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REGULATING FUEL DELIVERY

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EXECUTIVE SUMMARY

For the entirety of the nation's history, Americans have been leaders in the adoption of anything and everything that makes moving around easier. This only accelerated with the rise of car ownership and the build-out of the highways, sales, repair and fueling infrastructure that support it. As a result of such investment, the way Americans got around changed—and so did the spillover effects, positive and negative, of transportation and the political rules necessary to tame the problems related to it.

Some of these problems had to do with automobile fueling. Whereas horses ate grass and hay, and befouled streets with their remnants, and trains consumed coal and belched soot, cars are powered by gasoline, which produces its own noxious byproducts when burned. But what sets gasoline fuel apart here is its potential to pollute even before it goes into the car. Motor fuel pollution is a problem as old as the automobile, and politicians have long regulated the fueling business to work to keep the problem contained. Most of this regulatory burden was levied on fuel station owners, the individuals with the most at stake if their negligence caused problems for neighboring landowners. But now, the fueling business is decentralizing. And, in light of this, consumers and businesses have greater reason to shift to fuel delivery from regular gas station trips. However, this transition has been far from smooth.

Accordingly, the present study explores the obstacles that prevent innovation in the fuel delivery space and the expansion of delivery as an alternative to depot-based fueling. In doing so, it traces the history of the American motor fuel business and the economic rationale for its industrial organization. It then moves on to examine the regulation of fuel delivery by federal, state and local governments, with specific focus on California as a case study. And finally, it draws conclusions from the aggregation of these rules, and proposes alternative mechanisms available to policymakers.

INTRODUCTION

Since its invention, Americans have had a love affair with automobiles. We've built a vast stock[1] of infrastructure to support driving over the last three generations, and drive we did. Today, Americans drive over 3 trillion miles per year, with the vast majority of those miles in gasoline-powered cars and trucks.[2] This is triple the distance we traveled fifty years before.[3] To power all these vehicles, Americans consumed more than 143 billion gallons of motor gasoline in 2018.[4]

The business of distributing all that fuel has grown with automobile use. There are more than 121,000 convenience

1. See "Table 1.5: Investment in Fixed Assets and Consumer Durable Goods," U.S. Bureau of Economic Analysis, last accessed Oct. 17, 2019. https://apps.bea.gov/iTable/iTable.cfm?ReqID=10&step=2.

2. Federal Reserve Bank of St. Louis,"Moving 12-Month Total Vehicle Miles Traveled," *FRED*, last accessed Oct. 17, 2019. https://fred.stlouisfed.org/series/M12MTVUSM227NFWA.

3. Federal Highway Administration, "Historical VMT from 1970," *Traffic Volume Trends*, last accessed Oct. 17, 2019. https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm.

4. "Product Supplied for Finished Motor Gasoline," U.S. Energy Information Agency, Sept. 30, 2019. https://www.eia.gov/dnav/pet/pet_cons_psup_a_EPM0F_VPP_mbbl_a.htm.

stores that sell fuel in the United States as of 2019.[5] But this growth has not come without speed bumps. Motor fuel is a volatile compound, densely packed with chemical energy. The same properties that make it useful as a power source for cars can make it hazardous if mishandled. And, since we have known about these risks for decades, governments at the state, federal and local level have passed regulations to tame the most dangerous of them.

Today, automotive technology is advancing on a number of fronts, ranging from automation to parking. The automotive fuel market is no different. In recent years, changing transportation technology has allowed a new wave of decentralization of fueling infrastructure. However, this transition will not occur smoothly, as legacy rules we built up to manage the risks of fuel retailing in the past are not always in-line with the needs of fuel consumers of the future.

THE ECONOMICS OF THE AUTOMOTIVE FUEL MARKET

The automotive fueling market in the United States began as an outgrowth of the market for fuel for lighting and heating. Before the advent of the automobile, American consumers were already buying vast volumes of kerosene to substitute for sooty coal and flickering candles.[6] Eventually, natural gas and electricity replaced kerosene, but the infrastructure and economic arrangements that this market developed continued as the basis for the nascent automotive fuel market in the years that followed.

The first fuel pumps were developed in the 1880s, installed mostly at pharmacies in the early years.[7] Two decades later, on the eve of the Model T's mass production, the first purpose-specific gas station opened in St. Louis, although without modern fuel pumps[8]—those would not appear until 1913.[9] As automobile ownership grew through the first half of the twentieth century, fuel retailers grew as well.[10] Sales shifted from a secondary product at pharmacies, akin to the market in propane for home grilling today, to retailers that specialized in selling motor fuel and the other products people wanted when they were buying it. This transition happened irregularly, with different entrepreneurs combining fuel sales with what they thought drivers might want. Many early gas stations also offered car repairs, others were attached to restaurants and motels. Prominently, the rise of specialized gas stations acted as a kind of transition between early American general stores and the convenience stores that dot the nation today.

But consumers were not the only ones using fuel. The rise of the car came hand-in-hand with the rise of the truck to carry goods. And, with the rise of trucking came truck fleet owners—companies large enough to benefit from deals to purchase large quantities of fuel. These arrangements have a few flavors, but all function around the fact that vehicle fleet owners face pressure to both control fuel costs in the aggregate and limit variance in how much they pay each year to fill their vehicles.

One way to do this is to buy fuel in bulk, storing quantities of gas or diesel in tanks the company owns. Another is to seek out an agreement with the owner of a gas station or network of gas stations with whom the transportation company shares a service region. This arrangement could provide either a per-gallon discount when the fleet is filled, or set a pre-agreed price for some quantity of fuel or for some period of time. Each option provides a different blend of risk for both the transportation company and the fuel vendor.

Owning one's own fuel tanks can allow a company to stock up before prices rise, and bulk purchases can mean significant discounts from standard retail fuel prices. This practice of fuel "depoting" is common in some transportation subindustries,[11] including school busing.[12] But no return comes without risk. For tank owners, this manifests in two forms. First, owning fuel storage comes with the chance that fuel tanks will fail, making the company liable for environmental damage if the tanks leak and cause pollution. This also saddles the tank-owning company with the administrative burden of compliance with fuel tank regulations that seek to limit how often these pollution events happen.

Second, buying fleet fuel in bulk places the risk of changing gasoline, diesel and crude oil prices on transportation companies and their staff. However, these individuals are in the transportation business, not the petrochemical trading business and thus they are less likely to have the specialized knowledge needed to reliably buy enough fuel before prices rise. Moreover, on-site storage is necessarily limited by how big the tanks are and how fast the firm uses fuel. The greatest

5. "U.S. Convenience Store Count," The Association For Convenience and Fuel Retailing, Dec. 31, 2018. https://www.convenience.org/Research/FactSheets/ScopeofIndustry/IndustryStoreCount.

6. Alfred D. Chandler, "Organizational Capabilities and the Economic History of the Industrial Enterprise," *Journal of Economic Perspectives* 6:3 (1992), p. 82. https://www.aeaweb.org/articles?id=10.1257/jep.6.3.79.

7. "First Gas Pump and Service Station," American Oil and Gas Historical Society, last updated Sept. 2, 2019. https://aoghs.org/transportation/first-gas-pump-and-service-stations.

8. Ibid.

9. Kurt Ernst, "The modern gas station celebrates its 100th birthday" Hemmings, Dec. 1, 2013. https://www.hemmings.com/blog/index.php/2013/12/01/the-modern-gas-station-celebrates-its-100th-birthday.

10. See, e.g., Robert Bradley, *Oil, Gas and Government* (Rowman & Littlefield, 1996), Vol. II, pp. 1307-68.

11. "Aboveground Petroleum Tanks," Purdue University Agriculture Extension, 2007. https://www.extension.purdue.edu/extmedia/PPP/PPP-73.pdf.

12. Michael Laughlin and Andrew Burnham, "Case Study—Propane School Bus Fleets," U.S. Dept. of Energy, 2014. https://afdc.energy.gov/files/u/publication/case-study-propane-school-bus-fleets.pdf.

gas buyer in the world will not help a company that buys one tanker truck of fuel at a time all that much, and the benefits of storing fuel are limited when prices are falling.

Such drawbacks create a market niche for fueling agreements between gasoline retailers and transportation firms. Rate design can vary, but the ability for fuel sellers to specialize in the business and take advantage of economies of scale can mean lower fueling costs to companies that use fuel. All of this helps spread out fixed regulatory, administrative and inspection costs across transportation fleet owners, which results in lower costs than if each had to maintain their own fuel depot.

The third segment of the fuel market is fuel delivery. The rise of the internet has opened the door to a new wave of fueling firms that rely on tankers that go to the vehicles served rather than the other way around. For consumers, this can make sense in places where high real estate prices have led to the redevelopment of most gas stations. And fleet owners can get some of the benefits depoting fuel in places where the regulatory burden of owning tanks outweighs the costs. While the economic rationale for fuel delivery is clear, the laws that regulate the practice remain ambiguous. Most retail fueling rules revolve around firms that sell gas from depots, rather than tanker trucks. So, the American motor fuel market today consists of a dispersed network of gasoline retailers, supplemented by some fuel depots, and with a growing segment of fuel delivery firms.

REGULATION OF FUEL DELIVERY

In short, every level of government in the United States has some say in the business of automotive fueling, but most rules are at the state level. Fueling regulations can be roughly divided into two main categories. There are rules that apply to the transportation of motor fuel, and rules that relate to the on-site storage and sales of automotive fuel. Fuel delivery regulations combine portions of both categories, creating headaches for delivery firms, their customers and those tasked with regulating them.

The federal Department of Transportation imposes rules that require each tanker truck to be inspected annually.[13] Further, federal hazardous material transportation requirements require that companies operating gasoline and diesel tanker trucks obtain certificates of registration from the Dept. of Transportation to be allowed to move hazardous loads.[14] Environmental Protection Agency rules require firms to create spill prevention plans and train their employees how to follow them in the event of a fuel containment failure.[15]

Federal rules on owners of underground fuel tanks go even further. Since the 1980s, the federal government has required these firms to show they are financially capable of cleaning up any damage caused by a tank leak and of compensating any third parties harmed by tank pollution.[16] Research since then has shown bankruptcy rules can stem the value of a regulatory regime based on ex-post fines, making the case for these financial adequacy regulations.[17]

State regulation of fuel delivery is more extensive. The risks that come with automotive fueling are mostly localized, like extra threat of fire, noxious vapors and the nuisances fueling create for neighboring landowners. Among the states, California is a particularly illustrative example. Over time, the state and its municipalities have developed an extensive regime of fueling regulations. Some facilitate the evolution of the automotive fuel market to include a more extensive role for delivery, while the burden of other rules deters changes in the way we fill our cars.

CALIFORNIA AS A CASE STUDY

The reason motor fuel is so useful for transportation industries is that it is energy dense, and it packs a lot of potential power into each gallon of volume and pound of weight. But the problem with concentrated, efficiently stored energy is that if it is mishandled, it does not take much to release that power. A spark coming from a plug inside an engine block is useful. However, a spark in a pool of gasoline on the ground is a conflagration. And, as a state where fire risks are substantial, California, in cooperation with its localities, has developed a robust regulatory regime to suppress potential hazards from companies that sell motor fuel.

On one level, California is ahead of the game in this space. The basic fire rules for California governments the last few years have been the 2016 standard international fire code (IFC).[18] In 2018, the state adopted a version of the IFC for on-demand mobile fueling published that year as IFC Section

13. "Specification DOT 406; cargo tank motor vehicle," 49 CFR 178.346 (2011). https://www.govinfo.gov/app/details/CFR-2011-title49-vol3/CFR-2011-title49-vol3-sec178-346.

14. Ibid.

15. 40 CFR § 112 (2011). https://www.govinfo.gov/app/details/CFR-2018-title40-vol24/CFR-2018-title40-vol24-sec112-1.

16. Haitao Yin et al., "Risk-Based Pricing and Risk-Reducing Effort: Does the Private Insurance Market Reduce Environmental Accidents?", National Bureau of Economic Research, 2009, p. 1. https://www.nber.org/papers/w15100.

17. Haitao Yin et al., "Can environmental insurance succeed where other strategies fail? The case of underground storage tanks," *Risk Analysis* 31:1 (2011). https://www.ncbi.nlm.nih.gov/pubmed/20807380.

18. "2018 International Fire Code," International Code Council, 2018, p. 457. https://www.ci.independence.mo.us/userdocs/ComDev/2018%20INTL%20FIRE%20CODE.pdf

5707.[19] This allowed local fire agencies to adopt rules for how fuel delivery companies are allowed to operate.

In many cases, localities being allowed to adopt rules that make clear what firms may or may not do can yield valuable regime certainty for firms in the industry. It's one of the main reasons to use international standard regulatory codes over rules specific to the political entity. But, these rules had the opposite effect, in part because of the way California divides responsibility for fire code regulation between the state fire marshal and local fire officials.

Different areas of California have different fire risks, so legislators designed fire rules to reflect that. Normally, this does not cause many headaches, as most of the codes are similar enough not to matter much. But, for certain industries that operate across fire districts, building construction and transportation particularly, the costs of a patchwork of similar-but-sometimes-different fire codes can quickly grow to cost-prohibitive levels.

On this front, California's on-demand fueling regulations prove to be particularly problematic. While the state has standards, each local government has the ability to adopt amended rules that are typically more stringent than the state regulations. Local input is a core part of Section 5707, which states that fueling operations, "shall not take place without first obtaining a *permit* and approval from the *fire code official*. Mobile fueling operations shall occur only at *approved* locations" [Emphasis original].[20]

Such a mandate that all fuel delivery actions require local permits from fire officials amounts to giving fire officials veto power over whether delivery firms may operate in any given place. And moreover, these officials have a different set of incentives than elected local politicians, with more reason to act with an abundance of caution in regulating any action that could carry some amount of fire risk. At best, the incentive makes fueling-related fires less likely; at worst, it puts fire officials in the position of regulating a transportation industry they are not trained to fully understand.

One particularly burdensome ambiguity stems from the fact that IFC Section 5707 is unclear about who is to be licensed to facilitate fuel delivery.[21] Some places in California license the operator of the fueling operation. This makes the most sense, as they employ staff who must be trained in fire and spill prevention. But others require a license for each location at which fueling takes place, complete with an inspection of the site prior to the commencement of fueling operations. This method may reduce fire risk at the margin, but comes at great cost. Fuel delivery firms cannot simply add new customers without obtaining new permits or requiring firms to move their vehicles to already approved places for fueling. The former generates substantial regulatory burden for fuel delivery firms and their customers, while the latter destroys the economic raison d'être for delivery in the first place.

Fuming over Fuel Vapors

Beyond fire risk, fueling also has the potential to emit environmentally damaging fumes. These dangers are regulated by the California Air Resources Board (CARB) as part of the state's air quality standards.[22] CARB divides vapor management equipment into two categories, "Phase I" systems for mobile fuel handling equipment and "Phase II" systems for stationary fuel transfers.[23] CARB itself administers regulated Phase I fuel transportation certification, while local air quality management districts are empowered to regulate Phase II stationary fueling activity.

Gas stations and fuel depots are point-sources of air pollution from fuel vapors. And, as fueling is the primary use of the property, local involvement in limiting air pollution from stationary fuel depots is economically efficient. Phase II systems are specifically designed for stationary use, with no such equipment available to use for mobile fueling activity.

This involvement creates complications for fuel delivery firms. Mobile fueling combines aspects of activity requiring both Phase I and Phase II certification. With different standards in place for Phase I and Phase II equipment, delivery firms are put in the position of needing the same devices to meet two different sets of certification requirements. The alternative would be for the state to allow Phase I compliant equipment to be allowed to be used for consumer fueling activity currently limited to Phase II devices, or for the state to certify particular combinations of Phase I equipment as satisfying Phase II standards. A third option would be to certify all mobile fueling activity as "mobile," which would remove the activity from the purview of air quality management districts.

19. California State Fire Marshal, "California Fire Code Chapter 57 Matrix Errata," *Information Bulletin* 18-004, March 20, 2018. https://osfm.fire.ca.gov/media/8462/2018-004-california-fire-code-chapter-57-matrix-errata_ada.pdf.

20. "2018 International Fire Code," p. 457. https://www.ci.independence.mo.us/user-docs/ComDev/2018%20INTL%20FIRE%20CODE.pdf.

21. Ibid.

22. "Greenhouse Gas Standards for Medium- and Heavy-Duty Engines and Vehicles," California Air Resources Board, last accessed Oct. 17, 2019. https://ww2.arb.ca.gov/our-work/programs/ghg-std-md-hd-eng-veh.

23. For more on Phase II systems, see the following document related to the regulation's rulemaking: "Proposed California Greenhouse Gas Emissions Standards for Medium- And Heavy-Duty Engines and Vehicles (Phase 2) And Proposed Amendments To The Tractor-Trailer GHG Regulation," California Air Resources Board, Dec. 11, 2018. https://ww2.arb.ca.gov/rulemaking/2018/phase-2-and-tractor-trailer-amendments-regulation.

What's a gas station anyway?

Local governments hold broad authority to decide where different activities may occur within their borders. After all, the rise of the automobile came before the rise of zoning and thus towns have been regulating when, where and how cars and trucks may be refueled as long as they have been regulating land use.

Traditional gas stations are fuel retailers. Towns typically allow fuel retailing in most—if not all—commercial zones, with the use disallowed in residential areas. Industrial zones can vary, with some allowing retail broadly, others allowing it as a conditional use subject to extra approval, and others disallowing it as a non-industrial use. Local governments may also dictate whether transportation firms are allowed to maintain on-site fuel storage, either underground or in above-ground tanks.

Delivery gasoline activity fits awkwardly into the existing land use regulation framework. IFC 5707 recommends localities ban on-demand fuel deliveries from taking place on public roadsides. So, fuel deliveries must take place on private property. But fuel deliveries are generally short, if regular, actions accessory to the primary use of wherever fueling takes place. The act of refilling a fleet of vehicles parked at a depot overnight is only a small part of the overall use of the lot as a place from which vehicles are stored and dispatched. So, while it may make sense to codify whether a gas station may exist in a given area, local regulators have reason to give fuel delivery firms the same ability to serve customers as other types of deliveries. Codifying deliveries, and fuel deliveries specifically, as accessory uses for all zones that allow substantial car or truck parking lots would therefore provide a valuable complement in the zoning code to IFC 5707's provisions in municipal fire codes.

Beyond land use regulation, California tasks local—specifically county—governments with certification of fuel meter weights and measures. Each year, scales and meters must be certified accurate and sealed to ensure consumers are not being short changed due to faulty or adulterated equipment. In the automotive fuel industry, this is the sticker affixed to each gas pump at fueling stations.

However, things get complicated when the device itself moves across county lines, as is normal with fuel delivery tanker trucks. Each county the meter is used in must certify the device as accurate, creating layers of duplicative inspection and discouraging fueling firms from expanding piecemeal into communities at the edge of their service range.

POLICY REMEDIES

Local governments in California are well equipped to regulate the risks posed by standard gas stations, but the decentralized nature of the fuel delivery market makes the economic case for local regulation less clear-cut. Fuel delivery is a transportation business more than anything else, and like other transportation industries, the regulatory burden of variation in rules across localities adds up quickly. This makes the case for harmonizing local fuel delivery rules, either through state-level regulation, preemption of local regulation or encouraging reciprocity among local rules.

State-level regulation would solve many of the problems associated with the current governance of tanker truck air quality. California already regulates vapors from mobile fuel movements at the state level. Allowing local governments to regulate vapors from retail fueling and the state to regulate vapors from transfers makes sense when there is no retail fuel delivery market. However, these rules become duplicative when the retail action is a mobile vehicle-to-vehicle transfer. A better practice would define all on-demand fuel delivery as "mobile" for air quality regulatory standards, with regulation consolidated at the state level. This would reduce regulatory complexity and lower barriers to entry in the fueling market, while affirming local authority to regulate point-sources of air pollution.

Preemption of local regulation may be more appropriate in relation to fire code compliance certification. IFC 5707 set a clear standard for how fire risks of this industry are going to be regulated for the next few years. It requires input and approval of how and where fueling can take place by local fire officials. Short of mandating all localities to adopt IFC 5707 as-is, the state could seek to put some guardrails on how local governments can regulate this transportation industry. As it stands, through fire officials, local governments can prohibit fuel delivery entirely. This provision is ripe for rent-seeking behavior on the part of incumbent fuel station owners. The state could mandate local governments to allow fueling in places where safety factors are no less than existing gas stations, like industrial sites, retail parking lots and freestanding parking garages. Similar rules could be applied to zoning, with fuel delivery actions made legal in any zone that allows gasoline fueling activity.

Delivery firms also face problems when fire officials require certification of every location where fueling takes place, rather than certification of the fueling firm. These permits typically require sign-off by landowners where the delivery takes place, as well as site-specific inspections and rules—a burdensome process that can move slowly. Preemption may be appropriate to harmonize delivery certification rules such that delivery firms are given jurisdiction-wide permits. Most other transportation industries do not need to get a new permit for each customer they serve and this shift would regulate fuel delivery actions similarly.

Short of state-level regulation or other options that preempt local regulation of fuel delivery, California and similarly regulated states have options to ease the regulatory burden on innovative fueling firms. The state could encourage or require reciprocity among municipal governments in recognizing legitimate fuel delivery operations. This is one solution to weights-and-measures regulations. It is farcical that a fuel meter deemed accurate by inspectors in San Mateo county cannot be used in neighboring Santa Clara county. A better method would allow inspectors to trust their peers elsewhere in the state as competent professionals whose work need not be repeated unless there is specific reason to do so.

CONCLUSION

States have been regulating automotive fueling almost as long as automobiles have existed. Now, the industry is changing, with greater reason for customers to want to have fuel brought to them. To date, state and local officials have reacted irregularly, with fueling delivery regulations differing from county to county and town to town. Like other transportation industries, getting fuel delivery regulation right will require cooperation between officials. Whether through coordination, preemption or state regulation, progress in vehicle fueling is only held back when rules change at municipal borders and thus easing this burden is the key to the industry's future.

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