

IDEA

PHASE 3 TECHNOLOGY DEMONSTRATION HIGHLIGHT



PRIMARY FUNCTION OF TECHNOLOGY

FUEL OIL INVENTORY & MAINTENANCE PLANNING



SYSTEM(S) INVOLVED

HEATING, DOMESTIC HOT WATER



COST OF BASIC OIL TANK MONITORING INSTALLATION

\$5,000-\$7,000/FACILITY

COMPANY

US Energy Group

TECHNOLOGY

Oil tank monitoring system including ultrasonic level sensors, data collection devices, and USE-Manager software and services

DEMONSTRATION SITE(S)

Four Department of Education facilities in Manhattan:
Luis Munoz Rivera School, Jacques Cartier School,
Tag Young Scholars and Esperanza Preparatory Academy,
and Jackie Robinson School

DEMONSTRATION PERIOD

Dec. 2018 – Dec. 2019

Technology Description

The core of US Energy Group's oil tank monitoring system is a suite of USE-Manager software and services which provide real time and historical data collected by ultrasonic level sensors and data collection devices installed in oil tanks. The system is designed to monitor oil inventory across a portfolio of buildings from a single dashboard, providing information that can streamline purchasing and maintenance and provide data to develop hourly, daily, weekly or monthly models for fuel usage.

Prior to installation, US Energy Group surveys the facility to collect detailed information about the tanks, which frequently are field built and can widely vary in dimension. The surveyor inputs this data into a proprietary calculation algorithm, used to calculate and translate the signal into a real tank inventory. Data collection devices and ultrasonic level sensors are then installed, powered, configured, and calibrated by comparing initial output data to a manual tank measurement. Once programming and commissioning are complete, US Energy Group trains key facility personnel in the USE-Manager dashboard and reporting system.

Optimal Facility Characteristics

- This system has been shown to be able to be deployed in virtually any facility which hosts an oil tank, but may be particularly useful where physical or personnel limitations make manual inventory monitoring difficult.
- The system's data collection devices require internet connectivity to transmit data. In cases where access to a facility's internet service is restricted, additional cellular modems may need to be installed, as was necessary in this demonstration.

Demonstration Results & Discussion

The Department of Education (DOE), the host agency for this project, reports that after more than a year of use the US Energy Group oil tank monitoring system is effective as a real time fuel inventory control tool. It issues alerts when fuel drops below a specific amount and registers accurate delivery volumes within the limits expected given the inherent inconsistencies of field-constructed tanks, which make obtaining precise measurements difficult.

Prior to the system going online, the installation team worked directly with the DOE IT department to resolve a delay due to agency-wide restrictions associated with internet access for outside vendors and devices. In order to facilitate future installations of networked equipment, DOE and other agencies are addressing security concerns with updated protocols that extract data without comprising the integrity of the network.

Looking forward, DOE facility staff plan to use the system to optimize fuel delivery times to a

fifteen-minute window. They also plan to use it as a data source for trend monitoring and heating degree day analysis of oil consumption, which will help them predict future oil needs.

Recommendations for Implementation

- Challenges associated with internet security and connectivity should be addressed with the host agency's IT department during implementation planning. One solution is to build "soft switches" which capture data from the equipment without sending it to the network's main switch. Another is to use the facility's building automation system to extract data from the collection devices without being connected to the internet, though with this approach, the system would lose some functionalities such as portfolio level viewing, oil level comparison to deliveries, and live alerts.
- For optimal performance, facility personnel should perform semi-annual device maintenance and calibration, as well as consistently enter oil delivery data into the dashboard to discover discrepancies between vendor and sensor records and indicate the need for calibration.
- In order to get the most out of the system, US Energy Group recommends that operators use it for both oil tank fuel measurement and boiler operation monitoring and control, though the cost benefit of such a setup must be assessed. Installation of a full suite of tools is estimated at \$15,000 to \$25,000 per building, while monitoring, software maintenance, and support is priced around \$900 per building per year.