The Green Driver's Dilemma

Choosing the Right Environmentally Friendly Car

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Abstract

The current U.S. automotive fleet is composed largely of inefficient, polluting, gasoline powered vehicles. Increasing gas prices, anxiety regarding energy security, and ecological concerns have served to make efficiency an important factor for new car buyers. However, there is a lack of comprehensive buyer's guides to assist with the decision making process. Which technology is appropriate for each person's different needs? Which criteria should be weighed more heavily? This paper assembles the five most accessible and economical green car technologies, explains and compares them, and creates a rubric based on their strengths and weaknesses to help buyers choose the optimal car given their driving profile.

Vehicle Type/Model	Strengths:	Weaknesses:
Honda Civic / I.C.E.	Price, performance	Efficiency, long term expense
VW Jetta TDI / Diesel	Performance, efficiency at high speeds	City driving, emissions
Nissan Leaf / All-electric	Short trips, efficiency at low speeds	100 mile range, recharge time
Chevy Volt / Plug-in Hybrid	Short trips (<40 miles)	Recharge time, price
Toyota Prius / Hybrid-electric	Efficiency at low speeds	Highway driving

Methods

The categories listed were chosen based on availability of production models to the average driver and affordability, with luxury vehicles and less developed technologies — such as hydrogen fuel cells — left out of the running as a result. The data used came from various research papers, government departments such as the Department of Energy (DOE) and the Environmental Protection Agency (EPA), and the automotive press. The questions in the decision chart are based on the strengths and weaknesses of the available technologies, with different elements given different priority levels based on each driver's specific situation. For example: someone who spends the majority of their time on highways will likely find a diesel more suited to their needs than a hybrid, someone who drives 30 miles most days but takes the occasional longer road trip will find a plug-in hybrid preferable to an all-electric vehicle, etc.

Chevy Volt, Plug-in hybrid

Honda Civic, Gasoline I.C.E.

The 5 Categories

Nissan Leaf, All-electric

Toyota Prius, Hybrid-electric

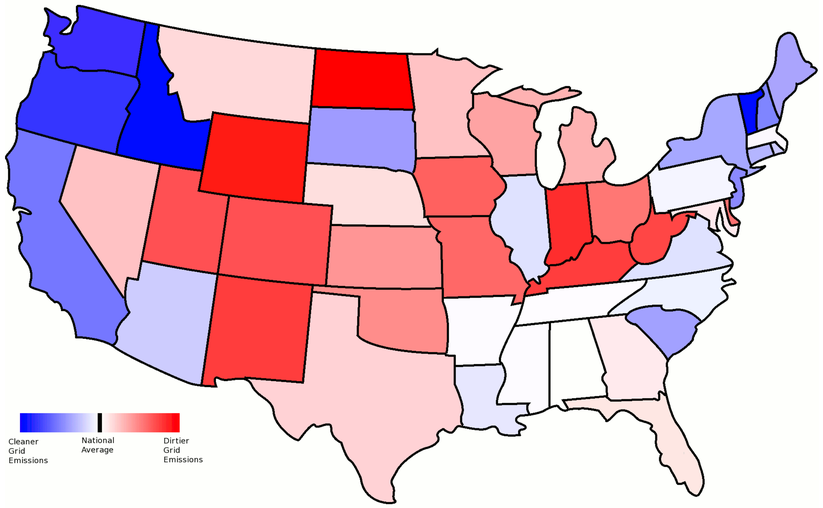
VW Jetta TDI, Diesel

This table was formulated based on the strengths and weaknesses of the technologies researched. To use it, a new car buyer chooses the answer that most closely fits their driving situation and preferences from each of the five question sets on the left. They then weigh the influence that each answer they chose has on their decision, and put a corresponding score from 1-4 in the influence column. For example, someone who spends 90% of their time on highways should write down a 4, whereas someone who only spends 60% of their time on highways should write down a 1. This number then gets written in the grayed-in boxes that correspond to each answer. Once finished, the buyer sums the points in each column to see which technologies most closely match their driving habits.

Decision Table	Influence (1-4)	Gasoline I.C.E.	Gas-Electric Hybrid	Plug-In Hybrid	All-Electric	Clean Diesel
Majority of highway driving						
Majority of city driving						
Primarily long (100+ mile) daily trip length						
Primarily moderate (40-100 mile) daily trip length						
Primarily short (<40 mile) daily trip length						
Sacrifice some performance for efficiency?						
Sacrifice some efficiency for performance?						
Cleaner than average grid resources						
Dirtier than average grid resources						
Preference for short-term savings						
Preference for long-term savings						
Sum of points:						

Conclusions

There are many different factors that should go into choosing a car. Based on both environmental (global climate change) and economic (rising gas prices) concerns, it is clear that standard gasoline powered vehicles are a poor choice compared to the many alternatives that are available. When choosing between these options the efficiency of the various technologies depends on individual driving profiles, with the strengths and weaknesses of the models allowing for a close match between the vehicle's capabilities and the driver's needs. Additionally, factors outside of an individual's control (such as how clean the power you use to charge your electric car is) have a large impact on actual efficiency levels. Use of the decision table provides a starting point for new car buyers, allowing them to find the vehicle for which their profile is most closely suited. This data combined with individual preference will lead to the choice that will provide for the highest efficiency and, optimally, the happiest consumer.



An electric car is only as clean as the energy that is used to charge it. This map shows relative emissions of CO_2 from grid power sources by state in terms of lbs/MWh. Emissions run from dark blue (cleanest) to dark red (dirtiest), with white being the national average.

(Data from U.S. Energy Information Administration, www.eia.doe.gov/oiaf/1605/ee-factors.html)

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