

Fierce Whiskers



FIERCE WHISKERS
DISTILLERY

&


CarbonBetter



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Tim Penney, Co-Founder



Tri Vo, Co-Founder

Fierce Whiskers Distillery was founded by Asian-Americans and native Texans, Tri Vo and Tim Penney. Longtime collaborators (their first business together was in high school), Tri and Tim started the distillery with a singular goal in mind—creating world-class whiskey that the city of Austin, Texas, could be proud of.

To remain true to the brand, each decision along the way has focused on the duo's goal of a well-made and uniquely Austin whiskey. While this began with using an Austin-based branding agency, The Butler Bros., to design the brand identity, it continued through the use of a regional architecture firm, Overland Partners, to collaborate on the design of the property and through each step of the distilling process from equipment selection to barreling, aging, sustainability, and beyond.

Fierce Whiskers is proud to be a local grain-to-glass Austin distillery among a small percentage of minority-owned distilleries in the United States.

FW is a unique American craft distillery that leans into its motto of “greatness through stubbornness.”

The Story of Fierce Whiskers

While the story of FW began in 2015, the facility broke ground in 2018, and they began barreling whiskey in 2020. Each step in the Fierce Whiskers process aims to make Austin a premier home for whiskey. This includes the decisions to select the most efficient distilling equipment, an American-made copper still, as well as using Texas grains to ensure the grain-to-glass quality of its whiskey.

FW is a unique American craft distillery and leans into the idea of greatness through stubbornness. Making world-class whiskey is not easy. Central to FW's production philosophy is the Texas Tight Cut, which means only using the absolute best part of the distillate for its whiskey. Adding to the uniqueness of FW is its five-story rickhouse, which was built on-site and employs louvers in order to harness the extreme atmospheric conditions of Central Texas.

FW aims to be a foundational building block in the craft spirits world of Austin, while staying true to its roots in the local community and ensuring direct ties to the local economy.

Footprint

Grain to Glass

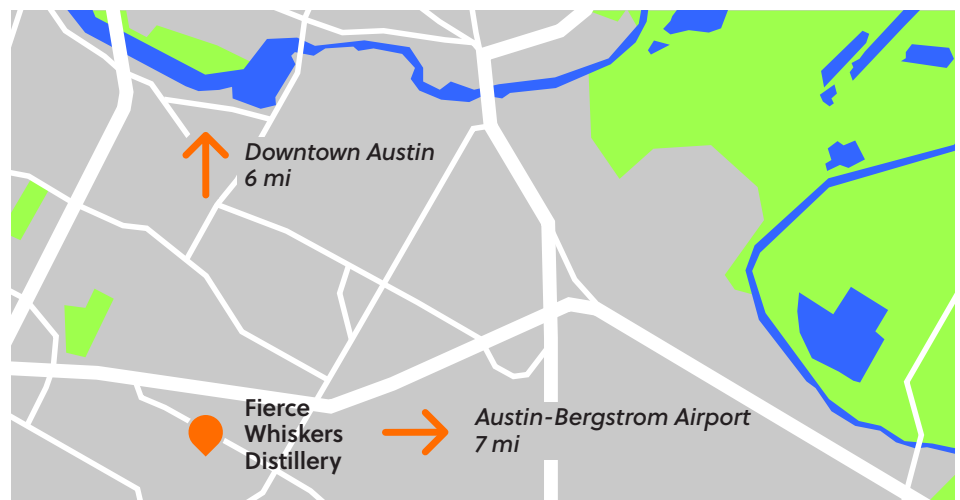
FW is focused on ensuring the highest quality of whiskey is produced, beginning with grain selection, barrel aging, and bottling. FW starts with milling regionally produced grains to create unique mash combinations for its whiskeys, including bourbon and rye. FW worked closely with a thirty-year Kentucky bourbon veteran to carefully select each piece of equipment including a Kentucky-produced copper still and a custom rickhouse. Throughout the distillation and aging process, FW has introduced its own techniques to leverage the extreme atmospheric conditions in Austin, TX, to produce a distinctly Texan whiskey. This includes improved efficiency of equipment using sophisticated automation systems that optimize quality control, consistency, and safety.

From Grain to Glass



Distillery Location

Finding a location to build a distillery with accessibility to the airport and the Austin community was difficult, but essential to FW's plan of making Austin a new home for whiskey. The FW site was developed on six acres in Southeast Austin, roughly seven miles from downtown Austin and six miles from Austin-Bergstrom International Airport. The FW site includes a five-story rickhouse and distillery with a tasting room. The location provides ample space and an urban tasting room experience catering to the local customer base. Positioning the facility in Austin proper allows for shorter travel distances and reduced carbon emissions associated with customers traveling to the distillery to visit and tour its unique distilling operations. The proximity to the airport was an intentional choice from a logistics perspective, allowing distribution efficiencies down the road, while simultaneously making it easier for tourists to incorporate a distillery tour into their Austin visit.

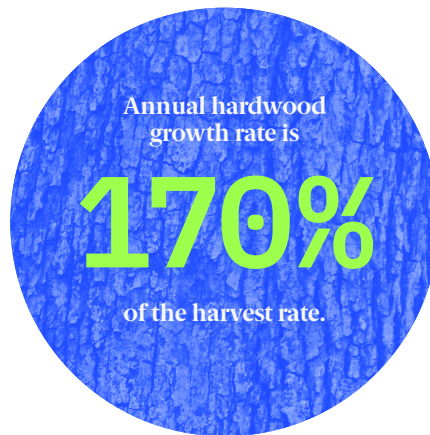


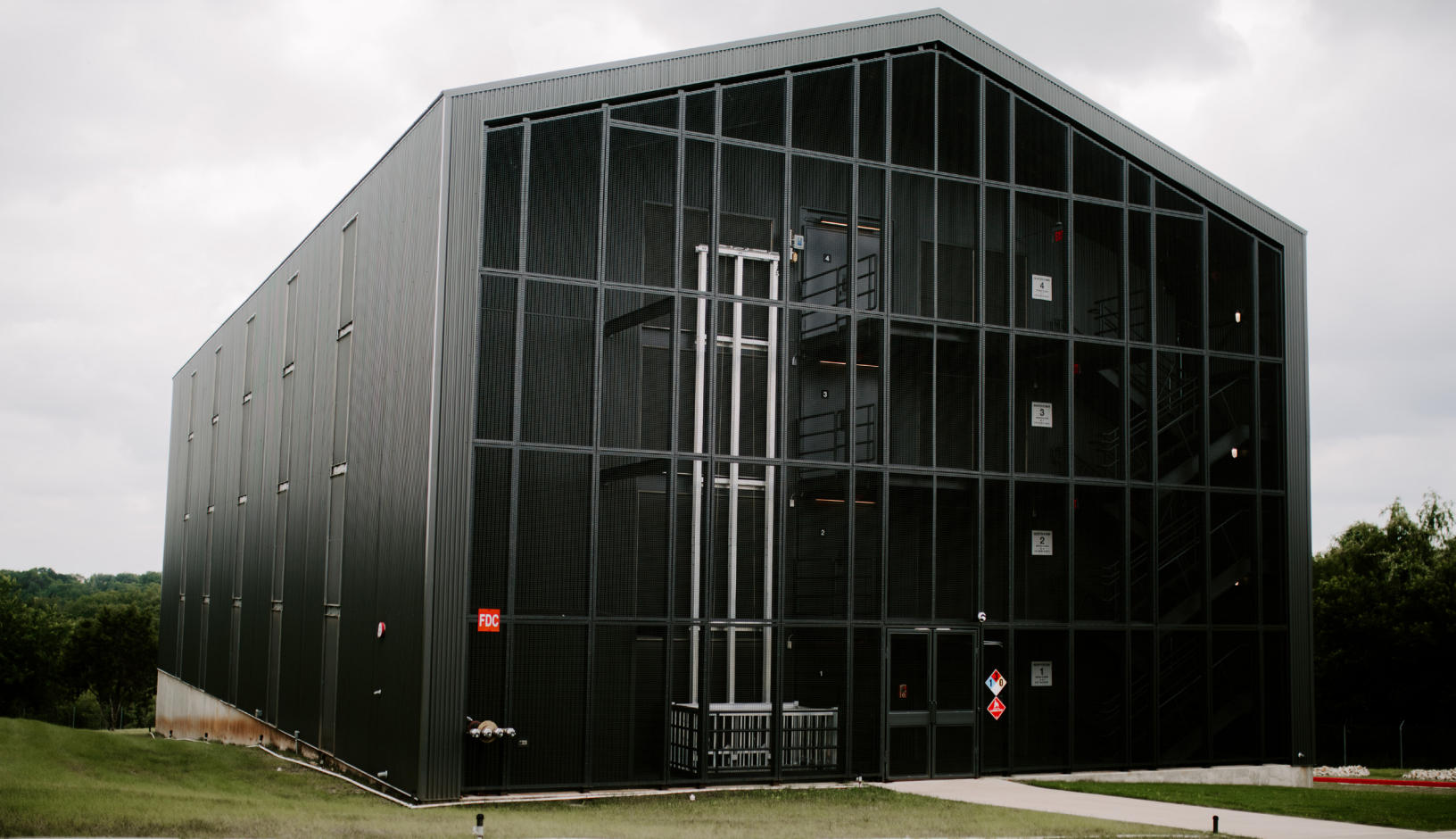


**Barrels for the
World's Finest Spirits**

White Oak Barrels

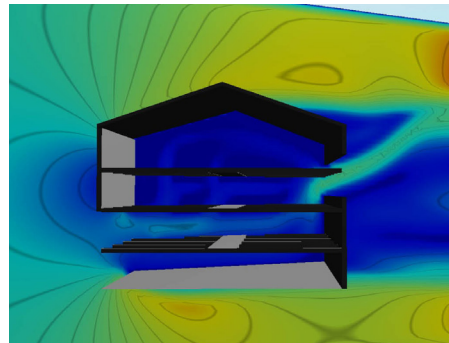
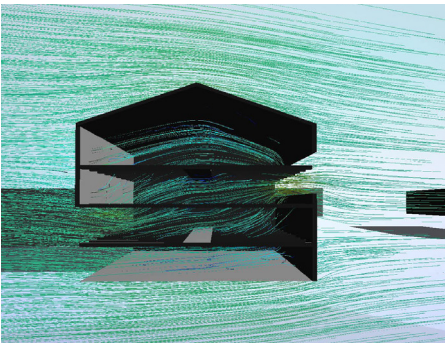
FW's ethos of "greatness through stubbornness," continues in the selection of barrels for its whiskeys. As with traditional American Bourbon, FW ages bourbon and rye in new white oak barrels for years at a time, giving its whiskeys distinctive and rich flavors. FW selected ISC white oak barrels because ISC ensures 100% of every white oak log purchased gets processed and utilized, with sawdust, bark, and waste-wood fiber and chips being utilized for fuel, landscape products, paper, and charcoal.¹ Additionally, ISC works with the White Oak Initiative² to ensure the long-term sustainability of America's white oak forests through research, technical assistance, program implementation, communication, and policy. ISC not only contributes financially to the initiative but also works directly with the organization to engage directly with forest owners and public land foresters as well. These efforts have contributed to white oak being the second fastest-growing hardwood resource, including an annual growth rate exceeding harvest by 70%.³ As part of FW's commitment to barrel sustainability, FW purchased previously used bourbon barrels for aging its non-whiskey spirits. Using these bourbon barrels not only reduces waste associated with white oak barrels in general, but it also provides a unique flavor profile to FW's non-whiskey spirits.





Rickhouse

The five-story bonded rickhouse, with four stories above ground and one below, is uniquely designed to allow FW more creative control over the flavor of its whiskey while harnessing the harsh summer climate conditions in Central Texas. FW selected the building location during the design phase based on the outcomes of a wind study, allowing the rickhouse to capture ideal prevailing winds. The louver system, with manual louvers on each side of the building, harnesses airflow to aid in temperature regulation. Typically, rickhouses have small windows rather than manual louvers. FW installed its own weather system to monitor temperature and humidity, allowing the distiller to make louver adjustments based on real-time weather data. The building is designed to maximize efficiency under harsh climate conditions while minimizing energy waste. The building is not HVAC-equipped; instead, there is a ridge vent and three fans in place in addition to the manual louvers system should ambient temperatures reach a level that might negatively impact the whiskey flavor, but to date, the fans have not been utilized.



A natural ventilation analysis was conducted to optimize direct air flow and fast ventilation based on the main wind direction.

Equipment



Distiller Cole Miller transferring bourbon mash from the cooker to the fermenter.



American-made copper still from Vendome Copper & Brassworks, Louisville, KY.

Boiler

FW installed a Fulton Vertical Spiral Ribbed Tube (VSRT) boiler system with a brake-horsepower (bhp) of 40 bhp to generate steam for use in the fermentation and distillation processes. VSRT boilers are optimized so that the spiral rib heat exchanger can transfer a high amount of heat in a compact space. The VSRT has an industry-leading operating efficiency of up to 86% (the industry standard is 82%), gross thermal efficiency of up to 82.5%, and 99.75% steam quality. Steam is applied to the fermentation batch tanks to maintain temperature and is also used for cleaning and sterilization of the tanks. Given the importance of steam to the distillation process and that the boiler is the largest consumer of natural gas at the facility, FW prioritized selecting an efficient boiler that was built to last to improve overall energy efficiency at the facility while minimizing life cycle impacts.

Reverse Osmosis Water

The distillery uses an economically efficient reverse osmosis system to produce high-purity water for use as feed water for the boiler and to adjust the alcohol proof prior to barreling and bottling. This system is capable of producing from 2.5 to 20 gallons of water per minute or up to 28,800 gallons per day, which can be produced as needed and stored on-site. Water is arguably the most important ingredient in the distillation process, and this machine aids in producing the highest quality of whiskey without impacting the flavor profile, ensuring flavor consistency over time.

HVAC

The FW distillery relies on an HVAC system consisting of a small split unit with 4-ton capacity and 4 large split units with 7.5 tons of capacity each to heat and cool the distillery and tasting room. The large units utilize refrigerant R-410A for cooling, which is considered to be a high global warming potential (GWP) refrigerant and would yield higher greenhouse gas (GHG) emissions if vented to the atmosphere as compared to low GWP refrigerants. However, the system is a closed loop, meaning that any potential emissions associated with refrigerant leaking are limited. FW performs all necessary preventative maintenance to reduce the risk of leaking.

To reduce demand on the HVAC system, the FW team aims to keep a low-temperature differential between the outside and the inside (e.g., thermostat in the distillery is set to 80° F in summer conditions rather than comfort cooling the process area). There are sensors on all doors to the outside that monitor when doors are open, even partially, to prevent HVAC usage when doors are open. The City of Austin required the installation of low-level vents in the distilling area to reduce fire and alcoholic vapor risks; the vents also take in cooled air. To increase HVAC efficiency and minimize uptake of cooled air by the vents, FW is considering installing alcoholic vapor monitors to reduce the run-time of the vents.

Chiller

To maximize efficiency for temperature regulation in the distilling process, FW installed a closed-loop chiller system sized for efficiency in medium to high temperature applications. The chiller system leverages high efficiency scroll compressors uniquely suited to chilling in distillery operations. Keeping with FW's focus on a reduced supply chain impact and increased environmental standards for manufacturing, the G&D Chiller was manufactured in the United States.

Lighting

FW chose light-emitting diodes (LED) for the interior and exterior of the distillery, the tasting room, and the rickhouse. All exterior lighting is set with timers to only operate when it is dark outside. Interior lights in low-traffic areas, such as hallways and bathrooms, are equipped with motion sensors and only turn on when motion is detected. FW prioritized energy reduction in the selection and management of lighting.

Merchandise

FW's commitment to the highest quality goes beyond the production of its local Austin whiskey and carries through to its merchandise.



T-Shirts

The FW T-shirts are produced from SUPIMA® Cotton which is grown in California under strict quality-controlled guidelines.⁴ Due to challenges with recycling cotton and fibers and the risk of contamination with other fibers, such as spandex, the cost of recycled yarn cost is generally higher than virgin cotton yarn costs but is consistently lower in quality, making responsibly grown cotton the preferable choice for the FW shirts. While the cotton utilized for the shirts is 100% grown in the U.S., the garments are produced in a windmill-powered, Fair Trade Certified™ facility outside of the U.S. FW wants to sell high-quality merchandise that meets leading environmental standards. At this stage, FW has not found a shirt company that manufactures in the U.S. that meets its environmental criteria. To contribute to the local economy, FW has chosen to screen print shirts locally in Austin, TX; and in the future, they would like to identify a manufacturer that can produce the shirts in the U.S. to its standards.



Tasting Room Glasses

FW has selected lower-impact glassware for serving its craft whiskey. The glassware is sourced from a manufacturer that recycles 99.9% of its cullet and commits to responsible sourcing of glass components, including the incorporation of recycled glass.⁵ The manufacturer has retrofitted furnaces at its New Jersey facility with new filter systems and emissions controls to reduce the carbon emissions associated with the natural gas-fired furnaces.⁶

Environmental Impacts

Baseline

FW first barreled its whiskey and moved it to the rickhouse for aging on September 30, 2020, with operations reaching a steady state in mid-November 2020. Depending on the product, the distillery currently operates 15-18 hours a day and could ramp up additional production hours in the future based on demand. While production is at a steady state, due to the aging times for the FW products, bottling and selling has not commenced.

To develop the environmental baseline, including water, energy, greenhouse gas emissions, and waste, an entire year of data at steady state operating conditions is needed. While FW's comprehensive baseline cannot be developed at this stage, FW has proactively chosen to assess where they are at today and will work to develop a baseline and any subsequent metrics and trends pending a full year of production operations. FW values transparency and sees the importance of sharing data early on in its journey.

→ UN Sustainable Development Goals

The United Nations (UN) has published 17 Sustainable Development Goals (SDGs) as a call to action to meet the UN's 2030 Agenda for Sustainable Development goals. Fierce Whiskers' environmental efforts directly support the following SDGs:



Methods and Boundaries

Methods

In preparation for this report, FW has referenced the Sustainability Accounting Standards Board (SASB) standard for the Food & Beverage Sector, Alcoholic Beverages, issued in October 2018. At this time, FW has focused on the Energy Management, Water Management, and Ingredient Sourcing sections of the SASB standard. Once the facility begins bottling and, selling its products, additional accounting metrics and disclosure topics may be evaluated in accordance with the SASB standard (e.g., Packaging Lifecycle Management).

As a supplement to the accounting metrics and topics in the SASB standard, FW has also evaluated climate impacts by quantifying Scope 1 (direct) and Scope 2 (grid, indirect) GHG emissions. Scope 1 GHG emissions from direct combustion of natural gas on site were quantified utilizing International Energy Agency (IEA) reference data, natural gas consumption from Texas Gas Services billing data, and emission factors from Title 40 of the Code of Federal Regulations Part 98, Subpart C. Scope 2 emissions associated with purchased grid energy were quantified based on FW's Austin Energy bills, and emission factors from the U.S. Environmental Protection Agency's (EPA's) Emissions & Generation Resource Integrated Database (eGRID). Total GHG emissions are estimated in carbon dioxide equivalents (CO₂e).

As part of this report, FW has identified high water-stressed ingredients according to SASB standards in coordination with water stress levels based on the World Resources Institute's Water Risk Atlas tool, Aqueduct. The majority of FW's ingredients are grains produced near Amarillo, Texas, which fall under Aqueduct's high-risk category. It is important to note that the grains are not produced at FW's physical location, however, it is something FW is consciously aware of and considers when making purchasing decisions.

Water management onsite follows SASB's definitions of total water withdrawn and total water consumed. However, water utility billing does not easily reflect total water consumption as the City of Austin's water utility billing system bills customers based on total water discharged. According to the billing statements for FW, the total water discharged equals the total water consumed. FW is working with the City of Austin to determine a better estimate of total water discharged and is tracking water consumption for its production

process—whiskey barreling. FW will be installing a discharge meter to monitor actual water discharged from the facility and is tracking total water consumption in terms of total alcohol that is barreled.

Boundaries

All data reflected in the water, climate & energy, and waste sections below are the result of direct and indirect consumption within the boundaries of the operational footprint of FW. FW has estimated the intensity of emissions, energy consumption and water use against produced alcohol, utilizing the proof gallon unit of measure for the production rates. Once bottling commences, FW will be able to calculate impacts against bottles of a certain proof but cannot do so until the angel share is determined.

At this time, Scope 3 (indirect) emissions associated with the supply chain, distribution, and transit to and from the site, by employees and customers, have not yet been considered.



Barrels & Proof Gallons

The produced quantity of alcohol in units of measure of proof gallon is calculated by the barrels produced and the proof of alcohol contained in each barrel. The proof gallon unit of measure is used for reporting to the federal Alcohol and Tobacco Tax and Trade Bureau (TTB).⁷ The Texas Gas Services and City of Austin utility billing cycles vary slightly. FW has quantified the proof gallons for each of the billing cycles in order to map emissions, energy and water consumption impacts against actual production rates. From the production of the first barrel in September 2020 through March 17, 2021, FW has produced a total of 17,038 proof gallons.

To relate environmental and energy impacts to a single 750 milliliter (mL) bottle of 90 proof whiskey as barreled, referred to as “bottle” henceforth, FW utilizes a value of 0.18 proof gallons per bottle. Note the calculated proof gallon per bottle does not account for any impacts after barreling, including angel share losses (evaporation during the aging process).

Water

FW has two water meters, one for irrigation and another for non-irrigation water use. However, as mentioned, FW is not calculating its exact water consumption aside from the total volume of alcohol that is barreled. FW has water

usage data beginning on June 16, 2020 through March 16, 2021. During that time period, FW withdrew a total of 3,253,300 irrigation gallons and 681,000 non-irrigation gallons with a **total of 14,786.94 gallons being barreled.**

Climate & Energy

Scope 1 Emissions

FW quantifies the Scope 1 combustion emissions associated with natural gas, which is combusted by the high-efficiency VSRT boiler for steam generation. The fuel totals are based on utility bills from Texas Gas Services and assume all gas purchased is combusted. FW has natural gas usage data beginning on August 17, 2020, and going through March 17, 2020, and in that time period, FW has consumed a total of 1,571 million British thermal units (MMBtus) of natural gas and emitted a total of 83.45 metric tons of CO₂e from natural gas combustion. From the start of production in September 2020 through March 17, 2020, these totals translate to an estimated emissions rate of 0.86 kg CO₂e per bottle (4.82 kg CO₂e per proof gallon) from natural gas combustion and an estimated natural gas consumption rate of 0.02 MMBtus per bottle (0.09 MMBtus of natural gas per proof gallon produced).

Scope 2 Emissions

FW has quantified the indirect emissions associated with consumption of electricity at the site using location based emission factors from the EPA's eGRID database. The estimated emissions are more conservative than a market based approach, which would take into account Austin Energy's residual grid mix of an estimated 43% renewables as compared to the Electric Reliability Council of Texas (ERCOT) regional mix which includes an estimated 19.8% renewables. From the first billing period starting June 18, 2020 through March 17, of 2021, FW has emitted an estimated 94.18 metric tons of CO₂e from electricity usage and has purchased a total of 238,000 kilowatt hours (kWh) from Austin Energy. From the production of the first barrel in September 2020 through March 17, 2021, this translates to an estimated emissions rate of 0.79 kg CO₂e per bottle produced (4.42 kg CO₂e per proof gallon) from indirect electricity emissions. FW utilized an average 1.99 kWh of electricity per bottle produced (11.18 kWh of electricity per proof gallon).

Total Energy Usage and Emissions

From startup through March 17, 2021, FW has generated 177.63 metric tons of CO₂e total, with 157.8 of the metric tons of CO₂e being generated after the start of production in September 2020.

For electric and gas combined, FW has consumed a total of 2,585 GJ of energy since start up. During the production period starting in September

2020, 2,388 GJ of energy has been consumed. Per the SASB standard, FW has estimated that 33% of their total energy use in GJ was from the grid.

The overall energy consumption intensity for production through mid-March 2021 is 0.02 GJ per bottle (0.14 GJ per proof gallon of alcohol) produced. The GHG intensity for the same period is 1.65 kg CO₂e per bottle (9.25 kg CO₂e per proof gallon of alcohol) produced.

Energy Intensity for production through mid-March 2021 is 0.02 GJ per bottle (0.14 GJ per proof gallon of alcohol) produced. GHG Emissions Intensity for the same period is 1.65 kg CO₂e per bottle (9.25 kg CO₂e per proof gallon of alcohol) produced.

Energy:

0.02
GJ



Emissions:

1.65
kg CO₂e





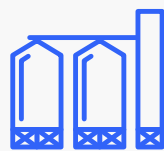
Solar

FW made the conscious decision to invest in solar energy, which was installed in April 2021. While these panels will only generate a portion of the electricity FW consumes, FW understands that each step in helping reduce its impact is meaningful. By installing on-site solar, they are reducing its load from the local grid, which can assist Austin Energy in its long-term energy management, water management, and GHG goals. Austin Energy's grid is a mix of fossil fuel-fired generation and renewable energy, produced locally and regionally. In most cases of fossil fuel-fired generation, water must be considered for cooling purposes and steam generation.

Energy Efficiency

A portion of FW's energy efficiency comes from its automation system, which seeks to produce high-quality whiskey as well as to ensure quality control over time. Facilities of this size do not typically have automation systems to this extent. FW specifically selected automation systems to ensure quality and consistency of its products; additional benefits include reduced energy consumption and reduced water loss.

**Spent FW
Grains Feed
Local Cattle**



Spent Grains Donated to Farmers:

112,000

lb / month

→ Circular Economy

(noun) | /'sɜːrkjələr i'kænəmɪl/

An economic system based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems.

Waste

FW is focused on reducing its waste, from energy and water to the supply chain. As part of its efforts towards making mindful decisions in energy efficiency, solar energy investment, water conservation, and its grain-to-glass initiative, FW is committed to reducing waste and participating in the **circular economy**. This includes finding off-takers for all of its spent grains. Ensuring the use of these grains is incredibly important to FW, which can be seen in its long-term commitments to local farmers who use the spent grains as animal feed to local competitions using the spent grains to create biodegradable products.

FW's spent grain consists of roughly 112,000 pounds of grain mixed with 40,000 gallons of water on a monthly basis. FW is committed to finding consistent and sustainable solutions for this waste and currently donates all spent grain to local farmers.



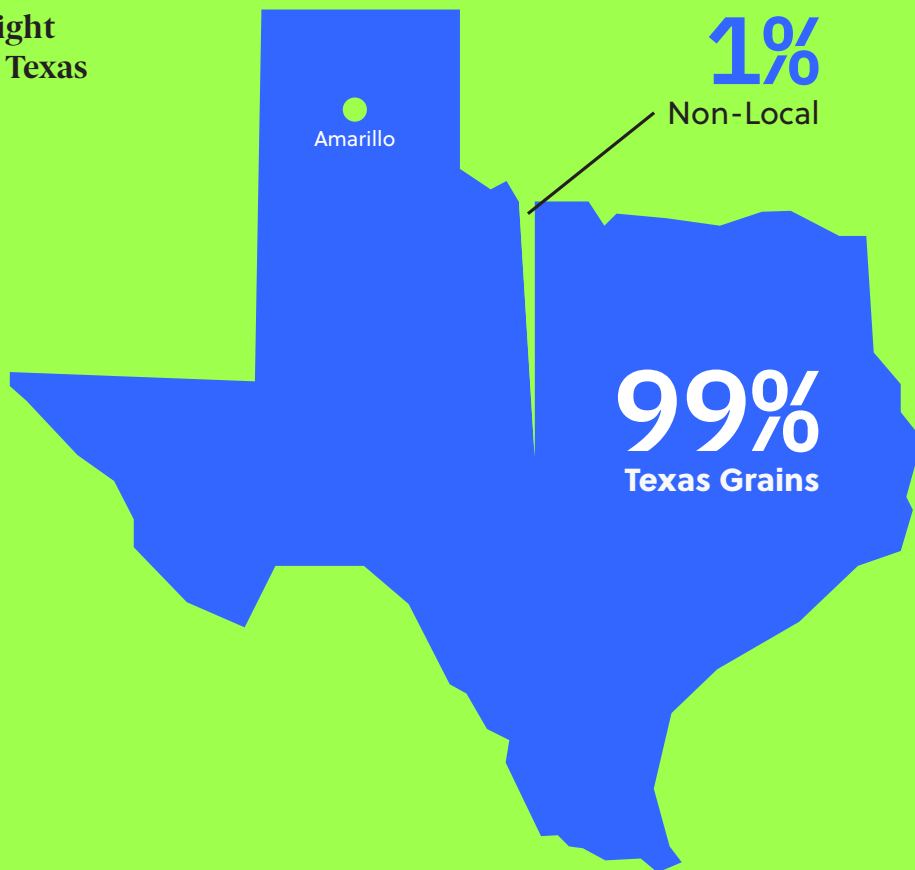
Ingredient Sourcing

The Ingredient Sourcing within the SASB standard for the Food & Beverage Sector, Alcoholic Beverages, has been used to share FW's story. As part of this standard, identifying each ingredient, the percentage of beverage ingredients sourced from regions with high or extremely high baseline water stress, and the distance from the distillery has been taken into account. In all cases, FW's decisions in selecting its ingredients were as purposeful as possible. For most grains, a regional company from Texas was selected; however the supplier was not able to provide high-quality options for all required grains, resulting in the selection of a supplier located much further than anticipated (British Columbia, Canada).

Four out of the five grains used by FW, 99% of the grains by weight, are produced near Amarillo, Texas. Amarillo lies within Texas' Region A water planning area where the primary source of water comes from the Ogallala Aquifer, an aquifer that is used at a rate that exceeds recharge. According to the Texas Water Development Board's Draft 2022 State Water Plan, the state as a whole is still expected to have severe water shortages as demand far exceeds supply. According to the World Resources Institute's *Aqueduct*,⁸ a Water Risk Atlas tool, the Amarillo region is considered high risk, with surrounding areas falling under a medium-high risk.

Based on SASB's standards, the percentage of ingredients used from a region with high risk to water resources is high as grains are the majority of FW's ingredients. While purchasing regionally produced grains is beneficial to the regional economy, FW will continue to balance its ingredient selections based on environmental and socioeconomic impacts.

Grains by weight sourced from Texas



Goals & Improvements



Data Transparency & Baseline

This report reflects FW's activities to date as production has ramped up over time. Based on existing data, the baseline for FW's environmental impacts begins in Fall 2021 where operations reached a steady state. Additional data may be gathered over time as production continues at or greater than the existing pace. Once a full year of steady state data is available, this baseline will be utilized to evaluate optimization opportunities moving forward. While FW has incorporated sustainability and energy efficiency into every facet of the facility and distillation process, FW strives for continual improvement. FW is committed to data transparency and seeks continual improvement on its sustainability journey. Despite not having a set baseline yet, FW sees the value and importance of sharing data from day one to present.



Solar

In April 2021, FW installed a solar project consisting of a rooftop solar array, a centralized inverter, and related electrical metering and safety equipment. FW selected high-efficiency inverters (98.5% California Energy Commission optimized) and power optimizers (99.5%). If production and energy demand increase from the current operational steady state, FW will evaluate the potential for additional energy generation and the potential for energy storage with the goal of taking steps to reduce the impact on load. For example, this may include coordinating with Austin Energy to shift production times to time periods of low grid demand.



Water Conservation

FW follows the City of Austin's conservation stage requirements for landscaping water use by only watering one day per week, between the hours of 7 p.m. to midnight and/or midnight to 10 a.m. Austin's climate is part of what makes FW's aging process unique, but the summer climate also creates significant landscaping water demand. FW is evaluating rainwater collection as a potential option moving forward to reduce water consumption.

While not directly related to FW's water consumption, FW is actively looking into the impacts of water on grain selection in relation to where its grains are produced. As with many sustainability choices, there is not a clear winner—selecting regionally produced grain from a water-stressed region adds to the complexity of FW's decisions and weighs heavily on decisions moving forward.

Currently, the facility is billed based on the total amount discharged for non-irrigation gallons. According to billing statements, the total amount discharged equals the total amount of water consumed. However, this does not properly reflect actual water consumption, as a portion of the water in the facility is used for whiskey production and is barreled. Moving forward, FW will continue to monitor the total non-irrigation water discharged and compare this to the total water billed by the City of Austin. The difference between water discharged and water barreled should indicate the consumed process water for the distillery.



Energy Efficiency

FW was required to install low-level vents in the distilling area to reduce fire and alcoholic vapor risks. While these are required to ensure safety for the distillery and its staff, the vents also increase the loss of temperature-controlled air to the environment. To increase HVAC efficiency and minimize the uptake of cooled air by the vents, FW is considering the installation of alcoholic vapor monitors to reduce the run-time of the vents. These monitors would allow FW to close vents when vapors are at levels considered safe or at the minimum increase the energy efficiency of the HVAC system.



Future of the Brand⁹

FW focuses on utilizing the best ingredients combined with a data-driven approach to ensure the highest quality and most enjoyable taste from each barrel. This means transparency in production and its sustainability efforts. Every single decision revolves around uncompromising quality while keeping energy efficiency in mind. As FW ramps up production, the company plan to grow its impact locally: FW is proud to serve Austinites, source grain as close as possible, and support its local farmers with their spent grain. FW strives for continual improvement in all that they do and will continue to share data every step of the way.

Local Engagement



FW believes in Austin's uniqueness and is committed to the local economy. FW is focused on distilling and bottling its whiskeys in Austin to become "Austin's bourbon." The FW team firmly believes in circulating money in the local community and the importance of buying where you live. This includes taking a full-circle approach, from purchasing Texas grains to having local off-takers of spent grain to reduce FW's waste and environmental impact.

FW's spent grains are collected by local farmers and small businesses for various

uses. As part of its goals in community engagement, FW participated in the City of Austin's Circular Economy Program's [Re]Verse Pitch Competition. This competition allows material suppliers to highlight its raw materials or waste, in this case, to entrepreneurs. The entrepreneurs are given time to create a pitch for a potential product that could be created using the raw material(s). As part of this competition, a company may utilize a portion of FW's spent grains to create beverage coasters. Additional product ideas and concepts are continually being developed with interest from several companies in using FW's spent grains.

While FW is focused on being active in Austin's economy, they want to remain active in other ways as well. FW aims to do this through local partnerships and memberships alongside other distilleries to help promote the idea of buying local. Local production supports the local economy and lowers the carbon emissions in shipping.

As part of its community engagement, FW will continue to seek opportunities to partner with local businesses. This includes but is not limited to using local vendors for supplies, merchandise, and events.



→ Footnotes

- 1 <https://www.iscbarrels.com/2020/08/25/white-oak-initiative/>
 2 <https://www.whiteoakinitiative.org/>
 3 <https://www.iscbarrels.com/2016/06/16/white-oak-sustainability/>

- 4 <https://originalfavorites.com/pages/supima>
 5 <https://www.arc-intl.com/en/commitments/>
 6 <http://www.cardinalfoodservice.com/sustainability>

- 7 <https://www.ttb.gov/>
 8 <https://www.wri.org/aqueduct>
 9 The FW tasting room will follow all required TABC Code and Rules specific to the facility. <https://www.tabc.texas.gov/texas-alcohol-laws-regulations/tabc-code-rules/>

Supplemental Calculations

City of Austin Water

Billing Cycle Start Date	Billing Cycle End Date	Non-Irrigation Gallons	Irrigation Gallons	Total Water (Irrigation & Non-Irrigation)	Non-Irrigation Discharge	Total water (liquor) Barreled (gal)	Non-irrigation use (gal) per bottle
6/16/2020	7/17/2020	0	1,200	1,200	—	0	0.000
7/17/2020	8/17/2020	0	1,200	1,200	—	0	0.000
8/17/2020	9/16/2020	10,300	545,300	555,600	10,300	0	0.265
9/16/2020	10/16/2020	30,600	378,000	408,600	30,600	424	0.536
10/16/2020	11/14/2020	108,100	309,200	417,300	108,100	2,332	0.199
11/14/2020	12/15/2020	131,900	44,000	175,900	131,900	3,551	0.205
12/15/2020	1/16/2021	153,100	832,500	985,600	153,100	3,763	0.087
1/16/2021	2/13/2021	134,000	728,400	862,400	134,000	2,491	0.108
2/13/2021	3/16/2021	113,000	413,500	526,500	113,000	2,226	0.846
Total		681,000	3,253,300	3,934,300	681,000	14,786.94	

Ingredient Sourcing

Ingredient / Source	Source / Supplier	Location / Region	Distance from Distillery (mi)
Corn	Texmalt	Amarillo, Texas	668
Wheat	Texmalt	Amarillo, Texas	668
Barley, malted	Texmalt	Amarillo, Texas	668
Rye	Texmalt	Amarillo, Texas	668
Rye, malted	Brewer Supply Group	Vernon, BC, Canada	2855
Yeast	Ferm-Solutions	Louisville, Kentucky	1412
Yeast nutrient	Ferm-Solutions	Louisville, Kentucky	1412
Panela sugar – rum sugar	Sunshine Barrels	Orlando, Florida	1596
barrels	Independent Stave Co	Lebanon, KY	1014
enzymes	Ferm-Solutions	Louisville, Kentucky	1036
baking soda, citric acid	Univar Solutions		
cleaning chemicals	Five Star Chemical	Denver, CO	933

Natural Gas Calculations

Billing Cycle Start Date	Billing Cycle End Date	Number of Days	Total NG Consumed (Ccf)	Total NG Consumed (cf)	HHV (BTU/cf)	Total BTU's of Natural Gas	Total GJ	kg CO2	kg CH4	kg N2O	kg CO2e	Metric Tons of CO2e	kg CO2e / Proof Gallon Produced	GJ NG / Proof Gallon Produced	MMBtu NG / Proof Gallon Produced
08/06/20	08/17/20	11	21.00	2,100.00	1039	2,181,900	2	116	0.002	0.0002	116	0.12	—	—	—
08/17/20	09/17/20	31	205.25	20,525.10	1039	21,325,579	23	1,132	0.02	0.002	1,133	1.13	—	—	—
09/17/20	10/16/20	29	977.26	97,726.00	1039	101,537,314	112	5,388	0.10	0.01	5,393	5.39	11.06	0.23	0.21
10/16/20	11/16/20	31	2,473.61	247,360.60	1039	257,007,663	283	13,637	0.26	0.03	13,651	13.65	4.67	0.10	0.09
11/16/20	12/16/20	30	3,012.56	301,255.50	1039	313,004,465	344	16,608	0.31	0.03	16,625	16.63	4.33	0.09	0.08
12/16/20	01/19/21	34	3,914.34	391,433.50	1039	406,699,407	447	21,579	0.41	0.04	21,602	21.60	4.48	0.09	0.08
01/19/21	02/13/21	25	2,878.81	287,881.10	1039	299,108,463	329	15,871	0.30	0.03	15,887	15.89	6.68	0.14	0.13
02/13/21	03/17/21	32	1,638.04	163,803.50	1039	170,191,837	187	9,030	0.17	0.02	9,040	9.04	3.49	0.07	0.07
Total			15,120.85	1,512,085.30		1,571,056,627	1,728	83,360	1.57	0.16	83,446	83.45			

- FW uses Texas Gas Services natural gas. Since 2014, Texas Gas has achieved a 22.1% reduction in pipeline CO2e emissions through pipeline replacement programs.
- Utilizing the EIA average American HHV for end users. The HHV was the same for 2020 and 2021. https://www.eia.gov/totalenergy/data/monthly/pdf/sec12_5.pdf
- For the unit conversion between, BTU and GJ: 0.0000011 GJ / BTU
- Per 40 CFR 98 Subpart C, table C-1, the emission factor for emissions of CO2 from the combustion of Natural Gas is **53.06 kg CO2 / MMBtu**
- Per 40 CFR 98 Subpart C, Table C-2, the emission factor for emissions of CH4 from the combustion of Natural Gas is **0.001 kg CH4 / MMBtu**
- Per 40 CFR 98 Subpart C, Table C-2, the emission factor for emissions of N2O from the combustion of Natural Gas is **0.0001 kg N2O / MMBtu**
- To calculate the total CO2 equivalency, the following global warming potentials (GWP) were used per 40 CFR 98 Subpart A.
25 CH4 298 N2O
- There are 1,000 kg in a metric ton.
- The primary consumer of natural gas is the VSRT boiler, which has a high thermal efficiency and long life cycle.
- Proof Gallon is a standard unit of measure for distilled spirits, relating volume and alcohol content: <https://www.ttb.gov/distilled-spirits/conversion-tables>

Electric Calculations

Start Date	End Date	Total Consumption (kWh)	Total Consumption (MWh)	Total Consumption GJ	Location Based Emissions					Metric Tons of CO2e	kg CO2e / Proof Gallon Produced	GJ Electricity / Proof Gallon Produced	kWh Electricity / Proof Gallon Produced
					kg CO2	kg CH4	kg N2O	kg of CO2e					
6/18/2020	7/17/2020	11,250	11.25	40.5	4,433	0.29	0.05	4,452	4.45	—	—	—	
7/17/2020	8/17/2020	17,500	17.5	63	6,895	0.46	0.07	6,925	6.92	—	—	—	
8/17/2020	9/16/2020	18,750	18.75	67.5	7,388	0.49	0.08	7,420	7.42	—	—	—	
9/16/2020	10/16/2020	24,250	24.25	87.3	9,555	0.63	0.10	9,596	9.60	19.68	0.18	49.7	
10/16/2020	11/14/2020	28,500	28.5	102.6	11,229	0.74	0.11	11,278	11.28	4.21	0.04	10.6	
11/14/2020	12/15/2020	33,000	33	118.8	13,002	0.86	0.13	13,059	13.06	3.20	0.03	8.1	
12/15/2020	1/16/2021	36,000	36	129.6	14,184	0.94	0.14	14,246	14.25	3.29	0.03	8.3	
1/16/2021	2/13/2021	28,750	28.75	103.5	11,328	0.75	0.12	11,377	11.38	3.97	0.04	10.0	
2/13/2021	3/16/2021	40,000	40	144	15,761	1.04	0.16	15,829	15.83	6.11	0.06	15.4	
Total		238,000	238	856.8	93,775	6.19	0.95	94,180	94.18				

- FW's electric provider is Austin Energy, a City of Austin utility. As of June 2019, Austin Energy's generation mix was at 43% renewable energy, including solar and wind. Austin Energy oversees a mix of >5,000 MW of total generation capacity and operates three natural gas-powered plants in the Austin area. They are also part owners of 2 power plants outside of Austin (one coal and one nuclear fuel). Purchase Power Agreements (PPAs) are in place for the renewables in their portfolio.
<https://austinenergy.com/ae/about/environment/renewable-power-generation>
<https://austinenergy.com/ae/about/company-profile/electric-system/power-plants>
- For the unit conversion between, BTU and GJ: 0.0036 GJ / kWh
- The location-based emission factor for the regional ERCOT grid was determined from EPA's eGRID database. The 2019 data was issued on 2/23/2021. Tab SRL19 was utilized for eGRID subregion data.
<https://www.epa.gov/egrid/download-data>
- The annual eGRID sub-region total emission rate output for GHGs are as follows, in kg/MWh:
394.013 CO2 0.004 N2O
0.026 CH4 395.713 CO2e
The grid mix accounted for in the eGRID emission factors for ERCOT: which include:
80.20% Non-renewables
19.80% Renewables
- There are 1,000 kWh in a MWh.
- There are 1,000 kg in a metric ton.