



Final Report

Contract Number: MS11069

"Ryder L/CNG Infrastructure Project: Orange"

California

Ryder System, Inc.

January 27th, 2015

Prepared for the Mobile Source Air Pollution Review Committee (MSRC) under the AB 2766
Discretionary Fund Work Program

Acknowledgements:

Ryder extends its thanks and appreciation to the following organizations for their efforts and contributions to the success of the Ryder L/CNG fueling Infrastructure project completed in Orange, CA:

- Mobile Source Air Pollution Review Committee (MSRC) & representatives from the South Coast Air Quality Management District (SCAQMD)
- Gladstein, Neandross & Associates (GNA) - Special acknowledgements to GNA for designing each fueling station to meet Ryder standards and ensuring program requirements were met.
- GP Strategies Corporation technical expertise and construction management of each station.

This report is submitted in fulfillment of grant requirements MS 11069 and Ryder L/CNG Infrastructure Project: Orange by Ryder System, Inc. under the partial sponsorship of the Mobile Source Air Pollution Reduction Review Committee (MSRC). Work was completed as of August 2012 for the Orange, CA location

Disclaimer:

The statement and conclusions in this report are those of the contractor and not necessarily those of the Mobile Source Air Pollution Reduction Review Committee (MSRC) or the South Coast Air Quality Management District (SCAQMD). The mention of commercial products, their sources or their uses in connection with material reported is not to be construed as either an actual or implied endorsement of such products.

Project Description & Work Performed:

A leader in the world of natural gas vehicles and as an experienced candidate, Ryder has taken steps to revolutionize the commercial transportation and logistics industry. Ryder has worked with many government entities, trade and professional groups to successfully deploy natural gas transportation solutions. Ryder continues to evaluate potential natural gas markets across the country to extend the benefits of natural gas to even more customers and industries. In 2011, Ryder was awarded funds under the Alternative Fuel Infrastructure grant program from MSRC for the construction of two public access natural gas refueling stations in Southern California. This report will focus on the successful completion of the Ryder fueling station in Orange, CA.

Ryder's station at 1440 N. Main Street Orange, CA was completed in August 2012. The project planning and implementation phase focused on infrastructure drawings, permits and design prior to the construction start date of June 2011. The installation of the fueling equipment included storage vessels, system components to include CNG dispensers, fuels station controls, card reader, fuel management, and compressors. The Orange station also has three pumps - two are CNG and one LNG. Ryder proudly owns this fueling station which also has a vehicle maintenance facility on site upgraded to service natural gas vehicles. The facility is operational and accessible to the public and fleets 24 hours a day and LNG accessible to fleets during business hours and will be for the total grant term of at least 5 years. The availability of allowing

the station to be publicly accessible demonstrates Ryder's commitment to the community and clean air by providing the public with the ability to conveniently refuel natural gas vehicles.

Ryder policies, process and procedures are stringent in ensuring the natural gas facility will meet rigorous industry and government safety standards. With our vendor, GNA, these areas were reiterated and addressed in the planning and design phase. Moreover, the completion of this facility was also an occasion to celebrate; Ryder held a facility grand opening on July 10, 2013 where a ceremony was held to commemorate the opening of the natural gas fueling station in Orange. The Ryder marketing team prepared and launched internal/external communications, awareness and outreach campaigns to publicize the availability of natural gas fueling in the area. Lastly, the completion of the facility in Orange is a huge contribution to the air quality improvement in San Bernardino County. The county is also classified as an ozone non-attainment area; the completion of this station will encourage the community and local businesses to invest in natural gas vehicles.

As a result of the project and introduction of new technology to our business, Ryder's technicians are continually receiving extensive, specialized training on the fueling station service and maintenance. On a daily basis Ryder's experienced employees inspect the equipment to ensure there are no leaks or issues with the equipment. Ryder's construction vendor GP Strategies Corporation has created a monthly maintenance program in which the fueling stations are inspected based on multiple service criteria. The monthly inspection includes, but not limited to, checking the fuel dispensers, pumps, valves, pipes, air system, flame detectors, methane sensors and ESD system. The safety of our employees and customers is priority and these inspections help ensure the equipment is functioning according to regulatory standards.

Problems Encountered:

The planning, design, construction, operation and marketing of each facility has proven to be successful but as with any new technology integrated into the Ryder business model it is a learning experience. There have been a few problems encountered at each station and the Ryder team has been able to identify and correct issues effectively. For example, there have been compressor failure, sensors failures and minor fuel leaks identified in the compressed gas piping section of the LNG area. The Ryder team and qualified contractors (GP) have addressed this issue. On rare occasion, minor yet critical components of the system has failed, such as pumps and valves, which has brought the station down for sometimes several days and has disrupted our customers' ability to operate effectively. Each time something like this has taken place, a root cause analysis has been performed by GP in order to effectively manage such items going forward. These improvements have led to an improved uptime of the station, which is now operating very effectively.

The operation and maintenance of the fueling station continues to be a learning curve and as new concerns are presented, we are confident that the Ryder team and our vendors are capable of managing through them effectively.

Emissions Benefits:

At full implementation this project continues to reduce emissions and enhance air quality in the Southern California area. In 2013 and 2014 the Orange location contributed with 320 Metric Tons of CO₂e reduction, by displacing diesel gallons with domestically produced low carbon natural gas. There has been 89,147 DGEs of CNG pumped at Orange in 2014 alone which is an increase of 76% over 2013. The results of this ground-breaking project are leading the way to a cleaner energy future. Ryder is an advocate and supporter of using natural gas in heavy duty equipment. Not only is Ryder promoting the use of domestic fuel sources, educating users on the benefits and supplying the technology, but Ryder is also supporting improvements in air quality throughout the nation. Ryder recognizes that clean air is essential to the preservation of our communities, environment and future generations. Ryder's efforts are committed to supporting the goals of sustainable development, environmental protection and pollution prevention.

Photographs & Outreach

1440 N. Main Street Orange, CA L/CNG Fueling Station:







Ryder's longstanding commitment to promoting transportation efficiency includes raising awareness and educating customers on the benefits of natural gas technologies. Our commitment includes hosting informative consumer websites, publishing educational

information in social media, providing press releases, fact sheets and advertisements about natural gas solutions. A few examples of these efforts are provided below.

Press Releases and Supporting Docs:

<http://investors.ryder.com/newsroom/News-Release-Details/2013/Ryder-Opens-Two-Natural-Gas-Fueling-Stations-in-California/default.aspx> –

http://www.fontanaheraldnews.com/business/article_bc572daf-eb23-514d-9e73-811a74d5b51c.html

<http://newsroom.ryder.com/event/fleet-management-solutions-fms/orange-ca-natural-gas-fueling-station-open-house>

Ryder NG Brochure



Ryder Natural Gas Solutions

Sustainable Efficiencies Made Simple



- Low emissions
- Low cost
- Domestic fuel source

Why use natural gas for commercial vehicles?

How green is your fleet? Could it be greener? As a fleet professional, you're concerned about energy security, emissions and fuel costs. Natural gas emits fewer greenhouse gases, costs less and is domestically sourced. If you're ready to make natural gas a part of your fleet strategy, Ryder can help.

Serious about sustainability

Working with the Department of Energy and Clean Cities Coalitions nationwide, we've already rolled out natural gas transportation solutions in Arizona, Texas, California and Michigan. And we're not stopping there. Today, Ryder is evaluating markets across the country and looking to extend the benefits of natural gas to more customers nationwide.

Natural gas: fueling benefits for your heavy-duty fleet

Whether you're a commercial rental, full service lease or dedicated contract carriage customer, if you have routes in high-density regions, you can benefit from the cost efficiencies and environmental benefits of natural gas. See how natural gas can help you:

- Cut your fuel costs dramatically
- Reduce well-to-wheel CO₂ emissions by up to 25%¹
- Tap Ryder's investment in people, safety, fueling, maintenance & service infrastructure
- Use a domestic energy source that reduces dependence on petroleum imports
- Fuel your fleet with one of the cleanest and quietest fuels on the market

Compressed and liquefied natural gas vehicles

With Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) vehicles from Ryder, you can choose an eco-friendly transportation solution that lowers transportation costs while reducing your carbon footprint.

Whether you're making local deliveries or need a high-mileage solution for longer distances, we can help you find the natural gas vehicle that's right for you. Choose from dedicated (100% natural gas) or dual-fuel (mix of diesel and natural gas) vehicles that have been tested for a variety of commercial applications. As the natural gas market evolves, Ryder is working closely with truck manufacturers to develop available engine technologies to meet growing demand.



¹ U.S. Environmental Protection Agency fact sheet: "Clean Alternative Fuels: Compressed Natural Gas", http://www.epa.gov/energy/alternative-fuels/epa_cng.pdf



Frequently asked questions Ryder Natural Gas Vehicles



What is natural gas as a vehicle fuel?

Natural gas as a vehicle fuel is provided in two forms: Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG).

Why natural gas versus diesel fuel?

Natural gas is produced domestically, and is abundantly available in North America. As a domestic fuel, users minimize the uncertainty of imported fuels.

What are the environmental benefits of switching to natural gas?

- Carbon monoxide emissions are reduced 90-97%.¹
- Carbon dioxide is reduced 25%.
- Nitrogen oxide emissions are reduced by 35-60%.
- Fewer toxic and carcinogenic pollutants and little to no particulate matter.

What is the availability of natural gas?

- CNG is more readily available in most major markets.
- LNG is not yet as prevalent for commercial transport support.

Are there additional costs associated with leasing a natural gas vehicle?

As with any new technology, there is a meaningful increase in the vehicle investment, where available. Ryder is currently taking advantage of every grant and incentive opportunity to help keep the costs to a minimum. The lower CNG and LNG fuel pricing should offset much of the increase in vehicle investment over its life.

Does Ryder lease natural gas vehicles today?

Ryder currently leases natural gas vehicles in the following locations:

California

- Orange
- Rancho Dominguez
- Fontana

Michigan

- Livonia
- Grand Rapids

Arizona

- Tucson

Why can't natural gas vehicles be leased from any Ryder facility?

Natural gas vehicles require special fire prevention measures in order to meet NFPA regulations. Ryder has completed upgrades to several facilities and will continue to expand its maintenance infrastructure to meet the growing demand.

What vehicle models are now available?

Manufacturers including Freightliner, Peterbilt, Navistar, Volvo / Mack and Isuzu provide natural gas options for most straight trucks and daycabs.

What size engines are available today?

Today OEMs are providing natural gas vehicles with 7.6L, 8.9L and 15L engines. In the latter part of 2012, an 11.9L engine will also be available.

Are there differences in engine types?

There are two types of engine technology. The first type is "Dedicated Fuel" which uses 100% natural gas with "spark" ignition. The second type is a "Dual Fuel" engine which uses a mix of diesel and natural gas. Diesel fuel usage comprises less than 15% of the fuel consumed, but ratios of natural gas to diesel fuel can vary by application.

What is the fuel economy of natural gas as opposed to diesel fuel?

Fuel economy is similar to diesel fuel economy and depends greatly on the application. The use of natural gas as a vehicle fuel in spark ignited engines tends to show a ten percent degradation in overall fuel economy from the similar diesel application. Keep in mind that on average the gallon equivalent of CNG or LNG tends to cost 30% to 50% less than diesel fuel.

[1] Department of Energy, Alternative Fuels and Advanced Vehicle Data Center, 12/8/2011.
http://www.afdc.energy.gov/afdc/vehicles/natural_gas_emissions.html

1-800-RYDER-OK (1-800-793-3765)

www.ryder.com/alternativefuels

© Copyright 2013, Ryder System, Inc. - ML0121_02/2013

DRIVE
WHAT
MATTERS™

Summary and Conclusions

Ryder is committed to advancing cleaner transportation solutions and funding opportunities such as the Alternative Fuel Infrastructure Program in order to help provide the foundation for public and private partnerships, to develop and promote natural gas energy solutions.

The Ryder project scope included the successful construction of an L/CNG fueling stations in Orange, CA. The publicly accessed station has three pumps: two CNG and one LNG. The project has had an overall positive impact on the natural gas fuel market has also encouraged businesses to consider natural gas as an alternative fuel, educate fleet organizations on the benefits and support fueling companies to actively expand the necessary infrastructure for these evolving markets. It also provides valuable analysis and reporting on customer experiences that will help encourage the growth of the technology in the Southern California market.

Ryder has the resources, experienced management and operations teams to ensure the success of this project. Facilitating the procurement and availability of natural gas solutions under this project continues to support the goals of the MSRC to reduce vehicle emissions and improve air quality. This investment supported not only the deployment of natural gas equipment, but equally if not more importantly, the research, education and training necessary to improve vehicle performance and reduce costs associated with this newer technology.

The Ryder L/CNG station project proposed for this solicitation has been successfully completed, proving to be an asset to the Southern California community and natural gas initiative. The completion of this L/CNG fueling station is a critical milestone demonstrating Ryder's commitment to expanding alternative fuel solutions. These state-of-the-art facilities play a key role in the ongoing expansion of natural gas infrastructure in Southern California and Ryder is proud to have been part of that effort.