

## Not My Beer: The Effects of a CO<sub>2</sub> Shortage

[Samantha DeCarlo](#) and [Angélica Marrero](#)

Office of Industries, 205-3165 and 205-2519

*Carbon dioxide (CO<sub>2</sub>) is more than a pollutant from your car's exhaust system; it is extensively used in the production of a wide range of products, ranging from refrigerants to beer. During peak World Cup fever in June 2018, several news outlets began reporting that there was a threat of a beer supply shortage due to a scarcity in food grade CO<sub>2</sub> production in Europe. Shortly thereafter, Mexico also began to suffer from CO<sub>2</sub> shortages. These shortages in both Europe and Mexico have highlighted the importance of CO<sub>2</sub> to a myriad of industries, including the beverage sector. This Executive Briefing on Trade (EBOT) takes a look at how CO<sub>2</sub> shortages occur and analyzes the potential trade implications using beer as a representative case study.*

### **Beyond Car Emissions**

Carbon dioxide (CO<sub>2</sub>) is an important component for a wide variety of industries, ranging from chemicals to food products for consumption. In the food sector, CO<sub>2</sub> is responsible for giving carbonated drinks their “fizz” factor and is necessary for forced carbonation operations, which are typically used for kegs. Lesser known uses for CO<sub>2</sub> include: as a sleeping agent to render animals unconscious before slaughter in the pork and poultry industries, to extend the shelf-life of certain food products (e.g., baked goods and meat products), and to de-caffeinate coffee.

### **The Captive CO<sub>2</sub> Industry Abroad**

Food grade CO<sub>2</sub> in Europe and Mexico is still primarily obtained as a by-product from limited sources, which means the CO<sub>2</sub> market is at the mercy of other industries.<sup>1</sup> In Europe, CO<sub>2</sub> production is predominantly limited to being a by-product of ammonia production, which is a key input in the fertilizer industry. Production of fertilizer in Europe typically peaks during the winter months, and manufacturing facilities subsequently undergo an annual shutdown for necessary maintenance in the spring. These closures usually coincide with peak production of both soft and alcoholic drinks; this production timeline has been in place for several years with few supply issues. In contrast, CO<sub>2</sub> production in Mexico is mostly a by-product of natural gas production, so issues in natural gas production have immediate effects on their captive CO<sub>2</sub> supplies.

### **A perfect storm**

Falling ammonia prices in 2018 led to an increase in ammonia sourced outside of Europe. Manufacturers of ammonia in Europe responded to diminished consumer demand for European product by extending the shutdown time for ammonia plants.<sup>2</sup> CO<sub>2</sub> production is already expected to be limited annually during peak drink production time, but there were also a number of unplanned ammonia production outages this past spring. These greater than usual outages, combined with changes in standard operating practices by ammonia manufacturers, coincided with an increase in consumer demand during the summer months. The typical summer demand for refreshing drinks, already stressed by the CO<sub>2</sub> supply shortages, was compounded by a massive heat wave and drought prevalent throughout Europe, as well as the quadrennial occurrence of the Federation of International Football Association's World Cup. The United Kingdom (UK) was the hardest hit in Europe, because only one plant is operating in the

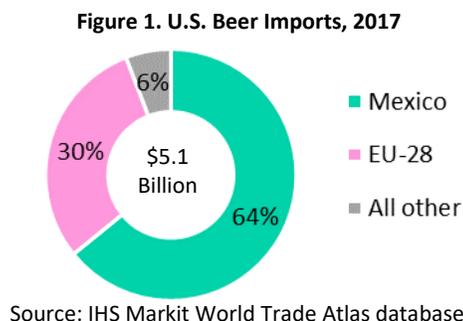
<sup>1</sup> There have been attempts to develop other CO<sub>2</sub> sources, such as raw gas streams from chemical operations and bioethanol plants, but ammonia plants remain the primary source for CO<sub>2</sub> in Europe.

<sup>2</sup> Also during this time, natural gas prices increased from 2017 to 2018.

country, and food and drink suppliers typically rely on local sourcing due to cost restraints.<sup>3</sup> By the end of the summer, however, European production facilities had reopened, thus avoiding the major crisis that news reports alluded to. However, in Mexico natural gas production decreased which has resulted in a shortage of CO<sub>2</sub> in the country. As of August 2018, the shortage is still ongoing.

### What about my beer?

The effects of concurrent CO<sub>2</sub> shortages with two of our trading partners had the potential to permeate into the United States. Since the shortage in Mexico is still actively occurring the outcome is still unwritten, but the U.S. could start to feel the consequences of the Mexican shortage through trade in downstream industries, such as beverages, specifically beer.



Mexico is the fourth largest producer of beer in the world, on an individual country basis. Additionally, Mexican beer accounts for the largest share of the U.S. imported beer market; imports from Mexico accounted for nearly 65 percent of total U.S. beer imports in 2017 (figure 1). U.S. imports of Mexican beer increased almost 75 percent during 2013–17, driven by an increase in popularity among U.S. consumers and changing demographics, ultimately increasing Mexican beer's share in the U.S. market and displacing domestic beer in favor of imported beer as a result. Collectively, Europe is the second largest beer producing region in the world, accounting for about 27 percent of the global production and 30 percent of total U.S. beer imports in 2017. While Germany is the largest producer in the region, the Netherlands is the largest exporter of beer to foreign markets. The Netherlands accounts for about 45 percent of the total U.S. imports of European beer, followed by Belgium (17 percent), Ireland (11 percent), and Germany (10 percent).<sup>4</sup> These four countries account for 93 percent of total U.S. imports of beer from Europe.

The supply of CO<sub>2</sub> in the United States is more diversified than in Europe and Mexico. The largest CO<sub>2</sub> source for U.S. merchant gas<sup>5</sup> markets is ethanol production (43 percent), with the remainder of CO<sub>2</sub> production coming from other several operations.<sup>6</sup> However, the United States imports goods that use CO<sub>2</sub> in their production processes, including beer, pork, processed food, and sparkling water. If these CO<sub>2</sub> shortages keep occurring, it could leave U.S. consumers vulnerable, waiting for a cold one at the bar during the hot days of summer.

**Sources:** Zhang, [Europe is Running Low on CO<sub>2</sub>](#), 7/6/18; Eurostat, [Happy Beer Day!](#), 8/4/17; Sampson, [CO<sub>2</sub> supply crisis hits Europe](#), 6/19/18; Meredith, [Beer rationing begins after a carbon dioxide crisis hits Europe](#), 6/27/18; Sampson, [A CO<sub>2</sub> supply shortage hits Mexico](#), 6/27/18;; Daneshkhu, [How the CO<sub>2</sub> shortage is affecting the food and drink industry](#), 6/30/18; Johnson, [How Imported Beers Will Embrace Craft, Premiumization In 2017](#), 2/7/17; Bernot, [How America fell in love with Mexican beer](#), n.d.; Sampson, [CO<sub>2</sub> shortage continues in Mexico](#), 7/31/18; Mikhailova, [What caused the UK's carbon dioxide shortage?](#), 6/22/2018; Mueller, [Ethanol Industry Provides Critical CO<sub>2</sub> Supply](#), 2/8/17; Kirin, [Kirin Beer University Report Global Beer Production by country in 2016](#), 8/10/ 2017.

<sup>3</sup> UK food and drink producers could not easily source from across the Channel because of plant shutdowns in Benelux and France. Major ammonia plants for Europe are in the UK, Norway, the Netherlands, and France.

<sup>4</sup> USITC/USDOC DataWeb (HTS 2203; accessed July 19, 2017).

<sup>5</sup> Production and retail of air separation gases including: nitrogen (N<sub>2</sub>), oxygen (O<sub>2</sub>), argon (Ar), helium (He), hydrogen (H<sub>2</sub>), and CO<sub>2</sub>.

<sup>6</sup> Includes production from manufacturing activities related to ammonia, caprolactam,, hydrogen refineries, and synthetic natural gas operations.