

WHITE PAPER / **FUTURE-FOCUSED SOLUTIONS**

CONVERTING TERMINAL ASSETS FOR RENEWABLE FUELS

BY John Scott, PE

The Renewable Fuel Standard (RFS) and state-level Low Carbon Fuel Standards (LCFS) are driving interest and growth of renewable fuel production in the U.S. These regulations open up the opportunity for terminal operators to consider converting existing assets to support renewable fuel production.



The renewable fuel industry is rapidly expanding, with many operators looking to convert existing tanks to accommodate production. Several considerations must be taken into account before modifications can be made. With careful evaluation of those assets, operators can identify if there's a benefit in converting — either entirely or partially — from traditional hydrocarbons to renewable fuel storage.

FUELING THE FUTURE

Interest in renewable diesel and sustainable aviation fuel is expected to grow, according to the U.S. Department of Energy, but each presents unique challenges for operators. When using biomass as feedstocks, the processing and storage of these feedstocks must factor in the handling of fats, oils, greases, and other raw material, waste and residue. To determine if converting existing infrastructure is the right path forward, there are several questions to explore upfront, such as:

- Do terminal operations only need modifications to store and move finished renewable fuel products?
- Is the facility to be adapted for complete renewable fuel production, requiring owners to bring in raw materials, undertake the refining process, and store and distribute the finished product?
- Can the facility handle collection and distribution of raw material and feedstock for renewable fuel production?

Determining overall process goals will provide a clearer view of whether tank storage conversion is both valuable and manageable for operations.

FACILITY CONVERSION CONSIDERATIONS

Although existing terminals are equipped with the necessary infrastructure to manage many different fuel types, modifications may be necessary to handle renewable fuel products and feedstocks.

FEED FOR FUEL

Infrastructure updates are often necessary to manage new types of raw materials and handle incoming feedstocks to make renewable fuels.

One source of renewable fuels can come in the form of renewable diesel, produced by hydroprocessing triglyceride feedstocks. Each plant or animal source produces triglycerides with their own unique blend of fatty acids as defined by the number of carbon atoms in each of the three chains, as well as the number and location of double bonds between carbons in the chains. These triglyceride sources also provide characteristic trace components, which are present in the fat or oil due to its growing conditions or any processing it has undergone between the farm and the renewable diesel processing unit.

Animal fats, including beef tallow and animal lard, present a unique complication for terminal conversions. These animal waste products, along with different blends of oils, will solidify at ambient temperatures and hamper the production process if not handled correctly. To eliminate the chance for solidification, this feedstock must remain heated to progress through the system. Tanks must be insulated, heated, or both and tank steel must be evaluated to see that the correct materials of construction are used. Piping, offload mechanisms and other distribution components are viable heating options to move product.

TANK DESIGN PARAMETERS

Unlike petroleum products, the specific gravity of renewable fuels varies — based on levels of fatty acid and glycerin composition. As a result, a storage tank designer should:

- Analyze tank shell thickness, lining and stiffening ring.
- Determine existing tank capacity.
- Tank roof and floating roof design.
- Test tank foundation loading based on fluctuating fluid levels.

Most storage tanks are designed and tested using water, which is heavier than renewable fuels, so older tanks especially should be carefully assessed for prior damage or to identify any modifications that need to be made.



INSTRUMENTATION

Accurate and dependable handling and control of liquid, steam and air flow for renewable fuels are essential. Depending on terminal asset conversion goals, instrumentation and controls must be carefully assessed to verify the effective handling of feedstock and end product.

To improve and update instrumentation and controls:

- Analyze and adjust ranges, flow conditions, valve closing times and operating limits.
- Determine which systems can be modified and any new instruments required.
- Evaluate existing instrumentation and control technology.
- Examine instrumentation material compatibility.

PROCESS SAFETY

Just as instrumentation must be assessed and modified to accommodate renewable fuels, process safety devices and detectors also must be inspected. As part of this crucial process:

- Evaluate and adjust the existing stormwater system as needed.
- Evaluate fire protection systems and procedures to make needed changes.
- Determine if standards will need to be met with the new renewable fuel process.

- Identify if any permit updates are required.
- Identify vapor control system suitability for new fluids.
- Plan to provide training on new procedures, hazard awareness and communication protocols.
- Review Material Safety Data Sheets, check that all safety documents and processes are updated and new ones created.
- Update any containment, spill measures and fugitive emissions safety protocols.

TERMINAL PROCESSES

There are many more considerations that should be addressed for a smooth and efficient conversion to renewable fuels operation. Evaluation of existing processes and assets can identify needed modifications early. For example:

- Assess current quality controls and determine how incoming product will be inspected.
- Identify what contaminants are present and how impurities will be removed.
- Consider and update surge procedures.
- Consider how products will be moved and evaluate requirements for pipelines, rail, truck racks and marine facilities.

Determine if existing custody transfer meters can be used, if they must be calibrated, and whether any additional certifications are required.

- Evaluate existing terminal pump and piping systems.
- Examine which adjustments would be needed to handle tallow feedstock heating and storage.
- Identify any heating requirements to address tallow feedstock flow issues.

CONCLUSION

Renewable fuels — powered by incentives, tax credits and market factors — present a great opportunity for terminal operators. By evaluating the potential for renewable fuel production and storage, operators can identify the right mix of asset conversion to engineer a strong future in renewable fuels.

BIOGRAPHY

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