Carbon dioxide Utilization in the United States

Carbon dioxide (CO_2) is manufactured in compressed gas and solid forms and then supplied to a diverse range of customers, including industrial, medical, and specialized users as carbon dioxide gas, dry ice, and liquid carbon dioxide. The CO_2 industry in the US had a total revenue of over $700 million in 2019. Air liquid SA, Linde PLC and Air Products and Chemicals are the three major businesses with a market share of 47.5%, 23.5% and 13.7%, respectively. The Compressed Gas Association is an active national association that represents CO_2 producers and others.

Fermentation from corn-ethanol plants is the largest single sector CO_2 source (32%). Ammonia manufacturing plants, hydrogen gas producing industry, and natural gas wells, contribute 21% each (total 63%), while remaining 5% of CO_2 is produced from other sources (Figure 1). **Food producers use 38.1% of CO_2,** beverage producers utilize 24.8%, oil and gas industry use 15.5%, followed by construction and manufacturing which share 11.0% , and others (agriculture, medical, exports) 10.6% of CO_2 produced in the US (Figure 2).

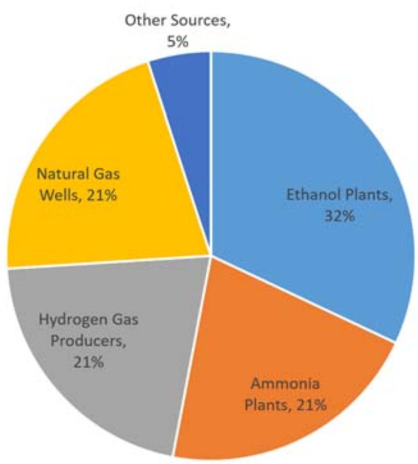

Figure 1: Sources of CO_2

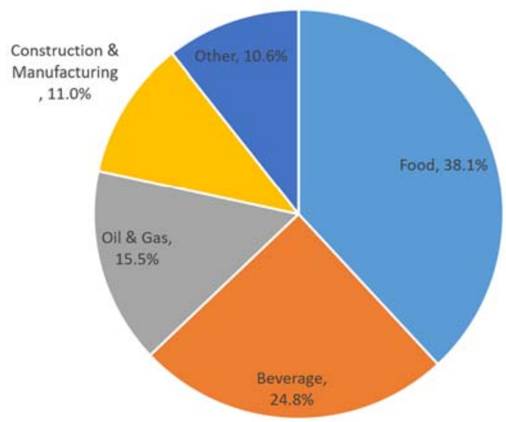

Figure 2: Users of CO_2

Reductions in U.S. ethanol production (driven by COVID-19 epidemic and complimented by geopolitical issues) are causing a significant disruption to carbon dioxide supply. In Iowa, we are currently seeing this impact pricing and availability of CO_2 in the food, beverage, and city water treatment (for pH reduction) industries. At this time, there does not seem to be a simple answer for increasing the supply of carbon dioxide. Similarly, there are not a lot of rapid alternatives to CO_2 by consumers of the product. Should shortages continue, options include support for ethanol plants that produce CO_2 as a byproduct, support for other industries (such as ammonia) to produce more CO_2, or rationing of CO_2 supplies.

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Sources: IBIS World, Compressed Gas Association, CIRAS Analysis