An array of alternative fuels exists already today. They fall into two categories: petroleum replacements such as ethanol and biodiesel, which are made from renewable sources (e.g., corn), and a variety of zero-emission fuels such as hydrogen and electricity.

Ethanol can be mixed with gasoline, and in some Midwestern states fuel is already 10% ethanol, but the real question is how our automobiles will move away from greenhouse gases. Both hydrogen and the batteries necessary for electric vehicles have a long way to go, but in 25 years they will be on the road.

The choice of a dominant fuel (reformulated gasoline, diesel, biodiesel, ethanol, methanol, natural gas, hydrogen) and the accompanying propulsion system (internal combustion, direct injection, electric, hybrid electric, fuel cell) for vehicles in the U.S. will be driven by consumer preferences, market forces, safety and environmental regulation, and technological innovation. Our choices will shape the life cycles of both fuels and vehicles, and impact the cost and attributes of transportation alternatives, infrastructure, air quality, resource consumption, human health, global warming, energy independence, geopolitics, and the economy. Broadly speaking, the direction we take will critically impact our ability to achieve social, economic, and environmental sustainability.

This question assumes that we will be driving cars in 25 years, which I think will be the case because the majority of people value cars highly. Although there has been substantial R&D, no alternative automobile fuel has achieved more than niche penetration, nor has any fuel emerged a clear winner. There is debate over the peaking of petroleum, however, new reserves and nontraditional sources (e.g., oil sands) are being identified: higher oil prices are facilitating development of alternative fuels but also are expanding oil sector activity. Much progress can be made in 25 years and no one can predict the future but my guess is that cars on the road will include those with varying levels of their propulsion coming from highly efficient engines, electric motors, and/or perhaps fuel cells but with the primary fuel being very clean gasoline. Who knows, perhaps in 25 years we’ll be flying our cars.