



IT'S NEVER TOO EARLY TO START PLANNING FOR YOUR FLEET'S SUSTAINABILITY FUTURE.

As a member of the Shell Group, Multi Service Fuel Card is working to help spread awareness and solutions aligned with Shell's commitment to provide the world with lower-carbon and sustainable forms of energy. One key element of this effort is to highlight these options and new fuel sources for Class 7 and 8 vehicles. On the following chart you'll see a variety of available, lower-carbon fuel options that will be instrumental in fueling the trucking industry while lowering harmful emissions.

As one of the leaders in the industry, we are committed to having our finger on the pulse of what's next so that we can help evolve your business. Thanks to Shell's global innovation with alternative fuel sources, we are able to provide you with the necessary information to start preparing for what is to come.

With these changes and shifts towards lower-carbon fuel options approaching, you will be posed with a question: How will you fuel your business? As your partner, we want to provide you with data on lower-carbon fuel sources so you can make an informed decision when the time comes to choose your next vehicle or new fuel source.

To prepare for this progression in fuel types, please take some time with the chart to learn about the different lower-carbon fuels and how they might potentially fit your needs. By diving into this chart, you'll be able to clearly see at a glance what each option has to offer and what each could mean for your particular business and situation. Having a good understanding of these fuel options will begin to prepare you for the future and allow you to start thinking about potential questions you might ask about what it means to you.

For more resources on alternative fuel and sustainability, visit us [here](#).

7% 
of US CO₂ emissions are from Commercial Road Transport¹

70% 
of Road Freight Leaders say decarbonization is a priority²

\$20 bn 
of Public Funding will be provided for clean fuel and vehicles³

¹ US EPA 2020 U.S. GHG Emissions by Sector & 2020 U.S. Transportation Sector GHG Emissions by Source

² Decarbonising Road Freight: Getting into Gear. Shell.com. 2021 Shell International B.V. <https://www.shell.com/energy-and-innovation/the-energy-future/decarbonising-road-freight>

³ GNA analysis of federal, state, local, and utility programs for on- and off-road R&D, demonstration, and in-use deployment of infrastructure and vehicles. Excludes loan programs. Multi-year programs were annualized.

	DESCRIPTION	PROS	CONS	COSTS	AVAILABILITY	CO ₂ FOOTPRINT TtW (lbs CO ₂)	CO ₂ FOOTPRINT WtW (lbs CO ₂)
						TtW (Tank to Wheel) = Product Use Phase	WtW (Well to Wheel) = Full Lifecycle
ULTRA LOW SULPHUR DIESEL (ULSD)	The current petroleum-based diesel fuel formulation since 2006.	<ul style="list-style-type: none"> Widely available Generally cost effective Large quantity of ULSD powered trucks 	<ul style="list-style-type: none"> Higher carbon footprint emitting fuel 	Truck Cost \$ Fuel Cost \$\$ Total Cost of Ownership \$		22.4 ¹	27.1 ¹
BIODIESEL (i.e. B20)	A renewable fuel made from biological sources, such as vegetable oils or animal fats, that is blended with ULSD fuel.	<ul style="list-style-type: none"> Works in standard Class 8 power unit engines Lower carbon footprint than ULSD 	<ul style="list-style-type: none"> Limited availability Must be mixed with at least 80% ULSD 	Truck Cost \$ Fuel Cost \$\$ Total Cost of Ownership \$		B20 = 18.3 ¹	B20 = 24.5 ¹
RENEWABLE DIESEL (HVO)	A renewable fuel produced through a hydrogenation process from sources like vegetable oils or animal fats, which can be used as a drop-in replacement for petroleum diesel in diesel engines.	<ul style="list-style-type: none"> Low cloud point (better cold-weather handling properties than biodiesel) Is a drop-in fuel and does not need to be mixed with ULSD 	<ul style="list-style-type: none"> Limited availability 	Truck Cost \$ Fuel Cost \$\$\$ Total Cost of Ownership \$\$		R99 Crop = 1 ¹ R99 Waste = 1 ¹	R99 Crop = 9.3 ¹ R99 Waste = 4 ¹
LIQUIFIED NATURAL GAS (LNG)	Natural gas that is cooled and converted into a liquid state for easier storage and transportation.	<ul style="list-style-type: none"> Better range than CNG Lower emissions Lower fuel costs 	<ul style="list-style-type: none"> Limited network Higher vehicle costs Additional safety considerations 	Truck Cost \$\$ Fuel Cost \$\$ Total Cost of Ownership \$\$		22.9 ² per DGE	22.9 ² per DGE
COMPRESSED NATURAL GAS (CNG)	Natural gas that is compressed to high pressures, used as a cleaner-burning alternative fuel for vehicles, producing lower emissions compared to gasoline or diesel.	<ul style="list-style-type: none"> Lower emissions Lower fuel costs Quieter operation Produced domestically 	<ul style="list-style-type: none"> Limited network (compared to diesel) Limited range Higher vehicle cost Only slightly lower emissions than traditional diesel fuel 	Truck Cost \$\$ Fuel Cost \$ Total Cost of Ownership \$		Slightly less than LNG	Slightly less than LNG
RENEWABLE NATURAL GAS (RNG)	Biogas derived from organic waste materials, such as landfill gas or agricultural waste, which can be cleaned and upgraded to a quality similar to natural gas. It can be used as a renewable and low-carbon substitute for natural gas in various applications.	<ul style="list-style-type: none"> Lower emissions Renewable Resource 	<ul style="list-style-type: none"> Limited Availability Not yet cost effective 	Truck Cost \$\$ Fuel Cost \$\$\$\$ Total Cost of Ownership \$\$\$		Up to 11.2 depending on source ³	Up to 11.2 depending on source ³
BATTERY ELECTRIC (BEV)	Electric vehicles powered by rechargeable batteries, eliminating the need for internal combustion engines. BEVs use electricity from the grid or other charging infrastructure to propel the vehicle.	<ul style="list-style-type: none"> Depending on electricity source can be zero to low emissions Lower operating Costs 	<ul style="list-style-type: none"> Range limitations Limited Class 8 Charging Infrastructure Poor load capacity Limited truck availability 	Truck Cost \$\$\$\$ Fuel Cost \$\$\$ Total Cost of Ownership \$\$\$\$		0-4 ⁴ (avg grid/renewable)	0-4 ⁴ (avg grid/renewable)
HYDROGEN FUEL CELL ELECTRIC (HFCEV)	Vehicles that use hydrogen gas and oxygen from the air to generate electricity through a chemical reaction in a fuel cell. This electricity powers an electric motor, resulting in water vapor as a by-product.	<ul style="list-style-type: none"> Long range Quick fueling times Only vehicle by-product is water vapor Depending on electricity source can be zero to low emissions 	<ul style="list-style-type: none"> Expensive to produce Cumbersome transporting and storing Extremely limited network availability 	Truck Cost \$\$\$ Fuel Cost \$\$\$\$ Total Cost of Ownership \$\$\$\$		5-13 ¹ (green, grey, blue)	5-13 ¹ (green, grey, blue)

¹ GREET 1 2021, The US DoE Argonne National Laboratory, Published 12-31-2020

² GREET 1 2021, The US DoE Argonne National Laboratory, IPCC Fourth Assessment Report on Climate Change (AR4), Published 12-31-2020

³ Shell Energy - Renewable Natural Gas Webpage

⁴ DEFRA 2021, IEA 2022, Shell 2021