

# **Refueling Infrastructure Deployment in Low- Income and Non-Urban Communities**

---

**Energy Systems and Infrastructure Analysis Division**

### **About Argonne National Laboratory**

Argonne is a U.S. Department of Energy laboratory managed by UChicago Argonne, LLC under contract DE-AC02-06CH11357. The Laboratory's main facility is outside Chicago, at 9700 South Cass Avenue, Lemont, Illinois 60439. For information about Argonne and its pioneering science and technology programs, see [www.anl.gov](http://www.anl.gov).

### **DOCUMENT AVAILABILITY**

**Online Access:** U.S. Department of Energy (DOE) reports produced after 1991 and a growing number of pre-1991 documents are available free at OSTI.GOV (<http://www.osti.gov/>), a service of the US Dept. of Energy's Office of Scientific and Technical Information.

### **Reports not in digital format may be purchased by the public from the National Technical Information Service (NTIS):**

U.S. Department of Commerce  
National Technical Information Service  
5301 Shawnee Road  
Alexandria, VA 22312

**[www.ntis.gov](http://www.ntis.gov)**

Phone: (800) 553-NTIS (6847) or (703) 605-6000

Fax: (703) 605-6900

Email: [orders@ntis.gov](mailto:orders@ntis.gov)

### **Reports not in digital format are available to DOE and DOE contractors from the Office of Scientific and Technical Information (OSTI):**

U.S. Department of Energy  
Office of Scientific and Technical Information  
P.O. Box 62  
Oak Ridge, TN 37831-0062  
[www.osti.gov](http://www.osti.gov)

Phone: (865) 576-8401

Fax: (865) 576-5728

Email: [reports@osti.gov](mailto:reports@osti.gov)

### **Disclaimer**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor UChicago Argonne, LLC, nor any of their employees or officers, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of document authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof, Argonne National Laboratory, or UChicago Argonne, LLC.

ANL-24/15

# Refueling Infrastructure Deployment in Low-Income and Non-Urban Communities

---

by

David Gohlke, Yan Zhou, and Xinyi Wu

Energy Systems and Infrastructure Analysis Division, Argonne National Laboratory

March 2024

## CONTENTS

ACKNOWLEDGMENTS .....	iv
LIST OF ACRONYMS .....	v
ABSTRACT.....	1
1 INTRODUCTION .....	1
2 ELIGIBLE CENSUS TRACTS .....	3
3 IMPLICATIONS ON REFUELING INFRASTRUCTURE DEPLOYMENT .....	7
4 CONCLUSIONS AND DISCUSSION .....	11
REFERENCES .....	13

## FIGURES

1 Qualified IRA 30C census tracts.....	4
2 Eligible 30C census tracts in Chicago metropolitan area .....	5
3 Eligible 30C census tracts in Detroit metropolitan area .....	6
4 Eligible 30C census tracts in Des Moines, Iowa metropolitan area .....	6

## TABLES

1 Tallies of Qualified IRA 30C Census Tracts and Resident Population .....	4
2 Metrics and Amenities Considered and Their Data Sources .....	8
3 Existing Fueling Infrastructure Based on Location Eligibility for 30C Tax Credit .....	9
4 New Installations in 2023 Based on Location Eligibility for 30C Tax Credit.....	9
5 Proxies for Charging Demand Based on Location Eligibility for 30C Tax Credit.....	10

## ACKNOWLEDGMENTS

This activity was primarily supported by the Office of Policy of the United States Department of Energy. The authors would like to thank Noel Crisostomo, Jason Frost, and Ted Sears for guidance and feedback. The authors would also like to thank Jim Kuiper for GIS analysis of alternative fuel corridors and urban areas.

This report was prepared as an account of work sponsored by an agency of the United States government. Neither the United States government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States government or any agency thereof.

## LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
AFDC	Alternative Fuel Data Center
CDFI	Community Development Financial Institutions Fund
CNG	compressed natural gas
DCFC	direct-current fast charging
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EV	(plug-in) electric vehicle
FCV	fuel cell vehicle
FHWA	U.S. Department of Transportation Federal Highway Administration
HUD	U.S. Department of Housing and Urban Development
IJA	Infrastructure Investment and Jobs Act
IRA	Inflation Reduction Act of 2022
IRC	Internal Revenue Code
IRS	Internal Revenue Service
L2	level 2 charging
LDV	light-duty vehicle
LNG	liquified natural gas
MHDV	medium- / heavy-duty vehicle
NACS	North American Charging Standard
NEVI	National Electric Vehicle Infrastructure formula program
NMTC	New Markets Tax Credit
ZEV	zero-emission vehicle

# **REFUELING INFRASTRUCTURE DEPLOYMENT IN LOW-INCOME AND NON-URBAN COMMUNITIES**

## **ABSTRACT**

The U.S. National Blueprint for Transportation Decarbonization identifies the need to invest in infrastructure supporting low- and zero-emission vehicles, especially in low-income and overburdened communities, to eliminate nearly all greenhouse gas emissions from the transportation sector by 2050. The alternative fuel vehicle refueling property tax credit (26 U.S. Code § 30C) includes eligibility criteria intended to encourage investment in underserved communities based on the economic characteristics or urban character of the census tract in which the fueling infrastructure is installed. Eligible census tracts are those that qualify for the New Markets Tax Credit or that are not located within urban areas as defined by the U.S. Census Bureau. This study quantifies how many fueling-related amenities are currently located in census tracts that qualify and do not qualify for the 30C tax credit based on IRS Notice 2024-20. For existing electric vehicle charging stations, 51% of Level 2 and 60% of Direct Current Fast Charging public stations are located in eligible census tracts. 73% of natural gas, propane, and hydrogen fueling stations are in qualifying census tracts and 75% of biodiesel and renewable fuel stations are in qualifying census tracts. This compares with 73% of existing gas stations in eligible census tracts. For deploying the refueling infrastructure to satisfy future demand, this study shows that truck stops (94%), commercial truck stops (92%), and Federal Highway alternative fuel corridors (89%) are predominantly located in eligible locations. Additionally, significant percentages of the population (62%), light-duty vehicle registrations (64%), and medium- and heavy-duty vehicle registrations (68%) fall within eligible areas.

## **1 INTRODUCTION**

The U.S. National Blueprint for Transportation Decarbonization identifies a holistic strategy to achieve a future mobility system that is clean, safe, secure, accessible, affordable, and equitable, and provides sustainable transportation options for people and goods. The Blueprint identifies that infrastructure investments needed to support low and zero-emission vehicles, especially in low-income and overburdened communities, are essential to achieve this goal over the next two decades (DOE 2023). The alternative fuel refueling property credit, also known as the 30C tax credit (26 U.S. Code § 30C), provides for a credit of up to 30% of the cost of any qualified alternative fuel vehicle refueling property, up to a limit of \$100,000 for businesses and \$1,000 for individuals. (IRS 2024a; U.S. Code 2022) Section 30C was updated in the Inflation Reduction Act (IRA) to continue through 2032 instead of expiring in 2021 (U.S. Congress, 2022). To ensure charging and fueling infrastructure is geographically dispersed so as to serve underserved communities based on the economic status or urban character of the census tract in

which the fueling infrastructure is installed, the 30C tax credit includes specific geographic eligibility criteria. Specifically, the eligibility requirements of the tax credit refer to the New Markets Tax Credit (NMTC) administered by the U.S. Department of Treasury (26 U.S. Code § 45D), and the definition of urban areas from the Census Bureau.

On January 19, 2024, the Department of the Treasury and the Internal Revenue Service (IRS) issued Notice 2024-20 providing guidance on the geographical requirements of the tax credit and to announce the intent to propose regulations for the credit (IRS 2024b). Eligible census tracts fall into two categories and eligible property can be in either type of tract (or both, if the tract falls under both categories) to qualify:

- Low-income community census tracts: Population census tracts as described in Internal Revenue Code section 45D(e), i.e., the “low-income community” definition of the New Markets Tax Credit (NMTC).
- Non-urban census tracts: Population census tracts defined as “not an urban area” (or “non-urban area”) according to Treasury/IRS guidance.

Tracts qualifying through the NMTC, which are typically low-income or other at-risk communities, are defined by existing Treasury regulations. A full database and mapping tool is available from the Community Development Financial Institutions (CDFI) Fund (CDFI 2023). Urban areas are defined within the IRA as “a census tract (as defined by the Bureau of the Census), which, according to the most recent decennial census, has been designated as an urban area by the Secretary of Commerce”. However, the Census Bureau defines “urban area” by census block, rather than census tract: “For the 2020 Census, an urban area will comprise a densely settled core of census blocks that meet minimum housing unit density and/or population density requirements.” (U.S. Census 2022a). In IRS Notice 2024-20, Treasury and IRS explained that they intend to propose regulations that if at least 10% of the census blocks within a tract are outside of urban areas, the population census tract is “non-urban” (IRS 2024b).

Individuals, businesses, and certain state, local, and other tax-exempt entities can claim the 30C credit. (IRS 2024a) Argonne has developed the 30C Eligibility Mapping Tool per DOE and IRS request (Argonne 2024). The mapping tool is intended to reflect currently available data for the two types of eligible census tracts relevant to the 30C credit, but is not formal IRS guidance. The IRA also expanded the definition of “qualified alternative fuel vehicle refueling property” to include charging stations for 2- and 3-wheeled vehicles (for use on public roads) and clarified that bidirectional charging equipment qualifies.

To estimate the total implications of the 30C tax credit, Argonne assessed the implications of 30C on the communities. Specifically, this study quantifies how many fueling-related amenities are currently located in census tracts that qualify and do not qualify for the 30C tax credit. This report considers fueling stations as well as proxy variables that may be representative of future installations of charging equipment.



## 2 ELIGIBLE CENSUS TRACTS

Section 30C, as amended by the IRA, requires property to be located in eligible census tracts: “Property shall not be treated as qualified alternative fuel vehicle refueling property unless such property is placed in service in an eligible census tract.” (U.S. Congress 2022). Eligibility is specifically determined within 30C(e)(3)(B):

(B) <<NOTE: Definitions.>> Eligible census tract.--

(i) In general.--For purposes of this paragraph, the term `eligible census tract' means any population census tract which--

(I) is described in section 45D(e), or

(II) is not an urban area.

(ii) Urban area.--For purposes of clause (i)(II), the term `urban area' means a census tract (as defined by the Bureau of the Census) which, according to the most recent decennial census, has been designated as an urban area by the Secretary of Commerce.

Thus, a census tract must qualify by either the NMTC or by being not in an urban area (i.e., a non-urban census tract). The IRA specifies that an “urban area” is “a census tract as defined by the Census Bureau which, according to the most recent decennial census, has been designated as an urban area by the Secretary of Commerce.” The Census Bureau determines “urban areas” for each decennial census, largely on the basis of population and housing density. In December 2022, Census released its list of urban areas as of 2020, and shortly thereafter, Census released the files that enable mapping of the geographic boundaries of these urban areas (U.S. Census Bureau 2022a; 2023).

The IRA’s amendments to 30C provide that location eligibility is based on population census tracts. IRS Notice 2024-20 explained that Treasury and the IRS intend to propose regulations that “...Any population census tract in which at least 10 percent of the census blocks are not designated as urban areas would be a “non-urban census tract.””(IRS 2024b).

There are a total of 85,395 census tracts in the United States and Puerto Rico in the 2020 Decennial Census (U.S. Census Bureau 2022c).<sup>1</sup> Of these tracts, 35% do not qualify, 24% qualify by not being an urban area, 29% qualify by the NMTC, and 12% qualify by both criteria, as shown in Table 1. Table 1 also shows a similar quantification of resident population, where over 204 million Americans (62%) live in Census tracts where property installations would qualify for the 30C credit.

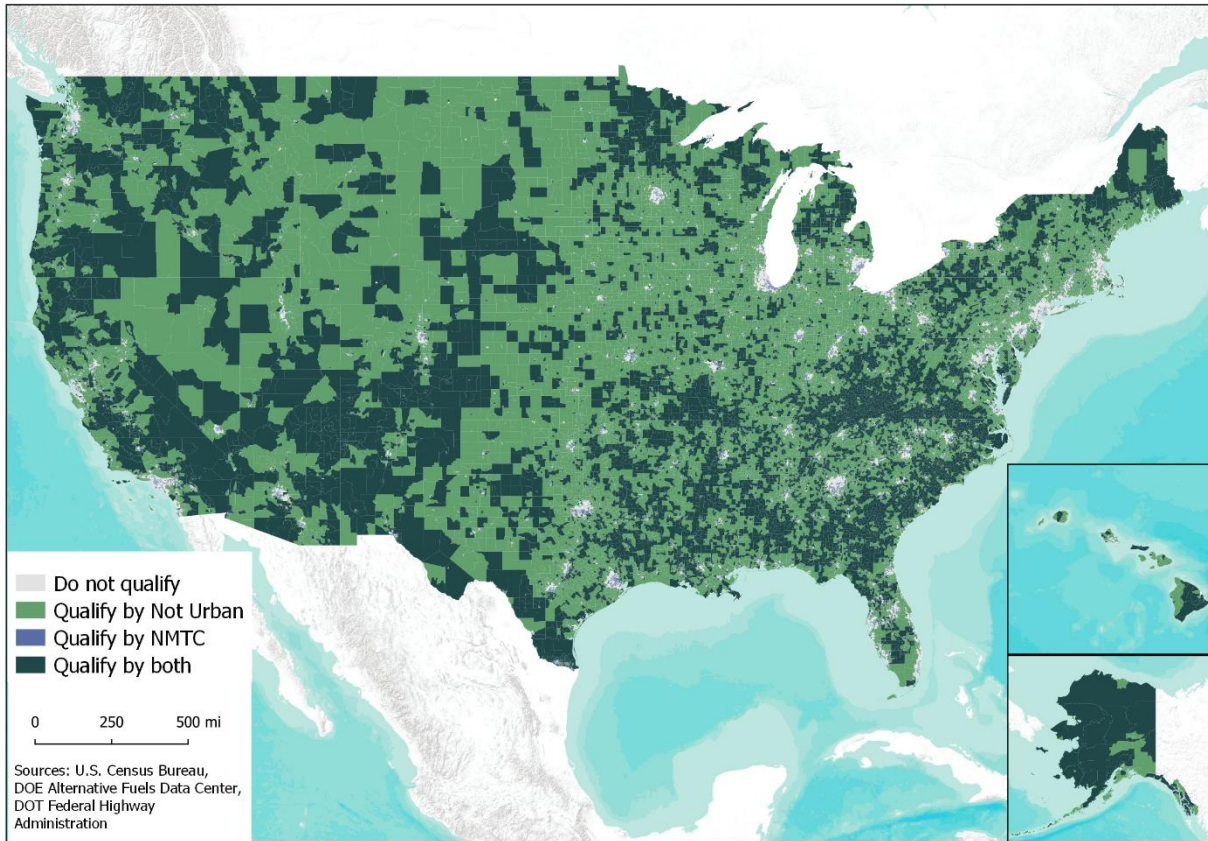
---

<sup>1</sup> There are also 133 tracts in Island Areas in the 2020 Decennial Census; every tract in the Island Areas of American Samoa, Guam, the Commonwealth of the Northern Mariana Islands and the United States Virgin Islands qualifies as they are all fully located outside of Census-defined urban areas.

**TABLE 1 Tallies of Qualified IRA 30C Census Tracts and Resident Population**

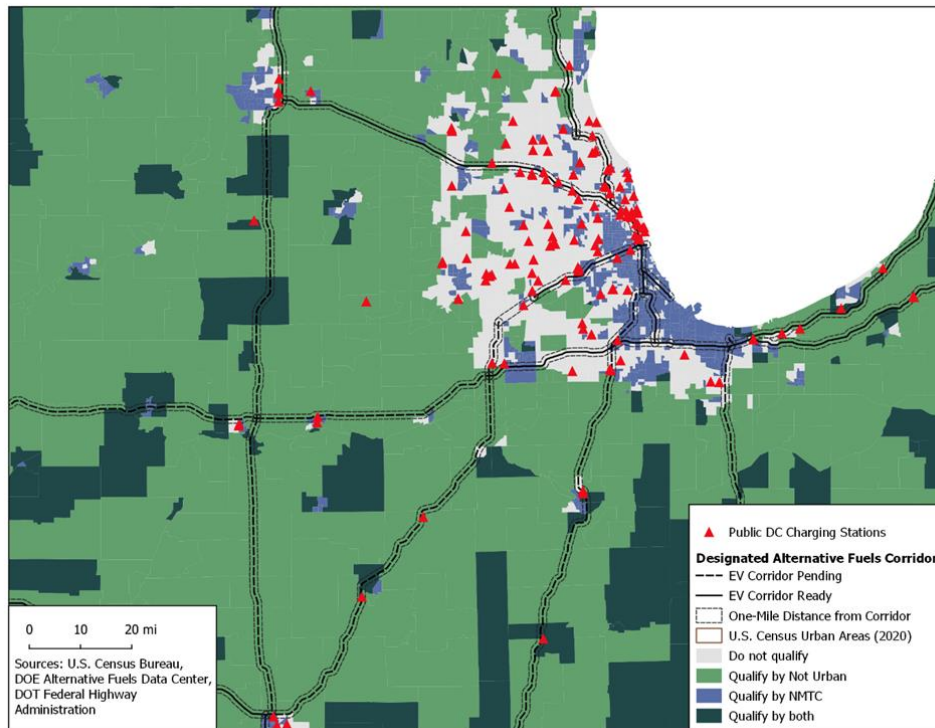
	Do not qualify	Qualify by Not Urban only	Qualify by NMTC only	Qualify by both
Census Tracts (number)	30,057	20,109	24,598	10,631
Census Tracts (percentage)	35.2%	23.5%	28.8%	12.4%
Population (number)	127.0M	79.0M	90.1M	35.3M
Population (percentage)	38.3%	23.8%	27.3%	10.6%

Figure 1 shows a national-scale map of locations eligible for the 30C credit. Areas in green qualify by being outside of urban areas, areas in light blue qualify by the NMTC credit, and areas in dark blue-green qualify by both criteria. The remaining areas in gray do not qualify.

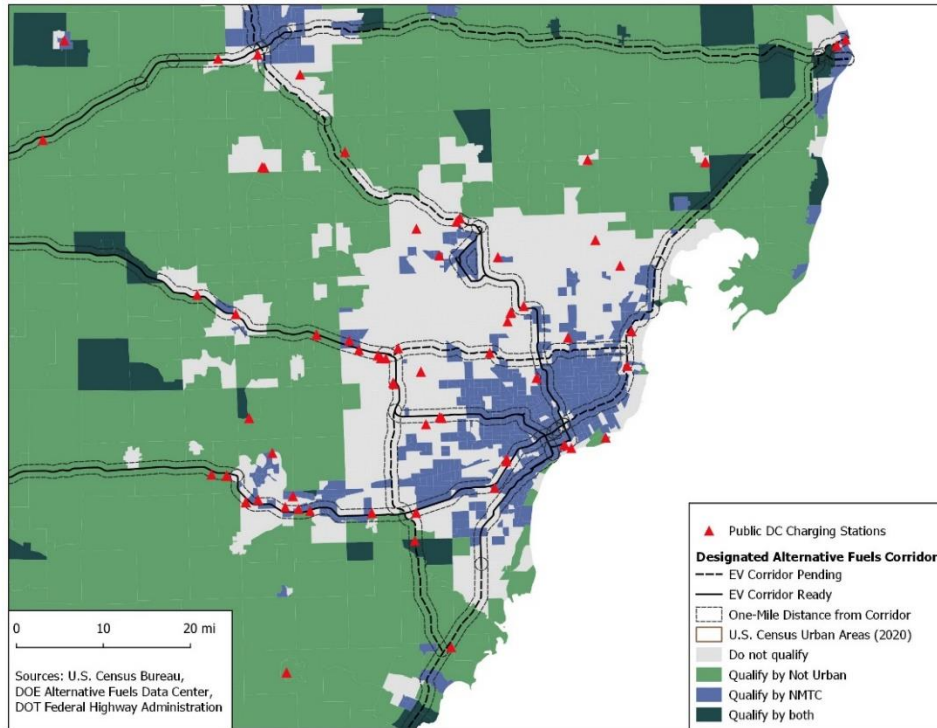


**FIGURE 1 Qualified IRA 30C census tracts**

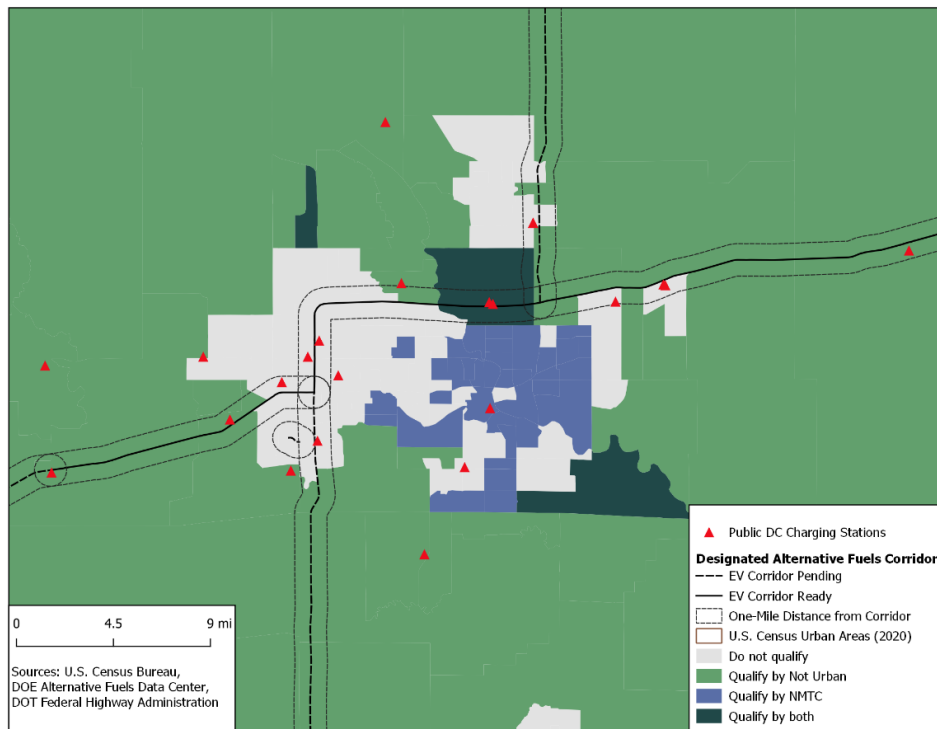
Figure 2 through Figure 4 depict zoomed-in views of three metropolitan areas, specifically Chicago, Detroit, and Des Moines. These were selected as representative of various sizes of metropolitan areas (very large, large, and mid-sized, respectively). These local maps include locations of existing public direct current fast charging (DCFC) electric vehicle (EV) charging stations from the Alternative Fuel Data Center (AFDC 2024a). These maps also show designated alternative fuel corridors (Rounds 1-6) from the Federal Highway Administration (FHWA 2023).



**FIGURE 2 Eligible 30C census tracts in Chicago metropolitan area**



**FIGURE 3 Eligible 30C census tracts in Detroit metropolitan area**



**FIGURE 4 Eligible 30C census tracts in Des Moines, Iowa metropolitan area**

### 3 IMPLICATIONS ON REFUELING INFRASTRUCTURE DEPLOYMENT

While the Census Bureau aims to have census tracts of generally similar population, a raw count of census tracts is not the most informative metric for determining the potential frequency of taxpayers claiming the tax credit. This study considers several different metrics to better consider how this “not urban” definition corresponds to the physical world, and specifically, where the installation of alternative fuel infrastructure would be most useful. Table 2 shows the metrics and amenities considered in this study as proxies for charging demand, along with their data sources. The amenities considered include both fueling stations and locations that may be particularly suited for fueling infrastructure in the future.

Existing fueling stations denote locations where individuals currently fuel, which includes gas stations, electric vehicle charging stations, and other alternative fuel stations. Locations of gas stations were derived from GasBuddy.com (Zhou et al. 2022a; GasBuddy 2022). EV charging stations and other alternative fuel stations were sourced from AFDC, including stations that are temporarily unavailable. For EV stations, both Level 2 (L2) charging and DCFC were analyzed. Given that EV charging can be constrained by both the number of stations and the number of ports, each of these is considered (Wood et al. 2017; Zhou et al. 2022b). E85 stations, which typically have a blend of 51%–83% ethanol (DOE 2017), are excluded from the analysis as they presumably do not qualify under Section 30C.<sup>2</sup>

Two different types of truck stops are considered: commercial trucks stops are existing locations that have some level of parking available, and truck stops assessed under Moving Ahead for Progress in the 21<sup>st</sup> Century (MAP-21) Section 1401 (Public Law 112-141) also known as “Jason’s Law”, which are collected by the U.S. Department of Transportation (DOT) to survey adequacy of parking and rest facilities for commercial motor vehicles engaged in interstate transportation (DOT 2023). Most of the commercial truck stops have fuel available for purchase, but do not necessarily offer overnight parking. Most of the Jason’s Law truck stops are in locations owned or operated by states and are suitable for overnight parking, and may or may not sell fuel or offer other amenities. EV charging corridors designated by FHWA are also shown as a metric where potential fueling stations can be added to satisfy interstate travel. Corridor miles denote the lengths of roadway where fueling stations are essential for establishing a comprehensive cross-country network.<sup>3</sup>

---

<sup>2</sup> Alternative fuels that qualify as clean-burning fuels for the purposes of the 30C tax credit (U.S. House 2023):

- (i) Any fuel at least 85 percent of the volume of which consists of one or more of the following: ethanol, natural gas, compressed natural gas, liquified natural gas, liquefied petroleum gas, or hydrogen.
- (ii) Any mixture-
  - (I) which consists of two or more of the following: biodiesel (as defined in section 40A(d)(1)), diesel fuel (as defined in section 4083(a)(3)), or kerosene, and
  - (II) at least 20 percent of the volume of which consists of biodiesel (as so defined) determined without regard to any kerosene in such mixture.
- (iii) Electricity.

<sup>3</sup> Alternative Fuel Corridors exist for hydrogen, propane, compressed natural gas (CNG), and liquified natural gas (LNG) in addition to for EV charging. EV charging was selected as the proxy metric due to the greater geographic coverage of its corridors.

**TABLE 2 Metrics and Amenities Considered and Their Data Sources**

Metric/Amenities	Description	Data Sources
Gasoline fueling stations	Number of distinct locations of fueling stations	(Zhou et al 2022a, from GasBuddy 2022)
Electric vehicle fueling stations and ports	Location and number of public charging stations and ports, both Level 2 and DCFC. This includes temporarily unavailable stations and Tesla-style (NACS) chargers	(AFDC 2024a)
Natural gas, propane, and hydrogen fueling stations	Number of distinct locations of fueling stations, including temporarily unavailable.	(AFDC 2024b)
Biodiesel and renewable diesel fueling stations	Number of distinct locations of fueling stations, including temporarily unavailable.	(AFDC 2024c)
Commercial truck stops	Number of distinct locations of truck stops	(AllStays.com 2023)
Jason’s Law truck stops	Number of distinct locations of truck stops	(DOT 2023)
Designated EV corridor miles	Length of roadway (in miles) of FHWA-designated alternative fuel corridors for electric vehicles (round 1-6), including ready and pending signage	(FHWA 2022)
Total population	Number of residents living in census tract	(U.S. Census 2022b)
Detached and mobile homes	Number of residents living in housing type by census tract	(U.S. Census 2022b)
Single-unit attached homes	Number of residents living in housing type by census tract	(U.S. Census 2022b)
Multi-unit dwellings	Number of residents living in housing type by census tract	(U.S. Census 2022b)
Transport and warehouse jobs	Number of employees working in industry by census tract	(Zhou et al 2022a, from AASHTO 2017)
LDV registrations	Number of registered LDV by ZIP code, estimated by census tract using HUD zip-to-tract crosswalk	(Experian Automotive 2023; HUD 2023)
MHDV registrations	Number of registered MHDV by ZIP code, estimated by census tract using HUD zip-to-tract crosswalk	(Experian Automotive 2023, HUD 2023)
ZEV registrations	Number of registered EV and FCV by ZIP code, estimated by census tract using HUD zip-to-tract crosswalk	(Experian Automotive 2023, HUD 2023)

Some metrics were considered as representative of where vehicles may have long-term parking, and thus be suitable for overnight fueling. Using data from the American Community Survey, population was further disaggregated by housing stock, analyzing detached and mobile homes, single-unit attached homes, and multi-unit dwellings, as each of these has different requirements for charging installations. The number of people employed in the transport and warehouse industries within a given tract was used as a potential proxy for warehouse depots that may be suitable for on-site fueling (AASHTO 2017). Vehicle registrations sourced from Experian Automotive were considered for light-duty vehicles (LDV) and medium- and heavy-duty vehicles (MHDV), along with registration locations of Zero-Emissions Vehicles (ZEVs), including plug-in EVs and fuel cell vehicles (FCV).

Table 3 summarizes the eligibility of the locations of existing fueling stations. The table categorizes various destination types and provides the percentage of each type located in areas eligible for the tax credit, including “Not Urban” areas, NMTC areas, and the overall total. Currently, 73% of gas stations are located within eligible 30C census tracts, whereas only 51% and 60% of L2 and DCFC public charging stations, respectively, are situated in these areas. These EV charging stations have been located proportionately less in not-urban and low-income locations. 73% of natural gas, propane, and hydrogen stations are located in eligible census tracts, with disproportionately more located in low-income areas, but fewer in not-urban areas. Biodiesel and renewable diesel exhibit the opposite behavior, being disproportionately located in rural areas, with a total of 75% located in 30C-eligible census tracts.

**TABLE 3 Existing Fueling Infrastructure Based on Location Eligibility for 30C Tax Credit**

	Qualify by Not Urban	Qualify by NMTC	Total
Gas stations	47%	46%	73%
Natural gas, propane, and hydrogen stations	36%	52%	73%
Biodiesel / renewable diesel stations	53%	37%	75%
DCFC stations	35%	39%	60%
L2 stations	22%	35%	51%
DCFC ports	34%	36%	56%
L2 ports	21%	35%	50%

Table 4 summarizes new installations in 2023, as derived from the AFDC database. Locations in eligible locations may qualify for the 30C tax credit if they were placed in service in 2023 (U.S. Code 2022). In 2023, a higher proportion of biodiesel and EV stations were located in qualifying locations than the historical trends shown in Table 3.

**TABLE 4 New Installations in 2023 Based on Location Eligibility for 30C Tax Credit**

	Qualify by Not Urban	Qualify by NMTC	Share of Total 2023 Installations
Natural gas, propane, and hydrogen stations	45%	51%	72%
Biodiesel / renewable diesel stations	71%	37%	86%
DCFC stations	37%	40%	63%
L2 stations	24%	35%	52%

Table 5 presents proxies for charging demand based on location eligibility for the 30C tax credit. Key findings indicate that truck stops (94%), commercial truck stops (92%), and corridor miles (89%) are predominantly located in eligible locations, particularly in rural areas. Corridor miles represent the lengths of the roadway where fueling stations are necessary to have a robust cross-country network, and are heavily located in rural areas.

Additionally, significant percentages of population (62%) live within eligible tracts that may be particularly relevant for installation of home-based EV chargers. A greater share of detached & mobile homes (65%) are in 30C-eligible locations, especially in non-urban locations. On the other hand, single-unit attached and multi-unit dwelling types are more often in low-income locations that qualify by the NMTC. Approximately 60% of jobs in the transport and warehouse industries are in locations that qualify for the 30C tax credit; these are more likely to qualify through the NMTC criteria than through the non-urban criteria.

Similar to the overall population, approximately two-thirds of LDV registrations (64%) and MHDV registrations (68%) fall within eligible areas. However, the percentage of ZEV registrations is comparatively lower at only 40%. Existing ZEV are disproportionately newer vehicles, and fewer are in NMTC communities. Likewise, there are fewer ZEV in rural areas.

**TABLE 5 Proxies for Charging Demand Based on Location Eligibility for 30C Tax Credit**

	Qualify by Not Urban	Qualify by NMTC	Total
Truck Stops	93%	32%	94%
Commercial Truck Stops	80%	46%	92%
Corridor Miles	82%	40%	89%
Population	34%	38%	62%
Detached & Mobile Homes	46%	34%	65%
Single-Unit Attached	18%	40%	53%
Multi-Unit Dwelling	14%	51%	59%
Transport/Warehouse Jobs	25%	43%	60%
LDV Registrations	38%	38%	64%
MHDV Registrations	38%	43%	68%
ZEV Registrations	21%	22%	40%



## 4 CONCLUSIONS AND DISCUSSION

The Section 30C Alternative Fuel Refueling Property Credit offers the potential for lower cost installations of infrastructure, which can contribute to decarbonization of the on-road transportation sector. The extent to which taxpayers claim this credit will depend on the suitability of locations to install fueling infrastructure while being in an eligible census tract. Argonne National Laboratory has a public tool where users can access and map the list of eligible tracts under the 30C tax credit. Using this data, we have explored the presence of existing fueling infrastructure to estimate how their locations may qualify for credits if developers choose those sites for additional installations going forward.

For existing high-power (DCFC) EV charging, 60% of existing installations are in 30C-eligible tracts. This is similar to the overall population or to registrations of LDV, implying that these are located where they are of highest utilization. However, 30C-eligibility of existing gas stations, corridor miles, and truck stops is higher, which implies that 30C will play a large role in supporting the deployment of a national charging network, including charging infrastructure needed for longer-distance transportation for people and goods. Other types of alternative fuel infrastructure (i.e., natural gas, propane, hydrogen, and biodiesel) are more aligned with infrastructure for gas stations, with approximately  $\frac{3}{4}$  of existing stations being located in 30C-eligible tracts.

The existing ZEV population is more likely to be registered in higher-income, urban locations. However, as ZEV share grows and vehicles are available for purchase as used vehicles, registrations for ZEV are likely to trend towards the overall LDV population. As such, these vehicles will shift toward 30C qualifying locations in non-urban and low-income neighborhoods, highlighting the need for additional charging infrastructure in these communities.

The list of amenities shown in Table 5 is not meant to be exhaustive for opportunities for installations of fueling infrastructure. A recent analysis considered many additional amenities with regards to social vulnerability (Sansone et al. 2023; Zhou et al. 2022a). Several of the metrics considered in that analysis may also be particularly relevant for installations of fueling infrastructure, especially for EVs. For example, ambulance depots, post offices, car dealerships, car rental sites, and vehicle registrations are locations where existing vehicle fleets can take advantage of the available fueling infrastructure. Libraries, grocery stores, places of worship, and retail jobs in general are locations with high public throughput and moderately long dwell times, ideal for opportunity-charging. Major cultural destinations, campgrounds, airports, rail hubs, and many educational or employment destinations all have the potential for long-dwell time charging opportunities.

Growth in alternative fuel stations, and especially EV stations is expected to continue. The DOT National Electric Vehicle Infrastructure (NEVI) program was enacted through the Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (U.S. Congress 2021). NEVI provides funding to states to strategically deploy EV charging stations and to establish an interconnected network to facilitate data collection, access, and

reliability, targeting 500,000 EV chargers nationwide by 2030 (FHWA 2024). The 30C tax credit is expected to accelerate this growth into non-urban and low-income communities.

## REFERENCES

- AASHTO (American Association of State Highway and Transportation Officials). 2017. Census Transportation Planning Products Program (CTPP). <https://transportation.org/ctpp/ctpp-data/current-data-2/>
- AFDC (Alternative Fuel Data Center). 2024a. *Alternative Fueling Station Locator: Filter by Fuel Type*. Accessed February 12, 2024. <https://afdc.energy.gov/stations/#/analyze?status=E&status=T&fuel=ELEC>
- AFDC (Alternative Fuel Data Center). 2024b. *Alternative Fueling Station Locator: Filter by Fuel Type*. Accessed February 12, 2024. <https://afdc.energy.gov/stations/#/analyze?status=E&status=T&fuel=BD&fuel=RD>
- AFDC (Alternative Fuel Data Center). 2024c. *Alternative Fueling Station Locator: Filter by Fuel Type*. Accessed February 12, 2024. <https://afdc.energy.gov/stations/#/analyze?status=E&status=T&fuel=CNG&fuel=HY&fuel=LPG&fuel=LNG>
- AllStays.com. 2023. *Truck Stop Location Map*. Accessed May 26, 2023. <https://allstays.com/c/truck-stop-locations.htm>
- Argonne (Argonne National Laboratory). 2024. *30C Eligibility Mapping Tool*. Updated February 16, 2024. <https://www.anl.gov/esia/refueling-infrastructure-tax-credit>
- CDFI (Community Development Financial Institutions Fund). 2023. *Welcome to the CDFI Fund CIMS Mapping Tool*. <https://www.cdfifund.gov/cims>
- DOE (U.S. Department of Energy). 2017. *Handbook for Handling, Storing, and Dispensing E85 and Other Ethanol-Gasoline Blends*. Clean Cities Technical Response Service, technical report DOE/GO-102016-4854. February 2016. [https://afdc.energy.gov/files/u/publication/ethanol\\_handbook.pdf](https://afdc.energy.gov/files/u/publication/ethanol_handbook.pdf)
- DOE. 2023. *U.S. National Blueprint for Transportation Decarbonization A Joint Strategy to Transform Transportation*. DOE.EE-2674. January 2023. <https://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation-decarbonization.pdf>
- DOT (U.S. Department of Transportation). 2023. *Truck Stop Parking*. Bureau of Transportation Statistics. Accessed May 1, 2023. <https://geodata.bts.gov/datasets/usdot::truck-stop-parking/explore>
- Experian Automotive. 2022. *Vehicles in Operation*. December 31, 2022. <https://www.experian.com/automotive/vehicles-in-operation-vio-data>

FHWA (Federal Highway Administration). 2022. *Alternative Fuel Corridors*. Round 6. [https://www.fhwa.dot.gov/environment/alternative\\_fuel\\_corridors/](https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/)

FHWA (Federal Highway Administration). 2024. *National Electric Vehicle Infrastructure (NEVI) Program*. <https://www.fhwa.dot.gov/environment/nevi/>

GasBuddy.com. 2022. *Gas Price Map*. Accessed January 19, 2022. <https://www.gasbuddy.com/gaspricemap>

HUD (U.S. Department of Housing and Urban Development). 2023. *HUD USPS ZIP Code Crosswalk Files*. 2023 Q1 release. Accessed May 19, 2023. <https://geodata.bts.gov/datasets/usdot::truck-stop-parking/explore>

IRS (Internal Revenue Service). 2024a. *Alternative Fuel Vehicle Refueling Property Credit*. Updated February 2, 2024. <https://www.irs.gov/credits-deductions/alternative-fuel-vehicle-refueling-property-credit>

IRS (Internal Revenue Service). 2024b. *Guidance on Satisfying the Geographical Requirements of the Section 30C Alternative Fuel Vehicle Refueling Property Credit*. Notice 2024-20. <https://www.irs.gov/newsroom/treasury-irs-issue-guidance-on-the-qualified-alternative-fuel-vehicle-refueling-property-credit> and <https://www.irs.gov/pub/irs-drop/n-24-20.pdf>

Sansone, Michael, David Gohlke, and Yan Zhou. 2023. “Incorporating Social Vulnerability Variables in Measures to Quantify Access to Opportunities”. *Transportation Research Record*. May 13, 2023. <https://journals.sagepub.com/doi/10.1177/03611981231168861>

U.S. Census Bureau. 2022a. *2020 Census Qualifying Urban Areas and Final Criteria Clarifications*. 87 FR 80114. <https://www.federalregister.gov/documents/2022/12/29/2022-28286/2020-census-qualifying-urban-areas-and-final-criteria-clarifications>

U.S. Census Bureau. 2022b. *American Community Survey*. DP04 Selected Housing Characteristics. Published December 8, 2022. [https://data.census.gov/table?q=dp04&g=010XX00US\\$1400000&tid=ACSDP5Y2021.DP04&mo=false](https://data.census.gov/table?q=dp04&g=010XX00US$1400000&tid=ACSDP5Y2021.DP04&mo=false)

U.S. Census Bureau. 2022c. *Tallies*. Updated July 18, 2022. <https://www.census.gov/geographies/reference-files/time-series/geo/tallies.html>

U.S. Census Bureau. 2023. *Urban and Rural*. Updated September 2023. <https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html>

U.S. Code. 2022. *Alternative fuel vehicle refueling property credit*. 26 U.S.C. § 30C, in effect as of January 5, 2023. <https://www.govinfo.gov/app/details/USCODE-2022-title26/USCODE-2022-title26-subtitleA-chap1-subchapA-partIV-subpartB-sec30C>

U.S. Congress. 2021. *Infrastructure Investment and Jobs Act*. H.R. 3684, 117<sup>th</sup> Congress. Enacted November 15, 2021. <https://www.congress.gov/bill/117th-congress/house-bill/3684>

U.S. Congress. 2022. *Inflation Reduction Act of 2022*. H.R. 5376, 117<sup>th</sup> Congress. Enacted August 16, 2022. <https://www.congress.gov/bill/117th-congress/house-bill/5376>

Wood, Eric, Clément Rames, Matteo Muratori, Sessa Raghavan, and Marc Melaina. 2017. *National Plug-In Electric Vehicle Infrastructure Analysis*. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Technical Report DOE/GO-102017-5040. September 2017. <https://www.nrel.gov/docs/fy17osti/69031.pdf>

Zhou, Yan, David Gohlke, and Michael Sansone. 2022a. *Opportunity Accessibility by Transportation Mode for all U.S. Census Tracts: Amenity Counts by Tract*. Argonne National Laboratory, data set. <https://doi.org/10.17038/ESIA/1897049>

Zhou, Yan, David Gohlke, Michael Sansone, Jim Kuiper, and Margaret Smith. 2022b. *Using Mapping Tools to Prioritize Electric Vehicle Charger Benefits to Underserved Communities*. Argonne National Laboratory, Technical Report ANL/ESD-22/10. May 2022. <https://doi.org/10.2172/1870157>



## **Energy Systems and Infrastructure Analysis Division**

Argonne National Laboratory  
9700 South Cass Avenue, Bldg. 362  
Lemont, IL 60439-4832

[www.anl.gov](http://www.anl.gov)



Argonne National Laboratory is a U.S. Department of Energy  
laboratory managed by UChicago Argonne, LLC