There are about 500,000 irrigation engines in crop production nationwide, each running, on average, 1039 hours a year, according to propane industry estimates. For engines fueled by propane, that can translate into six to eight gallons of clean-burning propane per hour, or a load of 6234 to 8312 gallons a year for each irrigation pump. Hours of operation are even higher in California, a leading irrigation state.

Research pegs the number of propane engines in irrigation operations at just 18,000 of the 500,000 total. Diesel accounts for about 113,000, followed by gasoline at 6000. Electricity is the most prevalent power source. In light of fuel-price comparisons favorable to propane and stricter emissions rules governing stationary engines, efforts are under way to help marketers capture a bigger chunk of the irrigation fuel market. The potential for increasing propane’s market share is encouraging, and gains for marketers stand to be substantial.

In November, the Nebraska Propane Education & Research Council (NPERC) launched a $500 rebate program for purchases of new, efficient, 75-hp or greater propane irrigation engines. As part of the program, dealers who sell the engine also receive a $150 sales incentive. “It’s a win-win-win for the farmer, the dealer, and the propane marketer,” says Jamie Bevers of the Nebraska Propane Gas Association (NePGA). “We want both the dealer and the farmer to take a good hard look at propane before making a purchasing decision.”

The program will continue through December of this year, or until NPERC funds allocated for the project are spent. The rebate and sales incentive applies to the replacement of an existing diesel, gasoline, or propane engine, or for a new irrigation well.

Ms. Bevers notes that while rebates for appliances such as water heaters and furnaces can build loads of a few hundred gallons a year, an irrigation engine may use thousands of gallons. “There are 90,000 irrigation wells in Nebraska and this major area outreach is an effort to increase market share for Nebraska’s propane marketers.”

In pursuit of that goal, NePGA late last year asked its members to send in the names and contact information for irrigation engine dealers in their areas to create a comprehensive list. NePGA is mailing rebate program information packages to those on the list. In addition to the rebate program, the packages highlight the positive results of an ongoing two-year study at the University of Nebraska comparing a new propane engine against a diesel counterpart. The research, funded by Nebraska PERC and the Propane Education & Research Council (PERC), indicates that the first-year total operating cost for a propane engine is $18,000 versus $26,000 for a diesel power plant.

To ensure there are technicians to maintain and repair propane irrigation engines, PERC has approved funding for a half dozen field training classes around the country in the upcoming year. The approval follows a successful pilot class conducted last August in Kearney, Neb. titled “Maintaining and Repairing Propane Fuel Systems on Stationary Engines.” Ten technicians attended the class, which covered installation, maintenance, and repair, as well as the properties of propane. The pilot class served to field test new curriculum that was developed with funding from PERC.

The eight-hour class was taught by veteran instructor Franz Hoffman of the Railroad Commission of Texas’ Alternative Fuels Research & Education Division (AFRED). Students completed hands-on classroom instruction and viewed a Ford V-10 irrigation engine in operation in a corn field. Hoffman, an engine fuel professional for 39 years, notes the class delved into regulatory compliance, technology, safety, mechanical components, and the history and properties of propane. An emissions tester was also deployed in the field trip portion of the class.

Propane’s Advantage in Fueling Irrigation Engines

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“Technicians from four companies were in the class, and it served to train the trainers so they can teach others in their companies,” says Hoffman. The session was broken down into six hours of classroom work and two hours for the field trip. “I enjoyed the class and sharing knowledge because there are [skills] gaps in our industry. Few of the people who designed and worked on the equipment in the 1980s are still active,” he observes. Meanwhile, technology has advanced and improved.

A major factor prompting PERC to fund and develop the technical instruction was that many farmers might spurn purchasing a propane engine over concern of the difficulty to find someone to service the newer, more fuel-efficient engines. NePGA notes that when propane engines were all gasoline conversions, nearly any mechanic could work on them. As they became more propane-specific, they became more complicated. “Our goal was to develop a learning tool for propane engine maintenance technicians,” says Mark Leitman, PERC’s director of agricultural programs. “We want to make certain that propane engines are well supported in the market. That requires propane technicians. Although there are a lot of trained diesel mechanics, we’re finding there are fewer who are familiar with propane systems.”

He adds that the agricultural engine fuel curriculum builds on previous PERC efforts that funded development of farm (fuel) cart designs and materials to teach safe fueling practices to agricultural employees. “Every engine represents a significant propane load, and in many parts of the country it is a summer application, which is counter-seasonal and critical to marketers. The economics favored propane this summer, which we hope will translate into many more farmers moving to propane engines.”

The instructional materials were developed by the educational consulting, safety, and regulatory compliance services firm Frey Associates (Maryville, Tenn.) with assistance from AFRED and a PERC advisory task force. The “Maintaining and Repairing Propane Fuel Systems on Stationary Engines” manual is scheduled to be published and available for sale early this year. It is designed to assist experienced supervisors and managers in training personnel how to properly and safely maintain stationary agricultural engines, and provide technicians an introduction to propane engine fuel systems.

The manual covers the physical properties of propane, propane fuel systems for stationary engines, propane-fueled stationary engine emission control systems, and propane-fueled engine fuel system maintenance and repair. The materials provide skills review sections and knowledge testing. Completion of the class at this time, however, does not lead to a certification. Publication of the manual was necessary because propane offers a desirable energy alternative for agriculture professionals and others living and working in rural areas, but many do not use it because mechanics may not feel properly trained to adequately maintain the propane fuel systems.

Gordon Frey of Frey Associates observes that as soon as final reviews are completed and the manual is published, classes will be scheduled around the country. Plans call for Hoffman to serve as the instructor. “States known for irrigation are being targeted first,” Frey notes, including Nebraska, Colorado, California, and North and South Dakota. He adds that class size will be limited to 20 students, and that the instruction is intended for participants to share with colleagues at their companies.

Major sections of the class cover the properties of propane and propane safety; regulations, standards, and codes; large and small engine components; and maintenance and diagnostics. “Fuel cost and air quality standards are working to propane’s advantage,” Frey observes. “Engine technology is now available to greatly reduce NOx [nitrogen oxide] and other emissions, and electronic sensors are able to keep engines running at peak load efficiency, thereby optimizing fuel use and improving air quality.”

He adds that while stationary engines power irrigation pumps, they are also used to generate electricity on the farm in distributed generation (DG) installations. Both applications use propane for fuel. “The electrical grid in many areas is not up to the demand,” he observes. “DG is
To assist farmers in estimating their fuel costs, the Propane Education & Research Council (PERC) has developed an agriculture cost estimator tool that is available through the Propane Industry Resource Catalog or online at www.agpropane.com.

In addition, PERC’s Propane Marketing Resource Center (MaRC) offers advertising templates, graphics, photographs, and a video highlighting propane’s use in irrigation that marketers can use in presentations to farmers and ranchers.

Both the online and slide rule agriculture cost estimators compare pumping costs for electricity, diesel, gasoline, natural gas, and propane. The tools also feature the grain drying cost estimator. For irrigation pumping, the estimator calculates the cost per hour using propane, electricity, diesel, gasoline, and natural gas. For grain drying, the estimator calculates the drying costs per bushel using propane, electricity, and natural gas.

PERC notes that cleaner-burning, energy-efficient propane makes sense for irrigation power year-round, but when diesel prices rise in the summer, propane can save farmers even more money. And, for many years, propane has been the smart choice for grain drying.

Ninety percent of propane drawn from tanks is converted to usable energy, which reduces waste and costs. The fuel also offers environmental benefits. Using propane as an alternative fuel can reduce greenhouse gas emissions from automobiles and other farm equipment, according to PERC’s study “Propane Reduces Greenhouse Gas Emissions: A Comparative Analysis.”

Most farm operations already use propane, so the fuel is readily available and cost-competitive. Of special interest is that the U.S. Department of Agriculture’s Rural Energy for America Program (REAP), also known as the Section 9007 Program, makes grants and loan guarantees to help farmers and rural businesses make energy-efficiency improvements, among other things. For more information about REAP, visit USDA Rural Development at www.rurdev.usda.gov.

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Cost Estimator, MaRC Help Marketers Make Case for Propane to Farmers