmful to the environment.

Here are some options we'll explore in the next pages:

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3.1 STYROFOAM

COMPOSITION AND CHARACTERISTICS

Styrofoam inserts, made from expanded polystyrene (EPS), are lightweight, durable, and custom-molded to fit wine bottles, offering excellent cushioning and shock absorption during shipping. However, due to significant environmental challenges, particularly in regions with limited recycling options, more sustainable alternatives are increasingly favored.

ENVIRONMENTAL BENEFITS

- Reduces shipping weight, leading to lower transportation emissions.
- Insulation from extreme temperatures.

ENVIRONMENTAL CHALLENGES

- Though technically recyclable, few facilities accept it, and the process is energy-intensive.
- Styrofoam is not biodegradable and persists in the environment for hundreds of years.

ACTIONABLE STEPS:

- **Stop using**
- **Switch to Eco-Friendly Alternatives:** Seek recycled or compostable alternatives to Styrofoam, such as mycelium, biodegradable air pillows, or molded pulp inserts.
- **Partner with Styrofoam Recycling Programs:** Collaborate with specialized recycling programs to ensure Styrofoam is properly collected and processed.
- **Label for Responsible Disposal:** Clearly label packaging with disposal instructions or include a QR code linking to recycling options, making it easy for customers to recycle responsibly.
- **Encourage Reuse When Possible:** Inform customers about the potential to reuse Styrofoam inserts for local returns, storage, or future shipments, reducing immediate waste.

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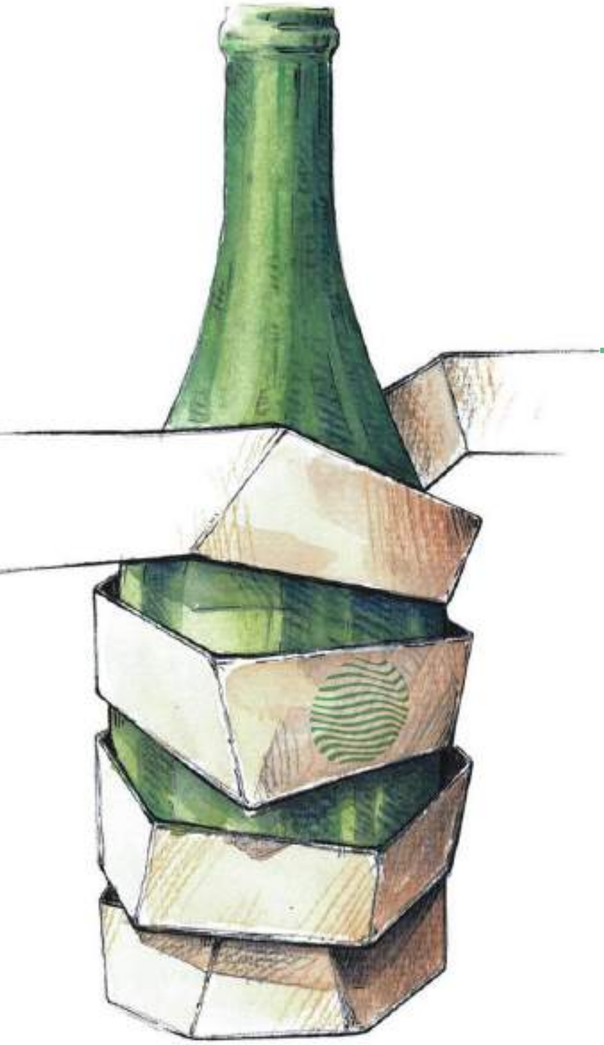

I commit to:

#stopstyrofoam

GOAL:

Stop using styrofoam in [_____ %] of my portfolio by the end of [year_____].

STATUS:

[_____ %] styrofoam used in of my portfolio in 2024.

Your Action

OUR COLLECTIVE IMPACT

Together, small actions lead to big results.

Company

Date

Signature

Send a screeshot of this page to:
together@portoprotocol.com

3.2 *Bubble* WRAP

COMPOSITION AND CHARACTERISTICS

Bubble wrap, made from low-density polyethylene (LDPE), consists of air-filled pockets that provide flexible, lightweight cushioning, making it ideal for protecting and conforming to the shape of wine bottles during shipping.

ENVIRONMENTAL BENEFITS

- Reduces overall shipping weight, helping to lower fuel consumption.

ENVIRONMENTAL CHALLENGES

- Bubble wrap is recyclable, but it is often not accepted in curbside recycling programs due to its film-like structure.
- LDPE is not biodegradable and contributes to plastic pollution if not properly recycled.

ACTIONABLE STEPS:

Choose Recycled, Recyclable Bubble Wrap:
Opt for bubble wrap made from recycled plastic with high post-consumer content and label it as recyclable.

Switch to Biodegradable Options:
Where possible, use biodegradable bubble wrap made from plant-based materials.

Provide Disposal Instructions:
Clearly label bubble wrap with instructions for recycling or composting.

Encourage Reuse:
Suggest that customers reuse bubble wrap for storage, future shipments, or cushioning.

Consider Paper-Based Alternatives:
Explore paper-based or compostable options for cushioning that may be easier to recycle or compost.

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3.3 *Air* CUSHIONS

COMPOSITION AND CHARACTERISTICS

Air cushions, made from polyethylene (PE) film, are lightweight and consist of air-filled pockets that offer strong impact resistance, making them ideal for protecting wine bottles by distributing force over a large area during shipping.

ENVIRONMENTAL BENEFITS

- Reduces shipping costs and emissions due to minimal weight.
- Use very little plastic compared to solid inserts like Styrofoam.

ENVIRONMENTAL CHALLENGES

- Often not accepted in standard recycling programs and need specialized facilities.
- Not biodegradable.

ACTIONABLE STEPS:

Use Recycled, Recyclable Cushions:
Choose cushions made with recycled content and label for recycling.

Opt for Biodegradable Options:
Try plant-based or compostable air cushions.

Provide Disposal Info:
Label with clear recycling or composting instructions.

Encourage Reuse:
Promote reuse by customers.

Test Paper-Based Alternatives:
Test paper-based options for eco-friendly cushioning.

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3.4 *Algae-Based* PLASTICS

COMPOSITION AND CHARACTERISTICS

Molded pulp inserts, made from recycled paper or cardboard, are sturdy, biodegradable, and custom-molded to cradle wine bottles, providing durable protection by absorbing shock and holding bottles securely in place as a sustainable alternative to plastic or Styrofoam.

ENVIRONMENTAL BENEFITS

- Biodegradable and compostable.
- Made from post-consumer recycled paper products.
- Easily recyclable.
- Lightweight, reducing shipping emissions.

ENVIRONMENTAL CHALLENGES

- Producing molded pulp requires significant water and energy resources, though the impact is less than that of producing plastic.

ACTIONABLE STEPS:

Choose Recycled Pulp:
Use inserts made from recycled materials.

Opt for Compostable Options:
Ensure inserts are compostable and biodegradable.

Right-Size for Efficiency:
Use custom sizes to reduce material waste.

Label for Disposal:
Add clear composting or recycling instructions.

Source Responsibly:
Work with certified suppliers for eco-friendly sourcing.

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3.5 *Molded Pulp* INSERTS

COMPOSITION AND CHARACTERISTICS

Molded pulp inserts, made from recycled paper or cardboard, are sturdy, biodegradable, and custom-molded to cradle wine bottles, providing durable protection by absorbing shock and holding bottles securely in place as a sustainable alternative to plastic or Styrofoam.

ENVIRONMENTAL BENEFITS

- They break down naturally and can be composted or recycled.
- They're made from post-consumer recycled paper products.
- These inserts are easily recyclable..
- Transport Efficiency: as it is lightweight, it reduces shipping weight and associated emissions.

ENVIRONMENTAL CHALLENGES

- Producing molded pulp requires significant water and energy resources, though the impact is less than that of producing plastic.

ACTIONABLE STEPS:

Choose Recycled Pulp:
Use inserts made from recycled materials.

Opt for Compostable Options:
Ensure inserts are compostable and biodegradable.

Right-Size for Efficiency:
Use custom sizes to reduce material waste.

Label for Disposal:
Add clear composting or recycling instructions.

Source Responsibly:
Work with certified suppliers for eco-friendly sourcing.

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Pulp shippers
THE VINEYARDS AT DODON

BENEFITS:

- Made from recycled materials, not petroleum polymers.
- Pulp is compostable, while polystyrene is forever.
- Takes up less space when stacked.
- Less expensive than polystyrene.

CHALLENGES:

- Can be damaged by mice.
- Less sturdy and structured than polystyrene.
- Provides less insulation than polystyrene.
- Heavier than polystyrene.

"At The Vineyards at Dodon, we are pleased to use pulp shippers rather than Styrofoam, or EPS. While EPS is a lighter option, pulp shippers are made with recycled materials, which is the right choice for the planet and reinforces our commitment to sustainability to our clients. Fortunately, this environmental choice works in our favor financially, as pulp shippers are less expensive than foam. Logistically, this option is beneficial as pulp shippers nest and take up less space – a precious commodity in the winery."

Regina Mc Carthy | The Vineyards at Dodon

3.6 *Foam* INSERTS

COMPOSITION AND CHARACTERISTICS

Foam inserts are typically made from expanded polystyrene (EPS) or polyurethane (PU). Both types of foam are custom-molded to fit specific products, but they present environmental challenges due to limited recyclability and the persistence of plastic waste.

ENVIRONMENTAL BENEFITS

- Lightweight, minimizing the overall weight of packaging and associated emissions.

ENVIRONMENTAL CHALLENGES

- Difficult to recycle and often end up in landfills.
- Foam takes hundreds of years to decompose.
- Production and disposal of foam contribute to environmental pollution, especially in marine ecosystems.

ACTIONABLE STEPS:

Choose Biodegradable or Recycled Foam:
Use foam made from plant-based or recycled materials.

Partner with Recycling Programs:
Collaborate with programs that recycle foam.

Encourage Reuse:
Suggest customers reuse inserts for storage or shipping.

Label for Disposal:
Provide clear recycling or composting instructions.

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3.7 *Mycelium-Based* BOX

COMPOSITION AND CHARACTERISTICS

Mycelium packaging, made from the root structure of mushrooms combined with agricultural waste, is lightweight, durable, and shock absorbent, grown into custom shapes for wine bottles, and is fully compostable, offering a sustainable alternative to traditional foam packaging.

ENVIRONMENTAL BENEFITS

- Biodegradable, leaving no toxic residues.
- Grown quickly and sustainably from agricultural waste, supporting a circular economy.
- Low carbon footprint, requiring minimal energy and resources.
- Non-toxic, releasing no harmful chemicals or pollutants.

ENVIRONMENTAL CHALLENGES

- While biodegradable, mycelium requires specific environmental conditions for decomposition, and in less ideal settings, it may break down more slowly.
- Water-resistant coatings may require synthetic, non-biodegradable materials, reducing eco-friendliness.

ACTIONABLE STEPS:

Source Certified Mycelium Packaging:
Choose mycelium-based boxes from suppliers with eco-certifications to ensure sustainable production.

Highlight Compostability:
Clearly label boxes as compostable to encourage proper disposal by customers.

Pilot in Select Shipments:
Test mycelium boxes in limited batches to evaluate performance and gather customer feedback.

Educate Customers on Eco-Benefits:
Include a note on the box about its eco-friendly, compostable nature to reinforce your brand's commitment to sustainability.

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3.8 *Seaweed-based* PACKAGING

COMPOSITION AND CHARACTERISTICS

Seaweed-based packaging, derived from seaweed extracts, is flexible, lightweight, and can be molded or wrapped around wine bottles, providing cushioning and protection similar to plastic while being entirely biodegradable and made from renewable resources.

ENVIRONMENTAL BENEFITS

- Biodegrades naturally without causing harm to the environment.
- Seaweed grows rapidly and doesn't require land, freshwater, or fertilizers.

ENVIRONMENTAL CHALLENGES

- Seaweed-based packaging is still in its infancy and not widely adopted in large-scale shipping.

ACTIONABLE STEPS:

Pilot Seaweed Packaging in Select Shipments:
Test seaweed-based materials in limited shipments to assess durability and gather feedback.

Source from Certified Suppliers:
Choose seaweed packaging from certified suppliers to ensure responsible harvesting and production practices.

Label as Compostable:
Clearly label the packaging as compostable or biodegradable to encourage proper disposal by customers.

Educate Consumers on Eco-Benefits:
Add a brief note on the packaging about its sustainable, compostable qualities to highlight your environmental commitment.

Explore Partnerships with Innovators:
Collaborate with seaweed packaging developers to support scaling and advancing the technology.

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3.9 *Honeycomb* (RECYCLED CARDBOARD) INSERTS

COMPOSITION AND CHARACTERISTICS

Honeycomb inserts, made from recycled cardboard arranged in a honeycomb pattern, provide strong cushioning and impact distribution while being lightweight and easily molded to fit various bottle sizes, offering an effective alternative to plastic or foam inserts.

ENVIRONMENTAL BENEFITS

- Made from recycled materials and recyclable.
- Using post-consumer waste reduces the need for virgin materials and minimizes landfill waste.

ENVIRONMENTAL CHALLENGES

- Like other paper products, honeycomb inserts require water and energy for production, though less so than plastics.

ACTIONABLE STEPS:

Choose High Recycled Content:
Use honeycomb inserts made from high percentages of recycled cardboard.

Label for Recycling:
Clearly mark inserts as recyclable to encourage proper disposal.

Right-Size Inserts:
Customize inserts to fit securely around bottles, minimizing material use while maximizing protection.

Encourage Reuse:
Suggest customers reuse inserts for storage or shipping when possible.

Source from Certified Suppliers:
Select inserts from suppliers with eco-certifications to ensure responsible production practices.

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3.10 *Inflatable Paper* CUSHIONING

COMPOSITION AND CHARACTERISTICS

Inflatable paper cushioning, made from recycled paper with air-filled chambers, provides effective protection for wine bottles, combining a fully recyclable outer layer with air pockets that reduce material usage, offering a lighter, eco-friendly alternative to traditional bubble wrap.

ENVIRONMENTAL BENEFITS

- The outer paper layer can be recycled along with regular paper products.
- Using air pockets reduces the total amount of packaging material required.

ENVIRONMENTAL CHALLENGES

- May provide less protection than other materials, especially if it deflates.
- Not all areas recycle inflatable paper, limiting disposal options.
- Air leaks can reduce effectiveness, potentially needing backup materials.
- Inflatable cushioning production can be energy-intensive.

ACTIONABLE STEPS:

Use Recycled or FSC-Certified Paper:
Opt for cushioning made from responsibly sourced or recycled paper.

Choose Eco-Friendly Inks and Adhesives:
Select biodegradable inks and adhesives for easier composting or recycling.

Label for Disposal:
Clearly indicate if the cushioning is recyclable or compostable.

Encourage Reuse:
Suggest customers reuse cushioning to extend its life.

Partner with Certified Suppliers:
Work with suppliers who follow environmental standards.

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PROTECTIVE PACKAGING SUMMARY

PACKAGING TYPE	ENVIRONMENTALLY FRIENDLY STEPS	ENVIRONMENTAL CHALLENGES
Bubble Wrap	Use recycled, recyclable bubble wrap; encourage reuse and proper disposal; explore paper-based alternatives.	Difficult to recycle in some areas; limited compostable options; can contribute to plastic waste if improperly disposed.
Air Cushions	Choose recycled, recyclable air cushions; consider plant-based options; label for recycling or composting; encourage reuse.	Durability concerns; limited compostable options; requires clear disposal guidance; potential for material waste if leaks occur.
Molded Pulp Inserts	Opt for recycled pulp; ensure compostability; right-size for efficiency; label for disposal; source from certified suppliers.	Limited flexibility; may be heavier, increasing transport emissions; some recycling programs may not accept molded pulp.
Mycelium-Based Boxes	Pilot in select shipments; source from certified suppliers; label as compostable; educate on eco-benefits.	Durability may vary; higher cost; limited availability in some regions; compostability requires specific disposal options.
Seaweed-Based Packaging	Pilot in select shipments; partner with certified suppliers; label as compostable; educate consumers on benefits.	Higher cost; limited availability; requires proper disposal to be compostable; may not be suitable for long-distance transport.
Honeycomb (Recycled Cardboard) Inserts	Use high recycled content; label for recycling; right-size inserts; encourage reuse; source from certified suppliers.	Bulkier than other options; limited flexibility for complex shapes; availability may vary by region.
Inflatable Paper Cushioning	Use recycled or FSC-certified paper; choose biodegradable inks/adhesives; label for disposal; encourage reuse; source from certified suppliers.	Potential air leaks reduce protection; limited recycling availability; can be less durable than other options; may require more energy to produce.

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SECONDARY PACKAGING ACTIONABLE STEPS

Use Recyclable and Compostable Materials:
Choose materials that can be easily recycled or composted, such as recycled cardboard, FSC-certified paper, or biodegradable plant-based options.

Optimize Packaging Design to Minimize Material Use:
Design secondary packaging to be as compact as possible, reducing excess material while ensuring product protection. Right-sizing packaging conserves resources and cuts down on waste.

Prioritize Single-Material or Easily Separable Components:
Avoid combining materials that are hard to separate (e.g., plastic and paper) to streamline recycling. Single-material packaging, like fully cardboard boxes, improves recyclability and reduces landfill waste.

Reduce Ink and Coatings:
Minimize ink coverage and avoid non-recyclable finishes like plastic laminates. Use water-based or vegetable-based inks and compostable coatings, which have a lower environmental impact.

Label Packaging for Disposal and Recycling:
Provide clear disposal instructions on the packaging to encourage consumers to recycle or compost correctly. Labels indicating recyclability or compostability guide end-of-life handling.

Consider Reusable Packaging:
For local deliveries or direct-to-consumer shipments, design packaging that can be returned or reused by customers, reducing the need for new materials.

Source from Certified, Responsible Suppliers:
Work with suppliers who have environmental certifications (e.g., FSC, recycled content certification) to ensure materials are responsibly sourced and produced.

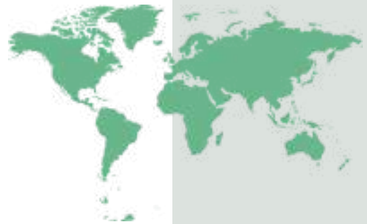
Encourage Minimalist Aesthetics:
Embrace minimalist design that uses fewer resources and eliminates unnecessary embellishments, aligning with eco-conscious consumer preferences.

GLOBAL ENVIRONMENTAL BENEFITS OF SECONDARY PACKAGING

Reduction in Product Waste:
Proper secondary packaging helps protect wine bottles from breaking during transportation, reducing waste.

Recycling Potential:
Many secondary packaging materials, such as cardboard and molded pulp, can be recycled, contributing to circular economy models.

Lightweight Materials:
Options like shrink wrap and molded pulp inserts reduce the weight of shipments, lowering fuel consumption and emissions during transport.



GLOBAL ENVIRONMENTAL CHALLENGES OF SECONDARY PACKAGING

Plastic Waste:
Plastic materials used in secondary packaging, such as shrink wrap and foam inserts, are often non-biodegradable and contribute to long-term environmental pollution.

Resource Use:
The production of materials like cardboard and wooden crates can have significant environmental impacts if not managed sustainably, including deforestation and high energy and water use.

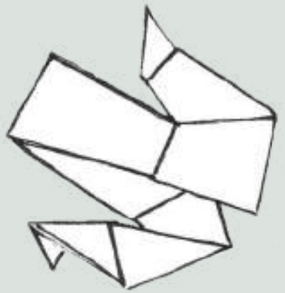
Recycling Infrastructure:
Not all regions have the necessary recycling infrastructure for materials like plastic and foam, meaning these materials often end up in landfills.

Tertiary PACKAGING:

Tertiary packaging for wine refers to packaging used for bulk handling, transport, and storage of multiple secondary packages. Its primary function is to protect and consolidate the secondary packaging (such as wine cartons or cases) for easier transportation.

Tertiary packaging is critical in the logistics and distribution phases, ensuring that products reach their destination safely and efficiently. Consists of pallets, stretch wrap, and other materials used to secure secondary packaging during transport.

It typically includes large-scale shipping and logistical packaging.



WE WILL EXPLORE:

- **Pallets**
- **Securing and Protecting Shipments**

1. PALLETS

Pallets are much more than just platforms; they are a crucial element of modern logistics and supply chain management. Traditionally made from wood, pallets are now also available in plastic, metal, and even paper.

We'll be exploring the following options:

- Wood Pallets
- Plastic Pallets
- Cardboard Pallets

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1.1 *Wooden* PALLETS

COMPOSITION AND CHARACTERISTICS

Made from softwoods like pine, hardwoods, or plywood.

ENVIRONMENTAL BENEFITS

- Wood is a renewable resource if harvested from sustainably managed forests.
- Can be repaired and reused multiple times.
- Wood decomposes naturally in the environment.

ENVIRONMENTAL CHALLENGES

- The production of wooden pallets can contribute to deforestation if sourced unsustainably.
- Heavier than plastic, which can increase fuel consumption during transportation.

ACTIONABLE STEPS:

Use Certified Wood:
Choose FSC-certified wood pallets for responsible sourcing.

Opt for Reusable and Repairable Pallets:
Invest in durable pallets that can be reused and repaired to extend their life.

Select Chemical-Free Options:
Use heat-treated rather than chemically treated pallets for safe disposal.

Recycle at End of Life:
Work with recycling programs to repurpose unusable pallets.

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1.2 *Plastic* PALLETS

COMPOSITION AND CHARACTERISTICS

Made from high-density polyethylene (HDPE) or polypropylene (PP).

ENVIRONMENTAL BENEFITS

- Durable and can be reused multiple times before recycling.
- Many can be recycled, reducing the need for new plastic production.

ENVIRONMENTAL CHALLENGES

- Take centuries to decompose if not properly recycled.
- Made from fossil fuels.

ACTIONABLE STEPS:

Use Recycled Plastics:
Choose plastic pallets made from post-consumer or post-industrial recycled materials like high-density polyethylene (HDPE) or polypropylene (PP).

Promote Closed-Loop Recycling:
Implement a take-back or recycling program where damaged or worn-out pallets can be returned to the manufacturer for recycling into new pallets.

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1.3. *Cardboard* PALLETS

COMPOSITION AND CHARACTERISTICS
Made from non-wood paper waste.

ENVIRONMENTAL BENEFITS

- Easily recyclable and recycled (made from waste paper).
- 15% lower carbon footprint than a wood pallet.

ENVIRONMENTAL CHALLENGES

- Limited reusability compared with wood pallets.

ACTIONABLE STEPS:

Use FSC-Certified or Recycled Cardboard:
Choose responsibly sourced or recycled materials.

Reinforce for Heavy Loads:
Ensure durability to extend pallet life.

Set Up Take-Back Programs:
Partner with logistics providers for reuse or recycling.

Confirm Recyclability:
Verify recyclability in target markets and provide disposal guidance.

Collaborate with Local Recyclers:
Work with local facilities for efficient end-of-life processing.

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GENERAL ACTIONABLE STEPS FOR PALLETS

Prioritize Recyclable and Reusable Materials:
Choose materials like FSC-certified wood pallets, recycled cardboard, or reusable plastic pallets to minimize environmental impact.

Optimize Material Use:
Use only as much packaging as necessary to secure and protect shipments, reducing excess material and waste.

Choose Durable Options for Reuse:
Invest in durable pallets, slip sheets, and covers that can withstand multiple uses within the supply chain.

Label for Proper Disposal:
Clearly mark packaging materials as recyclable, compostable, or reusable to encourage responsible disposal by recipients.

Set Up Take-Back or Reuse Programs:
Collaborate with distribution partners to collect and return tertiary packaging materials for reuse or recycling.

Explore Eco-Friendly Alternatives:
Consider alternatives like slip sheets instead of pallets, compostable pallet covers, or biodegradable cushioning to further reduce your environmental footprint.

Partner with Certified Suppliers:
Source materials from suppliers with certifications (e.g., FSC, recycled content) to ensure responsible sourcing practices.

Monitor and Measure Impact:
Regularly evaluate the environmental impact of tertiary packaging choices and make adjustments as new, more sustainable options become available.

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2. Securing and Protecting Shipments

Protecting wine shipments during transit is key to preventing damage and ensuring quality. From stretch wrap and pallet covers to slip sheets and pallet-free options, there are multiple ways to secure loads sustainably. This section explores eco-friendly choices for stabilizing shipments, focusing on reducing waste, reusability, and proper disposal.

We'll explore:

- Stretch Wrap
- Pallet Straps
- Pallet Covers

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2.1 *Stretch* WRAP

COMPOSITION AND CHARACTERISTICS

Typically made from low-density polyethylene (LDPE), which is a flexible plastic used to wrap around palletized goods to keep them stable.

ENVIRONMENTAL BENEFITS

- Adds very little weight to shipments, reducing transportation emissions.

ENVIRONMENTAL CHALLENGES

- LDPE stretch wrap is not biodegradable and often ends up as plastic pollution.
- Though recyclable, it requires specialized facilities, leading to frequent disposal as waste.
- Derived from fossil fuels.
- Primarily single-use, stretch wrap generates significant plastic waste.

ACTIONABLE STEPS:

- **Choose Recycled or Biodegradable Shrink Wrap.**
- **Use the Minimum Necessary:** Minimize the amount of wrap used to reduce waste.
- **Label for Recycling:** Clearly mark wrap as recyclable or compostable to guide proper disposal.
- **Explore Alternatives:** Consider reusable pallet covers or other sustainable options.
- **Set Up a Take-Back Program::** Collect used wrap from distribution points for recycling.

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Recycled Shrink wrap or biodegradable

MANINCOR

BENEFITS:

- Goes back to soil, as material biodegradable.

CHALLENGES:

- Costs 6 times more.
- Directions to dispose of the wrap correctly rarely make it to those doing the unpacking.

> We at Manincor decided for Biodegradable shrink-wrap to reduce plastic waste, fossil resources.
>
> Michael Goëss-Enzenberg | MANINCOR

2.2. *Pallet* STRAPS

COMPOSITION AND CHARACTERISTICS

- Plastic Straps: Made from materials like polypropylene (PP) or polyethylene terephthalate (PET).
- Metal Straps: Made from steel or aluminum.

ENVIRONMENTAL BENEFITS

- Plastic Straps are lightweight and relatively strong, reducing the need for heavier materials and lowering emissions during transport.
- Metal Straps are recyclable and long-lasting.

ENVIRONMENTAL CHALLENGES

- Non-biodegradable, contributing to long-term waste. They are often not recycled and can end up as litter or landfill waste.
- Energy-intensive to produce and recycle, and if not disposed of properly, can pose hazards to wildlife and the environment.

ACTIONABLE STEPS:

Choose Recycled or Biodegradable Materials:

Prioritize Reusability:
Select durable straps that can be used multiple times.

Apply Minimal Strapping:
Apply only as much as needed to secure the load.

Label for Disposal:
Clearly mark straps as recyclable or compostable.

Consider Alternatives:
Explore reusable bands or non-plastic options.

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2.3. *Slip* SHEETS

COMPOSITION AND CHARACTERISTICS

Made from materials like corrugated cardboard, plastic, or fiberboard. Slip sheets are used as an alternative to pallets to create a flat base for stacking and moving goods.

ENVIRONMENTAL BENEFITS

- Much lighter than traditional pallets, reducing transportation weight and fuel consumption.
- Cardboard slip sheets are recyclable and biodegradable.

ENVIRONMENTAL CHALLENGES

- Not as durable as pallets and may wear out quickly, leading to more frequent replacements.
- Plastic slip sheets may be difficult to recycle in standard facilities.

ACTIONABLE STEPS:

Assess Packaging for Slip Sheet Use:
Identify where slip sheets can replace traditional pallets or packaging to reduce material use.

Choose Recyclable Materials:
Opt for slip sheets made from recyclable paperboard or recycled plastics.

Select Durable Options:
Use sturdy slip sheets designed for multiple uses to minimize waste.

Evaluate Efficiency Gains:
Analyze how slip sheets improve loading efficiency and reduce transport emissions.

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Slip Sheets
LAWSON'S DRY HILLS

BENEFITS:

- Recycling a waste product into something that we need: these anti-slip sheets are made from recycled pallet shrink wrap.
- Reduces the need for pallets, as the slip sheets provide sufficient stability to keep cases in place.
- No longer need to ship pallets round the world - less weight to ship and more room for product.

CHALLENGES:

- na

"A slip sheet sits on top of a pallet which is then stacked with wine. It is then wrapped (our pallet wrap is biodegradable). When it is time for a container to be loaded, the forklift lifts the pallet into the container and pushes it off with a special attachment. This leaves the product in the container, on the slip sheet, while the wooden pallet is removed.

Belinda Jackson | Lawson's Dry Hills

2.4. *Pallet* COVERS

COMPOSITION AND CHARACTERISTICS

Made from polyethylene (PE) or polypropylene (PP), often single-use. Options include recycled plastic, biodegradable materials, or reusable fabric.

ENVIRONMENTAL BENEFITS

- Protects goods, reducing waste; lightweight, lowering transport emissions; some options recyclable.

ENVIRONMENTAL CHALLENGES

- Limited recycling availability, often single-use, and usually fossil fuel-based.

ACTIONABLE STEPS:

Use Recycled or Biodegradable Covers
to cut down on virgin plastic use.

Set Up Reuse Programs
to return or reuse covers within operations.

Minimize Use
by applying only what's necessary for protection.

Label for Disposal
to guide recycling or composting.

Consider Reusable Options
like heavy-duty fabric covers for frequent shipments.

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GENERAL ACTIONABLE STEPS FOR TERTIARY PACKAGING

Prioritize Recyclable and Reusable Materials:
Choose materials like FSC-certified wood pallets, recycled cardboard, or reusable plastic pallets to minimize environmental impact.

Optimize Material Use:
Use only as much packaging as necessary to secure and protect shipments, reducing excess material and waste.

Choose Durable Options for Reuse:
Invest in durable pallets, slip sheets, and covers that can withstand multiple uses within the supply chain.

Label for Proper Disposal:
Clearly mark packaging materials as recyclable, compostable, or reusable to encourage responsible disposal by recipients.

Set Up Take-Back or Reuse Programs:
Collaborate with distribution partners to collect and return tertiary packaging materials for reuse or recycling.

Explore Eco-Friendly Alternatives:
Consider alternatives like slip sheets instead of pallets, compostable pallet covers, or biodegradable cushioning to further reduce your environmental footprint.

Partner with Certified Suppliers:
Source materials from suppliers with certifications (e.g., FSC, recycled content) to ensure responsible sourcing practices.

Monitor and Measure Impact:
Regularly evaluate the environmental impact of tertiary packaging choices and make adjustments as new, more sustainable options become available.

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GLOBAL ENVIRONMENTAL BENEFITS OF TERTIARY PACKAGING

Reusable Materials:
Pallets (especially wooden and plastic ones) and some types of pallet strapping can be reused multiple times, reducing the need for single-use packaging materials.

Recycling Opportunities:
Many tertiary packaging materials, such as wooden pallets and metal straps, can be recycled at the end of their life, contributing to a more circular economy.

Transport Efficiency:
Tertiary packaging, such as stretch wrap and pallet strapping, helps secure loads during transit, minimizing product damage and loss. This reduces waste and enhances the efficiency of transportation systems by maximizing space and ensuring the safe delivery of goods.

Reduction in Carbon Emission related to packaging weight:
Materials like stretch wrap, plastic pallets, and slip sheets are designed to reduce the weight of shipments, which lowers fuel consumption and associated greenhouse gas emissions during transportation.

GLOBAL ENVIRONMENTAL CHALLENGES OF SECONDARY PACKAGING

Plastic Waste:
Tertiary packaging often involves the use of plastic materials such as stretch wrap, pallet covers, and plastic strapping, many of which are single-use and difficult to recycle. This contributes to plastic waste and pollution, especially when these materials are improperly disposed of.

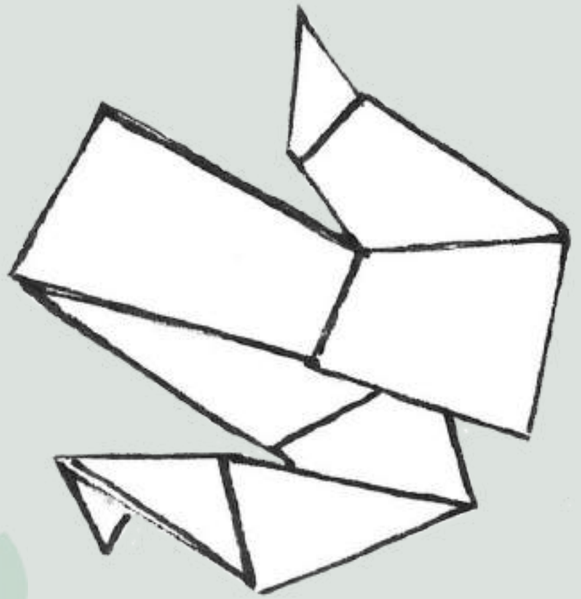
Resource-Intensive Production:
Wooden pallets and fiberboard slip sheets require natural resources (like timber) and energy to produce. Unsustainable sourcing of wood can lead to deforestation, habitat loss, and depletion of natural resources.

Recycling Infrastructure:
The recycling of tertiary packaging materials, especially plastic, can be limited by regional recycling capabilities. Stretch wrap and plastic strapping often require specialized recycling facilities, and many companies do not recycle these materials, resulting in significant waste.

Weight and Transport Costs:
While materials like plastic pallets and slip sheets are lighter than their wooden or metal counterparts, heavier options like metal strapping and pallets contribute to higher fuel consumption and carbon emissions during transportation.

V.

The Power of Design
by Omdesign

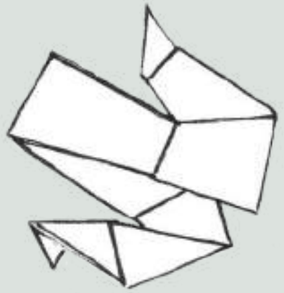


Chapter Summary:

In this chapter, we will explore the transformative power of design in driving environmentally friendly packaging.

In a future where humanity will need to look to nature for inspiration, we must relearn its cycles and rhythms to reconnect with our essence. Over the next years, the challenge will be to collectively become part of the solution, while keeping the consumer at the heart of it all. Design will be reinvented, becoming a tangible extension of brands, as concepts will be deconstructed and transformed.

Luxury will be redefined as an experience where time is cherished, and sustainability becomes integral to its core.



WE WILL EXPLORE:

- Surplus production as raw material
- Conscious Reuse
- Refill & Dematerialization
- Less is More
- The Beauty of Imperfections
- Replant, Educate, Prepare the Future
- Highlighting Respect for Nature
- The Luxury of Sustainability

As agents of change, we understand that consumer experience will increasingly take precedence. It is up to all of us to ensure that design continues to deliver unique moments, with concern for nature as the origin and the ultimate goal.

Sustainability often comes with challenges, whether in terms of costs or aesthetics. That's what makes designing appealing and environmentally friendly packaging such an exciting opportunity, while also being firmly aligned with the brand's identity.

The great challenge will be to find balance between these elements, where design represents the starting point and the seed of our commitment to the future.

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1. Surplus production as raw material

Leveraging surplus materials from winemaking and production processes to create new, environmentally friendly solutions.

Waste products are being transformed and repurposed, with by-products from one industry serving as raw materials for others. This approach is driving the creation of labels, inks, closures, and other packaging components, further contributing to a closed-loop system.

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Surplus production as raw material

1.1 *OMel* The bee hotel made of waste

Omdesign®'s OMel packaging was built with reused and surplus production of wooden wine boxes, which would be destroyed and burned.

No Waste / Reuse of waste mindset: New products are coming to life by transforming waste into packaging to tell a story.

In this case, the OMel was thought to work as a bee hotel, so it seeks to return to the environment a refuge for solitary bees to make it home and continue to protect the biodiversity of ecosystems.

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2. Conscient Reuse

Design agencies should develop innovative designs that promote the reuse of materials and packaging, reducing waste.

The challenge is to create something beautiful that people will proudly show and preserve, while reusing both the primary and secondary packaging.

2.1 *Super Bock Collector's Edition*

A premium, exclusive beer with packaging crafted from cork, designed to hold the glasses securely. It features a distinctive swing-top bottle with a practical functionality. Versatile and reusable, it promotes an emotional connection with its consumers and enhances the brand's visibility.

THE REUSE IS THE BIGGEST TREND!

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3. Refill & Dematerialization

We can reduce the need for excessive packaging through refillable systems and minimalist design principles.

The concept of refill and responsible innovation will extend the mission and utility of the product, enhancing customer engagement.

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Refill & Dematerialization

3.1 *H2OM* Time is running out

The H2OM project was launched as a self-promotion packaging that features a bottle of wine brandy, the eau de vie, and whose packaging is made from recycled cardboard.

The elegant glass bottle is repurposed as a water container.

A cork hourglass included in the design highlights the importance of water conservation and acts as a finite resource reminder.

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4. Less is More

Prioritizing lightweight and eco-efficient containers leads to minimize environmental impact.

Embracing the principle of "less is more", so we can elevate minimal material use through innovative and thoughtful ideas.

Waste less, reducing materials as much as possible.

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Less is More

4.1 *Muros Antigos range* by Anselmo Mendes

The Muros Antigos range, by Anselmo Mendes, uses a lightweight bottle (420g), lowering production and transportation emissions.

It features no capsules: no need for metal or plastic, simplifying the recycling process.

The whole range showcases the cork: highlights natural materials and reinforces a clean aesthetics.

All of these points reflect the brand commitment to sustainability, functionality and genuine character.

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5. The Beauty of Imperfections

Trends, as embracing imperfection, are shaping the way brands communicate sustainability through packaging. Authenticity is the key.

Bottles made of post-consumer recycled glass showcase the irregularities and don't hide the craft look, but make it an integral part of the stunning design.

These bottles speak to a new paradigm of glass packaging that appeals to the essence of the global "craft brands" movement.

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6. Replant, Educate, Prepare the Future

The role of creative agencies is also to challenge their clients and to design products or develop initiatives that inspire consumers to contribute to environmental restoration and long-term sustainability. It is urgent to prepare for the future now, with medium and long-term actions and results.

It's essential to educate all stakeholders in the packaging industry: suppliers, producers, retailers, and consumers alike.

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Replant, Educate, Prepare the Future

6.1 *Dream OM* The planting of a simple seed

In the cyclical dance of life, a simple seed holds the power to inspire and drive the evolution of humanity. This was the inspiration for Omdesign® to create the Dream Om project, that uses a sleeve made of cannabis-based paper, recycled and recyclable, built without glue and only with embossing and printing. The bottle base includes wheat seeds, representing the foundation of human sustenance and growth, and inside the paper sleeve there are the instructions to plant, nurture, and grow them, making the consumer part of the sustainability journey.

After use, the small bottle of Whisky is reusable and multifunctional, so can be repurposed as a decorative jar, adorned with the wheat flower planted, preserving its meaning and beauty for decades to come. This refillable glass container was enhanced with cork, on the stopper and on the neck-collar, that also works as a jar coaster. It also counts with a wood-free paper label made from 15% by-product from barley processing. To avoid single-use items, the seeds at the bottom are sealed by a reusable drop stopper, which poses an incredibly important message: to not stop the ecological drop.

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The cycle of Dream OM

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7. Highlighting Respect for Nature

Choosing environmentally friendly materials, as cork, allows the product to be used as a tool to showcase and celebrate the symbiotic relationship between winemaking and nature.

7.1 *Ramos Pinto RP10* Packaging as a story

The RP10 packaging is more than just a container: it's a powerful storytelling platform that expresses the brand's commitment to sustainability while shaping consumer perceptions and inviting them to share with the brand the creative reuse of this piece.

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8. The Luxury of Sustainability

Redefining luxury in beverages design through the lens of sustainability, where eco-conscious choices become a hallmark of premium products.

Despite the differences between the mass market and the luxury sector, they converge in their shared focus on sustainability and the value of time. Whether in its optimization or appreciation, we must leverage the crucial roles these elements will play as both a necessity and, increasingly, a luxury.

When we cannot run away from creating something rare and unique, we should turn our mindsets to use and promote a conscious production to the niche luxury sector, whose challenge is to create a desirable work of art, too remarkable to discard, that will be kept for generations.

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Conclusion

THE MANIFESTO

Zoom out: understand how materials were extracted and how they will most likely end their life. Take into account the market you're exporting to and their end-of-life facilities. Always think reusable and reused, recycled and recyclable. Move your mindset from single to multiple use. Avoid extracting new materials at all costs.

Go local: source materials close to home and avoid silent travel miles before and after packaging arrives and leaves your facilities. Think efficiency. Optimize your supply chain with this in mind.

Waste less. Less waste, fewer materials, translates to more profit on your balance sheet and less material to handle in your operation. Go radically light.

Ask questions of your suppliers. Choose them mindfully, like-minded.

Be bold: stop foil, reuse bottles and outer cases, avoid flint, bespoke, and heavy containers.

Fly less, ship more. Dare to ship your wine in bulk.

Start small if needed: make your tasting room a reuse lab or start with one brand for bulk shipping.

Go natural: the more your materials come from nature, the more they will biodegrade at the end of their life. Use fewer materials and increase recyclability.

Educate your consumers; be vocal about your endeavors and your reason why.

Be holistic: don't just consider your container but also your label, ink, and shrink wrap. Hold yourself accountable for the waste your packaging generates. Don't think only of carbon—think of your environmental footprint, your environmental impact. This shift will lead to a more holistic view, encompassing the entire life cycle of any material you choose, extending beyond packaging to your entire winemaking process.

This is our packaging manifesto. It can be yours too.

Can we count on you?

Please sign it and send it back to us to help start a global wine movement around it.

-The Porto Protocol Team

Bibliography

BIBLIOGRAPHY

CHAPTER I - GLOBAL OVERVIEW OF PACKAGING

(1) https://www.bottlebill.org/index.php/current-and-proposed-laws/worldwide/german
(2) https://www.ecosistant.eu/en/plastic-tax-in-spain-2023/y
(3) https://www.gov.uk/government/publications/extended-producer-responsibility-for-packaging-illustrative-base-fees/extended-producer-responsibility-for-packaging-illustrative-base-fees?utm_source=Klaviyo&utm_medium=campaign&_kx=PoCZhkgXS9Ej8A1GfR8kNzgyxxzMRiH3GlmOtdDS1hdQZP-I0zuZzCcVuaoh9Ndd.RCBQTB
(4) https://calrecycle.ca.gov/BevContainer/
(5) https://www.packaginglaw.com/news/australia-releases-national-plastics-plan
(6) https://sustainability.chemlinked.com/greenpedia/south-korea-extended-producer-responsibility-epr-system
(7) https://www.prowein.com/en/Media_News/Press/Press_Releases/Special_Report_on_ProWein_Business_Survey_2022_Packaging

CHAPTER II - THE ENVIRONMENTAL IMPACT OF PACKAGING MATERIALS

(1) The average global wine production is estimated to be around 260-270 million hectoliters per year, according to the International Organisation of Vine and Wine (OIV) converted into standard wine 0.75 liters bottles. This is a rough estimate, not an accurate number as many other containers are used, from bag-in-boxes to pouches.
(2) https://sdgs.un.org/goals
(3) https://green-business.ec.europa.eu/environmental-footprint-methods/life-cycle-assessment-ef-methods_en
(4) https://www.iwcawine.org/ghg-emissions
(5) Institute of Grocery Distribution (IGD) Report: Packaging: which supermarket categories have the biggest opportunity for action?
(6) Global Resources Outlook 2024 - UN Environment Programme
(7) https://ec.europa.eu/eurostat/databrowser/view/env_waspacr/default/table?lang=en
(8) https://www.oecd.org/
(9) https://www.epa.gov/
(10) https://globalrecyclingfoundation.org/
(11) https://nrcrecycles.org/
(12) https://www.wwf.org.uk/sites/default/files/2021-12/UK_Global_Packaging_Materials_Footprint.pdf
(13) European Aluminium Association.
(14) FEVE
(15) CEPI

BIBLIOGRAPHY

CHAPTER III - PRIMARY PACKAGING

(1) The Wine Society's Alternative Packaging Report - https://www.thewinesociety.com/49a7e0/globalassets/pdfs/sustainability/the-wine-societys-alternative-packaging-for-wine-report v12.pdf
(2) https://www.omsystembolaget.se/english/sustainability/labels/climate-smarter-packaging/
(3) https://www.unep.org/news-and-stories/story/problem-our-dwindling-sand-reserves & https://news.un.org/en/story/2022/04/1116972
(4) Information provided by BA Glass
(5) https://www.verallia.com/re-use/en/publication/contents/templates/VERALLIA_WHITE-BOOK_EN.pdf
(6) https://www.mga.edu/sustainability/docs/Recycling_Facts.pdf
(7) https://ukgbc.org/our-work/topics/embodied-ecological-impacts/aluminium/
(8) Frugal Pack
(9) https://ourworldindata.org/data-insights/packaging-is-the-source-of-40-of-the-planets-plastic-waste
(10) https://www.rainforest-rescue.org/topics/aluminum
(11) https://fvrecycling.com/blog/surprising-statistics-about-the-waste-that-businesses-produce
(12) https://circulareconomy.europa.eu/platform/sites/default/files/euric_metal_recycling_factsheet.pdf
(13)Bulk: https://www.awri.com.au/wp-content/uploads/2023/03/s2341.pdf

OTHER SOURCES:

- United Nations Environment Programme (UNEP) - Single-Use Plastics: A Roadmap for Sustainability
- This report from UNEP provides insights on the challenges of plastic recycling, contamination issues, and the environmental impact of single-use plastics.
- Link: UNEP Single-Use Plastics Report
- World Wildlife Fund (WWF) - No Plastic in Nature: Assessing Plastic Ingestion from Nature to People
- WWF's report examines microplastic pollution, its accumulation in oceans, and the effects on ecosystems and human health.
- Link: WWF No Plastic in Nature Report
- Ellen MacArthur Foundation - The New Plastics Economy: Rethinking the Future of Plastics
- https://unepgrid.ch/storage/app/media/Publications/2022sandandsustainabilityreportfinal.pdf
- https://www.oiv.int/sites/default/files/documents/OIV_State_of_the_world_Vine_and_Wine_sector_in_2022_3.pdf
- https://consult.defra.gov.uk/alcoholic-drinks-geographical-indications-team/consultation-wine-reform/supporting_documents/Wine%20Reforms%20Consultation%202023.pdf Institute of Grocery Distribution (IGD) Report: Packaging: which supermarket categories have the biggest opportunity for action?
- https://www.statista.com/statistics/397870/global-wine-production/
- Sustainable Wine Roundtable Bottle Weight Accord

BIBLIOGRAPHY

OTHER SOURCES:

- Ellen MacArthur Foundation, Reuse – rethinking packaging (2019). - https://www.ellenmacarthurfoundation.org/reuse-rethinking-packaging Verallia- Reimagining reuse for the circular economy of glass - https://www.verallia.com/re-use/en/publication/contents/templates/VERALLIA_WHITE-BOOK_EN.pdf
- https://spirits.eu/media/press-releases/spiritseurope-welcomes-institutional-alignment-on-ppwr-including-mandatory-re-use-exemption-for-spirits-better-protection-of-packaging designs-by-ip-rights Styria: https://www.youtube.com/watch?v=yVi54LTIAaQ https://circulareconomy.europa.eu/platform/en/strategies/french-act-law-against-waste-and-circular-economy
- https://www.therealreview.com/2022/08/04/top-ten-wine-consumers/
- https://www.abc.net.au/news/2017-08-07/recycling-companies-forced-to-stockpile-glass-industry-crisis/8778088
- https://www.wwf.org.uk/sites/default/files/2021-12/UK_Global_Packaging_Materials_Footprint.pdf
- https://www.thedrinksbusiness.com/2017/02/wine-closures-the-facts/
- https://daily.sevenfifty.com/the-search-for-the-perfect-eco-friendly-wine-closure/
- https://industrial.sherwin-williams.com/na/us/en/packaging/media-center/articles/can-coatings-unlocking-future-sustainable-packaging.html
- https://www.packagingdigest.com/bottles/11-fascinating-facts-about-frugalpacs-paper-bottles
- https://www.friendsofglass.com/taste/why-is-wine-stored-in-glass/
- https://www.packagingdigest.com/bottles/11-fascinating-facts-about-frugalpacs-paper-bottles
- https://www.alko.fi/en/alko-inc/for-suppliers/responsibility-and-impartiality/responsibility/environmental-impacts
- https://www.decanter.com/wine-reviews-tastings/bag-in-box-wine-374182/
- https://www.alko.fi/en/alko-inc/for-suppliers/responsibility-and-impartiality/responsibility/environmental-impacts
- https://www.alko.fi/INTERSHOP/static/WFS/Alko-OnlineShop-Site/-/Alko-OnlineShop/fi_FI/pdf_t/Muut%20pdf_t/Alko-Aluminium-bottle-CO2-calculation-Final-report.pdf
- https://www.portoprotocol.com/case-studies/cantina-goccia-good-wine-in-alternative-packaging/
- https://en.greengentechnologies.com/green-gen-bottle/
- https://www.csl-packaging.com/showroom/recyclable-cardboard-molded-paper-pulp-wine-bottle-packaging-tray.html
- https://www.heritagepaper.net/3-replacements-for-styrofoam-shipping-boxes/
- https://forums.winespectator.com/topic/styrofoam
- https://www.defeoassociates.com/renew-liner-simply-does-not-care/
- https://www.thermalshipping.com/products/box-liners/renewliner/
- https://www.sciencedirect.com/science/article/abs/pii/S0959652622020479https://mecsgroup.com/case-studies/wood-pallets-vs-plastic-pallets/
- https://igps.net/blog/2020/03/10/alternatives-to-pallet-wrap-eco-and-budget-friendly-ways-to-stabilize-pallet-loads/
- https://www.nicholdd.co.nz/product/greenspider-pallet-wraps-nz

BIBLIOGRAPHY

OTHER SOURCES:

- https://www.rebornplastics.com/
- https://plasblock.com/about-2/
- https://www.palletone.com/eco-friendly-wooden-pallets-are-sustainable-and-feature-certified-epds/
- https://www.sciencedirect.com/science/article/abs/pii/S0959652622020479
- https://naturalmerchants.com/organicwines/eco-friendly-organic-wine-labels/
- https://selfpackaging.com/content/43-sustainable-materials
- https://www.youtube.com/watch?v=ZhZb4OfJaSk&t=1831s
- ·https://www.bonappetit.com/gallery/sustainable-wine-packaging
- ·https://www.winemag.com/2022/02/20/wine-capsules-purpose/
- https://www.youtube.com/watch?v=RBEzlP9FYpE
- https://medium.com/@mandreosky/2024-packaging-trends-98b629257f19
- https://www.epa.gov/eps-partnership/aluminum-industry https://archive.epa.gov/epawaste/conserve/smm/wastewise/web/html/factoid.html https://bottledwater.org/environmental-footprint/ https://recycling-revolution.com/recycling-facts.html Le grand retour du réemploi du verre - ADEME Infos https://aive.pt/wp-content/uploads/2024/02/Wine-toolkit-2023-feb.pdf https://energyanalysis.lbl.gov/publications/climate-impact-primary-plastic https://link.springer.com/chapter/10.1007/978-981-97-6461-7_7 https://www.worldpackaging.org/Uploads/2021-10/ResourcePDF37_1635406572.pdf Report: Return System for Styria Wine Bottles
- International Organization for Standardization (ISO) 14040 and 14044 Standards for LCA
- Greenhouse Gas Protocol: https://ghgprotocol.org
- https://www.wri.org
- https://www.epa.gov/smm/sustainable-materials-management-basics
- https://www.eea.europa.eu