

The system uses passive low-frequency tags and readers to verify that a vehicle's fuel cylinders meet safety and inspection standards, thereby reducing the risk of explosion.

By Mary Catherine O'Connor

Apr. 1, 2009—Vehicles that run on compressed natural gas (CNG) carry steel cylinders to store the gaseous fuel. At filling stations, the fuel is dispensed at higher pressure than that in the tank, thereby enabling a speedy refueling process. If a vehicle carries a non-standard natural gas cylinder, however, or if it has not been inspected prior to refueling, this can cause an explosion during the refueling process. [Viridis](#), a Toronto-based provider of vehicle-fuel dispensing systems for CNG, as well as hydrogen, has developed an RFID-based system for ensuring safety and accurate billing when refueling CNG vehicles.

Viridis sells its CNG dispensers to companies or individuals that operate CNG fueling stations around the world (Viridis' CEO, Ian Patterson, estimates that the company is among the top five worldwide manufacturers of such dispensers). Once a dispenser is sold, Viridis has no means of ensuring that the fuel will be dispensed appropriately—that is, that employees will check that a vehicle's fuel cylinders meet safety and inspection standards—but Patterson says the RFID system his company has developed will change that.



Viridis' RFID-enabled CNG fuel dispenser includes a nozzle fitted with a reader antenna (the inner white ring).

Viridis' RFID-based system comprises [Texas Instruments](#) passive low-frequency (LF) ISO 11785-compliant tags and interrogators, a customized reader antenna designed into the fuel-dispensing nozzle assembly and specialized software to manage tag data. The RFID tag is to be attached, using a strong epoxy, near the vehicle's fueling valve, and within the tag's four-inch read range. Viridis software collects that tag data and controls the dispenser, so that it will only begin dispensing fuel when a valid RFID tag is read.

The exact data encoded to that tag will be determined by the regulatory body in each country. Typically, however, the tag data would include the vehicle's serial number (such as a VIN), the license plate number, the owner's name and the fuel cylinders' latest inspection date. In cases in which a vehicle has been converted to run on CNG (as opposed to being originally manufactured as a CNG vehicle), the date of conversion would be encoded to tag data, along with the party that converted the vehicle.

In order to improve air quality and deal with rising fuel costs, many nations—especially in Asia, and particularly in India, Bangladesh and Pakistan—have mandated that conventional gasoline-powered vehicles be replaced by (or converted to) CNG engines. In these countries, Patterson says, hundreds of thousands of CNG buses and other vehicles, such as three-wheeled auto-rickshaws, are currently in use.



Viridis sells its CNG dispensers to fueling station operators around the world.

And while these nations have set safety standards requiring that specific types of cylinders be used in vehicles, and that safe dispensing practices be followed, these standards and practices are often ignored. As a result, the number of deaths and injuries linked to the unsafe refueling of CNG vehicles has risen steadily, along with their popularity.

"In many countries, people are trying to save money, and they might get a cylinder that isn't up to spec," Patterson says. "And if the cylinder isn't designed for compressed natural gas, it'll fail. In Bangladesh alone, there have been 17 people killed in explosions" while fueling vehicles with CNG.

To ensure that only valid tags—and cylinders—are accepted during refilling, the Viridis software encrypts the data when it is encoded to the tag. The software controlling the fuel dispenser later decrypts this information upon reading the tag. Because the fueling stations are often located in rural areas where the dispensers lack a constant, reliable link to an Internet connection, Patterson says, the software that reads and verifies the tag ID number is designed to operate offline. In addition, the vehicle owner could choose to associate a credit card account with the tag ID, so that the fueling station could process a payment transaction at the same time that the vehicle is being fueled.

Patterson says he is presently in discussions with customers in Southeast Asia, and that he plans to soon begin a pilot project with one of them to test the patent-pending RFID system.

Radio frequency identification is also slated to play a role in powering up vehicles running on another type of alternative energy source: electricity. Last year, green energy startup company [Coulomb Technologies](#) revealed that RFID would be an important element in the operation of the electric-car charging stations it deploys around the San Francisco Bay area (see [RFID Is the Key to Electric Vehicle Recharging Stations](#)).