PLANNING *for* ALTERNATIVE FUEL VEHICLE INFRASTRUCTURE

TULSA AREA CLEAN CITIES

INCOG

Contents

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Photo Credit: Natural Gas Vehicles for America (http://agatest.org/)

Introduction

Gasoline and diesel have long been the predominant vehicle fuels used in the United States. Increasingly, though, concerns ranging from energy security to greenhouse gas emissions are generating heightened interest in transportation fuels other than gasoline and diesel. While fleet vehicle operators were the first to recognize and exploit the advantages of alternative fuels and alternative fuel vehicles (AFVs), consumers have also shown rising interest in using them.

The "chicken and egg" question comes up often in discussions about the prospects for greater use of alternative fuel vehicles—that is, does the availability of fueling/charging stations and fuel delivery infrastructure help generate sales of alternative fuel vehicles or do AFV sales help generate development of needed fueling infrastructure. While the answer is fairly debatable, it seems clear that a robust alternative fuel infrastructure network is critical to greater market adoption of AFVs, especially by consumers. It is also clear that the availability of alternative fuel infrastructure is the issue over which local governments can exert the greatest direct impact.

The alternative fuels addressed in this report are those that can be delivered to the ultimate consumer with relatively modest investments—electricity, natural gas and propane.

This report has been prepared to assist local governments in identifying how zoning and development regulations can be updated to better accommodate alternative fuel infrastructure and thereby help promote use of alternative fuel vehicles. Electricity and gaseous fuels (i.e., propane, compressed natural gas and liquefied natural gas) are the alternative fuels addressed in this report. Vehicles powered by these fuels have a current advantage over other alternative fuels because of the existing electric grid and gas delivery networks. Where adequate power and fuel distribution networks are in place, getting these fuels to the ultimate consumer may require only relatively modest investments in vehicle fueling stations and charging equipment. Local governments can also play a positive role by providing an up-to-date and predictable regulatory framework for prospective alternative fuel infrastructure providers.

Reasor's Foods, Bixby, Oklahoma

Electricity

Background

Electricity is considered an alternative vehicle fuel since it is used to charge the batteries that power the motors in plug-in hybrid and all-electric vehicles. The use of electricity as a fuel source for vehicles can have significant energy security benefits and result in reduced greenhouse gas emissions, even after factoring in emissions from power generating plants.

Battery Charging
Charging plug-in electric vehicles requires plugging into electric vehicle supply equipment. Charging equipment is classified by the rate at which batteries are charged. The higher the voltage, the more quickly a battery can be recharged.

The term "electric vehicle" generally refers to all hybrid electric vehicles, plug-in hybrid electric vehicles and all-electric (or battery-powered electric) vehicles. The U.S. Department of Energy's Alternative Fuels Data Center (www.afdc.energy.gov) is an excellent source of information on all types of alternative fuels and alternative fuel vehicles

Several states, regional agencies, and local governments have established themselves as leaders in supporting development of electric vehicle charging infrastructure networks, which can include at-home plug-in recharging equipment and publicly accessible EV charging stations. Largely as a result of such efforts, the network of EV charging infrastructure is rapidly expanding in most U.S. markets. Still, public EV charging stations are not nearly as widely available as traditional gas stations, which is due at least in part to a lack of zoning and code support.

Zoning Regulations

While the number local zoning ordinances that support and promote electric vehicle charging infrastructure has grown considerably in recent years, most ordinances remain silent on the subject. This section identifies zoning ordinance provisions that may require review and revision to better accommodate electric vehicle infrastructure and support more widespread use of electric vehicles.

Definitions

As with any zoning issue, clearly defining operative terms and using such terminology consistently is essential in crafting new or amended ordinance provisions. The following definitions, adapted from Plug-in Ready Michigan: An Electric Vehicle Preparedness Plan, are common elements of many modern electric vehicle infrastructure ordinances:

Battery charging station

An electrical component assembly or cluster of component assemblies designed specifically to charge batteries within electric vehicles.

Charging levels

The standardized indicators of electrical force, or voltage, at which an electric vehicle's battery is recharged.

1. *Level 1 is considered slow-charging. Voltage including the range from 0 through 120. (Also referred to as AC Level 1)*
2. *Level 2 is considered medium-charging. Voltage is greater than 120 and includes 240. (Also referred to as AC Level 2)*
3. *DC fast charging. Voltage is greater than 240. (Also referred to as Level 3)*

Electric vehicle

Any vehicle that is licensed and registered for operation on public streets and that is powered wholly or partially by electrical energy from the grid or by an off-board source that is stored on-board via a battery for motive purpose. The term "electric vehicle" includes battery electric vehicles and plug-in hybrid electric vehicles.

Battery electric vehicle

Any vehicle that operates exclusively on electrical energy from an off-board source that is stored in the vehicle's batteries and produces zero tailpipe emissions or pollution when stationary or operating.

Plug-in hybrid electric vehicle

An electric vehicle that:

1. *contains an internal combustion engine and also allows power to be delivered to drive wheels by an electric motor;*
2. *charges its battery primarily by connecting to the grid or other off-board electrical source;*
3. *may be able to sustain battery charge using an onboard internal-combustion-driven generator; and*
4. *has the ability to travel powered by electricity.*

Electric vehicle charging station

A public or private parking space that is served by battery charging station equipment that has as its primary purpose the transfer of electric energy (by conductive or inductive means) to a battery or other energy storage device in an electric vehicle.

Electric vehicle charging station, accessible

An electric vehicle charging station that is located within accessible reach of a barrier-free access aisle and the electric vehicle.

Electric vehicle charging station, private restricted-use

An electric vehicle charging station that is not available for use by the general public (e.g., within a private, within restricted access parking lots or fleet parking areas).

Electric vehicle charging station, public use

An electric vehicle charging station that is available for use by the general public.

Electric vehicle infrastructure

Conduit/wiring, structures, machinery, and equipment necessary and integral to support an electric vehicle, including battery charging stations.

Electric vehicle parking space

Any marked parking space that identifies the use to be exclusively for the parking of an electric vehicle.

Electric vehicle supply equipment

Industry term for charging hardware located at charging stations provided for the purpose of safely charging electric vehicle batteries.

Non-electric vehicle

Any motor vehicle that does not meet the definition of electric vehicle.

Allowed Uses

When a use or activity is not listed as an allowed use in a jurisdiction's zoning ordinance it can create confusion, delays or even an interpretation that such use is not allowed. Amending the zoning ordinance's use regulations to expressly identify electric vehicle charging stations as allowed use is an important step in signaling community support for widespread use of electric vehicles.

It is becoming increasingly common for modern zoning ordinances to identify electric vehicle charging stations as an allowed accessory use to any principal use. Such provisions are sometimes coupled with conditions that electric vehicle charging in residential zones be restricted for use by residents or otherwise not be available for use by the general public.

Level 1 Charging
Level 1 (sometimes referred to as AC Level 1) is the slowest charging level—4 to 5 miles of range per hour of charging. It occurs through ordinary household (120-volt) outlets. Level 1 charging is great for overnight fill-ups, but not well suited to long-distance travel.

Level 2 Charging
Level 2 (sometimes referred to as AC Level 2) charging offers faster charging speeds through use of 240 volt (208V for commercial) electrical service, the same as required for most electric ovens and clothes dryers. Level 2 charging stations are capable of charging at much faster rates than level 1 charging equipment—25 to 70 miles of range per hour of charging. Level 2 vehicle charging stations are suitable for home garages and are also becoming commonplace along many streets and in private parking lots.

DC Fast Charging
DC fast charging (sometimes referred to as Level 3) enables the fastest charging currently available (typically 480 V)—at approximately 240 miles of driving range per hour of charge time.

Whole Foods Market, Tulsa, Oklahoma

When principal use vehicle charging stations are addressed in local zoning ordinances, they are usually lumped into the same use category as gasoline service stations and regulated in the same manner as conventional fueling stations. A reasonable case can be made, however, for relaxing use restrictions on electric vehicle charging as a principal use because of the reduced risk of fuel spills, contaminated runoff and tailpipe emissions from idling vehicles.

Off-Street Parking

Electric vehicle charging stations should also be addressed in the off-street parking chapter of local zoning ordinances. To avoid potential confusion, for instance, it is wise to include ordinance provisions allowing parking spaces served by electric vehicle charging equipment to be counted when determining compliance with minimum off-street parking requirements.

A model ordinance prepared by Clean Cities Atlanta recommends creating incentives for providing electric vehicle charging stations by crediting each charging station-equipped parking space as 3 parking spaces.

The City of Grand Rapids (MI) goes a step further by counting any parking space "reserved, signed, and enforced for Low-Emitting and Fuel Efficient Vehicles (defined as vehicles classified as "Zero Emission Vehicles" by the California Air Resources Board or have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy annual vehicle rating guide) as 4 regular parking spaces."

Many zoning ordinances specify that required off-street parking spaces not be used for the sales, display or servicing of vehicles. Such provisions should be revised to clarify that such regulations are not intended as a prohibition on EV charging.

Accessible Design

The Americans with Disabilities Act (ADA) specifies that reasonable accommodation be made to ensure accessibility of all amenities provided to the general public.

This includes electric vehicle charging equipment and other conventional and alternative fueling infrastructure.

Although ADA does not include specific standards, it does provide general guidance related to routes, clearances, and parking spaces.

Some states, too, have developed guidelines related to charging station accessibility.

Reasor's Foods, Bixby, Oklahoma

Equipment Design

The following provisions from Walla Walla, Washington's ordinance (municipal code Chapter 156) are typical of other design-related zoning issues aimed at EV infrastructure:

Signage

Each charging station space shall be posted with signage indicating the space is only for electric vehicle charging purposes. Days and hours of operations shall be included if time limits or tow away provisions are to be enforced.

Maintenance

Charging station equipment shall be maintained in all respects, including the functioning of equipment. Contact information shall be provided on the charging station equipment for reporting when the equipment is not functioning or other problems are encountered.

Accessibility

Where charging station equipment is provided within an adjacent pedestrian circulation area, such as a sidewalk or accessible route to the building entrance, the charging equipment shall be located so as not to interfere with accessibility requirements.

Lighting

Where charging station equipment is installed, adequate site lighting shall exist, unless charging is for daytime purposes only.

Recommendations

The following recommendations are intended to accommodate and promote provision of electric vehicle charging infrastructure through zoning and parking policies. The measures recommended here should be adapted to reflect local planning policies and anticipated demand for electric vehicle infrastructure.

1. **Permit electric vehicle charging as an allowed accessory use in all zoning districts.**
2. **Expressly identify where principal use EV charging facilities are allowed, and subject them to the same (or more favorable) regulatory treatment as conventional gasoline stations.**
3. **Allow EV charger-equipped parking spaces to be counted towards satisfying minimum parking requirement, or as an incentive, consider counting them as more than one space.**
4. **Examine the EV-readiness code provisions found in the Mountlake Terrace (WA) code summary in the following section to determine if similar or modified provisions might be a good fit in your community.**

Ordinance Summaries

Dallas, Texas

In 2012, Dallas amended its zoning code to expressly allow accessory electric vehicle charging stations in all residential and nonresidential zoning districts. The code provisions allow up to 10% of a use's required parking to be reserved for electric vehicle charging. Equipment must be placed so that charging cords do not obstruct or cross sidewalks or pedestrian walkways. The Dallas ordinance eschews technical jargon and complexity and defines an "accessory electric vehicle charging station" as "a facility that provides electrical charging for vehicles.

Kansas City, Missouri

Kansas City requires that plug-in electric (PEV) vehicle parking spaces be reserved for parking and charging PEVs only. The code specifies that PEV parking spaces not impede pedestrian, bicycle, or wheelchair movement or create safety hazards. Spaces (or charging equipment) must have signage identifying any applicable use, fee, or safety information and indicating that the space is reserved for charging purposes only. PEV parking spaces in off-street parking facilities may be counted toward the off-street parking space requirements outlined in the City's Zoning and Development Code.

Kane County, Illinois

Kane County enacted its EV infrastructure ordinance (Chapter 28 of the county code) in February 2012. The regulations expressly allow Level-1 and Level-2 charging stations as an accessory uses in all zoning districts, with the caveat that stations in residential areas must be designated for private use only. Installation of Level-2 charging stations is subject to building permit approval. Level-3 charging stations are permitted in the commercial and industrial districts as an accessory use, subject only to building permit approval. Principal use charging facilities and battery exchange stations are regulated in the same manner as gasoline service stations.

While Kane County's regulations do not require the provision of EV charging equipment in parking lots, they do allow parking spaces served by charging equipment to be counted when determining compliance with minimum off-street parking requirements.

Plug-in Georgia Model Ordinance

Plug-in Georgia, an offshoot of Atlanta Clean Cities, has prepared a model electric vehicle infrastructure ordinance. While the model ordinance contains many of the same features as the other ordinances described in this section, it also includes two unique provisions:

1. It allows a use's off-street parking requirement to be reduced in exchange for parking spaces that are newly constructed or converted for use as electric vehicle charging spaces. The model ordinance's recommended approach would allow for each electric vehicle charging space to be counted as 3 parking spaces.
2. It also attempts to clarify that electric vehicle charging does not violate a provision that is common to many zoning ordinances, by stating that

Dallas amended its zoning code to expressly allow accessory electric vehicle charging stations in all residential and nonresidential zoning districts.

TABLE 1 — Minimum EV Parking Space Requirements, Mountlake Terrace (WA)

Land Use	Minimum Percentage of Parking Spaces Served by Charging Stations
Multi-unit residential	10
Lodging	3
Medical Office	3
Retail	1
Eating and Drinking Establishments	1
Civic/Institutional	1

otherwise applicable ordinance provisions prohibiting the sale, repair, dismantling or servicing of any vehicles or equipment from required parking spaces does not apply to electric vehicle charging.

Mountlake Terrace, Washington

Mountlake Terrace's ordinance expressly allows Level-1 and Level-2 charging stations as a permitted use in all zoning districts. Level-3 charging and battery exchange stations are permitted in all commercial and industrial zones. While these provisions provide a clear signal of the desire to accommodate electric vehicle infrastructure, the city's EV infrastructure strategy goes far beyond the mere removal of possible regulatory obstacles.

Among the ordinance's many additional features are "EV readiness" requirements that (1) builders of new single-family homes "rough-in" garage wiring for a Level-2 charging station and (2) new developments provide electric vehicle charging stations within most new and expanded parking lots. The minimum requirements are broken down by land use, as shown in Table 1, above.

The Mountlake Terrace ordinance (Chapter 19.126 of the City's municipal code) establishes signage and other design standards for charging station parking spaces and includes minimum requirements for the number of EV charging stations that are accessible to people with disabilities (referred to as "accessible" EV charging stations). See Table 2 on page 11.

Los Angeles, California

Plug-In Electric Vehicle (PEV) Ready Building Requirements.

Newly constructed buildings in Los Angeles must provide the necessary hardware for plug-in electric vehicle charging. One- and two-family dwellings and townhouses must be equipped with at least one PEV charging outlet, which is a 208/240 volt, 40 ampere, grounded alternating current outlet, or panel capacity and conduit for such outlet installation.

Other residential buildings that have a common parking area must be equipped with PEV charging outlets in at least 5% of the total parking spaces or panel capacity and conduit for these upgrades in the future. The parking area of new high-rise residential and non-residential buildings must include PEV charging outlets in at least 5% of the total parking spaces.

Mercer Island, Washington

The City of Mercer Island has developed an easy process for obtaining permits to install EV charging equipment. In most cases the installation requires only a simple electrical permit. Electrical permits for EV charging stations for single-family homes can be issued over-the-counter or even online. The following is an excerpt from the City's online informational handout:

Permit Submittal Requirements and Fees.

For Level-1 and Level-2 charging stations, the permit process is very simple. Fill out the electrical permit application (front and back) at the Permit Center, where the permit will be issued over-the-counter. You can also go online to: www.mybuildingpermit.com. Based on your specific proposal, the typical fee is $127, which includes the cost of inspection.

TABLE 2 — Minimum EV Parking Space Requirements, Mountlake Terrace (WA)

Number of EV Charging Stations	Minimum Number of (ADA) Accessible Charging Stations
5–50	1
51–100	2
101–150	3
151–200	4
201–250	5
251+	6

LEED v4

Providing preferred or discounted parking for certain electric vehicles and installing electric vehicle infrastructure can count for up to 1 credit under the latest version of U.S. Green Building Council's LEED certification program (Green Vehicles Credit). In order to obtain the credit, applicants for LEED certification must designate at least 5% of all project parking spaces as preferred parking for green vehicles or offer a discounted parking rate of at least 20% for green vehicles. In addition to providing preferred or discounted parking, the project must comply with one of the two following options for alternative-fuel fueling stations:

Option 1. Electric vehicle charging

Install level 2 charging equipment in at least 2% of all project parking spaces. Clearly identify and reserve these spaces for the sole use by plug-in electric vehicles.

OR

Option 2. Liquid, gas, or battery facilities

Install liquid or gas alternative fuel fueling facilities or a battery switching station capable of refueling a number of vehicles per day equal to at least 2% of all project parking spaces.

[Note: For the purposes of this LEED credit, "green vehicles" must achieve a minimum green score of at least 45 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide.]

New Haven, Connecticut

The City of New Haven provides free parking on all city streets for HEVs and AFVs registered in New Haven that have a U.S. Environmental Protection Agency city or highway fuel economy rating of at least 35 miles per gallon. HEV and AFV vehicle owners must obtain a non-transferable pass from the Department of Traffic and Parking to place on the vehicle's dashboard or hang from the rear view mirror. AFVs and HEVs are otherwise subject to all time and other posted parking restrictions.

OnCue Express, Oklahoma City, Oklahoma

Gaseous Fuels

When it comes to alternative fuel vehicles, gaseous fuels, including natural gas and propane are playing an increasingly important role because of their many benefits, including plentiful domestic supplies, reduced levels of harmful emissions and reduced threats to soil and water (in the event of spills).

Liquefied Petroleum Gas (Propane Autogas)

Liquefied petroleum gas (LPG) is commonly referred to as "propane autogas" when used as a transportation fuel. It is clean-burning, energy-efficient, domestically available and relatively low cost alternative to gasoline or diesel. Since propane is widely used as a heating fuel, production, storage and distribution networks are already in place across most of the U.S. As a result, propane autogas is the third most common engine fuel in the U.S., behind gasoline and diesel.

Propane fueling infrastructure is very similar to that used for conventional gasoline and diesel fuel stations. Propane is delivered to the fueling site by truck, then placed into an on-site storage tank, which is typically located above ground. Even the fueling dispenser is similar to a gasoline or diesel fuel pump. The biggest difference between conventional fuels and propane is that in order for propane to remain in its liquid state, it must be dispensed into vehicles under pressure.

National Codes

The design and installation of propane infrastructure is typically guided by the National Fire Prevention Association's Vehicular Liquefied Petroleum Gas Code (NFPA 58). Like the corresponding codes that address natural gas fueling sites (e.g., International Fire Code and NFPA 52), NFPA 58 includes an extensive set of design, location and safety standards, including minimum setback and separation distance requirements from storage tanks and fuel transfer areas. See Table 3 (below) and 4 (next page) for examples of such requirements.

Recommendations

Land use and zoning issues surrounding propane autogas stations and refueling facilities are really no different than those surrounding other alternative and conventional fuels. In fact, the discussion and recommendations regarding zoning for natural gas vehicle fueling facilities is equally relevant to propane autogas vehicle fueling stations (see pp. 16–21).

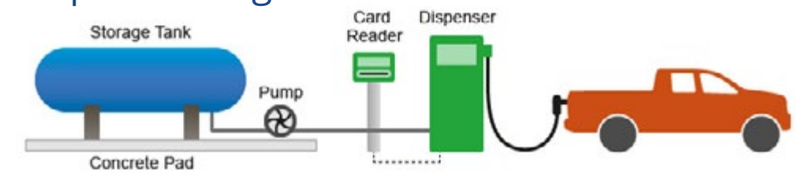
TABLE 3 — Propane Storage Separation Requirements, NFPA 58

Tank Size (gallons)	**Minimum Distance between Containers, Important Buildings and other Properties** (feet)
Less than 125	0
125–250	10
251–500	10
501–2,000	25
2,001–30,000	50

TABLE 4 — Propane Fueling Separation Requirements, NFPA 58

Exposure	**Minimum Distance between Point of Fuel Transfer and Exposure** (feet)
Building with Fire-resistive Walls	10
Building without Fire Resistive Walls	25
Property that Can be Built Upon	25
Public Assembly Areas (e.g., playgrounds)	50
Driveways	5

Propane Autogas Station



Source: Alternative Fuels Data Center, US DOE

Propane autogas fueling. Photo Credit: Sharp Energy

Natural Gas

Like liquefied petroleum gas, natural gas is clean-burning, domestically produced, relatively low-priced, and widely available. Despite these attributes, natural gas vehicle fueling infrastructure remains relatively limited, and very few zoning codes specifically address such facilities.

Two forms of natural gas are used to power motor vehicles: CNG (compressed natural gas), which is used in light-, medium-, and heavy-duty applications and LNG (liquefied natural gas), which is typically used in trucks and heavy-duty vehicles needing a longer travel range or large on-board fuel storage capacity.

Liquefied Natural Gas

LNG is stored, transported and dispensed as a liquid. While LNG can be produced on-site from locally available natural gas, it is typically delivered to natural gas fueling stations via tanker truck. In either case, the fuel is stored on-site in special double-walled cryogenic storage tanks. LNG is dispensed into vehicles much like gasoline and other liquid fuels, except that the super-cooled nature of LNG involves more sophisticated fueling equipment and requires the use of protective gear (e.g., eye protection and gloves) while fueling.

Compressed Natural Gas

CNG is used in its gaseous form and stored at high pressures. There are two key variations on CNG fueling: fast-fill and time-fill. The main structural differences between the two are the amount of on-site storage capacity and the size of the compressor.

Fast-fill CNG Stations

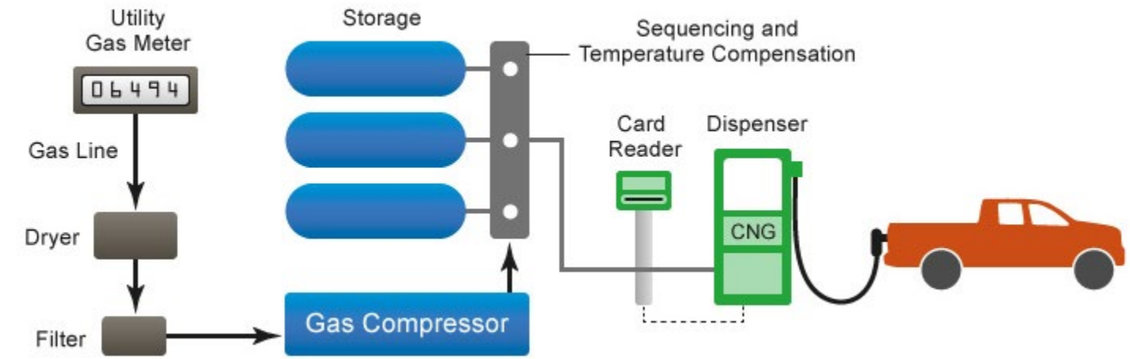
Fast-fill CNG stations receive fuel from the gas company at low pressures and then compress the gas to much higher pressures. After passing through the compression equipment, CNG is stored at high pressure in a series of storage tanks until a vehicle arrives for fueling. Refueling times at CNG fast-fill stations are similar to gasoline service stations.

Fast-fill CNG stations are generally best suited for retail fueling of vehicles and are currently the types of facilities most often adapted for public (consumer-oriented) natural gas fueling stations. With fast-fill CNG fueling stations, the required compression and dispensing equipment generally takes up only a small area, but depending on the size of the facility, the storage area requirements (for tanks) can be high. While natural gas storage tanks can be buried, they rarely are due to the requirements for ventilation and the associated higher cost of underground installation.

Time-Fill CNG Stations

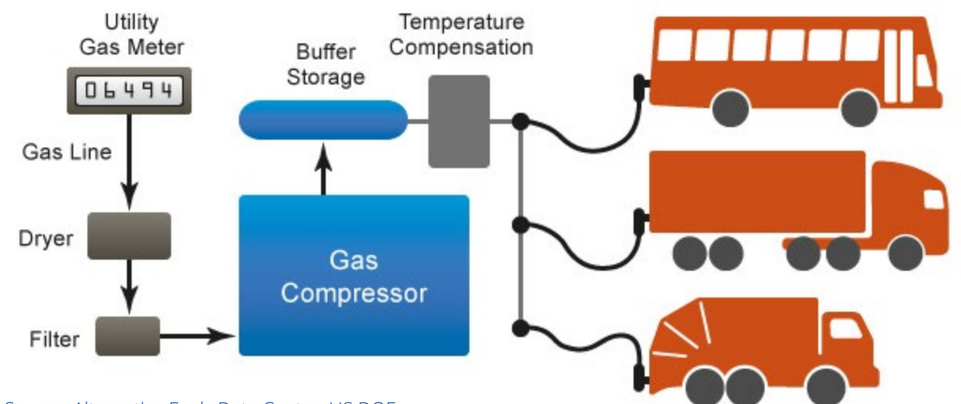
Like fast-fill stations, time-fill stations receive fuel at low pressure from the gas utility and then increase the gas to a higher pressure through the use of a compressor. Unlike fast-fill stations, however, vehicles fueling at time-fill stations are usually filled directly from the compressor, not from fuel stored in tanks. Time-fill CNG stations are used mostly by fleets and vehicles with large fuel tanks that can refuel overnight. They can also be used for home fueling, through the use of small CNG fueling appliances, typically installed in a garage.

Fast-Fill CNG Station



Source: Alternative Fuels Data Center, US DOE

Time-Fill CNG Station



Source: Alternative Fuels Data Center, US DOE

Apache Natural Gas, Tulsa, Oklahoma

National Codes

State and local governments have adopted a variety of codes and standards to regulate the construction and installation of natural gas fueling facilities. The two most prominent national codes are NFPA 52 and the International Fire Code (IFC), which are promulgated by the National Fire Protection Association and the International Code Council, respectively. Some states have their own codes, often based on these national codes. Station operators report that determining which codes will govern the design and construction of new stations is often the most challenging aspect of building a new natural gas fueling facility.

Blue Energy Fuels, Owasso, Oklahoma

In crafting new or revised zoning provisions, planners should be aware that the state and national codes governing natural gas storage and fueling facilities establish safety-related setback and separation requirements. NFPA 52, for example, establishes several CNG facility design and siting requirements that are relevant from a zoning perspective, such as the following:

8.4.2.3 Compression, storage, and dispensing equipment located outdoors shall be above ground, shall not be beneath electric power lines or where exposed by their failure, and shall be a minimum of 10 feet from the nearest important building or line of adjoining property that can be built upon or from any source of ignition.

8.4.2.4 Compression, storage, and dispensing equipment located outdoors shall be not less than 10 feet from the nearest public street or sidewalk line and at least 50 feet from the nearest rail of any railroad main track.

8.4.2.5 A clear space of at least 3 feet shall be provided for access to all valves and fittings of multiple groups of containers.

8.4.2.6 Readily ignitable material shall not be permitted within 10 feet of any stationary container.

8.4.2.7 The minimum separation between containers and aboveground tanks containing flammable or combustible liquids shall be 20 feet.

8.4.2.8 During outdoor fueling operations, the point of transfer shall be located at least 10 feet from any important building, mobile home, public sidewalk, highway, street, or road and at least 3 feet from storage containers. Exception: The point of transfer shall be permitted to be located at a lesser distance from buildings or walls constructed of concrete or masonry materials or of other material having a fire resistance rating of at least 2 hours, but at least 10 feet from any building openings.

12.2.2.5 [For LNG facilities] Points of transfer shall be located not less than 25 feet from the nearest important building not associated with the LNG facility, from the line of adjoining property that can be built upon, or from fixed sources of ignition.

If any local regulations are established, care should be taken to ensure that such regulations do not conflict with applicable national fire and safety code standards. Although zoning regulations cannot solve the sometimes confusing and conflicting nature of the national code debate, such regulations should not present a redundant or unnecessary regulatory obstacle for the development of alternative fuel vehicle infrastructure.

Zoning Regulations

Research conducted in 2014 suggests that very few zoning and development ordinances expressly address natural gas fueling stations. The absence of clear guidance often means that local officials and prospective station developers will be forced to navigate their way through the local zoning approval and permit process without a clear road map. This section identifies possible zoning ordinance modifications that can provide greater certainty for those wishing to establish natural gas fueling infrastructure, which will, in turn, support greater use of natural gas vehicles.

When it comes to zoning, the central question any station operator has is "where is my proposed facility allowed? For this reason, it is important that local zoning ordinances expressly identify natural gas fueling stations as an allowed use within one or more zoning districts.

A simple, straight-forward and reasonable approach would be to specify that retail-oriented natural gas fueling stations are in the same use category as conventional

service stations, thereby regulating retail sales of conventional and alternative fuel in the same manner, at least for zoning purposes. To do this, it is important that the ordinance's "fueling station" definition be written broadly enough to encompass facilities that dispense conventional and alternative fuels, including natural gas.

Some jurisdictions will want to regulate fleet vehicle fueling facilities and truck stops separately from (consumer-oriented) retail fueling stations, in which case the definition and use regulations will need to draw this distinction. Other communities may elect to regulate the location or the design of fueling stations based on the size and type (underground, horizontal above-ground or vertical above-ground). In all cases, however, it is not the type of fuel, but rather the design and operational characteristics (e.g., traffic and expected vehicle use) of the fueling facility that should be the basis for any land use and zoning distinctions.

In Dallas, one of only a few jurisdictions with specific zoning regulations for natural gas fueling facilities, "motor vehicle fueling stations" are defined simply as facilities for the retail sale of motor vehicle fuel dispensed from pumps or electric vehicle charging stations, excluding truck stops and liquefied natural gas fueling stations. The Dallas ordinance goes on to define "liquefied natural gas fueling stations" as facilities for the retail sale of liquefied natural gas from pumps to commercial motor vehicles.

Recommendations

The following recommendations are intended to accommodate and promote propane and natural gas vehicle fueling infrastructure through zoning practices. The measures recommended here should be adapted to reflect local land use planning policies and anticipated demand for natural gas vehicle fueling infrastructure.

1. **Expressly permit propane and natural gas vehicle fueling facilities in the same zoning districts as conventional vehicle fueling facilities.**
2. **If use-specific regulations are imposed, ensure they are not redundant with and do not conflict with any applicable standards (e.g., NFPA 52, NPFA 58 or IFC).**
3. **Allow consumer-oriented natural gas fueling appliances as an allowed accessory use.**
4. **Establish clear and predictable regulations and procedures governing development approval and permitting.**
5. **Consider counting parking spaces that are reserved for alternative fuel vehicles as multiple spaces, thereby reducing a use's off-street parking requirements.**

A proposed amendment to the Tulsa zoning code would establish the following new definitions to clarify the zoning treatment of natural gas fueling stations, fleet fueling facilities and truck stops:

Fueling Station (for Personal, Consumer Vehicles)
Uses engaged in retail sales of vehicle fuels for personal vehicles, other than fleet fueling facilities and truck stops. (Note: Fleet vehicle fueling facilities and truck stops are part of the "Commercial Vehicle Repair and Maintenance" specific use type). Fueling stations may dispense conventional vehicle fuels and/or alternative vehicle fuels.

Commercial Vehicle Repair and Maintenance
Uses, excluding vehicle paint finishing shops, that repair, install or maintain the mechanical components or the bodies of large trucks, mass transit vehicles, large construction or agricultural equipment, aircraft or similar large vehicles and vehicular equipment. Includes truck stops and fleet vehicle fueling facilities, which may dispense conventional vehicle fuels and/or alternative vehicle fuels.

Vehicle Fuels, Alternative
Electricity, CNG (compressed natural gas), LNG (liquefied natural gas), LPG (liquefied petroleum gas), hydrogen or other alternatives identified in the U.S. Energy Policy Act of 1992.

Vehicle Fuels, Conventional
Gasoline and diesel fuel.

Effective visual screening and vintage Route 66 styling at Blue Energy Fuels in Owasso, Oklahoma.

Ordinance Summaries

Dallas, Texas

The City of Dallas recently amended its development code to expressly address CNG and LNG fueling facilities, as well as establishments that offer electric vehicle charging as a primary use. The amendments clarify that CNG fueling and EV charging stations fall under the code's "motor vehicle fueling station" use classification and are therefore allowed wherever conventional service stations are allowed. Supplemental regulations for all fueling stations require that fuel pumps be set back at least 18 feet from all lot lines and stipulate that storage tanks for motor vehicle fuels, other than compressed natural gas, be located underground. Above-ground storage tanks used in connection with CNG fueling facilities are required to be screened from view.

(19) Motor vehicle fueling station.

(A) Definition: A facility for the retail sale of motor vehicle fuel dispensed from pumps or electric vehicle charging stations. This use does not include a truck stop or a liquefied natural gas fueling station as defined in this section.

(B) Districts permitted: By right in CR, RR, CS, industrial, central area, mixed use, and multiple commercial districts. By right as a limited use only in MO(A) and GO(A) districts. By SUP only in MF-3(A), MF-4(A), and NS(A).

(C) Required off-street parking: Two spaces. No handicapped parking is required.

(D) Required off-street loading: Sufficient space must be provided to for the unloading of a fuel truck.

(E) Additional provisions:

(i) Except for compression cylinder tanks used in connection with compressed natural gas fueling facilities, all storage tanks for motor vehicle fuel must be underground.

(ii) A fuel pump island must be constructed in a manner that allows vehicular access adjacent to the island without interfering with or obstructing off-street parking. The building official shall not issue a permit for construction of a pump island until its placement has been approved by the director.

(iii) Fuel pumps are permitted as an accessory use only if they meet the following:

(aa) The pumps must be available only to the owner and tenant of the main building and not available to the general public.

(bb) The fuel pump and any sign relating to the pump must not be visible from the public street. No sign may be erected indicating the availability of motor vehicle fuel.

(iv) Fuel pumps must be located at least 18 feet from the boundary of the site.

(v) Compression cylinder tanks used in connection with compressed natural gas fueling facilities must be screened from adjacent streets, alleys, and residential uses.

LNG

Under the Dallas code, LNG stations are defined and regulated separately from motor vehicle fueling stations. LNG fueling stations are permitted by right in the city's industrial zoning districts, but require special use approval if they include more than 4 pumps or are located within 1,000 feet of residential zoning.

Supplemental regulations for LNG stations establish minimum setbacks for liquefied natural gas storage tanks, fuel pumps, and points of (fuel) transfer. Setbacks are required from buildings, property lines, sources of ignition, public streets and sidewalks.

(16.1) Liquefied natural gas fueling station.

(A) Definitions: In this paragraph:

(i) Commercial Motor Vehicle means a motor vehicle that:

(aa) is designed or used for the transportation of cargo;

(bb) has a gross weight, registered weight, or gross weight rating in excess of 26,000 pounds; and

(cc) is not owned or operated by a governmental entity.

(ii) Liquefied Natural Gas Fueling Station means a facility for the retail sale of LNG from pumps to commercial motor vehicles.

(B) Districts permitted:

(i) By right in LI, IR, and IM districts, but SUP required if the use has more than four fuel pumps or is within 1,000 feet of a residential zoning district or a planned development district that allows residential uses.

(ii) By SUP in only in the CS district.

(C) Required off-street parking: None.

(D) Required off-street loading: Sufficient space must be allowed for the unloading of a liquefied natural gas fuel truck.

(E) Additional provisions:

(i) No overnight parking is allowed.

(ii) No signage is permitted on liquefied natural gas storage tanks except for required safety signage.

(iii) A fuel pump island must be constructed in a manner that allows vehicular access adjacent to the island without interfering with or obstructing off- street parking. The building official shall not issue a permit for construction of a pump island until its placement has been approved by the director.

(iv) Liquefied natural gas storage tanks, fuel pumps, and related equipment may not be located beneath electric power lines.

(v) Liquefied natural gas storage tanks, fuel pumps, and related equipment must be located at least 10 feet from the nearest building, property line, any source of ignition, or nearest public street or sidewalk.

(vi) Liquefied natural gas storage tanks, fuel pumps, and related equipment must be located at least 50 feet from the nearest rail of any railroad main track.

(vii) A clear space of at least 3 feet must be provided for access to all valves and fittings.

(viii) During fueling operations, the point of transfer (the point where the fueling connection is made) must be at least 10 feet from any building or public street or sidewalk, and at least three feet from any storage tanks or containers. The point of transfer may be a lesser distance from buildings or walls made of concrete or masonry materials, or of another material having a fire resistance rating of at least two hours, but the point of transfer must be at least 10 feet away from any building openings.

Chino, California

The City of Chino has taken the forward-looking step of requiring new home construction to include plumbing for a possible home natural gas fueling appliance. Section 15.24.050 of the city's municipal code (Gas Piping for CNG vehicles), states:

> *All newly constructed privately owned residential garages shall have a gas line and electrical outlet installed to a point along the garage wall that is near the vehicle fuel opening so that compressed natural gas fueling of a vehicle could occur in the future without obstruction. The gas service line shall be a minimum of ½"NPT and the electrical outlet shall be a dedicated 120VAC, 15 amp GFCI protected outlet. Gas line and electrical outlet to be installed a minimum of 24 inches above finished floor and within 36 inches horizontally from each other.*

Batavia, Illinois

Batavia's zoning code defines and regulates three types of fueling facilities. The code is most notable, however, because it allows alternative fueling in several districts in which conventional fueling is not allowed. Fleet fueling is allowed only in industrial districts.

Fueling Facility
A facility for the retail sale of vehicle fuel. Incidental uses may include convenience retail sales less than 1,000 square feet, an Automated or Self- Service Car Wash, Light Vehicle Services and Alternative Fueling Facilities. (allowed only in all commercial districts)

Fueling Facility, Alternative
Commercial sale of propane, natural gas, hydrogen, electric, or other alternative fuels to be used in vehicles. (allowed in all office, service, commercial and industrial districts)

Fueling Facility, Fleet
Fuel dispensing limited to fleet vehicles such as delivery trucks, school buses, and municipal vehicles where no retail sales are conducted. (allowed only in all industrial districts)

Duluth, Minnesota

Duluth classifies natural gas and alternative fueling stations as "filling stations" and allows them in a wide range of commercial, mixed-use and industrial districts.

The city has prepared a one-page handout (on the next page) to guide those interested in establishing CNG fueling stations.

City of Duluth
Construction Services & Inspections Division
411 West First Street • Room 210 • Duluth, Minnesota • 55802-1164
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Compressed Natural Gas Fueling Stations

March 2013

Compressed natural gas fueling stations are regulated by the Minnesota Fuel Gas Code (part of the MN State Building Code,) the Minnesota State Fire Code and City of Duluth Engineering regulations and must be installed in accordance with manufacturer's instructions.

CNG fueling stations (CNGFS) are not permitted within buildings and are required to be located not less than 10 feet away from buildings and lot lines.

The following are permitting, review and inspection requirements for CNG fueling stations:

Permits

- A plumbing contractor licensed in Minnesota must make a plumbing gas piping permit application and submit a site plan showing the proposed location of the CNGFS and manufacturer's instructions to the Construction Services office for review.
- Before the permit is approved, the Fire Marshal's office will conduct a site visit to observe the location of the proposed CNGFS.
- Duluth Engineering will review the location of the CNGFS shown on the site plan and determine if adequate gas supply is available based upon the increased load.
- After the plumbing permit has been approved, an electrical permit is required for wiring the CNGFS. Work must be in accordance with NEC Article 514 and other applicable regulations.

Inspections

- After plumbing and electrical permits are issued, plumbing, fire and electrical inspections are required.

Contact Information

Permitting Information	218/730-5240
Plumbing and Electrical Inspection Information	218/730-5161
City Engineering	218/730-5200
Fire Marshal's Office	218/730-4380

TULSA AREA
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