

# Dedicated biofuel terminals

According to the UN<sup>1</sup>, global production of biofuels has doubled in the last five years and will probably double again in the next four. Distribution and storage is no longer a cottage industry

by **Phil Thane**

**B**iofuels have presented the oil industry with a whole host of challenges, not least the necessity of dealing with thousands of new suppliers – including farmers, oil presses and ethanol distilleries. Many of these are small, relative to the major oil companies and terminal owners, and most are located far from the established petroleum supply chain.

Five years ago a small quantity of biodiesel or ethanol added to regular fuel was an optional extra and trucking in a few thousand gallons from individual producers was viable. Now that substantial and ever-increasing amounts are required by governments almost everywhere the biofuels industry is establishing terminals which provide a single point of contact for major customers, consolidate loads for economical movement and provide access or deliveries all day every day.

Building a terminal is not cheap. Refurbishing a former petroleum terminal is sometimes a better option, especially as these are generally located close to customers, but getting biofuels to them from the agricultural regions can be a challenge. Because of this several companies are planning, or at least considering, building biofuels collection



terminals in regions such as the US Midwest linked by rail or possibly even pipeline to distribution terminals on the coasts or close to major population centres.

Even when refurbishment is the solution it is not a simple case of cleaning out the tanks and applying new logos to the outside. It can mean extensive work to meet the

demands of biofuel storage, and some cases little more than the site and perimeter fence remain once tanks and pipework have been rebuilt.

#### Ethanol terminals

Ethanol has become big business in the US, revealing bottlenecks in the supply chain. Most of the distilleries

are in the Midwest and most of the demand for blended fuels is on the coasts. The recently opened Manly Terminal<sup>2</sup> in North Central Iowa is designed to alleviate this problem.

Covering about 100 acres just north of the town of Manly and opened in December 2007, the terminal is owned by a consortium consisting of the Kiewit

Group Companies, the Kenan Advantage Group (KAG) and the Iowa Northern Railway. Kiewit's L.B. Transport and KAG Ethanol Logistics are trucking companies which handle the collection of ethanol from distilleries for delivery to the terminal.

Iowa Northern was formed in 1984 from the remains of the Chicago, Rock Island & Pacific Railroad Company. With a total length of just 163 miles the line runs diagonally through Iowa from northwest to southeast from Manly to Cedar Rapids, Iowa and a branch line from Waterloo to Oelwein, Iowa.

Crucially it has connections to the major US railways at Cedar Rapids, Cedar Falls, Nora Springs and Manly. Since a group led by Dan Sabin took over management of the line in 1994 traffic has quadrupled and average speeds trebled.

Manly is an excellent location for an ethanol terminal in the heart of the biofuels belt of North Central Iowa. It is located within 300 miles of over half of all ethanol production in the US (approximately 6 billion gallons by 2010).

One of the first customers for Manly Terminal is Hawkeye Renewables which has opened a plant at Fairbank on the Iowa Northern Oelwein branch line and is building another just north of Shell Rock on the main line.

The first phase included completion of a 3 million gallon ethanol holding tank and 2 million and 1 million denaturant tanks. Manly is already storing in excess of 1 million gallons and further ethanol tanks will be added over the next few years with the eventual capacity expected to reach 20 million gallons.

Tanks are of no use by themselves Manly has a four-bay truck off-load truck area and seven bays for loading rail cars. Two rail tracks run though the bays so 14 railcars can be loaded simultaneously. Underground piping from the holding tanks draws the ethanol to fill the cars. At the moment there are three rail tracks into the terminal site, the first of 12 that will eventually be built.

Manly's owners say their operation is unique. Lee Kiewit, Manly's president says the second phase,

consisting of laying additional track and constructing a 5-million gallon holding tank, should be complete by the middle of this year, with a third phase adding more storage by the end of the year.

Manly Terminal has the ability to deliver ethanol from producers to all possible competitive markets as efficiently and inexpensively as possible. The seamless nature of the operation and the ability to quote fees as a complete package from producer to final destination will give the industry a common delivery point for trading and exchange while retaining the flexibility to play the markets. The

Tanks at the facility are insulated and heated to 10°C, to prevent gelling of the product. Ethanol tanks are lined to prevent stress corrosion cracking (SCC). Some companies line all wetted surfaces, but Marathon just lines the bottom and lower few feet of shell with thin-film epoxy so the highly stressed areas where SCC is most common are protected.<sup>3</sup>

Marathon still uses carbon steel tanks for biodiesel, but Linda Casey, communications manager at Marathon, explains that tanks holding ethanol can be susceptible to stress corrosion cracking and should

with Wolf Lake Terminals to create a biodiesel facility on the existing Wolf Lake site at Hammond, Indiana.

The site was under-used with spare, heated oil tanks suitable for biodiesel, but no terminal facilities suitable for fuel trucks. Gulf Hydrocarbon has taken over a 126,000 gallon tank and added petroleum style load racks with automatic, card operated loading available to drivers 24 hours a day seven days a week. For a relatively small outlay, the companies now have a profitable biodiesel terminal.

UK-headquartered ESV group is another company branching out into biofuel storage. The company was established to build a substantial farming business to supply feedstock to the biofuels industry. The group has connections with farmers in the Ukraine which supply grain for ethanol production and has also recently acquired 11,000 hectares with the aim of developing a substantial *Jatropha* growing business in Mozambique.

ESV announced last year it plans to build a new biofuels tank terminal and dock at Terneuzen in the Netherlands to handle both biodiesel and ethanol for the European petroleum industry.

At the time the terminal was expected to have a capacity of 184,000 m<sup>3</sup> but even before plans were finalised spokesman Ronny Maas said the company is now seriously considering doubling the capacity.

## Rising prices and tax credits for biodiesel are causing rapid expansion, and putting strain on the supply infrastructure

problems of being tied to one carrier on one rail line are eliminated and at the same time the carriers get the benefit of large unit trains instead of managing a huge number of single car moves.

### Marathon branches out

The largest ethanol plant in Ohio began production in February this year at Greenville. The plant was constructed by The Andersons Marathon Ethanol, a 50/50 joint venture between The Andersons Ethanol Investment, a subsidiary of The Andersons, and Marathon Petroleum Company, a wholly owned subsidiary of Marathon Oil Corporation. It is expected to produce 110 million gallons annually.

The Andersons has been a grain shipper since 1947 and diversification into ethanol production was a natural step. The tie up with The Andersons makes Marathon one of the first petroleum companies to have its own ethanol production facilities. Marathon has long been one of the biggest biofuel blenders in the US, using automated loading rack equipment to blend conventional E10 since 1990, RFG since 1994, E85 since about 2000, and from B2 up to B20 biodiesel since 2005.

be stress relieved or coated.

It is well documented that terminals storing ethanol often need extra fire protection provisions. 'Most types of existing fire detection work well,' says Casey. 'Ethanol fires emit very little UV radiation, but even UV detectors work reasonably well because the ethanol is denatured with petroleum.'<sup>4</sup> Dry Chemical extinguishing systems are effective. Foam systems must use AFFF foam which is alcohol resistant. Normal protein foams are destroyed by alcohol.'

### Biodiesel terminals

Personal diesel vehicles are relatively rare in the US, but many fleets are truck firms use the fuel. Rising prices and tax credits for biodiesel are causing rapid expansion, and putting strain on the supply infrastructure. Jess Hewitt of Gulf Hydrocarbon estimates that there is a need for 150 biodiesel terminals in the US each handling around 8 million gallons/year. So far there is little sign of that number being built.

Converting closed or under-used terminals to accommodate biodiesel is something of a Gulf Hydrocarbon<sup>5</sup> speciality. Gulf Hydrocarbon has partnered

### Future outlook

Economic uncertainties and the debate about how much effect biofuels are having on global food prices are not helping development in this field. However, biofuels of some kind maybe cellulosic ethanol or algal diesel are going to play an increasing role as petroleum stocks dwindle. Distributing them efficiently will be vital and in doing this, terminals play an integral role. ●

### References

1. Sustainable Bioenergy: A framework for decision makers, UN Energy, 2007.
2. www.manlyterminal.com
3. Chemical grade rubber liners can also be used in steel ethanol tanks.
4. Where pure ethanol is stored, heat sensitive fire detection is required.
5. www.gulphydrocarbon.com