

Carbon Dioxide Shortage

What's the Issue?

Carbon dioxide, or CO₂, is an essential chemical used in the treatment of drinking water, largely for pH adjustment after lime softening. Most carbon dioxide used in the United States for treatment of drinking water is generated as a byproduct in the production of ethanol. The primary demand for ethanol is as a fuel and gasoline additive. With most Americans under stay-at-home orders, the demand for gasoline and ethanol has dropped sharply causing ethanol producers to shut down their facilities and cease output. The curtailment has directly affected the supply of food and beverage grade carbon dioxide gas used by the water treatment industry. As a result, water utilities across the nation are being provided with Force Majeure notices from CO₂ suppliers.

CO₂ Supply Chain

Carbon dioxide, or CO₂, is an essential chemical used in the treatment of drinking water, largely for pH adjustment after lime softening. Most carbon dioxide used in the United States for treatment of drinking water is generated as a byproduct in the production of ethanol. The primary demand for ethanol is as a fuel and gasoline additive. With most Americans under stay-at-home orders, the demand for gasoline and ethanol has dropped sharply causing ethanol producers to shut down their facilities and cease output. The curtailment has directly affected the supply of food and beverage grade carbon dioxide gas used by the water treatment industry. As a result, water utilities across the nation are being provided with Force Majeure notices from CO₂ suppliers.

Mitigation Measures

Utilities facing limitations on their supply of CO₂ may make several short-term changes to reduce consumption, including:

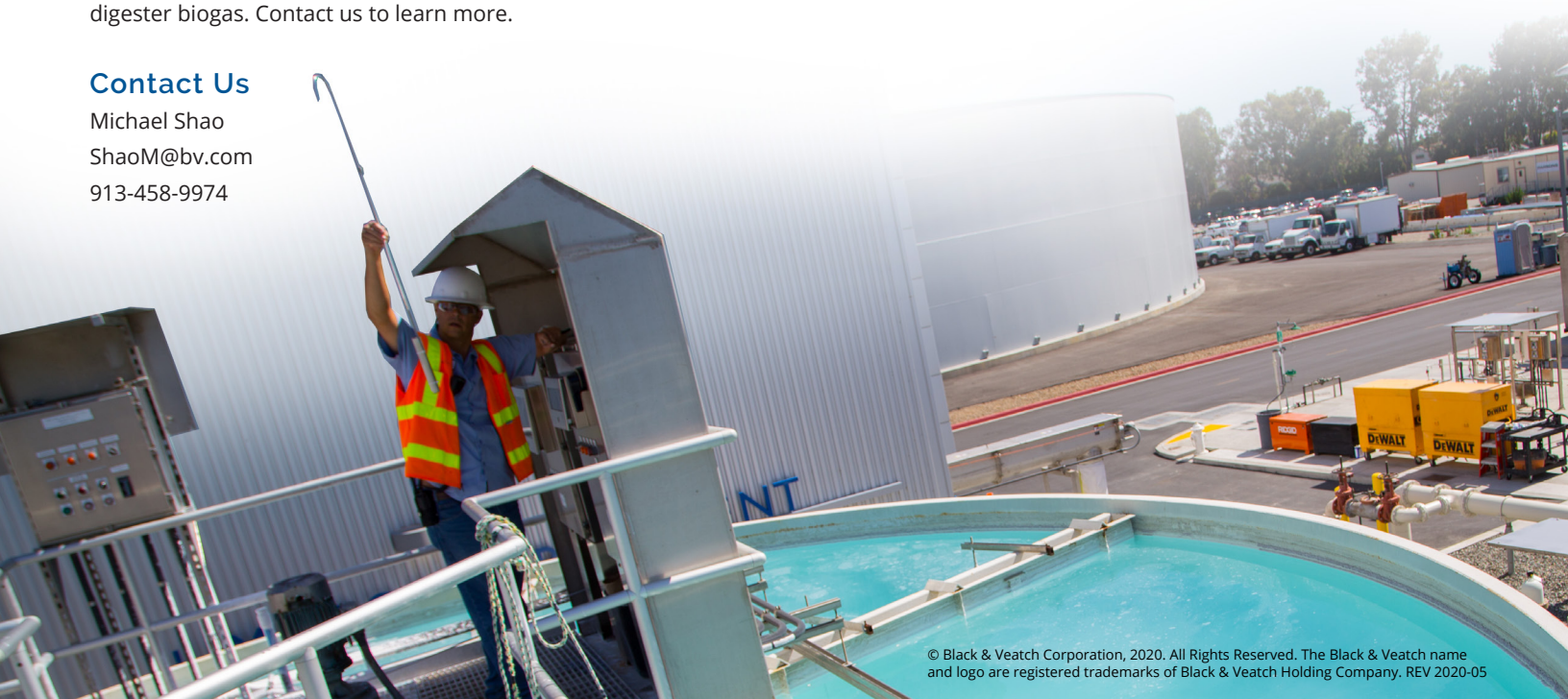
- **Increase treated water hardness goals.** Temporarily treating to a higher finished water hardness will reduce the required dosage of lime and thus reduce the demand for CO₂ in the recarbonation process.
- **Increase pH setpoints.** The decision to adjust finished water pH should be made carefully after considering all water quality and stability criteria to ensure the change does not detrimentally impact treatment or the integrity of the distribution system and household fixtures.
- **Use alternative acids.** Some utilities may be able to offset consumption of CO₂ by feeding a mineral acid, such as sulfuric acid, to reduce pH. Material requirements vary by chemical and should be verified before making any changes. Temporary chemical feed systems may be required.

Long-Term Solutions

Utilities interested in enhancing resiliency may look toward generating their own CO₂. Solutions include packaged systems to convert natural gas into high purity CO₂ and marketable, clean-burning hydrogen fuel, as well as technologies to recover CO₂ and methane from digester biogas. Contact us to learn more.

Contact Us

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U.S. Producers of Carbon Dioxide

Producer	Location(s)	Industry
Ace Ethanol, LLC	Oshkash, WI Stanley, WI	Ethanol Ethanol
AES Corporation	Panama, OK Cumberland, MD	Power Power
Agramarke Inc.	St. Joseph, MO	Ethanol
Air Products, L.P.	Port Arthur, TX	Chemicals
Arkema Inc.	Memphis, TN	Chemicals
Ascend Performance Materials Operations LLC	Decatur, AL	Chemicals
Basin Electric Power Cooperative	Beulah, ND	Ammonia
Big River Resources, LLC	Boyceville, WI	Ethanol
BP Amoco Chemical Company	Decatur, AL	Chemicals
BP West Coast Products LLC	Blaine, WA	Petroleum
Cardinal Ethanol, LLC	Union City, IN	Ethanol
Central Indiana Ethanol, LLC	Marion, IN	Ethanol
CF Industries Holdings, Inc	Sergeant Bluff, IA Donaldsonville, LA Woodward, OK Claremore, OK	Ammonia Ammonia Ammonia Ammonia
Chesapeake Energy Corporation	Tad, WV	Power
City Water Light and Power	Springfield, IL	Power
Conestoga Energy Holdings LLC	Garden City, KS Liberal, KS	Ethanol Ethanol
ConocoPhillips	Lost Cabin, WY	Petroleum
Dyno Nobel Inc	Deer Island, OR Cheyenne, WY	Ammonia Ammonia
E Energy Adams LLC	Adams, NE	Ethanol
Eastman Chemical Co	Longview, TX	Chemicals
Exxon Mobil Corp	Torrance, CA Baton Rouge, LA Baytown, TX Kemmerer, WY	Petroleum Chemicals Chemicals Chemicals
Fibrant LLC	Augusta, GA	Chemicals
Guardian Lima, LLC	Lima, OH	Ethanol
Hess Corporation	Seminole, TX	Carbon Dioxide
Honeywell International Inc	Hopewell, VA	Chemicals
ICM, Inc	Saint Joseph, MO	Ethanol
Kent Corporation	Muscatine, IA Washington, IN	Ethanol Ethanol
Koch Industries, Inc.	Dodge City, KS Enid, OK Beatrice, NE Pelham, GA Duncombe, IA Zachary, LA Carnas, WA	Ammonia Ammonia Ammonia Ethanol Ammonia Chemicals Chemicals

U.S. Producers of Carbon Dioxide

Producer	Location(s)	Industry
Kuraray America Inc.	La Porte, TX	Chemicals
Linde North America, Inc	Cherokee, AL	Carbon Dioxide
	Decatur, AL	Chemicals
	Carson, CA	Carbon Dioxide
	El Segundo, CA	Carbon Dioxide
	Richmond, CA	Carbon Dioxide
	Torrance, CA	Carbon Dioxide
	Cortez, CO	Carbon Dioxide
	Muscatine, IA	Carbon Dioxide
	Pekin, IL	Carbon Dioxide
	South Bend, IN	Carbon Dioxide
	Winthrop, MN	Carbon Dioxide
	Brandon, MS	Carbon Dioxide
	Fulton, NY	Carbon Dioxide
	Lima, OH	Carbon Dioxide
	Enid, OK	Carbon Dioxide
	Woodward, OK	Carbon Dioxide
	Pasadena, TX	Carbon Dioxide
	Corpus Christi, TX	Carbon Dioxide
	Price, UT	Carbon Dioxide
	Hopewell, VA	Carbon Dioxide
	Green River, WY	Carbon Dioxide
LSB Industries, Inc.	Cherokee, AL	Ammonia
	Pryor, OK	Ammonia
Lyondell Chemical Company	Pasadena, TX	Ethanol
Macquarie Infrastructure Corp	Kapolei, HI	Petroleum
MGP Ingredients, Inc.	Lawrenceburg, IN	Chemicals
MPLX LP	Mcalester, OK	Carbon Dioxide
Noble Americas Corp.	South Bend, IN	Ethanol
Northern Missouri Grain Processors Inc	Macon, MO	Ethanol
Pacific Ethanol, Inc	Pekin, IL	Ethanol
	Boardman, OR	Ethanol
Par Pacific Holdings, Inc.	Kapolei, HI	Petroleum
PBF Energy Inc.	Delaware City, DE	Petroleum
Phillips 66 Co	Carson, CO	Petroleum
	Wilmington, CA	Petroleum
POET, LLC	Fostoria, OH	Ethanol
	Bingham Lake, MN	Ethanol
	Albert Lea, MN	Ethanol
	Ladonia, MO	Ethanol
	Scotland, SD	Ethanol
Potash Holding Company, Inc	Augusta, GA	Ammonia
	Geismar, LA	Ammonia
	Lima, OH	Ammonia
Praxair, Inc.	Walden, CO	Carbon Dioxide
	Danbury, CT	Chemicals
	East Chicago, IN	Chemicals
Shell Chemical LP	Norco, LA	Petroleum

U.S. Producers of Carbon Dioxide

Producer	Location(s)	Industry
Shell Oil Co	Deer Park, TX	Petroleum
Southeast Minnesota Ethanol LLC	Preston, MN	Ethanol
Sterling Ethanol, LLC	Bridgeport, NE	Ethanol
	Sterling, CO	Ethanol
	Yuma, CO	Ethanol
Sunoco Retail LLC	Fulton, NY	Ethanol
Tate & Lyle Ingredients Americas LLC	Loudon, TN	Ethanol
Tesora Refining & Marketing Co LLC	Carson, CA	Petroleum
United Technologies Corporation	Mebane, NC	Chemicals
Valera Energy Corp	Benicia, CA	Petroleum
	Corpus Christi, TX	Petroleum
Western New York Energy, LLC	Medina, NY	Ethanol
Williams Partners LP	Parachute, CO	Carbon Dioxide
WRB Refining LP	Roxana, IL	Petroleum
Wugona	Ramsey, NJ	Ethanol
XTO Energy Inc	Price, UT	Carbon Dioxide

