

From the February 2009 Issue

It's not just a Pipe Dream

Kinder Morgan proved that it's possible to overcome the challenges of moving ethanol via pipeline when the company shipped its first commercial batch in November. Bolstered by industry support, consumer interest and favorable legislation, other pipeline companies are also tackling ethanol pipeline projects.

by Erin Voegele

In late 2008, Kinder Morgan Energy Partners LP became the first U.S. company to ship a commercial batch of ethanol through its Central Florida Pipeline, an 85-mile stretch between Tampa and Orlando, Fla.

Kinder Morgan's success is the result of extensive preparation and a sizable investment. The company spent about \$10 million to modify the pipeline, which was previously dedicated to gasoline service, so it could handle ethanol. The money was used to clean the pipe, replace ethanol-incompatible equipment and expand capacity at Kinder Morgan's Orlando terminal so it could handle the shipments. Commercial ethanol shipments are scheduled to continue through that pipeline once a week.

Several other companies are also working on ethanol pipeline projects. Magellan Midstream Partners LP and Buckeye Partners LP have partnered to study the feasibility of constructing a dedicated ethanol pipeline, which would span 17,000 miles from northwestern Iowa to New York Harbor.

In addition to the project with Magellan, Buckeye has notified the U.S. Department of Transportation of its plans to run a test batch of ethanol through an existing Detroit, Mich.-area pipeline. Eric Gustafson, Buckeye's chief operations officer, says the test batch will travel approximately 20 miles through the pipeline and should be complete within a few months.

In an effort to overcome the problems associated with traditional steel piping, ALL Fuels & Energy Co. has plans to construct a new resin-based multiproduct pipeline. According to President and Chief Executive Officer Dean Sukowatey, his company is in the process of funding a pipe manufacturing facility in Des Moines, Iowa. The company plans to construct a pipeline in two phases. Phase one would consist of a pipeline system throughout the Midwest. Phase two would seek to expand the pipeline to the East Coast.

Overcoming Obstacles

Although Kinder Morgan has successfully moved ethanol through the Central Florida Pipeline, many obstacles remain. The primary challenges involved in moving ethanol through a pipeline can be divided into two main categories; challenges resulting from the corrosive nature of ethanol, and challenges resulting because of how ethanol reacts with other products and substances within the pipeline.

Jim Lelio, Kinder Morgan's director of business development, says the obvious challenge is that ethanol reacts so much differently than the refined petroleum products that are typically moved through pipelines. The industry must find ways to overcome ethanol's affects on the pipe, the valves and the systems themselves. "If you can do that, you've got a good chance of moving the product," he says.

More specifically, the corrosive nature of ethanol leads to concerns over stress corrosion cracking (SCC). SCC can be defined as the slow growth of cracks along the pipeline, which are caused by mechanical stress and exposure to a corrosive environment.

While Kinder Morgan's success in transporting ethanol long distances through a pipeline is a new achievement, there is actually an extensive history involving the movement of ethanol short distances through pipes. Piping infrastructure can be found within ethanol plants, and it's used to connect tanks to various infrastructure elements, such as blending racks and barge docks. "Over the years, there have been about 10 to 20 instances of stress corrosion cracking in existing facilities handling ethanol," says Eric Gustafson, Buckeye's chief operating officer. These instances have been relatively minor because they occurred in completely contained environments. "The stress corrosion cracking, which occurs on the interior of the pipe, is different from what we are accustomed to with other products," says Bruce Heine, Magellan's director of government and media affairs. "That cracking could lead to a release of product."

Heine says pipeline companies are highly motivated to prevent all releases, which is why it's important to develop ways to prevent this type of corrosion. Although product release is exceedingly uncommon, Gustafson says his company has a zero-tolerance policy. "Even though there have only been a handful of these stress corrosion cracking incidents ... we need to understand what is causing them and make sure we have mitigated the risk," he says. Other compatibility and corrosion issues can arise because of the way ethanol reacts when nonmetal materials and plastics are present in existing pipelines.

Ethanol's solvent qualities pose additional challenges. Over years of use, small quantities of residue, or dirt, can build up in existing pipeline systems. Although this dirt is not soluble in petroleum products, it is soluble in ethanol, which can lead to discoloration.

In addition, pipelines can hold a small amount of water. In the petroleum production process water and hydrocarbons are often mixed, Gustafson says. At certain temperatures water stays soluble in the product in very small amounts. "As the temperature of the

product cools, which it typically does when it goes in the ground, some water drops out and becomes what we call free water," he says. Because the amount of water tends to be small, it's not a huge issue when transporting pure denatured ethanol. It does, however, make transporting pre-mixed ethanol and gasoline blends more difficult. "If a blend of gasoline and ethanol encounters water, the water will actually cause the ethanol to come out of the blend," Gustafson says. The result is a water ethanol mix, and gasoline that no longer meets specifications.

Dedicated Pipeline A Solution

Gustafson and Heine say a dedicated pipeline should help overcome many of the issues that arise when shipping ethanol via pipeline. Although the project is still in the feasibility study stage, the two companies continue to dedicate resources and effort to the project.

When constructing a new pipeline, special construction and welding techniques can be applied. "You can also choose materials that will be compatible with ethanol," Gustafson says. Furthermore, the pipeline would be dedicated solely to ethanol shipments, thus eliminating the problems stemming from incompatibility with other products. "This doesn't mean that you can't safely handle ethanol in some of the existing pipes—because I think we can—but it's easier when a system is specifically designed to [move ethanol]," Gustafson says.

ALL Fuels & Energy is taking yet another approach to overcoming challenges associated with the use of steel pipes by utilizing resin-based pipes. "[The resin-based pipes] work for all products, including ethanol, because they are very corrosion resistant," says Voldemars Pelds, president and chief executive officer of Leo Pelds Engineering Co. "It doesn't get eaten away by the ethanol." In addition, the pipe can be sealed from end to end, which prevents moisture from entering, Pelds says.

According to Sukowatey, the polymer used to make the pipe will weld, or bond, with fiberglass. "[This bond] is called a chemical weld because you can bond what's called a fiberglass reinforced pipe," Pelds says. "We then enhance it with a wrap of resin pipe." Although commodity prices can change, Pelds estimates the cost of the pipe will be comparable with the price of traditional steel piping.

Another benefit of ALL Fuels & Energy's proposed pipeline is its long lifespan when compared with steel. "Right now we can't even put a finite level of life on the pipe," Sukowatey says. "It's like putting a plastic jug in a landfill. It's probably going to be there 100 years from now."

The pipeline projects in development by Magellan and Buckeye, and by ALL Fuels & Energy are all designed to overcome logistical challenges faced by the industry. "If you look at the routing of the proposed pipeline system for Magellan and Buckeye, there are no pipes in place today that transport other products out of the upper Midwest to the Eastern Seaboard," Heine says. "The flow of gasoline and diesel fuel doesn't naturally go in that direction, but the flow of ethanol would."

Kinder Morgan will continue supplying ethanol service through existing pipelines, monitoring the Central Florida Pipeline and looking for opportunities to add ethanol service in other areas, Lelio says. He expects the company will begin to identify the next pipeline system toward the end of the first quarter of 2009.

Making the Dream Come True

Kinder Morgan's efforts to move ethanol via pipeline are the result of customer interest, Lelio says. "Every part of [the Central Florida Pipeline project] was driven by the needs of our customers," he says. "We're not just out there doing a science project. We're there because our customers want us to do this."

The first commercial batch of ethanol Kinder Morgan shipped through the Central Florida Pipeline sold out immediately, and Lelio expects this level of interest from customers will continue. Although he's not sure what exactly drove consumer interest, he says the project has received a "groundswell of support."

To continue their pipeline project Magellan and Buckeye are looking to the U.S. DOE's loan guarantee program, which was designed to encourage the commercial use of new or significantly improved technologies, Heine says. "We'll be looking to make some modifications to that existing program to recognize the differences associated with a large-scale renewable fuel pipeline project," he says. This would include extending some pre-existing timelines.

While the DOE loan guarantee program would improve the feasibility of ethanol pipeline projects, an important piece of legislation passed in 2008 made it possible for pipeline companies to continue ethanol projects. Language in the Emergency Economic Stabilization Act of 2008 revamps the tax code that had blocked publicly traded partnerships (PTPs), such as Kinder Morgan, Magellan and Buckeye, from claiming income generated from the storage and transportation of biofuels as qualifying income.

Under the old tax code, PTPs had to earn 90 percent of their income from the handling of depletable natural resources. If that condition was not met, the PTP would be treated as a corporation for tax purposes. The revised code allows PTPs to earn qualifying income from handling any liquid fuel approved by the U.S. EPA. "There is no way [our project] could move forward without that legislation," Gustafson says.

The U.S. DOT, which is in charge of safety regulations for hazardous liquid pipelines, is also getting involved with ethanol pipeline projects. In fact, Kinder Morgan worked closely with the DOT during the Central Florida Pipeline project, Lelio says. "[The DOT] was very interested in ensuring that the correct preliminary precautions were taken," he says. These precautions included the education and training of firefighters and other emergency response personnel so they would be prepared to deal with any ethanol-related emergency situations. "We were very thorough, and the DOT was very interested and involved in the entire process," Lelio says.

"Pipelines are the safest, most reliable and most cost-effective method to transport large volumes of liquid energy from where it's produced to where it's consumed," Heine says. Pipelines have fewer accidents than rail or truck transportation, the cost is lower and it's dependable. "Pipelines don't typically have problems with snow, ice or rain," Gustafson says. "They tend to be more predictable about getting products where they need to be on time, and in good shape."

Support from ethanol producers is also important to keep ethanol pipeline projects moving. "The people we have talked to are very enthusiastic," Gustafson says. "We just need to keep that enthusiasm growing."

"We think a project [like ours] would benefit the entire ethanol industry," Heine says. "We'll certainly be looking for trade association support as we move forward on legislative initiatives as well."

Erin Voegelé is an Ethanol Producer Magazine staff writer. Reach her at ervoegele@bbiinternational.com or (701) 373-8040.

© 2009 BBI International