Damn the Torpedoes

SUSTAINABILITY JOURNAL
MARE ISLAND BREWING CO.

Revised 11/2025

Introduction:

This living document is a summary of our sustainability efforts here at Mare Island Brewing Co. (with, yes, a bit of context and commentary sprinkled in).

Since our founding in 2014, we've always tried to do what we thought was the "green thing" whenever possible. But in retrospect, in those early days, we were… a wee bit uninformed.

By 2023, we realized—much to our surprise (and horror)—just how uninformed we were. We discovered that our cans were being rendered unrecyclable and diverted to landfill because of the "BOPP" ("Biaxially Oriented Polypropylene"—essentially a form of plastic) labels that we—like most all of the Craft Brew world—use. That discovery sent us down an intense sustainability review that's produced some real successes, including significant reductions in our waste stream, as well as material cost savings. At times, though, it's felt like a full-on trip down the rabbit hole.

For our customers, this journal offers some detail and transparency into our sustainability efforts. More than anything, we want to convey that we are intensely deliberative in our attempts to do the "right" thing—even when what's "right" turns out to be less than obvious and rarely easy.

For our fellow brewers in the Craft Brew industry, we put this together in hopes it can help shortcut your own sustainability efforts. We sure wish we'd had something like this when we first dove into being "greener." (If nothing else, know you're not alone in the rabbit hole.)

Sustainability is a complicated concept. We've come to subscribe to the "Planet-Profits-People" triad: environmental, economic, and social. Without balance among all three legs of

that stool, any effort is pretty much doomed to fail. The interplay between those three can be a particularly Gordian knot.

And let's get this out of the way: we're not smarter than the average bear, and we certainly don't have all the answers. There are, most certainly, errors and gaps in here. If you find the mistakes or have further information or suggestions, please reach out—it takes a village to save the world.

--Kent Fortner and Ryan Gibbons, *Founders of Mare Island Brewing Co.*

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Basic Recycling

Recycling is worthwhile. It isn't as straightforward as you might think, and it can be bizarrely maddening—but on balance, it is the right thing to do. We've also found that if you make it easy for people, they'll generally do it.

To that last point, we learned that so long as recycling bins are within a few steps—or under a desk—people are happy to use them. Any farther than that, and compliance dropped fast. Simple, but true.

To understand why recycling isn't straightforward, it helps to know how the system actually functions. Your waste management company is typically just collecting materials for potential recycling. They provide your bins and dumpsters, pick them up, sort the contents at their Material Recovery Facility ("MRF"—remember this term), bale the sorted materials, and then ship truckloads of post-consumer bales to buyers, sometimes to far-flung corners of the earth.

They'll sell aluminum (via a broker) to a smelter in Alabama—or maybe Mexico. They'll sell glass, again via a broker, to a glass recycler in Utah—or maybe Canada. They may sell plastics, when the price is right, to a state-of-the-art plastic recycling plant in Bakersfield, CA. Or… they may sell those plastics to Malaysia—and pay to ship them halfway around the world on a diesel-belching cargo ship. And what happens when that plastic gets to Malaysia is sometimes dubious: it might actually get burned in a big pile on the beach instead of recycled.

In fact, sometimes your recycling facility collects recyclables and just sends them to landfill. That happens when there's no economic buyer for the material, since the company is required by law to collect and sort it. Or the company may have no easy way to tell customers that a certain item isn't currently accepted. Sometimes they stop recycling a material temporarily when prices drop, but keep encouraging customers to separate materials so habits don't die off.

Every waste company has different economics and equipment. Some facilities—like San Francisco's—have fancy-pants optical sorters and eddy-current systems. Others—like Vallejo's—rely on a dozen poor blokes standing at an impossibly fast-moving conveyor belt, grabbing what they can and tossing it toward the right chute. Recycling is not at all the same everywhere. What gets recycled in one city may get landfilled in another, and the market for post-consumer materials is constantly in flux.

It can be disheartening to see how little of what's collected actually gets recycled. That said, some materials—particularly unlabeled used aluminum beverage cans—are a roaring success.

Cans and Labels

In 2025, we developed a "peelable" can label—a two-year effort full of twists, turns, and one major curveball.

As mentioned in the Introduction, back in 2023 we discovered our cans were unrecyclable because of the BOPP ("Biaxially Oriented Polypropylene") labels we used. That was a stunning revelation for a lot of reasons. We'd moved to cans in 2018 partly because aluminum is the ultimate recyclable material—it's endlessly reusable and takes about 95% less energy to recycle than to create from mined bauxite. Maybe reread that last sentence and let it sink in.

BOPP—basically a form of plastic—is magical stuff: strong, tear-resistant, and waterproof. It's perfect for beer labels that would otherwise soak right off the cans in a cooler. But as with many magical things, it has a dark side.

BOPP labels cause nasty problems at the smelters that recycle aluminum. The plastic and its adhesive produce noxious gases during smelting and leave pinpoint holes in the recycled aluminum sheets (the ones destined to become new cans). As a result, recycling facilities sort these labeled cans out and send them straight to landfill. One rough estimate: if all those labeled cans were actually recycled, it would eliminate the greenhouse-gas equivalent of about 67,000 cars from U.S. roads each year.

That discovery launched us on a journey. We visited recycling facilities, consulted corporate sustainability officers, university researchers, and non-profit experts. Nobody had the full picture, let alone a solution. A "recycling-friendly" aluminum can label—one that smelters could handle—doesn't currently exist. Nor is it in the works, based on our research.

Even more surprising, most of our Craft Brew peers were just as uninformed. And a few who were informed admitted they were afraid to talk about it—worried that well-meaning legislators might outlaw BOPP labels outright, which would be disastrous for small brewers. We get that fear. Very much so. But ignoring a problem doesn't make it go away.

Cans printed directly (think Budweiser) are perfectly recyclable. But the long lead times and massive minimums on printed cans—despite recent improvements—just don't work for small brewers who might dream up a new IPA on Thursday and can it two Thursdays later. BOPP labels make that flexibility possible. BOPP labels survive wet canning lines and Uncle Lou's boat cooler. In short, BOPP labels make Craft Brew possible.

We want to give props to two breweries—Telluride Brewing in Colorado and Anderson Valley in California—who tried to tackle this before us. But we felt their solutions, while well-intentioned, fell short: the labels were tough to peel and left behind too much sticky residue.

Our main breakthrough came through our label partner, Creative Labels in Gilroy, California. Pressman Robert (with the blessing of owner Chris) did the technical heavy lifting. Together

we tested about two dozen combinations of face stocks, adhesives, and back-printing configurations. If you're a brewer and want to get in on these peelable labels, call them.

We don't claim this is a perfect fix. But it at least makes recycling possible for those willing to peel. Our Big Hairy Audacious Goal: industry-wide adoption of "peel the label and toss, then recycle the can." That would be a real solution.

California's SB54 law—rolling out now with full effect by 2032—puts responsibility (and financial penalties) on producers for products that aren't recyclable. Marrying a recyclable can to a non-recyclable label fits squarely in those crosshairs. We see this peelable label as one way to stay ahead of that curve.

We determined our ideal peelable-label solution needed to:

- Allow the consumer to peel and toss the label, then recycle the blank can.
- Maintain full print quality.
- Survive cold, heat, and Uncle Lou's boat cooler.
- Use PET backing (not paper) for compatibility with our canning-line.
- Be easy to start peeling and leave no sticky residue.
- Cost no more than 10% above our current label price.

After two years of trials, our winning combo—developed with Creative Labels—uses Avery Dennison's R3500 "removable" adhesive. It checked every box except cost; it is bout 30% pricier than our old label, adding roughly 75 cents per 24-pack of 16oz cans. Manageable, but not trivial. We're hoping economies of scale—other brewers adopting it—might bring that cost down.

Interestingly, "aluminum" doesn't even appear on Avery Dennison's spec sheet for this adhesive. This is a brand-new use case. But progress in removable labeling for other materials gave us a head start.

And a quick note for our fellow brewers: we've never used labels containing PFAS ("forever chemicals"). They were common for waterproofing in the past, but California's restrictions have all but eliminated them. That said, it's worthwhile to inquire about your own labels, peelable or not.

Now, the curveball: we use PET release liner (the rolls the labels come on—what's left behind after canning). Like many small breweries, we abandoned paper backing long ago because it tore too easily on the canning line. Conveniently, we also found a collective that recycles PET liner (unlike paper, which has a silicone coating and is even more difficult to recycle). The hitch came when we realized some adhesive stocks that worked perfectly on paper backing failed on PET. We assume the glue cures differently on PET than on paper, changing how the adhesive releases. That discovery set us back months.

Our big "ah-ha" moment was *back printing*. Creative Labels suggested they could jet-print a thin layer of "adhesive deadener" onto part of the label's sticky side before it's rejoined to the liner (that's pretty wild to think about). We tested dozens of configurations and settled on

printing a quarter inch of deadener at the "peel here" corner, plus an eighth inch along the leading edge—at half strength—so the label still held but was easy to start peeling.

That opened another idea: if we're printing on the back anyway, why not print a hidden message? An easter egg! We can print this in shades of gray only—dense print would bleed through our cream stock—but this is still a great chance to tuck a bit of storytelling under the label. That marketing real estate alone might justify the increased price.

We're still experimenting with less expensive adhesives and checkerboard deadening patterns to cut costs, but for now, we've got a working solution.

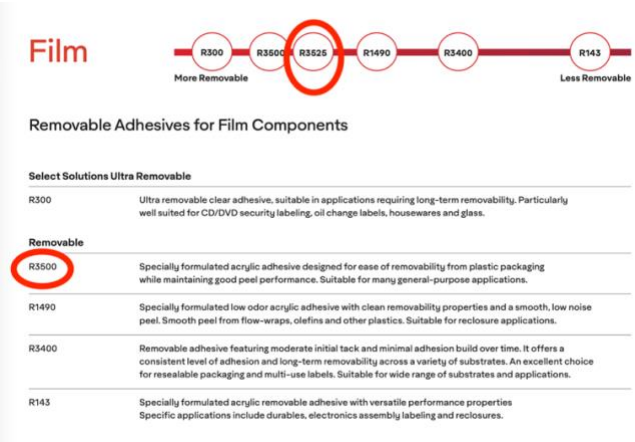
Our testing process played out over two years, across half a dozen trials with multiple adhesive and face-stock options. We tested labels after stints in the cold box, the fridge, the warm warehouse, and yes—Uncle Lou's cooler. Each sample sat two weeks before a blind panel scored it for print quality, bubbling, bleed-through, peelability, and residual adhesive.

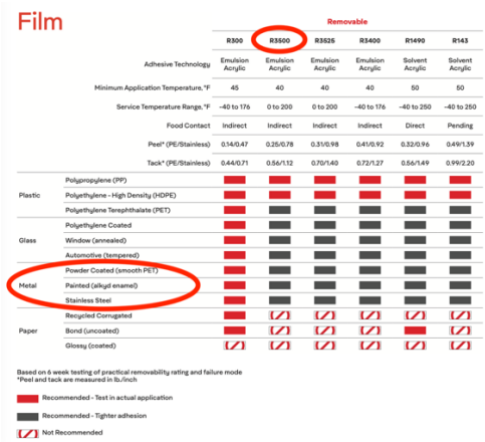
Our final combo—Avery Dennison R3500 removable adhesive, PET liner, back-printed deadening compound, and back-printed messaging—passed every test. We're now working with the California Craft Brewers Association to share, test, and (hopefully) promote it across the industry.

You can see Avery Dennison's full removable product line here. And we'll drop some highlights of the fact sheet in this document.

While Avery hasn't officially tested R3500 on aluminum, it's working in the field for us. We're now labeling a portion of our cans with this peelable configuration, with intent to go to all labels in 2026.

If you're a brewer, we'd love to compare notes. If you're a customer, peel a label—you might just find a story hiding underneath.





Yardbird Box

We worked hard to come up with an eco-friendly box suitable for both delivering and shipping our bi-annual beer-club releases. It turned out to be incredibly *not* straightforward.

The outer box, at least, was simple enough—though we had to design a custom one, down to the millimeter, to make the system work. Our box vendor was equal parts helpful and maddening, but eventually we got there. The custom cutting and folding plates were pricey, but we eventually bought a three-year supply to make the economics pencil out. (This was after a small proof-of-concept run—we can't recommend that approach highly enough: always do a trial before investing heavily.)

The box needed to fit four four-packs and three bottles. That's a tricky puzzle, especially when it the box has to protect everything well enough to survive as a UPS shipment. We worked with our vendor to create a foam insert with three holes that suspended the necks and bottoms of the bottles safely between the four-packs of cans. The vendor proudly told us the foam was post-consumer recycled material and itself recyclable…

…Only it wasn't. It might be recyclable somewhere—but not anywhere we could find in California. As we've learned with other materials, "theoretically recyclable" doesn't mean it is actually accepted at a MRF. In practice, all that foam went straight to landfill.

After working through the two-year stockpile of foam we'd bought to lower cost, we went back to our cardboard vendor and together came up with an impressive—if we do say so ourselves—piece of cardboard origami that did the same job. It's made of wonderfully recyclable cardboard, has the same cutouts, and offers nearly identical protection. Plus, a marketing bonus: we could print right onto the cardboard (more marketing real-estate), whereas the foam was, well, just foam.

Ultimately, we brought the cost roughly in line with the foam, made the packaging 100% recyclable, and gained extra messaging space. A big win—not without some work and heartbreak, but a big win nonetheless.

The cans (and their labels) are covered in the previous section, and we'll tackle PackTechs next.

PackTechs

Remember those heart-wrenching photos from a decade ago of turtles tangled in six-pack rings? The first fix was the "cut the rings" campaign. The next evolution was PackTechs.

PackTechs are the plastic four- or six-pack clips that snap over the tops of beer cans and double as carrying handles. Look down the beer aisle and they're everywhere. They're the modern replacement for the old six-pack rings. Turtles are now safe.

And supposedly, these are "recyclable." The chasing arrows and recycling number are printed prominently on top. Manufacturers insist they're recyclable—and in a perfect world, they'd be right. But we don't live in that world.

In the real world, PackTechs are too small—smaller than a softball—to get sorted off most recycling lines. Their shape also confuses optical sorters. Colored PackTechs only get sorted successfully about 30–40% of the time. Black colored PackTechs, for reasons we still don't fully understand, fool the machines completely—at some MRFs, their success rate is literally zero. That's a lot of "recyclable" plastic headed for landfill.

At least ours are not black.

Given those sorting limits, the next frontier is finding a truly sustainable replacement. We recently saw an impressive piece of cardboard origami that folds and presses over four- or six-packs—100% recyclable and printable for branding. We're eager to test it. Coors (ahem) has launched—in limited test markets—a wrap-around cardboard carrier that encloses the entire pack. Intriguing.

For now, we collect used PackTechs whenever we can—especially when we're pulling cans ourselves at events. We wash them and reuse them. That saves some cost and keeps a bit of plastic in circulation instead of heading to the landfill.

Still, from a sustainability standpoint, PackTechs have been a disappointment. We'll keep looking for something better—but in the meantime, we're squeezing as much reuse out of them as we can.

Compostables at Taprooms: Table Scraps and Compostable Bags

Let us share a tale of two cities.

California's SB1383, passed in 2016 and effective in 2022, requires restaurants to compost food scraps. At our Benicia Taproom, serviced by Republic Services Waste Management, the new organics bins just showed up—no charge. We lined them with compostable bags, scraped food into them, and off they went. We even reduced our waste bill because we could shrink our landfill dumpsters and reduce pickup frequency. The City of Benicia later recognized us for our efforts with a City Council plaque and a photo op featuring our chef, restaurant manager, the mayor, and a framed certificate. Easiest award we've ever earned.

At Taproom Number Two, in our fair city of Vallejo, Recology Waste Management charged us for the organics dumpster. We filled it with compostable bags of food scraps…and they never

picked it up. When we called, they told us we couldn't use compostable bags—their composting cycle was only 30 days, and the bags didn't break down fast enough. Our chef and sous chef had to climb into a dumpster full of rotting food, slice open every bag, dump out the contents, and haul out the plastic. We're lucky they still work for us.

Which meant, somehow, we were supposed to scrape table scraps into a bucket and dump raw food directly into a dumpster? Nasty. And from a health department standpoint, downright unworkable. We would have been written up in a hot second for harboring open, rotting food. As we should have been.

So, frankly, we just quit composting. The agony of defeat.

However, eventually, after countless calls with Recology, CalRecycle, Vallejo city staff, and even the City Council, we got the go-ahead to use compostable bags again. (We still don't know whether Recology's process changed or if it's now just *their* poor employees cutting open the bags.) But—abracadabra—we were composting like mad once more and drastically cutting our landfill load. We even got featured in Recology's monthly newsletter for our efforts (go figure).

One important point: when organics end up in landfills, they decompose without oxygen and release methane—roughly ten times more potent as a greenhouse gas than CO_2 in the short term. Some landfills try to capture that gas for reuse (methane is what we all know as "natural gas"), but methane capture systems are only 40–70% efficient. Sending organics to compost instead of landfill delivers massive greenhouse-gas savings.

Moral of the story? Local waste policies can make or break even the simplest sustainability effort.

Compostables at Taprooms: The Three Hole Conundrum

Who knew the humble plastic spoon could cause such angst?

Our third Taproom, on Mare Island, faces an even trickier composting challenge. Our food service runs out of a food truck we own, which means everything—plates, cups, cutlery—is disposable.

You know the drill: you stand in front of one of those three-hole bins—compost, recycling, landfill—utterly unsure what goes where. Our dream was simple: everything off the wagon should be recyclable or compostable. No landfill.

Our first undoing was the plastic spoon—the poster child for our plastic problem. While touring our local MRF (Material Recovery Facility), we learned that human sorters are trained to ignore anything smaller than a softball. They simply don't have the time or bandwidth. That

means all those little ketchup cups, bottle caps, and "recyclable" spoons you've paid extra for? Straight to landfill.

A little math:

- Basic plastic spoons: $20/case of 1,000.
- PCR (post-consumer recycled) spoons: $33/case.
- "Compostable" bioplastic spoons: $45/case.
- Bamboo spoons (truly compostable): $51/case initially, later $77/case.

We skipped basic plastic spoons—despite their low cost—because they were neither recycled nor recyclable. Then we discovered PCR spoons couldn't be recycled either, even though they had the chasing arrows on them; but at least they were made from post-consumer plastic. We moved to compostable bioplastic spoons—until we learned those don't actually compost in most facilities and release methane in landfills (like compostable bags). Bamboo seemed like the holy grail—until customers hated them (try eating soup off a splintery plank) and prices jumped to $77/case.

Given all that, what's the best option? Probably the basic plastic spoon if you count the total energy footprint of production. But at least the PCR spoon, which we use now, gives some plastic a second life. It's kind of a toss-up. We went with PCR.

So, before you yell at us for having plastic spoons (and yes, that happens), know that we worked hard on this issue. We're now looking to switch to metal spoons we can wash in-house with a commercial dishwasher—labor- and water-intensive, sure, but likely the greenest long-term choice. And it would be an upgrade for the dining experience. Win-win? TBD.

Ultimately, we didn't solve the three-hole problem. We still have that classic, maddening trio of pictographs that requires real focus in order to sort your refuse correctly. But here's the good news: compared to the days when nearly all our taproom waste went to landfill, we now prevent roughly 29 tons of CO_2-equivalent emissions each year simply by composting. That's 165 cubic yards of waste diverted—and the equivalent of taking about seven cars off the road. A solid win for little ol' us.

We're constantly re-evaluating how to balance planet, profits, and people vis a vis what is compostable, vs. what we can afford (and what people are wanting/willing to eat their soup with).

R.O. Water

We installed a small reverse-osmosis (R.O.) system to prep our brewing water. The thing is, for every two gallons that enter the system, only one gallon of pure brewing water comes out—and one gallon of brine, or "tails," is produced (and typically goes down the drain). In other words, 50% recovery.

Some high-efficiency systems can reach 80% recovery, and we plan to pursue that upgrade when replacement time comes—but that's not a cost we can justify now.

In the meantime, we capture those tails in a separate tank and reuse the water anywhere its mineral content is useful—or at least not harmful. We use it for washing down floors, cooling and diluting brewhouse discharge before it hits the drain, and balancing wastewater pH to meet sewer requirements.

The plumbing and tank for this added a modest upfront cost during construction, but it's paid off in water savings.

Spent Grain to Ranchers

One of our strongest sustainability wins has been side streaming our spent grain and other brewing organics to a local rancher/farmer, who mixes the grains into livestock feed and tills our trub, yeast, and hop leftovers into their fields as nitrogen-rich nutrients.

We're not pioneers here—many breweries do this. Some even get paid up to sixteen cents a pound for their organics. We've always given ours away, though we ask the ranchers to buy and maintain the macro bins used for transport, and to handle pickup themselves. After all, they've got the space, the gear, and usually the requisite F-350 dual-cab dually for the job.

We do provide and maintain our IBC totes (affectionately known as the "sh*t *bins*") that hold trub, yeast, and hop residue. Those bins aren't much use on a ranch, but we can repurpose them at the brewery when needed—and they're cheap and easy to find on Craigslist. We've also made it a rule: ranchers take both the spent grain and the sh*t bin. It's a fair deal—one's easy (feed), one's a little more work (tilling it into the land), and they get/take both for free.

Geography helps; we're surrounded by ranch and farm country—Napa, Sonoma, Central Valley—so finding willing partners hasn't been difficult.

For years, until he passed away, we worked with Farmer Gene, who raised about a hundred head of Black Angus in Napa Valley. He'd swing by weekly, we'd shoot the breeze for ten minutes, and he'd haul off our spent grain for his herd. Now and then we'd personally buy a side of beef back from him, closing the loop in the tastiest way possible.

After Gene passed, we began working with Crane Ranch in Sonoma, a multigenerational farm now run by Ron Crane. They pick up weekly, feeding about a thousand head of sheep. Again, we've even gotten a lamb or two from them. If we ever gain access to a commercial butchering facility, we could someday serve that same meat in our taprooms. For now, it's just for personal use.

We also share a small amount of grain with a local baker who teaches a "Spent Grain Baking" class—more novelty than sustainability—but it's fun. And our chef occasionally makes spent grain crackers for beer dinners.

Effluent

One of the biggest surprises in getting into craft brewing was how much time we'd spend managing effluent—the liquid outflow that ultimately heads to the sewer system.

In addition to side streaming all the solids we can (see: Spent Grain to Ranchers), which keeps costly biological oxygen demand and total dissolved solids down (two key factors that the Sanitation and Flood District use to calculate your bill), managing the pH of that outflow to stay within San and Floods limits takes constant attention. One technique is that we often use tails from our R.O. system (see: R.O. Water) to dilute the effluent stream and bring the pH into range.

Beer itself—and the general liquid byproduct of brewing—is mildly acidic. Our cleaning solutions, however, are intensely basic. After installing an automated system that measures pH and injects acid or caustic from storage barrels as needed, we discovered something simple but game-changing: a larger holding tank allows the acidic and basic sources to neutralize each other naturally, with fewer (or sometimes without) additional chemicals.

We actually repurposed the first brewing tank we ever bought—a sentimental relic that had been sitting in our warehouse for nearly a decade. It's now our neutralization tank. That's a win on two fronts: less chemical use and fewer 55-gallon plastic drums required for chemical delivery.

We later learned from our chemical company that Gordon Biersch collects spent drums such the manufacturer can pick them up by the truckload for reuse. That discovery was bigger than it sounds—early on, we had dozens of those giant plastic barrels lying around, and you can only Sawzall the tops off so many for use as large-event trash cans.

Utilities and Construction

Conservation of utilities—electricity, natural gas, water, and CO_2—is still a work in progress for us.

One of our first steps has been to track usage more precisely, using an easy-to-understand benchmark: *consumption per barrel packaged*. It's not perfect, since our facility includes a taproom and event space, and those overlap with brewery operations. We're looking to install

sub-meters for specific areas to get a clearer picture. If we could get a construction do-over, we'd have built that metering and monitoring capability in from the start; it would have been worth it.

The Brewers Association has an excellent benchmarking tool (for members) that lets you plug in your usage and production numbers into an excel spreadsheet to see how your use and conservation compare to peers. That exercise alone is eye-opening and motivating.

We've found that simply sharing those numbers with our brewing staff keeps conservation top of mind. Measuring promotes mindfulness.

A few design and construction choices have helped our green efforts as well. Some are required by California's Title 24 energy code: low-E windows, LED lighting, proper insulation, and the like.

But we also insulated under the slab where our cold box sits. It's hard to quantify the savings, but every study we read said that thin foam layer under the concrete makes a measurable difference.

We also opted for high-voltage, three-phase equipment wherever possible. It reduces transformer step-down losses and puts less wear on motors over time.

For chilling, we installed a "7x7" system—two identical 7-horsepower chillers working in tandem. When demand is low, it runs efficiently on one unit and kicks in the second only when needed. And conservation aside, if one chiller goes down, the other keeps us limping along until repairs are made. Win-win-win: conservation, cost savings, and redundancy.

Our hot water system uses on-demand, tankless water heaters instead of the giant always-on storage kind. We also added a recirculation pump that brings hot water to distant taps without wasting gallons while you wait. The pump sits at the furthest point from the heaters; push a button and it circulates hot water through the cold line until sensors detect the temperature rise—then it shuts off. You can wire multiple buttons to multiple taps. The result: no standing there running water down the drain while you wait for the hot water to arrive.

CO2 (Capture):

Another area we're actively exploring is CO_2 capture. On paper, it seems like a no-brainer: fermentation produces CO_2, and we need CO_2 to carbonate beer—so why not just capture what we make and reuse it?

In practice, it's not that simple. Capturing and purifying CO_2 requires serious plumbing and a lot of chilling capacity to concentrate the gas into a storable, reusable form. The concept has long worked for large breweries, but only recently has equipment been developed that might make sense for small operations like ours. We're following those developments closely.

This issue has become more pressing with the recent decline in California's oil refining capacity. CO_2 is a by-product of oil refining, and gas companies capture and process it to food-grade purity for resale. With less refining, there's less captured CO_2 available—creating shortages and price spikes.

That shortage has turned CO_2 capture from an item on the sustainability wish list into a potential necessity. What began as an environmental initiative may soon be an existential crisis.

Solar

Solar would probably be the single biggest conservation investment we could make at the brewery—but so far, it's proven too tricky for us.

Most breweries are in standalone buildings on their own utility meters. In those cases, the payback on solar is solid—typically three to seven years, and this is beyond the "green" contribution. The math gets even better if the utility uses time-of-use pricing and the brewery installs a battery system to shave peak rates.

Our situation is different. We lease space in a multi-tenant historic building, and our electricity is sub-metered by the landlord, downstream of a main meter. That makes tracking and crediting our specific solar generation nearly impossible. And although building codes allow solar even on historic structures, our landlord was understandably reluctant for aesthetic reasons.

There's another wrinkle: our power comes from a small municipal utility. They haven't adopted time-of-use pricing yet, so there's less incentive for us to store energy for later use.

We also run, for efficiency, on both high- and low-voltage systems—three-phase power for equipment, standard voltage for lights and plugs. Solar struggles to bridge that split; we'd need complex transformers or two independent systems.

The result is that, while solar plus batteries would ultimately make sense for us, they aren't as clear-cut economics as they might be in other locations or buildings. Morever, we can't execute it cleanly without owning or fully controlling our building. If we did, we'd have installed it already.

That said, we urge any brewery building from the ground up to integrate solar and batteries from day one. Beyond the carbon and cost savings, they're an excellent hedge against a power outage and the resulting catastrophes of taproom closure, food spoilage, and runaway fermentations.

Collectives: PET, Film, Pallets.

One of the biggest breakthroughs in our sustainability efforts came when we joined the Napa Zero Collective—an active, collaborative group of wineries in Napa Valley (and a few in Sonoma). We were the first brewery to join their ranks.

We found them somewhat by accident. During one of our early conversations with our label producer about peelable labels, we mentioned the mountain of PET backing we were sending to the landfill and lamented that it wasn't recyclable through our local MRF. The producer said, "I think the label material manufacturer picks those up."

Turns out they did—but only by the truckload. Luckily, that same manufacturer connected us with the Napa Zero Collective. One of their members, St. Supéry Winery, was already collecting PET liner from wineries across wine country. Once they had a full truckload, the manufacturer would pick it all up at once and recycle it into new PET backing for future labels. Win-win.

The Collective was also aggregating other "orphans" of the waste world—like stretch film. As we started collecting our own (think industrial-strength plastic wrap used on pallet loads), we realized how much we actually used. Placing a dedicated stretch-film bin in the brewery was simple; it filled quickly, and we could drop it off with the Collective during our regular beer deliveries to wine country. That film is turned into the kind of plastic park benches you see at schools. Win-win again.

We eventually started tossing in single-use plastic bags from our homes too—they go through the same process and end up as more park benches. Win-win-win.

But the Collective's biggest value might be the shared knowledge. Someone there has almost always just wrestled with the thing you're about to tackle. Thinking about solar? Someone's been through that. Need to offload old pallets? Someone's got a taker they found on Craigslist. Wondering what to do with your R.O. "tails"? Check out the beautiful plants they grew in their landscaping.

We've also found informal mini-collectives just as useful. (See: Effluent, and our connection through Gordon Biersch.) We're now trying to organize one for malt grain bags—those sturdy woven sacks that most all MRFs won't accept. The bag manufacturer has a recycling process, but only in bulk quantities. A few breweries joining efforts could make that work.

There are solutions to be found when you combine forces.

In Closing:

If you—by some odd act of masochism—have read through all this journal, the one thing we've probably impressed on you is how complex the act of sustainability is. And that, well, we are trying.

We'll leave you with this thought: while the problem of waste is a global one, and the solution is ultimately going to require a global and systemic approach (infrastructure, regulation, treaties, as well as a social movement), the reality we've discovered is that so many aspects of this are also remarkably local and within our reach. That's where our maneuvers have yielded the most benefit.

Other breweries and companies may have a completely different waste-stream issue that they need to solve—it took us a while to figure out exactly what our challenges (and potential largest solutions) were. In fact, we're still figuring that out. We've had to do research into others' challenges and solutions and then customize those to fit our situation.

So much of the challenges and the solutions depend on the capabilities and restrictions of the local waste management/recycling company and their MRF. We'd implore everyone (brewers or consumers of brew) to just go take a tour. And if you are a brewery, meet with their specialists. It will be eye-opening, and that new knowledge will instantly make you more sustainable by the sheer fact of better understanding how all this gets processed once the bins get picked up.

Space and self-distribution have been key to our solutions, as has being in proximity to wine country. Mare Island has large, inexpensive warehouse space, and that enables us to collect materials until we have enough to economically get them to a recycling solution. The fact that we have our own trucks driving beer all over the Bay Area makes dropping off these recyclables cost-effective. Wine country has a huge concentration of adjacent businesses that have similar (though not identical) waste-stream challenges, so we've been able to join forces with them. Other breweries may not have these same advantages, but if they really ponder their situation, they'll have others—like benefitting from state-of-the-art sorting at their local MRFs (versus the manual process at ours).

While some challenges require creative solutions, there's often no need to reinvent the wheel. Our suppliers and vendors often have solutions for the recycling of their products. That said, don't trust a vendor's *salesperson* when they say a product is "recyclable"—just because something is theoretically recyclable doesn't mean it actually gets recycled at your local MRF. We'd urge you to talk to a principal at your vendor—someone who has thought deeply about this, who realizes that if they don't solve this end-of-life issue for their products, they may eventually be forced out of business. While our local MRF may not take a specific material, there's almost always some organization out there that finds value in it (though typically in such bulk that you must join with others or get creative in how you collect it).

LCA—Life Cycle Analysis—has been helpful and is something we learned about later in this effort of ours. The idea behind LCA is that sustainability requires one to really look at the whole life cycle, from sourcing to manufacturing to disposal. And in looking at the challenge that way, you can try to discern where your time and effort will pay off the most. Sometimes switching to a more sustainable vendor can have a bigger impact than figuring out how to save a little water yourself. Though—for sure—having products that are easily recycled by the end user has some marketing benefit that shouldn't be ignored.

There's no doubt that all this has taken real effort. Just pulling back the curtain on our own practices and trying to measure progress requires some work. That said, the saying "everything thrives under care" is apropos here. As an example, the simple act of creating a monthly Excel "dashboard" of utility metrics has intrinsically driven us to try to increase our conservation. Again, measuring promotes mindfulness.

Overall, we've invested considerable time—and some money, but mostly time—in trying to be more sustainable. In doing so, we've found that we're not only doing better by the planet, but we are producing *more* profit. Whether that offsets the scope of this effort is a fair question, but generally we've found that finding sustainable solutions typically leads to reduced costs. Finally, we think our employees, our customers, and our community—the people—are benefitting too.

Onward and upward.

Resources

- CCBA Learning Hub Educational Articles — Sustainability (multiple videos, members only).
- Brewers Association Sustainability Benchmarking Assessment (and tool, members only).
- Visit/meet with your local Waste Management (Recycling) company.
- Consult your vendors; try and talk to the principals.
- Creative Labels in Gilroy.
- Book: *Wasteland*, by Oliver Franklin-Wallis.
- Podcast: *Sustainability Defined*.
- We'd love to hear from you!