

# Old World Regulations and New World Flexibility: Countering the Effects of Climate Change on Wine

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## INTRODUCTION

Climate change is taking a toll on wine grapes, wine-producing regions, and the wine industry as a whole, posing numerous problems that winegrowers, industry leaders, and legislators need to immediately address.<sup>1</sup> The urgency to sustain the wine industry stems from the fact that wine grapes are one of the more susceptible products within the agricultural industry.<sup>2</sup> Elizabeth M. Wolkovich, professor at the University of British Columbia, stated, “[w]ine grapes are extremely sensitive to climate and this is much of what makes wine so exquisite. But it also means wine grapes are extremely sensitive to climate change.”<sup>3</sup>

Benjamin Cook, from Columbia University, added, “[i]n some ways, wine is like the canary in the coal mine for climate change impacts on agriculture, because these grapes are so climate-sensitive.”<sup>4</sup> Not only are wine grapes sensitive to climate change, but as Aron Weinkauff, winemaker and vineyard manager at Spottswoode Estate Vineyard and Winery, pointed out, “[t]his is not a crop you get a few shots at a year. . . It’s just one chance each year to get it right,” further emphasizing the urgent need for

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<sup>1</sup> Sarah E. Daniels, *Climate Change is Rapidly Altering Wine as We Know It*, WINE ENTHUSIAST: THE ADVOCACY ISSUE (Feb. 3, 2020), <https://www.winemag.com/2020/02/03/wine-climate-change> [<https://perma.cc/J3FH-E6ES>]; *See To Slow Global Warming, U.N. Warns Agriculture Must Change*, NPR, (Aug. 8, 2019, 4:00 AM), <https://www.npr.org/sections/thesalt/2019/08/08/748416223/to-slow-global-warming-u-n-warns-agriculture-must-change> [<https://perma.cc/NNZ8-83HT>].

<sup>2</sup> Eric Asimov, *How Climate Change Impacts Wine*, N.Y. TIMES: THE POUR (Oct. 14, 2019), <https://www.nytimes.com/interactive/2019/10/14/dining/drinks/climate-change-wine.html> [<https://perma.cc/8B35-W44D>]; Daniels, *supra* note 1.

<sup>3</sup> Daniels, *supra* note 1.

<sup>4</sup> Sarah Fecht, *Wine Region Could Shrink Dramatically With Climate Change Unless Growers Swap Varieties*, EARTH INST.: STATE OF THE PLANET (Jan. 27, 2020), <https://blogs.ei.columbia.edu/2020/01/27/wine-regions-shrink-climate-change> [<https://perma.cc/2UVS-4YTH>].

industry leaders and regulators to take action to counter the effects of climate change on the wine industry.<sup>5</sup>

Paradoxically, climate change is benefitting certain aspects of the wine industry in the short term, as new wine regions are opening up for the industry that were once too cold.<sup>6</sup> Additionally, warmer temperatures are having a positive effect on certain wine grape varieties in regions that previously produced mediocre wines.<sup>7</sup> Scientists from the University of California, Davis, have also found that certain wine grape varieties “prone to stress” have traits that conserve water, especially in warmer and drier regions.<sup>8</sup> Therefore, these particular varieties “could be more resilient to climate change than expected,” according to Megan Bartlett, an assistant professor at UC Davis.<sup>9</sup> Ultimately, certain wine grape varieties may be able to conserve water naturally, which is a positive sign for members of the wine industry in combating climate change in warmer and drier climates, at least for those willing to grow these varieties.<sup>10</sup>

When viewing wine as an agricultural product, climate change will have long-term, negative effects on wine grapes and vineyards that far outweigh the short-term benefits.<sup>11</sup> The negative effects on wine grapes resulting from the continually rising temperatures are myriad, including: souring, improperly developing tannins, inconsistent acidity levels, sun burnt crops, and severe vine damage, to name a few.<sup>12</sup> Gregory Jones, Director of Evenstad Center for Wine Education, stated, “temperature is the most influential factor in overall growth and productivity of wine grapes,” but rising temperatures breed various other problems, such as pests and diseases, droughts, and an increase in the severity of winter storms.<sup>13</sup>

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<sup>5</sup> Marco della Cava, *Climate Change is Coming for Your Wine. What the World's Wineries are Doing to Save Grapes*, USA TODAY (Sept. 8, 2019, 10:46 AM), <https://www.usatoday.com/story/news/nation/2019/09/08/climate-change-threatens-worlds-wineries-which-grapes-saved/2136457001> [<https://perma.cc/9WSJ-WV9G>].

<sup>6</sup> Asimov *supra* note 2; Daniels, *supra* note 1.

<sup>7</sup> Asimov, *supra* note 2; Daniels, *supra* note 1.

<sup>8</sup> Amy Quinton, *Can Water Saving Traits Help Wine Survive Climate Change?*, UC DAVIS (Dec. 17, 2020), <https://www.ucdavis.edu/news/can-water-saving-traits-help-wine-survive-climate-change> [<https://perma.cc/HK2N-ZLXN>].

<sup>9</sup> *Id.*

<sup>10</sup> *Id.*

<sup>11</sup> Asimov, *supra* note 2.

<sup>12</sup> Daniels, *supra* note 1.

<sup>13</sup> *Id.*

In order to combat the negative effects of climate change, the wine industry has expanded to new regions, creating one of the primary “positive” effects of climate change on the wine industry, but this is just one remedy.<sup>14</sup> Additionally, winemakers are adopting many day-to-day practices in order to combat climate change at home to sustain the industry into the future.<sup>15</sup> For example, winemakers are growing wine grapes at higher elevations with cooler temperatures, or at least cooler nighttime temperatures, as well as experimenting with new or different varieties more appropriate to the region’s current climate.<sup>16</sup>

When winegrowers choose to grow at higher elevations, this decision presents its own set of challenges.<sup>17</sup> This response is seen in areas such as Patagonia, where Chilean and Argentinian winemakers are experimenting in the region’s microclimates and wild terroirs, with the hope that it “will provide future reprieve from some of nature’s elements, even if it means risk in the present.”<sup>18</sup> This response further reiterates the urgency that many in the wine industry are feeling and the willingness that businesses are showing to take extreme risks for long-term success.<sup>19</sup>

Currently, one of the best known solutions for combating the effects of climate change on wine grapes is selecting new varieties that are more appropriate to the current climate.<sup>20</sup> Eric Asimov, the New York Times’s wine critic, noted, “[i]t may seem impossible to imagine Bordeaux without cabernet sauvignon and merlot. . . but the prospect of a much warmer future may require even the most famous wine regions to rethink their methods.”<sup>21</sup> The big obstacle to this solution is appellation authorities, which regulate certain wine regions.<sup>22</sup>

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<sup>14</sup> Daniels, *supra* note 1. *See also* Asimov, *supra* note 2.

<sup>15</sup> Daniels, *supra* note 1. *See also* Asimov, *supra* note 2.

<sup>16</sup> Daniels, *supra* note 1. *See also* Asimov, *supra* note 2.

<sup>17</sup> Asimov, *supra* note 2.

<sup>18</sup> Michael Schachner, *Extreme Conditions and a Changing Climate on Patagonia’s Southern Winemaking Frontier*, WINE ENTHUSIAST, (Dec. 13, 2019), <https://www.winemag.com/2019/12/13/chile-argentina-patagonia-wine> [<https://perma.cc/V57E-PQFQ>]; Daniels, *supra* note 1.

<sup>19</sup> Schachner, *supra* note 18.

<sup>20</sup> Daniels, *supra* note 1; Asimov, *supra* note 2; Fecht, *supra* note 4.

<sup>21</sup> Asimov, *supra* note 2.

<sup>22</sup> Chris Mercer, *Bordeaux Winemakers Allow New Grapes to Fight Climate Change*, DECANTER, (July 2, 2019), <https://www.decanter.com/wine-news/bordeaux-new-wine-grapes-419730> [<https://perma.cc/QYQ3-MXJQ>].

Appellation authorities regulate the types of wine varieties that wine grape farmers can grow within a region, so changes in such regions are rare and “monumental.”<sup>23</sup> The appellation authorities in Bordeaux, for example, approved seven additional grape varieties for “experiments to determine whether they can be used to mitigate the effects of climate change,” but these types of changes do not happen overnight, nor do they result without controversy within the industry.<sup>24</sup>

In contrast, these types of rules and regulations do not exist to the same extent in the United States, so wine regions such as Napa Valley must rely on individual winegrowers to make the decision to grow more suitable varieties.<sup>25</sup> Wolkovich stated, “[i]n the future, I expect growers to struggle with maintaining varieties in certain regions without major interventions. . . . If they don’t make major changes, I think they will see declining yields – already seen in Europe – and declining quality as the varieties become increasingly mismatched to the climate.”<sup>26</sup>

Winemaker Dan Petroski of Larkmead, located in the Napa Valley region, is one such winemaker that chose to combat climate change through new varieties, and stated, “[t]echnology will assist, farming practices will assist. . . . There’s nothing you can do in the vineyard. . . . that’s going to help the vines to process when it gets that hot for that period of time.”<sup>27</sup> You have to work with varieties that mature under those conditions,” signifying that new varieties are vital to the preservation of the wine industry, but this alone will not solve all of the industry’s problems in facing climate change.<sup>28</sup>

For some, choosing different grape varieties more suitable to the current climate and state of the land may seem to be a

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<sup>23</sup> Daniels, *supra* note 1; Tom Mullen, France is Changing Key Wine Regulations, *Forbes* (July 3, 2019, 5:08 AM), <https://www.forbes.com/sites/tmullen/2019/07/03/france-is-changing-key-wine-regulations/#256ce6c19b63> [<https://perma.cc/CS2Q-CSU2>]; French Wine Classifications AOC Law Wine Grapes Vineyards of France, *Wine Cellar Insider*, <https://www.thewinecellarinsider.com/wine-topics/wine-educational-questions/wine-grapes-vineyard-france-classifications-appellation-law/> (last viewed Mar. 21, 2021) [<https://perma.cc/3SEF-9BDP>].

<sup>24</sup> Asimov, *supra* note 2.

<sup>25</sup> *Id.*

<sup>26</sup> Daniels, *supra* note 1.

<sup>27</sup> *Id.*

<sup>28</sup> *Id.*

dramatic change, but there are even smaller scale solutions that all producers have the capability to implement.<sup>29</sup> For example, some studies show that simple changes in canopy management can positively affect the soil and amount of water usage while also reducing sugar levels and increasing the levels of acids.<sup>30</sup> Other important benefits include adding and storing nutrients in the soil and maximizing the value of less water usage through the implementation of cover crops, particularly winter cover crops.<sup>31</sup> In general, cover crops “slow erosion, improve soil, smother weeds, enhance nutrient and moisture availability, help control many pests and bring a host of other benefits to your farm.”<sup>32</sup> Cover crops are especially beneficial in light of the changing climate because they have lower costs and produce inherently long-term benefits for the soil.<sup>33</sup>

Another practical solution to combat climate change and rising temperatures is “curtailing sunlight,” which means preventing extreme exposure to sunlight, especially during the afternoons.<sup>34</sup> Under these conditions, winegrowers do not have to concern themselves with whether or not the grapes will fully ripen, but rather whether or not the grapes will overripen as a result of the rapidly changing climate.<sup>35</sup> Curtailing sunlight is intertwined with implementing different varieties of grapes, evidenced in such regions as the Yarra Valley of Australia in the Southern Hemisphere.<sup>36</sup> There, winegrowers planted wine grape varieties “which benefit from a relatively cool climate,” on south facing slopes.<sup>37</sup> This approach is one of the many practical solutions in which the New World wine industry, in such regions as California and Washington, is thinking forward.<sup>38</sup> In the New World wine regions, it is easier to make these transitions because

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<sup>29</sup> See Michelle Renée Mozell & Liz Thach, *The Impact of Climate Change on the Global Wine Industry: Challenges and Solutions*, 3 WINE ECON. AND POL’Y 81, 85–86 (2014).

<sup>30</sup> Mozell & Thach, *supra* note 29.

<sup>31</sup> *Id.*

<sup>32</sup> ANDY CLARK, SUSTAINABLE AGRIC. RSCH. & EDUC., *MANAGING COVER CROPS PROFITABLY* (3rd ed. 2012).

<sup>33</sup> *Id.*

<sup>34</sup> Asimov, *supra* note 2; Mozell & Thach, *supra* note 29.

<sup>35</sup> Asimov, *supra* note 2.

<sup>36</sup> *Id.*

<sup>37</sup> *Id.*

<sup>38</sup> *Id.*

“the status of vineyard areas has not been rigidly defined by history.”<sup>39</sup>

Winegrowers will also have to find new, innovative ways to combat the increase in pests and diseases that is an inevitable result of warming temperatures.<sup>40</sup> One such solution is the Integrated Pest Management System, which is an “eco-system-based management practice that integrates biological, cultural, physical, and chemical tools to manage pests and diseases in the vineyard. . . This helps mitigate, too, against climate change by reducing the reliance upon agrochemicals and the subsequent chemical emissions. . .”<sup>41</sup> The wine industry can adopt practices used in sectors like organic agriculture, and especially from existing organic winegrowers, who are already utilizing organic strategies on their vineyards to counteract the increase in pests and disease in sustainable ways that do not add to the problems of climate change.<sup>42</sup>

Organic practices find innovative means in which to “manage the numerous pests and diseases that attack vines, leaves, roots and fruit, without using hazardous chemicals.”<sup>43</sup> In the United States, organic biodiversity may be one of the better solutions at this time, especially when dealing with pests and diseases, as there are various levels of regulations concerning pesticides and organic agricultural products that keep vineyards from exacerbating climate change.<sup>44</sup> These include the National Organic Program (“NOP”), Organic Materials Review Institute (“OMRI”), and the Environmental Protection Agency’s (“EPA”) FIFRA regulations.<sup>45</sup>

On a larger scale, the wine industry can make significant changes to combat climate change and sustain the industry into the future through the implementation of cleaner energy

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<sup>39</sup> *Id.*

<sup>40</sup> Mozell & Thach, *supra* note 29.

<sup>41</sup> *Id.*

<sup>42</sup> NEW ZEALAND WINE, *Organic Pest & Disease Management*, <https://www.nzwine.com/en/sustainability/organic-winegrowing/pest-disease> (Last viewed Mar. 20, 2021) [<https://perma.cc/ACJ4-7VEX>].

<sup>43</sup> *Id.*

<sup>44</sup> New Zealand Wine, *supra* note 42.

<sup>45</sup> *2014 Production Guide for Organic Grapes*, NYS IPM PUB. NO. 224, June 2014, at 1, 13; Eric Asimov, *How Does Your Love of Wine Contribute to Climate Change*, N.Y. TIMES (Apr. 30, 2019), <https://www.nytimes.com/2019/04/30/dining/drinks/wine-climate-change.html> [<https://perma.cc/VR37-ECRU>].

sources.<sup>46</sup> One of the bellwethers of this shift to renewable energy in the wine industry is Miguel A. Torress of Familia Torres, which owns five wineries in Spain, one in Chile, and one in California.<sup>47</sup> The Bodega Torres winery installed a biomass boiler, “which converts pruned vines and other organic residue into heat and electricity,” in order to help achieve their goal of a thirty percent reduction in carbon emissions by 2020.<sup>48</sup>

In addition, the winery receives twenty-nine percent of needed energy for the entire vineyard from solar panels; the winery utilizes geothermal installations “to control the temperature in the winemaking facilities; and, the winery is experimenting with other methods to capture and store carbon, especially the carbon emission released during the fermentation process in order to convert it into reusable energy.”<sup>49</sup>

Jackson Family Wines (“JFW”), based in the United States and holding forty wineries and brands, has adopted and implemented a similar model, serving as a model for what can be achieved across the entire industry.<sup>50</sup> In addition to cutting carbon through practical means such as switching to lighter bottles, adopting no-till farming practices, and composting to store carbon in the ground, the company also managed to severely cut waste sent to landfills, which “not only reduced the company’s carbon footprint, but saved \$8 million in energy costs,” savings the company used to reinvest in solar energy.<sup>51</sup> As a large portion of the JFW is located in California and Oregon, the company has focused a lot of its energy on eliminating as much water usage as possible, “aiming to increase water security in vineyards that are increasingly prone to drought.”<sup>52</sup>

There are myriad options for winegrowers and the wine industry to take in order to combat climate change that need to be further explored, but this note will ultimately focus on the differences between the Old World wine regions’ approaches to

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<sup>46</sup> Lindsay Patterson, *Two Producers Working to Protect the Future of Wine*, WINE ENTHUSIAST (May 17, 2019), <https://www.winemag.com/2019/05/17/two-producers-working-to-protect-the-future-of-wine> [https://perma.cc/CX3N-8FLA].

<sup>47</sup> *Id.*

<sup>48</sup> *Id.*

<sup>49</sup> *Id.*

<sup>50</sup> *Id.*

<sup>51</sup> *Id.*

<sup>52</sup> Lindsay Patterson, *Two Producers Working to Protect the Future of Wine*, WINE ENTHUSIAST (May 17, 2019), <https://www.winemag.com/2019/05/17/two-producers-working-to-protect-the-future-of-wine> [https://perma.cc/CX3N-8FLA].

climate change versus the New World wine regions, and especially a comparison between their respective rules and regulations.<sup>53</sup> At the surface level, the distinction between Old World and New World essentially refers to “where modern winemaking traditions originated.”<sup>54</sup> In other words, Old World wine is rooted in tradition and “the operative word is ‘influence,’” and includes regions such as, France, Italy, Portugal, Spain, and Germany.<sup>55</sup> On the other hand, New World regions are typically former colonies that borrowed traditions, but the various New World regions eventually developed many of their own methods of wine production.<sup>56</sup>

More importantly, the “main trait all Old World wine countries have in common is that their wine makings is heavily restricted, with guidelines all wineries must follow. Each country and region of that country in the Old World has been making wine a certain way for centuries, and current winemakers are held to those old standards.”<sup>57</sup> In contrast, the New World wines evoke an “entrepreneurial spirit,” putting less emphasis on traditional techniques, rules and regulations, and utilizing more modern advances in technology.<sup>58</sup> The European Union, constituting much of the Old World wine regions, is easily the most heavily regulated region of the wine industry.<sup>59</sup> Although the Old World regions are more regulated, the New World regions are not completely devoid of regulations, especially when it comes to chemicals and pesticides, labeling, and restricting the use of certain additives, to name a few.<sup>60</sup>

This note will fully explore the most promising, practical, and large-scale solutions for wineries and vineyards to

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<sup>53</sup> Tom Mullen, *Shifting Climate Alters Prime Vine Locations in Burgundy*, FORBES (Aug. 24, 2020, 4:50 AM), <https://www.forbes.com/sites/tmullen/2020/08/24/shifting-climate-alters-prime-vine-locations-in-burgundy/?sh=c7627994b88c> [https://perma.cc/FHY4-N2Q4]; Giulia Meloni et al., *Wine Regulations*, 41 APPLIED ECON. PERSP. AND POL'Y 620, 622–23 (2019).

<sup>54</sup> Madeline Puckette, *The Real Differences Between New World and Old World Wine*, WINE FOLLY, <https://winefolly.com/deep-dive/new-world-vs-old-world-wine> (last viewed Mar. 30, 2021) [https://perma.cc/LN4A-W89K].

<sup>55</sup> *Id.*

<sup>56</sup> *Id.*

<sup>57</sup> *The Guide to Old World Wine Vs. New World Wines*, VINEPAIR, <https://vinepair.com/wine-101/guide-old-world-vs-new-world-wines> (last viewed Oct. 19, 2020) [https://perma.cc/K3HW-FUPY].

<sup>58</sup> *Id.*

<sup>59</sup> Meloni, *supra* note 53, at 662.

<sup>60</sup> *Id.* at 623.



implement, as well as the juxtaposition of regulations between the Old and New World wine regions. This note concludes that Old World regions need more flexibility in order to adapt, while the New World regions need stricter regulations and incentives related to methods of combating climate change, such as limiting varieties to specific regions. In the alternative, the New World regions need a complete embrace of the freedom of individual wineries to implement more sustainable and progressive practices. These solutions have the potential to save this multi-billion dollar industry.<sup>61</sup>

### I. BRIEF HISTORY OF CLIMATE CHANGE

The Earth's climate has changed over the course of history, such as the occurrence of the last ice age about 11,700 years ago; most of these changes "are attributed to very small variations in Earth's orbit that change the amount of solar energy our planet receives."<sup>62</sup> In contrast, the current changes in climate ("climate change") are almost certainly the result of human activity.<sup>63</sup> The Intergovernmental Panel on Climate Change ("IPCC") stated, "[w]arming of the climate system is unequivocal," and the "[h]uman influence on the climate system is clear," having had "widespread impacts on human and natural systems."<sup>64</sup>

Scientists are attributing climate change primarily to greenhouse gases in the atmosphere that block heat from escaping.<sup>65</sup> Human activities, such as the burning of fossil fuels, like coal and oil, are contributing to greenhouse gas emissions and climate change.<sup>66</sup> Additionally, agriculture also contributes to a rise in greenhouse gas emissions.<sup>67</sup> The combination of greenhouse gas emissions and these human activities, according

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<sup>61</sup> *Id.*

<sup>62</sup> *Climate Change: How Do We Know?*, NASA, <https://climate.nasa.gov/evidence> (last viewed Jan. 18, 2021) [<https://perma.cc/96UB-QMSC>].

<sup>63</sup> *Id.*

<sup>64</sup> Climate Change 2014 Synthesis Report Summary for Policymakers, IPCC, [https://www.ipcc.ch/site/assets/uploads/2018/02/AR5\\_SYR\\_FINAL\\_SPM.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf) (last viewed Jan. 18, 2021) [<https://perma.cc/PTS8-HW76>].

<sup>65</sup> *The Causes of Climate Change*, NASA, <https://climate.nasa.gov/causes> (last viewed Jan. 18, 2021) [<https://perma.cc/M2H3-UJLC>].

<sup>66</sup> *Id.*

<sup>67</sup> *Id.*

to the IPCC, are “*extremely likely* to have been the dominant cause of the observed warming since the mid-20th century.”<sup>68</sup>

Irrespective of its cause, climate change has and will continue to impact the natural and human environment.<sup>69</sup> Climate change will warm the Earth and its oceans, leading to melting glaciers, shifting plant and animal ranges, and varying effects on crops and crop yields.<sup>70</sup> Additionally, climate change will create climate extremes, “such as droughts, floods and extreme temperatures,” which “can lead to crop losses and threaten the livelihoods of agricultural producers and the food security of communities worldwide.”<sup>71</sup>

## II. EFFECTS OF CLIMATE CHANGE ON AGRICULTURE

A United Nations Panel on Climate Change stated that humans will have to completely alter food production “to prevent the most catastrophic effects of global warming.”<sup>72</sup> According to the United Nations’s report, agriculture and the related industries of deforestation and land use contribute about one-third of greenhouse gas emissions from human activities, “including more than 40 percent of methane.”<sup>73</sup> Carbon dioxide, methane, and nitrous oxide are the three greenhouse gases that contribute the most to rising temperatures, and the agricultural and forestry industries within the United States constitute over 10 percent of all greenhouse gases emitted within the country.<sup>74</sup>

The big problem for agriculture is not merely the fact that it is one of the largest sources of greenhouse gases, but that industrial agriculture relies on other human activities that significantly contribute to climate change as well, such as

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<sup>68</sup> Climate Change 2014 Synthesis Report Summary for Policymakers, IPCC, [https://www.ipcc.ch/site/assets/uploads/2018/02/AR5\\_SYR\\_FINAL\\_SPM.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf) (last viewed Jan. 18, 2021).

<sup>69</sup> *Id.*

<sup>70</sup> *The Causes of Climate Change, supra* note 65; *The Effects of Climate Change*, NASA, <https://climate.nasa.gov/effects> (last viewed Jan. 18, 2021) [<https://perma.cc/8HWQ-HBEG>].

<sup>71</sup> *Id.*

<sup>72</sup> *To Slow Global Warming, U.N. Warns Agriculture Must Change*, NPR (Aug. 8, 2019, 4:00 AM), <https://www.npr.org/sections/thesalt/2019/08/08/748416223/to-slow-global-warming-u-n-warns-agriculture-must-change> [<https://perma.cc/J8LF-TAL2>].

<sup>73</sup> *Id.*

<sup>74</sup> *Economic Research Service: Overview*, USDA, <https://www.ers.usda.gov/topics/natural-resources-environment/climate-change> (last updated Aug. 14, 2020) [<https://perma.cc/YK4D-MWAK>].

electricity, transportation, and industry.<sup>75</sup> Especially in reference to the future of agriculture, the United Nations report emphasized the need to take quick action to reduce greenhouse gas emissions in light of their research, as “[e]missions from agricultural production are projected to increase,” and “could result in some irreversible impacts on our ecosystems.”<sup>76</sup>

In addition to the agricultural industry exacerbating global climate change, there are many aspects of climate change that in turn have negative effects on day-to-day agriculture itself.<sup>77</sup> For example, climate change is impacting water resources and crop yields in negative ways, problems that will make growing wine grapes more challenging due to their sensitivity to variations.<sup>78</sup> Another consequence of climate change that is related to human activities and will likely have devastating effects on the agricultural industry is extreme weather events, “such as heat waves, droughts, floods, cyclones and wildfires,” which will undoubtedly impact the agricultural industry negatively.<sup>79</sup> The challenges that climate change will pose to the agricultural industry will “threaten rural livelihoods, sustainable food security, and price stability.”<sup>80</sup> The availability of certain global commodities, including wine, and the corresponding price shifts, will affect both farmers within the United States, as well as the global economy.<sup>81</sup>

More imminently pertinent, especially in the United States, is addressing problems associated with industrial agriculture, “a model that neglects soils, reduces diversity, and relies too heavily on fertilizers and pesticides,” all of which makes the agricultural industry even more at risk and “susceptible to climate impacts in several ways.”<sup>82</sup> Climate change will not only

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<sup>75</sup> *Climate Change*, ENV'L LAW INST., <https://www.eli.org/keywords/climate-change> (last viewed Jan. 18, 2021) [<https://perma.cc/U6ZD-WSRX>].

<sup>76</sup> NATIONAL PUBLIC RADIO, *supra* note 72.

<sup>77</sup> Climate Change 2014 Synthesis Report Summary for Policymakers, IPCC, [https://www.ipcc.ch/site/assets/uploads/2018/02/AR5\\_SYR\\_FINAL\\_SPM.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf) (last viewed Jan. 18, 2021) [<https://perma.cc/E25U-WUY6>].

<sup>78</sup> *Id.*

<sup>79</sup> *Id.*

<sup>80</sup> *Volume II: Impacts, Risks, and Adaptation in the United States*, FOURTH NAT'L CLIMATE ASSESSMENT, <https://nca2018.globalchange.gov> (last viewed Jan. 18, 2021) [<https://perma.cc/W89K-8A22>].

<sup>81</sup> *Id.*

<sup>82</sup> *Climate Change and Agriculture*, UNION OF CONCERNED SCIENTISTS (Mar. 20, 2019), <https://www.ucsusa.org/resources/climate-change-and-agriculture> [<https://perma.cc/GAQ8-KP4A>].

impact water levels and soils, but will also increase diseases and pests, creating additional problems for farmers and their crop yields.<sup>83</sup> The agricultural model going forward will have to adjust in order to combat the changes that are coming with climate change, as the current neglect for the organic matter within the soil in industrial agriculture leads to soil that is not well-equipped to handle either droughts or floods.<sup>84</sup>

In the Union of Concerned Scientists, there is hope that farmers will be able to sustain the devastating effects of the constantly changing climate, but only if farmers adapt and implement “science-based farming practices.”<sup>85</sup> These science-based farming practices will at least have to entail planting cover crops, diversifying farms in order to scale back dependence on chemicals, as well as developing or implementing new crop varieties.<sup>86</sup> In reference to these practices, the Fourth National Climate Assessment summarized the needed changes as “altering what is produced, modifying the inputs used for production, adopting new technologies, and adjusting management strategies.”<sup>87</sup> Otherwise, crops will decline or disappear, livestock will experience further heat stress, and prices will change, all of which will negatively affect the farming community and the global economy.<sup>88</sup> In addition, both the Union of Concerned Scientists and the United States Department of Agriculture (“USDA”) acknowledge that governmental policy changes will have to be implemented in order to achieve the desired results and to combat climate change from within the agricultural industry.<sup>89</sup>

Ultimately, farmers must make changes that will reduce greenhouse gas emissions, in order to effectively counter climate change long-term, which the USDA believes is possible through policy and technological implementations.<sup>90</sup> Changes that

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<sup>83</sup> FOURTH NAT'L CLIMATE ASSESSMENT, *supra* note 80.

<sup>84</sup> UNION OF CONCERNED SCIENTISTS, *supra* note 82.

<sup>85</sup> *Id.*

<sup>86</sup> *Id.*

<sup>87</sup> *Volume II: Impacts, Risks, and Adaptation in the United States*, FOURTH NAT'L CLIMATE ASSESSMENT, <https://nca2018.globalchange.gov> (last viewed Jan. 18, 2021) [<https://perma.cc/7LKF-F7QE>].

<sup>88</sup> *Id.*

<sup>89</sup> UNION OF CONCERNED SCIENTISTS, *supra* note 82.

<sup>90</sup> *Economic Research Service: Overview*, USDA (Aug. 14, 2020), <https://www.ers.usda.gov/topics/natural-resources-environment/climate-change> [<https://perma.cc/2D33-NXAU>].

farmers can make include: carbon sequestration, tillage changes, and using biofuels instead of fossil fuels.<sup>91</sup> The USDA believes that all of these changes will lower emissions of carbon dioxide, methane, and nitrous oxide.<sup>92</sup>

### III. CLIMATE CHANGE AND THE “POSITIVE” EFFECTS ON THE WINE INDUSTRY

Although preserving the wine industry is not necessary in order to sustain the planet or the human population as a whole, “wine is an important product of human ingenuity,” and is also intertwined in the global economy.<sup>93</sup> Therefore, as a product of history and a symbol of human achievement, wine should be a topic of concern, especially in light of it being a high-risk agricultural product.<sup>94</sup> The wine industry is also worth protecting and preserving due to its large role in the global economy that supports human well-being and facilitates further development.<sup>95</sup>

Climate change will almost certainly impact all corners of agriculture eventually, but the wine industry is extremely sensitive to climate change issues because of the narrow regions in which wine grapes are grown, and these particular regions “are especially prone to variations in climate and long-term climate change.”<sup>96</sup> In addition to the wine growing regions themselves, wine grapes are one of the most “susceptible to minor changes in climate,” so the inevitable changes in these narrow wine growing regions will undoubtedly change both the global winegrowing map and overall wine production.<sup>97</sup>

On the contrary, in the short-term, one of the “positive” effects of climate change on the wine industry, and one of the better industry solutions to surviving climate change, is moving the wine industry into new regions which were once too cold, benefitting new communities and economies simultaneously.<sup>98</sup>

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<sup>91</sup> *Id.*

<sup>92</sup> *Id.*

<sup>93</sup> Mozell & Thach, *supra* note 29 at 85-86.

<sup>94</sup> *Id.*

<sup>95</sup> *Id.*

<sup>96</sup> Gregory V. Jones, Climate Change: Observations, Projections, and General Implications for Viticulture and Wine Production, WHITMAN C. ECON. DEP'T, [https://www.whitman.edu/economics/Workingpapers/content/WP\\_07.pdf](https://www.whitman.edu/economics/Workingpapers/content/WP_07.pdf) (2007).

<sup>97</sup> Mozell & Thach, *supra* note 29.

<sup>98</sup> Stephen Beard, *The Sun Finally Shines on One of the World's Most Northerly Vineyards – Because of Climate Change*, MARKETPLACE (Nov. 22, 2019),

The benefits extend as far as providing opportunities for new countries to open up to the wine industry, such as England.<sup>99</sup> Stephen Beard told the story of the evolving wine industry in England through the lens of the Renishaw winery, established in 1972 and at the time was the most northern vineyard, which ultimately “proved far too cold for winemaking.”<sup>100</sup> Now, as a result of climate change, the “long, chilly, overcast summers. . . are gone, and over the last decade—Britain’s had its warmest weather on record,” leading to a profound improvement in the quality of Renishaw’s wine and booming of its business, especially when it comes to their sparkling wine.<sup>101</sup>

The current climate in this region of England is now akin to that which previously existed in the French Champagne region, and well-known French Champagne houses are now buying property in England.<sup>102</sup> Although Renishaw is experiencing many current successes in this new winegrowing region, Kieron Atkinson, Renishaw’s winemaker, acknowledged, “In forty years’ time, it will be warm enough to grow full-bodied red wine here like cabernet sauvignon and merlot. As a winemaker, that’s exciting. As a human. . . it’s scary,” emphasizing the uncertainty of the future amidst an ever-changing climate.<sup>103</sup>

In the United States, many states, including New York, may benefit from the warming temperatures that climate change will bring when it comes to a boost in wine production, which will open up other economic doors.<sup>104</sup> Currently, California accounts for 86 percent of the United States’s wine production, followed by Oregon, Washington, and then New York, but the changing climate will allow states like New York to further expand their wine producing capacities, which will increase the tourism associated with the industry.<sup>105</sup> In 2018, New York State had over 400 wineries and 4.5 million wine tourists, generating \$13.8

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<https://www.marketplace.org/2019/11/22/climate-change-creating-better-conditions-english-winery> [<https://perma.cc/5Y9X-JDPQ>].

<sup>99</sup> *Id.*

<sup>100</sup> *Id.*

<sup>101</sup> *Id.*

<sup>102</sup> *Id.*

<sup>103</sup> *Id.*

<sup>104</sup> Dawn M. Robinson, et. al., *Global Climate Change Influences Wine Production and Tourism in Northern New York*, SUNY POTSDAM, (2021), <https://www2.potsdam.edu/griffipr/GlobalClimateChangeInfluencesWineProductionandTourisminNorthernNewYork.pdf> [<https://perma.cc/RPN2-UNKN>].

<sup>105</sup> *Id.*

billion in the state's economy.<sup>106</sup> These "positive" effects of climate change obviously come with adverse effects, and possibly even the downfall for some traditional wine growing regions; but expanding to new regions is one way in which the wine industry can adapt to combat climate change and sustain the industry, and it will likewise have "a major positive impact" on national, state, and local economies.<sup>107</sup>

### III. ISSUES WITH CLIMATE CHANGE AND WINE QUALITY

Grapevine and wine grape quality is driven by the climate more than any other factor, including "temperature, moisture stress, and radiation," as temperature "affects the rate of fruit ripening," as well as the concentration of sugars which directly affects aroma and flavor.<sup>108</sup> Changes in the climate, even very minor changes, affect the ultimate flavor of the wine grapes and the finished wine product, which "can make the difference between a poor, good, and excellent vintage. . . colder-than-normal temperatures lead to incomplete ripening with high acid, low sugar, and unripe flavors whereas warmer-than-normal temperatures create overripe fruit with low acid, high sugar, high alcohol and cooked flavors."<sup>109</sup> Therefore, a climatic shift in either direction can have devastating consequences for the finished wine's overall quality.<sup>110</sup>

In addition, many believe that rising carbon dioxide levels in the atmosphere will also have an effect on the quality of wine, at least in combination with rising temperatures and humidity, as the combination may "increase biomass, increased sugar (thus alcohol), and [may also cause] a decrease in acid levels, all of which will affect grape aroma and flavor."<sup>111</sup> Other detrimental factors that climate change will have on wine grapes and wine quality, include, tannins, color, and the ability of wines to age properly, all of which signify the need for the wine industry to

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<sup>106</sup> *Id.*

<sup>107</sup> *Id.*

<sup>108</sup> Dr. Bruce Zoecklein, *How Climate Change Affects Winegrowing*, WINES VINES ANALYTICS (Feb. 2018), <https://winesvinesanalytics.com/features/article/195134/How-Climate-Change-Affects-Winegrowing> [<https://perma.cc/TY9J-75KP>].

<sup>109</sup> Mozell & Thach, *supra* note 29, st 84.

<sup>110</sup> *Id.* at 84.

<sup>111</sup> *Id.*

adapt and adopt new solutions to avoid a significant reduction in quality of a product that has endured for centuries.<sup>112</sup>

#### IV. SOLUTIONS

##### *A. The Necessary Solution of Experimenting with New Varieties*

Not everyone in the wine industry can expand their operations into new or emerging wine regions, so the industry has to find innovative solutions to sustain their businesses, especially in the harder hit regions, such as California.<sup>113</sup> Winery owners are already adopting specific solutions closer to home, such as “experimenting with new varieties of grapes, finding new ways to maximize water use and even seeking out land in areas that used to be too cold for vineyards,” the latter of which could simply mean higher elevations in the surrounding area.<sup>114</sup> Over the last decade, temperatures have risen significantly in Napa Valley, one of the more prestigious wine growing regions in the United States, which dramatically increases the temperature inside of the growing grapes, “risking the collapse of the delicate and maturation process that is crucial to high-end winemaking.”<sup>115</sup>

On a day-to-day operations level, winegrowers such as Aron Weinkauff of Spottswode are implementing innovative measures by shading vineyards and planting new rootstocks that may be better at mitigating these higher temperatures.<sup>116</sup> In addition, a huge positive in the area of experimentation is that there are 5,000 known wine grape varieties, but only around twenty are produced around the world as of now, “leaving thousands of others to experiment with as the climate challenges the existing stock,” providing some hope that new experiments

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<sup>112</sup> Dr. Bruce Zoecklein, *How Climate Change Affects Winegrowing*, WINES VINES ANALYTICS, (Feb. 2018), <https://winesvinesanalytics.com/features/article/195134/How-Climate-Change-Affects-Winegrowing> [<https://perma.cc/4DE2-VH6C>].

<sup>113</sup> Marco della Cava, *Climate change is coming for your wine. what the world's wineries are doing to save grapes*, USA TODAY, (Sep. 12, 2019, 2:50 PM), <https://www.usatoday.com/story/news/nation/2019/09/08/climate-change-threatens-worlds-wineres-which-grapes-saved/2136457001> [<https://perma.cc/3GTR-PW3D>].

<sup>114</sup> *Id.*

<sup>115</sup> *Id.*

<sup>116</sup> *Id.*



2020-2021]

OLD WORLD REGULATIONS

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will produce positive results and wine regions will adapt to growing these new varieties more suitable to current climates.<sup>117</sup>

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<sup>117</sup> *Id.*

*B. Solutions to the Increased Presence of Pests and Diseases*

Warming temperatures bring an increase in pests and diseases, which may not be escapable as the wine industry shifts farther and farther towards the poles.<sup>118</sup> For example, the “[g]lassy-winged Sharpshooter has brought Pierce’s disease to California. With a lifting of temperatures, the disease may travel northward,” into the wine regions of Oregon.<sup>119</sup> A Penn State study concluded that other pests may have the capacity to move further northward, especially considering the warming temperatures, many of which are specifically destructive to vineyards and “may pose severe threats to more poleward resting vineyards as climate change develops.”<sup>120</sup> Therefore, “[c]limate change ... will force vineyard managers to be increasingly vigilant in identifying and, then, managing a variety of warmer-weather bound insects and diseases.”<sup>121</sup>

When it comes to combating the rise of pests and diseases that will accompany the warming wine growing regions, New Zealand Wine is proposing the use of organic pest and disease management practices, which will also help to prevent many of the problems underlying climate change as it relates to industrial agriculture.<sup>122</sup> The goal is to find innovative ways “to work with the cycles of nature. . . without using hazardous chemicals.”<sup>123</sup> One such inventive course of action is planting certain flowering plants between rows of wine grapes, “such as buckwheat and *Phacelia*,” which “provide nutrients and habitats for beneficial native insects that work to deter harmful pests.”<sup>124</sup> In addition, the proactive approach of organic vineyards includes combating various diseases, using sprays “made from natural mineral elements or beneficial bacteria and fungi, which outcompete diseases,” exhibiting that an organic approach is one possible solution to combat the growing number of pests and diseases

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<sup>118</sup> Mozell & Thach, *supra* note 29, at 85–86.

<sup>119</sup> *Id.*

<sup>120</sup> *Id.*

<sup>121</sup> *Id.*

<sup>122</sup> *Organic Pest & Disease Management*, NEW ZEALAND WINE, <https://www.nzwine.com/en/sustainability/organic-winegrowing/pest-disease> (last viewed Oct. 19, 2020) [<https://perma.cc/YE6R-PLBY>].

<sup>123</sup> *Id.*

<sup>124</sup> *Id.*

without furthering climate change problems associated with industrial agriculture.<sup>125</sup>

### *C. The Cover Crop Solution*

Cover crops are plants that are “used primarily to slow erosion, improve soil health, enhance water availability, smother weeds, help control pests and diseases, increase biodiversity and bring a host of other benefits to your farm.”<sup>126</sup> Cover crops are vital, especially to sustainable farms which seek to implement climate change remedies, as the cover crops add needed nitrogen into the soil and help control weeds in the absence of chemicals.<sup>127</sup> Cover crops are particularly beneficial to vineyards when addressing water use concerns, as cover crops facilitate moisture availability whether there is an abundance of water or a drought.<sup>128</sup>

For wine grapes, cover crops provide nutrients and prevent erosion, but for vineyards seeking to reap maximum benefit, implementation should take place in the years leading up to planting, the foundation of every new winery or vineyard.<sup>129</sup> In fact, researchers deduced that cover crops should be planted for at least an entire growing season prior to the establishment of a vineyard in order to recognize the many benefits of cover crops.<sup>130</sup>

In addition to the many ecological benefits of cover crops that help mitigate changes due to the climate, cover crops have many economic benefits for wineries and vineyards.<sup>131</sup> A few general economic benefits include: cutting fertilizer costs, reducing the need for herbicides and other pesticides, improving yields via enhanced soil health, preventing soil erosion, conserving soil moisture, and protecting water quality.<sup>132</sup>

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<sup>125</sup> *Id.*

<sup>126</sup> Andy Clark, *Cover Crops: Cover Crops for Sustainable Crop Rotations*, SARE (2015), <https://www.sare.org/resources/cover-crops>[<https://perma.cc/5PKR-4DYM>] .

<sup>127</sup> *Id.*

<sup>128</sup> *Id.*

<sup>129</sup> Cornell University, *2014 Production Guide for Organic Grapes*, NYS IPM PUB. NO. 224, June 2014, at 2, 5.

<sup>130</sup> *Id.*

<sup>131</sup> Sustainable Agriculture Research & Education, *Managing Cover Crops Profitably* (3rd ed. 2012) at 9.

<sup>132</sup> *Id.*

*D. Carbon Management and Water Use Solutions*

Although there are many practical, day-to-day solutions that the wine industry can and should implement to combat the rapidly changing effects of climate change, there are also larger solutions that can have positive effects on managing carbon and limiting greenhouse gas emissions that should be in the long-term plans for wineries and vineyards.<sup>133</sup> For example, Fetzer Vineyards, the first member of the wine industry to be certified Carbon Neutral, operates not only entirely organically, but also on 100 percent renewable energy.<sup>134</sup> It has consistently reduced emissions “through a variety of mechanisms, such as on-site solar arrays that power winery operations with 100 percent renewable energy and the installation of an innovative new wastewater treatment system that uses 85 percent less energy.”<sup>135</sup> In addition, it utilizes electric forklifts and has diverted almost all of its solid waste away from landfills through “composting, recycling, and repurposing.”<sup>136</sup> Fetzer Vineyards also utilizes carbon credits to offset the 4-5 percent non-renewable electricity that it needs each year in order to remain carbon neutral, ultimately signifying to others within the wine industry the possibilities in confronting climate change proactively and for the long-term.<sup>137</sup>

In addition to the many ways in which Fetzer Vineyards has reduced its carbon footprint and overall greenhouse gas emissions from larger scale solutions, the company has implemented practical measures to capture and store carbon that others in the wine industry should implement.<sup>138</sup> In order to manage carbon and maximize carbon storage capacity, Fetzer Vineyards “uses innovative agricultural practices ... such as cover

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<sup>133</sup> *Net Positive Wine: United States of America*, UNITED NATIONS: CLIMATE CHANGE, <https://unfccc.int/climate-action/momentum-for-change/climate-neutral-now/net-positive-wine> (last viewed Feb. 23, 2020) [<https://perma.cc/VKQ5-KDVN>].

<sup>134</sup> *Id.*

<sup>135</sup> *Id.*

<sup>136</sup> *Id.*

<sup>137</sup> *Sustainability: Planet, Fetzer Vineyards*, <https://fetzer.com/sustainability/planet> (last viewed Feb. 23, 2020) [<https://perma.cc/6X44-8QDF>].

<sup>138</sup> *Net Positive Wine: United States of America*, UNITED NATIONS: CLIMATE CHANGE, <https://unfccc.int/climate-action/momentum-for-change/climate-neutral-now/net-positive-wine> (last viewed Feb. 23, 2020) [<https://perma.cc/VKQ5-KDVN>].

cropping, composting, and sheep grazing.”<sup>139</sup> The United Nations determined that switching from fossil fuel reliance to renewable energy sources cuts emissions that contribute to climate change, while also reducing the negative environmental impacts of extracting the fossil fuels.<sup>140</sup>

Analyzing water use and understanding how varying amounts of water affect different varieties of wine grapes will be pivotal for sustaining the industry as climate change reshapes different wine growing regions.<sup>141</sup> For example, water stress can improve the quality of wine, as stress concentrates the flavors and aromas in the grapes, but too much water stress “will prevent grapes from achieving their ideal balance of sugars, acids and tannins, creating flat, uninteresting wines.”<sup>142</sup>

In light of a recent study, scientists from the University of California, Davis, found that the wine grape varieties from certain wine growing regions which experience more water stress could help these varieties better sustain the effects of climate change.<sup>143</sup> The study found that “varieties that produce their best wines in warmer, drier regions have traits that conserve water, helping the vines extend their water resources to last over the growing season.”<sup>144</sup> Megan Bartlett, lead author on the UC Davis study, stated, “[w]e have more work to do to understand how these traits will affect grapevines as the climate reaches new extremes,” so more research will be needed and necessary going forward in order to better understand how different varieties are adapting to new water levels in light of the constantly changing climate.<sup>145</sup>

### *E. Legal Solutions: Climate Change and Wine Regulations*

The main difference between Old World and New World wines, other than the obvious factor that Old World wines are wines from regions that began producing wine at an earlier time

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<sup>139</sup> *Id.*

<sup>140</sup> *Id.*

<sup>141</sup> *Net Positive Wine: United States of America*, UNITED NATIONS: CLIMATE CHANGE, <https://unfccc.int/climate-action/momentum-for-change/climate-neutral-now/net-positive-wine> (last viewed Feb. 23, 2020) [<https://perma.cc/VKQ5-KDVN>].

<sup>142</sup> *Id.*

<sup>143</sup> *Id.*

<sup>144</sup> *Id.*

<sup>145</sup> *Id.*

in history, is that Old World wines are heavily regulated, while New World wines have less restrictions and more freedom to experiment in light of modernity.<sup>146</sup> In other words, Old World wines are the wines grown in regions “where modern winemaking traditions first originated,” whereas New World wines “borrowed traditions,” typically as a result of colonization, and then decided to change their methodologies along the way.<sup>147</sup>

The European Union, which constitutes much of the Old World wine regions, remains both the largest wine-producing region and the most heavily regulated, with the overall purpose of regulating quantity and quality.<sup>148</sup> Other vital wine regions, such as Argentina and South Africa, are also heavily regulated, but currently not to the extent of the European Union; the United States and Australia are the least regulated, primarily limiting regulations to certain chemicals, labeling, and additives (although states like California adopted stricter regulations than the United States federal government).<sup>149</sup> In deciding how to proceed with more or less wine regulations in light of climate change and its effects on the wine industry, there are various elements to wine regulations that need to be taken into account, such as: market regulations (e.g., taxes), vine and vineyard regulations (e.g., geographical indications), wine-making practices, as well as labeling and bottling.<sup>150</sup>

Wine regulations in the European Union trace back centuries, but factors such as climate change demand the loosening of regulations in order for the industry to adapt effectively and efficiently, or at least modifying current regulations specifically to address the effects of climate change.<sup>151</sup> The combination of the expansion of the European Union, which added additional wine-producing countries, with the rapidly changing climate, have brought about some changes in recent years, but further reforms will almost certainly be necessary.<sup>152</sup>

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<sup>146</sup> *The Guide to Old World Wine Vs. New World Wines*, VINEPAIR, <https://vinepair.com/wine-101/guide-old-world-vs-new-world-wines> (last viewed Oct. 19, 2020) [<https://perma.cc/D6HT-QUGA>].

<sup>147</sup> Madeline Puckette, *supra* note 54.

<sup>148</sup> Giulia Meloni et. al., *Wine Regulations*, 41 APPLIED ECON. PERSP. AND POL'Y at 622—27 (2019).

<sup>149</sup> *Id.*

<sup>150</sup> *Id.*

<sup>151</sup> *Id.*

<sup>152</sup> *Id.*

France is a prime example of a country with strict regional wine regulations, and there are sound arguments justifying many of the regulations that have protected the integrity of their wine over the years, but climate change necessitates prompt change to this important player within the industry.<sup>153</sup> As a result, France is taking steps to allow non-Bordeaux grapes that may be more suitable to the current climate in the region, although the change will only allow for up to 10 percent of non-Bordeaux wine grapes in a Bordeaux blended wine. This is a positive initial step that will maintain the integrity of the wine produced in this region, while signifying that regulating authorities are now more willing to adapt to preserve a multi-billion dollar industry.<sup>154</sup>

Bordeaux expert, Jane Anson, said the plan should be a “wake-up call” for the wine industry, adding, “I would have expected Bordeaux bureaucracy to move more slowly, but clearly the governing bodies see the importance of giving winemakers the flexibility and agility to react,” highlighting the urgent need to address climate change quickly, particularly in regions where change typically takes decades to materialize.<sup>155</sup>

In contrast, the United States and other New World wine regions are less inclined to regulate the wine industry heavily, especially as the regulations pertain to factors that could serve as possible remedies for climate change, such as controlling wine grape varieties.<sup>156</sup> Although the lack of regulations could certainly be harmful in ways, the freedom that New World wine industries have to experiment with new varieties, methods, and technologies, could be extremely beneficial when it comes to combating climate change, especially if more industry leaders take the same approach that companies like Fetzer Vineyards are taking to sustain their business.<sup>157</sup> The problem is that members of the wine industry in regions such as the United States also have the freedom to choose not to take preventative action to

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<sup>153</sup> Tom Mullen, *France is Changing Key Wine Regulations*, FORBES, (July 3, 2019, 5:08 AM) <https://www.forbes.com/sites/tmullen/2019/07/03/france-is-changing-key-wine-regulations/?sh=5c09fc279b63> [ <https://perma.cc/CS2Q-CSU2>].

<sup>154</sup> *Id.*

<sup>155</sup> Chris Mercer, *Bordeaux Winemakers Allow New Grapes to Fight Climate Change*, DECANTER, (July 2, 2019), <https://www.decanter.com/wine-news/bordeaux-new-wine-grapes-419730> [ <https://perma.cc/DQJ7-J8CW>].

<sup>156</sup> Giulia Meloni et. al., *Wine Regulations*, 41 APPLIED ECON. PERSP. AND POL'Y at 622—27 (2019).

<sup>157</sup> *See*, Fetzer Vineyards, *supra* note 137.

combat climate change in the absence of stricter regulations until it may be too late, notwithstanding calls for change from reputable members within the wine industry that are adapting on their own.<sup>158</sup>

For the United States, if Congress and administrative agencies like the Alcohol and Tobacco Tax and Trade Bureau (“TTB”) do not take direct action to regulate wine growing and wine production more strictly, with the intent and purpose of regulating to combat climate change, then individual innovation from within the wine industry will have to be the hope of the future.<sup>159</sup> TTB does utilize an appellation program that mirrors the European Union in some ways, dividing wine regions into an “American Viticultural Area,” or an AVA.<sup>160</sup>

TTB designates specific AVAs “with specific geographic or climatic features that distinguish it from the surrounding regions and affect how grapes are grown,” although in practice TTB uses these AVAs primarily for labeling purposes, but the designations are already in place if the government wanted to modify AVAs to regulate what varieties certain regions could grow (e.g., limiting varieties to regions that are more suitable according to the current climate).<sup>161</sup> These are the types of regulations that would be appropriate for New World regions in order to counter the effects of climate change, without limiting other areas of innovation.<sup>162</sup>

These regulations may not be necessary in the end, as there are encouraging signs that more and more individual businesses within the wine industry are making needed changes to adapt to climate change, especially through many of the practical solutions discussed, even in the absence of strict regulations.<sup>163</sup> Like wineries in the United States, other New World wine regions that are not heavily restricted through the implementation of regulations, such as Australia, are taking

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<sup>158</sup> Ray Isle, *How Will Climate Change Impact California Wine?*, FOOD & WINE (Apr. 2, 2020), <https://www.foodandwine.com/wine/california-wine-future-climate-change> [<https://perma.cc/TRB2-ZDPF>].

<sup>159</sup> *See id.*

<sup>160</sup> *American Viticultural Areas (AVAs)*, TTB, <https://www.ttb.gov/wine/american-viticultural-area-ava> (last updated Sept. 21, 2020) [<https://perma.cc/EAZ4-38TJ>].

<sup>161</sup> *Id.*

<sup>162</sup> *Id.*

<sup>163</sup> *See* Isle, *supra* note 158.



similar measures to combat climate change.<sup>164</sup> Additionally, countries that are considered “Old World” and are more strictly limited through regulations, such as Portugal, a country that is being hit particularly hard by climate change when it comes to wine grapes, are finding innovative ways to adapt their businesses, notwithstanding the general regulations from governing bodies like the European Union.<sup>165</sup>

For countries like Portugal, adaptation is critical, as Filipe Duarte Santos, Ph.D., stated, “Mediterranean climates are quite vulnerable to climate change. . . . Because climate change exacerbates existing weather patterns, wine regions that are already hot and semi-arid places – such as parts of California, Southern Europe, and Southwest Australia – will become even more so.”<sup>166</sup>In light of the changing climate in Portugal, vineyards are: experimenting with numerous varieties, increasing genetic diversity, utilizing new technologies like drones and satellites “to monitor vineyard conditions and micro-target for watering, manage disease and pests, and treat nutrient deficiencies,” etc.<sup>167</sup>

Portuguese wineries are also switching to renewable energy sources and focusing on practical ways to reduce carbon emissions such as using and transporting lighter wine bottles, and the number of wineries adopting these types of new approaches is growing.<sup>168</sup> “Dozens of wineries have joined The Porto Protocol Foundation,” an organization that facilitates climate change solutions for those in the beverage industry, while hundreds of others have joined sustainability programs to help the wine industry in its fight against climate change.<sup>169</sup>

These wineries are embodying the trend that individual wineries and vineyards are willing and capable of combating the toll that climate change is taking on the wine industry, whether that is through the loosening of regulations across the European Union, or in places like the United States and Australia where

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<sup>164</sup> Gabi Mocatta, et. al., *Pass the Shiraz: How Australia’s Wine Industry Can Adapt to Climate Change*, THE CONVERSATION (June 15, 2020, 4:04 PM), <https://theconversation.com/pass-the-shiraz-please-how-australias-wine-industry-can-adapt-to-climate-change-140024> [https://perma.cc/J6AN-YJLQ].

<sup>165</sup> Sophia McDonald, *Portugal’s Vintners on the Forefront of Climate Change*, SEVENFIFTYDAILY (Aug. 3, 2020), <https://daily.sevenfifty.com/portugals-vintners-on-the-forefront-of-climate-change> [https://perma.cc/VK2B-EZRH].

<sup>166</sup> *Id.*

<sup>167</sup> *Id.*

<sup>168</sup> *Id.*

<sup>169</sup> *Id.*

wine regulations are fairly limited, but where it is completely at the discretion of individuals to act.<sup>170</sup> In other words, the trend towards sustainability in the wine industry is being felt across the globe, but the loosening or modification of regulations will have to continue in order for the industry to fully realize its potential to adapt in light of the many available solutions to counter the effects of climate change.

#### CONCLUSION

As a result of the rapidly changing climate, paradigmatic and practical changes are necessary in order for the wine industry to sustain itself going forward. Old World style regulations may be beneficial if the regulations are crafted or modified with the ultimate intent and purpose of combating climate change. Otherwise, regulations need to be loosened to the level of New World wine regions that enjoy more freedom to experiment and adapt quickly, so that individual wineries and vineyards can implement readily available solutions and innovate to find new ones.

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<sup>170</sup> *Id.*