

# CNG and Fleets: Building Your Business Case

Two online resources help fleets evaluate the economic soundness of a compressed natural gas program.

Natural gas is a clean-burning, abundant, and domestically produced energy source.

In the fleet world, these attributes have garnered growing interest in compressed natural gas (CNG) for medium- and heavy-duty vehicles<sup>1</sup>. CNG can also reduce operating costs and offer relative price stability compared to conventional petroleum fuels.

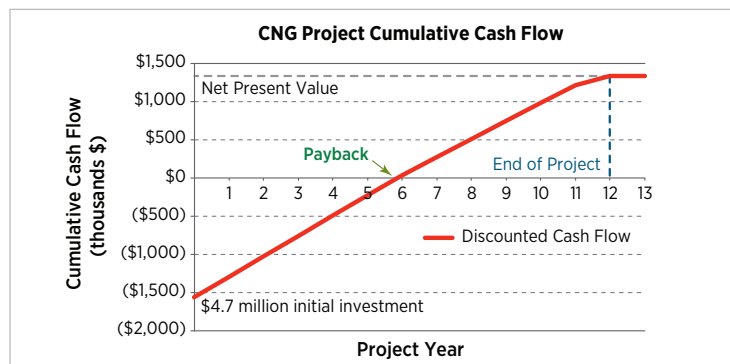
For fleets considering a transition to CNG, there are many aspects of CNG vehicles and fueling infrastructure that impact the viability and financial soundness of such a move. Analyzing these aspects to assess the economic feasibility of a CNG conversion can be a complex process, but there are tools to make it easier.

## Tools to Help

Determining the financial soundness of any investment is an important first step for any decision maker. The National Renewable Energy Laboratory's (NREL's) Vehicle Infrastructure and Cash-Flow Evaluation (VICE 2.0) model and the accompanying report, *Building a Business Case for Compressed Natural Gas in Fleet Applications*, are uniquely designed for fleet managers considering an investment in CNG and can help ensure wise investment decisions about CNG vehicles and infrastructure.

### VICE 2.0

The VICE 2.0 model helps fleets evaluate the soundness of CNG vehicle and fueling infrastructure projects. The model demonstrates the relationship between the operational parameters of the vehicle fleet and the financial viability of a CNG project. It supports several common



VICE 2.0 allows you to chart key investment indicators, such as payback period, discounted cash flow, and net present value.

<sup>1</sup>VICE 2.0 focuses on CNG because it is the best suited for “yo-yo fleets,” or fleets that start and end their day in the same location. Liquefied natural gas (LNG) is considered a better fit for applications that require a more dense concentration of fuel, such as over-the-road trucks or service vehicles that have longer routes.



Truck fleet managers should assess various factors to determine the financial viability of converting to or adding compressed natural gas.  
Photo by DeKalb County Sanitation Department, NREL 26760

categories of conventionally fueled (gasoline and diesel) heavy- and light-duty vehicles, such as transit buses, school buses, trash trucks, delivery trucks, paratransit shuttles or “para shuttles,” and taxis. VICE 2.0 is especially beneficial to fleets with routes that start and end in the same place and are therefore able to refuel at a central location.

VICE 2.0 also incorporates significant visual and reporting features, including a graphical presentation of return on investment, cumulative cash flow, and payback period (simple and discounted). The model calculates petroleum displacement (annual and cumulative) and annual greenhouse gas reductions, and displays them based on the input provided.

VICE 2.0 is user friendly and publically available on the Alternative Fuels Data Center website at [afdc.energy.gov/vice\\_model](http://afdc.energy.gov/vice_model).

### Vehicle Infrastructure and Cash-Flow Evaluation (VICE 2.0)

Helps Fleets Evaluate CNG Investments

#### Using your fleet-specific data on:

- Number of vehicles
- Vehicle types
- Fuel use
- Vehicle incremental cost
- Annual vehicle miles traveled
- Planned vehicle-acquisition schedules.

#### VICE 2.0 calculates and displays:

- Return on investment
- Payback period (discounted and simple)
- Annual greenhouse gas savings
- Fuel capacity and usage.

#### VICE 2.0 covers the following vehicle types:

- Transit Bus
- Taxi
- Pickup Truck
- Delivery Truck
- Trash Truck
- School Bus
- Paratransit Shuttle

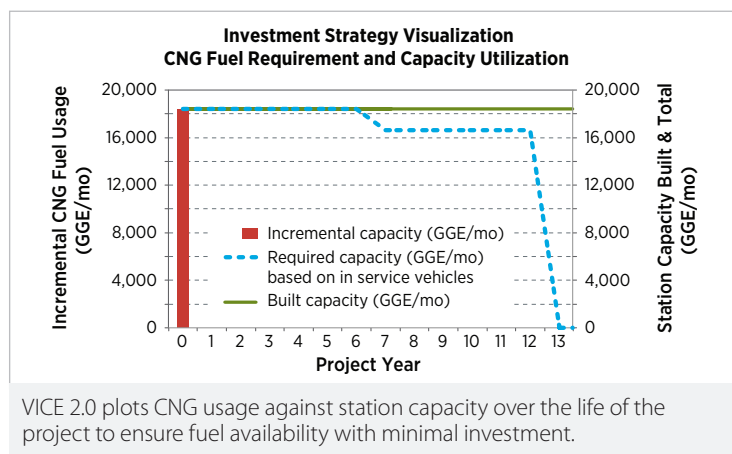
## Building a Business Case for CNG

The NREL report, *Building a Business Case for Compressed Natural Gas in Fleet Applications*, describes the capability of VICE 2.0 and explains how the model estimates the business case for decision makers considering a switch to CNG. The report is available at ([afdc.energy.gov/publications](http://afdc.energy.gov/publications)).

The report features an overview of VICE 2.0 and establishes the default values used by the model in a “base case” assessment. These values attempt to represent the most typical parameters affecting the financial performance of CNG projects, including investment type, tax exemption status for the fuel, and operations and incentives for hypothetical, base-case vehicles.

The report also explains how fleet operators should examine the specific operating parameters of their fleets, which may be significantly different from the generalized base case. This gives fleet operators a starting point, demonstrating how changes to the operational parameters of the model’s base case, like fuel cost and vehicle miles traveled, affect the profitability of the project.

The report advises caution when making independent vehicle and infrastructure investments. Even if a project shows potential with respect to the investment metrics, it is important to ensure that the infrastructure capacity will meet the fueling demands of the fleet. VICE 2.0 provides a quick graphic check for this situation.



In terms of economic soundness, most projects of this type are judged on the basis of net present value (NPV), return on revenue (ROR), and payback period. The report provides a short tutorial of each of the indicators, and VICE 2.0 can help evaluate financial viability based on various factors, such as fleet size, fuel consumption, and station and vehicle costs.

As illustrated throughout the report, subsidies and tax credits can have a tremendous positive impact on project profitability, especially for projects that involve vehicle and fuel purchasing. Fleet managers can track the availability of CNG incentives through their local Clean Cities coordinator ([afdc.energy.gov/cleancities/coalitions/coalition\\_contacts.php](http://afdc.energy.gov/cleancities/coalitions/coalition_contacts.php)) or the Alternative Fuels Data Center website ([afdc.energy.gov/laws](http://afdc.energy.gov/laws)).

## Find VICE 2.0 and Building a Business Case for Compressed Natural Gas in Fleet Applications at [afdc.energy.gov](http://afdc.energy.gov)

Other online resources for fleets considering CNG, including case studies (<http://www.afdc.energy.gov/case>), are available on the Alternative Fuels Data Center ([afdc.energy.gov](http://afdc.energy.gov)), EERE Clean Cities ([www1.eere.energy.gov/cleancities](http://www1.eere.energy.gov/cleancities)), and Energy.Gov ([www.energy.gov](http://www.energy.gov)) websites.

## Case Studies

Ohio-based Smith Dairy Trucking has a long history of being thoughtful about fuel use and identifying opportunities for improvement. When the company decided to look at alternative fuels, they first calculated their overall carbon footprint, and saw that switching just a small portion of the fleet to CNG could result in significant emissions reductions. Smith Dairy determined that by replacing six diesel trucks with CNG trucks, it could reduce its greenhouse gas (GHG) emissions by 64 short tons and save nearly 600 barrels of petroleum annually. After a year, Smith Dairy Trucking exceeded its original estimates for emissions reductions and petroleum savings. Source: [afdc.energy.gov](http://afdc.energy.gov), accessed May 1, 2015.

Waste Management, Inc., a leading provider of comprehensive waste and environmental services, has more than 3,000 natural gas collection trucks on the roads in North America. More than 90 percent of the trucks purchased by Waste Management in 2013 had natural gas engines. Waste Management is a National Clean Fleets Partner and operates one of the nation’s largest fleets of heavy-duty trucks powered exclusively by CNG (learn more at [www1.eere.energy.gov/cleancities/waste\\_management.html](http://www1.eere.energy.gov/cleancities/waste_management.html)). When Waste Management replaces an old diesel truck (2006 or older) with a new natural gas vehicle, it reduces diesel fuel use by an average of 8,000 gallons per year and greenhouse gas emissions by about 22 metric tons per year (the equivalent of a 21 percent emissions reduction per truck). Source: [http://www.wm.com/sustainability/pdfs/2014\\_Sustainability\\_Report.pdf](http://www.wm.com/sustainability/pdfs/2014_Sustainability_Report.pdf), accessed September 21, 2015.



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