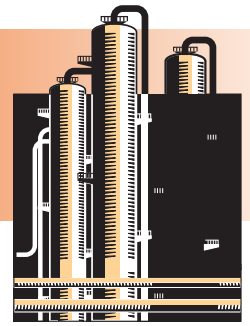


# PETROLEUM

## Project Fact Sheet



## DISTRIBUTED OPTICAL FIBER SENSORS FOR CONTINUOUS LIQUID LEVEL TANK GAUGING

### BENEFITS

- Offers potential to reduce the nearly 120 trillion Btu of energy lost annually from spillage of diesel fuel from railroad fuel tanks
- Saves energy through reduced power requirements
- Features high detection sensitivity, with accuracy to within 1 percent
- Does not require special signal conditioning to interface with host computers
- Lowers maintenance costs
- Offers low per-unit cost when manufactured in quantity

### APPLICATIONS

The Noverflo multipoint tank gauging device is expected to have immediate applications in the petroleum, chemical, and transportation industries. The railroad industry, in particular, has stated the need for improved fuel-management technologies capable of reducing fueling frequency, tracking fuel consumption, reducing train-idling time at fueling stations, identifying fuel guzzlers in high-cost areas, and reducing the number of times locomotives run out of fuel.

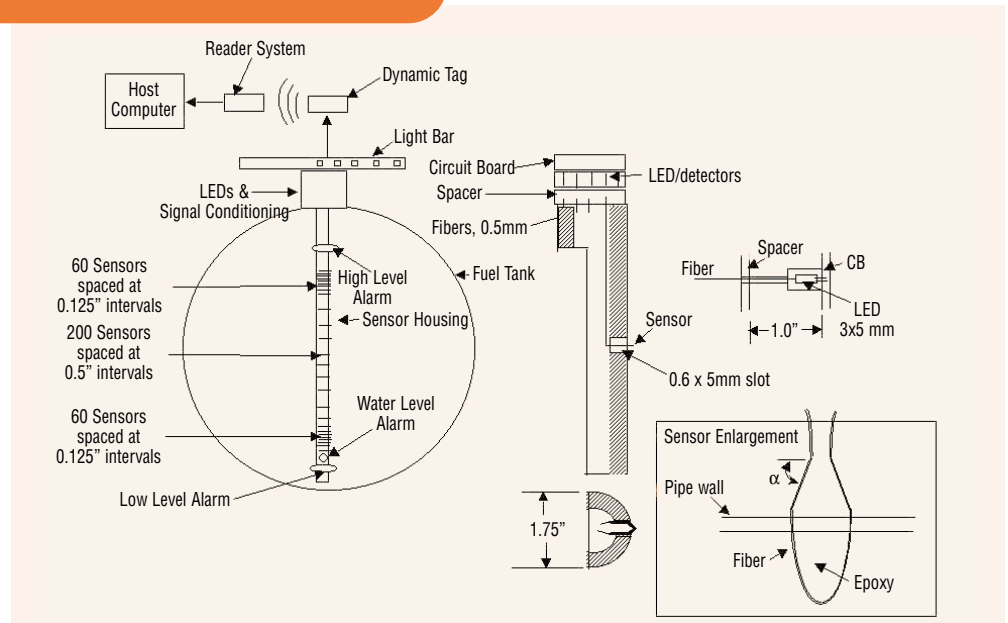
## INEXPENSIVE SENSOR SAVES ENERGY BY REDUCING POWER REQUIREMENTS, OPTIMIZING FUEL USE, AND REDUCING FUEL LEAKS

Accidental spillage of petroleum products from mobile and stationary storage tanks creates unnecessary cost from wasted material, as well as from environmental liabilities and fines. Currently, industries use several different types of sensors to detect and stop overflows. These sensors may work sufficiently in ideal situations; however, dense vapors, steam, and extreme temperatures can significantly affect their efficiency.

High-performance sensors, such as optical level switches and magnetostrictive tank-gauging switches, are extremely expensive. Only 10 percent of current above ground tanks are fitted with these sensors. Another sensor, called a bubbler, is less expensive, but not as sensitive as other sensors, while still incurring high installation and maintenance costs.

The Noverflo multipoint tank gauging device is an optical fiber-based, multipoint tank gauge sensor designed to function with high sensitivity at a cost much lower than current sensors in the industry. Early results reveal the optical fiber-based sensor will work efficiently in a non-ideal environment at a cost well below the current market standard.

### NOVERFLO MULTIPOINT TANK GAUGE



The Noverflo multipoint tank gauge offers an inexpensive means of detecting liquid levels in storage tanks with a high rate of accuracy.



## Project Description

**Goal:** Develop and field test four prototypes to demonstrate that the technology will perform as predicted and can be manufactured under \$500.

Numerous sensors on the market today are capable of detecting liquid levels in tanks used for above ground storage, railroad fuel, and other applications. These sensors, however, suffer from several major deficiencies, including high initial costs, high maintenance costs, and unreliability. Use of current sensor technologies in the railroad industry alone results in approximately \$62 million in wasted energy, with another \$100 million lost in fuel spillage.

Above ground storage tanks require sensors with greater accuracy to increase the efficiency of their automated fuel-management systems. A key problem area is the sensor's interface with the existing computer systems, where output signals from tanks often must travel hundreds of feet to a centralized location.

The Noverflo multipoint tank gauging device offers the level of sensitivity needed by industry and interfaces with most computer systems. Additionally, it is 2 to 5 times less expensive than existing technologies. This new technology reduces energy waste and lowers overall costs, key benefits to the petroleum, chemical, and transportation industries.

Noverflo, Inc., is developing this new technology with the help of a grant funded by the Inventions and Innovation Program in the Department of Energy's Office of Industrial Technologies.

## Progress and Milestones

- Develop prototype specifications and fabricate prototypes.
- Complete bench and field testing of prototypes.
- Design and fabricate special tools for mass production of sensors.
- Design and fabricate electronic circuitry of sensors.
- Develop housing for LEDs and photodetectors.
- Develop fuel-tank monitor capable of interfacing with each locomotive's dynamic tag and the host computer.

## Economics and Commercial Potential

Due to the amount of money lost each year in the railroad industry, at least \$100 million from spillage and \$62 million from inefficient fuel management, a need exists for new and improved automatic tank gauges. In addition, the petroleum and chemicals industries are susceptible to costly fines when their above ground storage tanks leak.

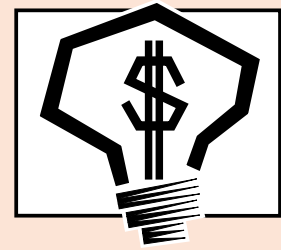
It is estimated that 22,000 locomotive tanks currently operating in the United States are prime candidates to be retrofit with new, higher-accuracy sensors. In addition, 40,000 above ground storage tanks are produced annually for the petroleum, chemical, and other industries. Overall, the liquid-level measurement market worldwide is estimated to be \$3.8 billion.

Industry representatives agree that Noverflo's multipoint tank gauging device is an option worth exploring. If thorough industry testing supports the projections for the technology regarding capital and energy savings and environmental benefits, the technology should be well received by the industry.

## INDUSTRY OF THE FUTURE—PETROLEUM

*Petroleum is one of nine energy- and waste intensive industries that is participating with the U.S. Department of Energy's (DOE) Office of Industrial Technologies' Industries of the Future initiative. Using an industry-defined vision of the petroleum industry in the year 2020, the industry and DOE are using this strategy to build collaborations to develop and deploy technologies crucial to the industry's future.*

**OIT Petroleum Industry Team Leader: Jim Quinn (202) 586-5725.**



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and conduct early development. Ideas that have significant energy savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

### PROJECT PARTNERS

Inventions and Innovation Program  
Washington, DC

Noverflo, Inc.  
Rockville, MD

### FOR PROJECT INFORMATION, CONTACT:

Dr. Joram Hopendorf, CEO  
Noverflo, Inc.  
1724 Yale Place  
Rockville, MD 20850  
Phone/Fax: (301) 762-3511  
Noverflo@aol.com

### FOR PROGRAM INFORMATION, CONTACT:

Lisa Barnett  
Program Manager  
Inventions & Innovation Program  
U.S. Department of Energy  
1000 Independence Ave., SW  
Washington, DC 20585-0121  
Phone: (202) 586-2212  
Fax: (202) 586-7114  
lisa.barnett@ee.doe.gov

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Office of Industrial Technologies  
Energy Efficiency  
and Renewable Energy  
U.S. Department of Energy  
Washington, DC 20585-0121



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