

# Beer



Oregon's booming craft beer industry had the 6th most permitted breweries (281) in the nation in 2015. Oregonians consume 36% of the craft beer production in-state, the highest level in the country. But all of that beer drinking adds up; according to the Oregon Consumption Based Greenhouse Gas Emissions Inventory, the upstream (i.e., raw materials through retail) emissions of beer consumption in Oregon (in-state beers plus imports) amount to 202,700 metric tons of CO<sub>2</sub> equivalents annually. That's about the same as 42,800 average passenger vehicles operated for a year.



The life cycle of beer is depicted above. Understanding the life cycle of beer can help focus attention on areas with the greatest potential for reducing environmental burdens. This summary highlights results from life cycle assessment (LCA) studies of beer. Such studies, while not specific to breweries in the Pacific Northwest, can help guide improvement efforts to those parts of the beer value chain where they are likely to have the most bearing, while also identifying potential trade-offs or unintended consequences.

## Key Findings

Barley-based beers are the main type of beer represented in the LCA literature. Greenhouse gas emissions (GHGE), also known as carbon footprint, are the dominant environmental impact examined in these studies, although energy and water use are also considered, and a handful of studies evaluate a full suite of environmental impacts spanning environmental and human health indicators.

An overview of the reviewed beer LCA studies reveals that the packaging format typically contributes the most to environmental impacts. The chart to the right shows an average contribution to the carbon footprint of beer for each life cycle phase, based on studies in the literature. In general, production of raw materials (dominated by malted barley), packaging, and refrigerated storage emerge as the most important life cycle stages for a variety of environmental impact categories.



Carbon footprint by life cycle phase of beer

## Conclusions

The LCA literature on beer production and consumption offers the following conclusions:

- Raw material production, specifically malted barley, is consistently an important contributor to most environmental impact categories considered.
- Opportunities may exist to reduce the carbon footprint of raw material production by brewing with un-malted barley and industrial enzyme.
- The GHGE from brewery operations are largely driven by energy use, and account for 2 – 28% of the impact. Efficiency efforts can lead to reduced impacts.
- Distribution transport was not a standout contributor in the LCA studies reviewed.
- Retail and home refrigeration of beer can be a notable contributor to the carbon footprint, and is dependent on how long the beer is kept cold.
- Producers can reduce the carbon footprint of beer by changing to packaging formats with a lower carbon footprint as shown below.



The full report created by Center for Sustainable Systems - University of Michigan can be downloaded from <http://www.oregon.gov/deq/mm/food/Pages/Product-Category-Level-Footprints.aspx>.