

# **SUSTAINABILITY OF CRAFT DISTILLERIES: AN ANALYSIS OF THE PROFITABILITY OF A CARBON NEUTRAL CRAFT DISTILLERY IN CENTRAL TEXAS**

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## **ABSTRACT**

Craft distilleries have an environmental impact totaling 6.5 pounds of carbon dioxide per 750 ml bottle of spirits produced (Sacks). There is enormous potential to decrease the environmental impact of the craft distillery impact. This project will focus on craft distilleries in central Texas to determine if a carbon neutral craft distillery in the region can be profitable. The energy and mass balance of a typical distillery production process revealed 8.7 MMBTU is needed for heat and 1052 kWh is needed for cooling throughout production. To decrease energy use, the well water will be passed through a heat exchanger with the cooking tank mixture to simultaneously pre-heat the well water going into the cooker and cool down the mixture leaving the cooker. The fermentation mixture will also be passed through a heat exchanger along with the mixing tank mixture to raise the temperature of the fermentation mixture prior to entering the still and lower the temperature of the mixing tank mixture. These two improvements lower the necessary energy for heating to 6.2 MMBTU and 385 kWh for cooling. At these levels, an onsite anaerobic digester to produce biogas ran in series with 3 microturbines can reliably provide the thermal and electrical energy requirements for a distillery throughout the year with excess electricity produced that can be sold back to the grid. Three wind turbines can provide marketing value and supplemental energy that can also be sold back to the grid for profit. The cost for the three microturbines, an anaerobic digester, two heat exchangers and three wind turbines is \$1-\$1.6 million. The annual cost for the thermal and electrical energy for a craft distillery in central Texas is \$111,600. An extra \$240 per year can be earned purely from supplemental electricity produced onsite. The initial investment starts to pay itself off and make a profit between 10 and 15 years proving that a carbon neutral craft distillery in central Texas can be profitable. However, with this long of a payback period, it would be up to the investors/owner's discretion to finance this project.

[Sacks, Katherine. "The Distilleries Working to Reduce the Foodprint of Spirits." *Salon*, Salon.com, 16 Jan. 2021, [www.salon.com/2021/01/17/the-distilleries-working-to-reduce-the-foodprint-of-spirits\\_partner/](http://www.salon.com/2021/01/17/the-distilleries-working-to-reduce-the-foodprint-of-spirits_partner/).]



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