Alternative Fuels Corridor Infrastructure Placement Plan

2021

PALMETTO CLEAN FUELS COALITION

INTRODUCTION

South Carolina was one of the first states that successfully obtained Alternative Fuels Corridor designations and deployed signage through the Federal Highway Administration (FHWA). The Palmetto Clean Fuels (PCF) coalition, along with the Energy Office of the SC Office of Regulatory Staff, developed an overview of the steps necessary to implement approved signage to serve as a guide to other states looking to do the same.

Section 1413 of the Fixing America's Surface Transportation (FAST) Act requires the Secretary of Transportation to designate national electric vehicle (EV) charging, hydrogen (HYD), propane (LPG), and natural gas (CNG/LNG) fueling corridors. The FHWA is working with other federal, state, and local officials, as well as private industry, to help plan and promote an interstate network of stations that will fuel vehicles powered by clean and domestically produced alternative fuels, so commercial and passenger vehicles can reliably travel between cities, regions, and across the entire nation.

To create and expand Alternative Fuels Corridors, PCF has developed a Corridor Infrastructure Placement Plan for EV, CNG, LNG, LPG, and hydrogen infrastructure. The goals of this plan are to identify major gaps in the current Alternative Fuels Corridor network and to suggest priority locations along corridor infrastructure where new stations can help build out corridor-ready roadways.

BACKGROUND

South Carolina Energy Office

The South Carolina Energy Office, (Energy Office) a division of the South Carolina Office of Regulatory Staff, advances South Carolina's energy strategy and policy through education and outreach. In addition, the Energy Office encourages energy efficiency, renewable energy, and clean transportation through a broad range of initiatives that include:

- Developing the State Energy Plan
- Providing Technical Assistance
- Offering Financial Assistance
- Conducting Education and Outreach
- Maintaining Energy Data Resources

Palmetto Clean Fuels – South Carolina's Clean Cities Coalition

Palmetto Clean Fuels Coalition (PCF) is an initiative of the South Carolina Energy Office. PCF works to increase the use of alternative fuels and advanced vehicle technologies in South Carolina. The US Department of Energy (DOE) approved the application for PCF's designation in 2003, recognizing the commitment of our stakeholders to building an alternative fuels market in South Carolina as a statewide coalition in 2004. Since then, PCF has been part of the Clean Cities program, a network of nearly 100 designated coalitions across the United States.

Nominations

July 2016
The US Department of Transportation Federal Highway Administration (FHWA) called on states to nominate national plug-in electric vehicle (EV) charging and hydrogen, propane, and natural gas fueling corridors along major roadways as a part of the "Fixing America's Surface Transportation" (FAST) Act.

August 22, 2016
PCF submitted a response to the call for nominations of Alternative Fuels Corridors (81 FR 47850, July 22, 2016) with SC Department of Transportation (SCDOT) approval.

November 3, 2016
The Energy Office received a response from the FHWA indicating several nominations were being designated as Alternative Fuels Corridors. Parts of I-20, I-26, I-77 and I-85 were designated as corridor-ready in South Carolina. Large portions of I-95 were designated as corridor-pending.

Updates

June 2020
PCF/Energy Office submitted a letter to FHWA detailing corridor segments that have reached Corridor-Ready status for CNG and Electric fuel types on portions of I-77 and I-26, with approval from SCDOT and the state FHWA division office.

February 2021
PCF/Energy Office were notified by the FHWA/USDOT that corridors for LPG had reached Corridor-Ready status. These included all of I-77, I-85, and a portion of I-20.

Signage

December 21, 2016
FHWA released a memorandum containing guidance on "Signing for Designated Alternative Fuels Corridors."

March 14, 2017
PCF submitted a signage request to the Director of Traffic Engineering at SCDOT, requesting that appropriate signage be installed along the signage-ready corridors. This request was lengthy, including specific signage locations, Manual on Uniform Traffic Control Devices reference numbers, and an interactive map.

March 17, 2017
Coordinators received a response from SCDOT acknowledging PCF's request and SCDOT's actions to review feasibility and provide cost estimates.

June 6, 2017
PCF received an official proposal from SCDOT for the placement of signs and a cost estimate of $4,531.25. Installation costs were waived, as SCDOT would cover the installation.

June 29, 2017

PCF received confirmation that fabrication of the signs was complete. SCDOT sent an invoice for $2,092.96. Instead of using the SCDOT Sign Shop, the signs were fabricated at the SC Department of Corrections – Prison Industries, significantly reducing the cost.

Alternative Fuels Corridor Convenings

PCF held a South Carolina-specific Alternative Fuels Corridor convening on June 13, 2018. This meeting was used to inform input at the Southeast convening in September. The topics included anchor fleets, sustainability, financing, and locations to determine the best methods to build out the existing corridors and implement new ones. There were four sessions, two of which were led by coalition stakeholders/PCF Advisory Board members. Participants wrapped up the day by summarizing key takeaways during a roundtable discussion.

A Regional Alternative Fuels Corridor Convening took place on September 25, 2018, in Charleston, SC. The regional convening consisted of 40 stakeholders. Representatives from the USDOT and the National Renewable Energy Laboratory provided key background information about future corridor nominations and the next round of designations. There were several key takeaways to expand the Alternative Fuels Corridors in the Southeast. The initiative to expand the Alternative Fuels Corridors has increased collaboration across states. This collaboration is necessary for the success of the corridors since corridors cross state and county lines. Signage can help normalize the use of alternative fuels by making consumers aware of their availability. Lastly, state leaders can encourage the expansion of the corridors by promoting alternative fuels through rate schedules, streamlining permitting processes, incentivizing infrastructure, and providing incentives for consumers to use alternative fuels.

DESIGNATION CRITERIA

Below is a listing of corridor designation criteria for each fuel type, as spelled out in the FAST Act.

Criteria for Corridors[1]				
Electricity	Compressed Natural Gas	Liquified Natural Gas	Hydrogen	Propane
Only public stations				
5 miles from the highway				
50 miles between stations	150 miles between stations	200 miles between stations	100 miles between stations	150 miles between stations
Only DC fast charging stations with CHAdeMO and CSS connectors (no Tesla)	Only fast-fill stations with 3,600 psi fill pressure		Only retail stations (accept payment at the point of sale)	Only primary stations (offer fueling capabilities for vehicles)

Corridor-Ready

Corridor-ready is defined as a corridor having a minimum of 2 stations. Final classifications will be made on a case-by-case basis.

Corridor-Pending

If a corridor is being designated as corridor-pending and currently has no alternative fuel facilities located on it, then a strategy for infrastructure build-out should be submitted.

Fuel-specific Criteria

EV Charging

Electric vehicle designations will only consider corridors with DC Fast Charge infrastructure. Because Tesla stations are proprietary, and, therefore, not available for use by non-Tesla EV owners, they are not included.

Corridor-Ready

A corridor with Public DC Fast Charging no greater than 50 miles between stations, and no greater than 5 miles off the highway. Starting with Round 4 Designations, for EV sites to be eligible for an EV Ready Corridor, they must be equipped with both CHAdeMO and CCS connectors.

Corridor-Pending

Public DC Fast Charging chargers separated by more than 50 miles

[1] National Renewable Energy Laboratory – Center for Integrated Mobility Sciences

Hydrogen

If a hydrogen refueling station, currently used for non-road transportation purposes, is being used to support the nomination process, then the station must be compliant with SAE J2601 standards and meet all of the criteria outlined in this document for a hydrogen corridor including being publicly accessible.

Corridor-Ready

Public hydrogen stations no greater than 100 miles between one station and the next on the corridor, and no greater than 5 miles off the highway

Corridor-Pending

Public hydrogen stations separated by more than 100 miles

Propane

For propane stations, only "primary" stations (i.e., those stations that offer vehicle-specific fueling capabilities and fuel priced specifically for use in vehicles, as designated by the US Department of Energy's Alternative Fuel Station Locator) would be considered when determining infrastructure coverage along a nominated corridor.

Corridor-Ready

Public, primary propane stations no greater than 150 miles between one station and the next on the corridor, and no greater than 5 miles off the highway

Corridor-Pending

Public, primary propane stations separated by more than 150 miles

CNG

Corridor-Ready

Public fast fill, 3,600 psi CNG stations no greater than 150 miles between one station and the next on the corridor, and no greater than 5 miles off the highway

Corridor-Pending

Public, fast fill, 3,600 psi CNG stations separated by more than 150 miles

LNG

Corridor-Ready

Public LNG stations no greater than 200 miles between one station and the next on the corridor, and no greater than 5 miles off the highway

Corridor-Pending

Public LNG stations separated by more than 200 miles

CURRENTLY DESIGNATED CORRIDORS IN SOUTH CAROLINA

The chart below outlines interstates currently designated as corridor-ready and corridor-pending in 2021:

Interstate	Designation Status	Fuel Types	EV	CNG	LNG	LPG	Hydrogen
I-85	Designated 2021: *Ready*	EV CNG LPG	Entire length of corridor	Entire length of corridor		Entire length of corridor.	
	Designated 2016: *Pending*	H2					Entire length of corridor.
I-77	Designated 2021: *Ready*	EV LPG	Entire length of corridor	Between SC/NC border and Rock Hill		Entire length of corridor.	
	Designated 2016: *Pending*	CNG H2		Between Rock Hill and I-77/I-26 interchange in Cayce			Entire length of corridor.
I-26	Designated 2021: *Ready*	EV LPG CNG	From Irmo to Orangeburg and from Ladson to Charleston.	Between SC/NC border and Spartanburg		From Spartanburg, SC to Charleston, SC.	
	Designated 2016: *Pending*	CNG H2	From NC border to Irmo; and from Orangeburg to Ladson.	Between Spartanburg and Charleston			Entire length of corridor.
I-95	Designated 2021: *Ready*						
	Designated 2016: *Pending*	EV CNG LPG H2	Entire length of corridor	Entire length of corridor.		Entire length of corridor.	Entire length of corridor.
I-20	Designated 2021: *Ready*	LPG				From Camden, SC to GA border.	
	Designated 2016: *Pending*	EV CNG LPG H2	Entire length of corridor	Entire length of corridor.		From Florence to Camden.	Entire length of corridor.

NECESSARY INFRASTRUCTURE PLACEMENT

The chart below outlines interstates currently designated corridor-pending in 2021 and the needed infrastructure at points along the corridor to switch the interstate to corridor-ready:

Interstate	EV	CNG	LNG	LPG	Hydrogen
I-85			Spartanburg, SC at the intersection of I-26 and I-85 and Anderson, SC		Spartanburg at the intersection of I-26 and I-85 and Anderson, SC
I-77		Columbia, SC at the intersection of I-26 and I-77	Columbia, SC at the intersection of I-20 and I-77		Rock Hill, SC and Columbia, SC at the intersection of I-77 and I-20
I-26	Bowman, SC off I-26 and I-95; Clinton, SC at the fork of I-26 and I-385; and Landrum, SC	Columbia, SC at intersection of I-26 and I-77; and Bowman, SC off I-26 and I-95	Bowman, SC at the intersection of I-95 and I-26, Spartanburg, SC at the intersection of I-26 and I-85	Spartanburg, SC at the intersection of I-26 and I-85	Bowman, SC at the intersection of I-95 and I-26, Columbia, SC at the intersection of I-20 and I-26, and Spartanburg, SC at the intersection of I-26 and I-85
I-95	Ridgeland, SC; Bowman, SC off I-26 and I-95; Manning, SC; and Dillon, SC	Bowman, SC off I-26 and I-95; and Florence, SC at the intersection of I-95 and I-20	Bowman, SC at the intersection of I-95 and I-26	Florence, SC at the intersection of I-20 and I-95 and Ridgeland, SC	Florence, SC at the intersection of I-20 and I-95, and Bowman, SC at the intersection of I-95 and I-26
I-20	Camden, SC; and Aiken, SC	Florence, SC at the intersection of I-95 and I-20; and Columbia, SC at the intersection of I-20 and I-26	Columbia, SC at the intersection of I-20 and I-77 and Aiken, SC		Florence, SC at the intersection of I-20 and I-95 and Columbia, SC at the intersection of I-20 and I-26

EV

Current locations of DC Fast Chargers can be found at each of the red dots on the map. Corridor-ready corridors are marked in solid blue, and corridor-pending corridors are depicted by red lines. Orange circles mark optimal locations for the deployment of DC Fast Chargers. By installing DC Fast Chargers at suggested locations, charging stations would be no more than 50 miles apart and less than 5 miles from the corridor. DC Fast Chargers must be equipped with both CHAdeMO and CSS Connectors.

Alternative Fuels Corridors – EV Charging

Corridor-Pending

Corridor-Ready

DC Fast Charger

Optimal Location for New Station Deployment

Interstate	New Stations Needed	Locations of Necessary Infrastructure
I-85	0	
I-77	0	
I-26	3	1. Bowman, SC off I-26 and I-95 2. Clinton, SC at the fork of I-26 and I-385 3. Landrum, SC
I-95	4	4. Ridgeland, SC 5. Bowman, SC off I-26 and I-95 6. Dillon, SC 7. Manning, SC
I-20	2	8. Camden, SC 9. Aiken, SC

CNG

There are several CNG stations that meet corridor-ready criteria, as shown by the light blue dots. These stations created one corridor-ready corridor at the top of the state. Light blue circles show optimal infrastructure placement. By installing stations at suggested locations, infrastructure will be no more than 150 miles apart and less than 5 miles from the corridor.

Alternative Fuels Corridors – CNG

Corridor-Pending

Corridor-Ready

CNG Station

Optimal Location for New Station Deployment

Interstate	New Stations Needed	Locations of Necessary Infrastructure
I-85	0	
I-77	1	1. Columbia, SC at intersection of I-26 and I-77
I-26	2	2. Columbia, SC at intersection of I-26 and I-77 3. Bowman, SC off I-26 and I-95
I-95	2	4. Bowman, SC off I-26 and I-95 5. Florence, SC at the intersection of I-95 and I-20
I-20	2	6. Florence, SC at the intersection of I-95 and I-20 7. Columbia, SC at the intersection of I-20 and I-26

LNG

There are currently two LNG stations in South Carolina, and they are represented by the blue dots on the map. Due to the lack of infrastructure, there are also no designated corridor-ready or corridor-pending roadways in the state. The green circles represent optimal placement for new infrastructure. By installing stations at suggested locations, infrastructure will be no more than 200 miles apart and less than 5 miles from the corridor.

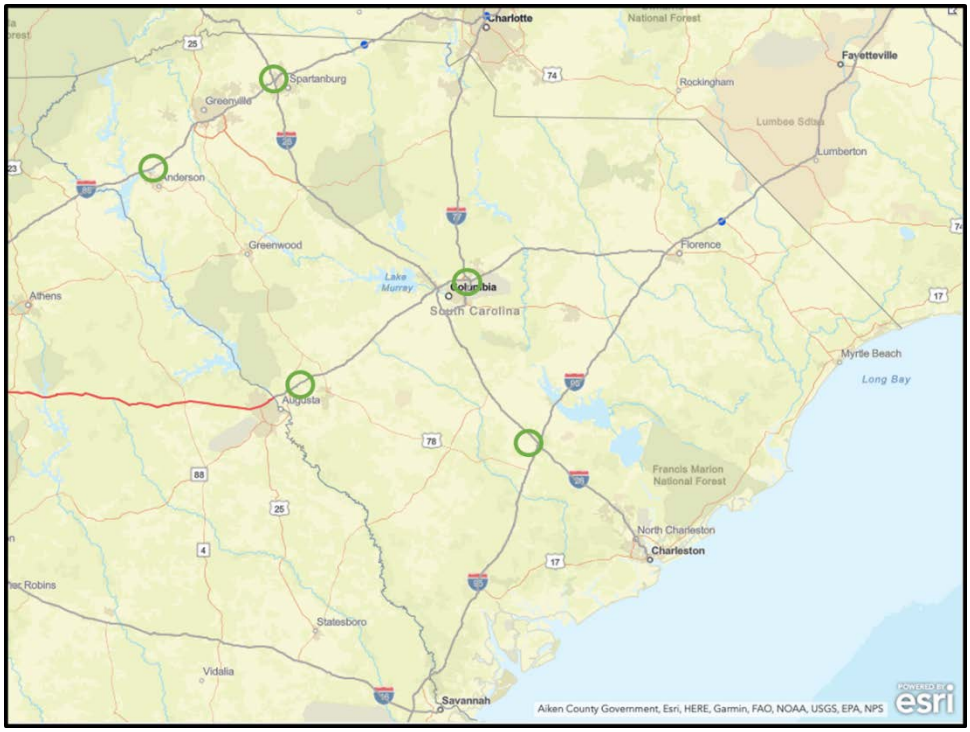
Alternative Fuels Corridors – LNG

Corridor-Pending

Corridor-Ready

LNG Station

Optimal Location for New Station Deployment



Interstate	New Stations Needed	Locations of Necessary Infrastructure
I-85	2	1. Spartanburg, SC at the intersection of I-26 and I-85 2. Anderson, SC
I-77	1	3. Columbia, SC at the intersection of I-20 and I-77
I-26	2	4. Bowman, SC at the intersection of I-95 and I-26 5. Spartanburg, SC at the intersection of I-26 and I-85
I-95	1	6. Bowman, SC at the intersection of I-95 and I-26
I-20	2	7. Columbia, SC at the intersection of I-20 and I-77 8. Aiken, SC

LPG

The current propane infrastructure, as shown by the orange dots, has allowed three highways to be designated as corridor-ready. Purple circles show optimal placement for propane infrastructure to designate all interstates as corridor-ready. By installing stations at suggested locations, infrastructure will be no more than 150 miles apart and less than 5 miles from the corridor.

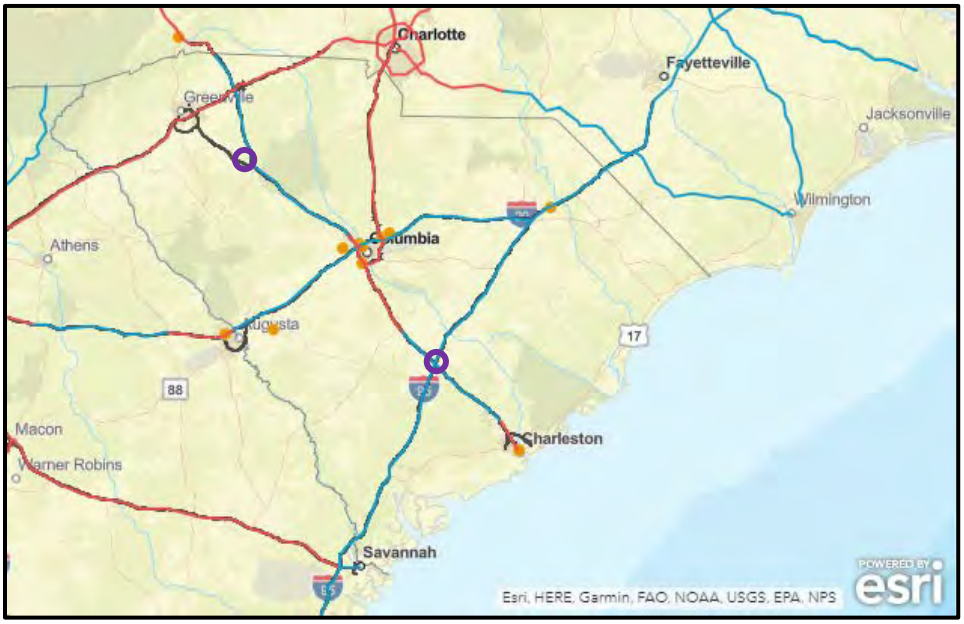
Alternative Fuels Corridors – LPG

Corridor-Ready

Corridor-Pending

LPG Station

Optimal Location for New Station Deployment



Interstate	New Stations Needed	Locations of Necessary Infrastructure
I-85	0	
I-77	0	
I-26	1	1. At the intersection of I-26 and I-385
I-95	1	2. At the intersection of I-26 and I-95
I-20	0	

Hydrogen

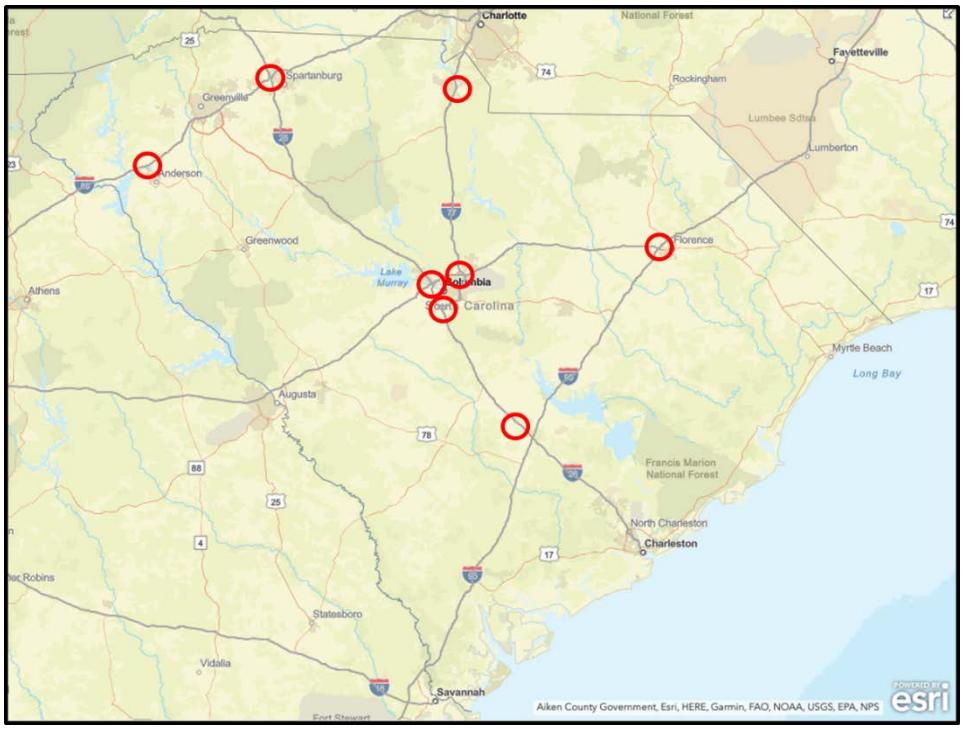
There are currently no public hydrogen stations in South Carolina. Since there is no public infrastructure, there are no highways that meet corridor-ready criteria. To create an optimal corridor-ready corridor system, PCF suggests infrastructure be placed at the location of the red circles on the map. By installing stations at suggested locations, infrastructure will be no more than 100 miles apart and less than 5 miles from the corridor.

Alternative Fuels Corridors – Hydrogen

Corridor-Pending

Corridor-Ready

Optimal Location for New Station Deployment



Interstate	New Stations Needed	Locations of Necessary Infrastructure
I-85	2	1. Spartanburg, SC at the intersection of I-26 and I-85 2. Anderson, SC
I-77	2	3. Rock Hill, SC 4. Columbia, SC at the intersection of I-77 and I-20
I-26	3	5. Bowman, SC at the intersection of I-95 and I-26 6. Columbia, SC at intersection of I-26 and I-77 7. Spartanburg, SC at the intersection of I-26 and I-85
I-95	2	8. Florence, SC at the intersection of I-20 and I-95 9. Bowman, SC at the intersection of I-95 and I-26
I-20	2	10. Florence, SC at the intersection of I-95 and I-20 11. Columbia, SC at the intersection of I-20 and I-26

Conclusion:

Given South Carolina's strong manufacturing base— especially for the automotive industry— reliance on tourism, unique interstate network, strong port activity, and commitment to the health and well-being of its citizens and environment, the Energy Office is committed to moving goods and people in the cleanest, most efficient, and most economical means possible.

PCF encourages infrastructure developers to locate and install fueling infrastructure at these critical locations to further develop alternative fueling infrastructure along the National Highway System and to facilitate the movement of freight along the corridors.

The Energy Office looks forward to working alongside businesses and organizations to strengthen Alternative Fuels Corridors and to promote the use of alternative fuels.

PALMETTO CLEAN FUELS COALITION