


# Home fuel advantage

How new technology promises to spark NGV ownership

BY THE GAS TECHNOLOGY INSTITUTE



**ACCORDING TO THE U.S. DEPARTMENT OF ENERGY (DOE), NATURAL GAS VEHICLES (NGVS) ARE** “a good option for high-mileage, centrally fueled fleets that operate within a limited area.”<sup>1</sup> It stands to reason, then, that NGVs would also be a smart option for consumers. After all, they can primarily run on compressed natural gas (CNG), which burns cleaner than gasoline and reduces tailpipe emissions by up to 95 percent. 





**The hope is to provide consumers with an easy-to-install wall unit that can plug into a standard electrical outlet and dispense natural gas from the same pipelines that deliver the natural gas used to heat our homes.**



**“Conventional approaches use four stages of compression, each with its own piston, crankshaft bearings and other moving parts that add to the complexity of the system. What we’re doing is stacking these compression stages so they are integrated into one key component—and drive them with a linear motor. We take the linear motion of the motor and apply it directly, so there is only one moving part and greater simplicity.” — Jason Stair**



Natural gas vehicles can also be significantly less expensive to fuel. According to a recent “Clean Cities Alternative Fuel Price Report” published by DOE, CNG costs, on average, about \$1.49 less than gasoline on a per gasoline gallon equivalent (GGE) basis.<sup>2</sup>

Yet, even with all the benefits that NGVs offer, consumer interest seems to be idling, in part because of the lack of natural gas fueling infrastructure. In the U.S. today, there are about 600 retail natural gas fueling stations available to the public,<sup>3</sup> most of which are located in Texas, California, Utah and New York.

It’s a classic chicken-and-egg scenario. Until there are more ways to fuel, consumer NGV ownership is not likely to rev up. On the other hand, more natural gas fueling stations are not likely to open until there are more NGVs on the road.

#### AT-HOME FUELING

One solution is to provide the 65 million U.S. households that have residential natural gas service with an affordable, efficient and convenient way to fuel their NGVs right at home. Current at-home “time-fill” systems can be plugged in at night to fuel a vehicle so that it is filled and ready to go in the morning.

BRC FuelMaker, a leading manufacturer, offers a product line that includes Phill and FMQ products for home and small fleet fueling. To date, the Phill home fueling product hasn’t quite taken off, due in part to the high costs involved in installing a home fueling system in this new market segment.

“There are lots of hurdles to installing home fueling units,” says Jason Stair, engineer at Gas Technology Institute (GTI), a leading research and development organization serving energy and environmental markets. One hurdle is that residential natural gas is delivered at about 0.25 psi pressure and NGVs need to store CNG at 3,600 psi. So, a compressor is needed for any system designed to fuel an NGV.

#### REVVING UP NGV ADOPTION

In an effort to shore up consumer interest in NGV ownership, DOE’s Advanced Research Projects Agency-Energy (ARPA-E) recently launched the Methane Opportunities for Vehicular Energy (MOVE) program and awarded funding for 13 research projects.

The objective of one of those projects—an award of more than \$4 million to GTI and research partners at the Center for Electromechanics at the University of Texas at Austin (UT-CEM), and Argonne National Lab (ANL)—will be to investigate the potential of a more efficient and affordable compressor technology for home fueling systems. As it turns out, ARPA-E has set some pretty aggressive cost targets such as developing a \$500 compressor that would result in a home fueling system that costs less than \$2,000, which is about half the cost of current systems.

In order to meet those targets, the GTI team is proposing the development of a compact system that can compress natural gas using a linear motor with a single moving piston. The hope is to provide consumers with an easy to install wall unit that

can plug into a standard electrical outlet and dispense natural gas from the same pipelines that deliver the natural gas used to heat our homes.

In the design stage now, the project team is working to develop a prototype in about six months and to begin testing in the field in about 18 months. “There’s a lot of interest from some major commercial manufacturers,” says Stair.

With the help of ARPA-E funding, as well as significant private sector funding, GTI and other U.S. research organizations are working to eliminate the technical barriers to the widespread adoption of NGVs by U.S. households. “At this point, the energy independence, environmental and consumer fuel saving benefits of NGV ownership are well understood,” says Tony Lindsay, the R&D director who is managing this and other ARPA-E research projects at GTI. “With this novel approach, we are striving to make home fueling a practical and affordable option for consumers.”

To learn more about GTI’s NGV and other technologies, please visit [www.gastechnology.org](http://www.gastechnology.org). ♦

1 U.S. DOE site: <http://energy.gov/articles/photo-week-driving-force-natural-gas>

2 “Clean Cities Alternative Fuel Price Report,” April 2013, U.S. DOE, page 5, [http://www.afdc.energy.gov/uploads/publication/alternative\\_fuel\\_price\\_report\\_april\\_2013.pdf](http://www.afdc.energy.gov/uploads/publication/alternative_fuel_price_report_april_2013.pdf)

3 DOE Alternative Fuels Data Center, Natural Gas Fueling Station Locator: [http://www.afdc.energy.gov/fuels/natural\\_gas\\_locations.html](http://www.afdc.energy.gov/fuels/natural_gas_locations.html)