

# Case Studies: Alternative Fuels



## Overview

Alternative fuels, such as biodiesel, ethanol derivatives (E10, E85) and natural gas (CNG, LNG), are relatively young transport fuels compared to the conventional fuels petrol, diesel and LPG.

The value of biodiesel and ethanol fuels lies in their renewable content which can be derived locally and produce less greenhouse gas and particulate emissions upon combustion. These are important for reducing conventional fuel imports and emissions from road based transport (82.7% of domestic transport CO<sub>2</sub>-e emissions – *Australian Transport Facts 2012*).

The following case studies from around the world demonstrate the benefits of using these fuels in everyday applications.

### Biodiesel

In Australia, biodiesel is available as B5 or B20 (5% or 20% renewable content); the bio content can be derived from tallow (fats), recycled cooking oils or plant seeds.

[The NSW Green Truck Partnership](#) demonstrated that B20 can reduce greenhouse gas emissions by around 20%, with potentially no impact on fuel efficiency.

Similarly, a [study](#) by Transport Canada found that B20 has reduced both tail pipe CO<sub>2</sub> and air toxic emissions, with minimal impacts on efficiency and maintenance.

The [Freight Best Practice Program](#) in the United Kingdom has also experienced neutral to positive

fuel efficiency and issue-free maintenance from the use of B20 in their vehicles.

[B20 trials](#) in underground mines in the United States found a significant reduction in emissions of particulate matter; this is especially pertinent to engines operating near people.

### Ethanol

In the US the Minnesota Department of Agriculture has been shown through a [feasibility study](#) that increasing ethanol blends from E10 to E20 can provide similar engine power and performance, with no evidence of mechanical issues.

Another [fuel economy study](#) by the American Coalition for Ethanol supports ethanol blends being relatively fuel efficient and non-harming.

As ethanol is a 'drop-in' fuel, its qualities will differ from vehicle to vehicle. This [study](#) on vehicle energy from Environmental Science and Technology reveals some very positive results for ethanol efficiency under the right circumstances.

There is also a [UK example](#) of the green house savings of E85 and its safe use, from the ELTIS Urban Mobility Portal.

### Natural Gas

Natural gas can have emissions benefits over liquid fossil fuels; however it is important to assess like for like engine technologies.

An [example](#) from the Green Truck Partnership shows that even when comparing the less efficient spark-ignition engine, running on Compressed

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Natural Gas (CNG), there are economic benefits against the use of compression-ignition diesel.

Further evidence of substantial economic benefits from substituting diesel with Liquid Natural Gas can be found in this Green Truck [study](#), which also highlights the emissions benefits of high pressure direct injection technology.

A US Department of Energy (DOE) – Alternative Fuels Data Centre [study](#) has assessed the relative benefits of running diesel hybrid-electric propulsion systems against CNG systems, with results favouring the electrified drive-train in this instance.

US DOE [experience](#) has also shown that CNG can make economic sense for freight haulage, albeit with some initial challenges around fuel tank vehicle range and refuelling.

In the household waste collection industry fuel use is a major operating cost. Looking ahead to the future, one [US company](#) is switching to CNG in order to ward off future diesel price impacts and enhance business reputation in the urban environment.

A promising area in the development of natural gas powered vehicles is their ability to operate with diesel as a 'dual-fuel' system. Recent [heavy-duty truck trials](#) in Australia have shown diesel fuel consumption can be reduced by 40 to 60 percent whilst maintaining reliable performance.

From the ELTIS Urban Mobility Portal come more low emission examples. In this case a light vehicle fleet in the UK has [demonstrated](#) positively the benefits of running on natural gas compared to their standard diesel vehicles.

Elsewhere in France, despite higher capital costs, [CNG vehicles](#) have been shown to increase business profitability over time scales comparable to normal fleet vehicle turnover.

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#### See Also:

- [Case Study: Ecodriving](#)
- [Case Study: Fleet Efficiency](#)
- [Case Study: Electric and Hybrid Vehicles](#)
- [Case Study: Biodiesel – Adelaide Metro bus fleet](#)

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