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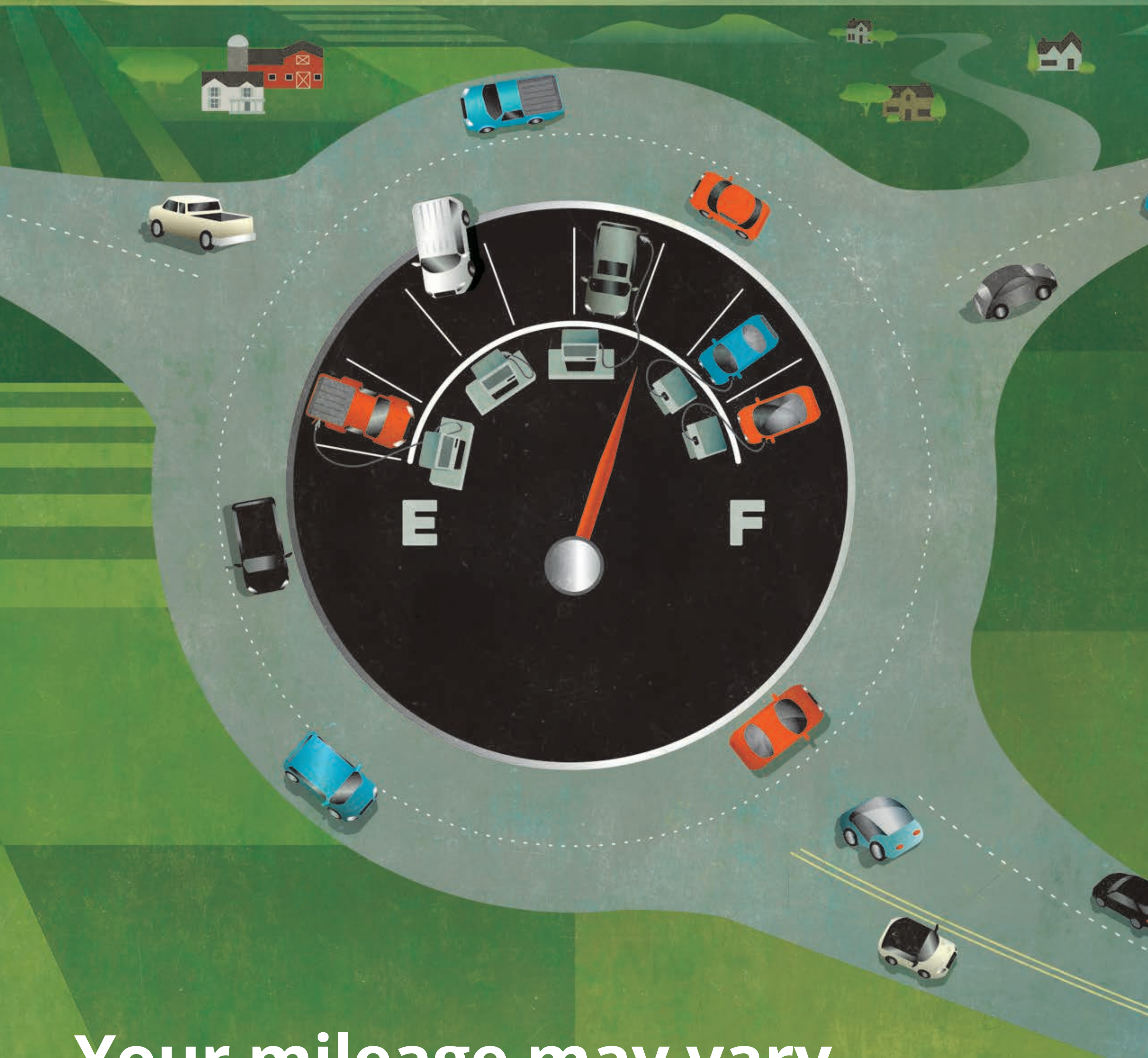

Your mileage may vary

The future of mobility and the downsizing of US gasoline demand

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Introduction: Driving toward the future

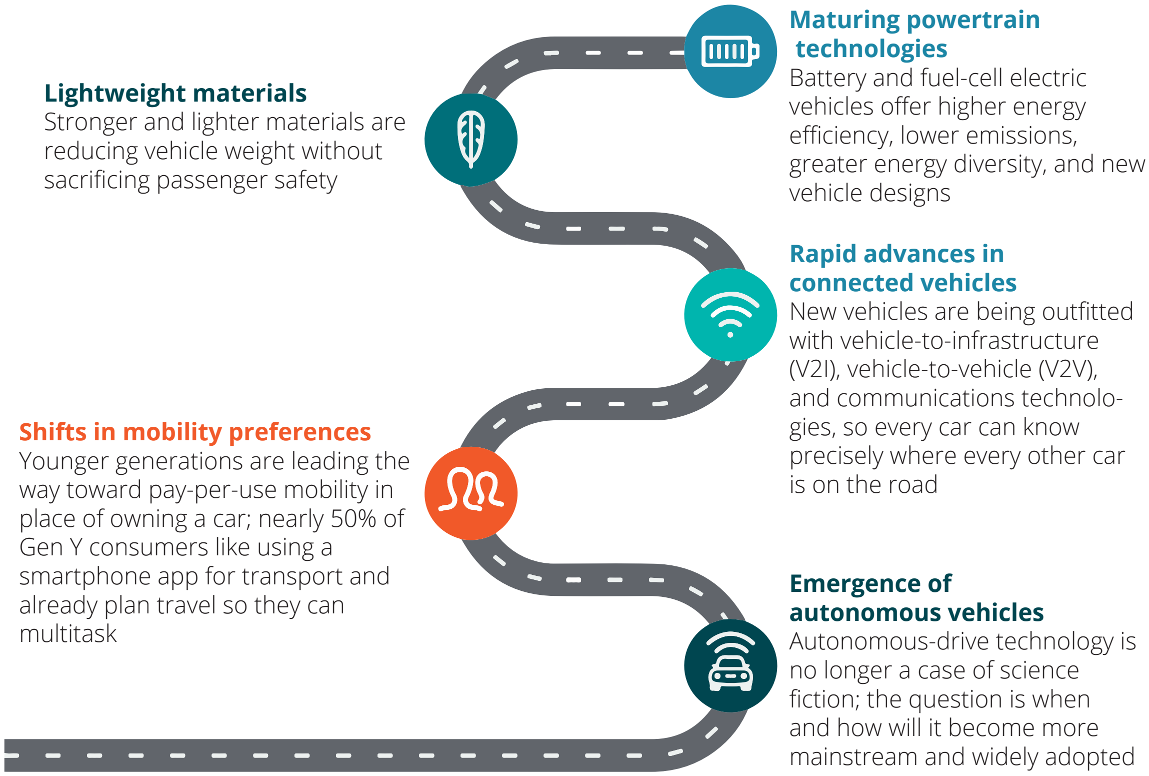
A CENTURY ago, obviously there were many fewer cars, drivers, and roads, but the template was already in place—including where those 1916 drivers stopped to fill their tanks. A decade earlier, the first filling station had been built, in St. Louis, and the number of pumps had risen—and would continue to rise—as Americans bought more cars and headed out on new highways. The numbers have fallen a bit from their peak (in every developed nation, not just the United States),

but 110,000 or so stations still line US roads today.[1] Drivers, as they always have, pull up alongside pumps, fill their vehicles' tanks, and merge back into traffic.

But the emerging transportation ecosystem may, for the first time, broadly transform how we fuel our cars and trucks—and that means potentially dramatic changes for the industries that supply that fuel. What happens if and when consumers begin opting en masse for carsharing and ridesharing rather than private ownership? What about if and when most cars no longer run on gasoline?

Several interconnected trends—some technological, some social—are driving these changes (see figure 1). Advances in materials science, computing power and artificial intelligence, and a global emphasis on reducing greenhouse gas emission have the potential to fundamentally change the American mobility ecosystem, with far-reaching implications for stakeholders throughout the value chain. New technologies such as plug-in hybrid drivetrains and improving battery efficiencies[2] could rapidly increase the availability of low-carbon-emitting powertrains. Moreover, rising consumer interest in ridesharing and shifts in attitudes away from car

Figure 1. Factors driving change in the mobility landscape



Source: Deloitte analysis, *Deloitte global automotive consumer study*, 2014.

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ownership could accelerate widespread adoption of new technologies.

Evidence is accumulating that at least some of the distant future is no longer just around the corner—it's already here. Multiple companies have made significant strides in developing autonomous vehicles, and municipalities and federal authorities have cleared the way for widespread testing.[3] As of September, Google's self-driving vehicles had traveled 1.97 million miles,[4] and other companies have made significant inroads as well, with Uber launching its own autonomous vehicle pilots in Pittsburgh in August 2016.[5] And based on recent trends, vehicle battery costs across the industry could drop below $100 per kilowatt-hour within five years, making electric powertrains cost-competitive with traditional combustion engines in certain markets.[6]

These advances are occurring within the broader development and application of the Internet of Things (IoT) technology. The rise of the "connected car"[7] may thus enable effective use of other advancing and complementary technologies emerging within the broader IoT context. Service providers are working on apps and telecommunications infrastructure, and automakers are planning the next generation of connected vehicles.

But for the US oil and gas industry, whose industry value chains are built on molecules rather than megabytes, these shifts in the automotive landscape may seem a little ephemeral, with uncertain impact. What matters for fuels suppliers is not so much who (or what) drives a vehicle, or how IoT technology links that vehicle to a digital ecosystem, but how drivetrain technologies, fuel efficiency, and fuel use might be evolving. Fundamentally, for refiners and retailers, it's still primarily about demand. And from the perspective of a refiner, demand is driven by fuel efficiency and consumer driving habits.

Naturally, efficiency—miles per gallon—depends partly on whether drivers are buying small or large cars, hybrids or conventional gas-powered vehicles, choices aided by fads, gasoline prices, automaker promotions, and other factors. But it's also largely driven by regulatory policy such as the federal Corporate Average Fuel Economy (CAFE) standards, which aim to improve efficiency (and therefore reduce total gasoline consumption) by requiring each automaker's fleet of vehicles to meet certain mileage standards. For model years 2017 through 2025, the CAFE program is looking to increase average fuel efficiency by over 30 percent.[8] (See sidebar, "What are CAFE standards?") The targets have historically followed population and economic growth, though urbanization and suburbanization have had a significant impact.

Now external factors are playing a bigger role—one that is often both dramatic and unpredictable. Advances like plug-in hybrids, battery electric vehicles, lightweight composites, and urban ridesharing in low-emissions vehicles could redraw the playing field for every player in the new mobility ecosystem, including fuel suppliers. And that means that regulators may well push beyond the aggressive CAFE goals: With the incredible pace of innovation, we can expect potential fuel efficiency to continue to improve for all types of drivetrains, including gasoline- and diesel-powered internal combustion engines, enabling future regulatory changes that could dramatically lower the amount of energy needed to power personal transport in the United States.

WHAT ARE CAFE STANDARDS?

Established under the federal Energy Policy and Conservation Act of 1975 and later amended, the Corporate Average Fuel Economy standards aim to reduce total US consumption of gasoline (and therefore oil) by regulating average vehicle fuel efficiency. These standards are applied fleetwide, meaning that if regulators raise the standards (in miles-per-gallon terms), automakers must produce and sell vehicles that exceed these mileage standards overall. [9]

Car buyers don't typically see these, since the fuel economy labels on new-car windows are produced by the Environmental Protection Agency and National Highway Traffic Safety Administration. CAFE requirements are based on different testing methodologies for different purposes,[10] with results often varying by 20 percent or more.[11] More importantly for those manufacturing vehicles or forecasting fuel efficiency, the CAFE standards are applied fleetwide on a model-year basis, so annual targets affect new cars and trucks but not those already on the road. The current requirements were announced in 2009, covering model years 2012–16,[12] based not just on fuel efficiency targets but also vehicle type (for example, cars or light trucks) and footprint size, measured in square feet. Phase II of the national program should be implemented for model years 2017–25, aiming to increase average fuel efficiency by over 30 percent.

The most important impacts of CAFE fuel standards on gasoline consumption:

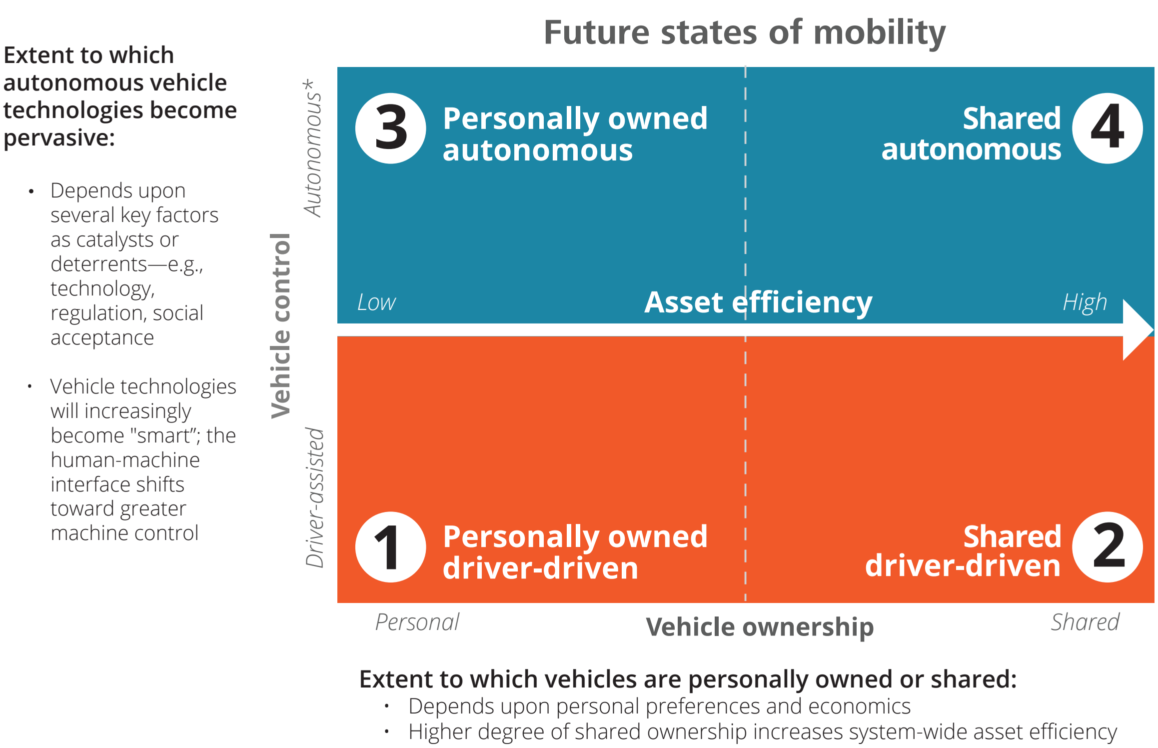
- These standards may be the single largest driver of improved fuel efficiency of light-duty vehicles by incentivizing adoption of novel technologies.
- Because they apply to model years and the average car in the United States is over 11 years old,[13] the full impact of higher requirements could take decades to materialize.

Oil and gas in the new mobility ecosystem

DELOITTE'S article *The future of mobility*[14] lays out a framework that posits the emergence of four concurrent "future states" emerging within the mobility ecosystem. Key is that all four states will likely co-exist across a number of geographies (urban, suburban, and rural) and consumer demographics to a varying extent and, therefore, represent characterizations of market segments existing in parallel rather than alternative scenarios.

Future state 1 envisions a world where private ownership remains the norm as consumers opt for the forms of privacy, flexibility, security, and convenience that come with owning a human-

Figure 2. The future states of mobility



*Fully autonomous drive means that the vehicle's central processing unit has full responsibility for controlling its operation and is inherently different from the most advanced form of driver assist. It is demarcated in the figure above with a clear dividing line (an "equator").

Source: Deloitte analysis.

Deloitte University Press | dupress.deloitte.com driven vehicle. While incorporating driver-assist technologies, this future state assumes that fully autonomous drive does not completely displace driver-controlled vehicles anytime soon.

Future state 2 imagines how continued growth of ridesharing and carsharing may impact both companies and people. Economic scale and increased competition could drive the expansion of shared vehicle services into new geographic territories and more specialized customer segments. As shared mobility serves a greater proportion of local transportation needs, it might reduce the need for personal vehicles, particularly in homes that have several.

Future state 3 sees the widespread adoption of autonomous vehicles, but private ownership remains dominant. Drivers still prefer owning their own vehicles but seek driverless functionality for its safety and convenience.

Finally, *future state 4* anticipates a convergence of both the autonomous and vehicle sharing trends. Mobility management companies and fleet operators offer a range of passenger experiences to meet widely varied needs at differentiated price points, initially in urban areas but spreading rapidly into suburban communities.

Most oil and gas companies develop business strategies for a world of incremental change (future state 1). And even if they recognize the likelihood of other future states, they might struggle to recognize the magnitude of the potential impact on increasing or decreasing demand for transportation fuels. But these trends, even in the abstract, are key to envisioning how consumers interact with their vehicles—and with the fuel pump. Advanced battery technologies combined with ridesharing, with or without a human driver, would make the zero-emission vehicle not just viable but more cost-effective in many urban and suburban areas.

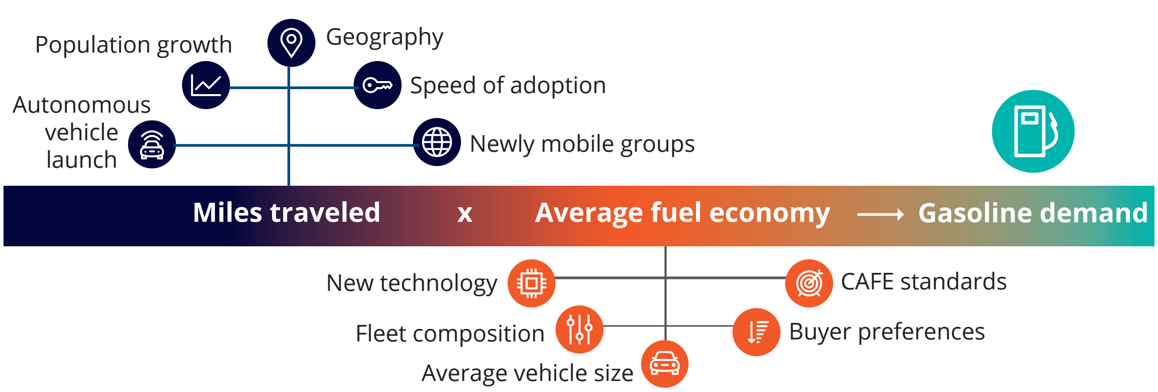
And shared mobility can have other impacts as well. If picking up a car, carpooling, or simply hailing a cab becomes much easier, the number of miles an individual routinely travels could increase. But these total people miles are not the same as vehicle miles traveled. Increases in the average number of passengers per vehicle could more than offset the growth in people miles. Moreover, high-efficiency vehicles are better suited for constant daily driving, with lower fuel and operating costs balancing any higher up-front capital costs due to novel technologies. In a world of carpoolers, the streets of cities such as New York City, Chicago, or even Houston could be filled with battery-powered electric and plug-in hybrid vehicles, many getting over 100 mpg.[15] All of this would result in a very different system of passenger transportation than what we have become accustomed to since the advent of the passenger automobile, and especially in post-WWII America.

Modeling the impacts of the future of mobility

OIL and gasoline are, of course, used for far more than fueling light-duty vehicles.[16] But there's a reason why consumers and regulators focus on cars and trucks' mileage per gallon: These vehicles represent close to 90 percent of US gasoline consumption.[17] (Diesel is also used for personal transportation but in the United States accounts for only a small fraction of the fuel consumed by passenger vehicles, and is mostly used for medium- and heavy-duty vehicles.[18]) Since gasoline represents over 40 percent of the refining yield of a barrel of crude oil (42 US gallons),[19] changes in light-duty vehicle fuel consumption would have a large impact on the overall oil and gas industry—upstream, midstream, and downstream.

Modeling the impact of the future of mobility on US fuel consumption (see figure 3) relies relies on two factors: the total number of light-duty vehicle miles traveled, and the average efficiency of the vehicles that are being driven. To project the future vehicle miles traveled, Deloitte's model[20] includes current demand for mobility as the breakdown of miles that individuals travel (i.e., people miles) in urban, suburban, and rural environments and via personally owned and shared vehicles, using Federal Highway Administration data and other public sources. From there, we applied a growth factor to account for rising demand due to population growth and the emergence of newly mobile groups (such as youth and the elderly), using World Bank and US Census Bureau data. Our model converts people miles to vehicle miles traveled by dividing by the average number of passengers in personally owned and shared vehicles, respectively. Finally, we allocate vehicle miles traveled to different future states by simply assuming that the adoption of shared and self-driven vehicles will follow patterns similar to other recent technologies.

Figure 3. Connecting the dots: Some key parameters for modeling the evolving mobility ecosystem's impact



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By 2040, our model projects, light-duty vehicle miles traveled could increase by over 20 percent, equating to roughly 1 percent annual growth—about half the rate seen in the 1990s.[21] Other models including the Energy Information Administration's Annual Energy Outlook project moderately higher miles traveled by 2040 (less than 5 percent difference over the forecast period). All models either implicitly or explicitly assume more than just economic or population growth, considering other factors such as consumer preferences, which are expected to continue to change along with the mobility ecosystem. And of course, applying different assumptions about the speed of adoption could significantly alter the model results.

Modeling fuel efficiency can be even more complex. Again, regulators apply CAFE standards to only new models, not all vehicles on the road (i.e., the entire fleet). Moreover, there are different standards for passenger cars and light trucks, and the formulas for calculating CAFE standards across a manufacturer's entire fleet are enormously complex—and don't necessarily reflect real-world conditions. A driver might get 25 percent fewer miles per gallon than his or her car's CAFE fuel economy suggests.[22] To account for these uncertainties, we model the existing light-duty vehicle fleet as roughly 78 percent cars and 22 percent trucks,[23] calculating both historical CAFE mileage using the older requirements[24] as well as the current policy that will be implemented 2017–2025.[25] Those estimates are adjusted to reflect real-world performance and average fleet age, providing an efficiency snapshot for each model year.[26]

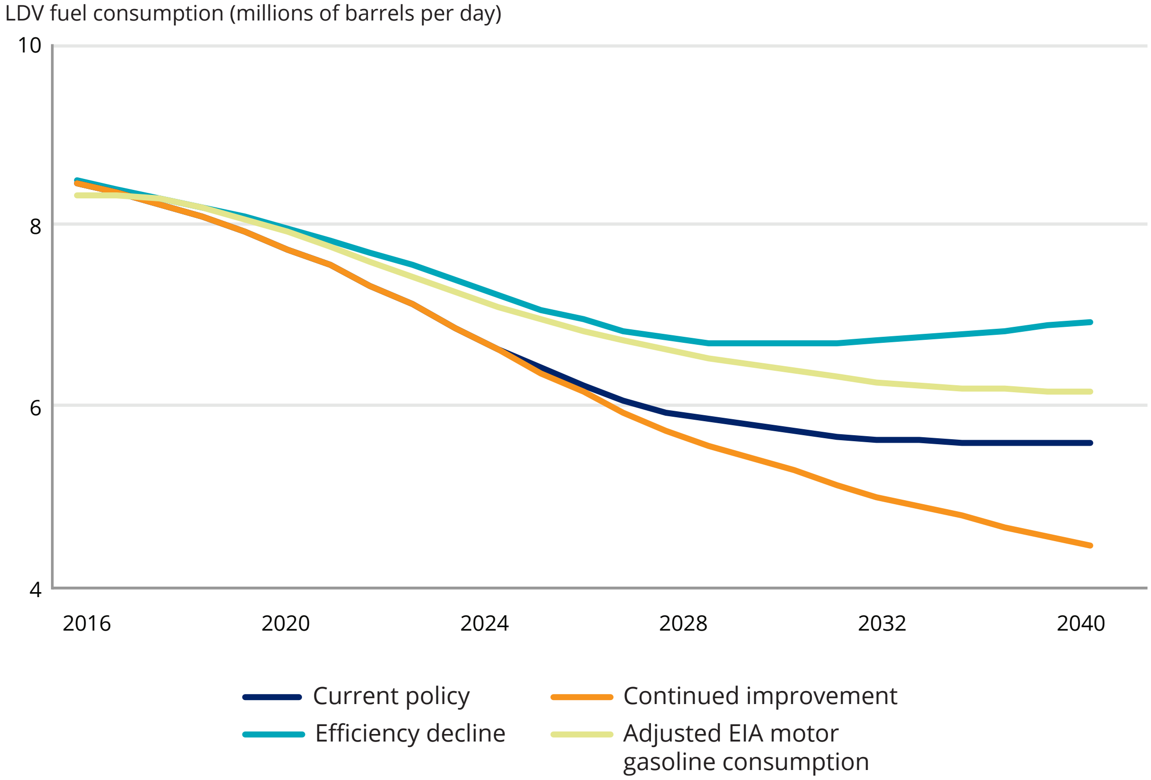
> Since regulatory standards are fleetwide, a large-scale adoption of high-efficiency technologies makes meeting the requirements simpler for automakers and less costly for consumers.

Combining that annual fleet efficiency with the projected vehicle miles traveled produces an estimated amount of energy consumed by light-duty vehicles in billions of gallons of gasoline equivalent. To demonstrate how different efficiencies would impact consumption over time, the model includes three scenarios reflecting how different future states could drive consumption even assuming the same number of vehicle miles traveled:

- *Current policy* that applies the existing CAFE standards program through 2025, with no future efficiency gains—a business-as-usual case. This scenario reflects future vehicles similar to the cars and trucks currently on the road, with modest mileage improvement from more efficient conventional combustion engines and a broader adoption of traditional and plug-in hybrids.
- *Continued improvement* that extrapolates the rising fuel efficiency over the entire forecast period, reflecting potential impacts from new technologies such as plug-in hybrids and battery-powered electric vehicles, along with changes in transport options including carsharing programs and autonomous vehicles.
- *Efficiency decline* scenario that includes the efficiency gains from the business-as-usual scenario but assumes that real-world results will lag the gains that standards promise. We would see absolute gains in efficiencies but underperformance relative to expectations.

Figure 4 shows the impact of these three scenarios as well as the US Energy Information Administration's (EIA) projections of light-duty vehicle energy consumption. These scenarios represent how the four different future states of mobility would intersect with what is not just technically feasible but also politically viable. The world of incremental growth favors traditional vehicles, as many consumers remain attracted to the simplicity and familiarity of the typical passenger car. However, carsharing and ridesharing services and autonomous vehicles would benefit from advances

Figure 4. US light-duty vehicle fuel consumption, 2016–2040



Source: Deloitte projections; Energy Information Administration.[27]

Note: Two different EIA data series were examined from the 2016 Annual Energy Outlook. Figure 4 shows the EIA's projected consumption of gasoline for the United States, less 10 percent to account for non-LDV consumption. The second data set includes total light-duty vehicle energy consumption—not only conventional motor gasoline and diesel consumption but consumption of alternatives such as biofuels.[28] While the two series are not exactly equivalent due to underlying compositional differences, the absolute values and trends are similar.

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in materials science and drivetrain technology such as plug-in hybrids and electric vehicles that could lower fueling and maintenance costs. Since regulatory standards are fleetwide, a large-scale adoption of high-efficiency technologies makes meeting the requirements simpler for automakers and less costly for consumers. Each of these future states, and each of the fuel consumption scenarios modeled, implicitly reflects the opportunities that the new mobility ecosystem provides for significant improvements in efficiencies.

Even with conventional technologies, automakers might well easily meet current CAFE standards, considering real-world fuel efficiency for new vehicles is projected to rise from roughly 27 mpg in 2016 to almost 40 in 2025. Indeed, many plug-in hybrids can get 100 or more miles to the gallon.[29] As mentioned, CAFE standards are applied fleetwide, and relatively modest changes in relative volumes sold could make significant headway toward that goal; just meeting those standards through 2025 would significantly reduce US gasoline demand. Even in the business-as-usual case, fuel consumption would decrease by 2.9 million barrels per day (roughly 44 billion gallons per year) between 2016 and 2040—a more than 30 percent drop. That is the amount of gasoline refined from 6 million barrels per day of crude oil[30] and more than the total amount of tight oil currently produced in the United States.[31]

But in a world where autonomous vehicles are the norm and not the exception, and one where the cost of electric drivetrains approaches or surpasses parity with conventional internal combustion engines, there may be opportunities for automakers and consumers to continue driving improvements in fuel efficiency. For example, even if rural areas primarily retain driver-driven vehicles, urban areas could move toward autonomous shared vehicles. Transportation in cities could become primarily non-gasoline, with autonomous vehicles serving as the primary transportation vessel for mobility on demand, and with plentiful electric recharging stations negating any range anxiety. One more step would be to increase electric vehicle range or, until long-range batteries become widely available along with remote charging stations, employ autonomous hybrids to connect the suburbs to the urban core. In that world, it would be likely that each new model year's fleet becomes more efficient, as electric vehicles become a higher percentage of annual sales, potentially displacing conventional powertrains entirely in some markets.

In that scenario, one with continued improvement, the political and technological viability of incredible increases in fuel efficiency could become more viable. To reflect that, our model continues the trend set by the current standards and extrapolates it through 2040. This would mean average new LDV fuel efficiency would not only rise by 13 mpg over the next decade—it would top 64 mpg by 2040. That would decrease daily gasoline demand by 4 million barrels—roughly 50 percent—over the next 25 years. That is the amount of gasoline refined from over 9 million barrels of crude oil daily, a volume larger than the total current production of the United States[32] and more than Iran[33] and Iraq[34] combined.

The third scenario is the exception that proves the rule: It assumes like the other two scenarios that vehicle miles traveled will increase incrementally, but that the deviation between real-world fuel efficiency and the CAFE standards will widen. Essentially, in this case technological advances cannot keep up with the higher standards, partially offsetting the regulations' impact. Still, even with those assumptions, gasoline demand in the United States would decline almost 20 percent. This means that across a range of assumptions, gasoline demand will most likely decline, with potential for a dramatic drop close to 50 percent. Even if drivers still drive themselves in conventional cars, they would go at least 50 percent farther on the same tank of gas.

Notwithstanding the impact of US government regulations, forecasters see potential declines in fuel usage both elsewhere in North America and in other Organization for Economic Co-operation and Development (OECD) countries. These projections rely on many of the same underlying drivers, and the future of mobility in the United States is reflected in global trends. For example, ExxonMobil projects a 40 percent decline in OECD light-duty vehicle fuel demand by 2040 compared to 2014, with a lengthy downward path as fuel efficiency rises and alternative-fuel vehicles increasingly displace gasoline and diesel.[35] Elsewhere in the world, with rising consumer interest in inexpensive, conventional cars and IoT-connected road infrastructure lagging far behind US advances, fuel demand may well compensate: ExxonMobil expects developing-economy fuel demand for light-duty vehicles to rise by 50 percent by 2040, with a tripling of vehicles on the road more than outweighing fuel efficiency gains.[36] Overall, then, the global outlook for light-duty vehicle demand shows only a 10 percent decline from 2014. Applying ExxonMobil's OECD outlook to the United States specifically would project US light gasoline demand declining 3.6 million barrels per day by 2040, almost as large as Deloitte's *continued improvement* scenario.

Overall, the global outlook for light-duty vehicle demand shows only a 10 percent decline from 2014.

The 2016 edition of the BP Energy Outlook also discusses trends in North America,[37] which is in part comparable to Deloitte's US light-duty transportation fuel demand scenarios. In it, BP specifically cites changes in US transport demand as the largest factor in overall North American liquids consumption. By 2035, the report projects a decline in US transport fuel of 1.8 million barrels per day, or about 20 percent.[38] Although this is over a somewhat shorter time horizon than the ExxonMobil outlook or the Deloitte scenarios and includes a larger number of vehicles, it illustrates the same fundamental story.[39] Light-duty vehicles are the largest source of US transport fuel consumption, and as BP notes, the decline in transport fuel consumption is driven not by the number of vehicles on the road[40] but, rather, by the extraordinary increase in expected fuel economy.

FUTURE STATES ACROSS GEOGRAPHIES

Urban: Battery technology is improving rapidly, with prices per kilowatt-hour plunging, but several challenges remain to be addressed, including weight, the difficulty in commercializing novel chemistries, and, possibly most important, range limitations.[41] Ridesharing programs combined with battery-changing stations would sidestep electric vehicles' main limitations, particularly if the process could be automated via driverless cars. Urban areas, including the sprawling cities of the southeastern United States, could become primarily electric in the next few decades, decoupling gasoline consumption from economic and population growth.[42] There might be fewer cars per capita driving relatively few miles, even as the absolute number of vehicles is greater than in other geographies due to sheer population.

Suburban: Suburbs could see a higher number of vehicles per capita, with average miles driven falling between urban and rural areas. By virtue of the lower population density, the rate of adoption seen in cities would likely be slower. Electric vehicles' range concerns could become more meaningful the farther drivers move from urban centers. Ridesharing that focuses on carpooling, and battery-plus drivetrains such as plug-in hybrids, may make increasing sense as technologies evolve. Unlike urban areas, the suburbs may not be electric-dominant, but over the next 25 years, the percentage of traditional drivers with traditional combustion engines could drop substantially. After all, close to 90 percent of vehicles in the United States could be replaced with existing electric models, even if the cars must be charged overnight.[43]

Rural: Rural areas may have the fewest total cars—they contain less than 20 percent of the country's population[44]—but represent the highest number of miles driven on average, making them key to the adoption of new automotive technologies. Even if a battery-powered electric vehicle can make 90 percent of the trips required by cars today, the other 10 percent is critical. Moreover, the business model for ridesharing makes sense in cities with a large number of customers, each purchasing a short ride; that model could stumble outside of cities and suburbs. Rural areas, therefore, will likely see mostly incremental changes, with limited opportunities for many of the changes seen elsewhere.

Conclusion: Generating value with declining demand

IF US demand for gasoline falls significantly over the next 25 years, how will it affect the oil and gas industry overall? Most likely, not as dramatically as many might expect, due to the industry's size and global reach. True, reducing crude consumption by several million barrels a day would fundamentally change the midstream and downstream sector, but the impact on upstream companies may be more muted. Total oil production is expected to be roughly 110 million barrels a day by 2040,[45] with roughly 10 percent in natural production declines annually from existing fields. That means producers would need to discover and develop billions of new barrels of oil each year just to keep production flat, requiring hundreds of billions of dollars of annual investment.[46] Since the United States is a net importer, there will likely continue to be a large market for US production even if demand for gasoline dips, with prices set by a number of global factors including economic growth in the developing world and broader energy efficiency trends. In a world of lower demand growth, it may be increasingly important for diversified upstream operators to manage their portfolios for margins and returns at the expense of some growth. US production potential should remain robust in this world, as it is generally not on the high-cost end of the global supply curve.

> In urban areas, the connection between economic growth and increases in energy consumption could decouple, if not reverse.

But for companies that operate refineries, pipelines, product distribution or retail stores in the United States, the changing mobility ecosystem could challenge the long-term fundamentals of the business. We forecast not only a net decrease of gasoline produced but a shift in the geography of consumption. The four future states (incremental change, a world of carsharing, the driverless revolution, and a new age of autonomy) will likely coexist, with varying impact on different people and different communities. At the end of the day, the truism "location, location, location" could play a pivotal role in the profitability of investments of these long-lived midstream and downstream assets. Moreover, as demand for product declines, there may be a need to rationalize existing capacity and make investments to adjust to a changing mobility landscape. To some degree, spending will likely be focused on improving efficiency of the existing network, but there may be a need for increased capacity serving the export sector—for example, by bringing the substantial amount of shale oil to international markets. In some cases, notably in urban areas, the connection between economic

Figure 5. Expected impacts of lower gasoline demand on oil and gas sub-sectors in various scenarios in the United States

	Efficiency decline	Current policy	Continued improvement
Upstream	Minimal impact expected, as global supply and demand determines oil prices, with US fuel consumption being only one factor of many.	Similarly, absent significant unforeseen demand drop in the United States, global factors will likely continue to drive upstream value creation.	Weaker US fuel demand affects global oil prices on the margin, but with a deep and diverse resource base in the US both onshore and offshore, the US upstream sector could remain resilient.
Refining	Despite minimal need for new capacity, ongoing investments in efficiency, environmental compliance, and potential for product exports would require continued investment in existing assets.	Potential need for capacity rationalization and possible consolidation of operations, with inland refineries serving domestic demand facing possible challenges, while large, coastal locations would cater to growing international demand.	Lack of access to major petrochemical consumers and export markets likely to significantly challenge inland refineries, leading to consolidation of major assets along coastal centers.
Pipelines and distribution	Incremental changes would be needed to optimize pipelines, storage, and distribution terminals, with the impact of US unconventional oil supply potentially outweighing demand factors.	Demand for gasoline consumption in certain regions of the county, leading to declining refinery demands, will likely lead to some consolidation of asset capacity and geographical distribution.	Due to lower product demand, there will likely be a conversion of a number of inland refinery sites to distribution terminals, leveraging tank farms and loading racks to serve inland markets. Pipeline capacity would focus on trunklines connecting major inland shale plays and coastal demand centers.
Retail	Minimal impact expected, with urban and highway retail locations required across the country. Some potential decline in both demand for, and number of, retail gas stations in urban areas, but the typical consumer would likely see little change.	Low to no growth in the total number of retail outlets. High-volume sites would continue to outperform and the importance of nonfuel revenue streams will likely accelerate, with potential for substantial declines in both number of stations and revenue in urban and near-urban areas.	Potential for decrease in total number of outlets and amount of fuel sold, particularly in urban and suburban areas. Rural stations less likely to be affected. Potential for stations to broaden services, including electric vehicle charging, alternative fuel dispensing, and acting as local ridesharing aggregation hubs.

Source: Deloitte analysis.

Deloitte University Press | dupress.deoitte.com growth and increases in energy consumption could decouple, if not reverse, as cities will likely be the first adopters of these rapidly advancing technologies in mobility.

That being said, even with declining gasoline demand, the consumption of mobility will likely increase as autonomous vehicles and ridesharing programs simplify the process of getting from A to B. Retail gas stations in particular could focus on serving these customers more broadly—for instance, introducing electric recharging that evolves along with the market itself. Figure 5 illustrates how different levels of changing demand could impact the various subsectors, particularly those involved with the production and sales of refined products like gasoline.

As the future of mobility comes into view, oil and gas companies will likely need to adapt. A number of game-changing innovations seem around the corner, and they portend serious impacts on the oil and gas industry. Unlike the cyclical price environment, these trends are long-term and irreversible. Current trends—including the incredible advances in automotive technology, the implementation of the CAFE standards, and the retirement of older, less fuel-efficient vehicles—indicate that gasoline consumption will likely decline significantly in the next 25 years. If it does fall by 30 to 50 percent, as our model suggests, the midstream and downstream business models will need to adapt. Clearly, for some segments of the industry, consolidation on core assets with an eye to the global markets will be key. For traditional distributors, the opposite may be true, requiring a focus on rural and exurban consumers. No matter if you expect the world to remain one of incremental change or see a new age of autonomy on the horizon, the implications for traditional light-duty vehicles will underpin the outlook and opportunities for oil and gas companies.

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