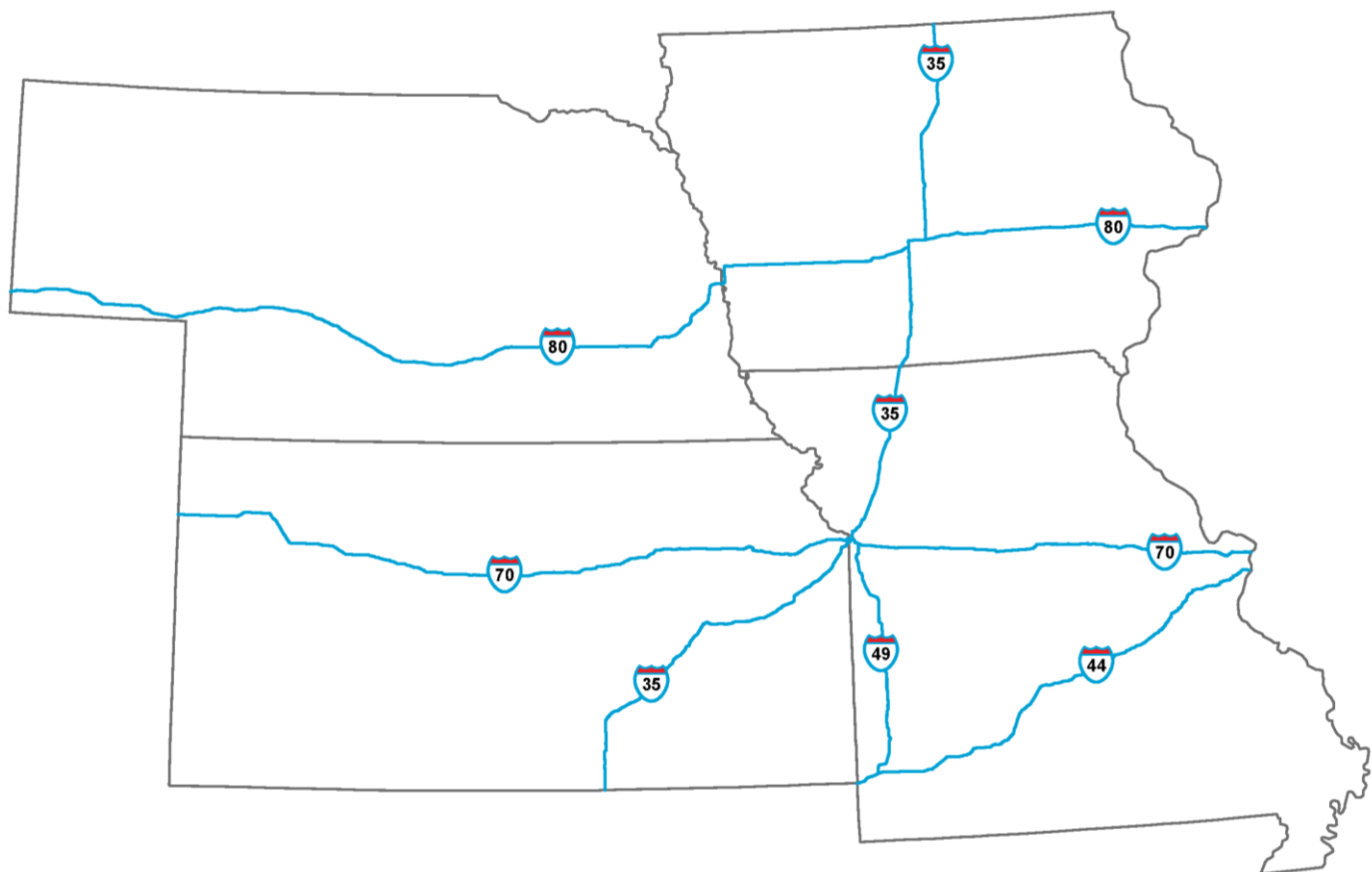


ALTERNATIVE FUELS CORRIDOR STUDY

MAY 2016



Mid-America Collaborative for Alternative Fuels Implementation



www.metroenergy.org

Metropolitan Energy Center

816-531-7283

Supported by funds from U.S. Dept. of Energy Award No. DE-EE0006009.

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EXECUTIVE SUMMARY

Executive Summary

The Mid-America Alternative Fuels Corridor Study (Corridor Study) focuses on fueling stations for compressed and liquefied natural gas (CNG and LNG), propane autogas (LPG), and biodiesel (B20 and higher blends) for heavy-duty class 7-8 trucks along interstate highways I-80, I-70, I-49, I-44 and I-35 in Missouri, Kansas, Nebraska, and Iowa. This Corridor Study collected information on existing stations, known stations planned for completion in 2015, vehicle miles traveled (VMT) on selected interstates, projections on heavy-duty truck alternative fuel vehicles and traffic, and signage for stations offering alternative fuels. The study includes recommendations for numbers, locations and types of alternative fueling stations along identified corridors.

The unique characteristics of each alternative fuel and its infrastructure make for complex implications. A full accounting of all possible deployment outcomes is beyond the scope of this study. By way of example:

- Existing diesel stations now offer biodiesel blends less than B20 – typically B2 or B5. Many may be able to offer B20, assuming economics and incentives allow managers to expand their offerings. From the standpoint of logistics and equipment, B20 blends have far lower technical hurdles than other fuels, and biodiesel availability could expand with substantially greater speed than that of other alternatives.
- Propane autogas use in heavy trucks is severely limited; there are limited numbers of class 7 trucks equipped to use propane, and no class 8 models. Existing propane stations are not currently equipped to handle heavy-duty vehicles.
- Existing incentives for alternative fuels vary from state to state, and additional incentives will likely be needed to reach desired targets for alt-fuel use. Further economic support may be needed to build investment in alternative fuel infrastructure.

The Corridor Study tracked 116 alternative fueling stations in four states either already in place or planned to be operational by the end of 2015. This study is intended to promote consideration, discussion and investment in alternative fuels for heavy trucks by fleet operators, station owners and fuel providers. It may also provide opportunities for our stakeholders to market specific corridors or segments of corridors as development targets, or as preferred routes once clean fuel options are in place. It will also allow Clean Cities, MEC and other organizations to measure potential and actual impacts of expanded alternative fuel availability and the creation of viable alternative fuel corridors.

This Corridor Study is supported by the Mid-America Collaborative (the Collaborative) for Alternative Fuels, which consists of the Kansas City Regional Clean Cities Coalition, Nebraska Clean Cities Coalition, St. Louis Regional Clean Cities and the Iowa Clean Cities Coalition. The Collaborative endorses a multi-pronged approach where appropriate fuel diversity creates an energy secure future. The Collaborative also aims to eliminate obstacles to adoption of vehicles and infrastructure using CNG, LNG, B20, ethanol (E85), LPG, electricity, and hybrid-electric technologies. The project is funded by United States Department of Energy (U.S. DOE) Award DE-EE0006009. Visit www.metroenergy.org to learn more about the Collaborative. Metropolitan Energy Center (MEC), a 501(c)3 based in Kansas City, provides staffing and administration for the Kansas City Regional Clean Cities Coalition and serves as the lead in this U.S. Department of Energy project.

INTRODUCTION

Introduction

The Mid-America Collaborative's Corridor Study focuses on fueling stations for compressed and liquefied natural gas (CNG and LNG); propane autogas (LPG); and biodiesel (B20 or higher percentage blends).

In 2012 and 2013, 2.5 million class 7 and class 8 trucks accounted for 12.1% of total American petroleum consumption, logging well over 300 billion VMT with average efficiency of 5.8 mpg.¹ Total ULSD consumption was approximately 95 million gallons per day, and with diesel prices averaging \$3.98 for the period, expenditures on diesel fuel for heavy trucks averaged approximately \$378 million dollars per day². Fleet managers are investing for even fractional improvements in efficiency, alternative fuels offer attractive and often substantial cost savings, and diesel emissions are subject to ever-more stringent regulation at multiple levels of government. But without needed infrastructure, large-scale expansion of alternative fuels in long-distance trucking is unlikely, despite the opportunity costs that failure to act would inflict on the transportation, energy and fuel wholesale/retail sectors.

With the goal of assisting in regional alternative fuel deployment, the Corridor Study is designed to assist fuel wholesalers/retailers in increasing the availability of CNG, LNG, Propane, and B20 heavy-duty class 7-8 vehicles by providing the following:

- Desirable levels of alternative fuel deployment as a percentage of local traffic and vehicle miles traveled (VMT) between metropolitan areas on major interstate corridors;
- National projections of class 7-8 alternative fuel vehicle usage.
- An assessment of existing alternative fuels stations;
- Estimated needs for future capacity, using projections of different numbers of vehicles;
- An assessment of actual daily average traffic on travel corridors and growth estimated in state and regional long-range transportation plans;
- An assessment of road signage for labeling alternative fueling stations and improvement recommendations;
- A phased implementation plan for alternative fuel stations; and,
- An analysis of the impact of change needed for medium and long-term alternative fuel investment and development.

DEFINITIONS

Biodiesel (B20)

Biodiesel is a renewable fuel that can be manufactured from vegetable oils, animal fats, or recycled restaurant grease and can be used in diesel vehicles. Biodiesel has chemical properties similar to petroleum diesel, but it is a cleaner-burning alternative. To be considered an alternative fuel biodiesel must contain at least 20% biodiesel to 80% conventional diesel fuel.

Natural Gas

Compressed Natural Gas (CNG) is an odorless, nontoxic, gaseous mixture of hydrocarbons—predominantly methane (CH₄). When CNG is provided for vehicles, it is typically dispensed at pressures of 3,000 pounds per

¹ Oakridge National Laboratory - Transportation Energy Data Book, Edition 34, 2015

² <https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD EPD2DXLO PTE NUS DPG&f=W>

INTRODUCTION

square inch (PSI) or 3,600 PSI. The high pressure of CNG allows more natural gas, and therefore energy, to be stored in a compact container. All CNG stations mentioned in this study are fast-fill stations.

Liquefied Natural Gas (LNG) is the liquid form of natural gas that occurs when natural gas is cooled below negative 260 degrees Fahrenheit. When it evaporates, LNG expands to 600 times its volume. It takes more processing and energy to liquefy natural gas than to compress it, but a given volume of LNG holds over twice the energy of CNG. However, LNG, like CNG, still has a lower energy density than diesel fuel. It also requires complex cryogenic systems to keep the natural gas in a liquid state for fueling, and the space required for on-board storage does slightly cut cargo capacity. Fueling with LNG also requires specialized training and equipment for drivers and fleet maintenance personnel.

Propane

Also known as liquefied petroleum gas (LPG) or propane autogas, propane is a clean-burning, high-energy alternative fuel. Propane is a three-carbon alkane gas (C_3H_8). It is stored under pressure inside a tank and is a colorless, odorless liquid. As pressure is released, the liquid propane vaporizes and turns into gas that is used in combustion.

Heavy-Duty Class 7-8 Freight Vehicles

Class 7-8 Freight Vehicles have a gross vehicle weight (GVW) of 26,001 lbs or more, typically travel long distances carrying heavy loads, and consume more fuel on average than any other vehicle type. Currently, there are class 7-8 vehicles available that run on biodiesel and natural gas. However, there are only a limited number of Class 7 LPG vehicles available.

STATION GEOGRAPHY

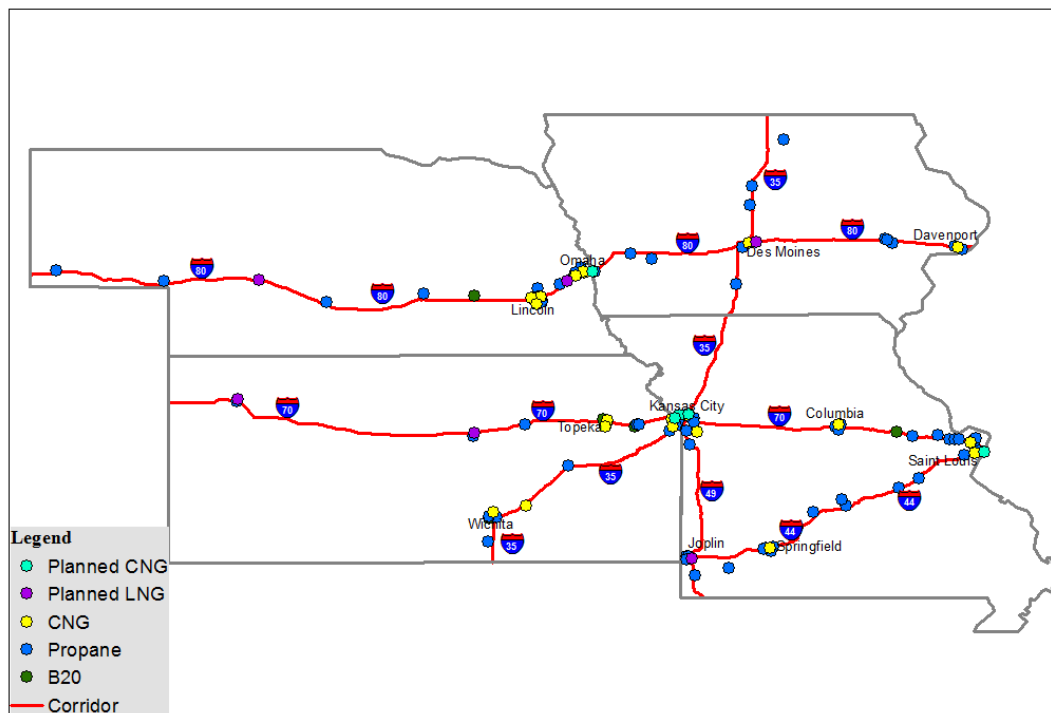
Station Geography

Multiple high-traffic interstates run through the heart of the Midwest. For this study, our focus is the interstate corridors defined by the portions of I-80, I-70, I-49, I-44 and I-35 located in the states of Missouri, Kansas, Nebraska and Iowa. As noted above, our survey covers both existing alternative fuel stations and those slated for completion by the end of 2015. In addition to the public stations listed in this report, multiple private alternative fuel stations are already in place along the same corridors, but are not part of the survey, which is limited to public fueling sites. A complete list of stations locations is located in Appendix I.

Table 1 – Total Number and Type of Alternative Fuels Infrastructure in the Mid-America Corridor³

FUEL TYPE	PUBLIC STATIONS	PLANNED STATIONS	TOTAL
Biodiesel	7	0	7
CNG	20	0	20
LNG	0	12	12
Propane	77	0	77
Total	104	12	

Current Public and Proposed Stations in Mid-America Corridor



Source: www.afdc.energy.gov/locator/stations/

³ U.S. Department of Energy, Alternative Fuel and Advanced Vehicles Data Center.

STATION GEOGRAPHY

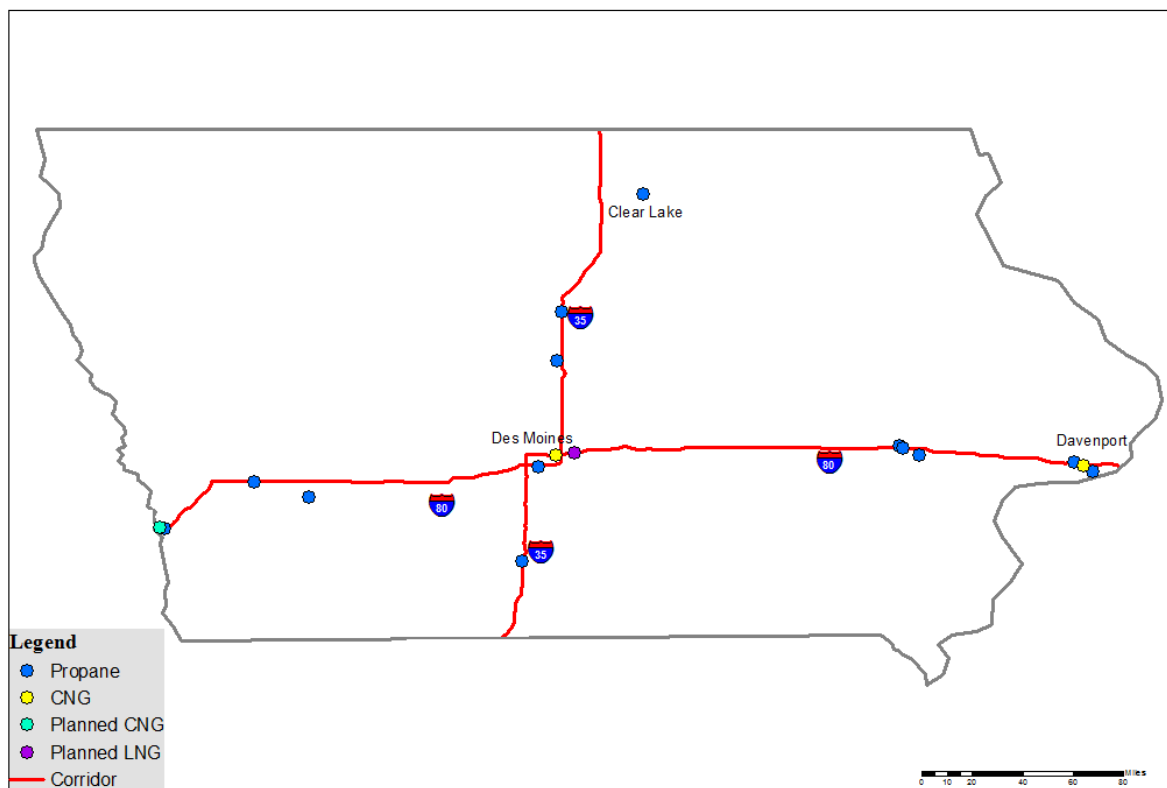
Iowa

Interstate corridors in Iowa include I-35 and I-80. Below is a breakdown of stations located in Iowa:

Table 2 – Total Number and Type of Alternative Fuels Located in Iowa's Corridors

FUEL TYPE	PUBLIC STATIONS	PLANNED STATIONS	TOTAL
B20	0	0	0
CNG	2	2	4
LNG	0	1	1
Propane	13	0	13
Total	15	3	

Current and Planned Stations in Iowa



Source: www.afdc.energy.gov/locator/stations/

STATION GEOGRAPHY

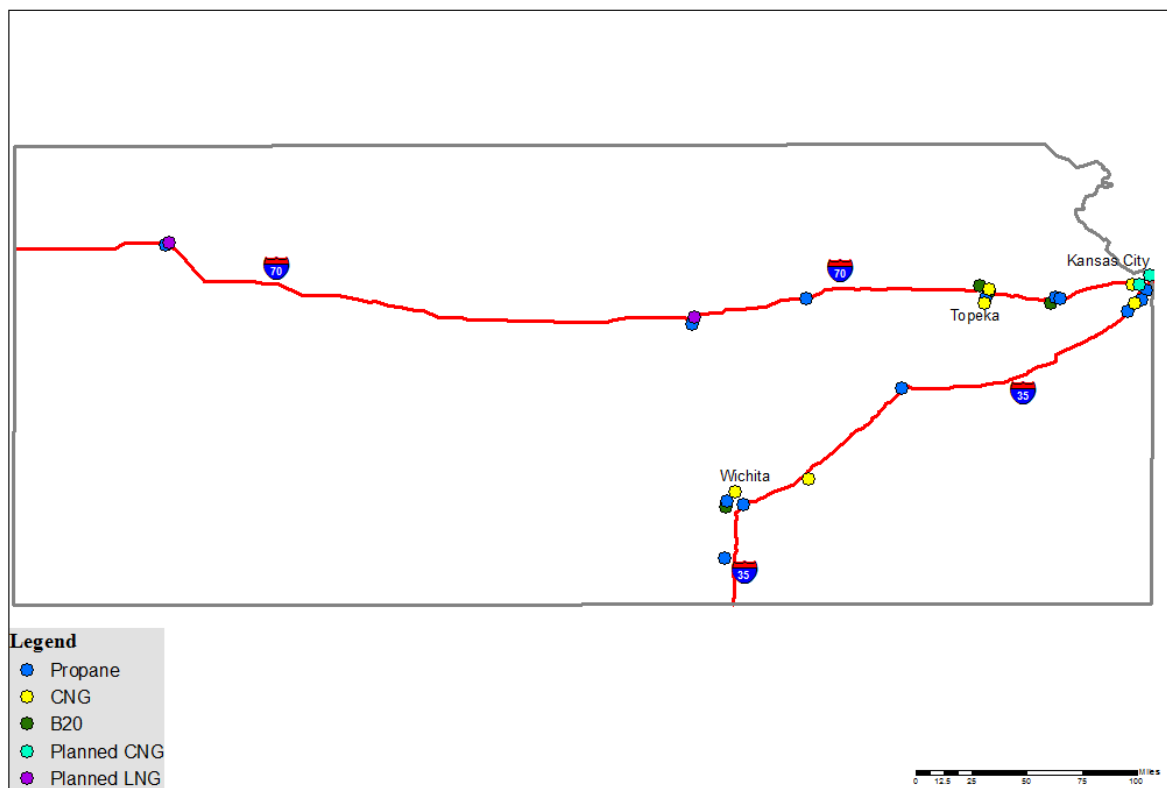
Kansas

Major interstate corridors running through the State of Kansas include I-70 and I-35. Below is a breakdown of stations located in Kansas:

Table 3 – Total Number and Type of Alternative Fuels Located in Kansas' Corridors

FUEL TYPE	PUBLIC STATIONS	PLANNED STATIONS	TOTAL
B20	4	0	4
CNG	6	2	11
LNG	0	3	5
Propane	14	0	14
Total	24	5	

Current and Planned Stations in Kansas



Source: www.afdc.energy.gov/locator/stations/

STATION GEOGRAPHY

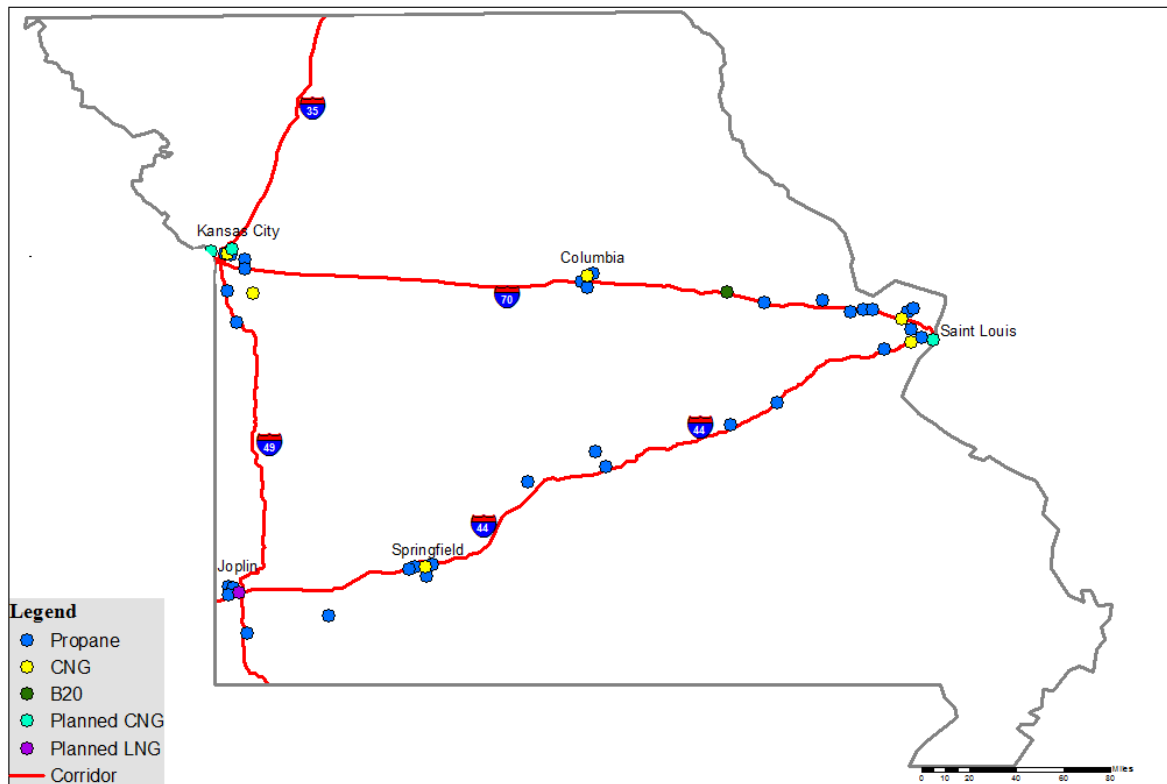
Missouri

Major interstate corridors running through the State of Missouri include I-35, I-44, I-49 and I-70. Below is a breakdown of stations located along this corridor:

Table 4 – Total Number and Type of Alternative Fuels Located in Missouri's Corridors

FUEL TYPE	PUBLIC STATIONS	PLANNED STATIONS	TOTAL
B20	1	0	1
CNG	6	2	8
LNG	0	1	1
Propane	33	0	33
Total	40	3	

Current and Planned Stations in Missouri



Source: www.afdc.energy.gov/locator/stations/

STATION GEOGRAPHY

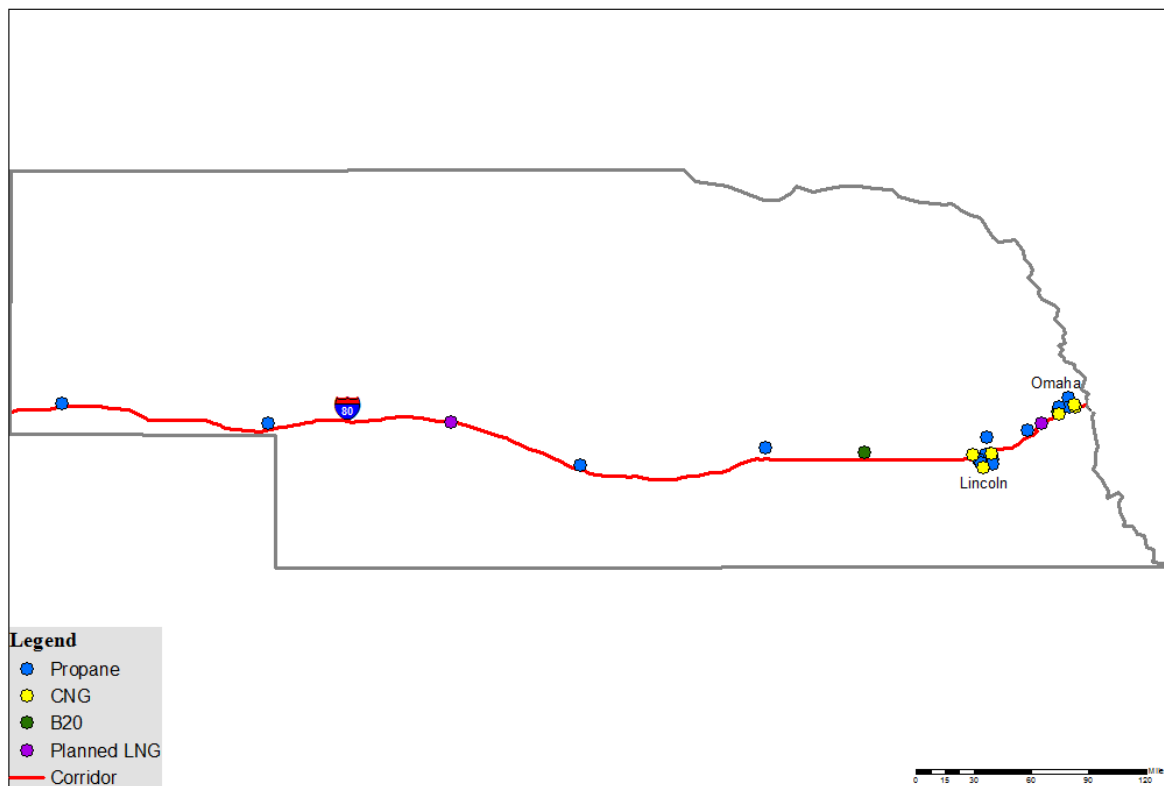
Nebraska

Interstate 80 is the only major interstate corridor in Nebraska. Below is a breakdown of stations along this route:

Table 5 – Total Number and Type of Alternative Fuels Located in Nebraska's Corridors

FUEL TYPE	PUBLIC STATIONS	PLANNED STATIONS	TOTAL
B20	2	0	2
CNG	6	0	6
LNG	0	2	2
Propane	17	0	17
Total	25	2	

Current and Planned Stations in Nebraska



STATION GEOGRAPHY

Below are the recommendations for numbers, locations and types of alternative fuel stations along selected interstates. Locations were chosen using an algorithm for distances between existing and planned stations; the industry standard for station spacing is between four and one-half hours and nine hours driving time. We also recommend that stations be located one mile or less from the interstate – a major consideration in the algorithm is the time it takes a driver to leave the interstate, fuel, and return. Station locations reflect plans to create corridors to meet growing future demand for alternative fuels. Note: Julesburg is in Colorado, but less than one mile from the Nebraska state line and is located on I-76 approximately five miles from its junction with I-80.

Table 6– Suggested Locations for Installation of Biodiesel Infrastructure

LOCATION	CITY	CORRIDOR
Iowa	Story City	I-35
	Davenport	I-80
	Clear Lake	I-35
	Lamoni	I-35
Kansas	Overland Park	I-35
	Emporia	I-35
	Junction City	I-70
	Salina	I-70
	Hayes	I-70
	Oakley	I-70
	Goodland	I-70
Missouri	South Kansas City	I-49
	Independence	I-70
	Liberty	I-35
	Cameron	I-35
	Bethany	I-35
	Higginsville	I-70
	Marshall Junction	I-70
	Columbia	I-70
	Harrisonville	I-49
	Butler	I-49
	Nevada	I-49
	Lamar	I-49
	Joplin	I-49
	Anderson	I-49

STATION GEOGRAPHY

Missouri	Mt. Vernon	I-44
	Springfield (east)	I-44
	Springfield (west)	I-44
	Lebanon	I-44
	Rolla	I-44
	St. Clair	I-44
Nebraska	Kearney	I-80
	North Platte	I-80
	Julesburg (CO)	I-80
	Kimball	I-80

Table 7– Suggested Locations for Installation of CNG Infrastructure

LOCATION	CITY	CORRIDOR
Iowa	Clear Lake	I-35
	Grinnell or Brooklyn	I-80
	Lamoni	I-35
	Adair	I-80
Kansas	Emporia	I-35
	Junction City	I-70
	Salina	I-70
	Hays	I-70
	Oakley	I-70
	Goodland	I-70
Missouri	Nevada	I-49
	Carthage	I-49
	Lebanon	I-44
	Rolla	I-44
	Cameron	I-35
	Bethany	I-35
	St. Clair	I-44
Nebraska	Kearney	I-80
	North Platte	I-80

STATION GEOGRAPHY

Julesburg (CO)	I-80
Kimball	I-80

Table 8– Suggested Locations for Installation of LNG Infrastructure

LOCATION	CITY	CORRIDOR
Iowa	Clear Lake	I-35
	Grinnell/Brooklyn	I-80
	Lamoni	I-35
	Adair	I-80
Kansas	Emporia	I-35
	Junction City	I-70
	Salina	I-70
	Hayes	I-70
	Oakley	I-70
	Goodland	I-70
	Topeka	I-70
	Wichita	I-35
Missouri	Kansas City	I-35/I-70
	Nevada	I-49
	Carthage	I-49
	Lebanon	I-44
	Rolla	I-44
	Cameron	I-35
	Bethany	I-35
	St. Clair	I-44
	St. Louis	I-70
	Springfield	I-49
	Columbia	I-70
Nebraska	North Platte	I-80
	Julesburg (CO)	I-80
	Kimball	I-80

STATION GEOGRAPHY

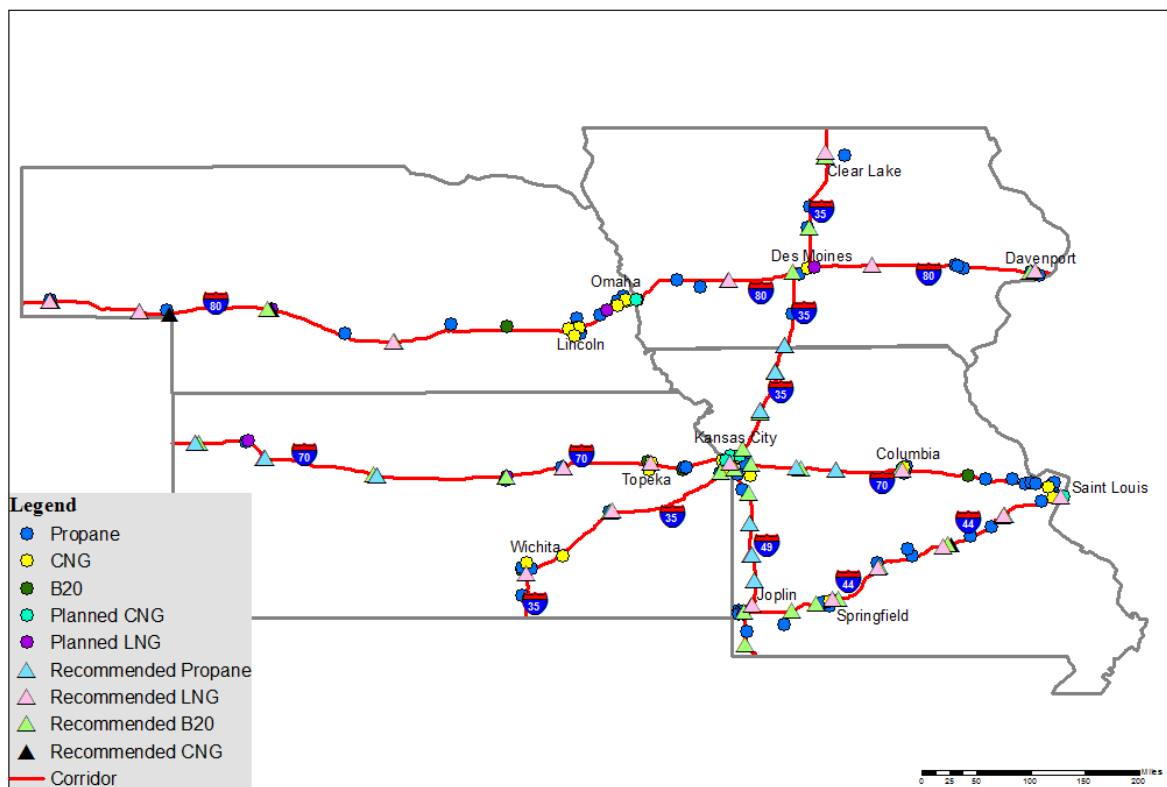
Table 9— Suggested Locations for Installation of Propane Infrastructure

LOCATION	CITY	CORRIDOR
Iowa	Des Moines/Ames	I-80, I-35
	Davenport	I-80
	Clear Lake	I-35
	Lamoni	I-35
Kansas	Overland Park	I-35
	Emporia	I-35
	Junction City	I-70
	Salina	I-70
	Hayes	I-70
	Oakley	I-70
	Goodland	I-70
Missouri	South Kansas City	I-49
	Independence	I-70
	Liberty	I-35
	Cameron	I-35
	Bethany	I-35
	Higginsville	I-70
Missouri	Marshall Junction	I-70
	Columbia	I-70
	Harrisonville	I-49
	Butler	I-49
	Nevada	I-49
	Lamar	I-49
	Joplin	I-49
	Anderson	I-49
	Mt. Vernon	I-44
	Springfield (east)	I-44
	Springfield (west)	I-44
	Lebanon	I-44
	Rolla	I-44
	St. Clair	I-44

STATION GEOGRAPHY

Nebraska	Kearney	I-80
	North Platte	I-80
	Julesburg (CO)	I-80
	Kimball	I-80

Current, Planned and Recommended Stations in Mid-America Corridor



VEHICLE MILES TRAVELED AND TRAFFIC ASSESSMENT

Vehicle Miles Traveled (VMT) and Traffic Assessment

According to the Energy Information Administration (EIA), nationally, “Heavy Duty Natural Gas Trucks (Class 7 – 8) are projected to increase in vehicle miles traveled (VMT) by 15% by the year 2040, and the actual vehicle stock are also anticipated to increase by approximately 30%. Natural gas (LNG and CNG) trucks are projected to comprise about 4% of the overall Class 7-8 vehicles on the roads in 2040.” EIA also projects limited increases in heavy-duty LPG or gasoline trucks, and not surprisingly shows continuing diesel dominance, with diesel powering approximately 90 percent of the class 7-8 vehicles on the roads in 2040.

A recent study by ICF on trends in propane noted that growth has been constrained in recent years by limited vehicle choices. However, with multiple new models arriving on the market, ICF projects sales growth from fewer than 13,000 dedicated or conversion vehicles recorded in 2014 to around 52,000 annually by 2025. The same study also expects 40% of these new vehicles to be light duty, and about 60% medium-duty trucks—noting by omission limited Class 7 and 8 propane options, at least to date.⁴

Figure 1— U.S. Freight Transportation - Vehicle Miles Traveled (Billions of Miles) Projections

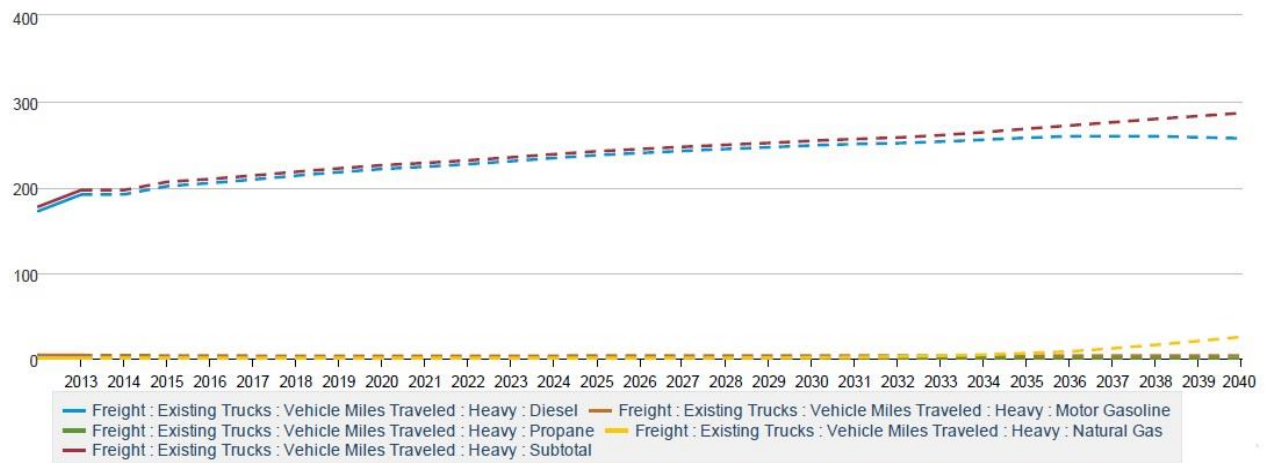


Table 10 – Existing Freight Transportation - Vehicle Miles Traveled (Billions of Miles) – By Fuel Type

	2015	2020	2025	2030	2035	2040
Diesel	201.2	221.3	237.4	248.8	257.7	256.9
Motor Gasoline	3.8	3.3	3.5	3.6	3.6	3.6
Propane	0.4	0.3	0.3	0.4	0.4	0.5
Natural Gas	0.8	0.8	0.8	1.4	6.5	25.4
Subtotal	206.2	225.6	241.9	254.2	268.2	286.5

⁴ http://www.afdc.energy.gov/uploads/publication/2016_propane_market_outlook.pdf

VEHICLE MILES TRAVELED AND TRAFFIC ASSESSMENT

The Corridor Study looked at each state's Long-Range Transportation Plan (LRTP) for information on the economic impact of current transportation trends, current traffic counts and projections of future freight volumes. Each state's plan devotes considerable time to analyzing present traffic counts and projected VMTs, along with the economic resources needed to maintain current infrastructure and meet future needs. Each long-term plan also discusses the environmental impacts of transportation, both in terms of air quality and public health, and in the context of how changes in regulations, energy prices and vehicle technology could impact regional transportation networks.

Average Daily Traffic Counts for corridors in the study helped us determine optimal locations for potential alternative fuel development, and in conjunction with long-term growth projections, helped in projecting potential demand for alternative fuels investments

Table 11 – Volume of Vehicle Miles Traveled ⁵

STATE	CORRIDOR	MILES OF INTERSTATE	ANNUAL VEHICLE MILES TRAVELED (IN MILLIONS) ⁶	MEAN ANNUAL AVERAGE DAILY TRAFFIC ⁷
Iowa	I-80	303.23	3,056	127,609
	I-35	218.33	2,007	82,152
Kansas	I-70	424.15	2,554	51,172
	I-35	235.51	1,990	72,396
Missouri	I-44 ⁸	293.39	3,875	93,656
	I-49	178.71	3,600	255,083
	I-35	114.74	1,002	125,201
	I-70	250.16	4,555	123,077
Nebraska	I-80	455.32	3,501	118,836
Total		2,473.54	26,140	1,049,182

Iowa

Freight movement by truck in Iowa is heavily concentrated on interstates and federal highways, and in commercial networks surrounding major metropolitan areas. The state's highway system, which includes 782 miles of interstate and 2,422 miles of other primary highways, carried 85 percent of Iowa's large truck traffic in 2010. Over the prior 30 years, large truck traffic on Iowa's primary roads showed an increase of 123% with the highest truck activity on I-80 in eastern Iowa. The state projects increases of nearly 43% in truck freight volumes by 2040, from 360 million tons to more than 514 million tons⁹.

⁵ Sources: US Department of Transportation, Federal Highway Administration, Route Log and Finder List and Summary of Interstate System by State and Route Number

⁶ Amount reported is cumulative miles for all vehicles.

⁷ Amount reported is cumulative for all vehicles and represents the average number of vehicles that use that section of the road daily.

⁸ Source: Mid-America Freight Coalition and Missouri Department of Transportation

⁹ http://www.iowadot.gov/iowainmotion/files/iowainMotion_final.pdf

VEHICLE MILES TRAVELED AND TRAFFIC ASSESSMENT

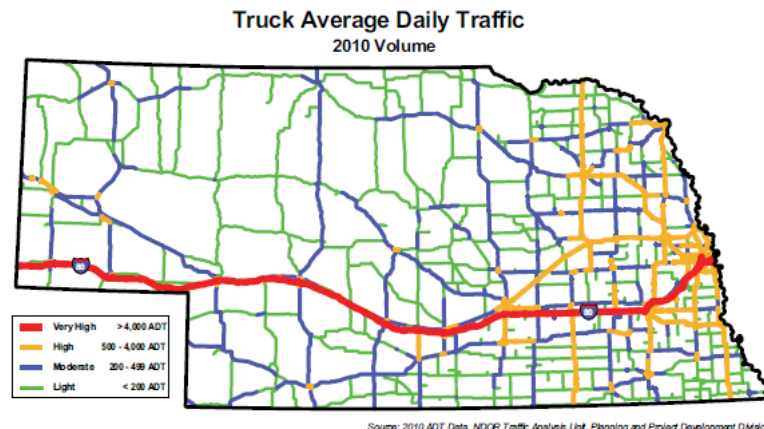
Missouri

Approximately half of Missouri's economy is substantially affected by freight, through direct shipments or the economic impacts of distribution and intermodal centers. 60% of total shipments through Missouri move by truck, as do 94% of intrastate shipments.¹⁰ By 2040, the state DOT projects a 40% increase in total freight to nearly 1 billion tons. Regarding alternative fuel options, Missouri's LRTP also notes:

"Natural gas is the fastest-growing fuel in the transportation sector due to its comparatively lower price, but there is a high initial cost to retrofit or replace existing equipment. The high demand for natural gas from the trucking industry has prompted the fuel retail industry to provide compressed natural gas (CNG) and liquefied natural gas (LNG) at fuel stations on major truck corridors".

Nebraska

In Nebraska's LRTP, the truck average daily traffic is highlighted in the figure below, with a high concentration on I-80. As a major east-west heavy freight artery, I-80 possesses strong potential for alternative fuel deployments. Nebraska's plan anticipates a 67.7% increase in freight transport via truck through the year 2040. However, as Missouri's LRTP also notes, greater Panama Canal capacity may shift some Asian trade from Pacific to Atlantic ports. In addition, potential Arctic sea routes as ice recedes may also cut transcontinental shipping tonnage.



Kansas

The Kansas Department of Transportation projects that truck traffic will increase by 97% by 2030¹¹. The interstate highways in the state, specifically I-70 and I-35; make up just 8 percent of the state's total highway system, yet carry more than 40% of total traffic. I-70, linking Denver to Kansas City and St. Louis, and I-35, which connects Mexico to the upper Midwest are key freight routes, and I-35 connects in Kansas with one of the region's largest intermodal hubs.

VMT assessment and transportation plans help determine the demand and market potential for alternative fuels. Given multiple projections for increased traffic and freight movement, with the increased traffic and freight movement in the Mid-America region, substantial potential for alternative fuels exists, along with the economic

¹⁰ <http://www.semissourian.com/files/final-draft-of-modot-long-range-transportation-plan-nov-5-2013.pdf>

¹¹ https://www.ksdot.org/Assets/wwwksdotorg/LRTP2008/pdf/KS_LRTPFinal.Chapter_1.pdf

VEHICLE MILES TRAVELED AND TRAFFIC ASSESSMENT

and environmental benefits associated with their use. An optimal site may be chosen based on existing gaps in alternative fuel service, but traffic at that site may be relatively low. In such situations, stakeholders will have to take extra steps to ensure fleets are aware that the alternative fuel is available; this can be done via outreach or signage. Beyond that, active engagement with locally based fleets and assistance in switching to alternatives will be necessary to build alternative fuel demand. Shifting the market over to alternative fuels, such as biodiesel, natural gas and propane will have a positive effect on the overall air quality and economy in this region.

SIGNAGE ASSESSMENT

Signage Assessment

States generally follow federal road signage rules published in the Manual on Uniform Traffic Control Devices (MUTCD) which is developed and approved by the Federal Highway Administration (FHWA). The MUTCD sets national standards for the placement and layout of all signs. Each state then refines those rules and sets additional fees as applicable to highlighting services - gas, food, lodging, camping or attractions - on signs located at interchanges.

Specific service signs are often referred to as “logo” signs – i.e. displaying business names and logos. While the MUTCD has approved a pictographic image for CNG there are no graphic images for biodiesel, LPG or LNG. An additional issue is that propane and natural gas fueling stations do not meet MUTCD requirements that would allow them to be posted as “GAS”, and are therefore not allowed on logo signs. Whether to post information on alternative fuel availability is a decision left to the individual business owner or franchisee.

A summary of the rules and fees for posting on Logo signs are found below.

Iowa

The Iowa Department of Transportation (IA-DOT) regulates specific service signs located along interstate and freeway-primary highways that identify qualifying gas, food, lodging, camping or attractions at the next interchange. The IA-DOT does not endorse any of the sign production businesses contained on the list of 28 providers found on their website. There are designated gas service panels that allow for an alternative fuel placard to be added if the service is available at that interchange.

Participating stations must meet the following criteria:

- Location within 3 miles of a highway;
- Compliance with all applicable laws concerning the provision of public accommodations without regard to race, religion, color, age, sex, or national origin;
- Continuous operation at least 12 hours per day, seven days a week, year-round;
- Appropriate licensing, and providing fuel, oil, and water, free air or tire repair, restrooms and telephones.

Logo signing fees are \$230 per sign annually. A business that has four signs - one from each direction on the interstate/freeway and ramp signs for each ramp pays annual fees of \$920. These fees pay for the costs associated with the maintenance and operation of the logo program.



Kansas

The Kansas Department of Transportation contracts with Kansas Logos, Inc. (a subsidiary of Interstate Logos) for the development and installation of specific servicing signing. The stations must meet the following criteria:

- Continuous operation at least 12 hours per day, 7 days per week, including holidays;
- Provide vehicle services including fuel, oil, air and water, modern restroom facilities, public telephone, drinking water, or be within walking distances of a business (under same ownership or contractual agreement) that provides these amenities; and,

SIGNAGE ASSESSMENT

- Be within a maximum distance of service of 15 miles, depending on location, and if outside of the Kansas City, Topeka, and Wichita metro areas.

There are four levels of participation fees, based on an average daily traffic count (ADTC) of the intersection and are per direction. Below are annual fees for mainline signs, an additional \$100 per direction is added to the prices below if the business wants an additional ramp sign.

- ADTC 0-19,999 - \$900;
- ADTC 20,000-49,999 - \$1,400;
- ADTC 50,000-99,999 - \$1,800; or
- ADTC 100,000 and above - \$2,300.

Missouri

The Missouri Department of Transportation contracts with Missouri Logos (a subsidiary of Interstate Logos) for the development and installation of specific servicing signing and tourist oriented directional signing (TODS) programs. The stations must meet the following criteria:

- Continuous operation at least 12 hours per day, 7 days per week;
- Provision of fuel, oil, water and free air, restroom facilities, public telephone, drinking water; and,
- Location within a maximum distance of 6 miles from the interchange

There are two levels of participation fees and they are based on an average daily traffic count (ADTC) of the intersection and are per direction:

- Standard Volume - \$1,000 annually for an ADTC of 0-29,999; or,
- High Volume - \$1,500 annually for an ADTC of 30,000+.

Nebraska

The Nebraska Department of Transportation regulates signs placed along interstate highways and contracts with Nebraska Logos, Inc. for sign development and installation. Commercial activities and business enterprises which include, but are not limited to, restaurants, motels, gas stations and campgrounds, may qualify for on premise, advertising, logo. For interstate highway specific information signs (SIS) there are precise criteria each type of facility must meet to be eligible to participate in the Logo Signing Program¹². The stations must meet the following criteria:

- Be within 3 miles of a highway;
- Continuous operation at least 16 hours per day, 7 days per week on Interstate or freeway or continuous operation at least 12 hours per day, 7 days per week on primary highways; and,
- Provide fuel, oil and water; modern restroom facilities and drinking water; and telephone available for public use.

The minimum cost to advertise on a sign is a onetime fee of \$1,200, which does not include production, fabrication and installation of the actual business sign.

¹² Nebraska Logos, Inc.

SIGNAGE ASSESSMENT

Table 12 – Signage Summary for Existing Infrastructure in the Corridor Study Area¹³

STATE	OPERATING ALTERNATIVE FUEL STATIONS	ALTERNATIVE FUEL STATIONS POSTED ON INTERSTATE HIGHWAY SIGNS	ALTERNATIVE FUEL OF POSTED ON INTERST HIGHWAY SIGNS
Iowa	15	No database available	-
Kansas	24	0	-
Missouri	40	5	0
Nebraska	25	4	0
Total	104	9	0

Recommendations

As Table 12 shows, operating alternative fuel stations within the Corridor study area are not well advertised by highway signs, substantially limiting drivers' knowledge of alt-fuel options. Ideal sign placement would be within three miles of a participating station, and would also specify the types of alternative fuels available.



Additionally, we recommend that alternative fuel distributors work with Clean Cities Coalitions in order to market their fuel through the highway signage programs. Through this partnership, Clean Cities will be able to provide support in marketing of alternative fueling locations and connecting interested fleets with the alternative fuel distributors.

To develop signage best practices, we would recommend standardization and nationwide uniformity in promoting alternative fuels. This will help facilitate the promotion of highway signs by the FHWA for CNG, LNG, LPG and B20. Adding incentives for alternative fuel station signage will also promote additional signs that can help facilitate the promotion of alternative fueling stations. In addition, individual states' Department of Transportation should employ a higher level of regulation in signage tracking, including databases accessible to drivers.

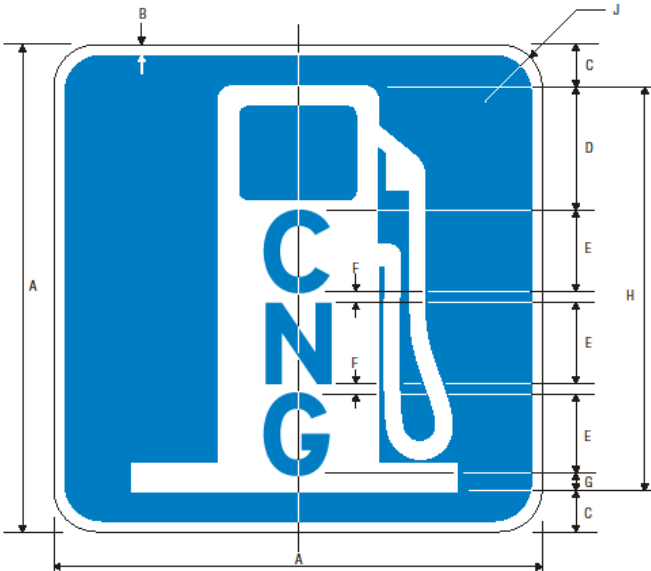
Signage Specifications

Common standards for all alternative fuel signage will create continuity for future deployments. It is recommended that alternative fuel signage should follow the FHWA-MUTCD D9-11A Alternative Fuel-Compressed Natural Gas as a template. The signage should follow the 30" by 30" size regulations for freeway or expressway general service signs. The following sign could be used as model for other alternative fuel signage, by

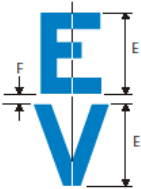
¹³ Addresses of current alternative fuel stations pertinent to this study were cross referenced with available data through the respective state's Department of Transportation. Stations included in these numbers also include E85, which was not a part of this study.

SIGNAGE ASSESSMENT

replacing the CNG lettering with B20, LPG, and LNG. This simple template will build driver familiarity and strengthen associations with specific alternative fuels. See below for an example of size and color specifications¹⁴.



D9-11a
ALTERNATIVE FUEL



*See page 6-12 for design.

A	B	C	D	E	F	G	H	J
18	.5	1.5	4.5	3 EM	.5	.5	15	1.5
24	.5	2	6	4 EM	.625	.75	19.75	1.5
30	.75	2.5	7.625	5 EM	.688	1	25	1.875

COLORS: LEGEND BLUE (RETROREFLECTIVE)
SYMBOL WHITE (RETROREFLECTIVE)
BACKGROUND BLUE (RETROREFLECTIVE)

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¹⁴ <http://www.trafficsign.us/shs/guide/d9-11a.pdf>

POTENTIAL ALTERNATIVE FUEL IMPACTS

Implementation Plan

This Corridor Study is designed to assist fuel wholesalers/retailers in increasing the availability of natural gas, propane, and biodiesel to heavy-duty class 7-8 vehicles traveling or based near their refueling station locations. Below are a set of implementation steps that can be considered by wholesalers/retailers to maximize usage of existing stations and locations that are considering deploying alternative fuels. The goal is to also maximize return on retailers' economic investments, by recommending a phased approach to installations based on reasonable expectations for growth in demand. A number of the steps in the implementation plan can be accomplished in coordination with and supported by various stakeholders in the Mid-America study area, including federal and state agencies, Clean Cities Coalitions, and heavy-duty class 7-8 heavy vehicle operators.

Recommendations and Future Expansion

Ultimately, to change the scope of the market for the heavy-duty class 7-8 vehicles that travel through corridors covered by this study, vehicles will need consistent and strategically aligned access to alternative fuels infrastructure. Ideally, the easiest transition would be related to biodiesel, because of the lower infrastructure costs and the relative ease of integration of B20 into existing distribution and dispensing systems.

For fleets and drivers using natural gas, a high degree of certainty on fuel availability and fueling locations will be necessary, given the current relative scarcity of fast-fuel natural gas stations and associated range anxiety. For fuel suppliers, given the high costs of CNG and LNG infrastructure, one approach would be to site new fueling facilities in or near cities that are home to existing fleets using natural gas, in addition to siting within easy reach of major freight routes and key intersections. In doing so, CNG and LNG station owners will provide needed certainty for local fleets and for drivers arriving from out of state. In order to justify the costs of natural gas infrastructure, it is recommended that retailers also seek out a fleet that has a home base in the same city or nearby areas, to ensure consistent use of fuel at the station.

The propane market seems to be the biggest and most available to the public. Although there is a wide network of propane refueling sites, the Clean Cities Coalitions are aware that many of these sites are not necessarily equipped to accommodate larger vehicles and likely do not have the appropriate nozzles and dispenser equipment to meet the needs of the heavy-duty class 7-8 market. To fully maximize the use of the propane sites, it will be important to upgrade each site to ensure proper refueling can take place.

Complete Corridors

Recognizing the current gaps of available alternative fuel stations, it is advised that stations should be prioritized aiming to complete corridors through the Mid-American Collaborative area. Identifying the least amount of infrastructure to complete corridor creates the highest level of success, from an alternative fuel standpoint. This strategy will serve the fuel distributors that want to deploy alternative fuels into their company's future refueling options. Suggested below is the minimum number of alternative fuel stations needed to create a complete corridor.

POTENTIAL ALTERNATIVE FUEL IMPACTS

Table 13 – Summary of CNG Stations Needed to Complete Corridor

CORRIDOR	MINIMUM NUMBER OF ADDITIONAL STATIONS
I-80	1
I-35	2
I-70	1
I-44	0
I-49	0

Table 14 – Summary of LNG Stations Needed to Complete Corridor

CORRIDOR	MINIMUM NUMBER OF ADDITIONAL STATIONS
I-80	2
I-35	4
I-70	2
I-44	1
I-49	0

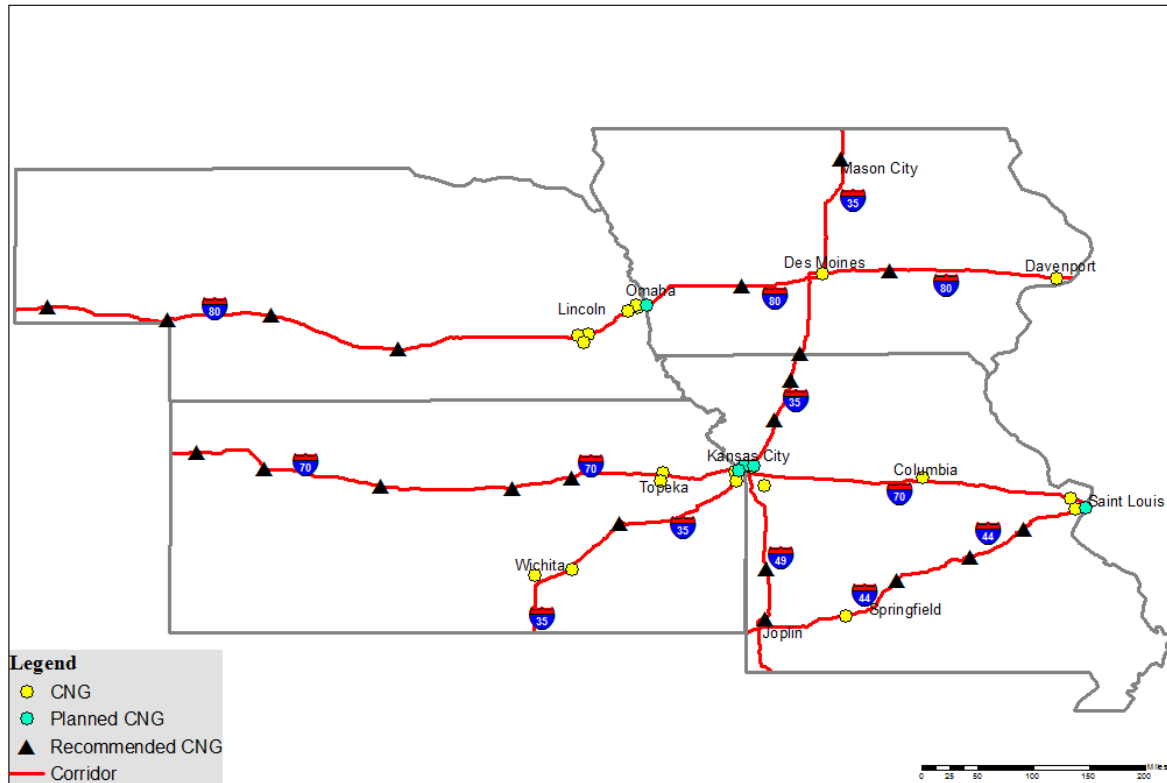
Table 15 – Summary of B20 Stations Needed to Complete Corridor

CORRIDOR	MINIMUM NUMBER OF ADDITIONAL STATIONS
I-80	4
I-35	3
I-70	3
I-44	2
I-49	2

As noted in Table 13-15, the most practical alternative fuels to complete an alt-fuel corridor would be CNG and biodiesel. An assumption is that natural gas sites needed for viable corridor coverage would be capable of fast-fill fueling of class 7-8 trucks. As mentioned before, propane distribution systems exist, but additional station modifications would be required before fast-fill propane can be considered ready to go for class 7 trucks.

POTENTIAL ALTERNATIVE FUEL IMPACTS

Current, Planned, and Recommended CNG Stations in Mid-America Corridor



POTENTIAL ALTERNATIVE FUEL IMPACTS

TABLE 16- Implementation Plan for Adoption of Alternative Fuels

IMPLEMENTATION PHASE AND ACTION ITEMS – B20

Research, Education and Outreach

- Research vehicle traffic, freight flows, fleet routing and fleet base locations to determine optimum locations for the minimum investment needed to create viable biofuel corridors
- Educate heavy-duty class 7-8 fleet owners and operators about B20 use, availability and financial and environmental benefits.
- Partner with regional Clean Cities organizations in all four states to coordinate outreach to fleets to provide information on applicable incentives for fuel adoption.
- Additional outreach should be concentrated on providing technical education to fleet mechanics on biodiesel properties and associated maintenance issues.
- Provide the latest information regarding technical considerations on storage, maintenance, and dispensing, and on industry and regulatory standards to all stakeholders.

Exploring and Developing Financing Assistance

- Research and disseminate information on federal, state and local funding and incentives to reduce capital/labor costs for installation of for B20 infrastructure.
- Educate fuel providers and distributors on financial incentives for biodiesel sales.
- Strengthen links with biofuel trade and industry associations to explore options for leveraging private financing to invest in infrastructure, technology and marketing.
- Coordinate lobbying efforts at state and federal levels to maintain existing financial incentives as needed, or to create new incentives for biodiesel investments.

Increasing Fleet Use at Existing Stations

- Identify fleets and companies currently using B20 and fleets based along the identified corridors.
- For companies interested in B20 use, partner to check feasibility of integrating biodiesel into operating plans.
- Determine optimal locations for biodiesel sales, considering local fleet presence, traffic flows, freight volumes and local and regional availability of B20.
- Connect retailers and distributors with B20 fleets and prospects; provide current technical information on fueling systems, B20 storage and maintenance, and B20 impacts on vehicle warranties.
- Confirm for specific retail locations that storage and distribution systems are compatible with B20 or higher blends, and that branded stations are not prohibited from biofuel sales.
- Work with retailers, state regulators and industry associations to assist with signage development and installation.
- Track B20 investment and sales.

POTENTIAL ALTERNATIVE FUEL IMPACTS

IMPLEMENTATION PHASE AND ACTION ITEMS – NATURAL GAS

Research, Education and Outreach

- Research vehicle traffic, freight flows, fleet routing and fleet base locations to determine optimum locations for the minimum investment needed to create viable natural gas corridors
- Educate heavy-duty class 7-8 fleet owners and operators about CNG/LNG use, availability and financial and environmental benefits.
- Partner with Clean Cities organizations in all four states to coordinate outreach to fleets to provide information on applicable incentives for fuel adoption and infrastructure investment.
- Additional outreach should be concentrated on providing technical education to fleet mechanics and drivers on CNG/LNG properties and associated maintenance and fueling issues.
- Provide the latest information on technical considerations on storage, maintenance and dispensing, and on industry and regulatory standards to all stakeholders.

Exploring And Developing Financing Assistance

- Research and disseminate information on federal, state and regional funding and incentives to reduce capital/labor costs for installation of CNG/LNG infrastructure.
- Educate fuel providers and utilities on applicable financial incentives.
- Strengthen links with natural gas utilities, trade and industry associations to explore options for leveraging private financing to invest in infrastructure, technology and marketing.
- Coordinate lobbying efforts at state and federal levels to maintain existing financial incentives as needed, or to create new incentives for CNG/LNG investments.

Increasing Fleet Use at New or Existing Stations

- Identify fleets currently using CNG/LNG or based along the identified corridors.
- Partner with companies interested in CNG/LNG use to check feasibility of integrating natural gas into operating plans.
- Determine optimal locations for CNG/LNG sales, considering local fleet presence, traffic flows, freight volumes, locations of natural gas pipelines and required space.
- Connect utilities and distributors with CNG/LNG fleets and prospects; provide current technical information on fueling systems, gas storage and maintenance, and on conversion costs and potential impacts on vehicle warranties.
- Confirm for specific retail locations that space is available for natural gas development, and that branded stations are not prohibited from CNG/LNG sales.
- Provide information on applicable building codes and regulations.
- Work with retailers, state regulators and industry associations to assist with signage development and installation.
- Track CNG/LNG investments and sales.

POTENTIAL ALTERNATIVE FUEL IMPACTS

IMPLEMENTATION PLAN AND ACTION ITEMS – PROPANE

Education and Outreach

- Research vehicle traffic, freight flows, fleet routing and fleet base locations to determine optimum locations for the minimum investment needed to create viable propane corridors.
- Educate heavy-duty class 7 fleet owners and operators about propane use, availability and financial and environmental benefits; connect fleet operators with propane class 7 OEMs.
- Partner with Clean Cities organizations in all four states to coordinate outreach to fleets to provide information on applicable incentives for fuel adoption and infrastructure investment.
- Additional outreach should make technical training available to fleet mechanics and drivers on propane properties and associated maintenance and fueling issues.
- Provide the latest information on technical considerations on storage, maintenance, dispensing, and on industry and regulatory standards to all stakeholders.

Exploring and Developing Financing Assistance

- Research and disseminate information on federal, state and regional funding and incentives to reduce capital/labor costs for propane infrastructure.
- Educate fuel providers and utilities on applicable financial incentives for propane sales.
- Strengthen links with propane suppliers and industry associations to explore options for leveraging private financing to invest in infrastructure, technology and marketing.
- Coordinate lobbying efforts at state and federal levels to maintain existing financial incentives as needed, or to create new incentives for propane investments.

Increasing Fleet Use at New or Existing Stations

- Identify fleets currently using propane or fleets based along the identified corridors.
 - Partner with companies interested in propane to check feasibility of integrating propane gas into operating plans.
 - Determine optimal locations for propane sales, considering local fleet presence, traffic flows, freight volumes, existing distribution systems, and facility space needed.
 - Connect and distributors with propane fleets and prospects; provide current technical information on fueling systems, storage and maintenance, and on conversion costs and potential impacts on vehicle warranties.
 - Confirm for specific retail locations that space is available for propane fueling built-out, and that branded stations are not prohibited from propane fuel sales.
 - Provide information on applicable building codes and regulations.
 - Work with retailers, state regulators and industry associations to assist with signage development and installation.
 - Track propane investments and sales.
-

POTENTIAL ALTERNATIVE FUEL IMPACTS

Potential Alternative Fuel Impacts

Increased Market Share

According to the EIA there are approximately 6,832 gas stations located in the four-state region. Existing and pending projects together account for only 1.6 percent of this total. To make the target petroleum and emission reductions goals attainable, it will be essential to continue to support existing alt-fuel stations and to expand the number of alternative fuels stations throughout the corridor by building alt-fuel market share.

Petroleum and Emission Reductions

Substantial impacts on gasoline and diesel consumption will require substantial expansion of alternative fuel infrastructure, and a concomitant large-scale adoption of alternative fuels by regional and national fleets. The four states reviewed in this study consume roughly 14.1 billion gallons of petroleum in the freight transportation sector. A cumulative 5% reduction of petroleum use in these four state would, by way of example, necessitate the deployment of 41,234 CNG vehicles to displace 700 million gallons of liquid petroleum fuels. As an extended result, CNG has a greenhouse gas emissions profile and the deployment of 41,234 CNG vehicles would result in 740,000 metric tons of GHG in the region. Only with substantial and continuing investment in fleets and infrastructure will substantial reductions in petroleum use and greenhouse gas production be possible.

Table 17 – Impact of Increased Alternative Fuel Availability in Corridor

MID-TERM	CURRENT STATUS	PERCENT CHANGE (BY 2020)	IMPACT	EXAMPLE OF CHANGE NEEDED IN FREIGHT MARKET ¹⁵
Petroleum Use (billion gallons)	14.1	5.0% reduction	-0.70	Deployment of 41,234 CNG vehicles
Emissions (million metric tons) ¹⁶	321	0.2% reduction	-0.74	See above
LONG-TERM	CURRENT STATUS	PERCENT CHANGE (BY 2050)	IMPACT	EXAMPLE OF CHANGE NEEDED IN FREIGHT MARKET
Petroleum Use (billion gallons)	14.1	20% reduction	-2.8	Deployment of 164,936 CNG vehicles
Emissions (million metric tons)	321	0.9% reduction	-2.97	See above

Maintenance or Increase of Incentives

¹⁵ Based on case study data where the average freight truck travels 100,000 miles and uses 17,000 gallons of diesel per year, also factoring the similar fuel economy for natural gas and biodiesel <http://www.afdc.energy.gov/case/1006>

¹⁶ A base sample vehicle load weight of 20,000lbs and 100,000 miles (average freight truck travel) emitting 163.71 metric tons of GHG with an 11% reduction in life-cycle GHG emissions by using CNG <http://www.freightemissionscalculator.com/>

POTENTIAL ALTERNATIVE FUEL IMPACTS

Since alternative fuels only hold a small portion of the current market share of refueling options, mandates and incentives are critical to support adoption and deployment. Specific incentives such as rebates, grants and tax credits can be eventually phased out once the self-sustaining markets have been developed. Also, current available incentive programs may not cover the full range of fuels reviewed in this Corridor Study. Below are the current applicable, available incentives throughout the Corridor. These incentives were found on the Department of Energy Alternative Fuels and Data Center website, and through state statute and revenue department links.

- Iowa incentives
 - [Biodiesel Blend Retailer Tax Credit](#)
 - [Biofuel Infrastructure Grants](#)
 - [Biodiesel Producer Tax Refund](#)
 - [Alternative Fuel Demonstration Grants](#)
- Kansas Incentives
 - [Alternative Fuel Vehicle \(AFV\) Tax Credit](#)
 - [Alternative Fueling Infrastructure Tax Credit](#)
 - [Renewable Fuel Retailer Tax Incentive](#)
 - [Biofuel Blending Equipment Tax Exemption](#)
 - [Biodiesel Production Incentive](#)
 - [Biofuel Production Facility Tax Exemption](#)
 - [Idle Reduction Weight Exemption](#)
- Missouri Incentives:
 - [Alternative Fueling Infrastructure Tax Credit](#)
 - [Idle Reduction Weight Exemption](#)
 - [Alternative Fuel Vehicle \(AFV\) Emissions Inspection Exemption](#)
- Nebraska Incentives:
 - [Motor Vehicle Clean Burning Fuel Conversion System/Kit Rebate](#)
 - [Clean Burning Motor Vehicle Purchase Rebate](#)
 - [Clean Burning Motor Fuel Dispensing Property Rebate](#)
 - [Dedicated AFV and Fueling Equipment & Facilities Projects Loans](#)
 - [Alternative Fuel Tax Refund](#)
 - [CNG Vehicle Incentives \(Omaha Municipal Utilities District\)](#)
 - [Idle Reduction Weight Exemption](#)

Significant adoption of alternative fuels such as biodiesel, propane and natural gas in the heavy-duty class 7-8 vehicle market will significantly contribute to the reduction of petroleum use, lower emissions throughout the mid-America region, and increase positive economic activity in the region. To make this happen, the National U.S. Department of Energy Clean Cities and its affiliate Coalitions, Metropolitan Energy Center, and the Mid-America Collaborative members are all working together to advance discussions with fleets, station owners/developers, utilities, fuel suppliers and other stakeholders about the importance of a multi-state, strategic approach to alternative fuels implementation along these corridors for heavy-duty trucks.

CONTACTS AND RESOURCES

Contacts and Resources

Corridor Study Collaborators:

Metropolitan Energy Center
www.metroenergy.org/

Mid-America Collaborative for Alternative fuels
<http://www.metroenergy.org/index.php/clean-transportation/programs/mid-america-collaborative-for-alternative-fuels-implementation/>

Legacy Environmental, Inc.
<http://www.legacyenv.com/>

Corridor Study Resources:

- 1) Oakridge National Laboratory Transportation Energy Data Book, Edition 33, 2014
<http://cta.ornl.gov/data/index.shtml>
- 2) U.S. Department of Energy, Alternative Fuel and Advanced Vehicles Data Center.
http://www.afdc.energy.gov/afdc/fuels/stations_counts.html
- 3) Iowa Department of Transportation, <http://www.iowadot.gov/index.html#/services>
- 4) Kansas Department of Transportation, <http://www.ksdot.org/bureaus/burrow/beaut/default.asp>
- 5) Kansas Interstate Logos, Inc., <http://www.kansas.interstatelogos.com/state/home.aspx>
- 6) Missouri Department of Transportation
- 7) Missouri Interstate Logos, Inc. <http://www.missouri.interstatelogos.com/state/>
- 8) Nebraska Department of Transportation – Department of Roads
<http://www.transportation.nebraska.gov/roway/pdfs/hwysign.pdf>
- 9) Nebraska Logos, Inc. <http://www.nebraska.interstatelogos.com/state/home.aspx>
- 10) Iowa Department of Transportation, 2013 Volume of Traffic on the Primary Road System of Iowa,
<http://www.iowadot.gov/maps/trafbook/trafbook2013.pdf>
- 11) Mid-America Collaborative for Alternative Fuels – Air Quality Report, <http://www.metroenergy.org/wp-content/uploads/2013/12/Alternative-Fuels-for-Air-Quality-Report-FINAL.pdf>
- 12) Missouri Freight Plan: <http://www.mofreightplan.org/>
- 13) Kansas Freight Advisory Committee: <http://ksdot1.ksdot.org/bureaus/burRail/rail/KFAC.asp>
- 14) Nebraska Long Range Transportation Plan, <http://www.transportation.nebraska.gov/lrtp/>
- 15) US Department of Transportation, Federal Highway Administration, Route Log and Finder List,
<http://www.fhwa.dot.gov/reports/routefinder/table1.cfm>
http://www.ops.fhwa.dot.gov/freight/freight_analysis/state_info/missouri/mo.htm

APPENDICES

Appendices for Mid-America Alternative Fuels Corridor Study

- I. Currently Operating Alternative Fuel Stations
- II. Planned Alternative Fuel Stations
- III. Corridor Maps

APPENDICES

Appendix I: Currently Operating Alternative Fuel Stations

BIODIESEL – EXISTING FACILITIES

	NAME OF STATION	LOCATION	BLENDS AVAILABLE	ROUTE	ACCESS
IA	NONE				
KS	Zarco USA	900 Iowa Street	B20, B10, B5, B2	I-70	Public
		Lawrence, KS 66044			
	Capital City Oil	917 SE Adams Road	B100	I-70	Public – Card Key
		Topeka, KS 66607			
	Capital City Oil	4141 Lower NW	B20	I-70	Public – 24-7
		Silver Lake Rd.			Card Key
		Topeka, KS 66618			
	Hampel Oil	3950 West 30 th St.	B20	I-35	Public – CC
		Wichita, KS 67217			
MO	Biofuels USA	418 Boonslick Road	B20, B50 (winter)	I-70	Public – CC
		New Florence, MO 63363	B99 (summer)		
NE	United Farmers Coop	1504 Platte Avenue	B20	I-80	Public – CC
		York, NE 68467			
	Sapp Brothers	9905 Sapp Brothers Drive	B20	I-80	Public - CC
		Omaha, NE 68138			

LNG – EXISTING FACILITIES

	NAME OF STATION	LOCATION		ROUTE	ACCESS
IA	NONE				
KS	Flying J/Clean Energy	4610 Kansas Ave	LNG	I-70	Public
		Kansas City, KS 66106			
MO	NONE				
NE	NONE				

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CNG – EXISTING FACILITIES

	NAME OF STATION	LOCATION	VEHICLE SIZE	ROUTE	ACCESS
IA	Kwik Star #215	100 West 65 th Street	Accommodates	I-80	Public
		Davenport, IA 52806	All Vehicles		
	GAIN Clean Fuel	1205 NE Broadway Ave	Accommodates	I-80	Public – Credit
		Des Moines, IA 50313	All Vehicles		Card Only
KS	Questar Fueling	6580 Kansas Avenue	Accommodates	I-70	Public – Credit
		Kansas City, KS 66111	All Vehicles		Card Only
	Questar Fueling	5625 SW Wenger Street	Accommodates	I-70	Public – Credit
		Topeka, KS 66609	All Vehicles		Card Only
	Kansas Gas Service	11401 West 89 th Street	Accommodates	I-35	Public – Credit
		Overland Park, KS 66214	All Vehicles		Card Only
	Kansas Gas Service	200 East 1 st Avenue	Accommodates	I-70	Public – Credit
		Topeka, KS 66603	All Vehicles		Card Only
	City of El Dorado	222 East 2 nd Avenue	Accommodates	I-35	Public – Credit
		El Dorado, KS	All Vehicles		Card Only
	CNG Services LLC	2950 North Ohio Street	Accommodates	I-35	Public – Credit
		Wichita, KS 67219	All Vehicles		Card Only
MO	Spire Natural Gas	4231 Cypress Road	Accommodates	I-70	Public – Credit
	Fueling Solutions	St. Ann, MO 65202	All Vehicles		Card Only
	Clean Energy	1900 Lake Ridgeway Road	Accommodates	I-70	Public – Credit
	City of Columbia	Columbia, MO 65202	All Vehicles		Card Only
	Clean Energy	1200 East 18 th Street	Accommodates	I-70 I-35	Public – Credit
	City Fleet Services	Kansas City, MO 64120	All Vehicles		Card Only
	Clean Energy	505 SE Transport Road	Accommodates	I-70	Public – Credit
	Lee's Summit Schools	Lee's Summit, MO 64081	All Vehicles		Card Only

APPENDICES

PROPANE AUTOGAS – EXISTING FACILITIES

	NAME OF STATION	LOCATION	CORRIDOR	ACCESS
IA	United LP Company	11274 265 th Street	I-35	Public – Call Ahead
		Mason City, IA 50401		
	Flying J	3040 220 th Street	I-35	Public
		Williams, IA 50271		
	Cenex – Heart Of Iowa	633 Market Avenue	I-35	Public
		Story City, IA 50248		
	Pilot Travel Center	2010 West Clay Street	I-35	Public
		Osceola, IA 50213		
	U-Haul	101 63 rd Street	I-35	Public
		Des Moines, IA 50312		
	Wings America	7005 North Chestnut Street	I-80	Public – Call Ahead
		Avoca, IA 51521		
	Pelgas, Inc.	603 West 2 nd Street	I-80	Public – Call Ahead
		Atlantic, IA 50022		
	A-1 Propane Services	4181 Naples Avenue	I-80	Public – Call Ahead
		Iowa City, IA 52240		
	Consumers Co-Op	3500 2 nd Street	I-80	Public – Call Ahead
		Coralville, IA 52241		
	U--Haul	2601 2 nd Street	I-80	Public
		Coralville, IA 52241		
	Flying J	8200 NW Boulevard		Public
		Davenport, IA 52806	I-80	
	U-Haul	1012 Spruce Hills Drive	I-80	Public
		Bettendorf, IA 52722		

APPENDICES

PROPANE AUTOGAS – EXISTING FACILITIES (continued)

	NAME OF STATION	LOCATION	CORRIDOR	ACCESS
IA	U-Haul	721 32 nd Avenue	I-80	Public
		Council Bluffs, IA 51501		
KS	Ferrellgas	2837 Roe Lane	I-35	Public
		Kansas City, KS 66103		
	U-Haul	7740 Metcalf Avenue	I-35	Public
		Overland Park, KS 66204		
	Smitty's Lawn & Garden	2300 North Rogers Road	I-35	Public
		Olathe, KS 66062		
	Heetco, Inc.	1853 East 1450 Road	I-70	Public – Call Ahead
		Lawrence, KS 66044		
	Lawrence KOA	1473 KS-40	I-70	Public
		Lawrence, KS 66044		
	U-Haul	3825 SW Topeka Boulevard	I-70	Public
		Topeka, KS 66609		
	Propane Central	514 North 9 th Street	I-70	Public
		Salina, KS 67401		
	Chief LP Gas Company	1580 Highway K-25	I-70	Public
		Colby, KS 67701		
	Flying J	4215 West Highway 50	I-35	Public
		Emporia, KS 66801		
	U-Haul	5213 East Pawnee Street	I-35	Public
		Wichita, KS 67218		
	U-Haul	3710 West McCormack Street	I-35	Public
		Wichita, KS 67213		

APPENDICES

PROPANE AUTOGAS – EXISTING FACILITIES (continued)

	NAME OF STATION	LOCATION	CORIDOR	ACCESS
KS	Farmer's Co-Op Assoc.	9011 North A Street	I-35	Public
		Wellington, KS 67152		
MO	Ferrellgas	1775 NE Chouteau Trafficway	I-35	Public
		Kanas City, MO 64120		
	Flying J	1300 North Corrington Avenue	I-35	Public
		Kansas City, MO 64120		
	U-Haul	305 Highway 24 East	I-70	Public
		Independence, MO 64050		
	U-Haul	4312 South Noland Road	I-70	Public
		Independence, MO 64055		
	U-Haul	800 Business Loop 70 West	I-70	Public
		Columbia, MO 65203		
	Ferrellgas	3901 Waco Road	I-70	Public – Call Ahead
		Columbia, MO 65202		
	US Rents-It	1600 Old Highway 63 South	I-70	Public
		Columbia, MO 65201		
	Flying J	1 Camp Branch Road	I-70	Public
		Warrenton, MO 63383		
	U-Haul	2000 Highway K	I-70	Public
		O'Fallon, MO 63366		
	Ferrellgas	1600 Mid Rivers Industrial Drive	I-70	Public
		St. Peters, MO 63301		
	U-Haul	3990 South Service Road	I-70	Public
		St. Peters, MO 63301		

APPENDICES

PROPANE AUTOGAS – EXISTING FACILITIES (continued)

	NAME OF STATION	LOCATION	CORRIDOR	ACCESS
MO	U-Haul	8961 Dunn Road	I-70	Public
		Hazelwood, MO 63042		
	Heritage Propane	1968 NE 61 Service Road	I-70	Public – Call Ahead
		Flint Hill, MO 63346		
	U-Haul	7270 Olive Boulevard	I-70	Public
		University City, MO 63130		
	U-Haul	1800 North Highway 67	I-70	Public
		Florissant, MO 63033		
	U-Haul	1641 South Kingshighway	I-44	Public
		St. Louis, MO 63110		
	Geldbach Petroleum	100 Beckett Memorial Drive	I-44	Public – Call Ahead
		Valley Park, MO 63088		
	Flying J	1500 AF Highway	I-44	Public
		Sullivan, MO 63080		
	AmeriGas	221 Highway DD West	I-44	Public – Call Ahead
		Cuba, MO 65453		
	Goodrich Gas, Inc.	322 St. Robert Outer Road	I-44	Public – Call Ahead
		St. Robert, MO 65583		
	Goodrich Gas, Inc.	16624 Highway 67	I-44	Public – Call Ahead
		Crocker, MO 65452		
	Titan Propane	19910 Houston Road		Public – Call Ahead
		Lebanon, MO 65536		
	U-Haul	1768 North Glenstone Avenue	I-44	Public
		Springfield, MO 65803		

APPENDICES

PROPANE AUTOGAS – EXISTING FACILITIES (continued)

	NAME OF STATION	LOCATION	CORRIDOR	ACCESS
MO	U-Haul	3150 South Campbell Avenue	I-44	Public
		Springfield, MO 65807		
	Titan Propane	4230 W. Chestnut Expressway	I-44	Public – Call Ahead
		Springfield, MO 65802		
	KOA	5775 Farm Road 140	I-44	Public
		Springfield, MO 65802		
	Titan Propane	865 Chapel Drive	I-44	Public – Call Ahead
		Monett, MO 65708		
	U-Haul	11827 Blue Ridge Boulevard	I-49	Public
		Kansas City, MO 64134		
	Flying J	700 J Highway	I-49	Public
		Peculiar, MO 64078		
	Titan Propane	18702 Highway 59	I-49	Public – Call Ahead
		Neosho, MO 64850		
NE	U-Haul	8920 Maple Street	I-80	Public
		Omaha, NE 68134		
	U-Haul	8716 L Street	I-80	Public
		Omaha, NE 68127		
	Ferrellgas	13606 L Street	I-80	Public
		Omaha, NE 68127		
	Flying J	15010 South State Highway 31	I-80	Public
		Gretna, NE 68028		
	Great Plains Service	642 US Highway 6	I-8-0	Public – Call Ahead
		Ashland, NE 68003		

APPENDICES

PROPANE AUTOGAS – EXISTING FACILITIES (continued)

	NAME OF STATION	LOCATION	CORRIDOR	ACCESS
NE	Otte Oil & Propane	3435 Davey Street	I-80	Public – Call Ahead
		Davey, NE 68336		
	Converse Service	8201 North 56 th Street	I-80	Public
		Lincoln, NE 68514		
	Ferrellgas	3200 Superior Street	I-80	
		Lincoln, NE 68504		Public – Call Ahead
	Performance 66	7000 Vine Street	I-80	Public
		Lincoln, NE 68505		
	Lee's Propane Service	625 West O Street	I-80	Public
		Lincoln, NE 68528		
	Hillis 66	600 South Street	I-80	Public
		Lincoln, NE 68502		
	HIS Auto Care	7000 Van Dorn street	I-80	Public – 24/7 Key Card
		Lincoln, NE 68506		
	U-Haul	1730 South Locust Street	I-80	Public
		Grand Island, NE 68801		
	All Points Co-Op	707 East Pacific Street	I-80	Public – Call Ahead
		Lexington, NE 68850		
	Flying J	3400 South Newberry Street	I-80	Public
		North Platte, NE 69101		
	Flying J	I-80 and Big Spring Road	I-80	Public
		Big Springs, NE 69122		
	Kimball Panhandle	103 South Howard Street	I-80	Public – Call Ahead

APPENDICES

	Co-Op	Kimball, NE 69145		
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APPENDICES

Appendix II – Planned Alternative Fuel Stations

B20	Name of Station	Location	Corridor	Access
IA	NONE			
KS	NONE			
MO	NONE			
NE	NONE			

LPG	Name of Station	Location	Corridor	Access
IA	NONE			
KS	NONE			
MO	NONE			
NE	NONE			

LNG	Name of Station	Location	Corridor	Access
IA	Clean Energy Flying J	3231 Adventureland Drive Altoona, IA 50009	I-80	Public – Credit Card Only
KS	Clean Energy	4650 Kansas Avenue Kansas City, KS 66106	I-70	Public – Credit Card Only
	Clean Energy Flying J	2250 North Ohio Street Salina, KS 67401	I-70	Public – Credit Card Only
	Clean Energy Pilot	1100 East Willow Street Colby, KS 67701	I-70	Public – Credit Card Only
MO	Clean Energy Flying J	11570 Highway FF Joplin, MO 64804	I-49	Public – Credit Card Only
NE	Clean Energy Flying J	15010 South State Highway 31 Gretna, NE 68028	I-80	Public – Credit Card Only
	Clean Energy Flying J	3400 South Newberry Road North Platte, NE 69101	I-80	Public – Credit Card Only

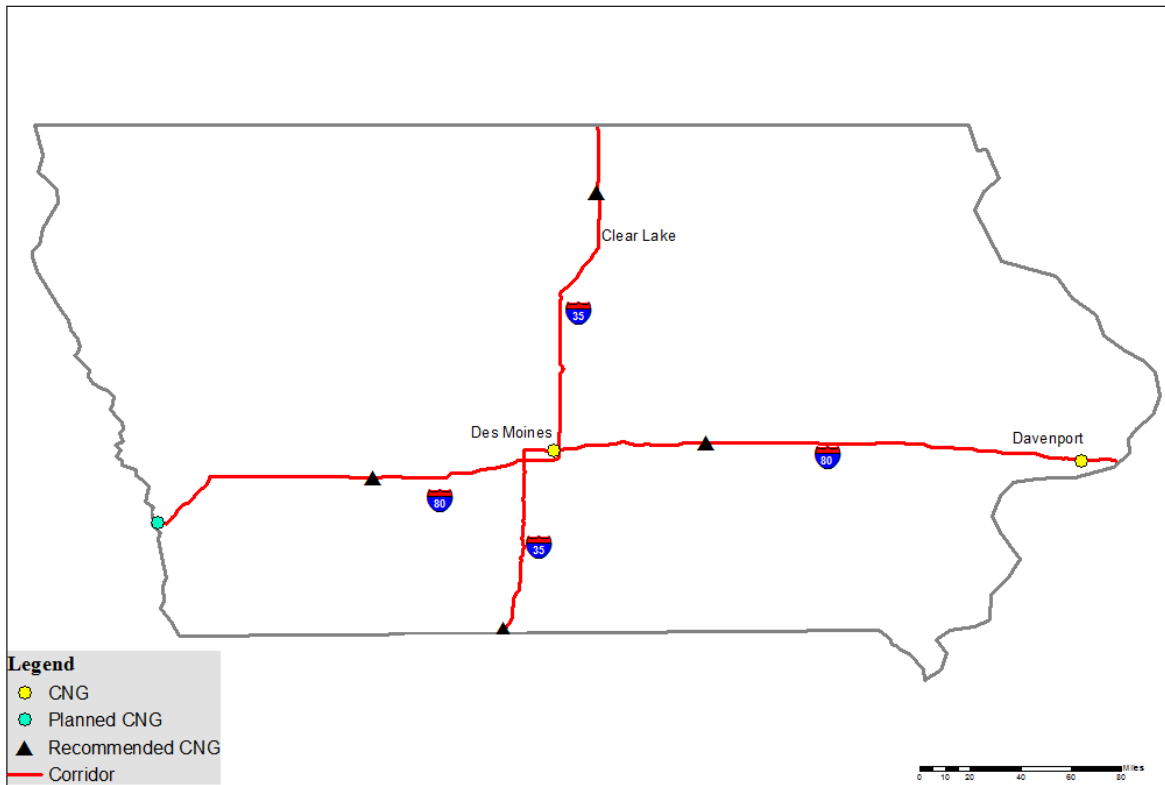
APPENDICES

CNG	Name of Station	Location	Corridor	Access
IA	Sapp Brothers	2608 South 24 th Street	I-80	Public – Credit Card Only
		Council Bluffs, IA		
	Clean Energy	3231 Adventureland Drive	I-80	Public – Credit Card Only
		Altoona, IA 50009		
KS	World Fuel Services	401 Kindelberger Road	I-70	Public – Credit Card Only
		Kansas City, KS 66115		
	Clean Energy – ANGH	4650 Kansas Avenue	I-70	Public – Credit Card Only
		Kansas City, KS 66106		
MO	Clean Energy	7801 NE 38 th Street	I-35	Public – Credit Card Only
	Kansas City Ford Plant	Kansas City, MO 64161		
	GAIN Clean Fuel	1400 South 2 nd Street	I-44	Public – Credit Card Only
		St. Louis, MO 63104		
NE	NONE			

APPENDICES

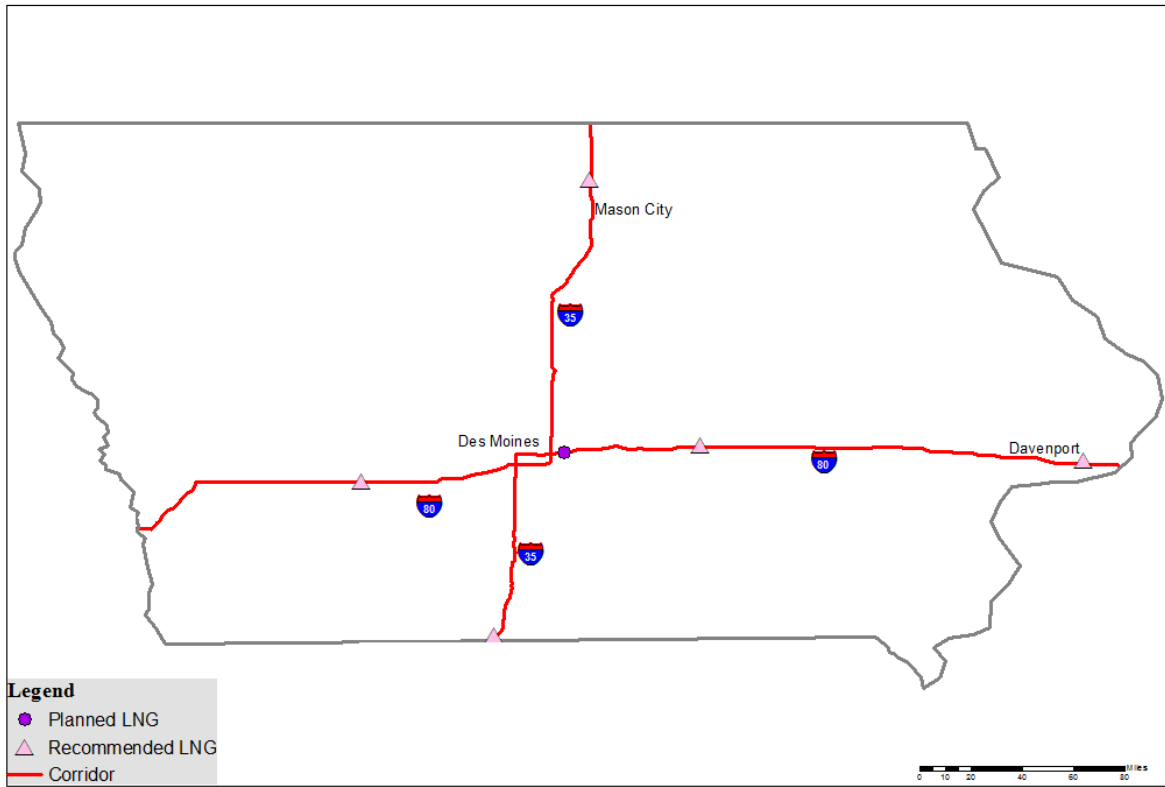
Appendix III – Corridor Maps

Current, Planned and Recommended Stations in Iowa



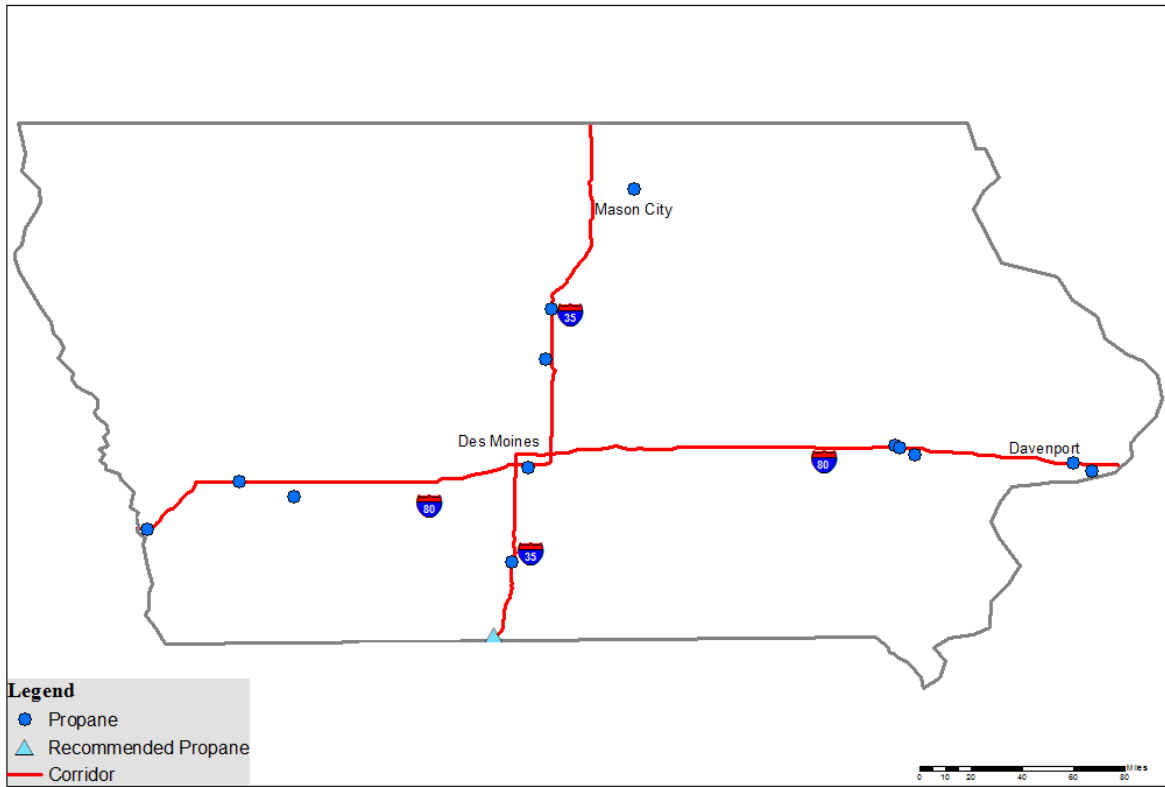
APPENDICES

Planned and Recommended LNG Stations in Iowa



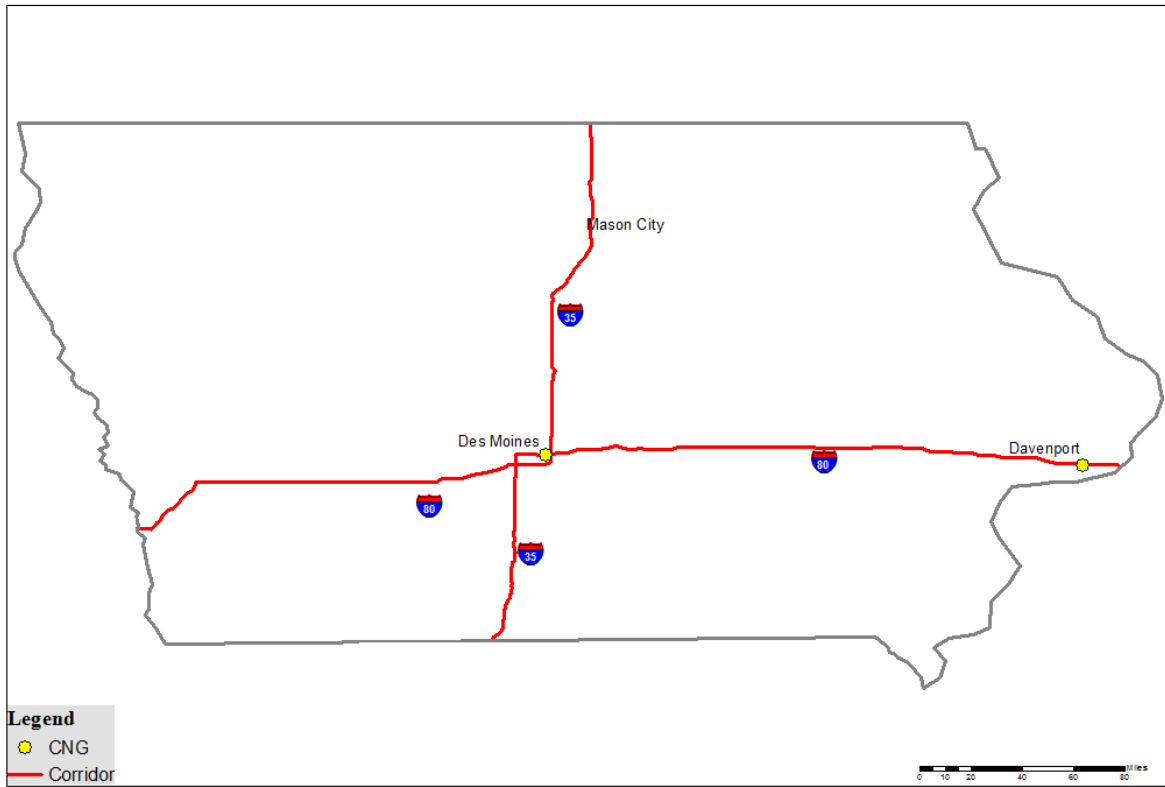
APPENDICES

Current and Recommended Propane Stations in Iowa



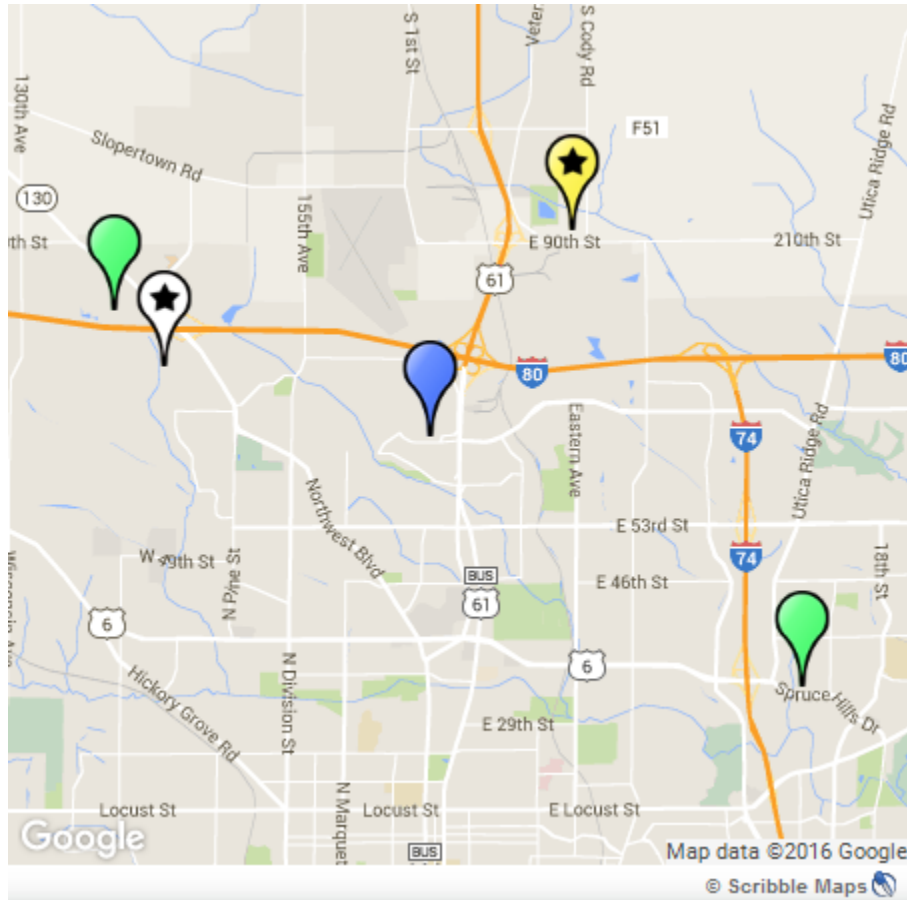
APPENDICES

Current Public CNG Stations in Iowa



APPENDICES

Current and Recommended Public Stations In Davenport, IA



Existing Propane



Existing CNG



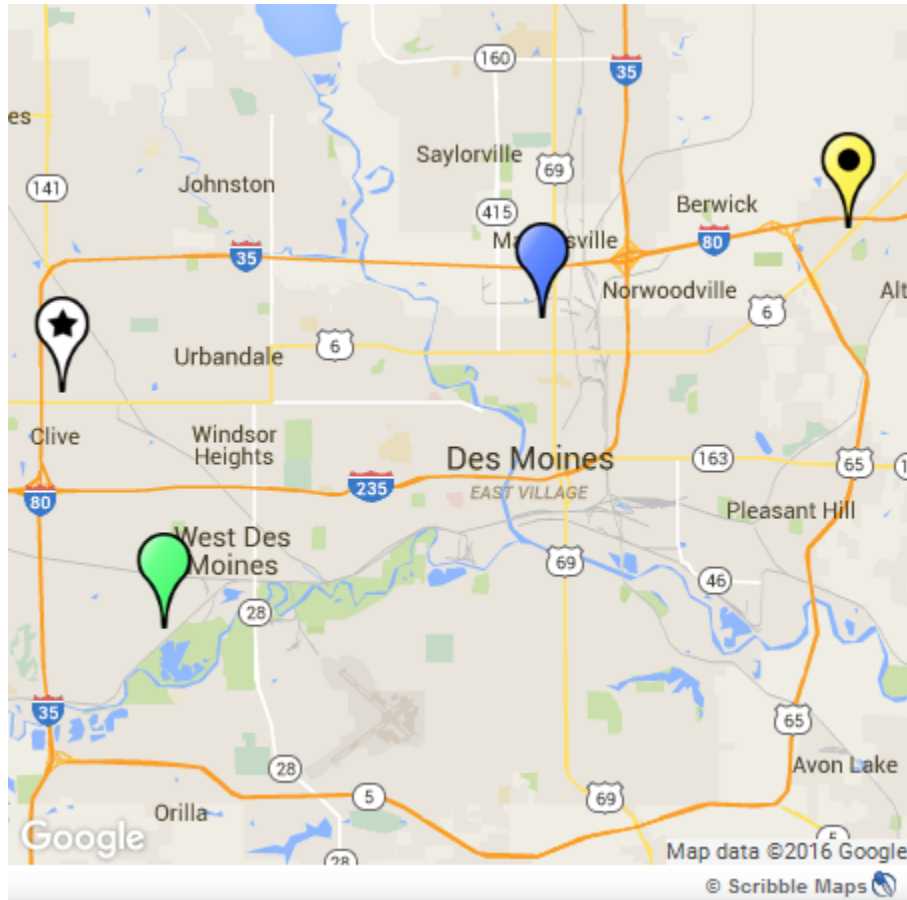
Recommended LNG



Recommended B20

APPENDICES

Current and Recommended Public Stations In Des Moines, IA



Existing Propane



Existing CNG



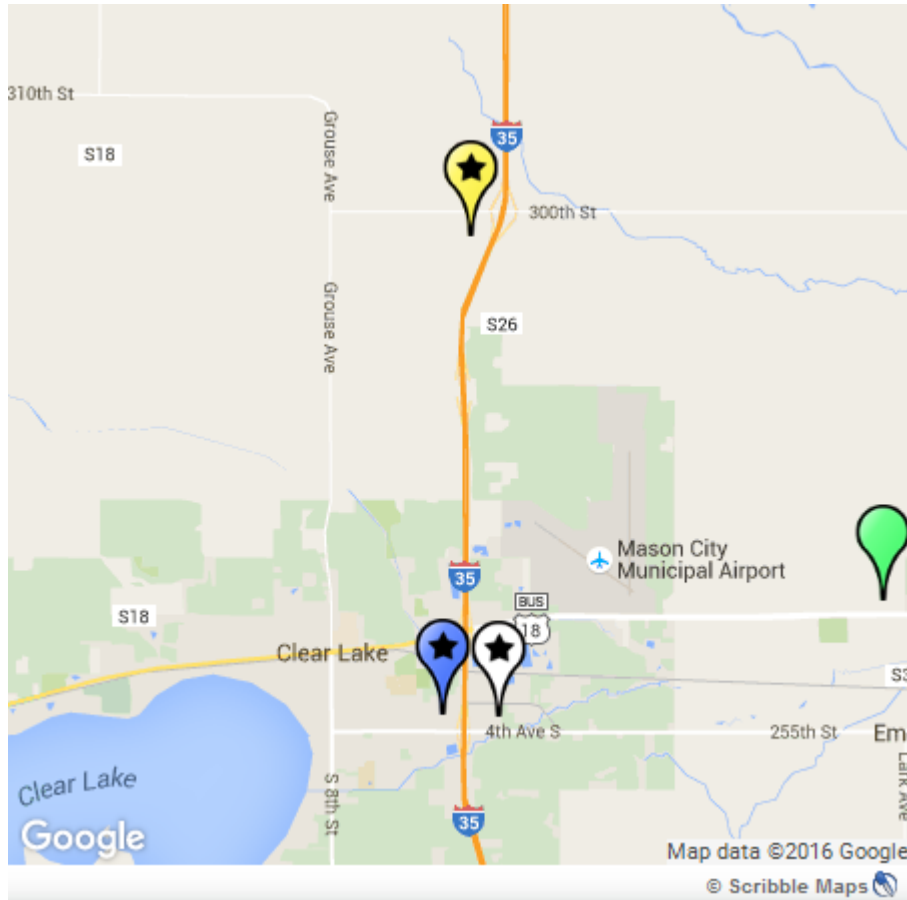
Planned LNG



Recommended B20

APPENDICES

Current and Recommended Public Stations In Mason City, IA



Existing Propane



Recommended CNG



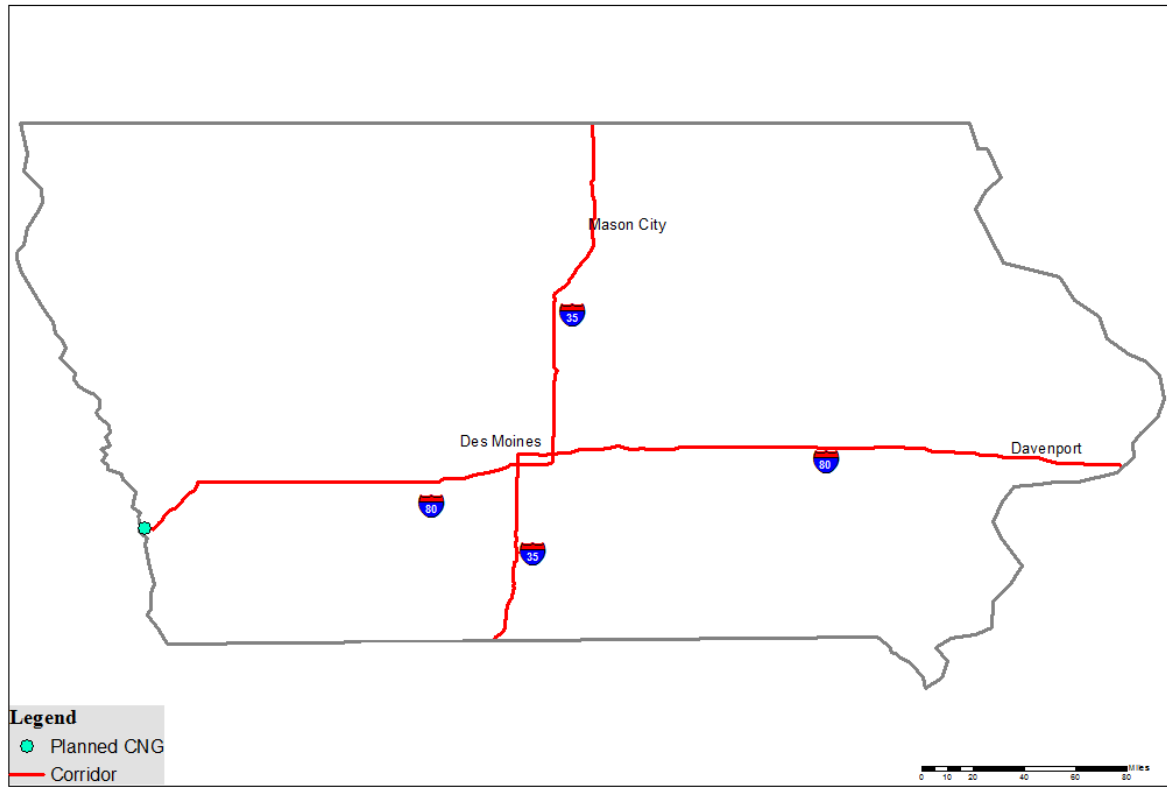
Recommended LNG



Recommended B20

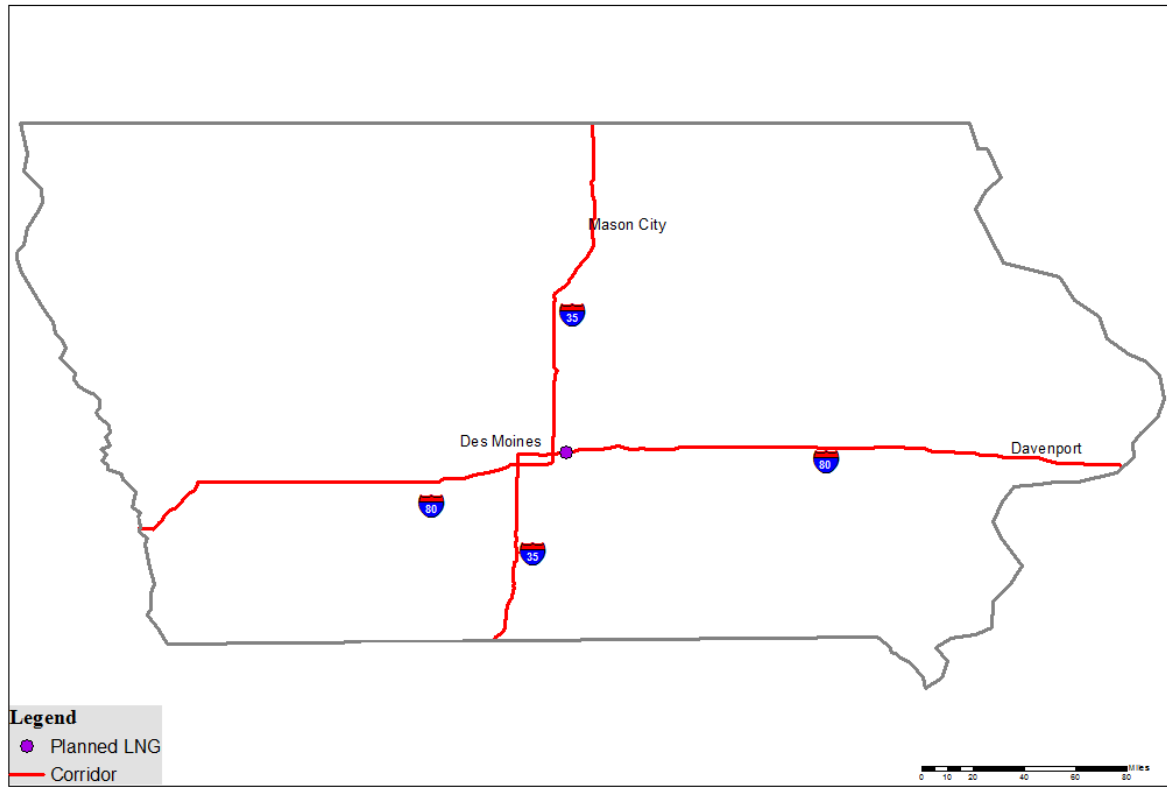
APPENDICES

Planned CNG Stations in Iowa



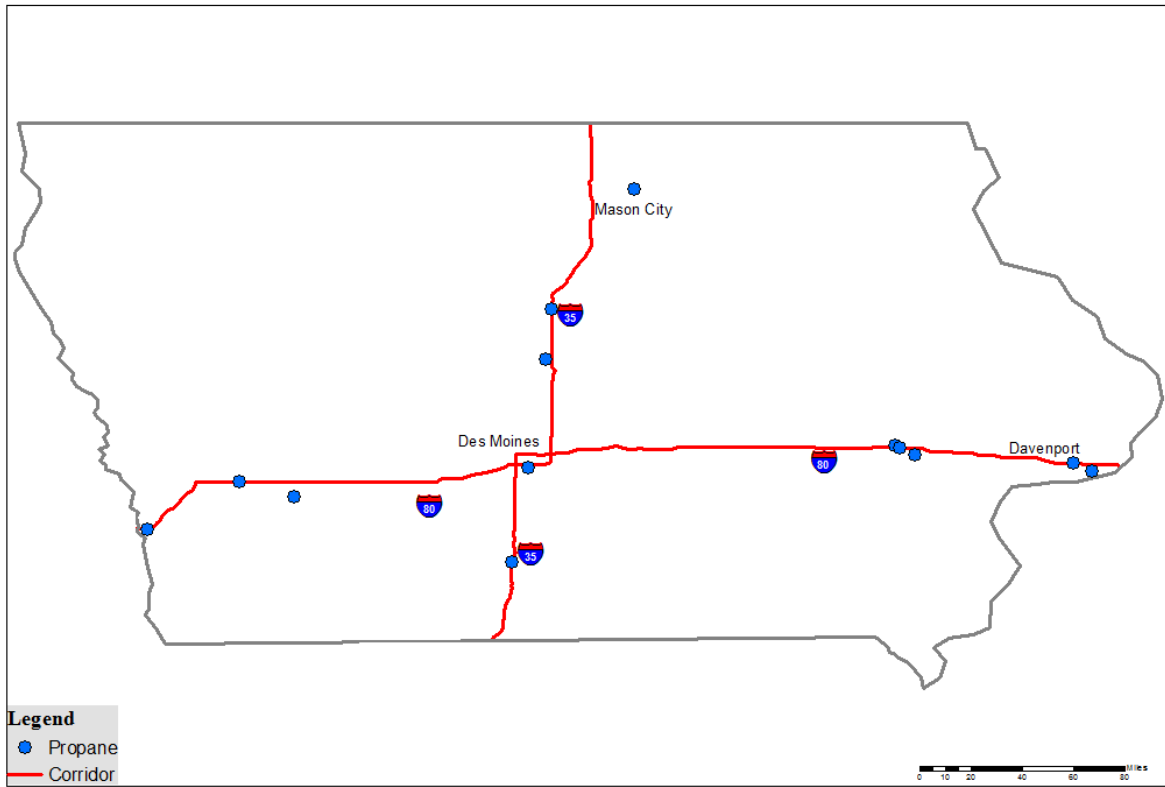
APPENDICES

Planned LNG Stations in Iowa



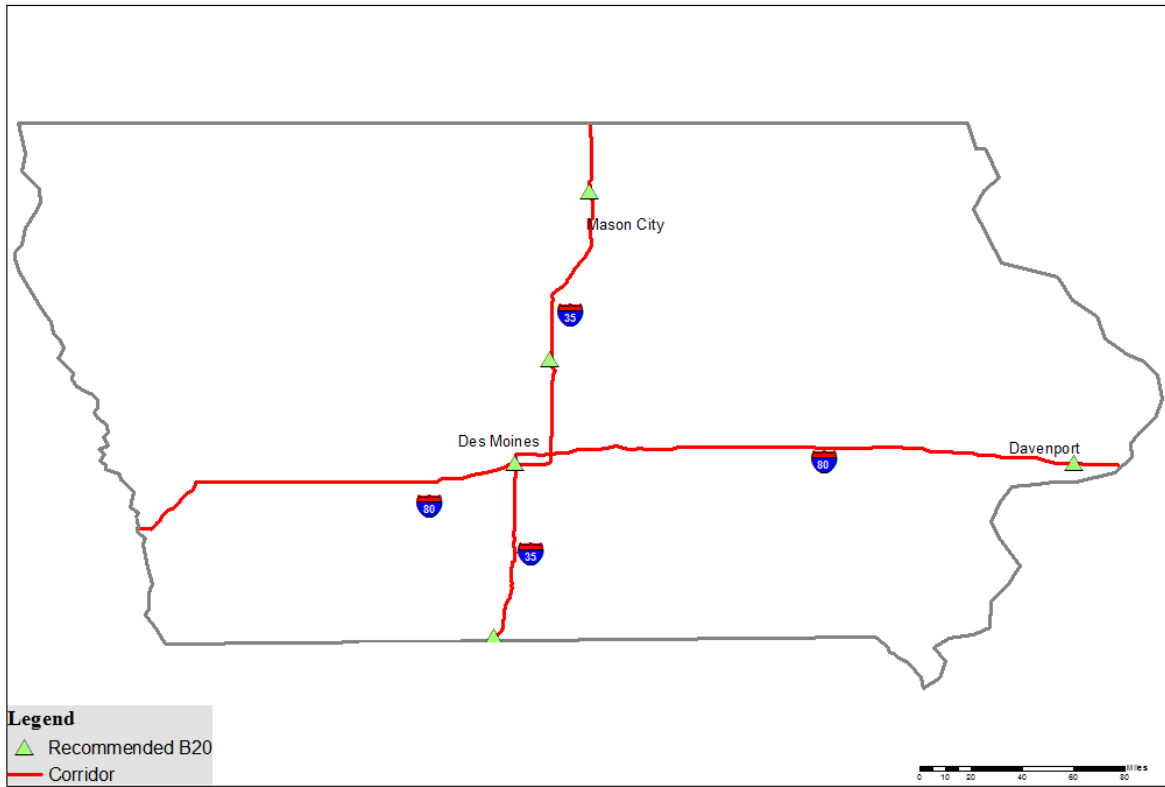
APPENDICES

Current Public Propane Stations in Iowa



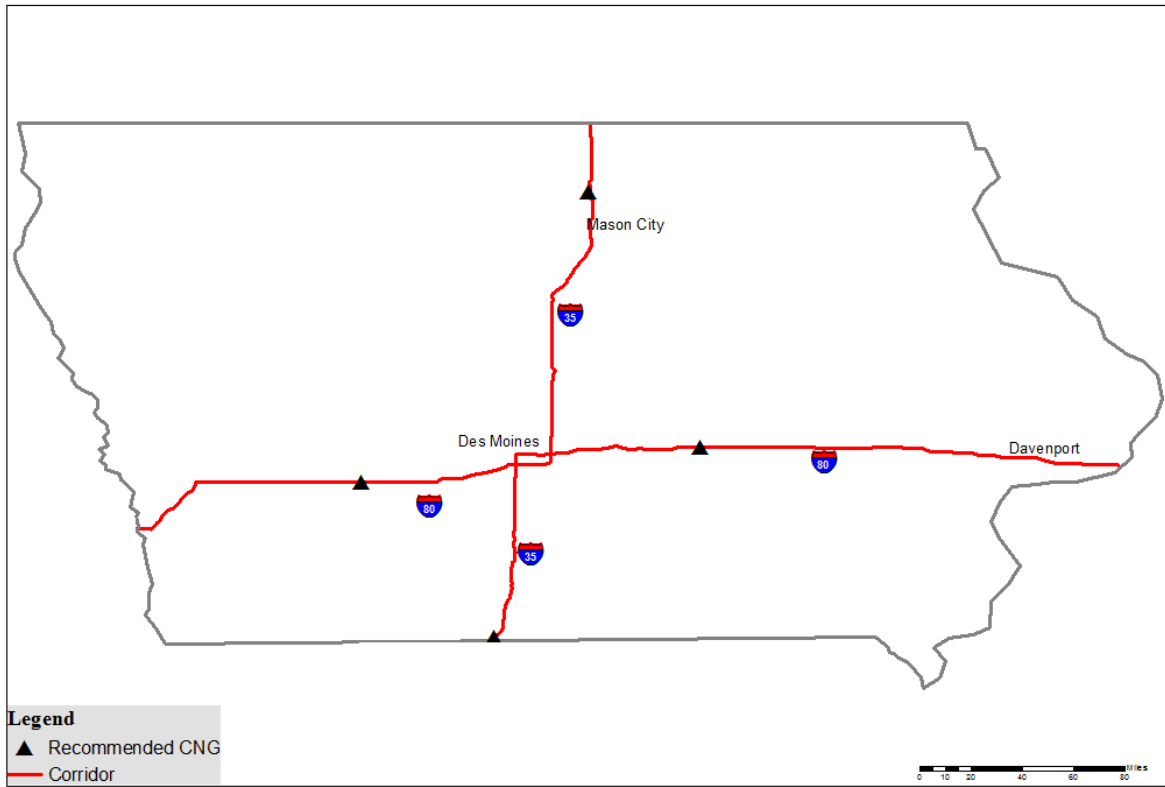
APPENDICES

Recommended B20 Stations in Iowa



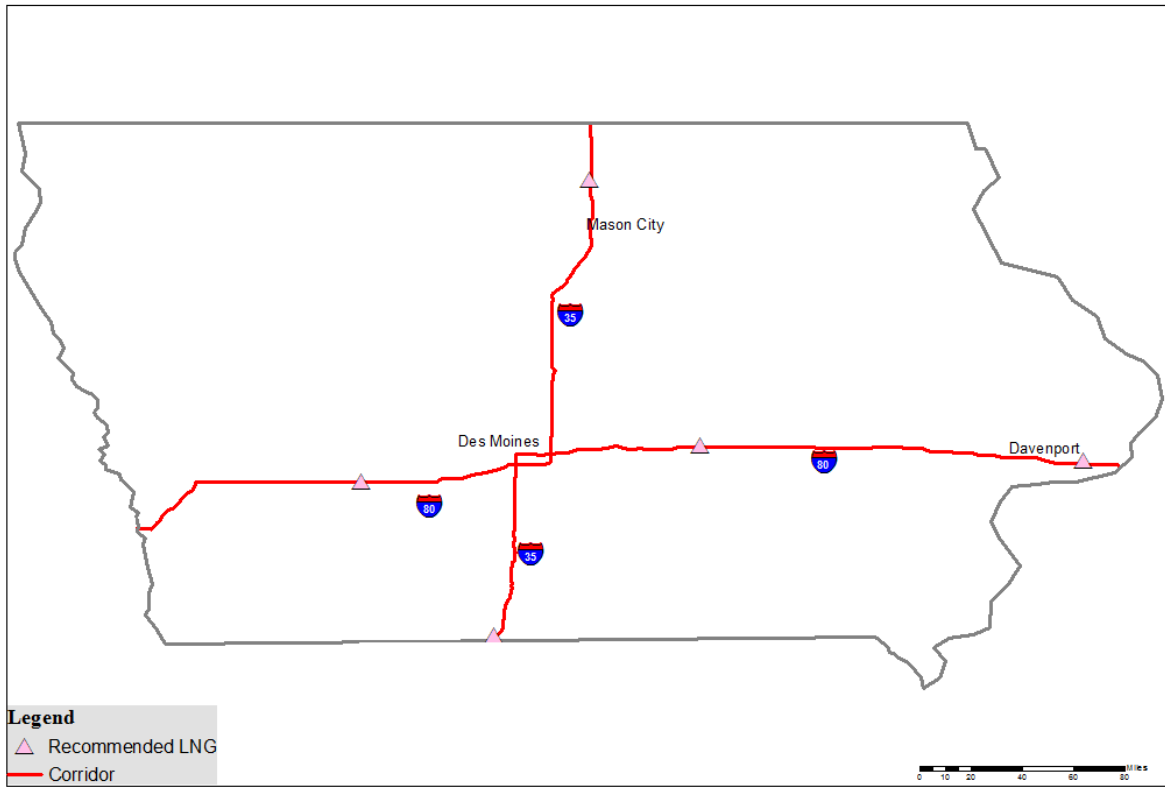
APPENDICES

Recommended CNG Stations in Iowa



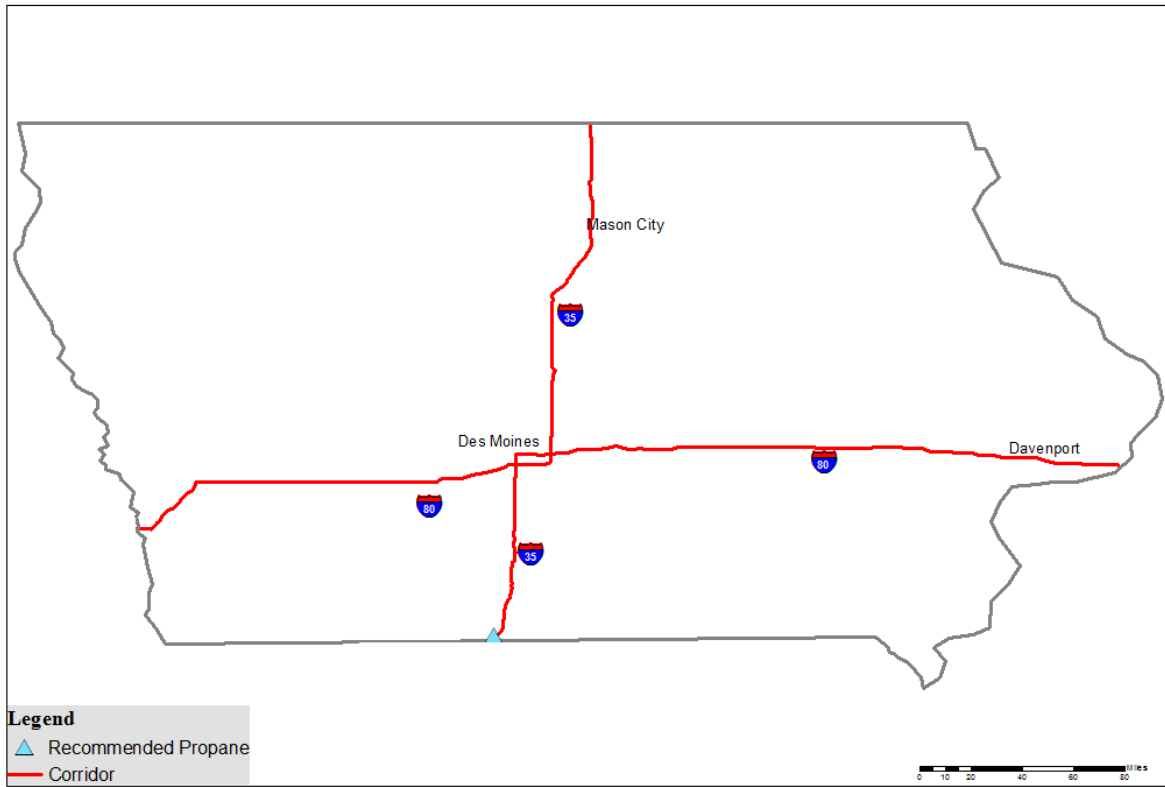
APPENDICES

Recommended LNG Stations in Iowa



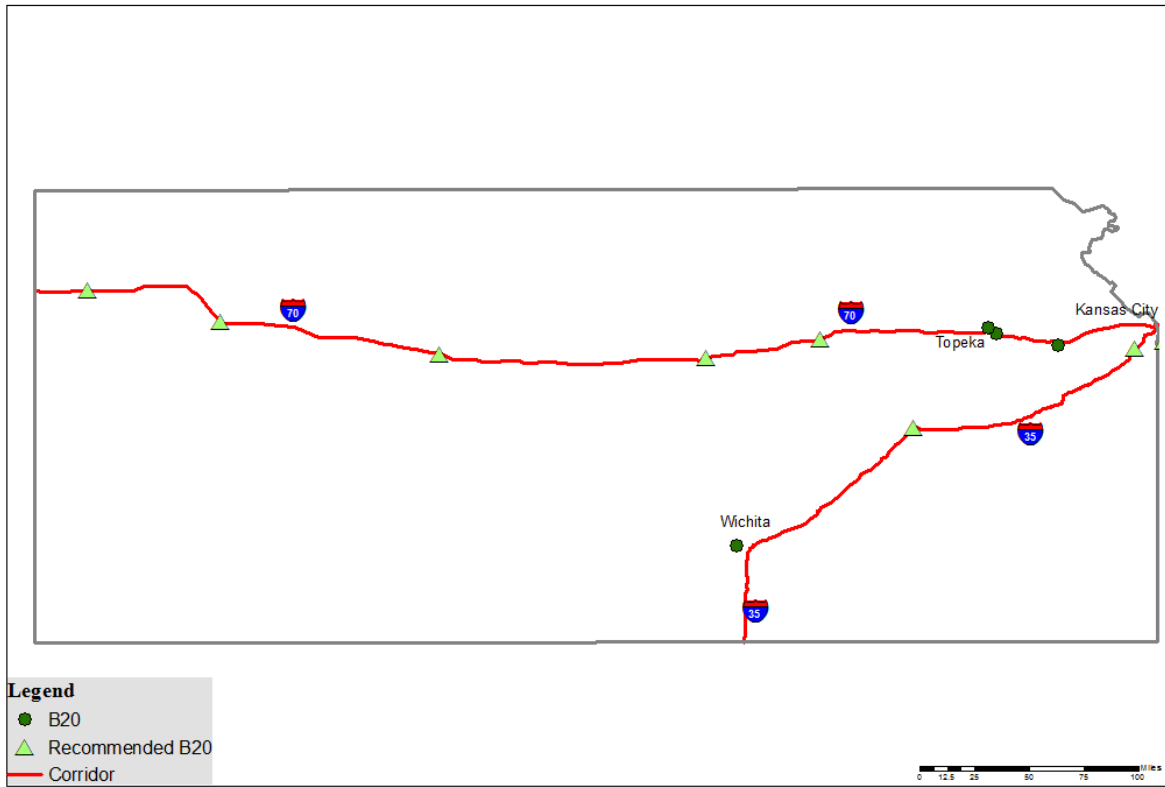
APPENDICES

Recommended Propane Stations in Iowa



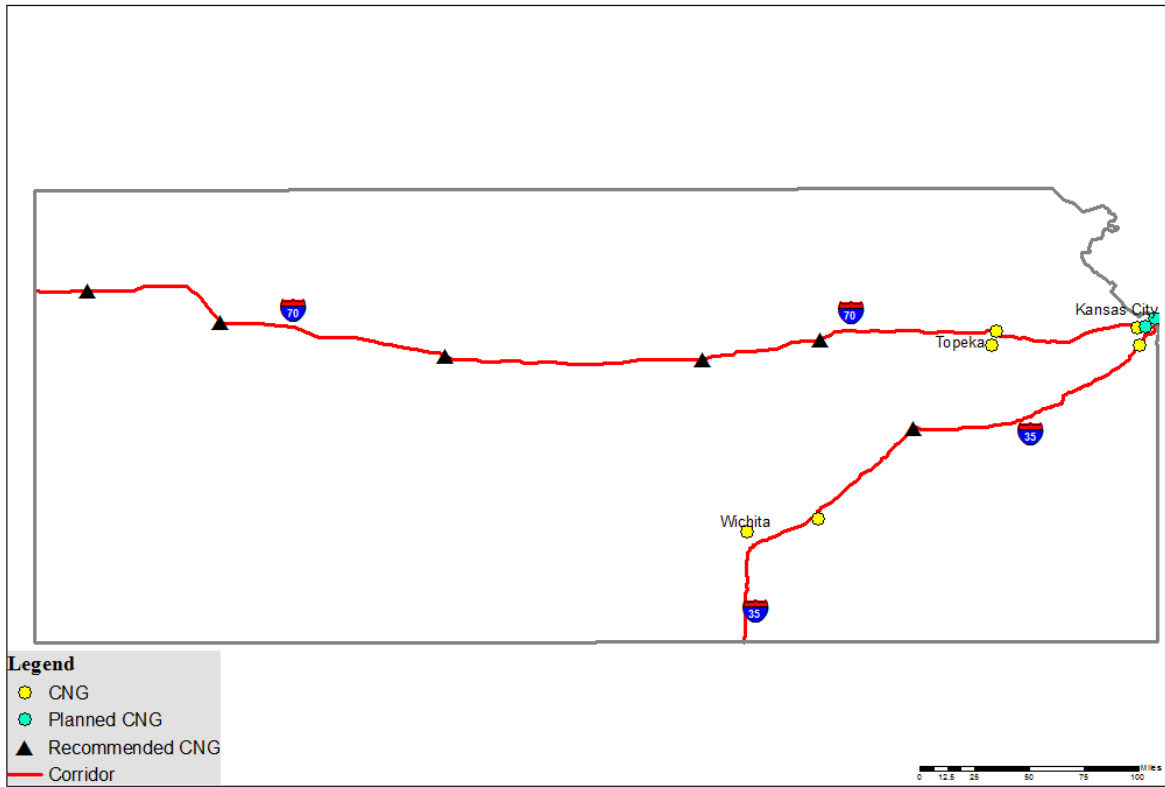
APPENDICES

Current and Recommended B20 Stations in Kansas



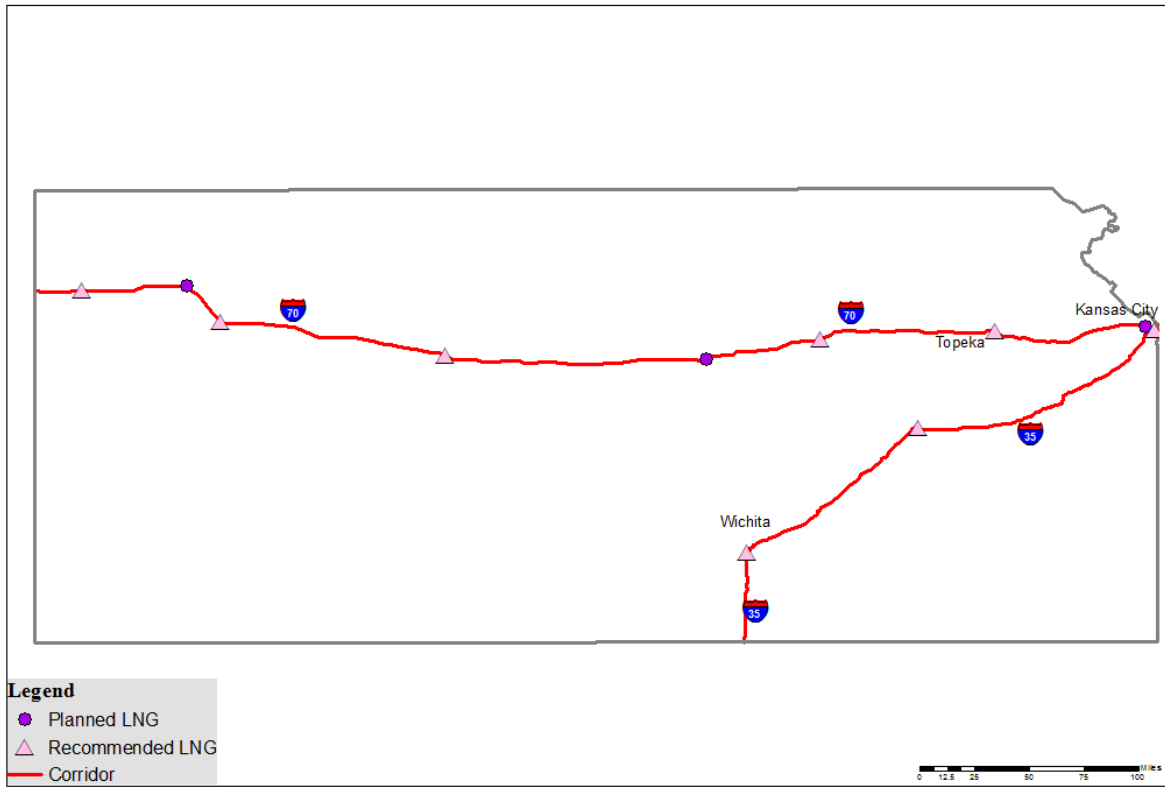
APPENDICES

Current, Planned, and Recommended CNG Stations in Kansas



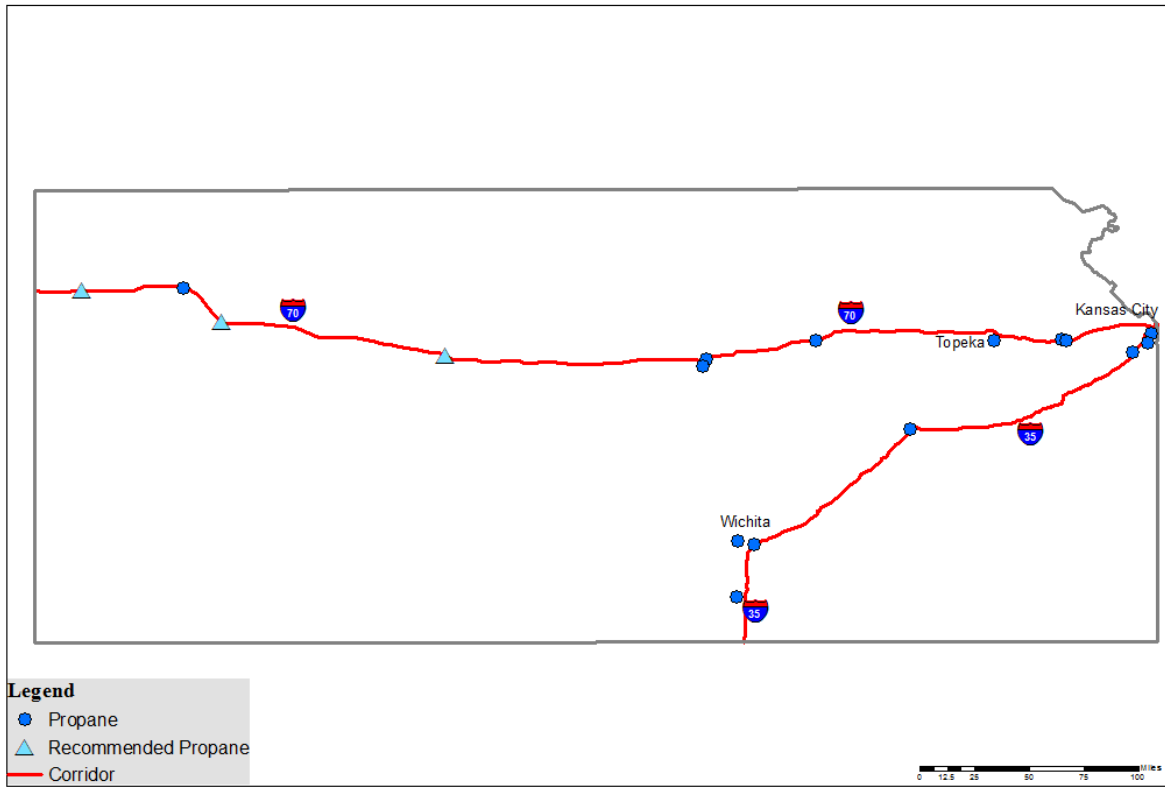
APPENDICES

Planned and Recommended LNG Stations in Kansas



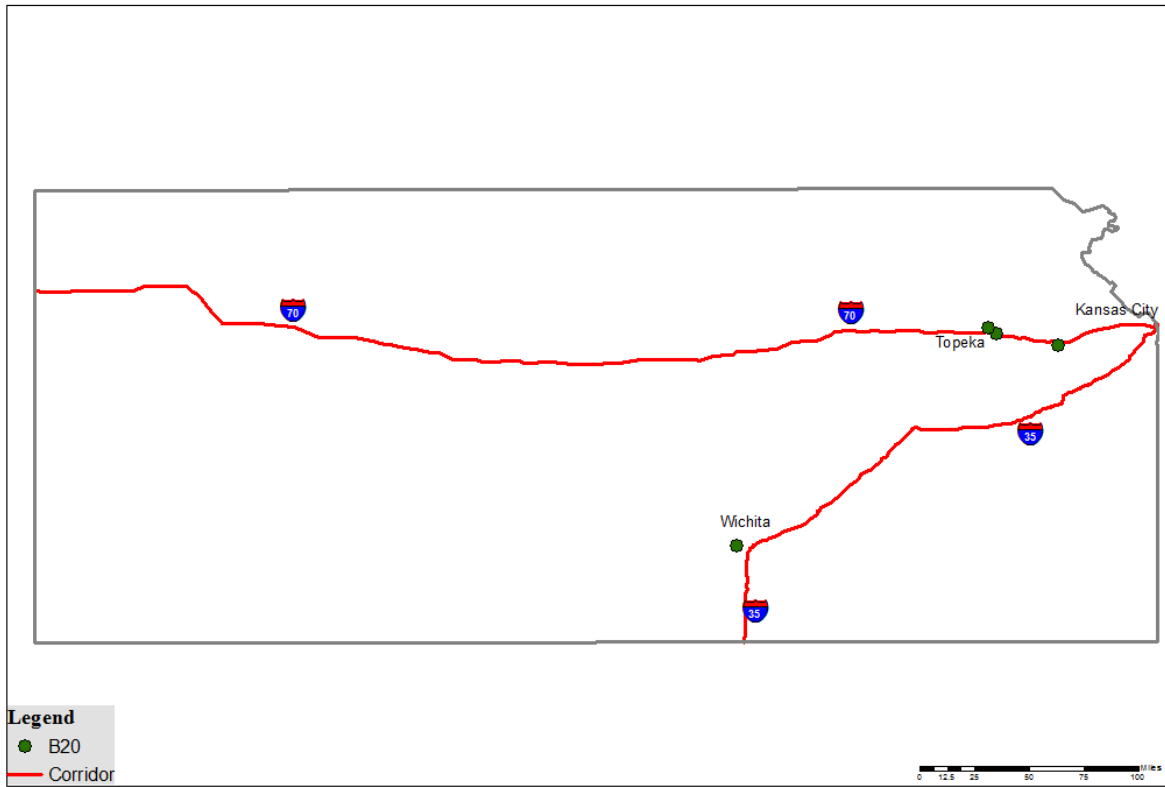
APPENDICES

Current and Recommended Propane Stations in Kansas



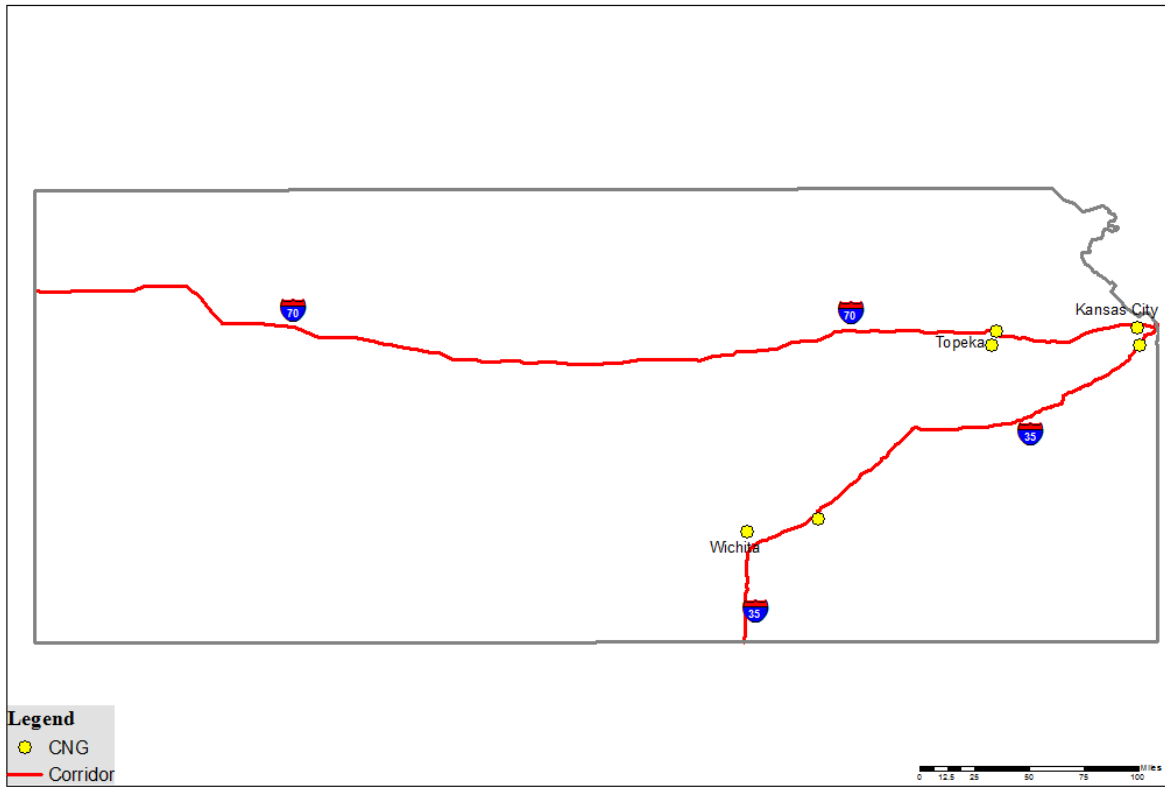
APPENDICES

Current Public B20 Stations in Kansas



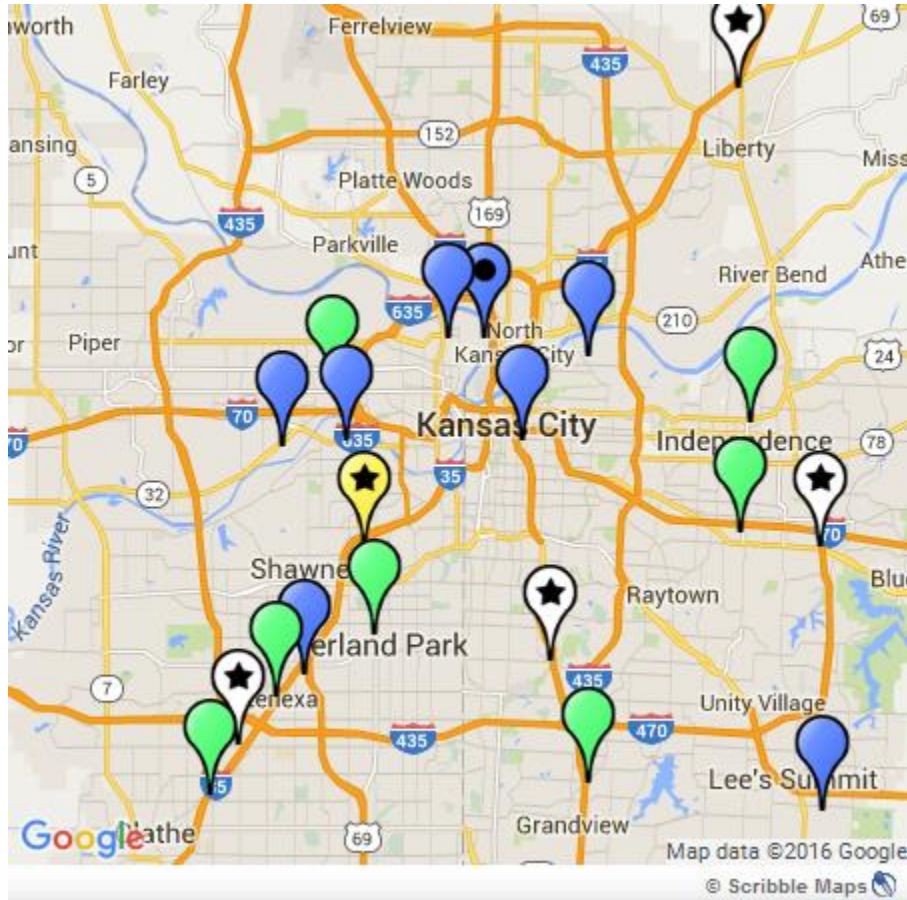
APPENDICES

Current Public CNG Stations in Kansas



APPENDICES

Current, Planned and Recommended Public Stations in Kansas City



Existing Propane

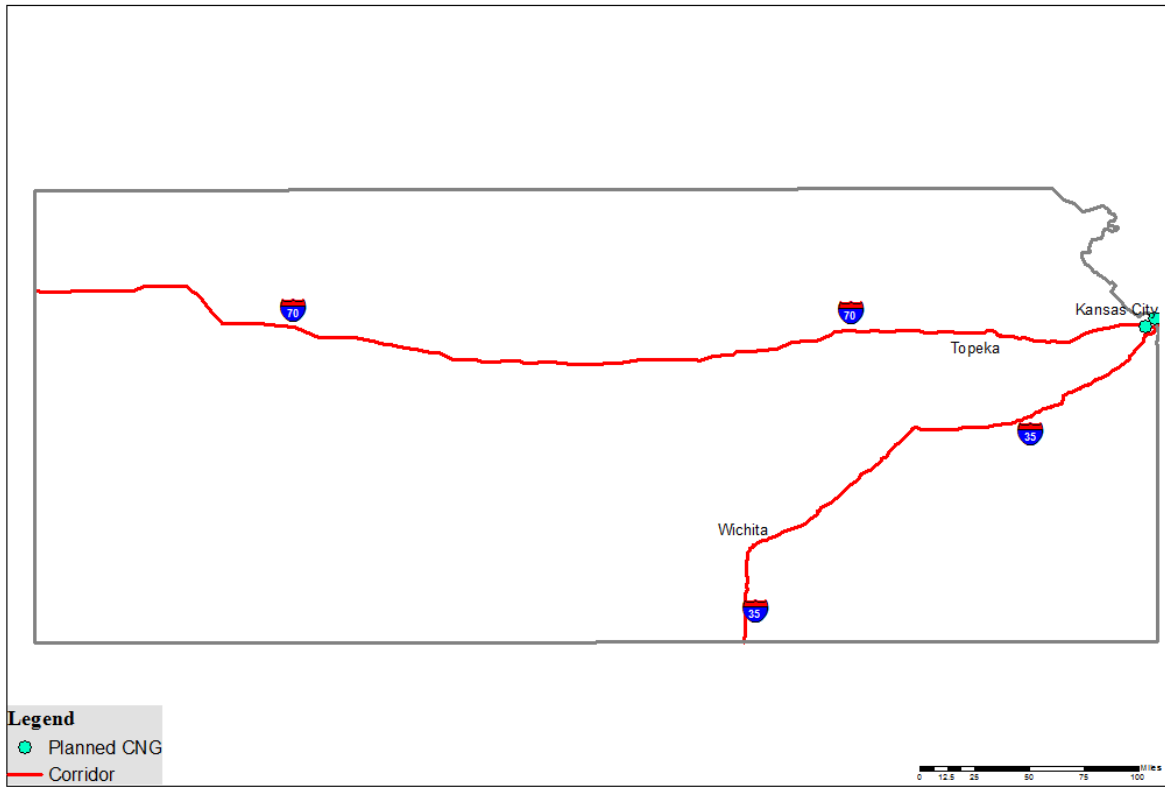
Existing CNG

Planned CNG

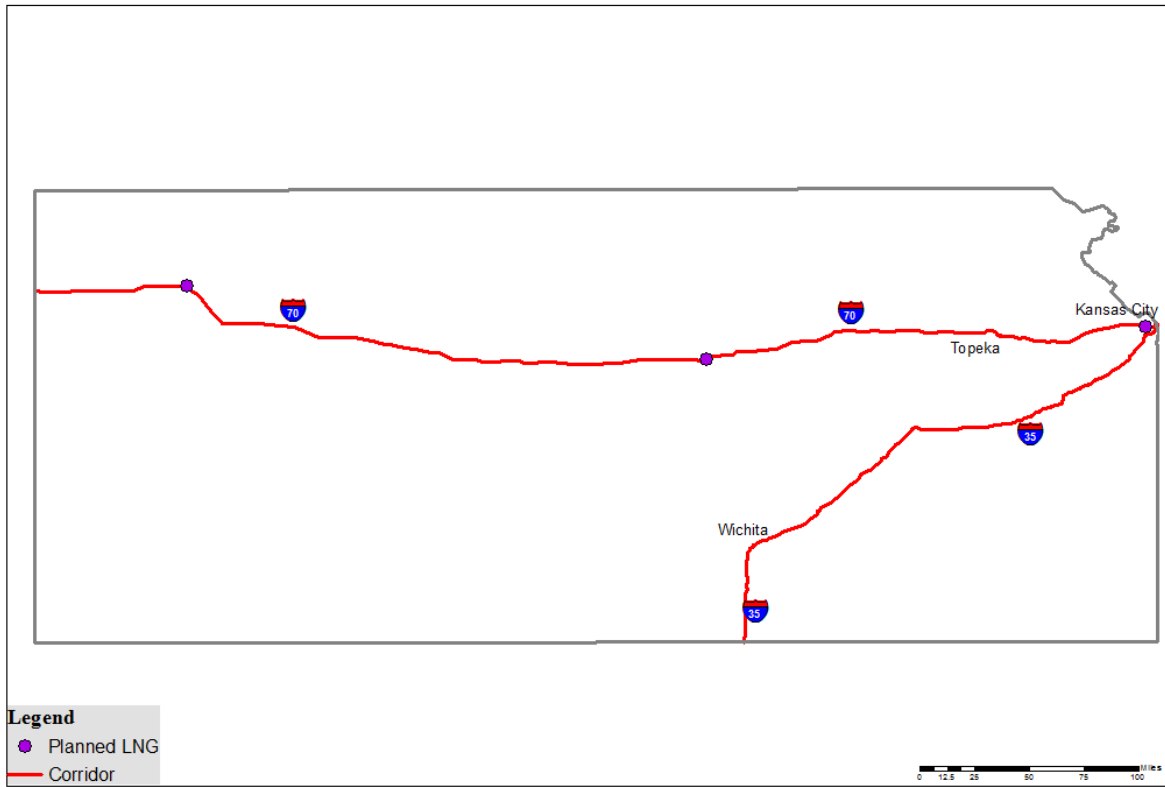
Recommended LNG

Recommended B20

Planned CNG Stations in Kansas

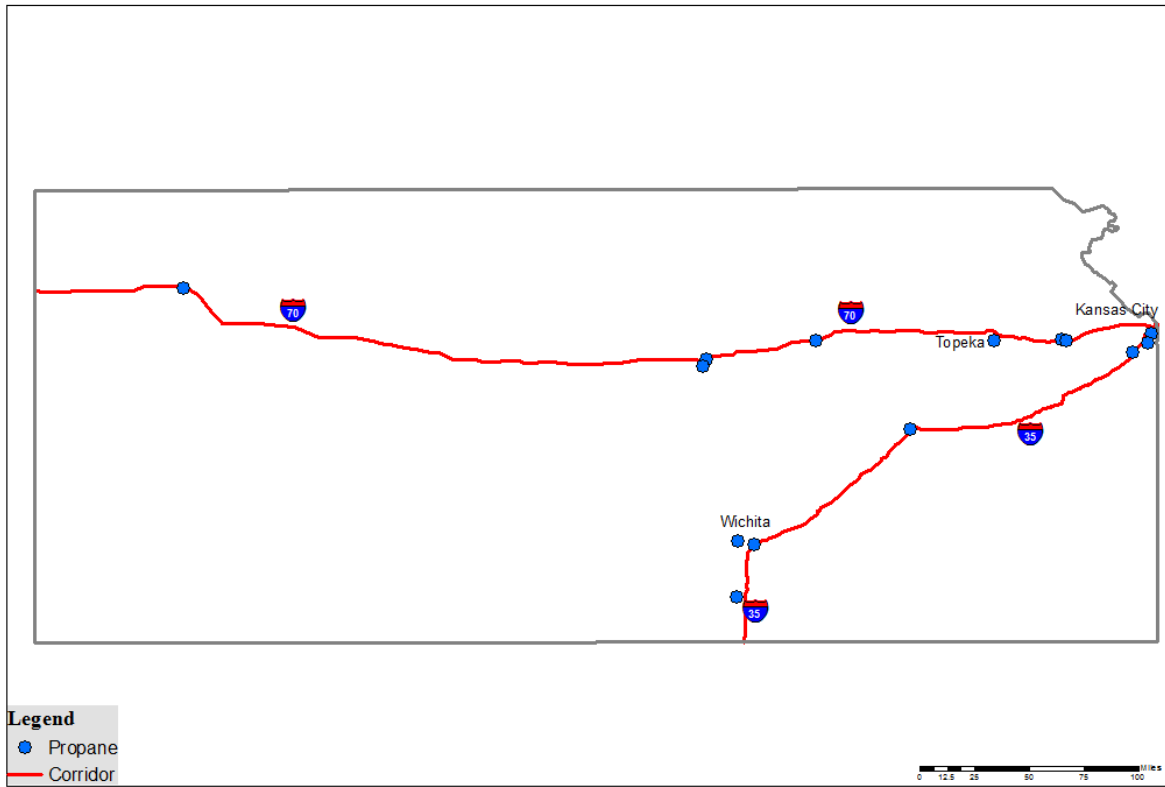


Planned LNG Stations in Kansas



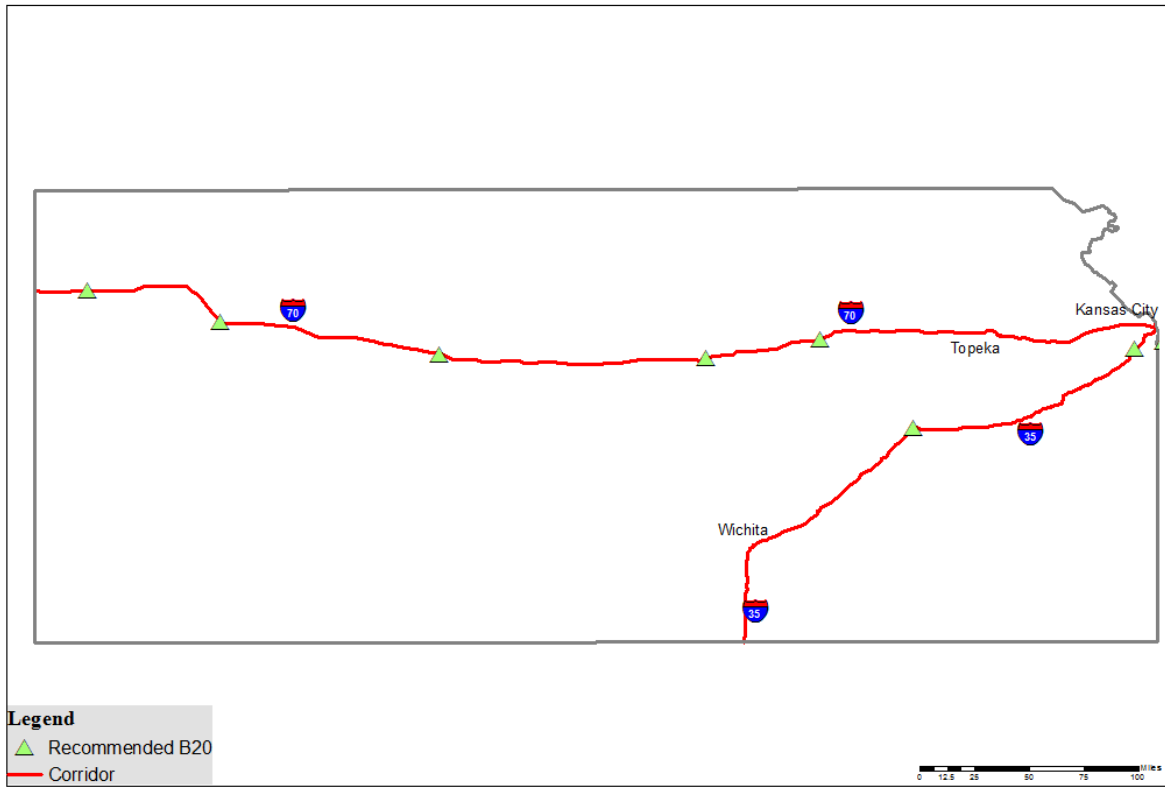
APPENDICES

Current Public Propane Stations in Kansas



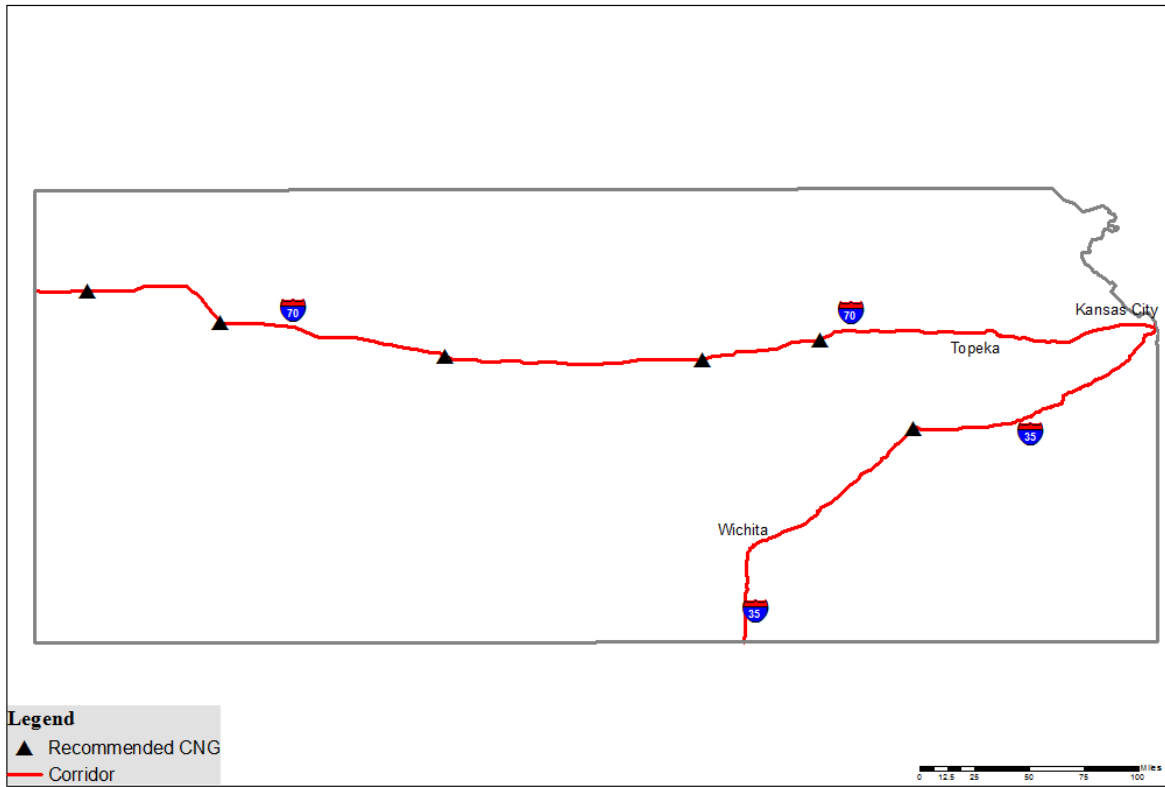
APPENDICES

Recommended B20 Stations in Kansas



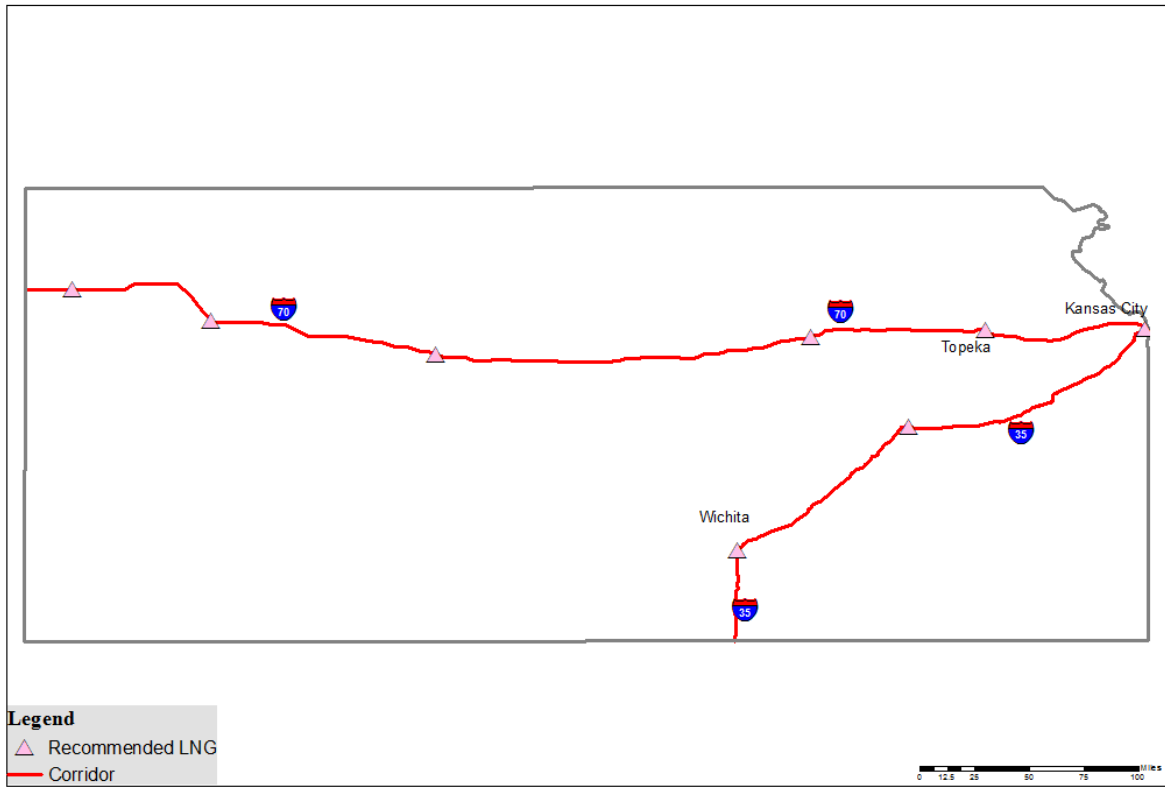
APPENDICES

Recommended CNG Stations in Kansas



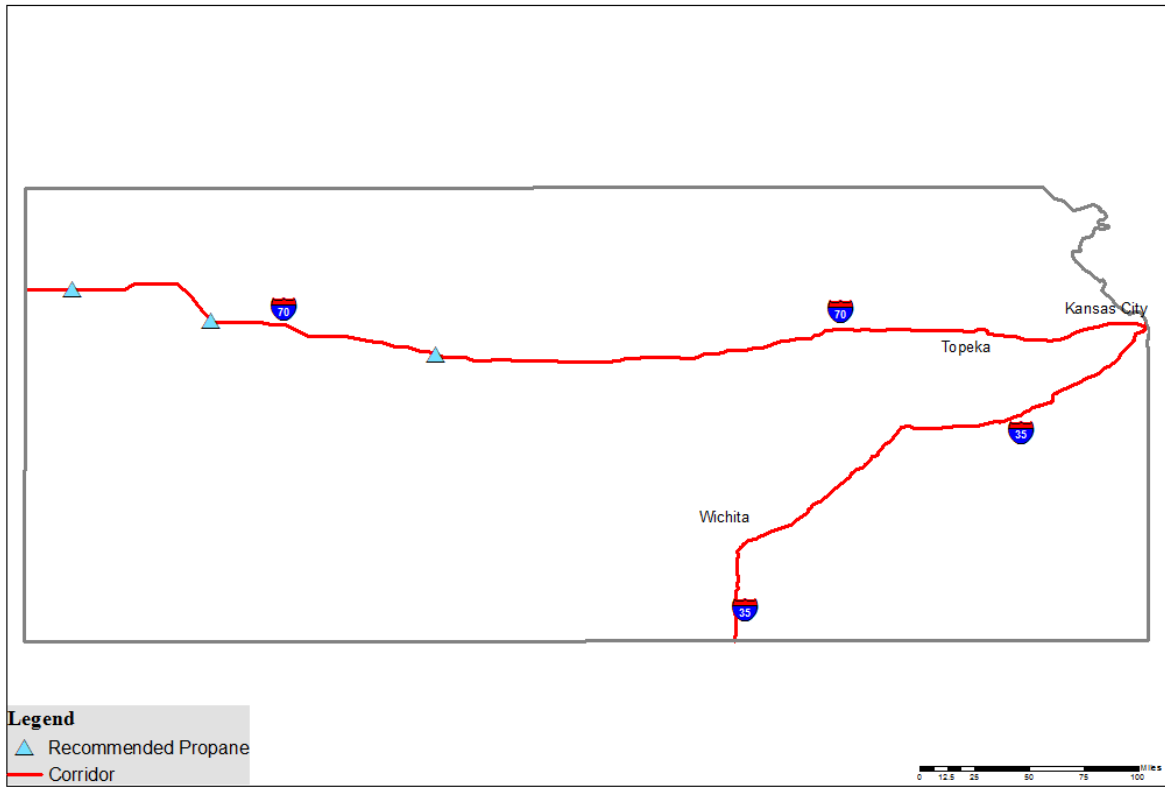
APPENDICES

Recommended LNG Stations in Kansas



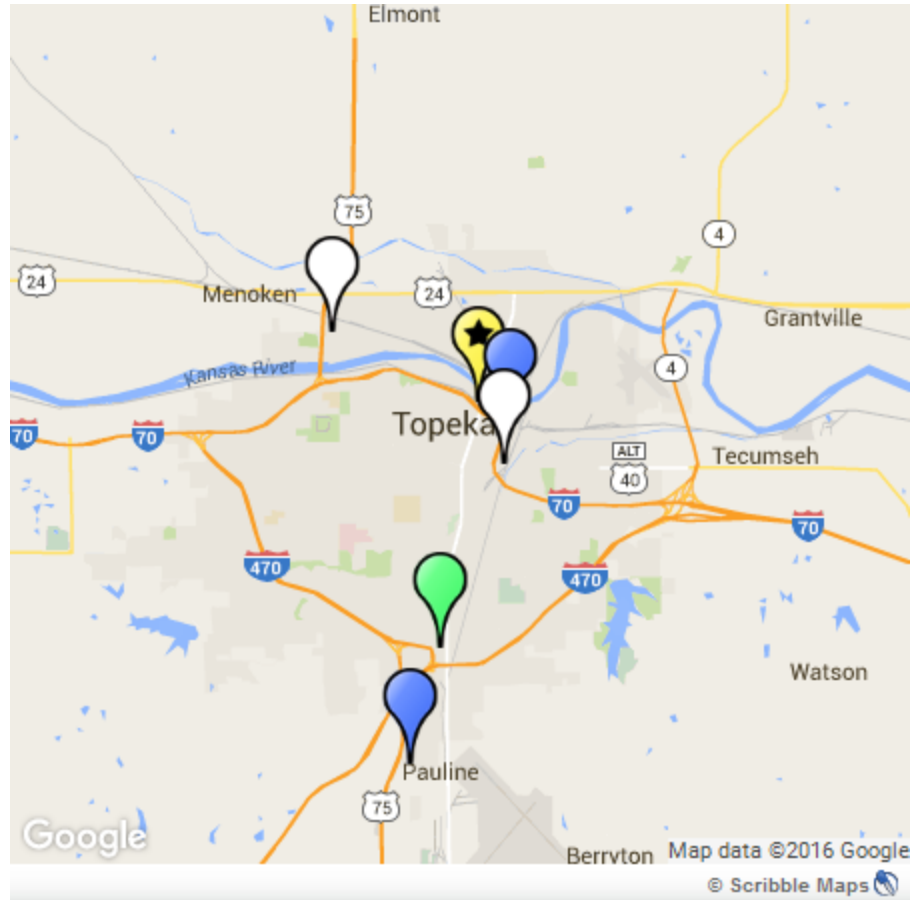
APPENDICES

Recommended Propane Stations in Kansas



APPENDICES

Current and Recommended Public Stations In Topeka, KS



Existing Propane

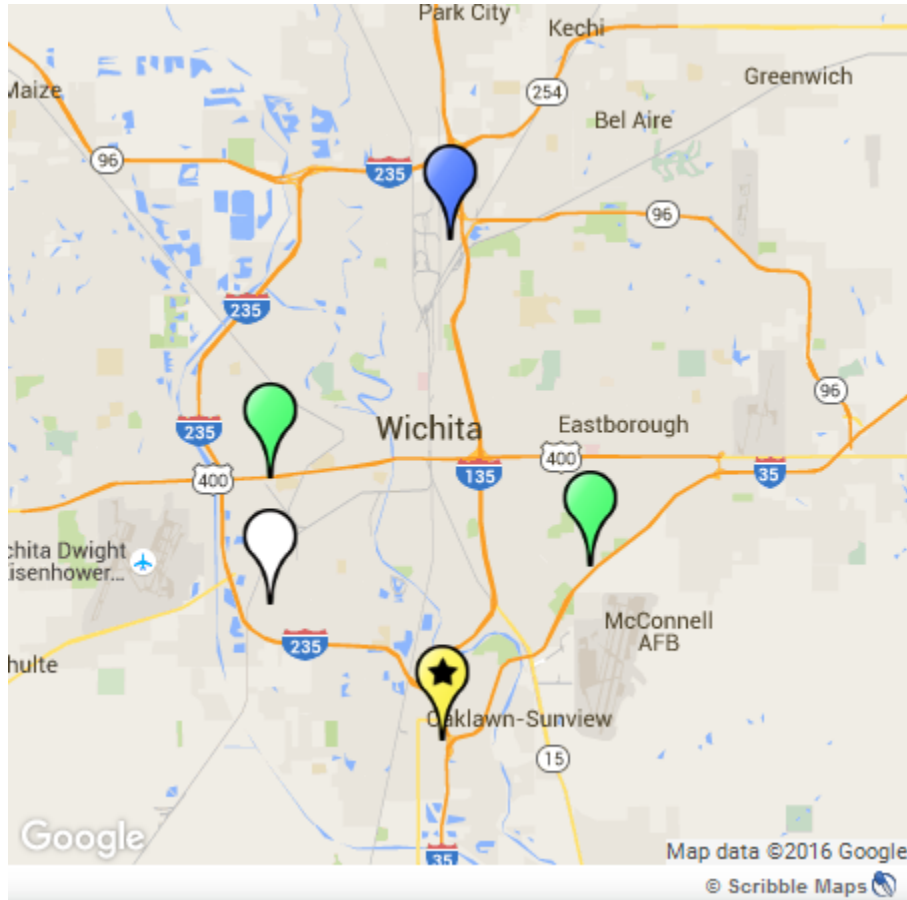
Existing CNG

Recommended LNG

Existing B20

APPENDICES

Current and Recommended Public Stations In Wichita, KS



Existing Propane



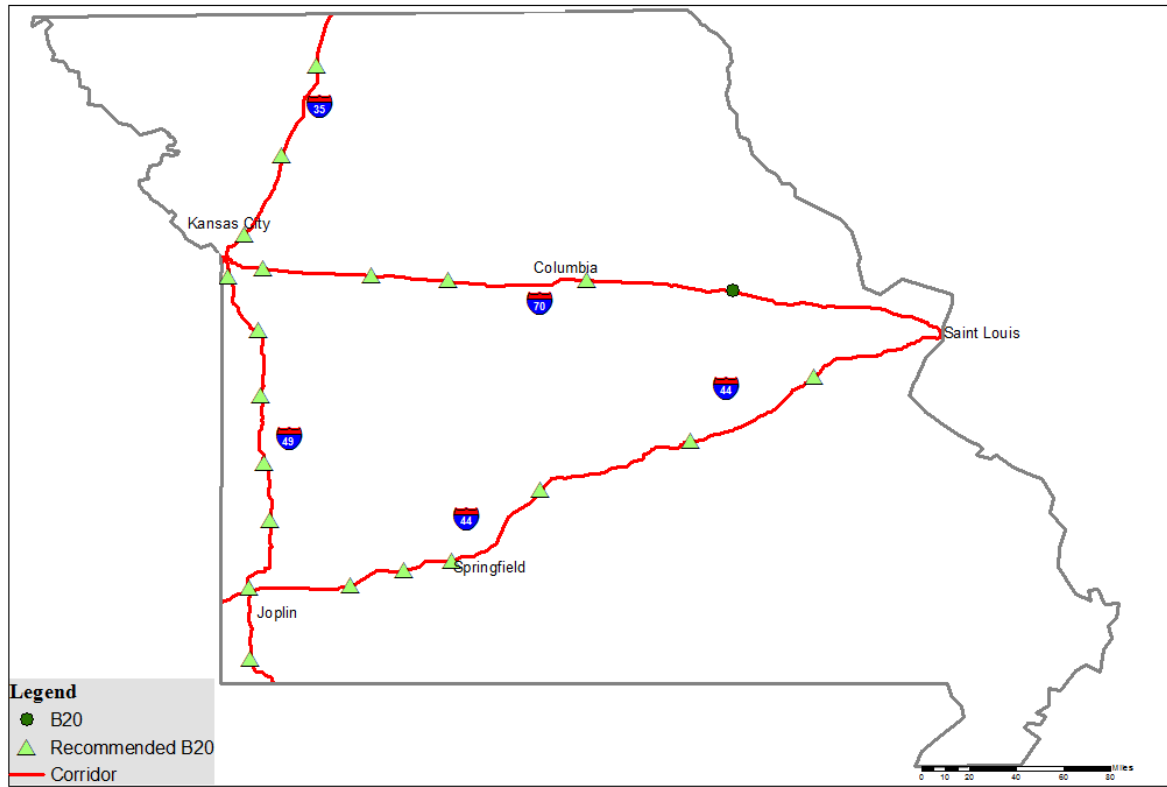
Existing CNG



Recommended LNG

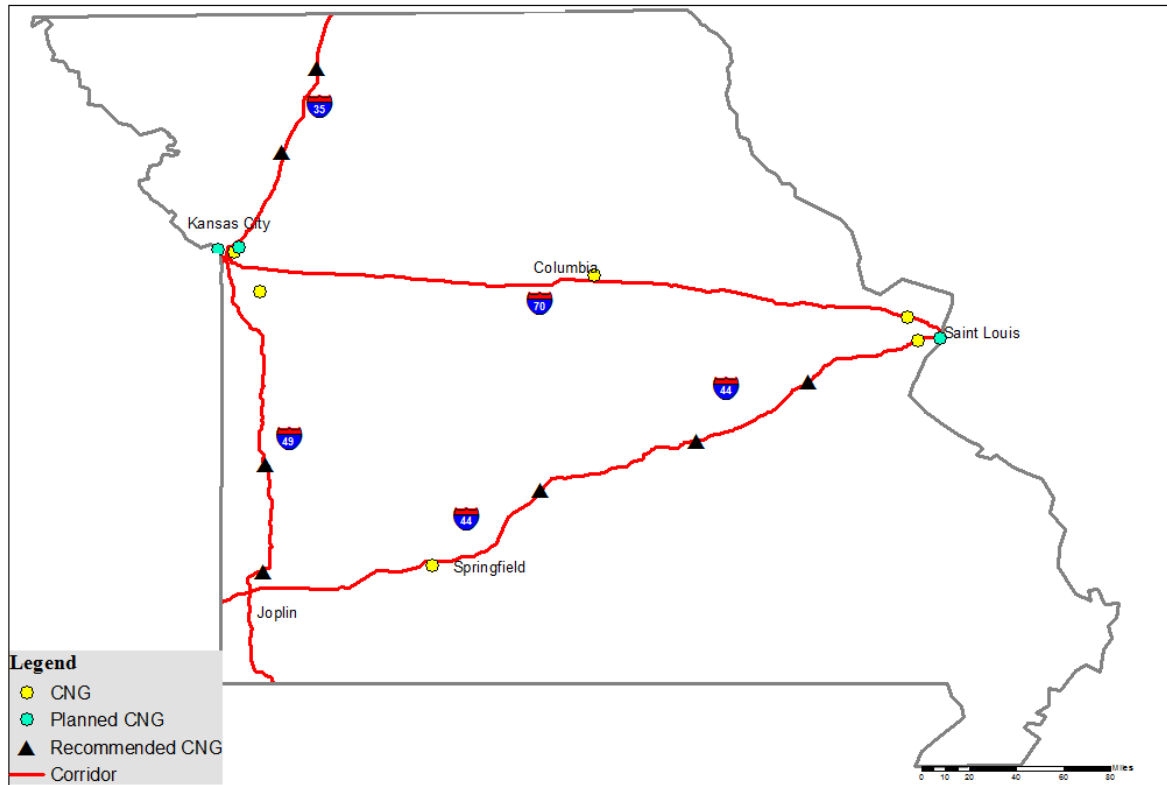
APPENDICES

Current and Recommended B20 Stations in Missouri



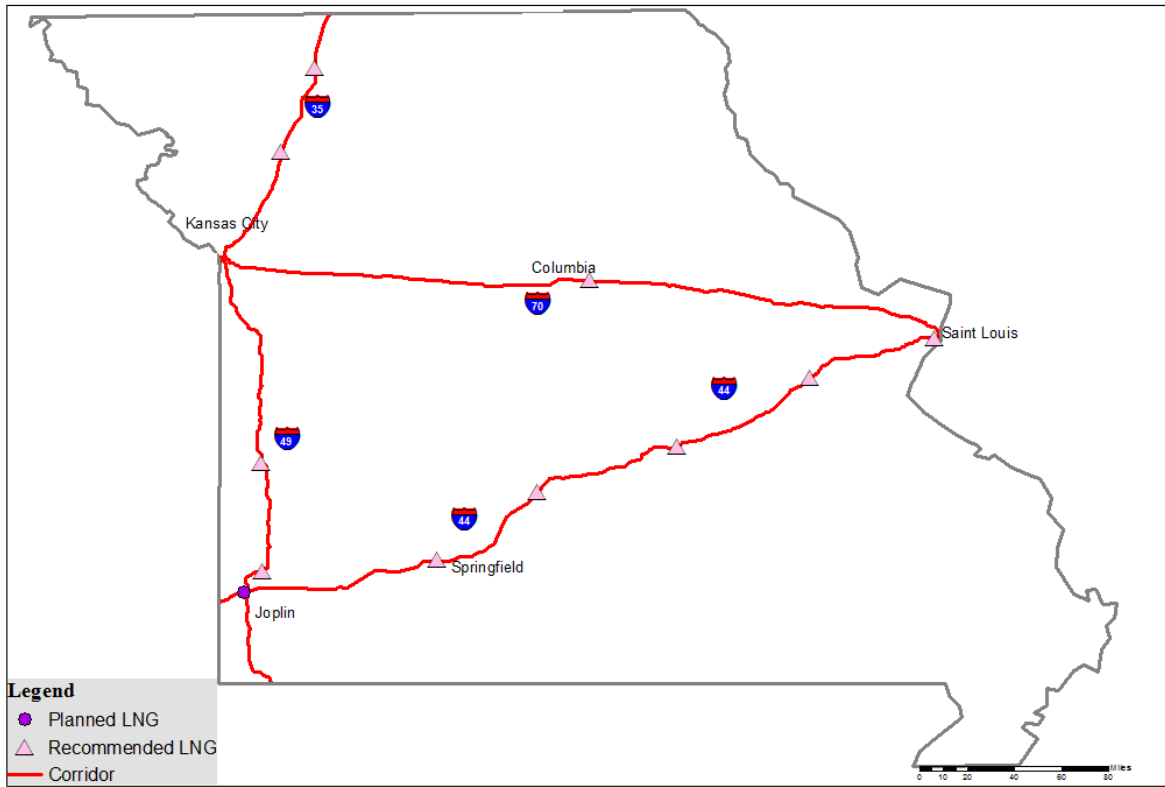
APPENDICES

Current, Planned, and Recommended CNG Stations in Missouri



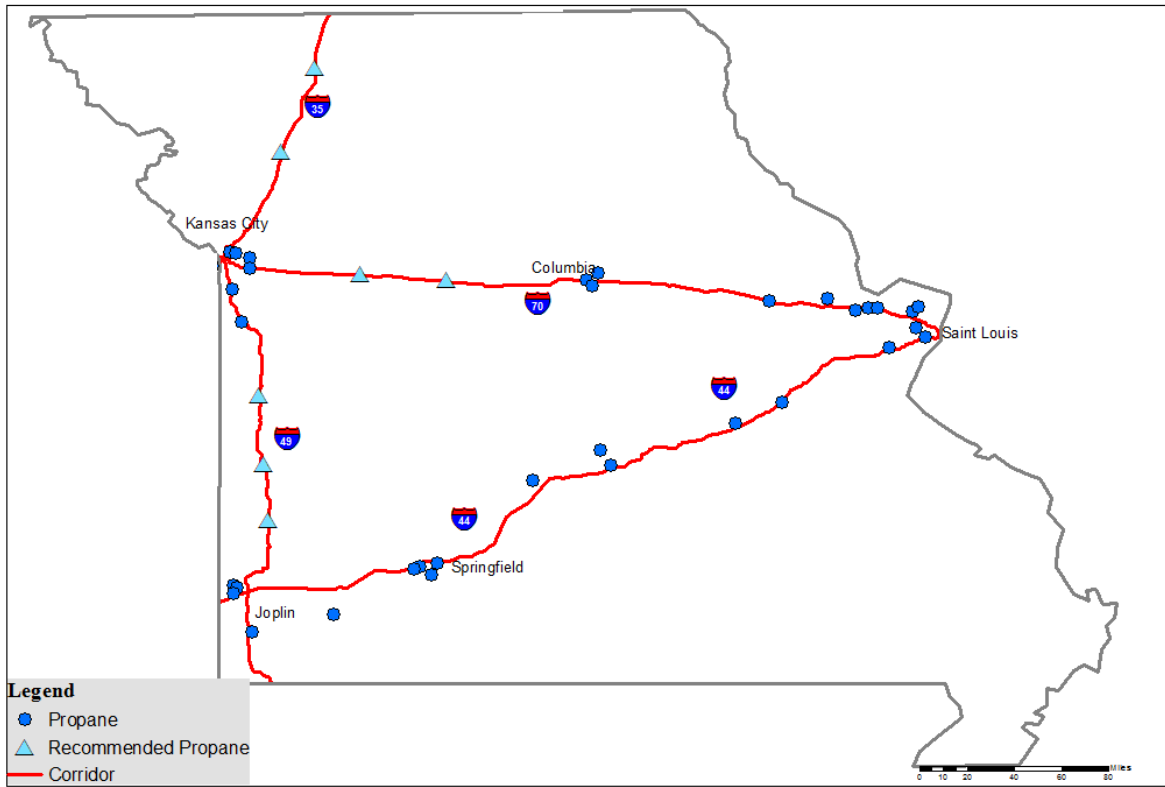
APPENDICES

Planned and Recommended LNG Stations in Missouri



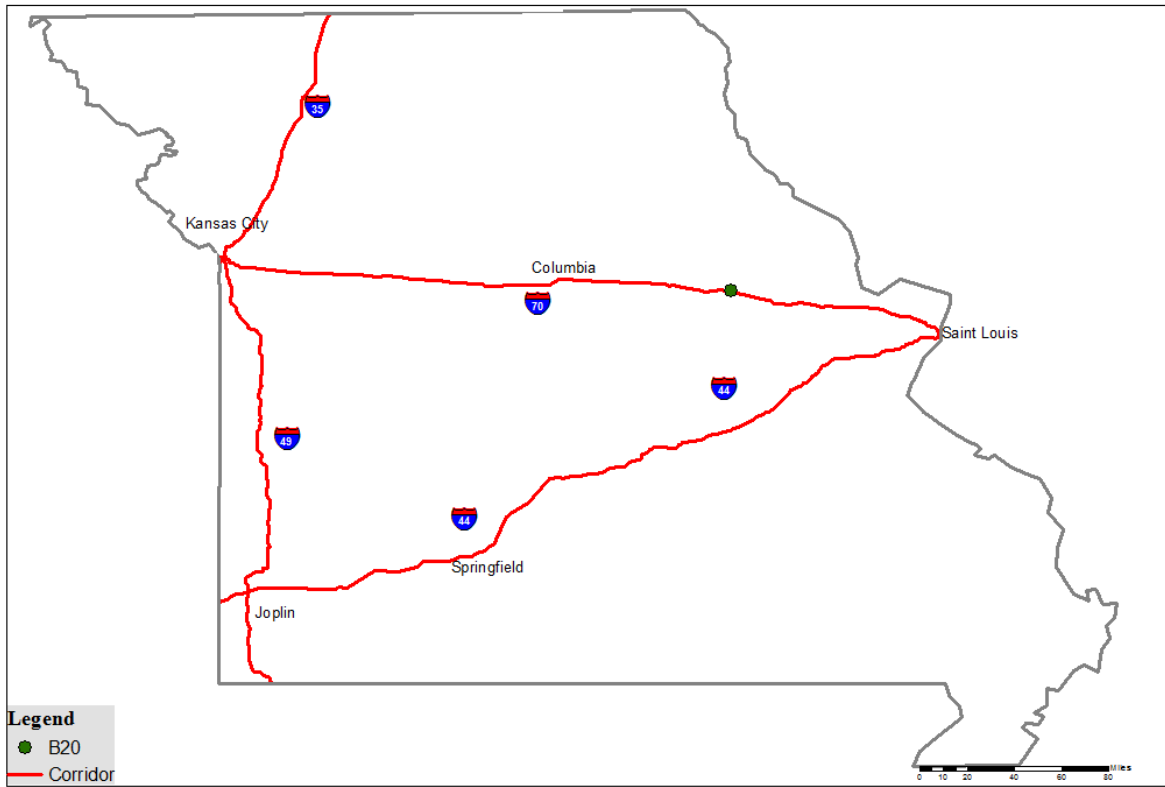
APPENDICES

Current and Recommended Propane Stations in Missouri



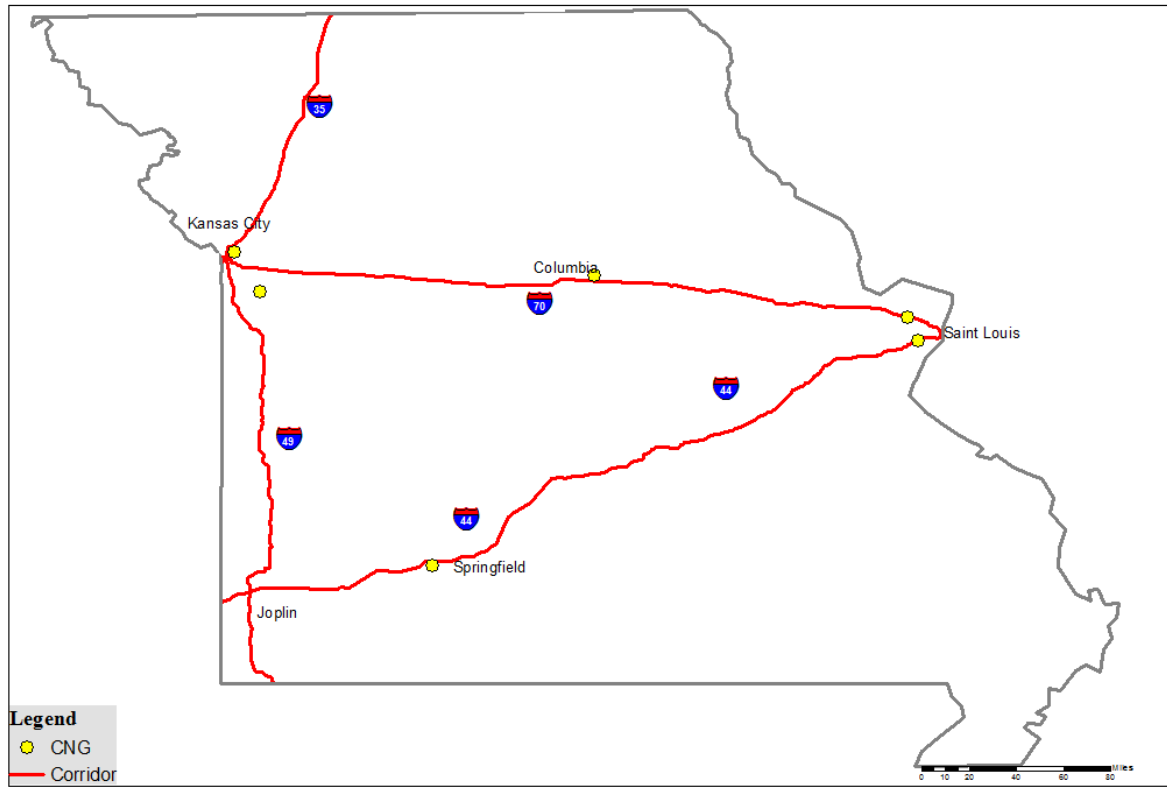
APPENDICES

Current Public B20 Stations in Missouri



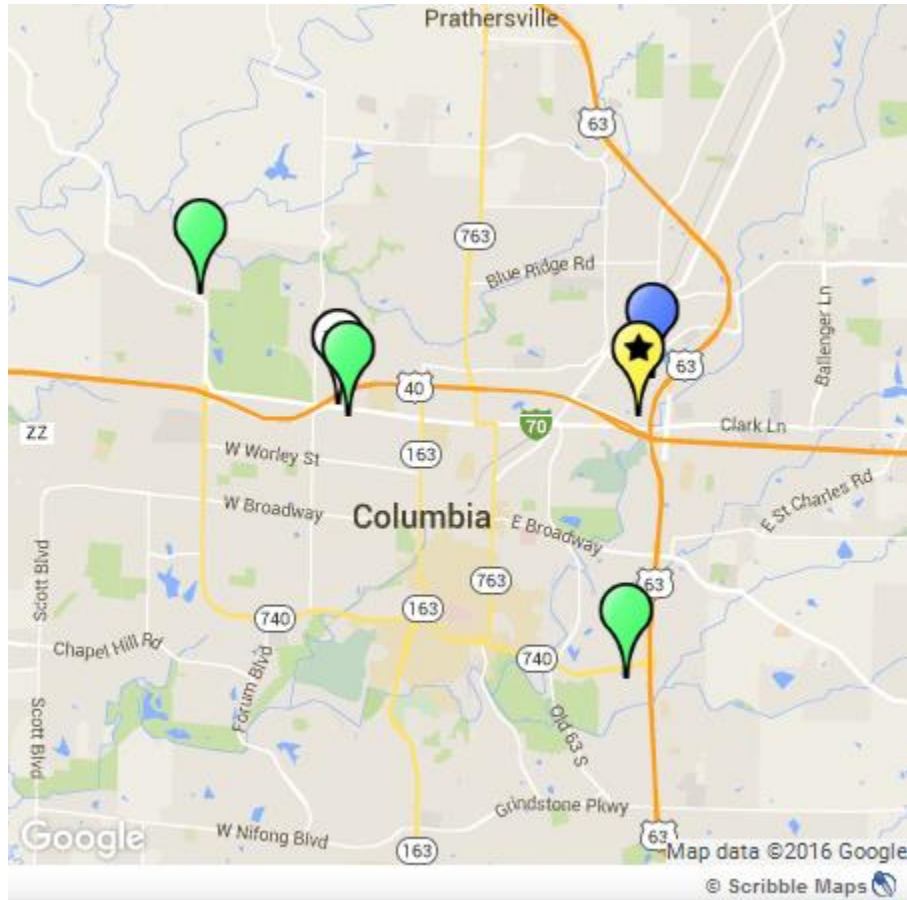
APPENDICES

Current Public CNG Stations in Missouri



APPENDICES

Current and Recommended Public Stations In Columbia, MO



Existing Propane

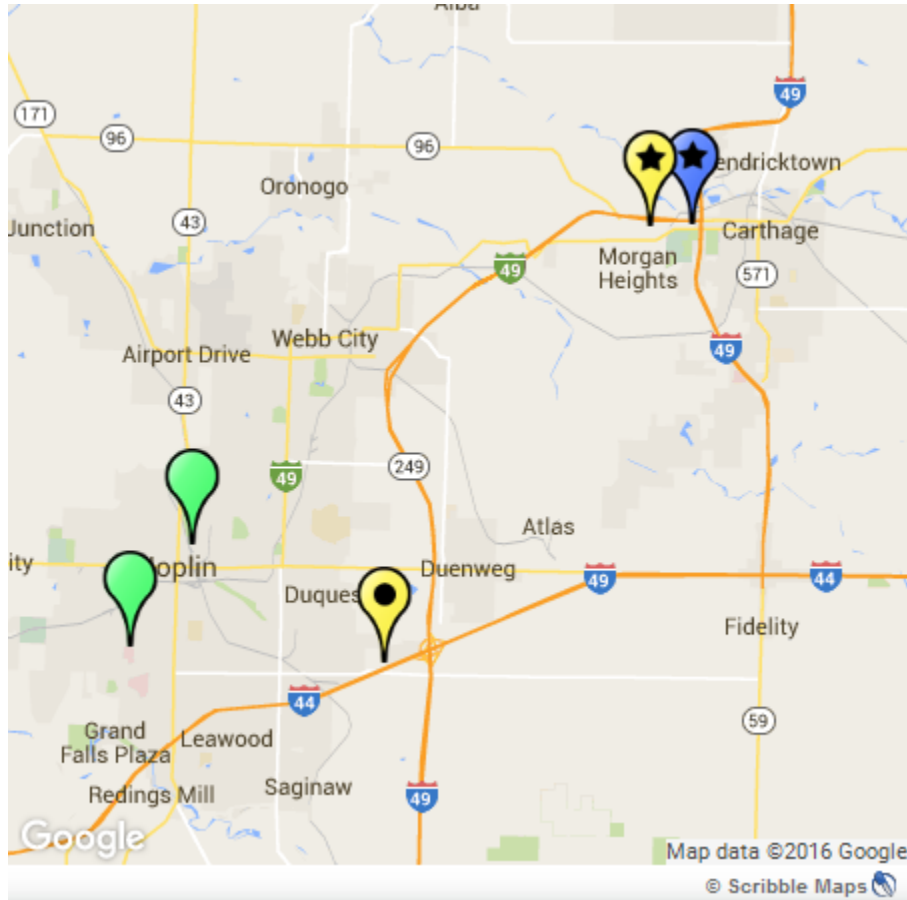
Existing CNG

Recommended LNG

Recommended B20

APPENDICES

Current, Planned & Recommended Public Stations In Joplin, MO



Existing Propane



Recommended CNG



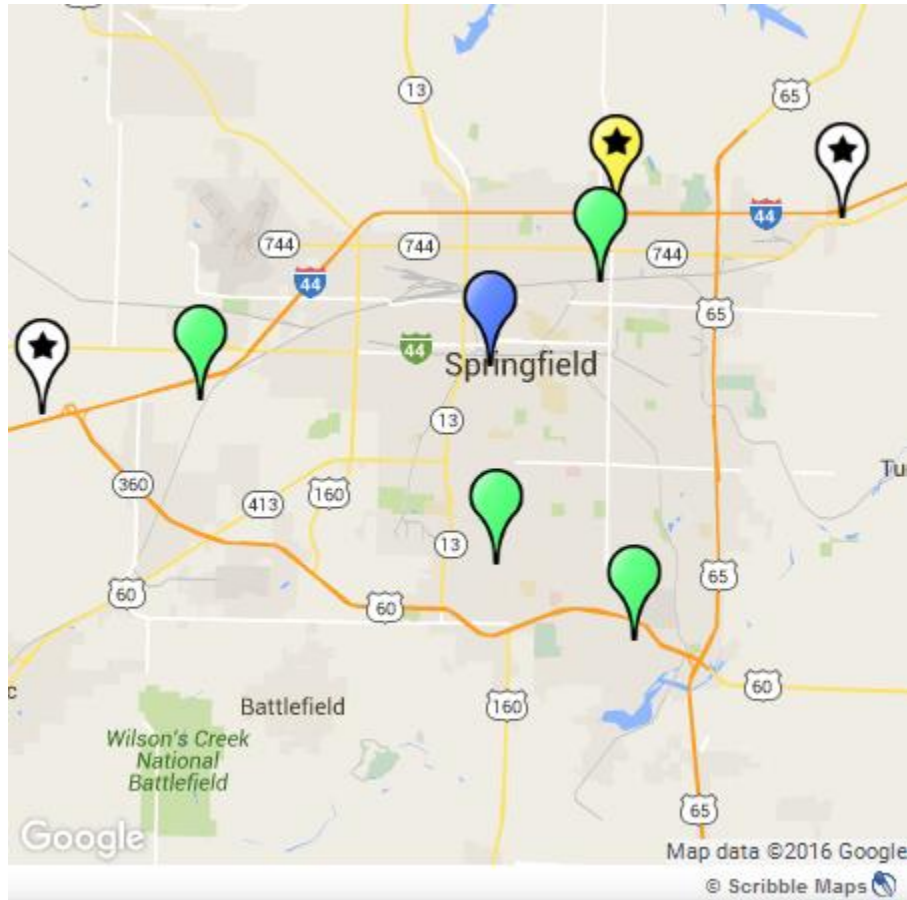
Recommended LNG



Planned LNG

APPENDICES

Current & Recommended Public Stations In Springfield, MO



Existing Propane



Existing CNG



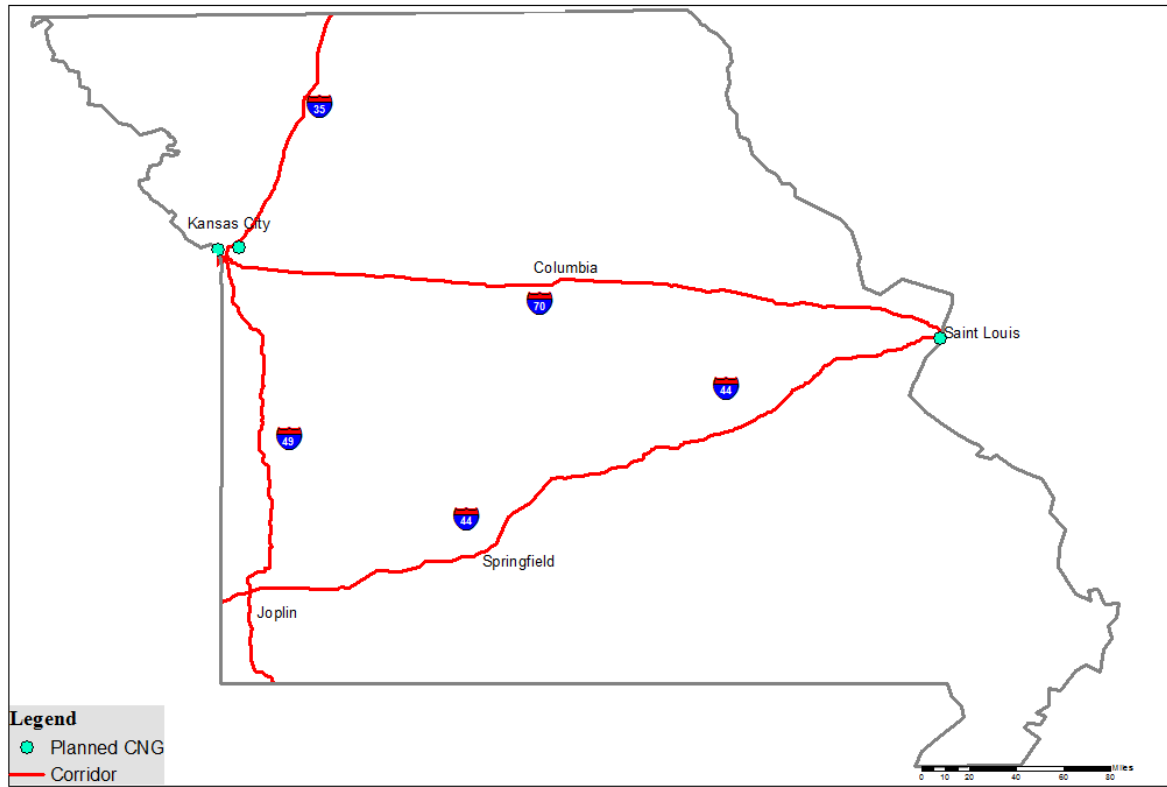
Recommended LNG



Recommended B20

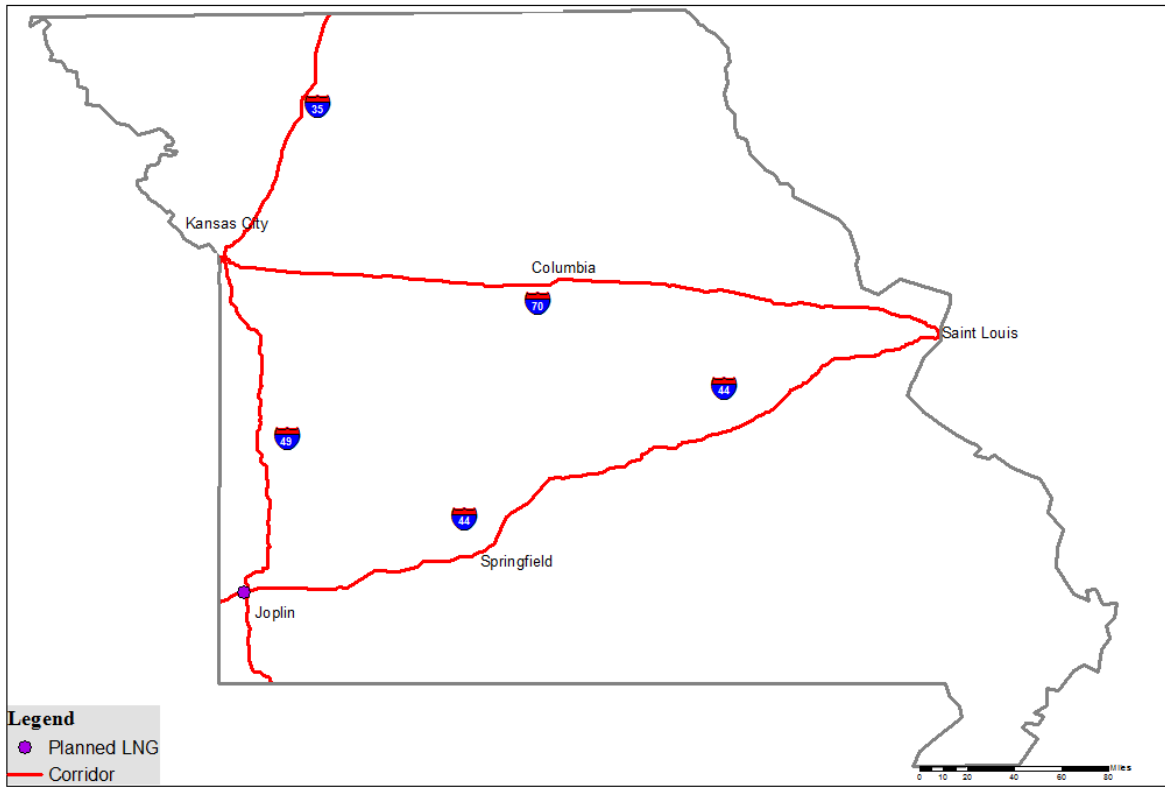
APPENDICES

Planned CNG Stations in Missouri



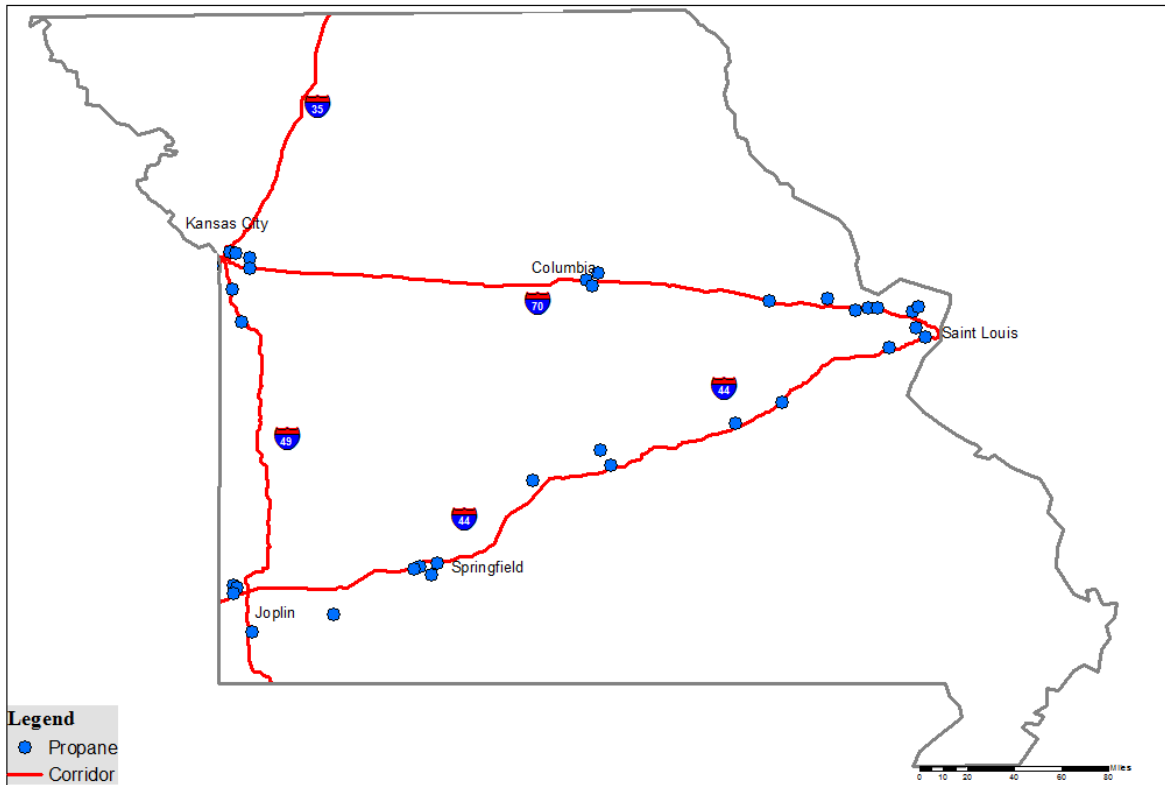
APPENDICES

Planned LNG Stations in Missouri



APPENDICES

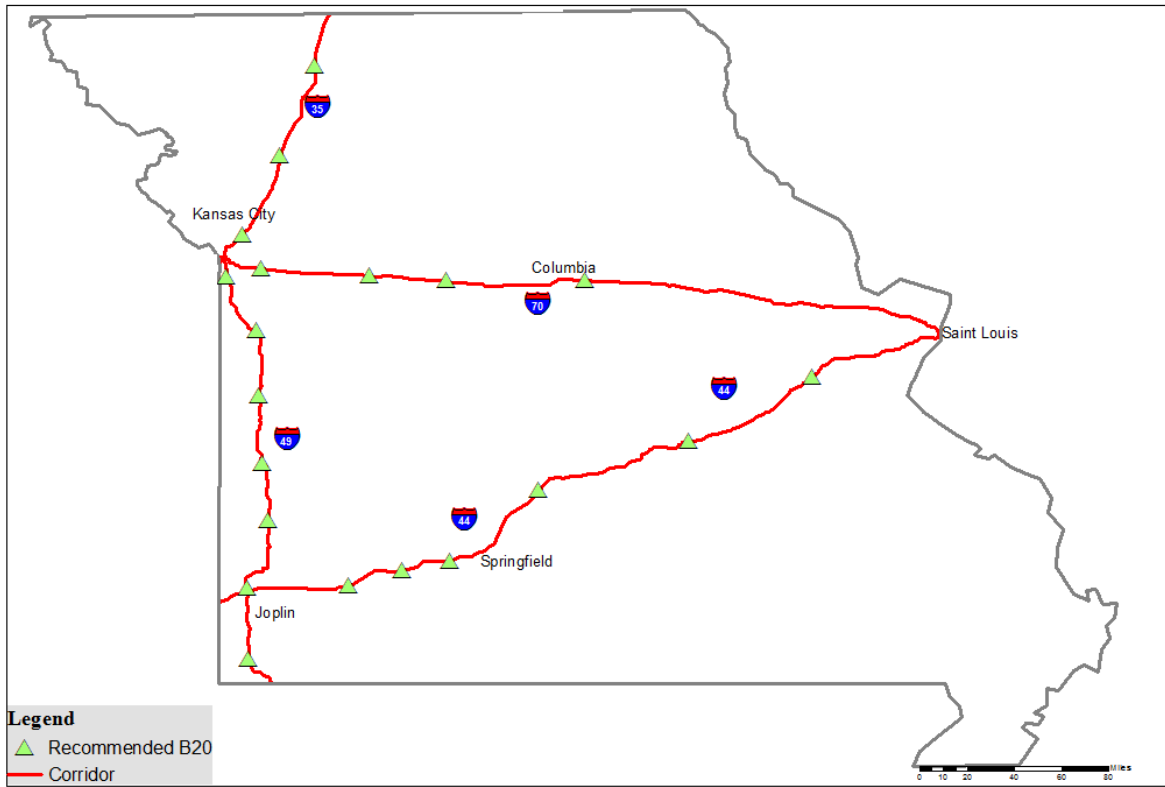
Current Public Propane Stations in Missouri



Source: www.afdc.energy.gov/locator/stations/

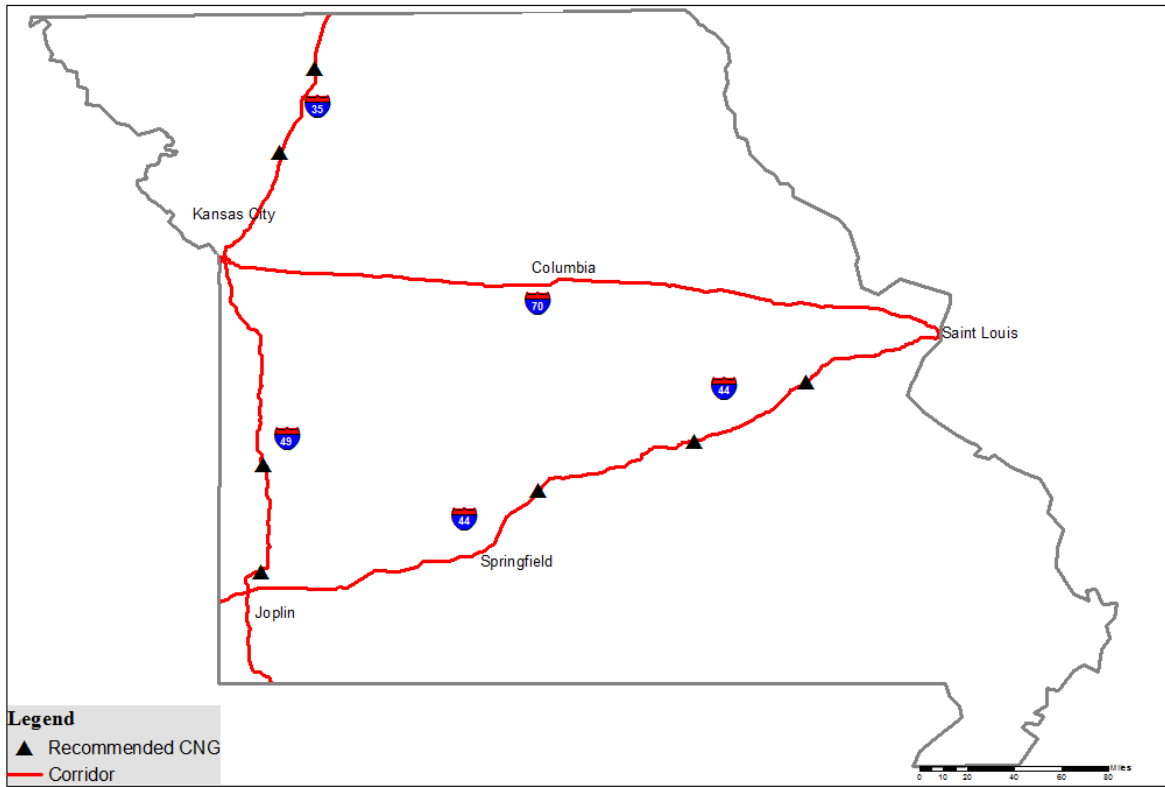
APPENDICES

Recommended B20 Stations in Missouri



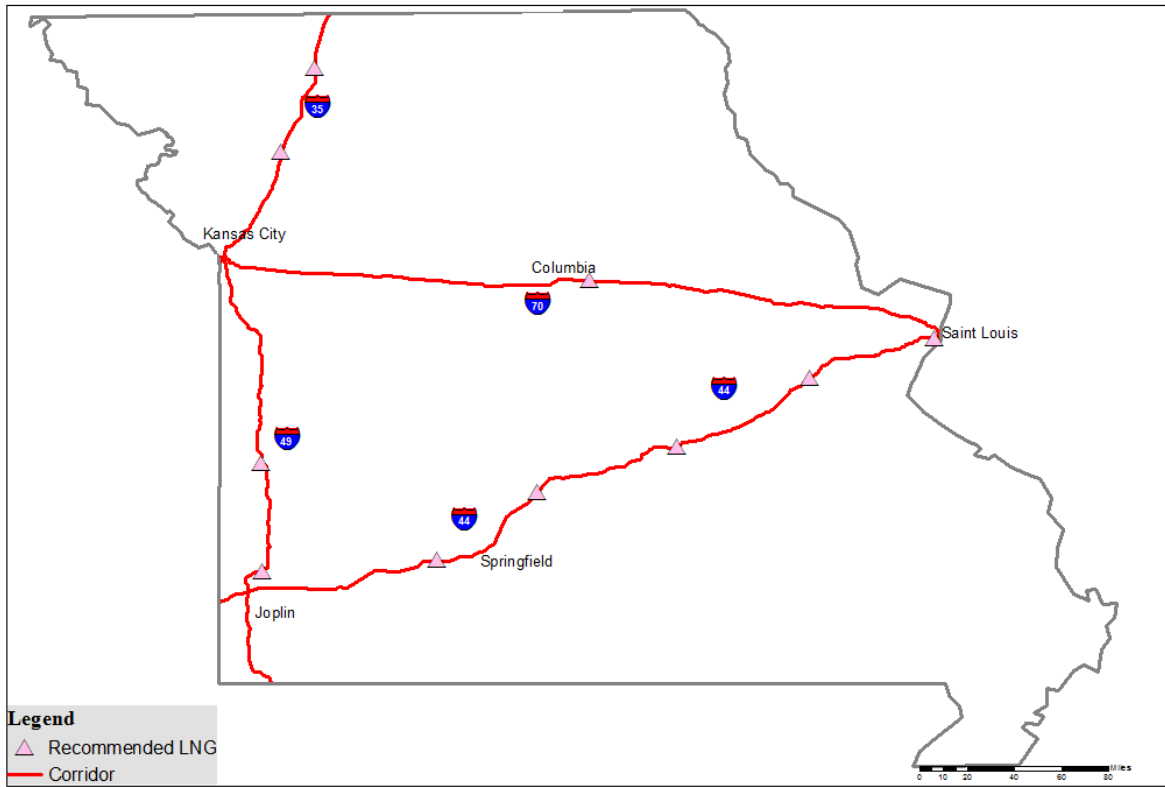
APPENDICES

Recommended CNG Stations in Missouri



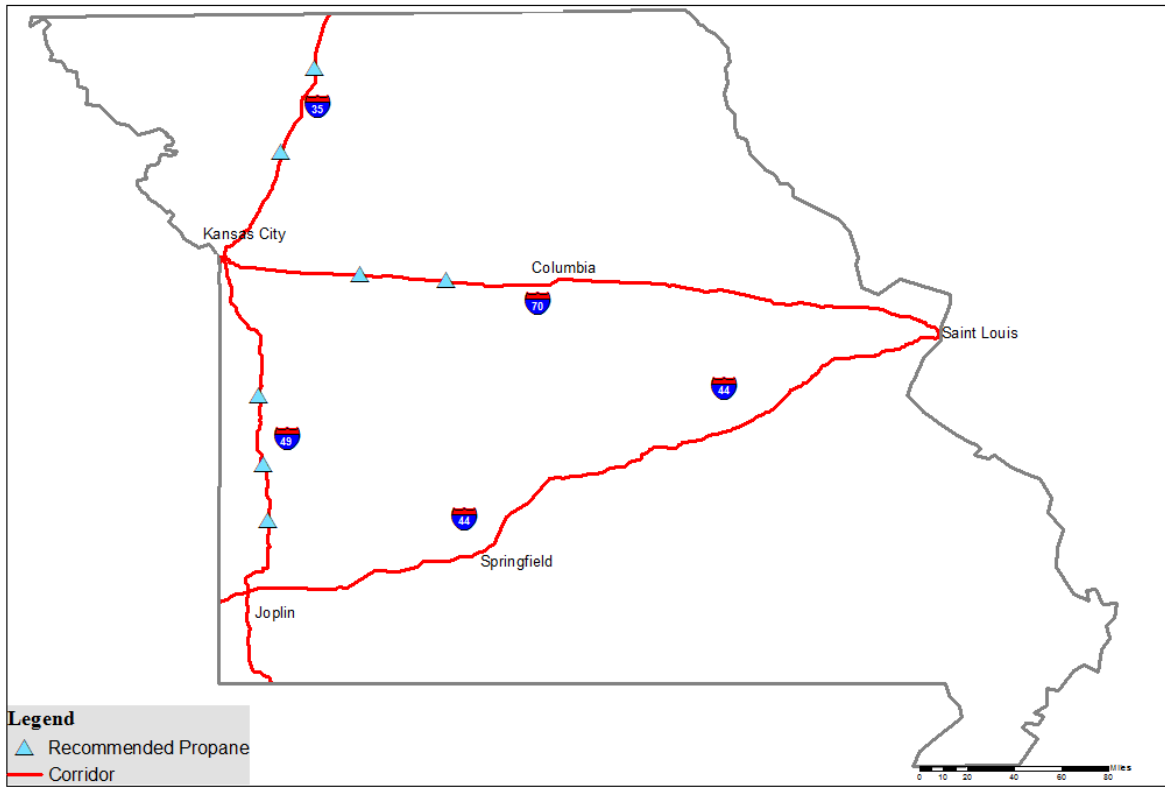
APPENDICES

Recommended LNG Stations in Missouri



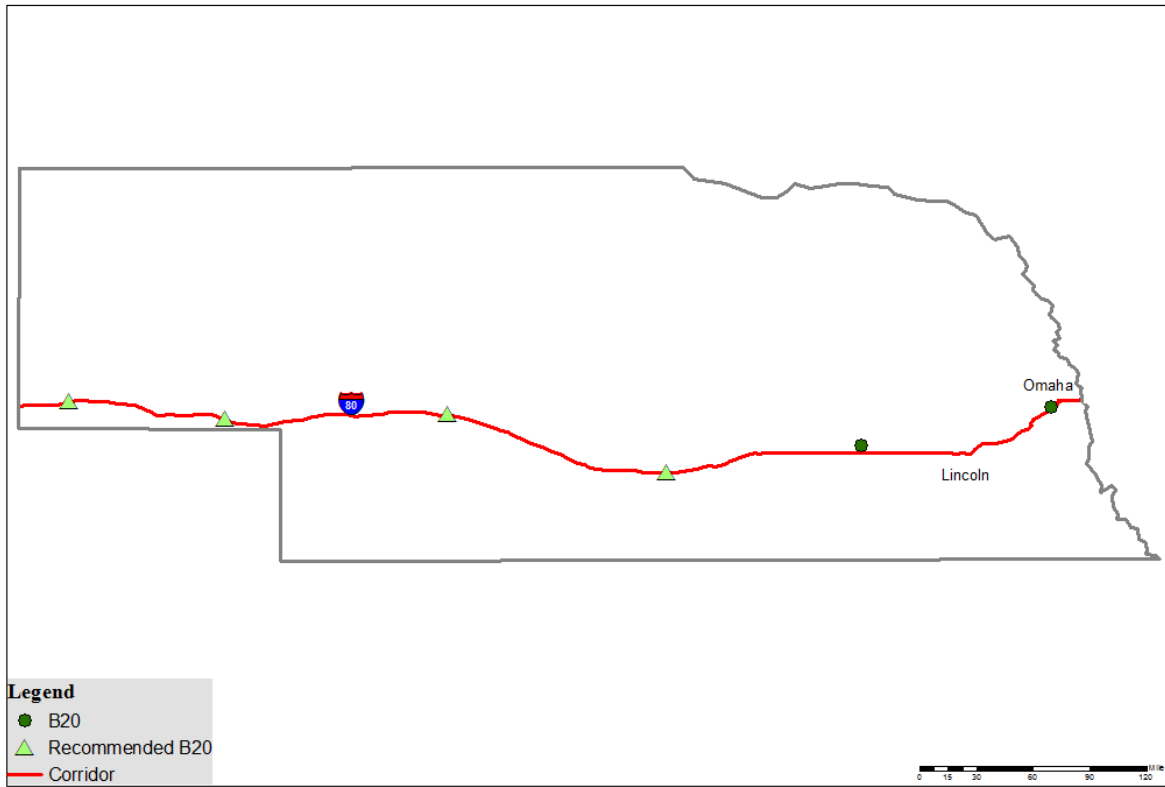
APPENDICES

Recommended Propane Stations in Missouri



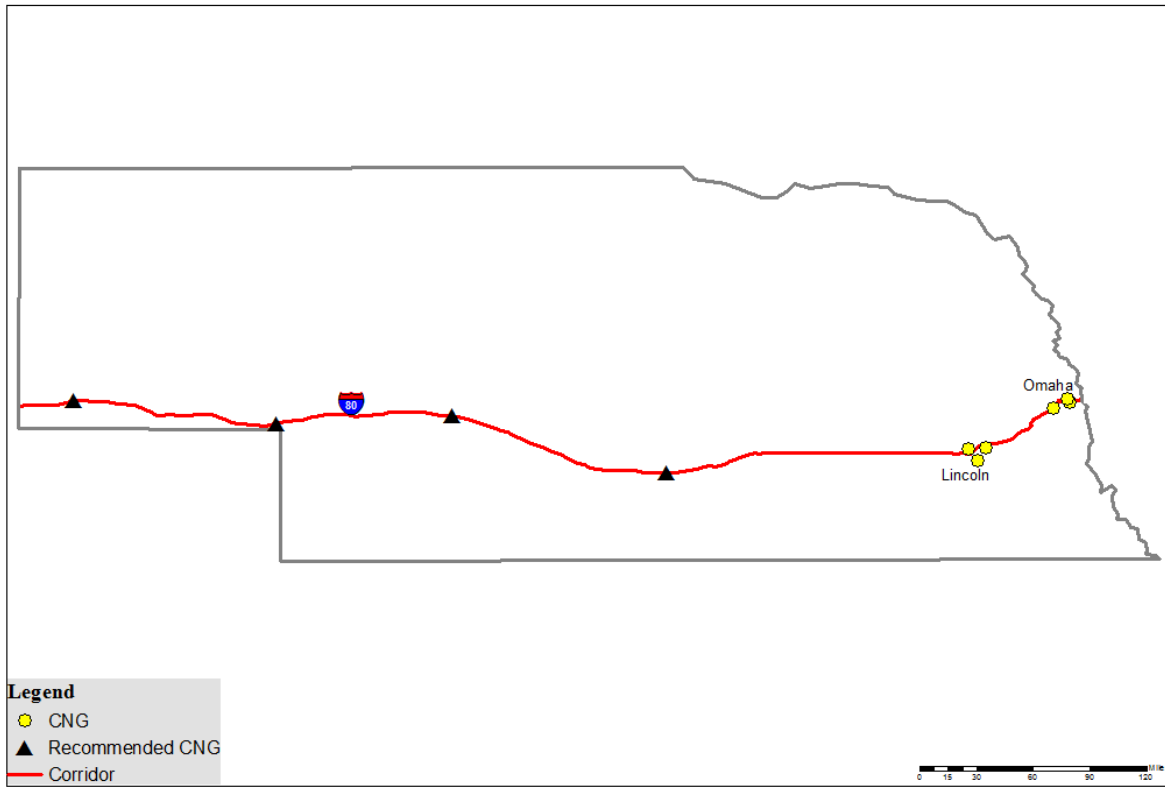
APPENDICES

Current and Recommended B20 Stations in Nebraska



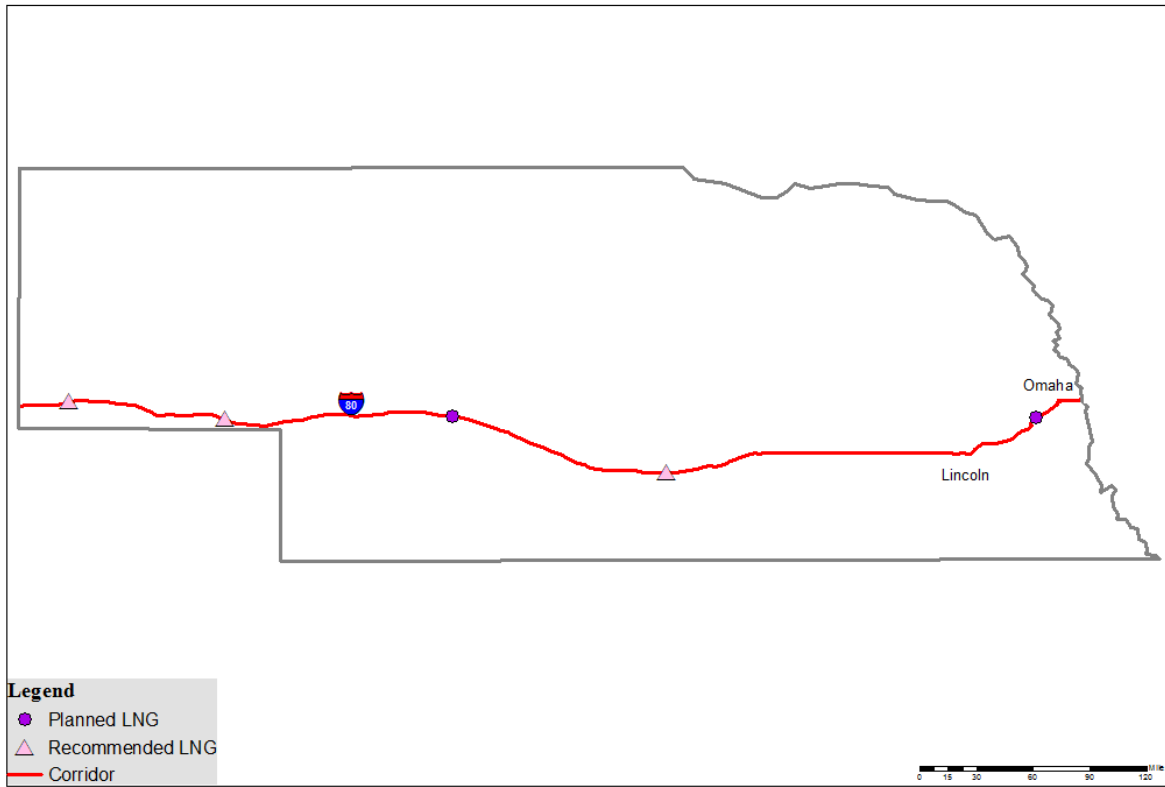
APPENDICES

Current and Recommended CNG Stations in Nebraska



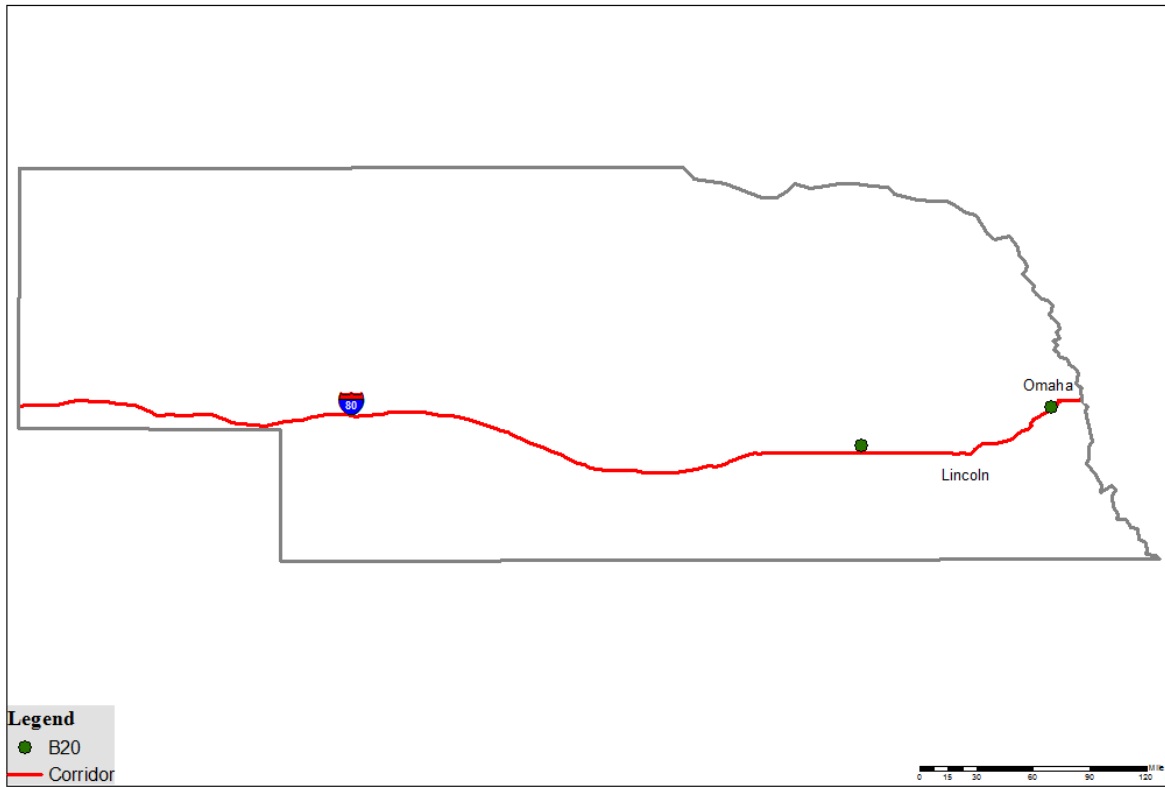
APPENDICES

Planned and Recommended LNG Stations in Nebraska



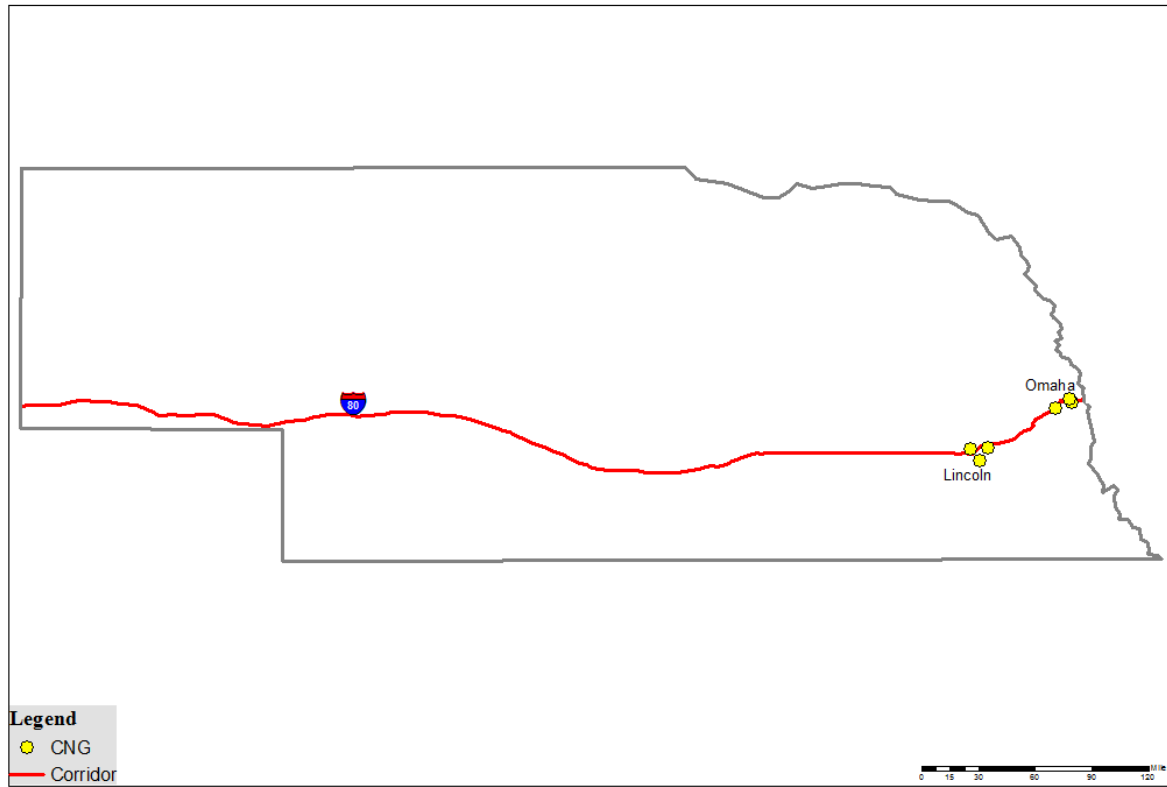
APPENDICES

Current B20 Stations in Nebraska



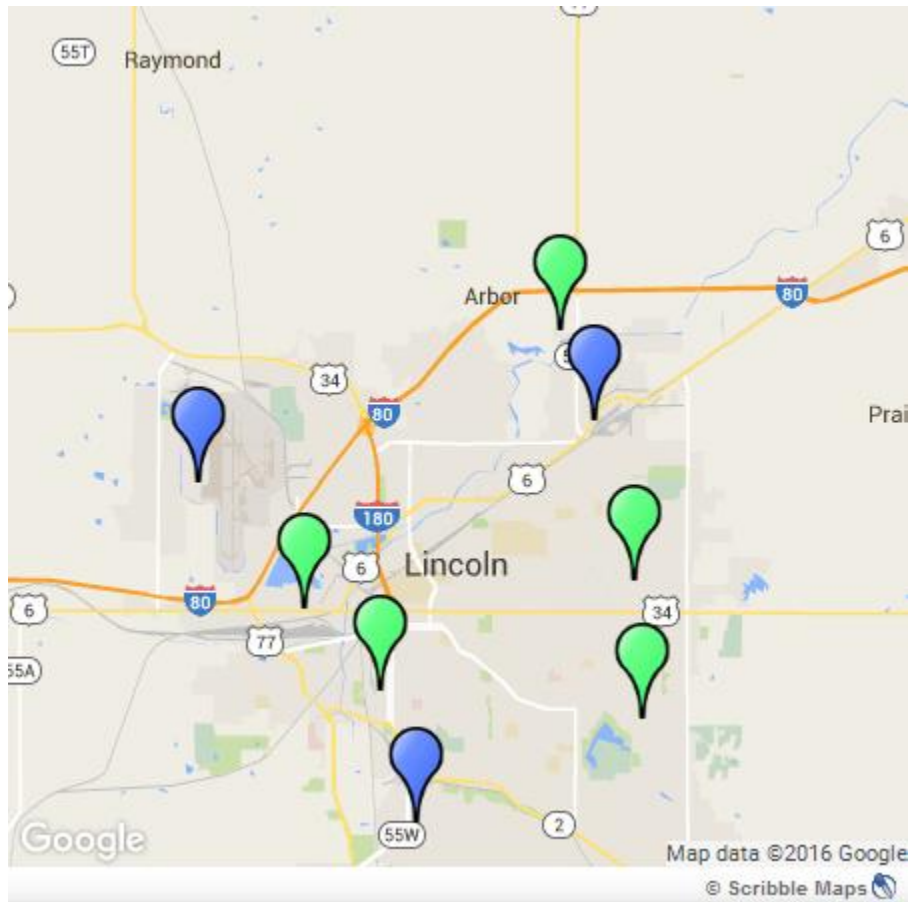
APPENDICES

Current CNG Stations in Nebraska



APPENDICES

Current Public Stations In Lincoln, NE



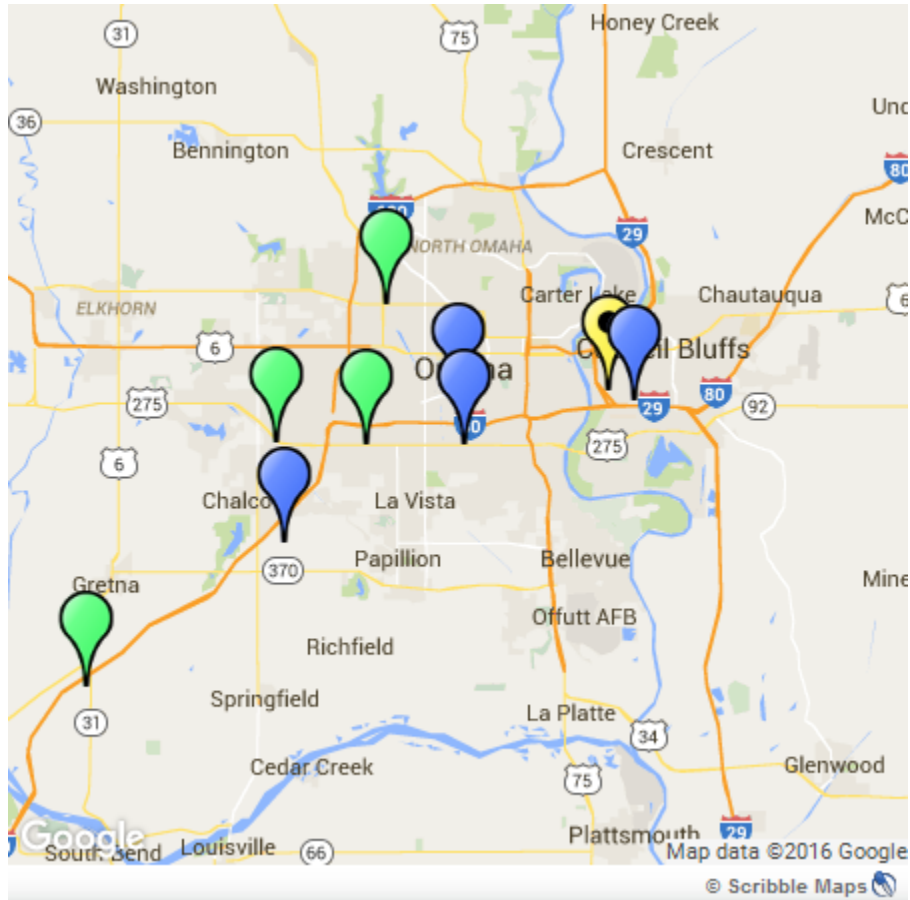
Existing Propane



Existing CNG

APPENDICES

Current & Planned Public Stations In Omaha, NE



Existing Propane



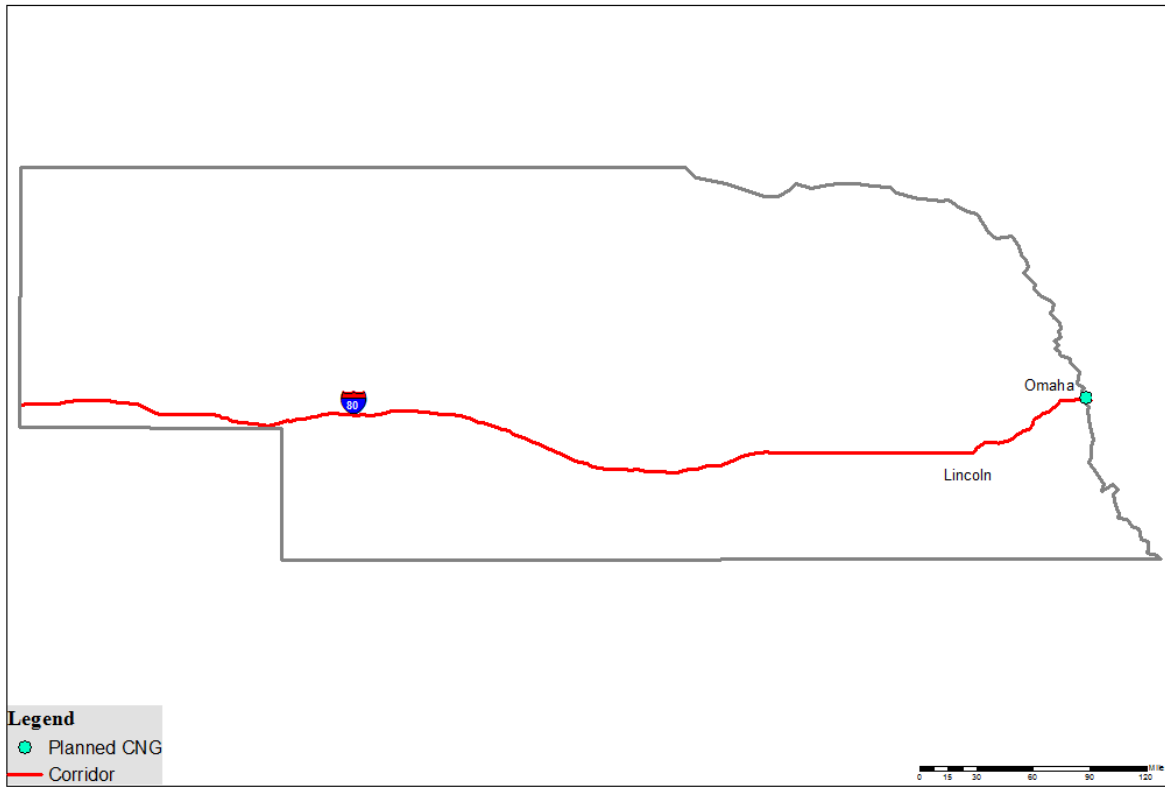
Existing CNG



Planned LNG

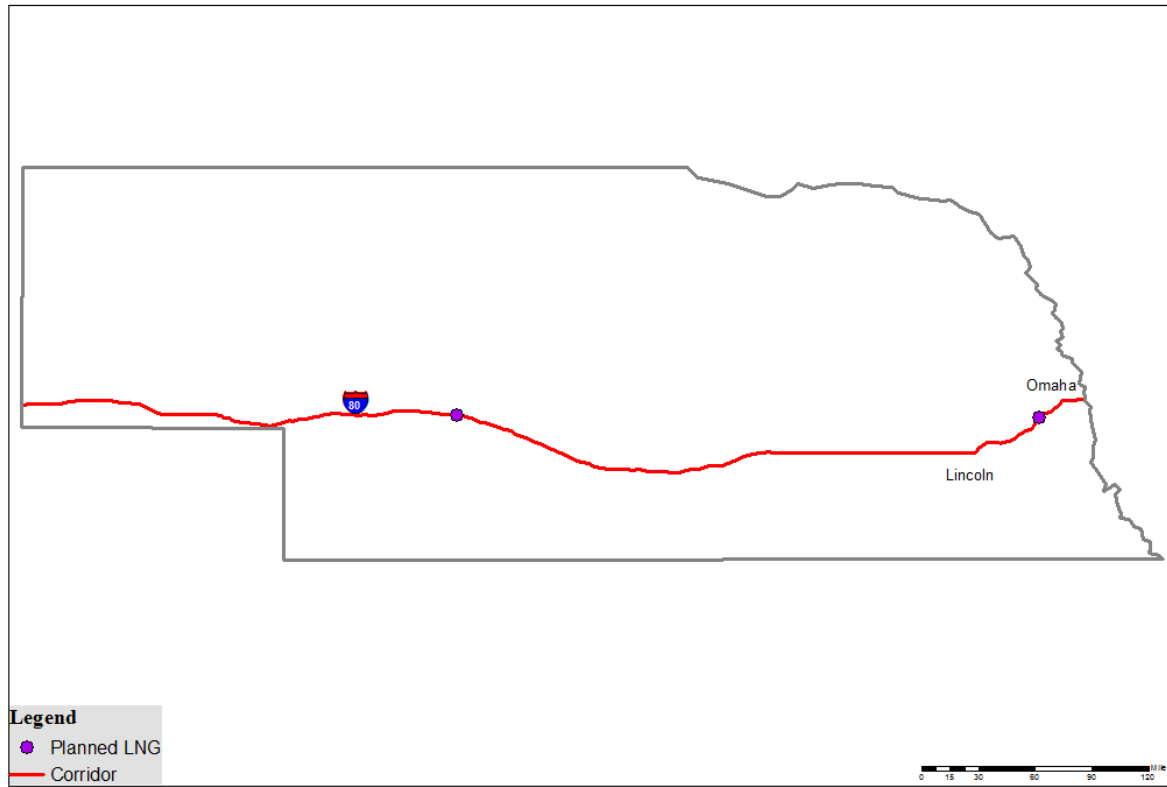
APPENDICES

Planned CNG Stations in Nebraska



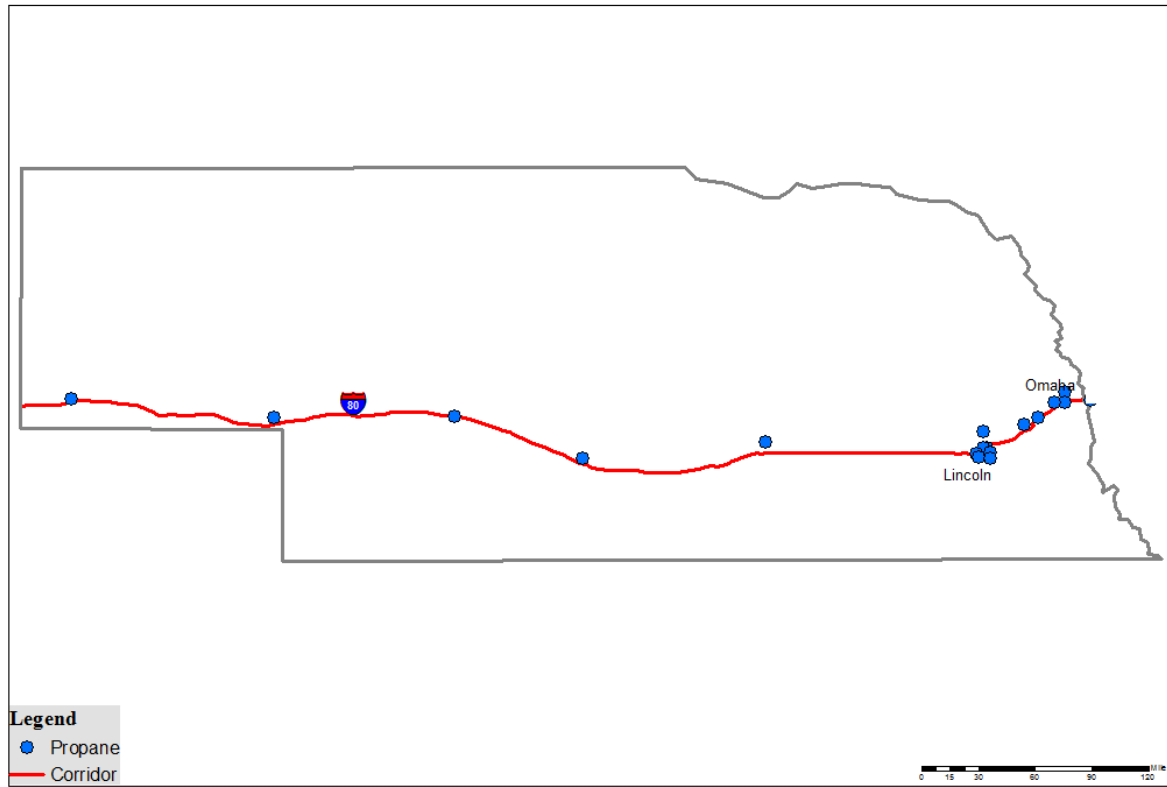
APPENDICES

Planned LNG Stations in Nebraska



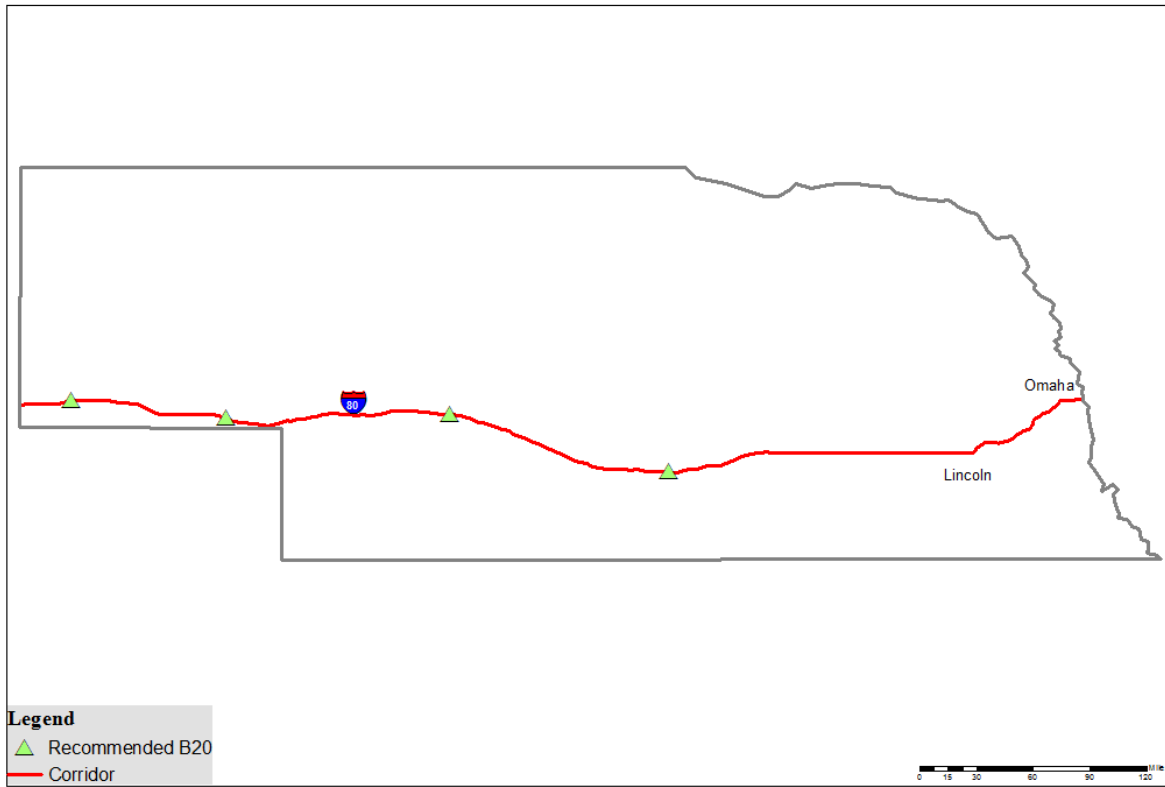
APPENDICES

Current Propane Stations in Nebraska



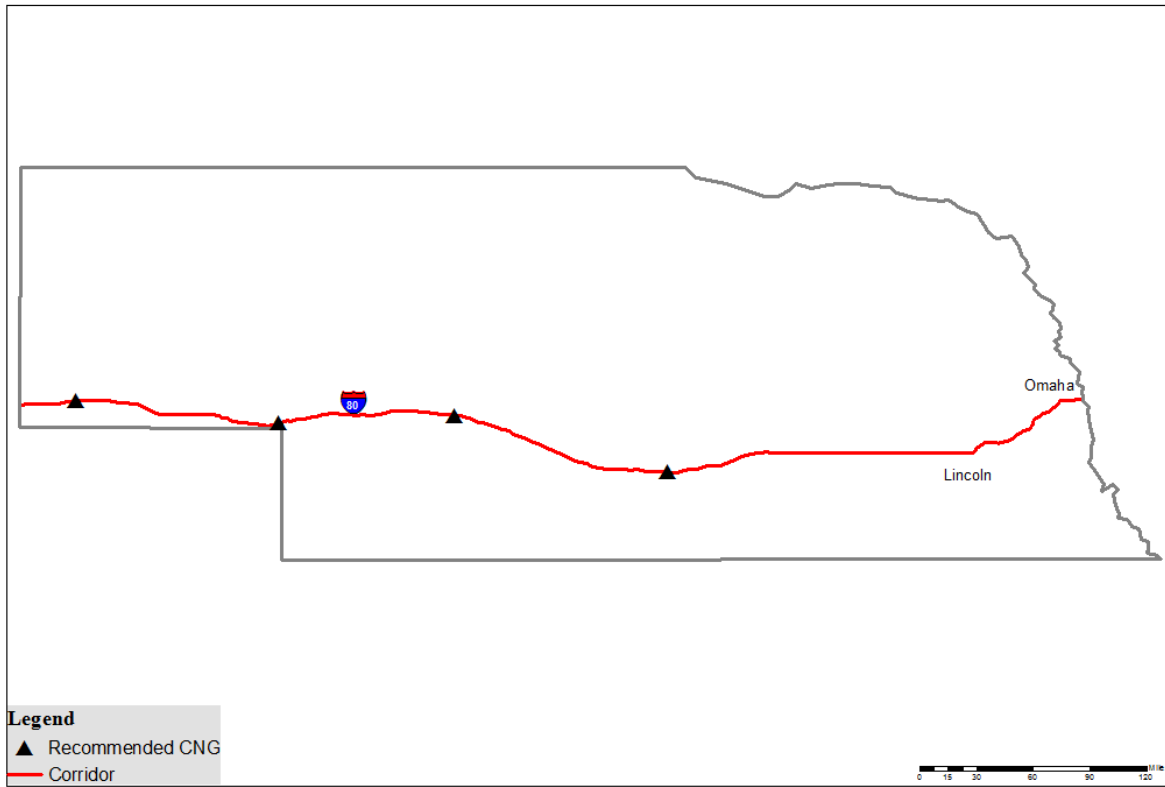
APPENDICES

Recommended B20 Stations in Nebraska



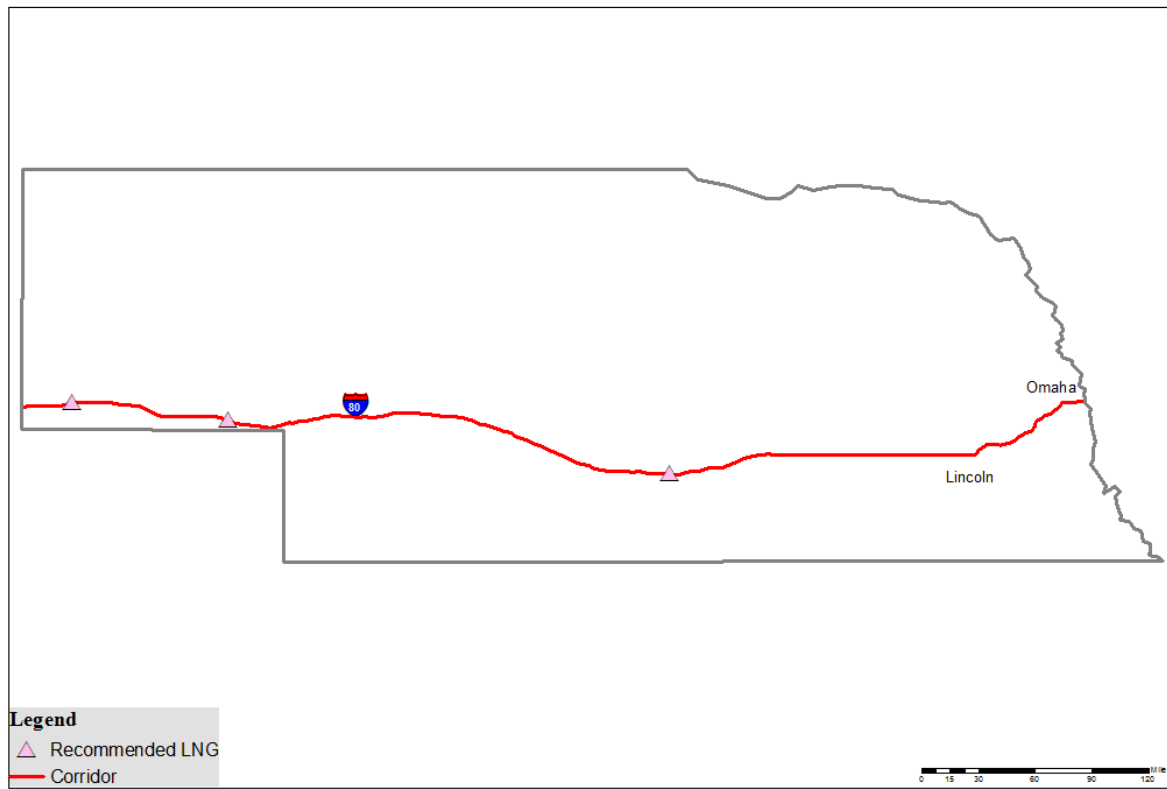
APPENDICES

Recommended CNG Stations in Nebraska



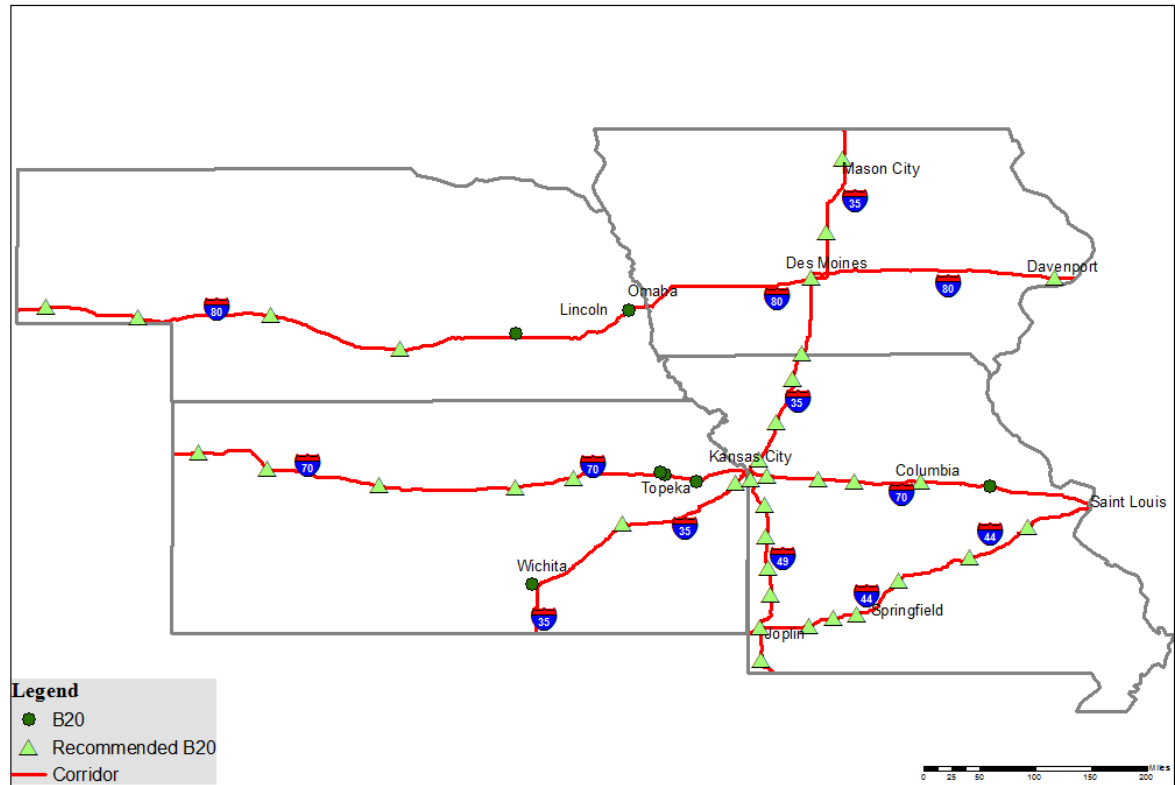
APPENDICES

Recommended LNG Stations in Nebraska



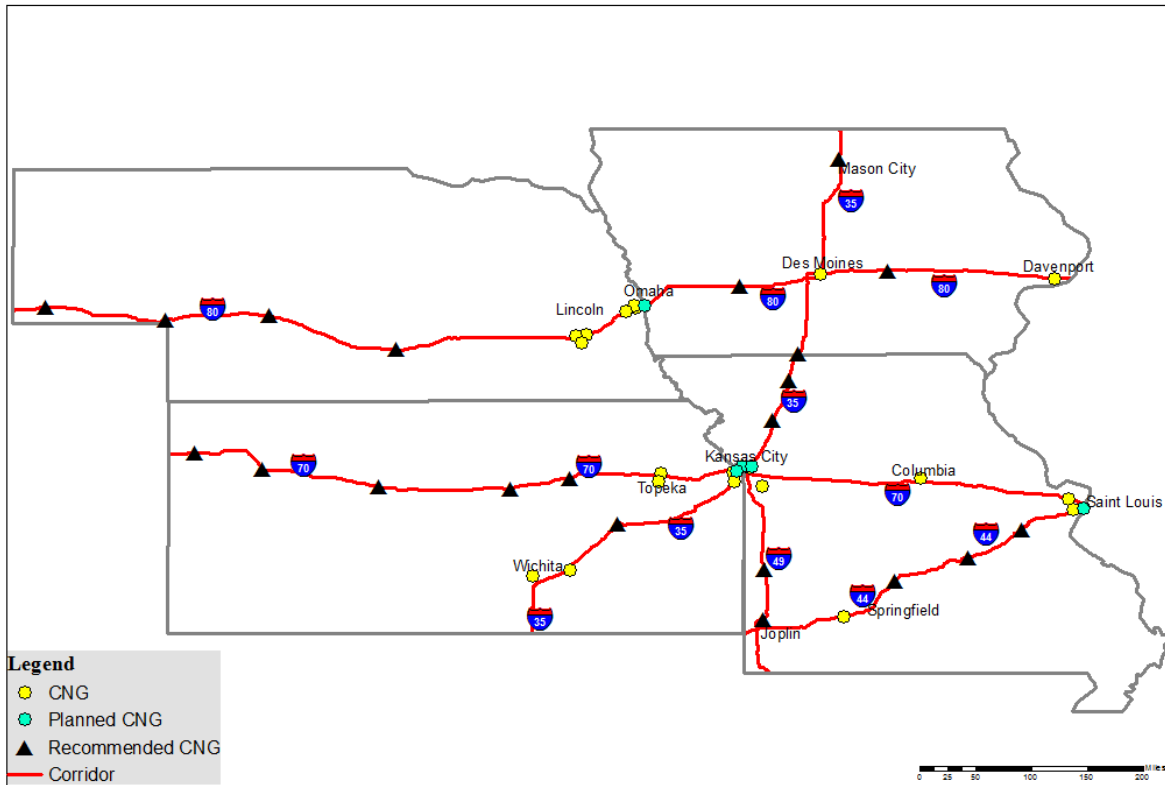
APPENDICES

Current and Recommended B20 Stations in Mid-America Corridor

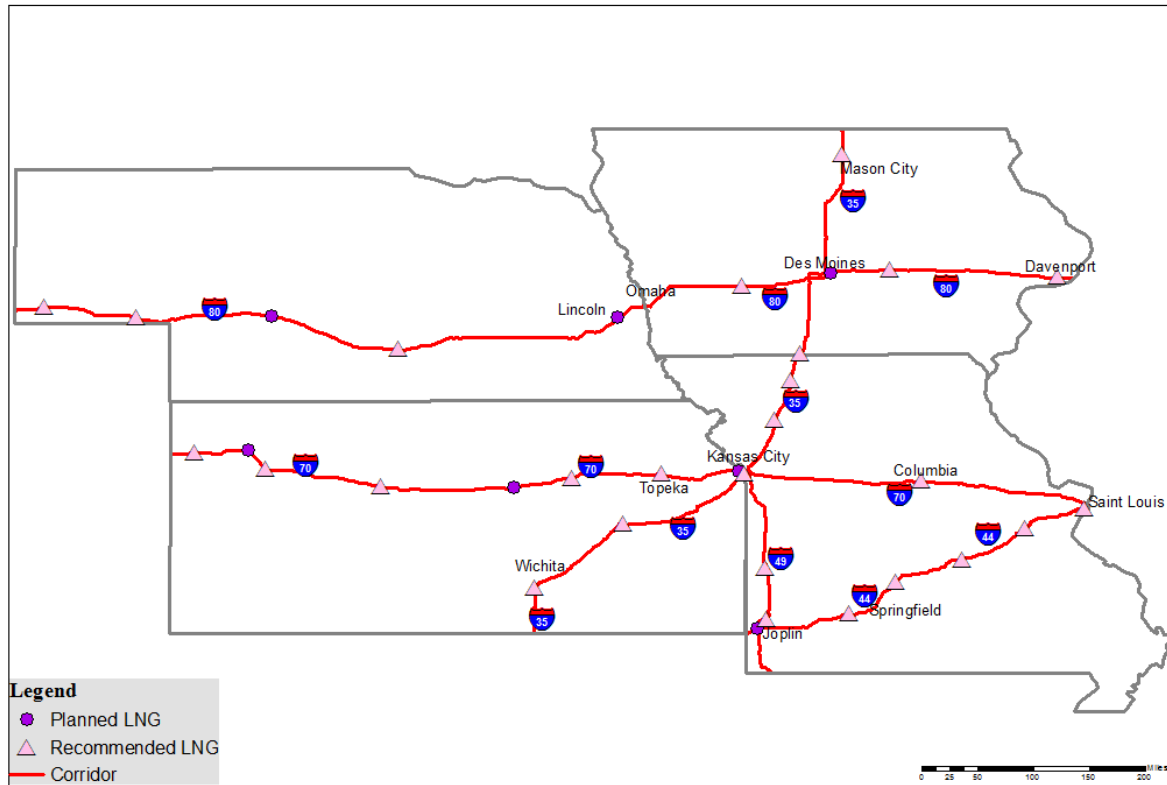


APPENDICES

Current, Planned, and Recommended CNG Stations in Mid-America Corridor



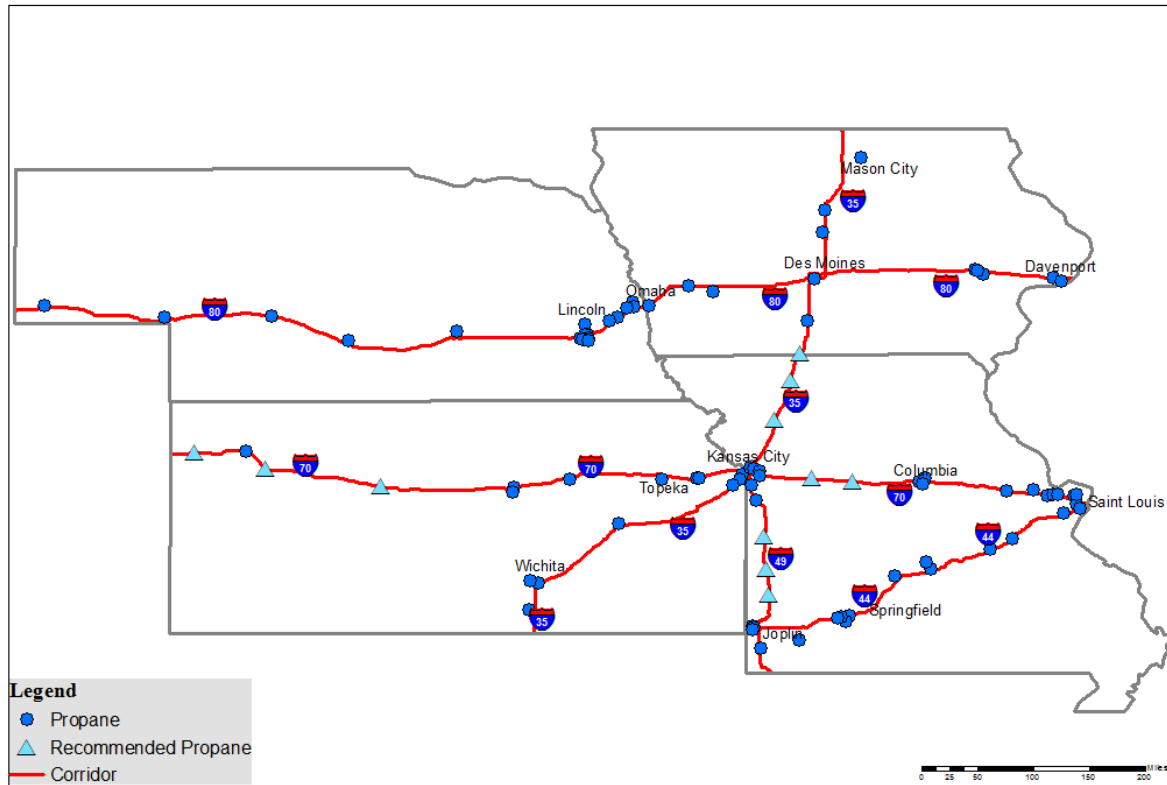
Planned and Recommended LNG Stations in Mid-America Corridor



Source: www.afdc.energy.gov/locator/stations/

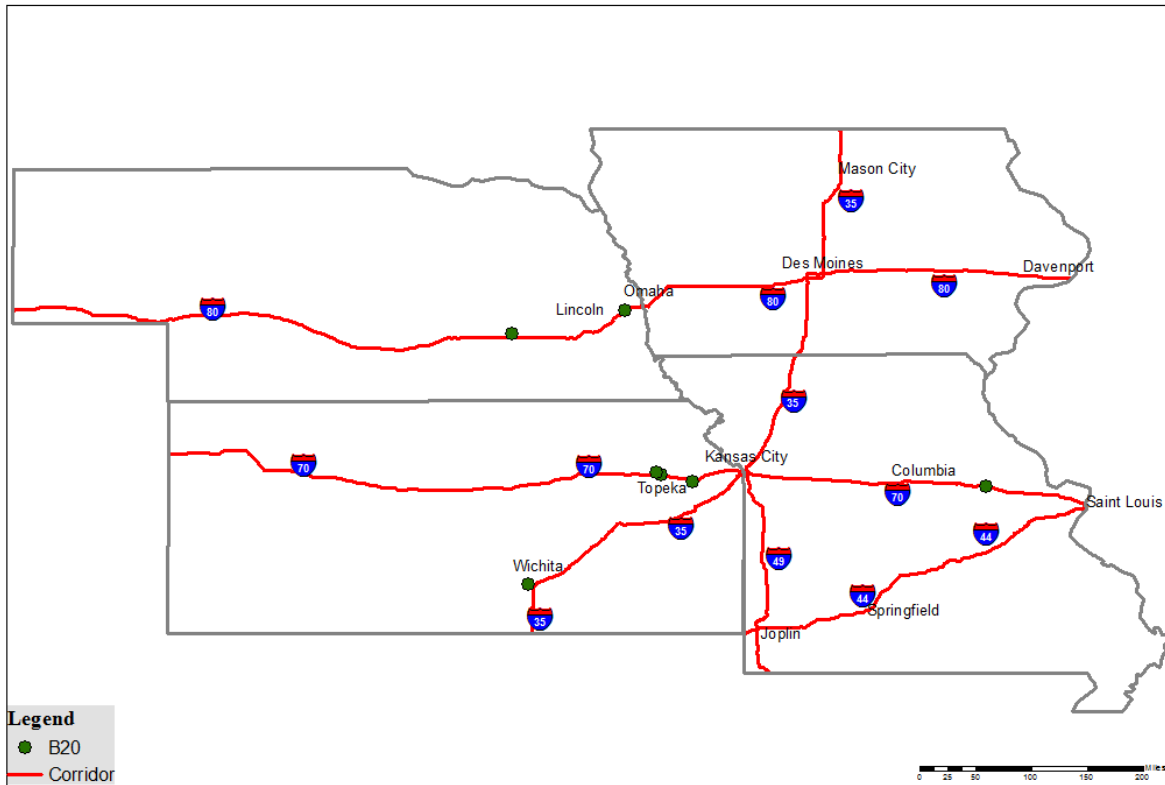
APPENDICES

Current and Recommended Propane Stations in Mid-America Corridor

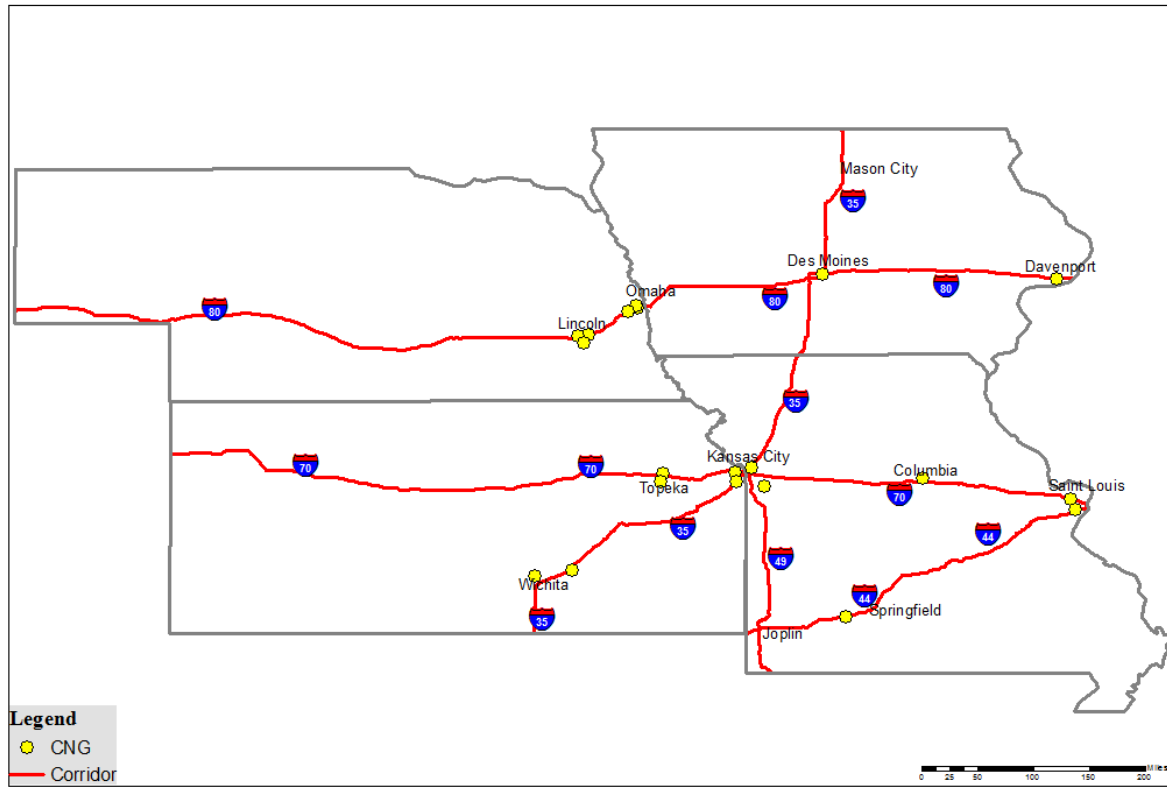


APPENDICES

B20 Stations in Mid-America Corridor



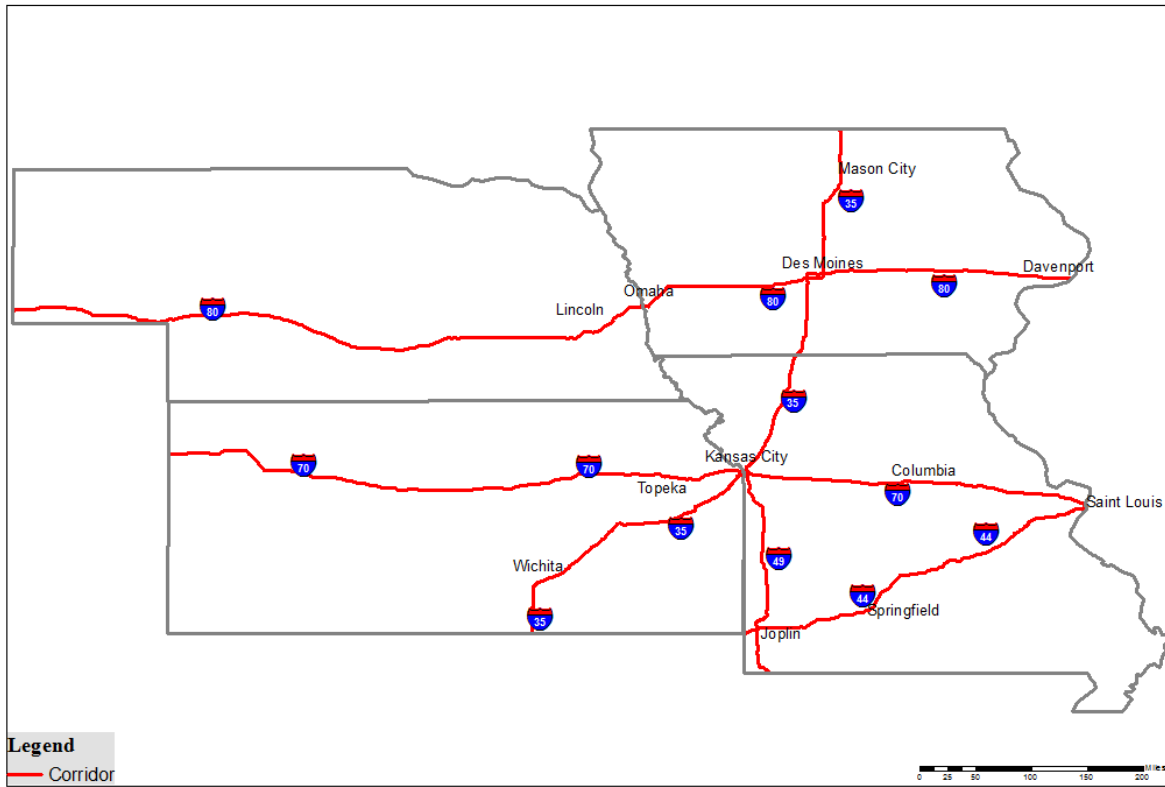
CNG Stations in Mid-America Corridor



Source: www.afdc.energy.gov/locator/stations/

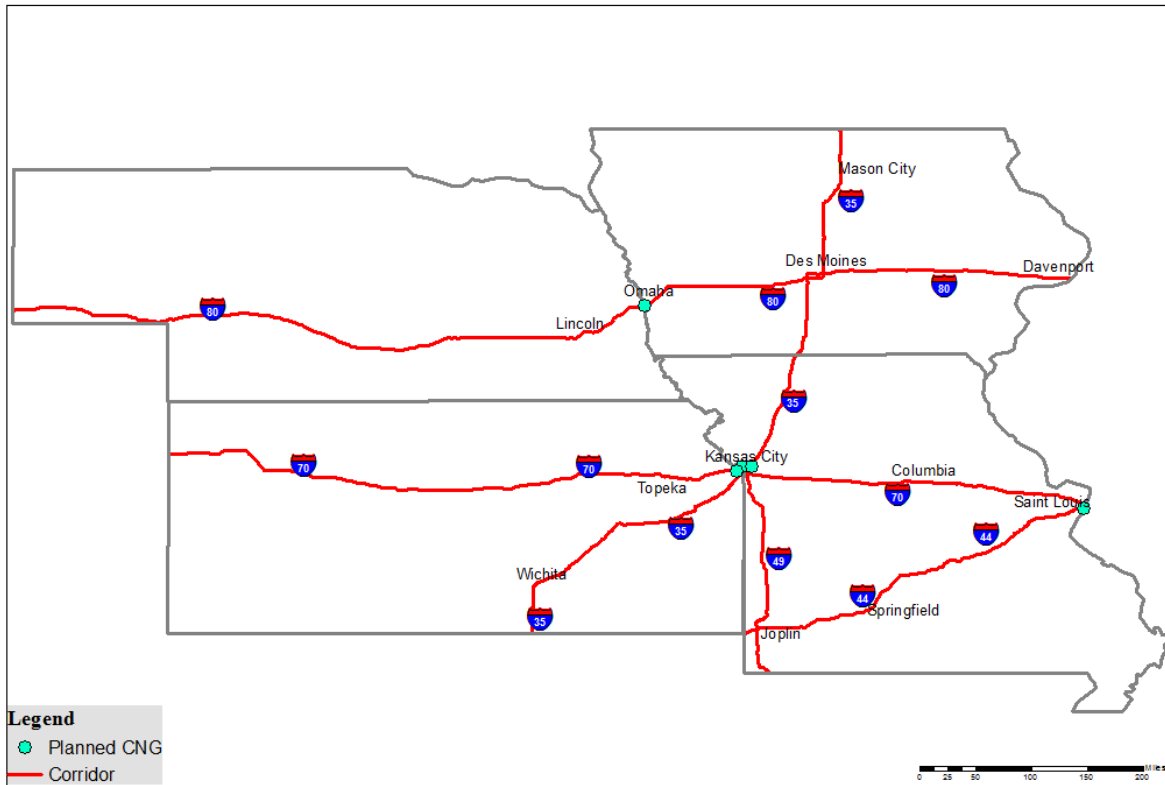
APPENDICES

Mid-America Corridor



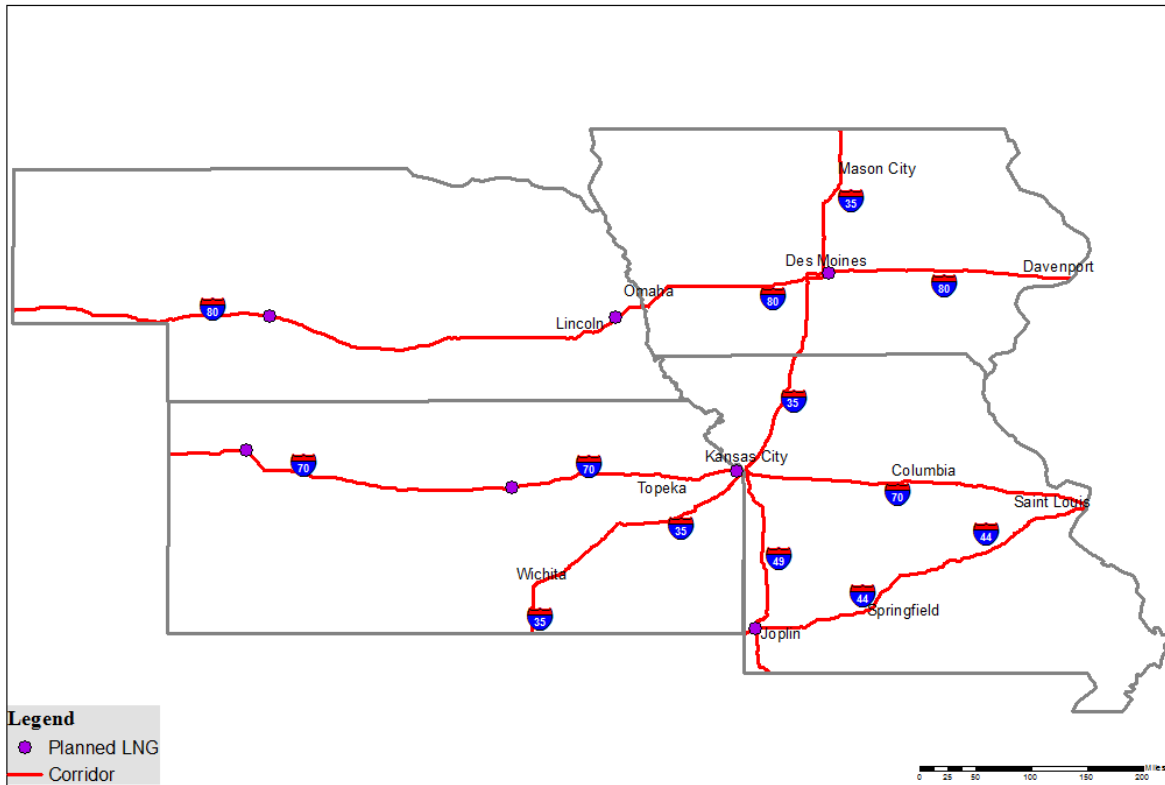
APPENDICES

Planned CNG Stations in Mid-America Corridor



APPENDICES

Planned LNG Stations in Mid-America Corridor



APPENDICES

Propane Stations in Mid-America Corridor

