Before the Taps Run Dry: Incentivizing Water Sustainability in America's Craft Breweries

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According to Duke Wilhelm IV of Bavaria's Purity Law of 1516, otherwise known as "The Reinheitsgebot," beer may only contain three essential ingredients: water, hops, and barley.[1] Yet both in ancient times[2] and today, beer may contain any number of fermentable sugars, herbs, spices, fruits, or vegetables that lend themselves to the diverse flavors of the beverage's more than one hundred different styles.[3] Regardless of style, beer's most vital ingredient, water, makes up approximately 90%–95% of its total contents.[4] Yet surprisingly, the amount of water used in its production is far greater than the amount of water contained in a cold pint at a long day's end.[5] In fact, the Brewers Association[6] estimates that the average ratio of water used in beer production relative to the amount of water in the finished beer is about seven barrels of water for every one barrel of beer produced.[7]

To make matters worse, the national average ratio of wastewater effluent discharge to beer produced is only marginally better.[8] This "effluent," or wastewater discharge to local water treatment plants,[9] often contains high concentrations of organic matter and extreme power of hydrogen ("pH") values.[10] These wastewater discharges can be a burden on local treatment plants, and in many cases, can be the impetus for steep fines or even prevent breweries from opening in a given municipality.[11] As the craft beer industry continues to expand, its enormous water consumption and lack of wastewater pretreatment may trigger more stringent local, state, and federal regulation.[12] Should such laws take effect, compliance costs would likely pose a significant hurdle for small, closely-held businesses such as breweries.

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1. *German Beer Primer for Beginners*, German Beer Inst., http://www.germanbeerinstitute.com/beginners.html (last visited Aug. 24, 2015). At the time of the Reinheitsgebot, neither Duke Wilhelm nor his Bavarian contemporaries had any knowledge of beer's fourth essential ingredient, yeast, which is imperative to the fermentation of beer. *Id.*
2. *See, e.g.*, Patrick E. McGovern, Uncorking the Past: The Quest for Wine, Beer, and Other Alcoholic Beverages 28–58 (2009) (reviewing the author's archaeological and biochemical analysis of ancient alcoholic beverages containing any number or combination of ingredients such as barley, grapes, cornelian cherry, arid longyan, wildflower honey, unhulled rice malt, and various botanicals).
3. *Compare* BJCP, Inc., Beer Judge Certification Program 2015 Style Guidelines i–iii (Gordon Strong ed., 2015), http://www.bjcp.org/docs/2015_Guidelines_Beer.pdf [hereinafter 2015 BJCP Guidelines], *with Beer Styles*, BeerAdvocate, http://www.beeradvocate.com/beer/style/ (last visited Aug. 28, 2015). The number and character of beer styles varies between authorities. Although the *Beer Judge Certification Program 2015 Style Guidelines* list 118 styles, some authorities indicate otherwise. BeerAdvocate, for example, lists 105. These values are in constant flux—as the craft brewing industry continues to expand, both "historical beers" and new styles emerge onto the market and gain official recognition, while previously recognized styles are redefined. *Compare* 2015 BJCP Guidelines, *supra* at 37–41, 54–58, *with* BJCP, Inc., Beer Judge Certification Program Style Guidelines iii–iv (Gordon Strong ed., 2008), http://www.bjcp.org/docs/2008_stylebook.pdf (the former including a greater variety of India Pale Ales and Historical Beers than the latter).
4. Authorities differ slightly with respect to the concentration of water in beer, but most state concentrations within the range of 90%–95%. *See How Protecting Streams and Wetlands Makes for Great Beer*, Nat. Resources Def. Council, http://www.nrdc.org/water/brewers-for-clean-water/making-great-beer.asp (last visited Aug. 28, 2015) (stating that "[b]eer is about 90 percent water"); Brewers Ass'n, Water and Wastewater: Treatment/Volume Reduction Manual 6 (n.d.) [hereinafter Treatment/Volume Reduction Manual] (stating beer contains 95% water). *But see Eisbock*, German Beer Inst., http://www.germanbeerinstitute.com/Eisbock.html (last visited Aug. 28, 2015) (explaining that the German Eisbock beer style gains its alcoholic potency "from being frozen near the end of their maturation" such that "[d]uring this process, the beer loses about 7[%] to 10% of its water content").
5. Treatment/Volume Reduction Manual, *supra* note 4.
6. The Brewers Association is a trade association that represents the craft brewing industry. *See Purpose*, Brewers Ass'n, http://www.brewersassociation.org/brewers-association/purpose (last visited Aug. 28, 2015).
7. Treatment/Volume Reduction Manual, *supra* note 4.
8. *Id.* at 17. Although the Brewers Association reports the ratio of water used to beer produced in terms of barrels, it reports the ratio of wastewater to beer produced in liters, stating that this ratio is "1.3 to 2 liter/liter lower than water to beer ratio." *Id.*
9. *Effluent Guidelines Appendix F: Definitions*, U.S. Envtl. Protection Agency, http://water.epa.gov/scitech/wastetech/guide/pesticides/appf.cfm (last updated Aug. 14, 2012). For the purposes of this Note, consider references to "wastewater" and "effluent" as generally synonymous.
10. Treatment/Volume Reduction Manual, *supra* note 4, at 8.
11. Reshard Alexander, *Sustainable Craft Brewing: The Legal Challenges*, Triple Pundit (June 6, 2012), http://www.triplepundit.com/2012/06/legal-issues-in-beer-brewing/.
12. Treatment/Volume Reduction Manual, *supra* note 4, at 8.

Despite the fact that brewers can take measures to achieve greater water sustainability, the reality is that most do not because the financial costs typically outweigh the benefits. Given that the industry is now firmly established and still rapidly growing, Congress would be wise to encourage water sustainability in America's craft breweries.[13] The federal government should implement a regulatory scheme to provide brewers with incentives to voluntarily upgrade their facilities to achieve greater water sustainability and adopt industry best practices. Such a framework would provide a financial solution to an environmental problem while supporting the continued growth of the American craft brewing industry.

Part I of this Note underscores the importance of the craft brewing industry by briefly recounting its place in U.S. history and emphasizing its increasing economic output. Part II asserts that in spite of this positive economic impact, the craft brewing industry bears an unduly heavy local, state, and federal tax burden in comparison to other industries. Part III describes the negative externalities that arise from the production of beer and how breweries can ameliorate them. Part IV reviews the governing body of local, state, and federal regulations that apply to brewery water consumption and discharge. Part V stresses the need for a federal regulatory scheme to incentivize water sustainability at breweries and offers a synthesized two-part proposal.

I. The American Craft Beer Industry

A. *What Does It Mean to Be a "Craft Brewery"?*

United States craft beer finds its earliest roots in colonial America, where English colonists brought the beverage and its production methods from their homeland.[14] As the United States expanded over time, so too did the brewing industry. By 1873, there were 4131 breweries in operation.[15] After suffering a nearly fatal blow due to Prohibition,[16] the industry slowly began creeping back in the late 1970s. In 1982, there were only fifty microbreweries,[17] but today, there are over 3400 and counting.[18] In order to be deemed a "craft brewery," beer producers must fit within the Brewers Association's three-part definition: they must be small, independent, and traditional.[19] Breweries that annually produce six million barrels of beer or less are considered "small."[20] Breweries that are less than 25% owned, controlled, or do not have an "equivalent economic interest" by an alcoholic beverage industry member that is not itself a craft brewer may call themselves "independent" craft breweries.[21] Finally, craft breweries are only "traditional" if they have a majority of their total beverage alcohol by volume ("ABV") in beers "whose flavor[s] derive[] from traditional or innovative brewing ingredients and their fermentation."[22]

B. *"Beer-onomics": The Economic Impact of the Craft Brewing Industry*

Since the late 1970s, the craft brewing industry has grown significantly and today supplies 7.8% of total U.S. beer sales.[23] While this percentage alone is not remarkable, the craft beer industry reports sales volume growth of 17.6% and a 36% increase in exports.[24] Indeed, a recent study ranked craft breweries and other privately-held beverage companies as the third fastest-growing business sector in the United States, with an overall sales growth of 20% in 2013.[25] Not only are sales on the rise, but also the number of new craft breweries.[26] In 2014, there were 3418 craft breweries—a 19.4% increase from 2013.[27] The craft brewing industry also boasts an impressive economic output. Considering the total impact of beer brewed by craft brewers as it moves through the three-tier system (production, wholesale, and retail), as well as all non-beer products such as food and merchandise, craft breweries contributed $55.7 billion to the U.S. economy in 2014[28] and employed 424,000, with 115,000 of those jobs directly associated with breweries and brewpubs alone.[29]

13. *See infra* Section I.A for definition of "craft breweries."
14. *Brewing in Colonial America Part I*, N. Am. Brewers Ass'n, http://www.northamericanbrewers.org/brewingcolonial.htm (last visited Aug. 28, 2015).
15. *The American Beer Story*, CraftBeer, http://www.craftbeer.com/the-beverage/history-of-beer/the-american-story (last visited Apr. 8, 2015).
16. *The Revival*, CraftBeer, http://www.craftbeer.com/the-beverage/history-of-beer/the-revival (last visited Apr. 8, 2015).
17. *Id.* Virtually all microbreweries are craft breweries, but the reverse is not the case. The Brewers Association states that a microbrewery is a beer producer that "produces less than 15,000 barrels of beer per year with 75[%] or more of its beer sold off-site." *Craft Beer Market Segments*, Brewers Ass'n, https://www.brewersassociation.org/statistics/market-segments/ (last visited Jan. 27, 2016). These businesses sell their product by one or more of the following methods: "the traditional three-tier system (brewer to wholesaler to retailer to consumer); the two-tier system (brewer acting as wholesaler to retailer to consumer); and, directly to the consumer through carry-outs and/or on-site tap-room or restaurant sales." *Id.*
18. *Number of Breweries*, Brewers Ass'n, http://www.brewersassociation.org/statistics/number-of-breweries/ (last visited Aug. 28, 2015).
19. *Craft Brewer Defined*, Brewers Ass'n, http://www.brewersassociation.org/statistics/craft-brewer-defined/ (last visited Aug. 28, 2015).
20. *Id.*
21. *Id.* Although the Brewers Association does not define "alcoholic beverage industry member," this term may be understood to mean any producer of alcohol for consumption, including but not limited to wineries, meaderies, distilleries, and non-craft breweries such as Anheuser-Busch InBev and MillerCoors LLC.
22. *Id.* The Brewers Association notes that "[c]raft beer is generally made with traditional ingredients like malted barley; interesting and sometimes non-traditional ingredients are often added for distinctiveness" and that "[f]lavored malt beverages (FMBs) are not considered beers." *Id.*
23. *National Beer Sales & Production Data*, Brewers Ass'n, http://www.brewersassociation.org/statistics/national-beer-sales-production-data/ (last visited Aug. 28, 2015).
24. *Id.*
25. Mary Ellen Biery, *Industries to Watch in 2014: The 10 Fastest-Growing Fields*, Forbes (Dec. 29, 2013), http://www.forbes.com/sites/sageworks/2013/12/29/industries-to-watch-in-2014-the-10-fastest-growing-fields/.
26. *But see* Sean Williams, *Craft Beer: The 3 Biggest Threats to the Industry*, Motley Fool (Oct. 11, 2014), http://www.fool.com/investing/general/2014/10/11/craft-beer-the-3-biggest-threats-to-the-industry.aspx. The exception to this growing trend occurred between 2000 and 2005, due to "an exuberance by newcomers who saw opportunities" in the craft beer market but "didn't have the market knowledge to produce lasting success." *Id.*
27. *Number of Breweries*, *supra* note 18.
28. *Economic Impact*, Brewers Ass'n, https://www.brewersassociation.org/statistics/economic-impact-data/ (last visited Aug. 28, 2015).
29. *Id.* The Brewers Association defines a "brewpub" as "[a] restaurant-brewery that sells 25[%] or more of its beer on site." *Craft Beer Market Segments*, *supra* note 17. The beer brewed at a brewpub is produced primarily for sale in the restaurant and bar, however, "[w]here allowed by law, brewpubs often sell beer 'to go' and/or distribute to off site accounts." *Id.*

II. A "Tax on a Tax": The Onerous Tax Burden of the U.S. Craft Brewing Industry

The beer industry, including America's craft brewers, bears one of the largest tax burdens in the country. The government raises a total of $48.5 billion in local, state, and federal tax revenues from the beer industry alone.[30] Generally, the price of beer at retail includes state and federal excise taxes, state sales taxes, and state and federal business taxes.[31] Together, these taxes equal nearly 40% of the retail price paid by consumers,[32] making the total tax burden on U.S. consumers nearly 68% higher than for the average purchase.[33] Although a discussion of other state and local taxes may be of merit, this Note will focus exclusively on federal excise taxes because they are levied directly at breweries.[34]

State excise tax rates on beer vary anywhere between $0.02 per gallon[35] and $35.60 per barrel[36] (approximately $1.15 per gallon).[37] By contrast, the federal excise tax rate, which is calculated based on production volume, is simpler. Breweries that produce more than two million barrels per year must pay a rate of $18 per barrel.[38] This rate virtually never applies to craft breweries, however, because most produce far less than two million barrels per year.[39] All brewers who produce less than that amount (except for brewers who are part of a controlled group with annual combined barrel production exceeding two million barrels) currently pay a reduced tax rate of $7 per barrel on the first 60,000 barrels in a fiscal year, and then pay the standard rate of $18 per barrel on any barrelage over that.[40]

III. The Need to Reduce Craft Beer's Environmental Impact

As with so many industries, the benefits of rapid growth can inevitably give rise to negative externalities.[41] Among the most alarming issues that will affect the growth of the craft brewing industry are water consumption and the discharge of wastewater.[42] As the industry continues to expand, it will likely become a drain on local water sources and a burden on municipal wastewater treatment plants unequipped to handle the high concentrations of organic matter in wastewater effluent. Drought-stricken states in the American West and South will be particularly interested in incentivizing water conservation in an ever-drying climate.[43] Granted, breweries across the country are aware of their extensive consumption, waste, and pollution of water, but most do not voluntary adopt industry best practices because these efforts are too costly or require too much space to fully implement.

A. Brewery Consumption of Water

The first and most obvious issue with respect to the craft brewing industry's use of water is overconsumption due to inefficiency. Because beer contains approximately 90%–95% water by composition, breweries consume massive amounts of water to make their product.[44] In 2014, craft breweries sold 21,775,905 barrels ("bbl") of beer.[45] Assuming production requires seven barrels of water for every one barrel of beer produced,[46] the craft brewing industry theoretically used 152,431,335 bbl of water in 2014, not accounting for any produced, but unsold barrels.[47]

The brewing industry is by no means incapable of increasing its water efficiency. In fact, breweries that value water efficiency may collect and manage data on a regular basis.[48] Some breweries install pulse output mechanical sub-meters to automatically collect data, while others install an open artificial water channel called a "flume" to measure the rate of flow, or breweries may install both.[49] This data is then summarized in the form of various metrics that are normalized to production and expressed as ratios.[50] Production metrics include volume of water used per product (e.g., water bbl/product bbl); and volume of wastewater discharged per product (e.g., wastewater bbl/product bbl). When these metrics are used together with recent water and sewer billings, the brewery can develop a water balance sheet to help formulate clear reduction targets.[51] New Belgium Brewing Company, for example, has emerged as an industry leader in this very effort. Sub-meters are installed

30. John Dunham & Associates, The Beer Industry Economic Contribution Study 2 (2015), http://www.beerinstitute.org/assets/uploads/general-upload/BSA-2015-Report.pdf (pertaining to the beer and malt beverage industry, which includes other fermented beverages).
31. *Id.*
32. *Id.*
33. *Federal Excise Tax*, Beer Inst., http://www.beerinstitute.org/policy-issues/excise-tax (last visited Aug. 24, 2014).
34. *Id.*
35. Liz Malm et al., *Map: Beer Excise Taxes Rates by State, 2014*, Tax Found., http://taxfoundation.org/blog/map-beer-excise-tax-rates-state-2014 (last visited Aug. 28, 2015).
36. Tenn. Code Ann. § 57-6-103 (2013).
37. *See id.*
38. 26 U.S.C. § 5051(a)(1) (2012).
39. The exceptions are Boston Beer Company, D.G. Yuengling & Son, Straub Brewing, August Schell Brewing, and Minhas Craft Brewery, all of which brew more than two million barrels per year, but are still considered to be "craft breweries" pursuant to the Brewers Association's definition. *See* Jason Notte, *5 Craft Beer Brewers Who Have Lost Their Craft Privileges*, MainStreet (Jan. 13, 2015), http://www.mainstreet.com/article/5-craft-beer-brewers-who-have-lost-their-craft-privileges/page/6.
40. 26 U.S.C. § 5051(a)(2)(A).
41. For example, new research shows that the Gold Rush's mining activities in the Sierra Nevada Mountains between 1848 and 1884 left enough mercury-contaminated sediment to significantly add to the levels of heavy metal in river valleys downstream and in the San Francisco Bay for the next 10,000 years. *See* Douglas Main, *Gold Rush's Poisonous Legacy: Mercury Will Linger for 10,000 Years*, Live Sci. (Oct. 29, 2013), http://www.livescience.com/40794-gold-rush-mercury-pollution.html.
42. *See* Alexander, *supra* note 11.
43. *See* David Miskus, *Current National Drought Survey*, U.S. Drought Monitor (Oct. 8, 2015), http://droughtmonitor.unl.edu/Home.aspx.
44. Treatment/Volume Reduction Manual, *supra* note 4, at 6.
45. *National Beer Sales & Production Data*, *supra* note 23.
46. *Id.*
47. This calculation is purely theoretical and relies on a 7:1 national average ratio. The author does not contend that this value actually represents the amount of water wasted by U.S. craft breweries in the barrelage sold in 2014. Instead, the author has included this figure as a way to underscore the seriousness of brewery water overconsumption and the importance of a regulatory solution.
48. *See* Treatment/Volume Reduction Manual, *supra* note 4, at 14.
49. *Id.* at 15–16.
50. *Id.* at 18.
51. *Id.* at 23.

throughout its facility in Fort Collins, Colorado, and the brewery strives to reduce its water use from 3.96 to 3.50 bbl per barrel of beer.[52]

Once a brewery has a clear record of its water use, it can then target problem areas at any stage in the production process to achieve its efficiency goals. Among some of the most polluting processes in beer production are fermentation and filtration,[53] which together create 3% of total wastewater volume, but 97% of total biochemical oxygen demand ("BOD") in brewery wastewater.[54] To address this issue, breweries can install frequency controllers on fermentation vessel pumps, thereby fine-tuning the water flow based on cooling needs, consequently reducing both water flow and energy use.[55] Ringwood Brewery in Hampshire, United Kingdom, implements a simpler solution that stores surplus yeast for local farmers to use as fertilizer free of charge[56]—thus saving Ringwood approximately £3000 per year in trade effluent charges.[57]

B. The Challenges of Brewery Wastewater

Inevitably linked to water consumption is brewery wastewater, which has both economic and environmental implications. Although the cost of water from a municipal supplier is relatively cheap compared to other utilities, when combined with treatment and effluent disposal costs, it can become an expensive resource.[58] Generally, the cost of water imposed by municipalities includes supply fees, or "tap fees," and various forms of wastewater fees.[59] In addition, some localities impose additional effluent surcharges, which are based on the results of laboratory tests on discharge samples taken where the wastewater enters the municipal system.[60] Thus, because most breweries discharge 70% of their incoming water as effluent, breweries in municipalities that compound their wastewater fees struggle with onerous wastewater expenses.[61] Furthermore, brewers that fail to comply with wastewater discharge regulations run the risk of paying substantial fines.[62]

Brewery wastewater is also costly from an environmental perspective, as it contains a number of chemical compounds and high amounts of organic biodegradeable matter.[63] If untreated, this nutrient pollution can promote the rapid growth of algae and bacteria that consume oxygen, in turn causing fish kills[64] in rivers or anaerobic conditions in local public treatment plants.[65] Unfortunately, these facilities are typically not equipped to handle untreated brewery effluent loads.[66] The most common byproducts of brewery wastewater include extraordinarily high or low pH levels, high concentrations of BOD, and total suspended solids ("TSS").[67] BOD is a measure of the nutrient value of wastewater, and TSS is a measure of suspended solids in wastewater.[68]

Brewery wastewater pH, which generally fluctuates throughout the production process between a 5.0 and 12.0,[69] can be problematic for two reasons. First, as the wastewater sits, wild yeast and bacteria will continue fermentation, in turn generating acids that lower the wastewater pH over time.[70] Acidity is especially problematic for breweries that produce sour beer, as some sour beer styles achieve acidity as low as 3.1 pH.[71] These acidic conditions can damage concrete structures and inhibit subsequent biological treatment processes.[72] Second, high or low pH wastewater can put breweries at risk of violating municipal pH limits. The U.S. Environmental Protection Agency ("EPA") pH discharge limits are between 5.0 and 11.0,[73] but municipal limits vary.[74] For example, Eugene, Oregon, which is home to thirteen breweries,[75] prohibits wastewater discharges having a pH less than 5.5 or greater than 12.0 into the sanitary sewer.[76] By contrast, Portland, Oregon, home to sixty-one breweries,[77] has an allowable pH range of 5.0 to 11.5.[78]

Brewery wastewater is also hazardous to local treatment plants because it contains higher concentrations of sugar and alcohol than domestic wastewater, which is what most plants are designed to treat.[79] Domestic wastewater has a BOD and TSS of approximately 150 milligrams per liter ("mg/L"), whereas untreated brewery wastewater has a BOD of about 10,000 mg/L and a TSS of 5000 mg/L.[80] Treatment plants

52. *Goal: Reduce Water Use Per Barrel to 3.5:1 by 2015*, New Belg. Brewing Company, http://www.newbelgium.com/sustainability/Environmental-Metrics/Water.aspx (last visited Aug. 28, 2015).
53. Treatment/Volume Reduction Manual, *supra* note 4, at 17 (stating that fermentation generates biochemical oxygen demand ("BOD") up to 100,000 parts per million and that filtration generates BOD up to 135,000 parts per million).
54. *Id.*
55. *Id.* at 24–25.
56. *Id.* at 25.
57. *Id.*
58. *Id.* at 6.
59. *See* John Mercer, *Wastewater Opportunities for the Craft Brewer*, Master Brewers Ass'n Am. 9 (n.d.), http://www.mbaa.com/districts/Northwest/Documents/MERCER,%20Wastewater%20Opportunities%20for%20the%20Craft%20Brewer.pdf.
60. Treatment/Volume Reduction Manual, *supra* note 4, at 16.
61. *Id.* at 6.
62. Alexander, *supra* note 11.
63. *Id.*
64. "Fish kills" are events in which a large number of fish of all sizes are found dead and dying over a long period of time. Large fish kills are often the result of suffocation caused by oxygen depletion that occurs following the die-off of a large algae bloom, the decay of water weeds after treatment with herbicides, the turnover of oxygen-poor bottom waters following a thunderstorm, or the runoff of livestock waste and other organics. *See* L.A. Helfrich & Stephen A. Smith, *Fish Kills: Their Causes and Prevention*, Va. Cooperative Extension (2009), http://pubs.ext.vt.edu/420/420-252/420-252.html.
65. Mercer, *supra* note 59, at 3.
66. John Mercer, *Wastewater Basics for a Growing Brewery*, Craft Brewing Bus. (Sept. 22, 2014), http://www.craftbrewingbusiness.com/equipment-systems/wastewater-basics-growing-craft-brewery.
67. *Id.*
68. *Id.*
69. *Id.* On brewing and packaging days, pH will be around 5.0; on Clean-in-Place days, the pH may be as high as 12.0. *Id.*
70. *Id.*
71. *See pH Readings of Commercial Beers*, Embrace Funk, http://embracethefunk.com/ph-readings-of-commercial-beers (last visited Aug. 28, 2015).
72. Treatment/Volume Reduction Manual, *supra* note 4, at 38.
73. Mercer, *supra* note 66.
74. *Id.*
75. *Facts*, Or. Craft Beer, http://oregoncraftbeer.org/facts/ (last updated Dec. 16, 2014).
76. Eugene, Or. Code § 6.511(e) (2014).
77. *Facts*, *supra* note 75.
78. Portland, Or. Code § 17.34.030(B)(7) (2012).
79. Mercer, *supra* note 66.
80. *Id.*

usually use an aerobic treatment method whereby bacteria break down organic matter in wastewater.[81] In order to keep these bacteria functional, the facility must provide them with a constant supply of oxygen[82]—an expense that can account for as much as 83% of a plant's total operating costs.[83] Because the concentration of organic matter in untreated brewery wastewater effluent is so high, this requires the plant to aerate the bacteria even more, resulting in higher costs and the creation of more biomass (sludge) from dying bacteria.[84]

C. *Industry Best Practices—Brewery Wastewater Pretreatment*

Breweries that choose to have a robust wastewater pretreatment program typically utilize three distinct processes: pH neutralization, solids removal, and biological treatment.[85] Brewers can normalize wastewater pH by either consolidating wastewater of varying pH levels into designated holding tanks before discharge or by treating it with chemicals.[86] Onsite solids removal involves any combination of physical treatment, screening, reuse of spent grains, use of a grit chamber, or chemical flocculation.[87] Two of the most popular solids removal practices among breweries include reusing spent brewing grains to produce breads and desserts for patrons and donating excess grains to local farmers.[88]

Biological treatment, the most capital intensive pretreatment method at a brewery, is a process by which organic matter in wastewater is aerobically (with oxygen) or anaerobically (without oxygen) restored to safe levels by microorganisms.[89] This process takes the burden of pretreatment off local treatment plants. The advantage of aerobic treatment is that it eliminates more than 99% of BOD.[90] The disadvantages are that it uses more energy than anaerobic treatment, generates sludge that requires disposal, and demands more space.[91] By contrast, anaerobic treatment uses anaerobic organisms to convert non-settleable organic matter into biogases such as methane, carbon dioxide, and trace amounts of hydrogen sulfide.[92] The advantages to anaerobic treatment are that it provides a renewable energy source in the form of biogas, it generates far less sludge than aerobic treatment, has low operating costs, requires less space, and requires capital equal to or less than aerobic treatment systems.[93] One drawback is that anaerobic treatment only reduces BOD by 80%.[94]

D. *The Unique Posture of Breweries in Western and Southern States Due to Droughts and Water Shortages*

Although breweries across the United States face issues with water sustainability, those in drought-stricken Western and Southwestern states have the greatest need to overcome these challenges.[95] California is experiencing one of the worst droughts on record[96] and currently spends more than $30 billion annually to support its water system.[97] Due to the state's climate and topography, its water shortages result in large part from a decreased supply of alpine snows[98] caused by climate change.[99] To meet its needs, California (like other Western states) relies on irreplaceable groundwater from aquifers, resulting in virtually irreversible negative externalities.[100] A recent satellite study from the University of California, Irvine and the National Aeronautics and Space Administration indicates that the Colorado River Basin, which supplies water to forty million people in seven states,[101] lost 65 cubic kilometers (15.6 cubic miles) of water between 2004 and 2013—twice the amount of water stored in Lake Mead, the largest reservoir in the United States, which can hold two years' worth of Colorado River runoff.[102]

Failure to achieve greater water sustainability in light of drying climates will have disastrous effects on the craft brewing industry as a whole. California and Texas represent the U.S. craft brewing industry's greatest economic outputs, $6.8 billion[103] and $3.7 billion[104] respectively. California is home to more than 431 craft breweries (more than any other state),[105] while 117 craft breweries reside in Texas, which ranked seventh in craft beer production volume at 982,918 bbl in 2014.[106]

81. *Id.*
82. *Id.*
83. *Let Gravity Work for You*, ClearCove Systems 3, http://clearcovesystems.com/wp-content/uploads/2014/03/ClearCove-Brochure-Let-Gravity-Work-for-You-Summer-2014.pdf (last visited Aug. 28, 2015).
84. Mercer, *supra* note 66.
85. Treatment/Volume Reduction Manual, *supra* note 4, at 36.
86. Brewers can use caustic, food grade lime, or magnesium hydroxide to raise wastewater pH, or they can use carbon dioxide to lower it. Mercer, *supra* note 59, at 37.
87. Treatment/Volume Reduction Manual, *supra* note 4, at 37.
88. E-mail from Bill McGeeney, Marketing Dir., Round Guys Brewing Co., to Author (Jan. 6, 2015, 13:28 PST) (on file with author) (open e-mail attachment).
89. Treatment/Volume Reduction Manual, *supra* note 4, at 37.
90. *Id.* at 38.
91. *Id.*
92. *Id.*
93. *Id.*
94. *Id.*
95. Alexander, *supra* note 11.
96. Taylor Thornburgh, Note, *Crisis in California: The Need for Statewide Comprehensive Groundwater Management*, 7 Geo. Wash. J. Energy & Envtl. L. 90, 90–91 (2016); State of California, *California Drought*, CA.gov, http://ca.gov/drought (last visited Aug. 28, 2015).
97. Michelle Nijhuis, *When the Snows Fail*, Nat'l Geographic (Oct. 2014), http://www.nationalgeographic.com/west-snow-fail/.
98. *Id.*
99. *Id.*
100. Dennis Dimick, *If You Think the Water Crisis Can't Get Worse, Wait Until the Aquifers Are Drained*, Nat'l Geographic (Aug. 19, 2014), http://news.nationalgeographic.com/news/2014/08/140819-groundwater-california-drought-aquifers-hidden-crisis; *see* Thornburgh, *supra* note 96, at 91–93 (discussing implications of groundwater use in the San Joaquin Valley).
101. Dimick, *supra* note 100.
102. *Id.*
103. *See California Craft Beer Sales Statistics*, Brewers Ass'n, https://www.brewersassociation.org/statistics/by-state/?state=CA (last visited Jan. 24, 2016).
104. *See Texas Craft Beer Sales Statistics*, Brewers Ass'n, https://www.brewersassociation.org/statistics/by-state/?state=TX (last visited Jan. 24, 2016).
105. *See California Craft Beer Sales Statistics*, *supra* note 103.
106. *Texas Craft Beer Sales Statistics*, *supra* note 104.

E. Barriers to Water-Conscious Brewing

In a recent survey of seventy-six breweries, the Brewers Association made some troubling findings with respect to water sustainability practices.[107] First, few breweries have a dedicated onsite wastewater pretreatment system.[108] Second, of the seventy-six breweries surveyed, only half had pretreatment systems installed, and those that did mainly adjusted pH and removed solids.[109] Third, in addition to paying fees based on incoming water purchases and on the strength of the effluent discharge,[110] approximately one-third of breweries in the survey had to pay an extra surcharge based on effluent strength.[111]

Absent any relevant government regulation, breweries that choose to exercise water sustainability typically do so for three reasons. First, water-efficiency and pretreatment often decrease production expenses, resulting in annual savings. Second, sustainable production methods are a powerful marketing tool. As Bill McGeeney, Director of Marketing at Round Guys Brewing Company, points out, "In Pennsylvania . . . resource cost and corporate citizenship is a driving force behind helping to make breweries sustainable."[112] Indeed, a brewery with a robust sustainability program can set itself apart from the ever-growing myriad of brands piling precious retailer shelf space and cramming bar tap lines. Finally, some breweries implement industry best practices out of necessity. Breweries in Western and Southwestern states are prime examples.

Although the benefits of water sustainability are staggering, the reality is that breweries face two significant barriers to installing technologies necessary to meet these goals. First, the initial capital expenditure associated with purchasing or upgrading water-efficient and pollution control equipment can be prohibitively expensive.[113] Round Guys Brewing Company's Bill McGeeney highlights this difficulty, stating, "At this stage, all of [Round Guys'] spare cash goes right back into capital. Really, it [is] a matter of boosting cash flow to allow for purchases with immediate social returns."[114] Indeed, the smallest entry-level aerobic system costs between $400,000 and $900,000. Similarly, the smallest entry-level anaerobic system costs $700,000 to $1.2 million.[115] Moreover, the expenditure of capital to support water usage reductions "has been difficult to justify due to the low tap fees associated with municipal water supplies in the United States."[116]

Second, space is an issue for many breweries, especially those in crowded urban areas, because most pretreatment units require large holding tanks, de-sludge operations, and sensitive controls or operating conditions.[117] Indeed, few craft breweries own the property on which they brew. In 2010, U.S. breweries spent approximately $54 million on rental property.[118] Even if an urban tenant-brewer had the space to install equipment in rented brewing space, the brewer may not choose to do so because if the brewery expands and moves to a larger space, it will not benefit from gains on the sale of real property upgraded with water-conscious technologies.

IV. Federal, State, and Local Water Laws Relating to the Brewing Industry

The discharge of wastewater is regulated by a large body of federal, state, local, and regional laws.[119] Four programs, all of which result from the Clean Water Act ("CWA"),[120] regulate or can potentially impact the discharge of brewery wastewater: the National Pollutant Discharge Elimination System ("NPDES"); the National Pretreatment Program; local pretreatment limits; and the Impaired Waters and Total Maximum Daily Loads ("TMDL") Program.[121]

Although there are no government regulations *directly* linked to the consumption of water itself, as a practical matter, local water and wastewater capacity limitations may serve as an indirect regulatory driver. As John Mercer, owner and consultant at Brewery Wastewater Design and the former Utility Manager at Deschutes Brewing Company in Portland, Oregon notes, brewers that do not "do their homework ahead of time" may find themselves in a municipality "at max capacity for both water and wastewater."[122] As Mercer's example illustrates, breweries must be cognizant of local water laws even before opening their doors because wastewater regulations may ultimately affect local incoming water capacities as well.

A. The Clean Water Act and National Pollutant Discharge Elimination System

The CWA regulates the discharge of pollutants into U.S. waters and establishes quality standards for surface waters.[123] The CWA mandates the EPA to establish wastewater effluent limitations guidelines for discharges into U.S. surface waters.[124]

107. Treatment/Volume Reduction Manual, *supra* note 4, at 8.
108. *Id.*
109. *Id.*
110. *Id.* at 13.
111. *Id.*
112. E-mail from Bill McGeeney, *supra* note 88.
113. Treatment/Volume Reduction Manual, *supra* note 4, at 38.
114. E-mail from Bill McGeeney, *supra* note 88.
115. Treatment/Volume Reduction Manual, *supra* note 4, at 38.
116. *Id.* at 12.
117. *Id.* at 36.
118. Timothy R. Sloane, *Green Beer, Incentivizing Sustainability in California's Brewing Industry*, Golden Gate U. Envtl. L.J. 481, 499 (2012).
119. Regional regulations are the result of certain groups working together to require all water-intensive businesses in certain watersheds to implement water conservation practices. Treatment/Volume Reduction Manual, *supra* note 4, at 9. For example, the Great Lakes Compact is an eight-state water management pact signed into law in October 2008 that seeks to "ban diversion of Great Lakes water, with some limited exceptions, and set responsible standards for water use and conservation with the basin." *Great Lakes Compact*, Alliance for Great Lakes, http://www.greatlakes.org/page.aspx?pid=526 (last visited Aug. 28, 2015). This Note will not address regional regulations, as they generally have less impact on breweries than regulations stemming from the Clean Water Act.
120. Clean Water Act of 1977, Pub. L. No. 95-217, 91 Stat. 1566 (codified as amended at 33 U.S.C. §§ 1251–1387 (2012)).
121. Treatment/Volume Reduction Manual, *supra* note 4, at 9.
122. E-mail from John Mercer, Owner/Consultant, Brewery Wastewater Design, to author (Oct. 2, 2014, 10:52 AM) (on file with author).
123. Treatment/Volume Reduction Manual, *supra* note 4, at 9.
124. 33 U.S.C. § 1311(m) (2012); *see also Effluent Guidelines*, U.S Envtl. Protection Agency, http://water.epa.gov/scitech/wastetech/guide/index.cfm (last

These guidelines are incorporated into NPDES permits,[125] issued by either authorized states or the EPA,[126] to industrial and municipal treatment facilities that discharge pollutants into U.S. surface waters.[127] There are a number of NPDES permits and programs,[128] but the National Pretreatment Program is the most pertinent to the craft brewing industry.

B. The National Pretreatment Program

In most areas of the United States, a publicly-owned treatment works ("POTW") collects wastewater and removes contaminants before discharge into U.S. waters.[129] The National Pretreatment Program requires federal, state, and local governments to implement Pretreatment Standards to regulate pollutants from industrial users ("IUs")[130] that must obtain permits or implement other control mechanisms before sending wastewater to the local POTW.[131] These permits specify the effluent quality that IUs must meet via pretreatment prior to discharge.[132] If an IU discharges significant amounts of wastewater and meets other criteria, then it will be considered a Significant Industrial User ("SIU") and will be subject to even stricter federal categorical pretreatment standards.[133] If and when an industrial discharge inhibits or disrupts the POTW's treatment operations or sludge disposal, it is considered an "interference" and a violation of the POTW's NPDES permit.[134] More importantly, any untreated pass through is likely to cause environmental damage to receiving water bodies.[135]

C. Local Enforcement of the National Pretreatment Program

The local limits set by POTWs have real implications for craft breweries. As the Brewers Association has noted, "Craft brewers in different states and cities are increasingly questioned about wastewater or need to provide flow and chemical sampling data."[136] Under the National Pretreatment Program, any POTW with a total design flow greater than five million gallons per day, as well as smaller POTWs, must establish and enforce specific limits on IUs as part of a local pretreatment program to prevent pass through and interference.[137] These limits are usually imposed at the end-of-pipe discharge.[138] There are two ways to monitor these discharges. First, POTWs are required to conduct on-site inspection of all SIUs at least once per year.[139] Second, SIUs must self-monitor for all regulated parameters at least twice per year unless limits are monitored by a sewage or municipal works agency.[140]

Breweries that meet SIU criteria are subject to local limits and consequently should be especially cognizant about their wastewater discharges. For example, Firestone Walker Brewing Company of Paso Robles, California, is an SIU subject to regular inspection by the local POTW,[141] and Stone Brewing Company of Escondido, California, has been issued a minor non-POTW NPDES permit.[142] Should breweries violate local requirements, the local POTW may seek injunctive relief or levy civil or criminal penalties in at least $1000 per day for each violation.[143] For example, in 2003, D.G. Yuengling & Son, Inc. was penalized $110,000 for such violations.[144] For so many of these small businesses, these steep penalties can mean the difference between brewing another year and shutting off the taps.

D. The Impaired Waters and Total Maximum Daily Loads Program

Not only must craft breweries comply with POTW local limits stemming from the National Pretreatment Program, but they also must often comply with state regulations under the federal Impaired Waters and TMDL Program.[145] Under this program, states must identify "impaired waters" within their borders for which "effluent limitations . . . are not stringent enough"[146] and establish a priority ranking for certain

updated Jan. 7, 2016).

125. 33 U.S.C. § 1342.
126. *Learn About Effluent Guidelines*, U.S. Envtl. Protection Agency, http://water.epa.gov/scitech/wastetech/guide/questions_index.cfm (last updated Dec. 22, 2015).
127. *National Pollutant Discharge Elimination System (NPDES)*, U.S. Envtl. Protection Agency, http://www.epa.gov/npdes (last updated Jan. 16, 2016).
128. *See All NPDES Program Areas*, U.S. Envtl. Protection Agency, http://www.epa.gov/npdes/all-npdes-program-areas (last updated Feb. 11, 2016).
129. *Pretreatment*, U.S. Envtl. Protection Agency, http://water.epa.gov/polwaste/npdes/pretreatment (last updated Sept. 9, 2014).
130. *Id.*
131. 40 C.F.R. § 403.8(f)(1) (2015); *see also* U.S. Envtl. Prot. Agency, EPA-833-B-11-001, Introduction to the National Pretreatment Program iii (2011).
132. *Id.*
133. A SIU is any IU that discharges an average of 25,000 gallons or more per day of process wastewater to the POTW, contributes a process wastestream making up 5% or more of the average dry-weather hydraulic or organic capacity of the POTW treatment plant, or is designated by the POTW as such because of its reasonable potential to adversely affect the POTW's operation or violate any pretreatment standard or requirement. 40 C.F.R. § 403.3(v)(ii) (2015).
134. *Id.* § 403.3(k).
135. *Id.* § 403.3(p); *see Pretreatment Program for Industry*, Napa Sanitation District, http://www.napasan.com/Pages/ContentMenu.aspx?id=104 (last visited Jan. 27, 2016) ("[Napa Sanitation District's] sewage collection and treatment systems have not been designed to treat them, industrial wastes can damage sewers and interfere with the operation of the treatment plant or pass through the system untreated, resulting in pollution of the Napa River.").
136. Treatment/Volume Reduction Manual, *supra* note 4, at 8.
137. 40 C.F.R. §§ 122.21(j)(4), 403.8(a), (f)(4).
138. U.S. Envtl. Prot. Agency, *supra* note 131, at 3–6. "End-of-pipe" means at the point of connection to the POTW's collection system. *Id.*
139. 40 C.F.R. § 403.8(f)(2)(v).
140. *Id.* § 403.12(e), (g).
141. *See* Greg V. Arthur, U.S. Envtl. Prot. Agency, NPDES Compliance Evaluation Inspection Report—Firestone Walker Brewing Company (Dec. 15, 2011), http://www.epa.gov/region9/water/pretreatment/files/firestone-brewery-ins.pdf.
142. *Stone Brewing Company*, *Discharge Monitoring Report 2013*, U.S. Envtl. Protection Agency, http://cfpub.epa.gov/dmr/facility_search.cfm (enter "Stone Brewing Company" in the "Facility Name" Field, then click "Search Facilities").
143. 40 C.F.R. § 403.8 (f)(2)(B)(6)(vi)(A).
144. *See* Press Release, U.S. Envtl. Prot. Agency, Yuengling Settles Clean Water Act Case (Sept. 23, 2003) (on file on Westlaw, 2003 WL 23674612) (explaining that Pennsylvania brewery D.G. Yuengling & Son, Inc. agreed to pay a $110,000 penalty to settle a December 2002 EPA complaint regarding pH violations and metal discharges to the local wastewater treatment facility).
145. 40 C.F.R. § 130.7.
146. 33 U.S.C. § 1313(d)(1)(A) (2012).

pollutants or TMDLs.[147] Three TDML categories pertinent to breweries are "pH/Acidity/Caustic Conditions," "Organic Enrichment/Oxygen Depletion," and "Nutrients." Breweries residing in TMDL priority areas must be careful that they do not discharge too much of these pollutants to local POTWs.

V. Proposal: Methods for Achieving Greater Water Sustainability in U.S. Craft Breweries

The rapid expansion of the craft brewing industry, its heavy consumption of water, and its massive discharge of pollutants into local wastewater systems combine to present a growing national problem that must be addressed with a national solution that incentivizes breweries to install more water-efficient machinery and adopt more scrupulous wastewater treatment practices. This framework would benefit the environment as well as breweries that run the risk of water-related monetary penalties or injunctions. Section A explores existing guaranty loan solutions and draws on their most advantageous principles to propose Part One of a two-part solution: a brewery water sustainability guaranty loan program, in Subsection A.4. Section B analyzes current federal excise beer tax policy and legislation to propose Part Two of a two-part solution: an amendment to the federal excise beer tax, in Subsection B.2. Part VI synthesizes Proposal Parts One and Two into a comprehensive proposal to incentivize water sustainability in U.S. craft breweries.

A. Guaranty Loans for Technological Upgrades and Real Property Purchases to Achieve Greater Water Sustainability

Crafting innovative solutions to new problems does not always warrant reinventing the wheel. Two existing loan programs offer insight into how a guaranty loan program could be tailored to incentivize water sustainability in craft breweries—the B&I Guaranteed Loan Program ("B&I Program") and the U.S. Small Business Administration CDC/504 Loan.

1. The B&I Guaranteed Loan Program

An integral part of the American Recovery and Reinvestment Act of 2009[148] is the B&I Program of the U.S. Department of Agriculture ("USDA"). The B&I Program's mission is to improve "the economic and environmental climate in rural communities" by guaranteeing private loans to rural profit or nonprofit businesses.[149] To qualify, the borrower of a B&I Program loan must be engaged in or propose to engage in a business that will: "(1) provide employment; (2) improve the economic or environmental climate; (3) promote the conservation, development, and use of water for aquaculture; or (4) reduce reliance on nonrenewable energy resources by encouraging the development and construction of solar energy systems and other renewable energy systems."[150] Also, all funds from the guaranteed B&I Program loan may be used for: (1) certain industrial acquisitions or prevention of the loss of employment opportunities; (2) "[b]usiness conversion, enlargement, repair, modernization, or development";[151] (3) "[p]urchase and development of land, easements, rights-of-way, buildings, or facilities";[152] and (4) "[p]urchase of equipment, leasehold improvements, machinery, supplies, or inventory."[153] Generally, the total amount of USDA loans to a borrower may not exceed $10 million.[154] The maximum guarantee percentage is 80% for loans of $5 million or less, 70% for loans between $5 and $10 million, and 60% for loans exceeding $10 million.[155] Although the B&I Program is still in its infancy, it has thus far been largely successful, as its 528 projects have created and saved 32,500 rural jobs.[156]

Accordingly, the federal government should draw on the lessons of this early success and implement a similar loan guarantee program for the craft brewing industry. Like the water conservation and environmental improvement prerequisites of B&I Program loans, brewery water technology loans should be based on whether the equipment that the brewery proposes to order and install would improve water efficiency or reduce the concentration of effluent discharged to local POTWs.

If a brewery water sustainability loan guaranty program drew on the B&I Program's water conservation requisite alone in that the loan guarantee was solely contingent on a brewery's pledge to install water-sustainability equipment, the program would have limited success. Breweries lacking the space to install these technologies, as well as those renting a property, would be unable to realize the full benefits of such a guaranty program. For example, if a tenant-brewer installed these technologies, it would not realize property value gains derived from those improvements if and when it moved into a new, larger space. Thus, any successful brewery loan guaranty program would also have to help finance land purchases for the purpose of expanding the business.

2. The U.S. Small Business Administration CDC/504 Loan

One solution to the craft brewing industry's space and tenancy issues currently exists, and has already helped certain craft brewers.[157] The U.S. Small Business Administration

147. *Id.* §§ 1313(d)(1)(A)–(C), 1314(a)(2).
148. American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115.
149. *Performance Measurements*, USDA Rural Dev., http://www.rd.usda.gov/recovery/business.html (last visited Aug. 28, 2015).
150. 7 C.F.R. § 4279.108 (2015).
151. *Business and Industry Loan Guarantees Program 101*, USDA Rural Dev., http://www.rurdev.usda.gov/bcp_gar.html (last visited Aug. 28, 2015).
152. *Id.*
153. *Id.*
154. 7 C.F.R. § 4279.119 (2015).
155. *Id.*
156. *Performance Measurements*, *supra* note 149.
157. One recent craft brewery-recipient of a CDC/504 loan (as well as an SBA 7(a) loan) was Upstream Brewing Company of Omaha, NE, which used the funds to purchase the property on which it brewed. *Crafting a Brewing Business: Upstream Looks to 504 Deal to Improve Cash Flow*, U.S. Small Bus. Admin., https://www.sba.gov/offices/district/ne/omaha/success-stories/crafting-brew-

("SBA") provides small businesses with long-term, fixed-rate financing that they can use to purchase fixed assets for expansion or modernization.[158] These loans are made available through Certified Development Companies ("CDCs"), which are private, nonprofit corporations established to contribute to economic development within local communities, and are referred to as "CDC/504" loans.[159] Participating lenders must provide half the financing, with the SBA offering 40% of the costs financed through the CDC.[160] The maximum CDC/504 loan amount for a single product is $5.5 million for manufacturers, and the minimum is $50,000.[161]

When applied to breweries, however, the CDC/504 loan has one key drawback: the small business "must intend to create or retain one job for every $65,000 of the debenture ($100,000 for small manufacturers) or meet an alternative job creation standard if it meets any one of [fifteen] community or public policy goals."[162] Some of these public policy goals are: "[b]usiness district revitalization"; "[e]xpansion of exports"; "[e]xpansion of minority business development"; "[r]ural development"; and "[e]nhanced economic completion."[163] Though it is unlikely, should a craft brewery fail to meet any of these public policy goals, it will be denied the CDC/504 loan, and will be unable to expand to incorporate new space for its water-conscious brewing technologies.

3. The EPA's Small Business Innovation Research Program

One of SBA's major duties is to oversee the Small Business Innovation Research ("SBIR") program.[164] First established by the Small Business Innovation Development Act of 1982,[165] the SBIR program is a federally-funded, set-aside program "designed to increase the participation of small, high technology firms in federal research and development [('R&D')] endeavors" with the goal of eventually commercializing the most promising of products.[166] Every federal department with an R&D budget of $100 million or more, including the EPA, is required to establish and operate an SBIR program.[167] Under the EPA's SBIR program, the Agency "issues annual solicitations for Phase I and Phase II research proposals from science and technology-based firms."[168] The EPA's SBIR program provides $2.5 billion annually in incentive funding to small businesses.[169]

The craft brewing industry has already benefited from the EPA's SBIR program. Currently in the midst of Phase I is Cambrian Innovation,[170] the developer of the EcoVolt, the world's first bioelectrically enhanced wastewater energy system.[171] This technology "uses electrically active microbes to treat wastewater while simultaneously generating renewable biogas sufficient to generate [as much as] 50% of [a] brewery's electricity needs and greater than 20% of [its heating] needs."[172] The EcoVolt has already found a home at Bear Republic Brewing Company of Cloverdale, California[173] and Lagunitas Brewing Company ("Lagunitas") of Petaluma, California.[174] So far, the EcoVolt has had a significant positive impact on Lagunitas' water and energy goals. Before its installation, Lagunitas transported "50,000 gallons per day of high-strength wastewater to East Bay Municipal Utility District . . . requiring over [3000] trucks" per year.[175] With the EcoVolt, Lagunitas is projected to eliminate all 3000 trucks annually,[176] thus reducing the brewery's carbon footprint, increasing its heating efficiency, cutting its electric bill, and reducing its effluent loads.

Although the support of the EPA and the SBA through its funding of the EcoVolt and perhaps other technologies may one day be helpful to America's breweries, that support alone is insufficient to incentivize craft breweries to upgrade their water sustainability. This is because reliance on the SBIR program alone would only indirectly treat the problem and would fail to directly ameliorate the working capital and space craft breweries need. Effluent treatment and energy-efficient technologies such as the EcoVolt should, however, be a government-encouraged technology in a more direct incentive program.

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ing-business-upstream-looks-504-deal-improve-cash-flow (last visited Aug. 28, 2015) [hereinafter *Upstream Looks to 504 Deal*].

158. *Id.*

159. Robert Jay Dilger & Sean Lowry, Cong. Research Serv., RL33243, Small Business Administration: A Primer on Programs 1, 11 (2013).

160. *Upstream Looks to 504 Deal*, *supra* note 157.

161. Dilger & Lowry, *supra* note 159, at 11.

162. *Id.*

163. *For Lenders: Financing the 504 Way*, U.S. Small Bus. Admin., https://www.sba.gov/offices/district/mt/helena/resources/lenders-financing-504-way (last visited Aug. 28, 2015).

164. Three acts of Congress govern the existence and execution of the SBIR program: The Small Business Innovation Development Act of 1982, The Small Business Research and Development Enhancement Act of 1992, and the Small Business Innovation Research Program Reauthorization Act of 2000. Currently, the program is operating on a continuing resolution. Office of Inv. & Innovation, U.S. Small Bus. Admin., *The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program: Program Overview* 1, 4 (n.d.), http://www.sbir.gov/sites/default/files/sbir_sttr_program_overview_tips_for_applicants.pdf.

165. Small Business Innovation Development Act of 1982, Pub. L. No. 97-219, § 3, 96 Stat. 217, 217 (codified as amended at 15 U.S.C. § 638 (2006)).

166. Dilger & Lowry, *supra* note 159, at 20.

167. 15 U.S.C. § 638(f)(1) (2006).

168. *See generally EPA's Small Business Innovation Research (SBIR) Program*, U.S. Envtl. Protection Agency, http://epa.gov/ncer/sbir/ (last visited Aug. 25, 2015).

169. *U.S. EPA Supports Sustainable Water Management and Clean Energy Innovation at Calif. Brewery*, U.S. Envtl. Protection Agency (Mar. 11, 2014), http://yosemite.epa.gov/opa/admpress.nsf/0/2af7807ad316930b85257c98006391e6?OpenDocument.

170. *EPA Supporting Small Businesses by Advancing Sustainable and Innovative Products and Research/Twenty-One Businesses Receiving Funding to Strengthen the Economy and the Environment*, U.S. Envtl. Protection Agency (July 14, 2014), http://yosemite.epa.gov/opa/admpress.nsf/d0cf6618525a9efb85257359003fb69d/a34fd9569e08471085257d150069454c!OpenDocument.

171. *U.S. EPA Supports Sustainable Water Management and Clean Energy Innovation at Calif. Brewery*, *supra* note 169.

172. *Id.*

173. *Id.*

174. *Cambrian Innovation and Lagunitas Partner to Launch Breakthrough Wastewater Treatment Technology*, Cambrian Innovation (Nov. 26, 2013), http://cambrianinnovation.com/cambrian-innovation-and-lagunitas-partner-to-launch-breakthrough-wastewater-treatment-technology.

175. *Id.*

176. *Id.*

4. Proposal Part One: Brewing Water Sustainability Loans

The first part of an overall water-conscious brewing incentive should include a guaranty loan program called the Brewing Water Sustainability Loan Program ("BWS Loan Program" or the "Program"). This solution proposes an amendment to the Small Business Act and recommends that participating breweries be subject to new EPA categorical effluent guidelines specific to Program borrowers to ensure compliance.[177] Thus, the BWS Loan Program would be implemented by the EPA and overseen by the SBA, similar to the mechanics of the SBIR program. However, unlike the SBIR program, funds would not come primarily from federal coffers, but instead from SBA guaranteed qualified lenders, much like the USDA B&I Program and the SBA's CDC/504 Loan. Breweries would apply and submit to the EPA their proposals for equipment orders and real property acquisitions. Applications would be subject to both EPA and SBA eligibility review.

BWS Loan Program eligibility would be based on five prerequisites. In addition to meeting the EPA and SBA policy goals and standard loan eligibility criteria,[178] a brewery-applicant would only be eligible if it: (1)(a) proposes to install water sustainability technologies on its existing property, or (b) in the event it does not own the property on which it brews, proposes to purchase real property and install such technologies on said property;[179] (2) is a "small business" under SBA's definition of the term;[180] (3) produces less than six million barrels per year; (4) complies with EPA-promulgated categorical standards specific to BWS Loan Program participants; and (5) meets other policy requirements, such as reducing water consumption, improving the economic and environmental climate of communities, providing employment, and promoting competition.

These five eligibility requirements capture the spirit of the USDA B&I Program, the SBA's CDC/504 program, and the CWA. Criterion (1)(a) of the BWS Loan Program applies the sustainability requirements of the USDA B&I Program, making loan guarantees largely conditioned on whether a brewery's proposed equipment purchases would improve water efficiency or reduce the concentration of effluent discharged to local POTWs, such that the brewery would be in compliance with new categorical standards. The prerequisite in (1)(b) draws on the wisdom of the SBA's CDC/504 program,[181] ensuring that breweries requiring real property for expansion or the necessary water-conscious technologies are not excluded from participating in the BWS Loan Program. Prerequisites (2) and (3), respectively, narrow eligibility to the Program to only those breweries that qualify as small businesses under SBA standards[182] and that fall within the Brewers Association's definition of "craft brewery," thus precluding large industry producers from exploiting a tax incentive meant for the small, closely-held businesses that need it most.

In order to meet the fourth prong of BWS Loan Program eligibility—criterion (4) above—a brewery would have to make certain indications of intent and understanding in its loan application. First, the brewery would have to notify the EPA of its intent to use loan proceeds for equipment, and if necessary, real property, that would facilitate its effort to achieve greater water sustainability. Second, the brewery would have to acknowledge that its participation in the Program would subject it to new national categorical pretreatment standards specific to Program borrowers. Because almost all Program breweries would presumably be indirect industrial dischargers,[183] the EPA would issue these standards based on national, uniform, technology-based Pretreatment Standards for New Sources ("PSNS") and Pretreatment Standards for Existing Sources ("PSES").[184] Cutting-edge brewery pollution control technologies, including pulse output mechanical sub-meters, aerobic and anaerobic pretreatment systems, and Cambrian Innovation's EcoVolt, would presumably be permissible expenditures of loan proceeds because they would likely facilitate the brewery's water sustainability efforts.

Such national categorical pretreatment standards imposed on BWS Loan Program breweries would achieve four goals. First, the standards would serve as an enforcement mechanism to ensure that Program breweries comply with minimum effluent concentration requirements. Should a brewery fail to meet these requirements over a period of time prescribed by EPA regulations, the participants would be barred from additional BWS Loan Program proceeds until they reestablish compliance. Second, by enforcing a national stan-

177. This is to say that breweries not participating in the BWS Loan Program would not be subject to the brewing industry national categorical standards.

178. Generally, to qualify for SBA loan assistance,

> a small business applicant must: (a) Be an operating business (except for loans to Eligible Passive Companies); (b) Be organized for profit; (c) Be located in the United States; (d) Be small under the size requirements of part 121 of this chapter (including affiliates) . . . and (e) Be able to demonstrate a need for the desired credit.

13 C.F.R. § 120.100 (2014). The SBA imposes additional eligibility requirements, but they are beyond the scope of this Note.

179. Prerequisite (1)(a) does not condition a tenant-brewer's receipt of loan proceeds on purchase of real property, but simply gives the brewer the option to purchase the property through additional capital.

180. For the purpose of SBA loan eligibility, SBA establishes size for "types of economic activity, or industry" under the North American Industry Classification System. 13 C.F.R. § 121.101. These size standards are published at 13 C.F.R. § 121.201. Breweries are considered "small" if they have less than 500 employees. *Id.* § 121.201; *see NAICS Keyword Search*, U.S. Census Bureau, https://www.census.gov/cgi-bin/sssd/naics/naicsrch (last visited Jan. 24, 2016) (enter code number 312120).

181. *See Upstream Looks to 504 Deal*, *supra* note 157.

182. *See* 13 C.F.R. § 121.201; *see also Craft Brewer Defined*, *supra* note 19.

183. An "Indirect Discharge" is defined as "the introduction of pollutants into a POTW from any non-domestic source" regulated under the Clean Water Act. 40 C.F.R. § 403.3(i) (2014).

184. The determination of which standards, PSNS or PSES, would apply to an indirect discharger is based on whether a source is "new" or "existing." A "New Source" is defined as "any building, structure, facility or installation from which there is or may be a Discharge of pollutants, the construction of which commenced after the publication of proposed Pretreatment Standards under section 307(c) of the [Clean Water] Act" which will be applicable if they are later promulgated. *Id.* § 403.3(m)(1). Although only generally defined by § 403.3(m)(1), an "existing source" can be considered any "building, structure, facility or installation" from which there already was a "Discharge of pollutants, the construction of which commenced" before the publication of Pretreatment Standards for the industry in question. *Id.*

dard, rather than leaving state or local regulatory agencies to establish their own technology-based standards through permitting, the EPA would ensure uniformity in program enforcement. Third, a national enforcement mechanism would prevent municipalities from engaging in a race to the bottom just to get more breweries within their city limits. Finally, using a standards-setting approach, rather than a technology-forcing method[185] whereby the EPA only guarantees loans for purchases of pre-approved technologies, prevents regulation from stifling innovation.[186]

If implemented, the BWS Loan Program would have three advantages. First, the loan guarantee method directly addresses breweries' greatest barrier to environmentally responsible brewing—capital—and offers funds up front to help breweries make these investments. Second, guaranty loans are well-suited to the brewing industry because water-conscious technologies pay for themselves over time through water expense savings.[187] In other words, breweries could repay loans with expenses saved, rather than projected revenue. Third, from a fiscal standpoint, a loan guarantee program is more feasible than a grant program, which would immediately deplete federal financial resources.

B. Water Efficiency-Based Small Brewer Tax Incentive Program

Although the BWS Loan Program would incentivize craft breweries to make the upfront capital investment in water-conscious technologies, this incentive alone does not create a lasting solution. This is because by nature, loan guarantees (and grants, for that matter) only incentivize a one-time capital investment.[188] In order for an incentive program to truly work, it must also encourage breweries to shoulder the expense of continually monitoring their consumption and waste through industry best practices. One solution to this problem is to amend the Internal Revenue Code to introduce a federal progressive tax incentive based on water efficiency and production volume that draws upon the structure of the currently proposed Small Brewer Reinvestment and Expanding Workforce Act ("Small BREW Act").[189] This new tax would be implemented by the U.S. Department of Treasury using measurements gathered from self-reported data and local water companies.

1. The Small BREW Act—Progressive Structure and Bipartisan Support

Re-introduced on January 8, 2015, the Small BREW Act proposes an amendment to the Internal Revenue Code's current federal excise tax structure on beer.[190] It seeks to effectuate this goal by establishing a three-tier progressive tax based on production volume measured in barrels of beer.[191] The bill stipulates that for all brewers producing not more than six million barrels of beer during the calendar year, "the per barrel rate of tax imposed by this section shall be—(i) $3.50 on the first 60,000 qualified barrels of production, and (ii) $16 on the first 1,940,000 qualified barrels of production to which clause (i) does not apply."[192]

Thus far, the Small BREW Act has received impressive bipartisan support. In 2013—its first year of introduction—it was cosponsored by 77 Republicans and 104 Democrats in the House of Representatives.[193] The legislation has recently been reintroduced in the 114th Congress (2015–2016) by Senator Benjamin Cardin (D-MD) and has been cosponsored by thirty-four senators on both sides of the aisle.[194] Indeed, federal tax legislation favorable to the craft beverage industry became law as recently as December 2015.[195] House Bill 2029, a tax extenders bill that was included in the FY 2016 Consolidated Appropriations Act, removes bond requirements and extends filing periods for "producers of alcohol that reasonably expect to be liable for not more than $50,000 per year in alcohol excise taxes."[196] Although these amendments to the Internal Revenue Code do not affect the federal excise tax *rate* on craft brewers, it is certainly a step in the right direction as well as an indication—based on its broad bipartisan support[197]—that even greater reforms for the industry are on the horizon.

2. Proposal Part Two: Applying the Small BREW Act's Progressive Structure to a Brewery Water Sustainability Tax Incentive

Drawing upon the progressive structure of the Small BREW Act, a federal progressive excise tax incentive could be established for craft breweries based not solely on production

185. "Technology forcing" is a regulatory approach whereby a "regulator specifies a standard that cannot be met with existing technology, or at least not at an acceptable cost." David Gerard & Lest B. Lave, *Implementing Technology-Forcing Policies: The 1970 Clean Air Act Amendments and the Introduction of Advanced Automotive Emissions Controls*, Carnegie Mellon U. 1 (May 2003), http://www.cmu.edu/gdi/docs/implementing-technology.pdf.

186. *See* Luke A Stewart, *The Impact of Regulation on Innovation in the United States: A Cross-Industry Literature Review*, Info. Tech. & Innovation Found. 2 (2010), http://www.iom.edu/~/media/Files/Report%20Files/2011/Health-IT/Commissioned-paper-Impact-of-Regulation-on-Innovation.pdf (crafting regulation contingent on "innovation for compliance" can potentially result in "'dud'" products or processes, and thus, even when it demands compliance innovation, regulation can still stifle innovation in the end).

187. Sloane, *supra* note 118, at 501.

188. *See generally Business and Industry Loan Guarantees Program 101*, *supra* note 151.

189. *See* Small Brew Act, H.R. 232, 114th Cong. (2015).

190. *See generally id.* (proposing "[a] Bill [t]o amend the Internal Revenue Code of 1986 to provide a reduced rate of excise tax on beer produced domestically by certain qualifying producers").

191. Keith Gribbins, *The BEER Act vs. The Small BREW Act: What's the Difference?*, Craft Brewing Bus. (May 16, 2013), http://www.craftbrewingbusiness.com/news/the-beer-act-vs-the-small-brew-act-whats-the-difference/.

192. Small Brew Act, H.R. 494 § (2)(a)(2)(A).

193. *H.R.494—Small BREW Act*, Congress.gov, https://www.congress.gov/bill/113th-congress/house-bill/494/cosponsors (last visited Aug. 28, 2015) (navigate to "Cosponsors" tab).

194. *S.375—Small BREW Act*, Congress.gov, https://www.congress.gov/bill/114th-congress/senate-bill/375/cosponsors (last visited Aug. 28, 2015) (navigate to "Cosponsors" tab).

195. H.R. 2029, 114th Cong. § 332 (2015).

196. *Id.*

197. *See* Craft Beverage Modernization and Tax Reform Act of 2015, H.R. 2903, 114th Cong. (2015). House Bill 2903 is a legislative compromise package that includes provisions of the Small BREW Act. *See id.* It was also the model for the provisions eventually included in the FY 2016 Consolidated Appropriations Act.

volume but instead on both production volume and the brewing industry's widely used ratio of barrels of water consumed to barrels of beer produced. This program would first adopt the Small BREW Act's tax structure for all brewers not producing more than six million barrels of beer per year as a starting point. For those brewers that wish to participate in the incentive program, their deductions will be based on water reports generated by a combination of self-reporting sub-meter data and POTW data. For breweries with a 5.6-to-1.0 ratio or above (no actions are taken to reduce water consumption), their taxes will be levied at $3.50 for the first 60,000 bbl of beer produced, $16 for the next 1,940,000, and $18 for the next two million bbl or more. A brewery within the range of a 5.5-to-1.0 and 3.6-to-1.0 ratio (a reduction in water consumption by slightly more than 20%), will pay rates reduced by 20% in kind: $2.80 on the first 60,000 bbl, $12.80 on the next 1,940,000, and $14.40 on the next two million bbl or more. Finally, a brewery within the range of 3.5-to-1.0 or less (a reduction in water consumption by 50% or more), will pay rates reduced by 50%: $1.75 on the first 60,000 bbl, $8 on the next 1,940,000 bbl, and $9 on the next two million bbl or more.

By structuring a water sustainability progressive brewing tax incentive based on the relationship between production volume and the water volume to beer volume ratio, this ensures that the smallest and most water-efficient breweries (i.e., those in the 60,000 bbl or less with a ratio of 3.5-to-1.0 or less) receive the greatest tax deductions. Although levying the tax based on annual water consumption may seem unfair because brewery water consumption naturally fluctuates over time, using an annual method gives a better snapshot of a brewery's overall consumption of water. It also incentivizes even stricter self-assessment in warmer months, when water conservation is most important, so that the overall annual ratio does not increase.

3. In Defense of a Federal Progressive Brewery Excise Tax Incentive

There are three major arguments against the use of a tax incentive structure based on production volume and water consumption. First, there is argument from practicality—measurement may be difficult for small, capital-short craft breweries to handle the self-monitoring necessary to participate in the incentive program and thus receive annual deductions. Second, an incentive program based solely on *consumption* means there is no tax incentive for monitoring and treating *wastewater*. Both of these criticisms are addressed by emphasizing that the proposed tax incentive program would be implemented along with the BWS Loan Program's two-pronged EPA and SBA platform.

The third potential argument against a federal progressive tax incentive is that states, not the federal government, should take responsibility for incentivizing the growth and sustainability of the craft brewing industry. For example, California recently enacted the Manufacturing and Research & Development Equipment Exemption ("Exemption"),[198] which provides certain qualified persons or businesses, including breweries, tax breaks on industrial equipment, including property used for pollution control.[199] California has many special taxing districts, which add a use tax of anywhere between 0.10%–2.00% onto a base rate of 7.50%.[200] Under the Exemption, when buying certain qualifying equipment, the brewery would need only to provide the seller with a partial exemption certificate to get the reduced rate, which is a 4.1875% sales and use tax.[201]

The assertion that a state-based tax exemption or incentive would be more effective than a federal program is flawed for three reasons. First, given the interconnected nature of the national and global economy, it is nearly impossible to design a tax incentive so that the benefits remain in-state.[202] For example, breweries receiving tax breaks in California may poach workers from neighboring Oregon to the detriment of Oregon breweries.[203] Second, state and local tax incentives generally reduce overall market efficiency.[204] This is because any tax incentive that actually affects a business' location decision is likely to make the business move to an area that would not otherwise be optimal—including localities that are located farther away from key markets or infrastructure.[205] Consequently, local incentives can cause businesses to consume more energy or infrastructure resources than they would without the incentive. Third, because brewery water sustainability is a national issue, a national solution must be crafted to meet it. If remedies were left up to the states, a race to bottom, whereby states would refrain from increasing their sustainability standards, may result. Put simply, by implementing a progressive tax on the federal level, breweries will be unable to inadvertently (or purposely) pit states and localities against each other for the best incentives and instead make market-efficient choices about where they sustainably brew.

VI. Conclusion: Proposing the Establishment of the Brewery Water Sustainability Loan Program and an Amendment to the Federal Excise Beer Tax

A fully comprehensive federal solution to brewery wastewater and overconsumption should combine the upfront-cap-

198. *Manufacturing and Research & Development Exemption*, Cal. State Board Equalization, http://www.boe.ca.gov/sutax/manufacturing_exemptions.htm#Sellers (last visited Aug. 28, 2015).
199. *Qualifications*, Cal. State Board Equalization, http://www.boe.ca.gov/sutax/manufacturing_exemptions.htm#Qualifications (last visited Aug. 28, 2015).
200. *Tax Districts, California City & County Sales & Use Tax Rates*, Cal. State Board Equalization, http://www.boe.ca.gov/sutax/pam71.htm (last visited Aug. 28, 2015).
201. *Purchasers—Manufacturing and Research & Development Exemption*, Cal. State Board Equalization, http://www.boe.ca.gov/sutax/manufacturing_exemptions.htm#Purchasers (last visited Aug. 28, 2015).
202. *See* Carl Davis, Inst. on Taxation & Econ. Policy, *Tax Incentives: Costly for States, Drag on the Nation* (Aug. 12, 2013), http://www.itep.org/pdf/taxincentiveeffectiveness.pdf.
203. *Id.*
204. *Id.*
205. *Id.*

ital injection incentive of the BWS Loan Program and the back-end, long-term savings incentive of a federal progressive excise tax. If implemented in conjunction, this would provide these small businesses with the capital to first invest in water sustainability and measurement technologies, and then receive continued annual savings if breweries fall within one of the reduced rate tax brackets. With these annual savings in water tap fees and wastewater surcharges, breweries would have the working capital they desperately need to produce more beer, expand distribution, hire more employees, and reinvest in more efficient technologies, thus securing even greater annual savings on water-related expenses.

Although the proposed incentive package does include a tax incentive for effluent concentration reduction, the technologies to achieve this goal, such as aerobic and anaerobic pretreatment systems, would be eligible for funding through the accompanying loan guaranty program. Indeed, investments in technologies like the EcoVolt, which both treats effluent and produces renewable energy, are the most ideal because it would save breweries utility costs and potentially on wastewater surcharges. Indeed, whether a brewery uses a traditional aerobic or anaerobic pretreatment system, or the EcoVolt, there will inevitably be savings on charges related to wastewater effluent anyway.

Since its revival in the early 1980s, the craft brewing industry has been a continual innovator in the flavor, body, and complexity of beer. It has also been an increasingly influential and rapidly expanding industry in the U.S. economy. As climates dry and breweries open all across the country, this industry will inevitably clash with issues of energy sustainability and water scarcity. This country-wide problem needs a proactive, country-wide solution. The dual federal incentive program consisting of loan guarantees for brewery water sustainability and a new federal excise tax bracket based on production and water efficiency would effectively serve this purpose. With the desperately needed injection of upfront capital and continued annual savings, these innovative small businesses will be able to continue producing new and exciting products, employing local individuals, and positively impacting local communities, all while having minimal impact on local water supplies—a fortunate set of circumstances that we can all raise a glass to.