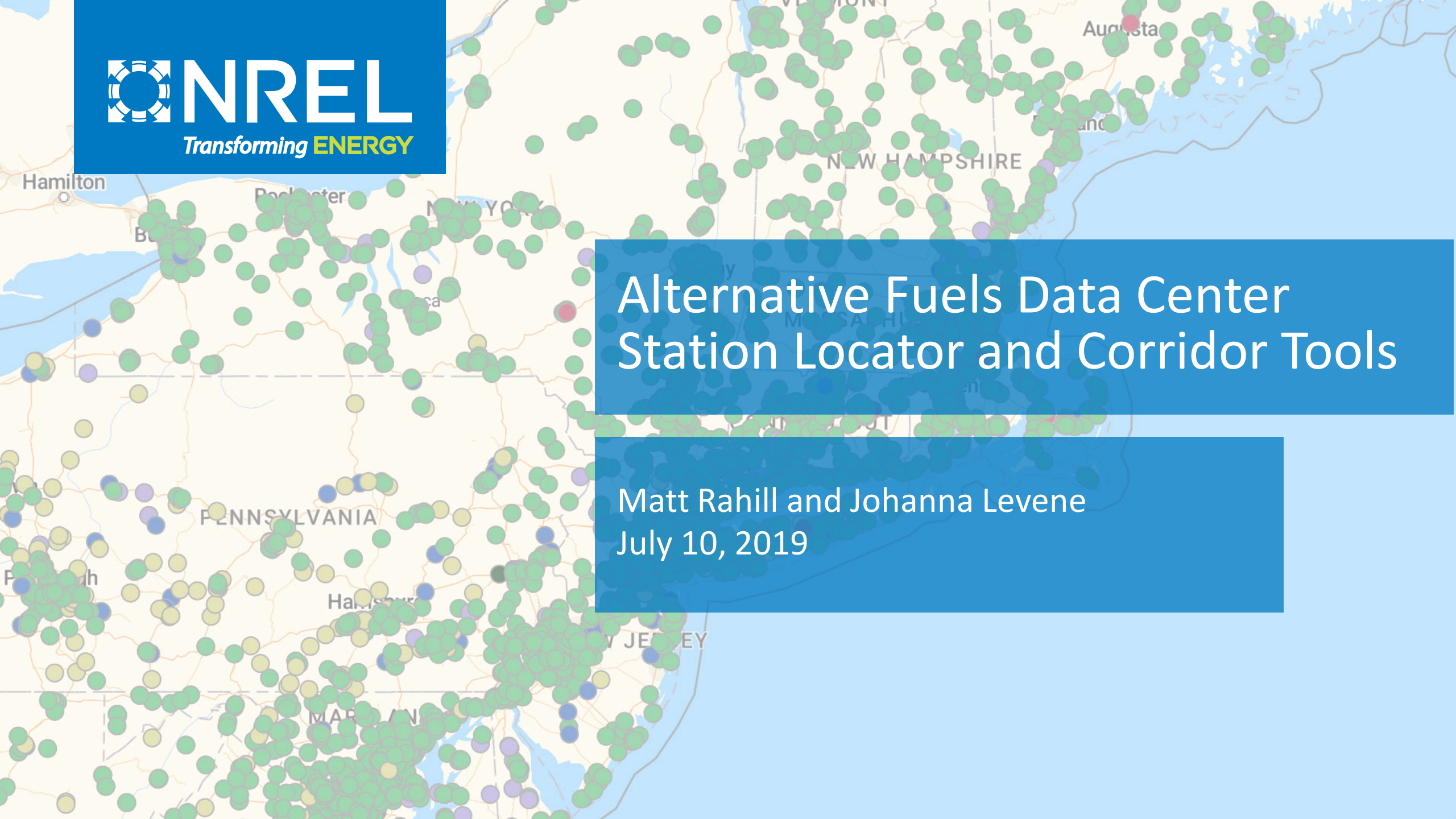
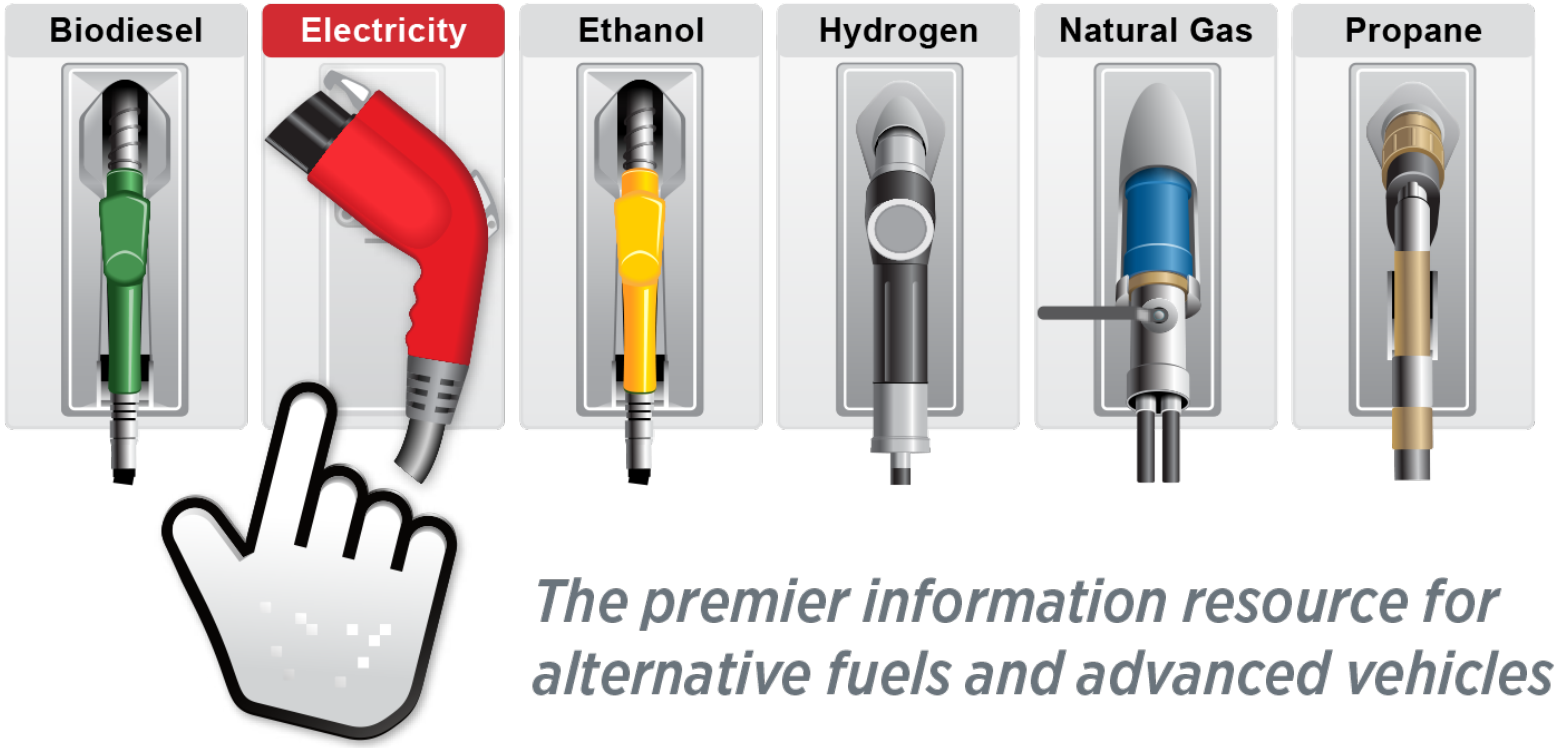



# Alternative Fuels Data Center Station Locator and Corridor Tools

Matt Rahill and Johanna Levene
July 10, 2019

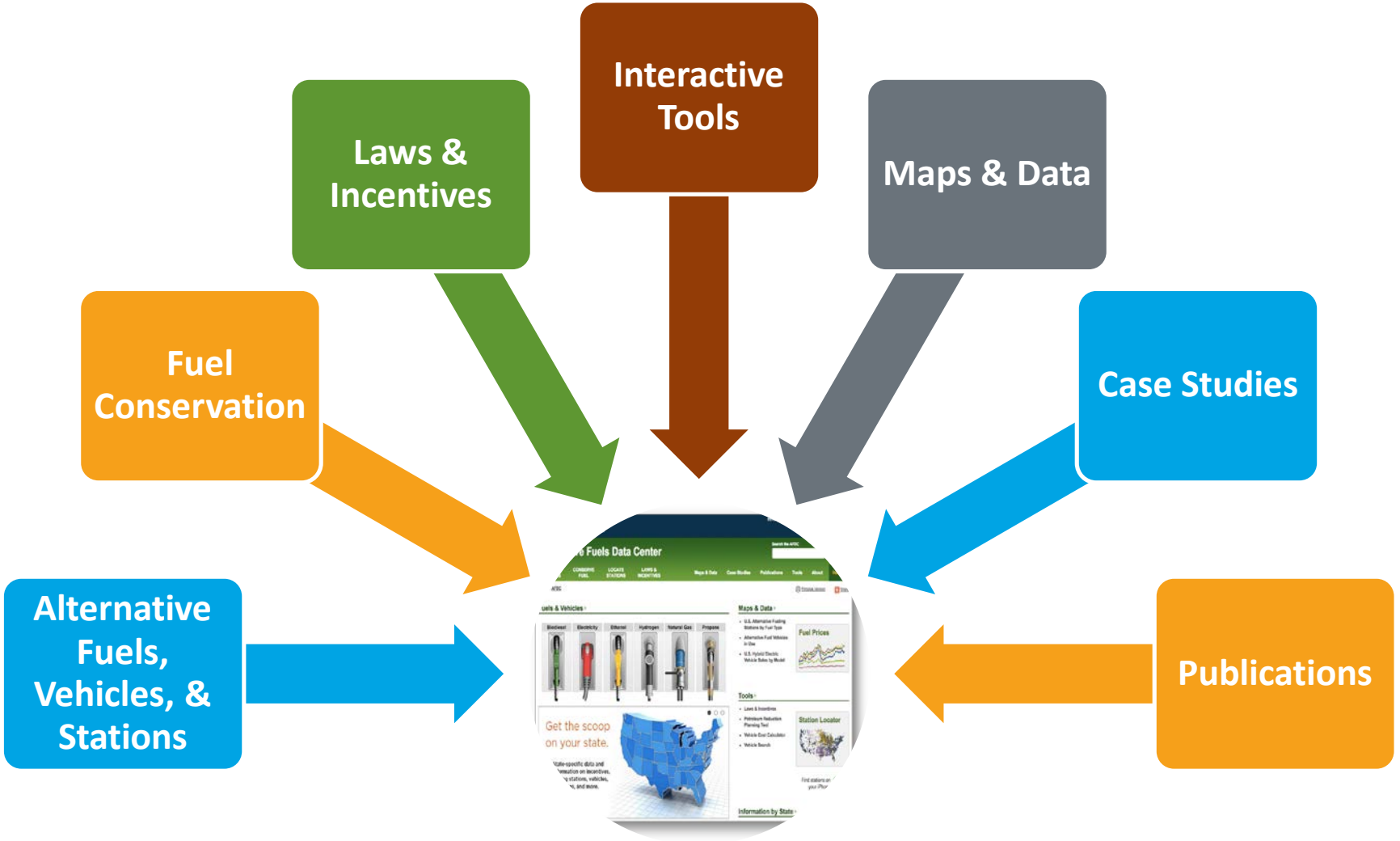
# Alternative Fuels Data Center




*The premier information resource for alternative fuels and advanced vehicles*

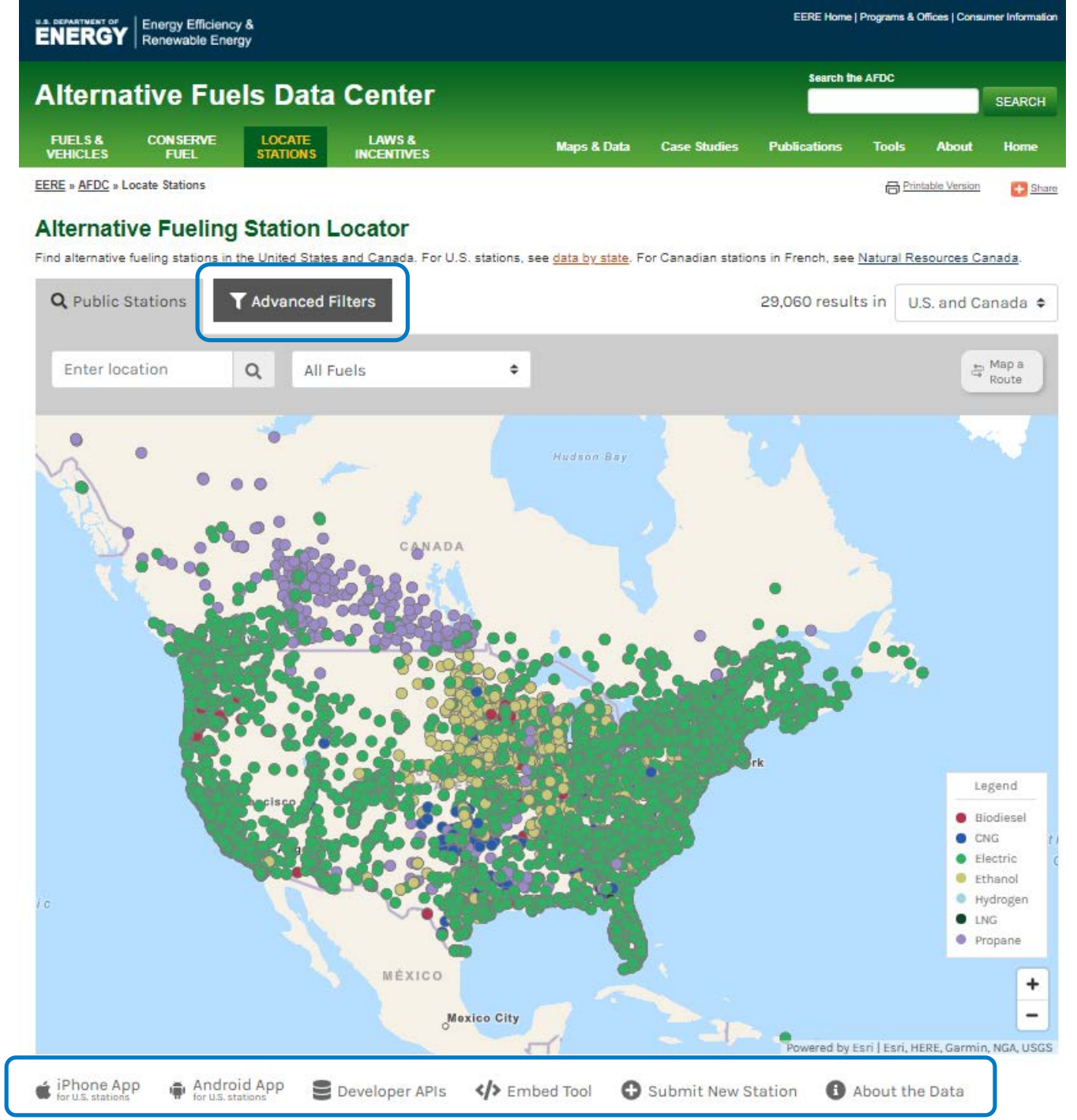
*afdc.energy.gov*

# What does the AFDC provide?

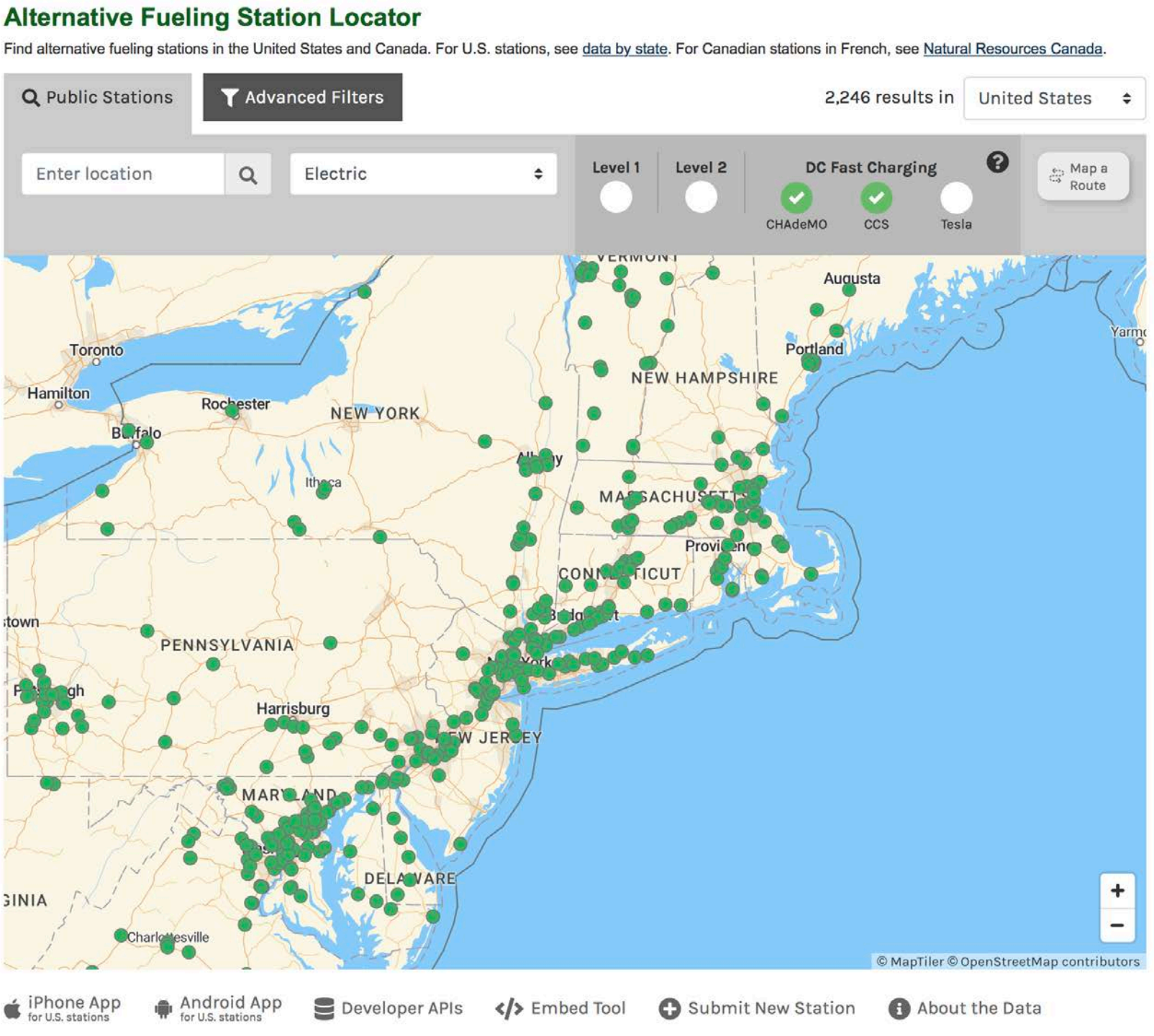


# Alternative Fuel Stations

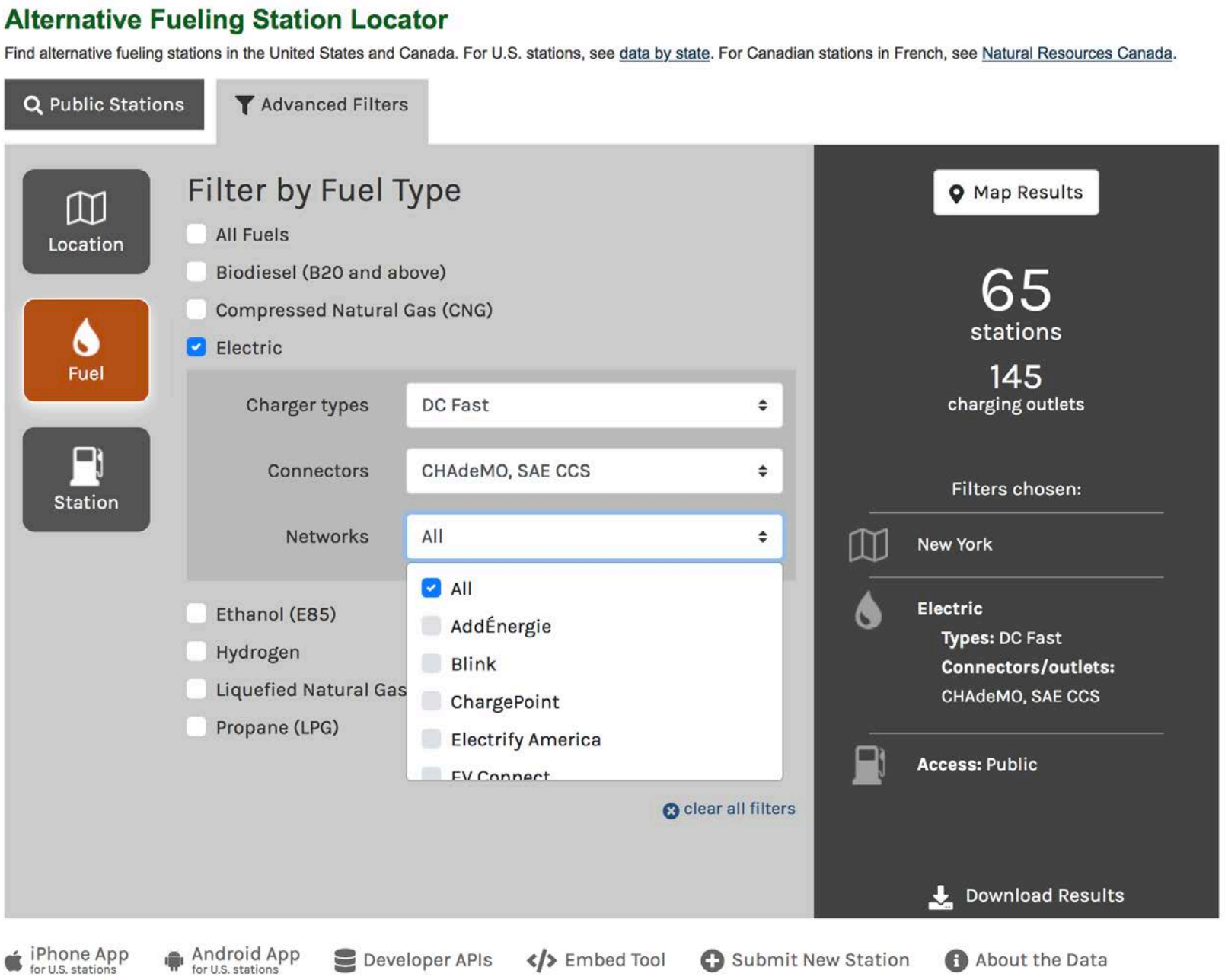
*afdc.energy.gov/stations*



# Alternative Fuel Stations



# Alternative Fuel Stations



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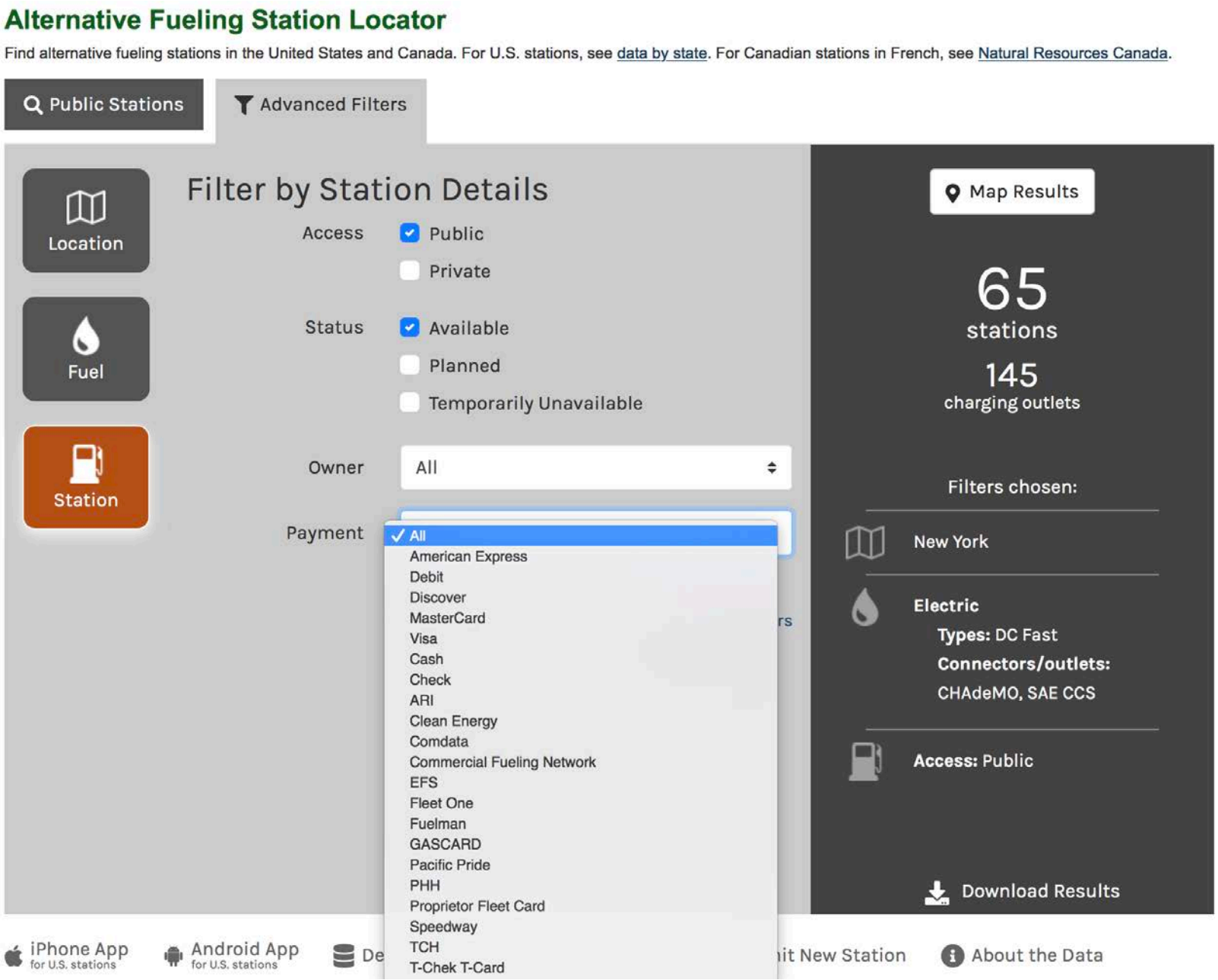
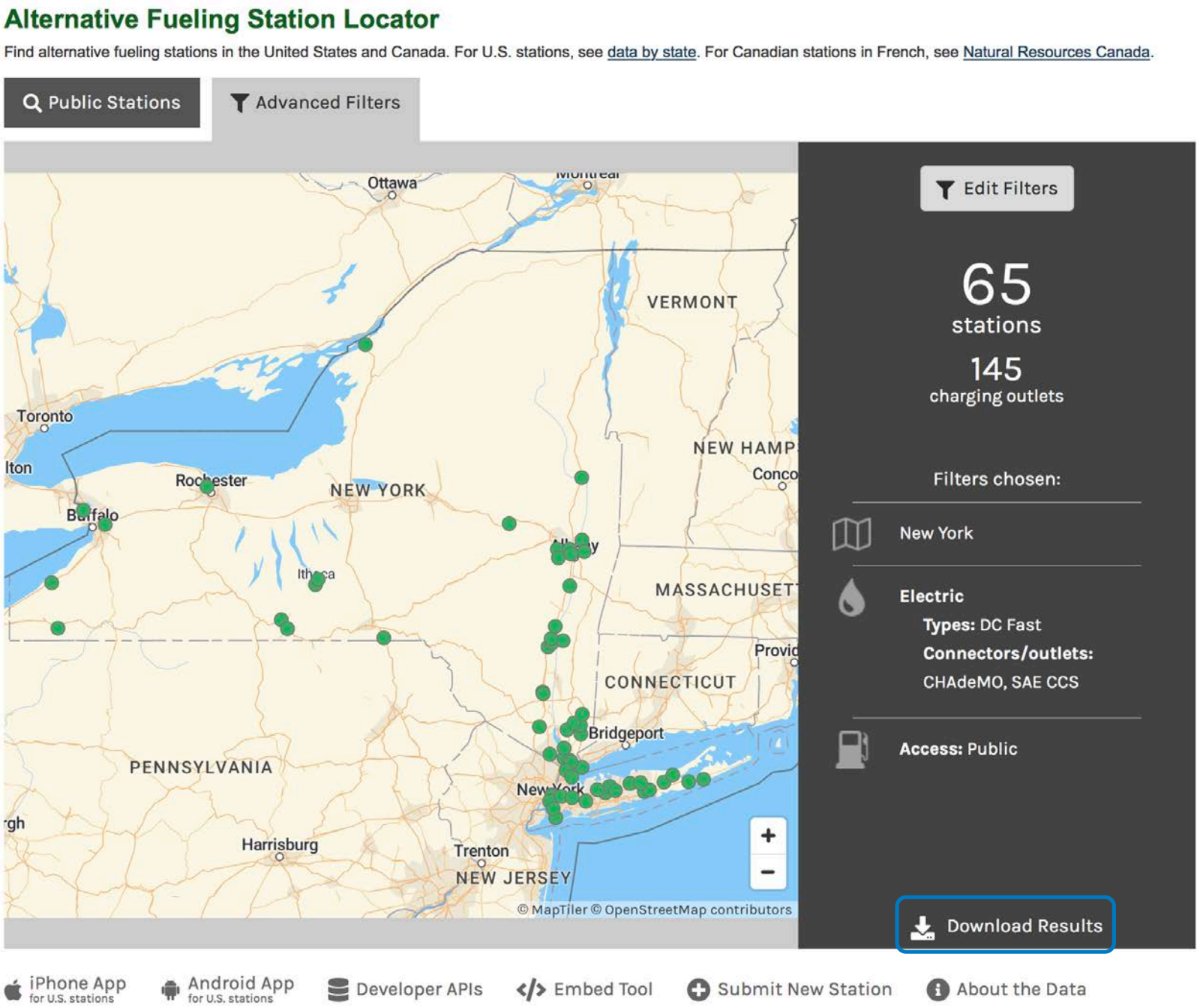
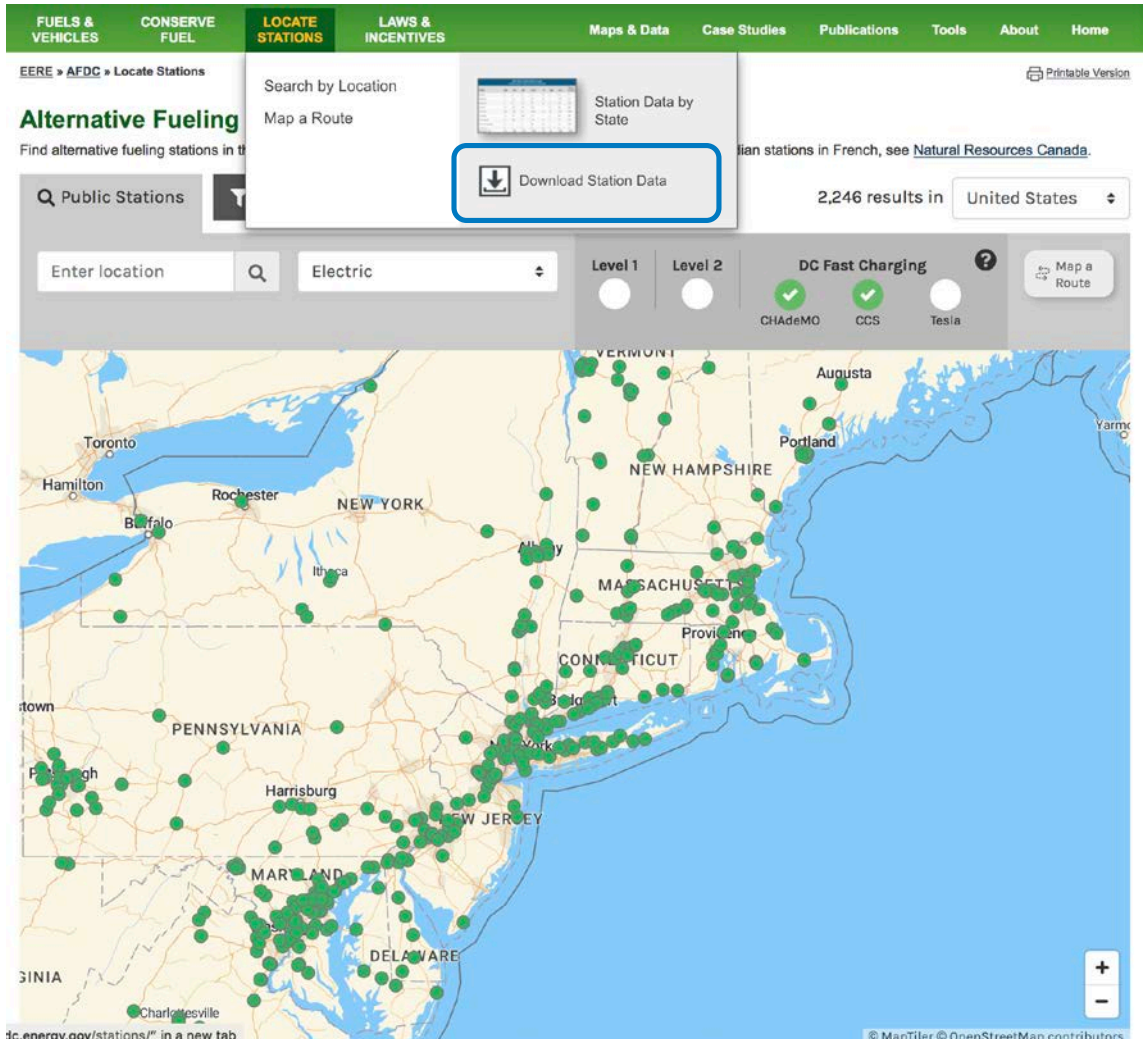
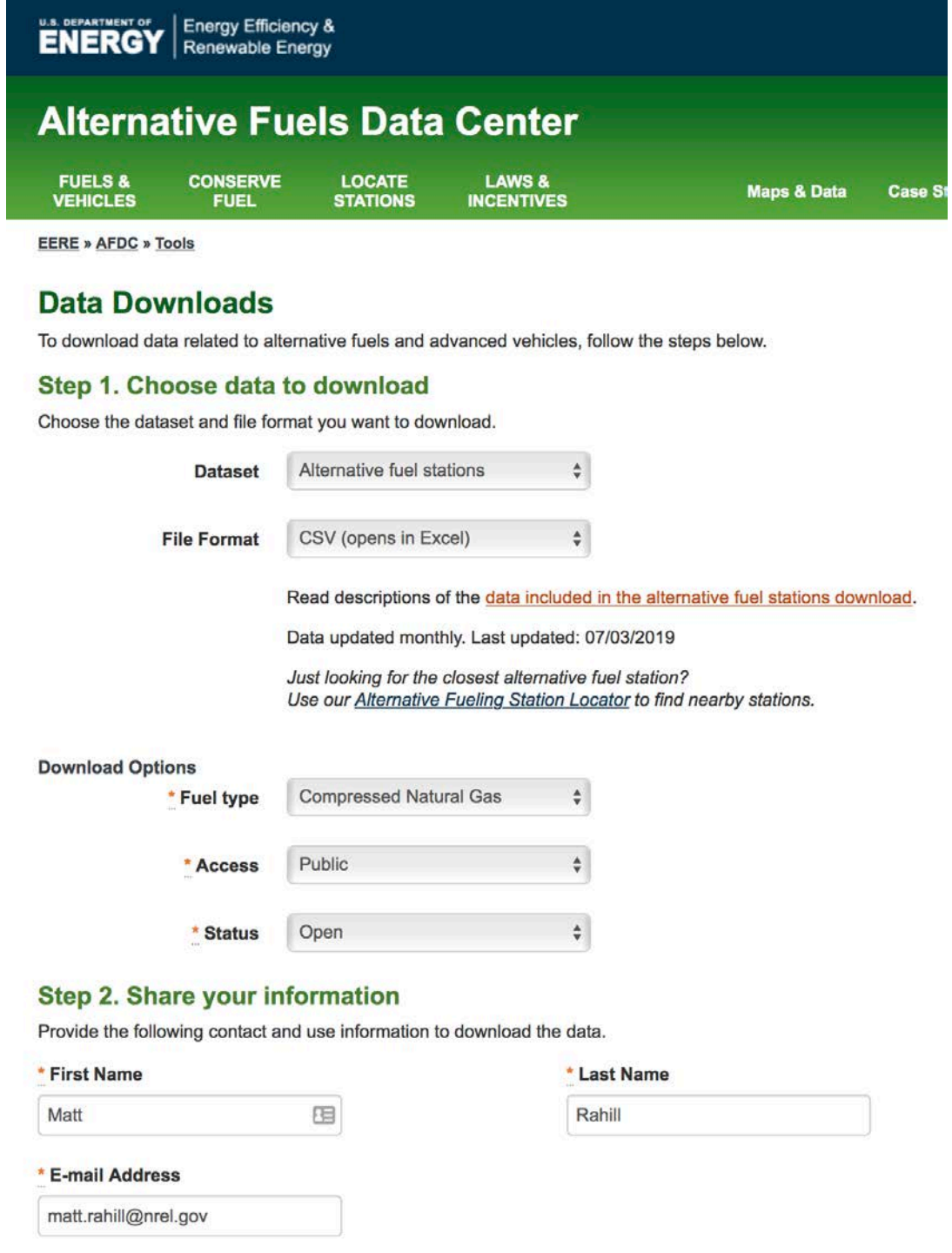


# Alternative Fuel Stations

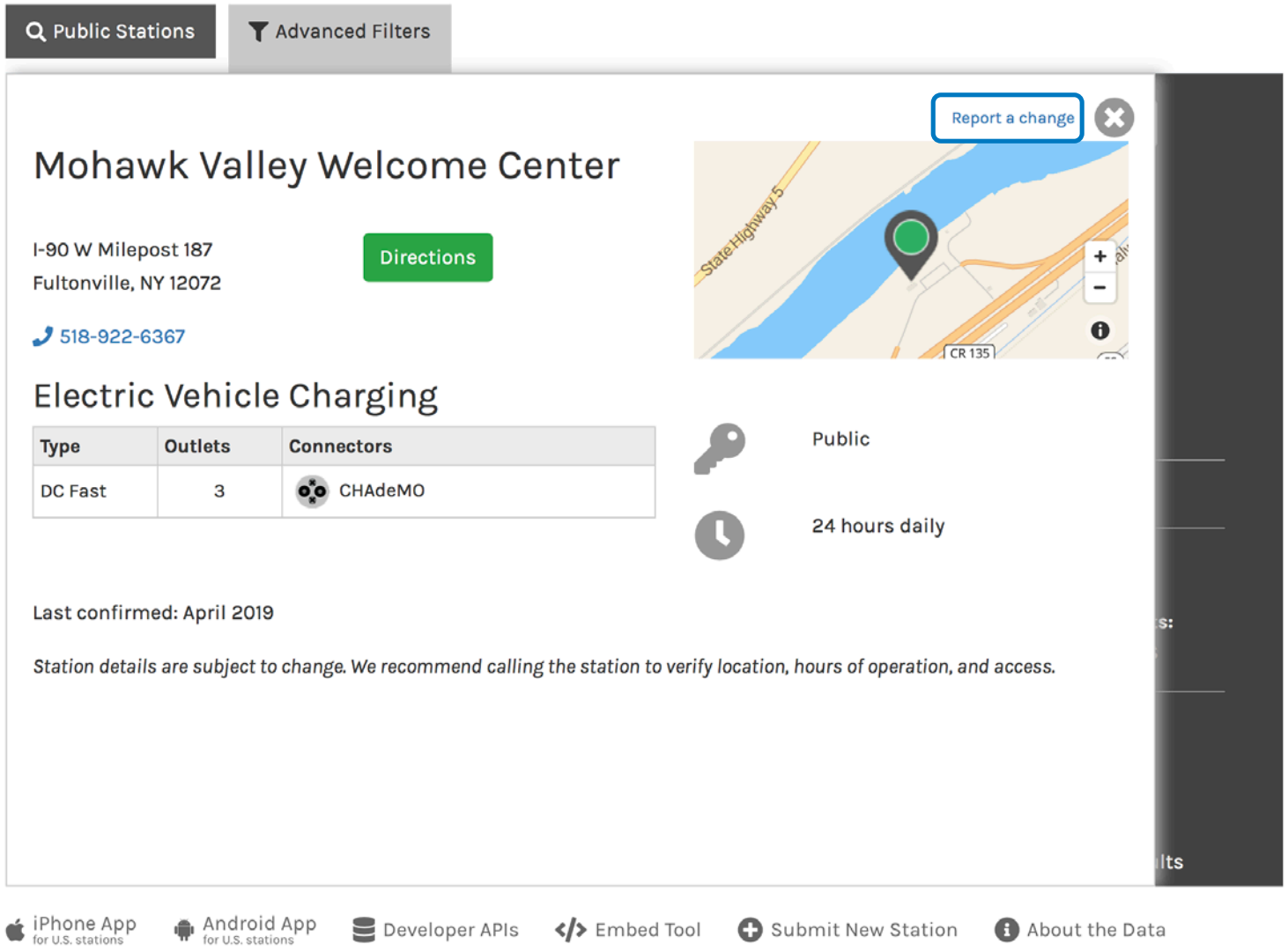


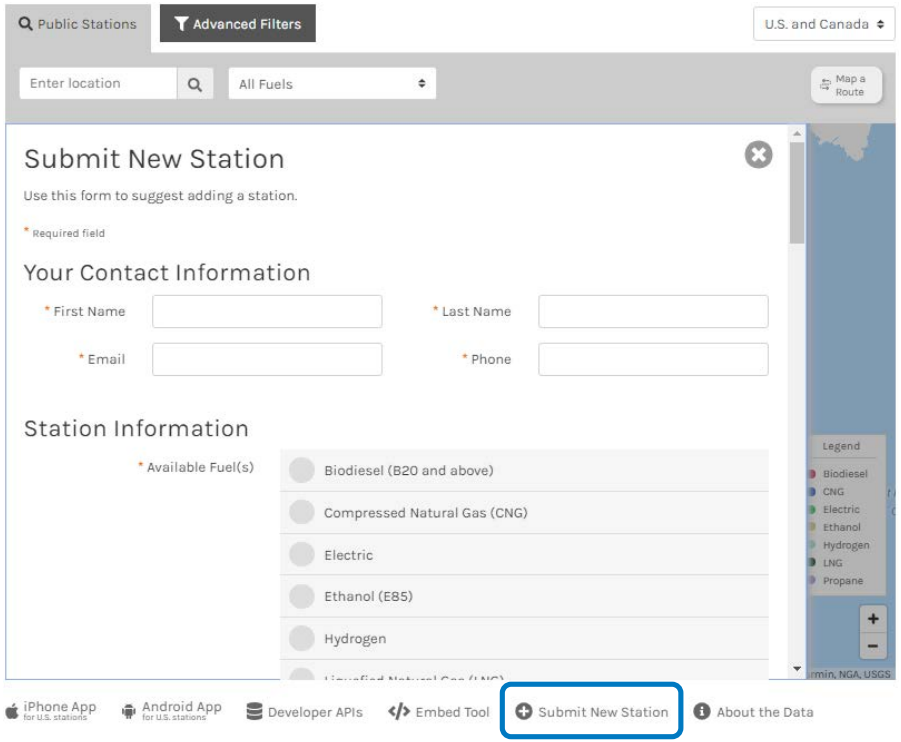
# Alternative Fuel Stations



# Alternative Fuel Stations



# Alternative Fuel Stations

Developer Network

NREL
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Documentation » Transportation » Alternative Fuel Stations

## Alternative Fuel Stations

Query our database of alternative fuel stations.

This includes biodiesel, compressed natural gas, ethanol, electric charging, hydrogen, liquefied natural gas, and propane station locations.

**All Stations** (GET /api/alt-fuel-stations/v1)
Return a full list of alternative fuel stations that match your query.

**Get Station by ID** (GET /api/alt-fuel-stations/v1/:id)
Fetch the details of a specific alternative fuel station given the station's ID.

**Last Updated Date** (GET /api/alt-fuel-stations/v1/last-updated)
Retrieve the date when the alternative fuel stations data were last updated.

**Nearest Stations** (GET /api/alt-fuel-stations/v1/nearest)
Return the nearest alternative fuel stations within a distance of a given location.

**Stations Nearby Route** (GET|POST /api/alt-fuel-stations/v1/nearby-route)
Find alternative fuel stations within a distance of a driving route.

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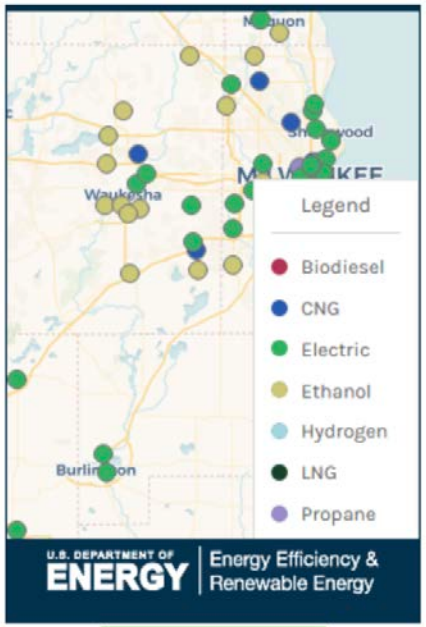
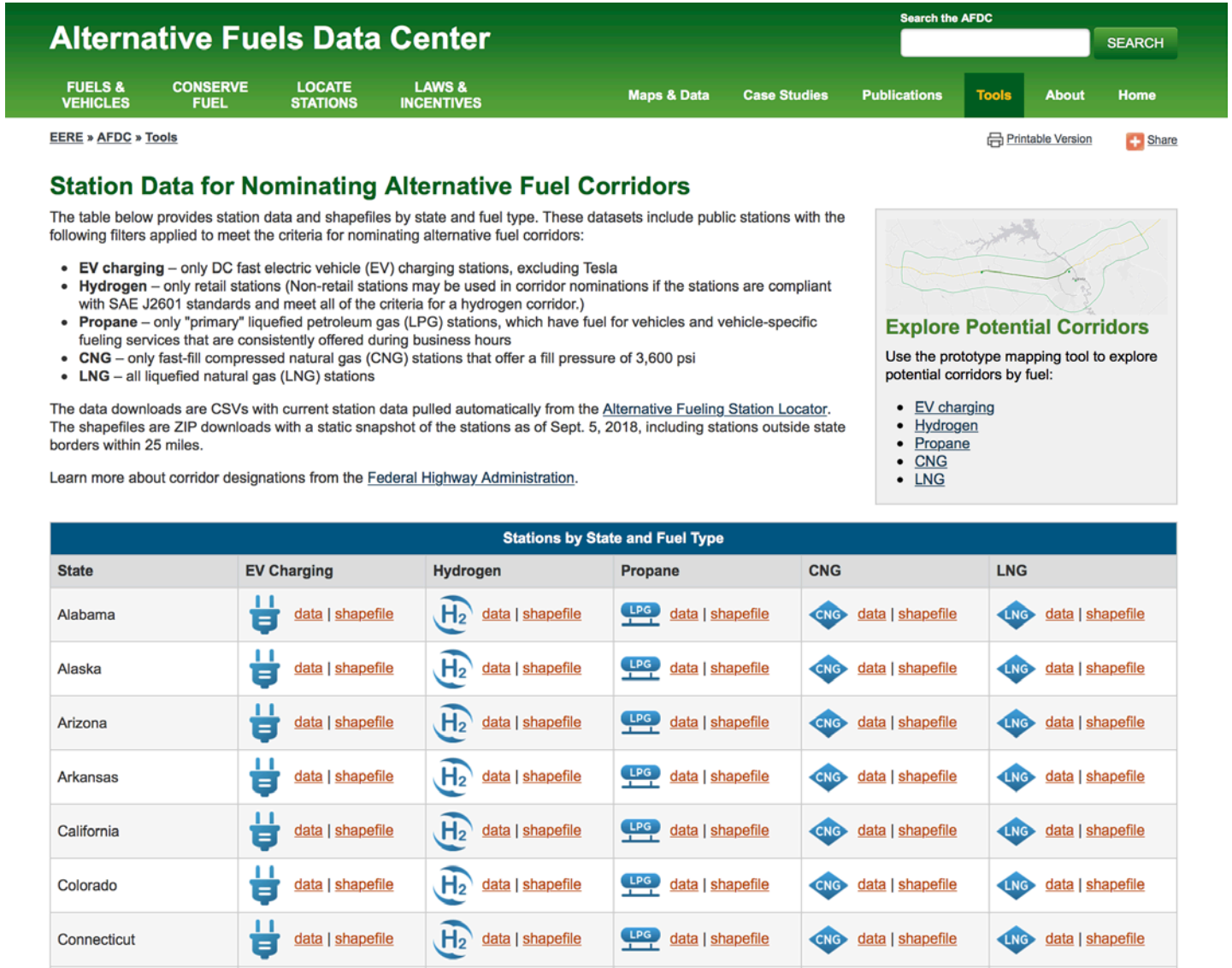
*developer.nrel.gov/docs/transportation/alt-fuel-stations-v1*




*afdc.energy.gov/widgets*

# Resources for Nominating Corridors



Alternative Fuels Data Center

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## Station Data for Nominating Alternative Fuel Corridors

The table below provides station data and shapefiles by state and fuel type. These datasets include public stations with the following filters applied to meet the criteria for nominating alternative fuel corridors:

- **EV charging** – only DC fast electric vehicle (EV) charging stations, excluding Tesla
- **Hydrogen** – only retail stations (Non-retail stations may be used in corridor nominations if the stations are compliant with SAE J2601 standards and meet all of the criteria for a hydrogen corridor.)
- **Propane** – only "primary" liquefied petroleum gas (LPG) stations, which have fuel for vehicles and vehicle-specific fueling services that are consistently offered during business hours
- **CNG** – only fast-fill compressed natural gas (CNG) stations that offer a fill pressure of 3,600 psi
- **LNG** – all liquefied natural gas (LNG) stations

The data downloads are CSVs with current station data pulled automatically from the Alternative Fueling Station Locator. The shapefiles are ZIP downloads with a static snapshot of the stations as of Sept. 5, 2018, including stations outside state borders within 25 miles.

Learn more about corridor designations from the Federal Highway Administration.

### Explore Potential Corridors

Use the prototype mapping tool to explore potential corridors by fuel:

- EV charging
- Hydrogen
- Propane
- CNG
- LNG

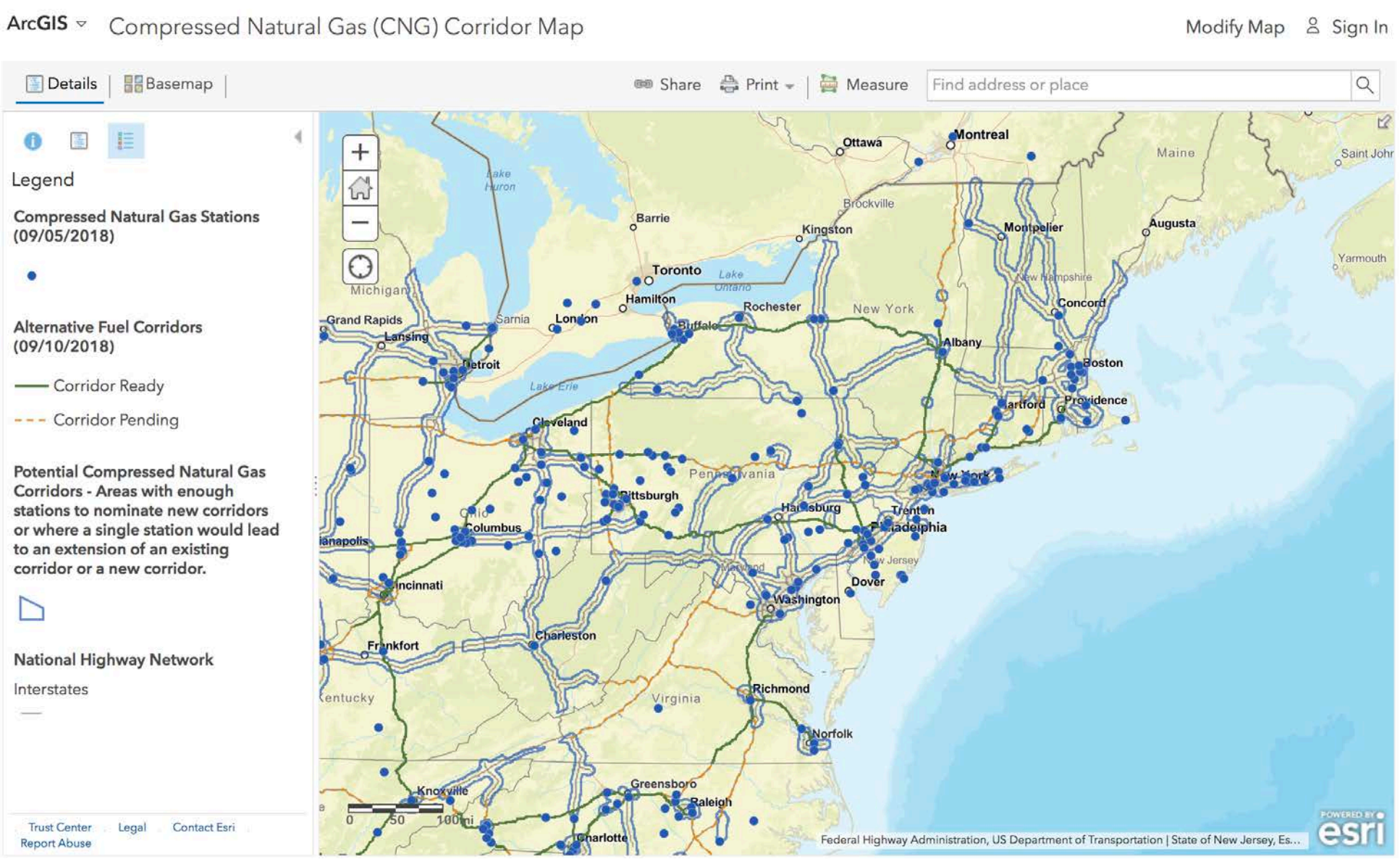
**Stations by State and Fuel Type**

| State | EV Charging | Hydrogen | Propane | CNG | LNG |
|---|---|---|---|---|---|
| Alabama | data \| shapefile | data \| shapefile | data \| shapefile | data \| shapefile | data \| shapefile |
| Alaska | data \| shapefile | data \| shapefile | data \| shapefile | data \| shapefile | data \| shapefile |
| Arizona | data \| shapefile | data \| shapefile | data \| shapefile | data \| shapefile | data \| shapefile |
| Arkansas | data \| shapefile | data \| shapefile | data \| shapefile | data \| shapefile | data \| shapefile |
| California | data \| shapefile | data \| shapefile | data \| shapefile | data \| shapefile | data \| shapefile |
| Colorado | data \| shapefile | data \| shapefile | data \| shapefile | data \| shapefile | data \| shapefile |
| Connecticut | data \| shapefile | data \| shapefile | data \| shapefile | data \| shapefile | data \| shapefile |

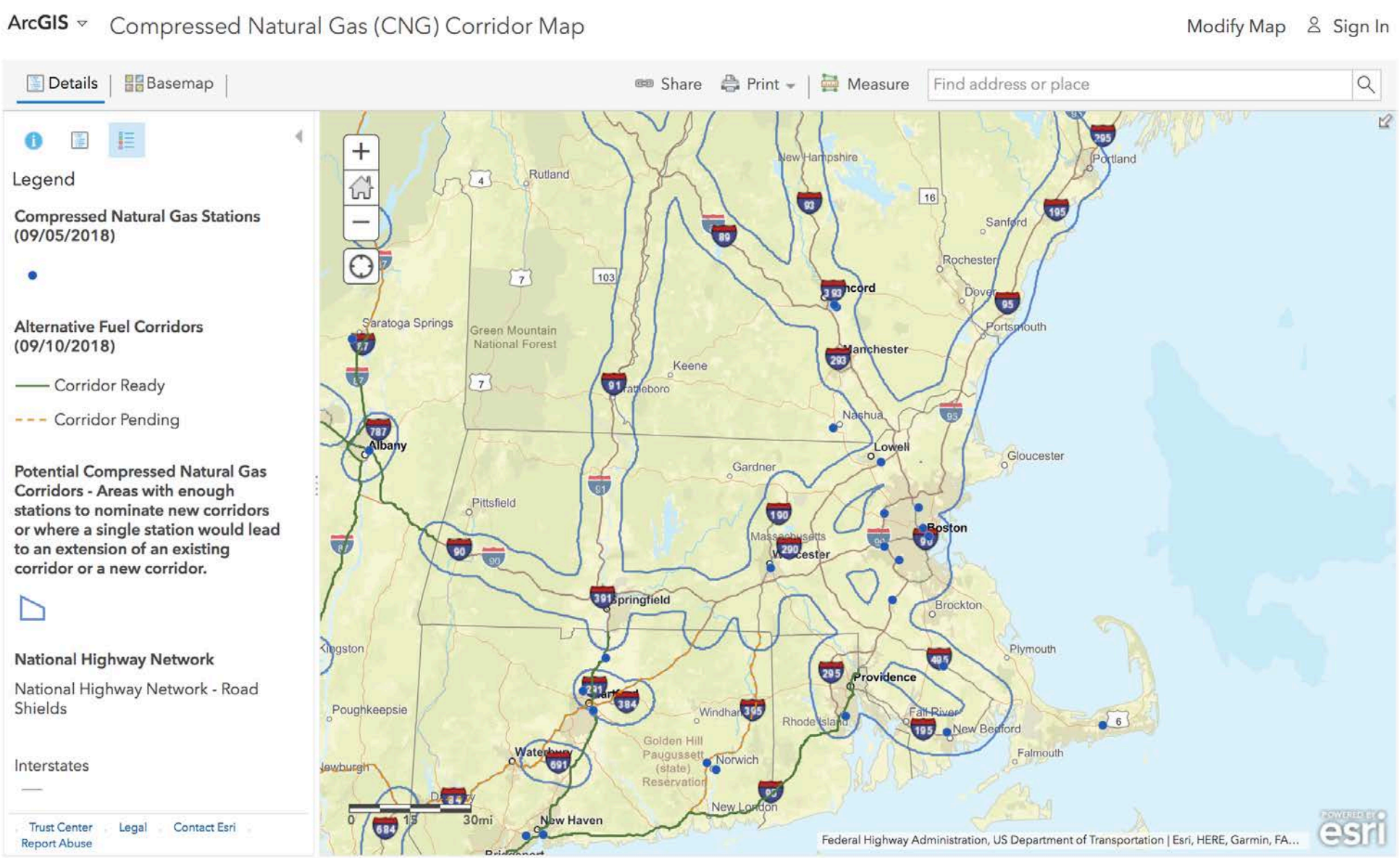
- CSV downloads
- Shapefiles
- Interactive maps

*afdc.energy.gov/corridors*

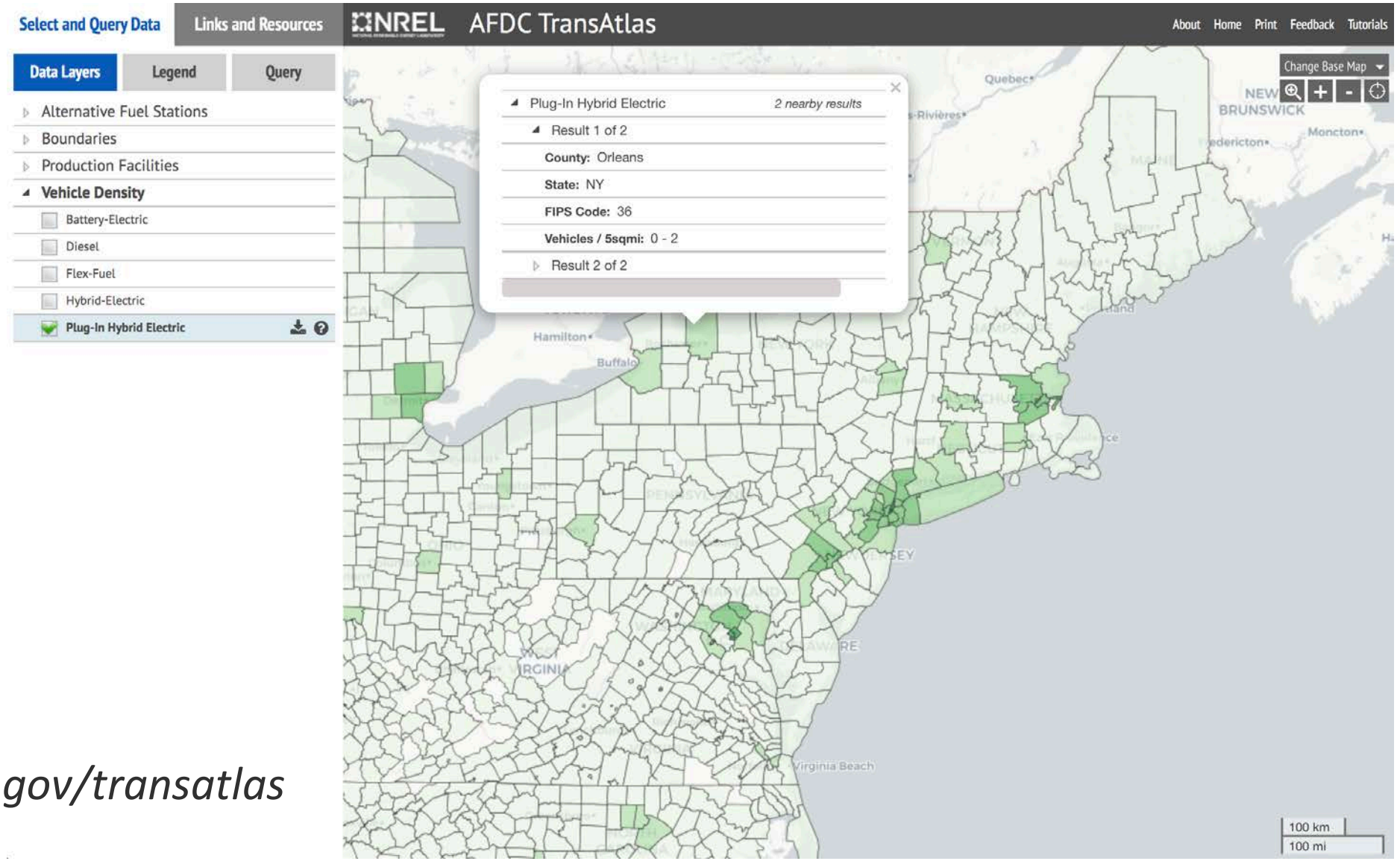
# Interactive Maps for Nominating Corridors



# Interactive Maps for Nominating Corridors

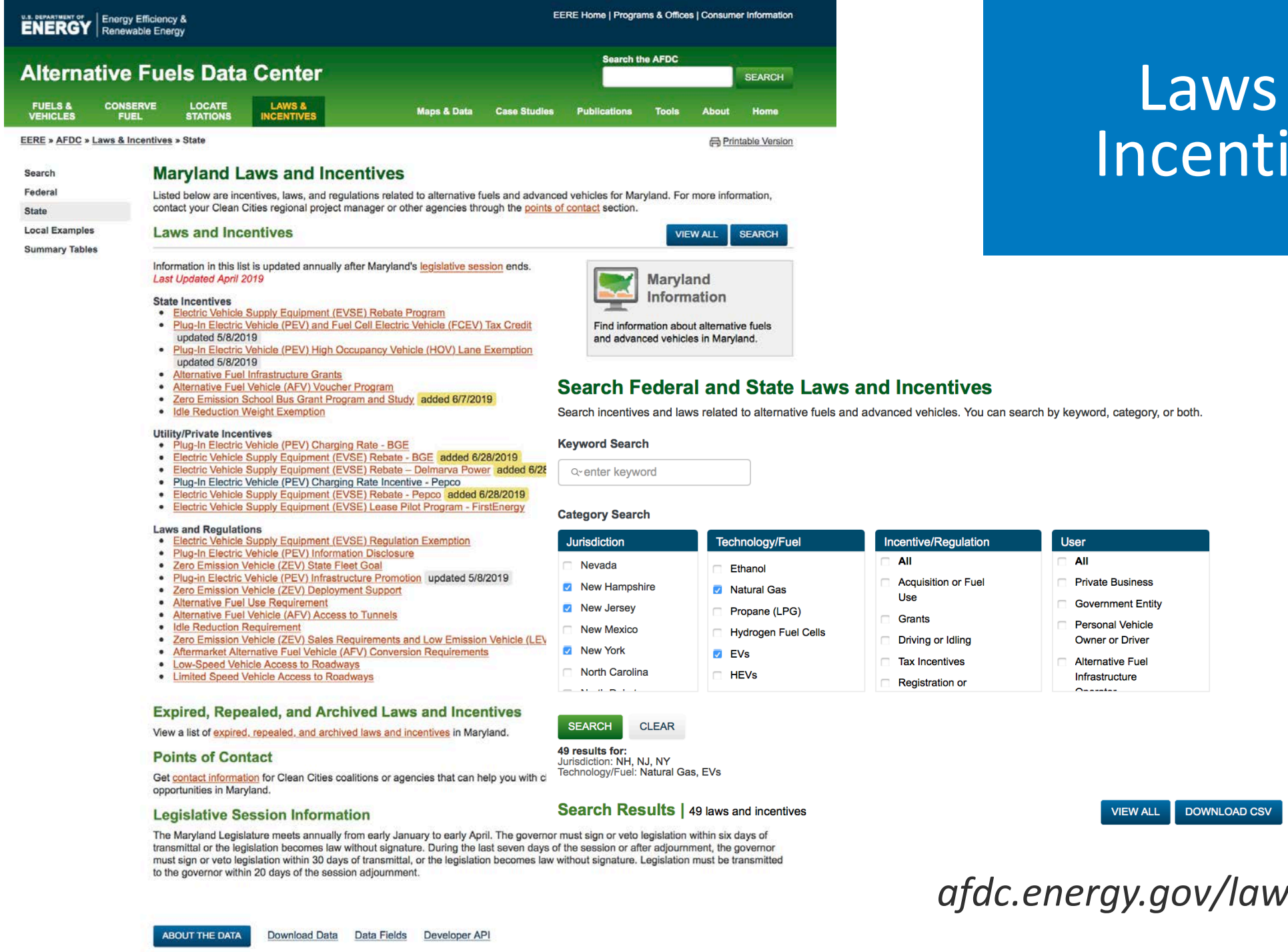


# TransAtlas



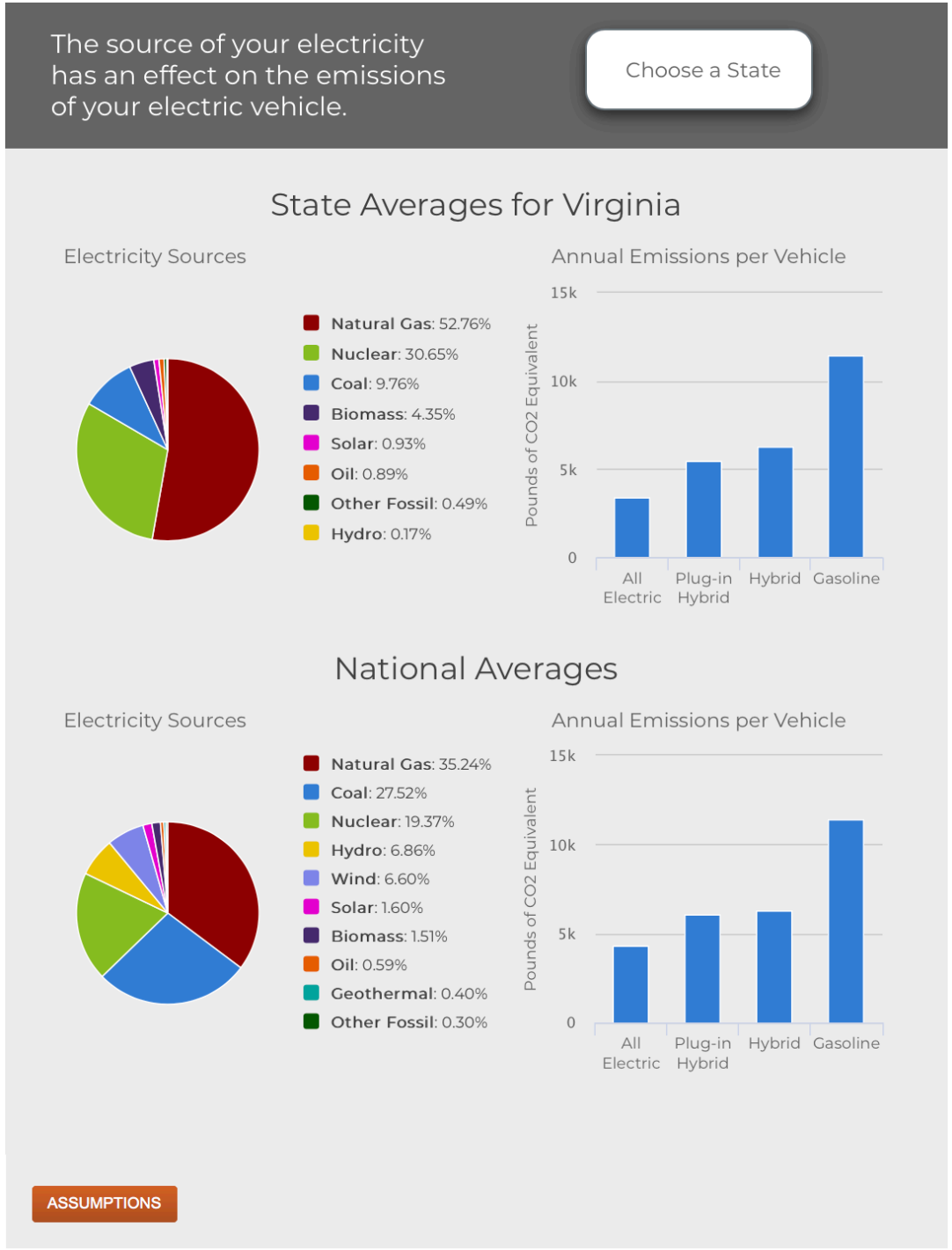

*maps.nrel.gov/transatlas*

# Laws & Incentives



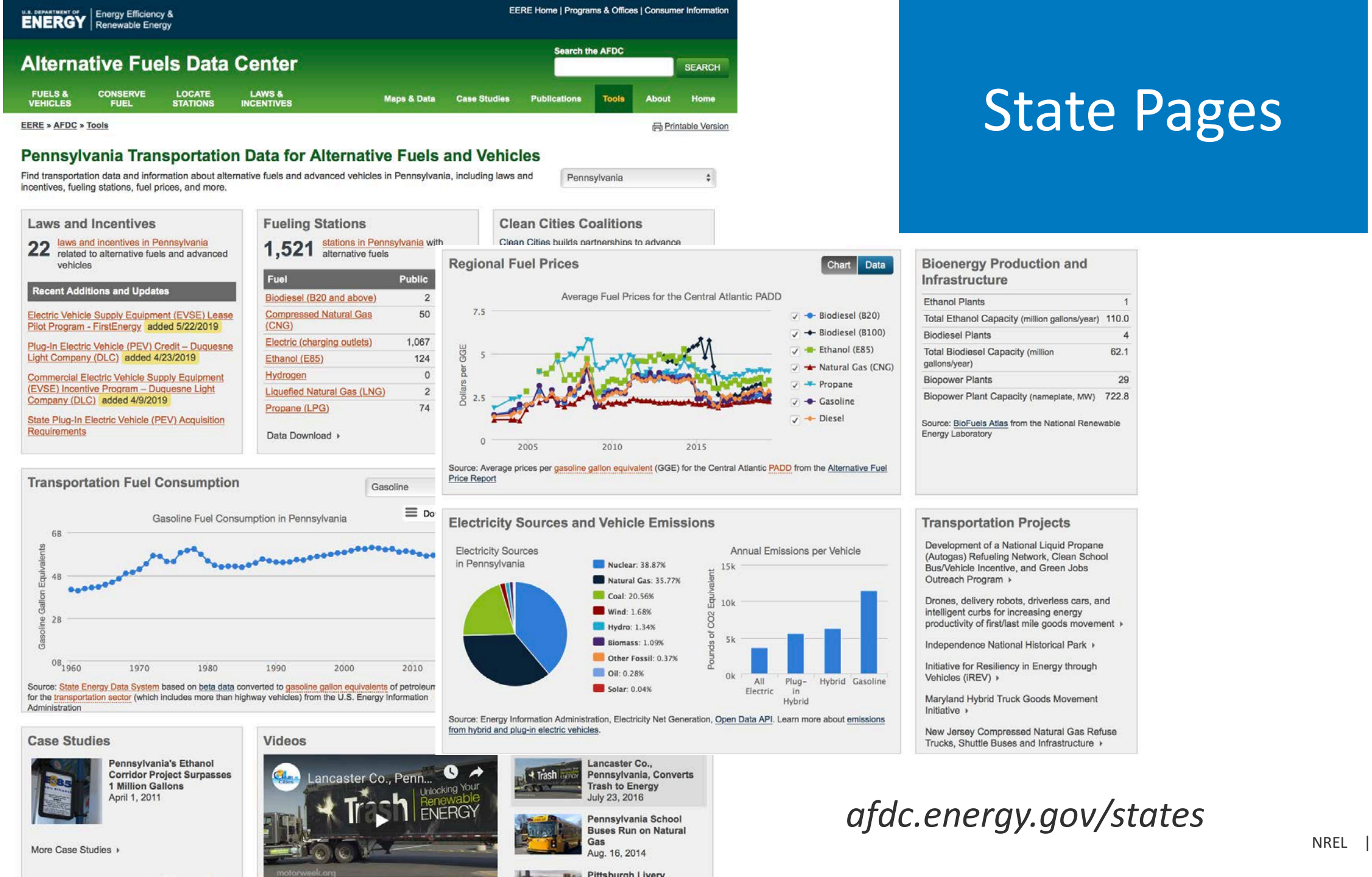

*afdc.energy.gov/laws*

# Electricity Sources & Emissions




*afdc.energy.gov/vehicles/electric_emissions.html*

# State Pages




*afdc.energy.gov/states*

A tool to provide a simple way to estimate how much electric vehicle charging you might need at a city- and state-level.

# EVI-Pro Lite

*afdc.energy.gov/evi-pro-lite*

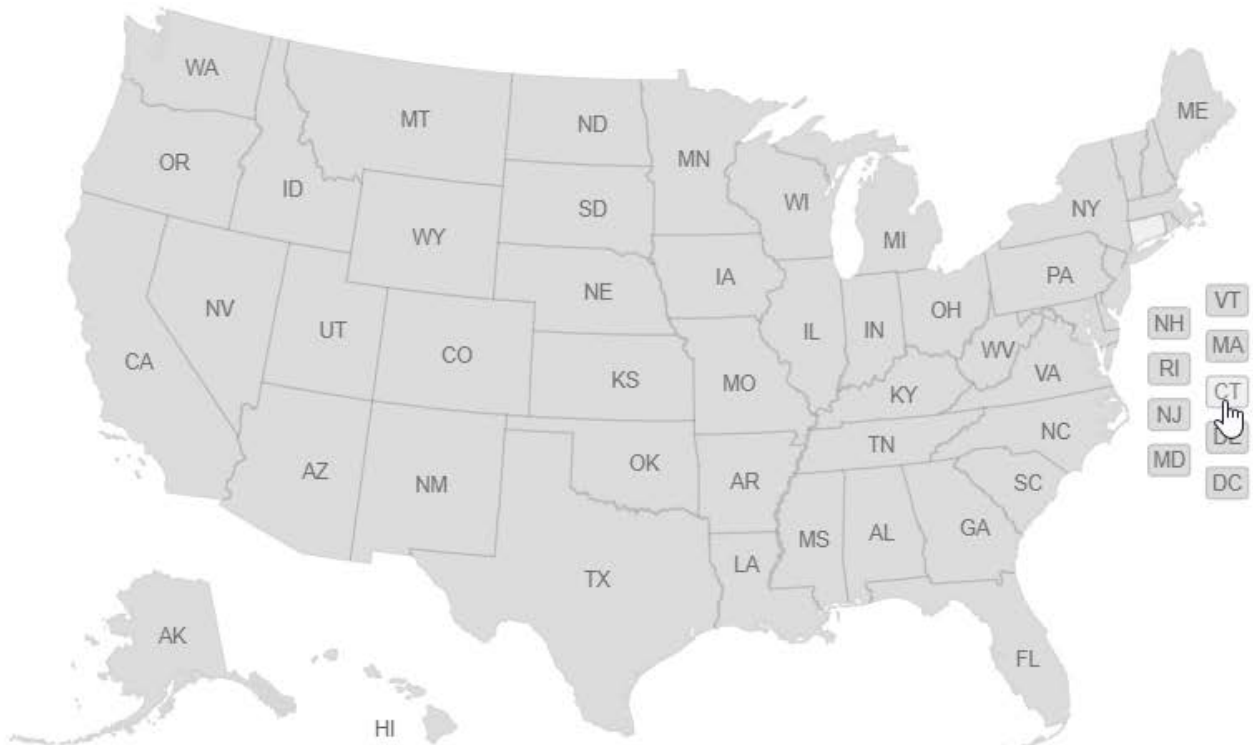
How Much Electric Vehicle Charging Do I Need in My Area?

State — Vehicles — Results

Start Over

# Choose a State

Select State



How Much Electric Vehicle Charging Do I Need in My Area?

State — Vehicles — Results

Start Over

# How many plug-in electric vehicles would you like to support in Connecticut?

15,000

**For reference, there were 3,006,700 light-duty vehicles on the road in Connecticut as of the end of 2016 and 4,500 of those were plug-in electric vehicles.**

Calculate

# Your Results

In Connecticut, to support 15,000 plug-in electric vehicles you would need:

**371** Workplace Level 2 Charging Plugs

**294** Public Level 2 Charging Plugs

*There are currently 635 plugs with an average of 2.1 plugs per charging station per the Department of Energy's Alternative Fuels Data Center Station Locator.*

**55** Public DC Fast Charging Plugs

*There are currently 160 plugs with an average of 3.6 plugs per charging station per the Department of Energy's Alternative Fuels Data Center Station Locator.*

## Where Do I Start?

Planners may want to prioritize installation of fast charging infrastructure above Level 2 charging.

**Build DC Fast First:** Establishing fast charging networks that enable long-distance travel, serve as charging safety nets, and provide charging for drivers without home charging is critical to support all-electric vehicles that have no other alternative for quickly extending their driving range.

**Build Level 2 Second:** EVI-Pro typically simulates the majority of Level 2 charging demand coming from plug-in hybrid electric vehicles, which have the ability to use gasoline as necessary for quickly extending driving range.

**Change Assumptions**

Plug-in Electric Vehicles (as of 2016): 4,500

Light Duty Vehicles (as of 2016): 3,006,700

**Number of vehicles to support** 15,000

**Vehicle Mix**

| | |
|---|---|
| **Plug-in Hybrids 20-mile electric range** | 15 % |
| **Plug-in Hybrids 50-mile electric range** | 35 % |
| **All-Electric Vehicles 100-mile electric range** | 15 % |
| **All-Electric Vehicles 250-mile electric range** | 35 % |
| **Total** | **100%** |

**How much support do you want to provide for plug-in hybrid electric vehicles (PHEVs)?**

- ○ **Full Support** *Most PHEV drivers wouldn't need to use gasoline on a typical day.*
- ◉ **Partial Support** *Calculate using half of full support assumption.*
- ○ **Do not count PHEVs in charging demand estimates.**

**Percent of drivers with access to home charging** 100 %

Recalculate

See all assumptions.

## What's Next?

Armed with an estimate of how much electric vehicle charging you might need, you may still have some questions.

### Where do I put stations?

A good place to start is mapping where they already exist using the Alternative Fuels Data Center Station Locator. Also, review this National Renewable Energy Laboratory report to learn about how the detailed version of EVI-Pro was used to determine candidate sites in Columbus, Ohio.

### How much does a station cost?

Recent studies by the National Renewable Energy Laboratory and Idaho National Laboratory have examined capital costs of current and future charging stations.

- Costs Associated with Non-Residential Electric Vehicle Supply Equipment
- National Economic Value Assessment of Plug-In Electric Vehicles
- Considerations for Corridor and Community DC Fast Charging Complex System Design

### What are the projections for plug-in electric vehicle growth?

The U.S. Energy Information Administration's Annual Energy Outlook is one resource for vehicle sales projections. Additional projections are made by private consulting firms.

### What are some site-specific considerations?

Find more information about charging at these sites.

- Charging at home
- Multi-Unit dwelling charging
- Charging in public
- Workplace charging

### Still have questions?

If you need technical assistance or have questions about EV infrastructure contact your local Clean Cities coalition. For questions about the EVI Pro model, contact webmaster.

# Electric Vehicle Infrastructure Projection Tool (EVI-Pro) Lite

This tool provides a simple way to estimate how much electric vehicle charging you might need at a city- and state-level.

## How Much Electric Vehicle Charging Do I Need in My Area?

Estimate for a State

Estimate for a City/Urban Area

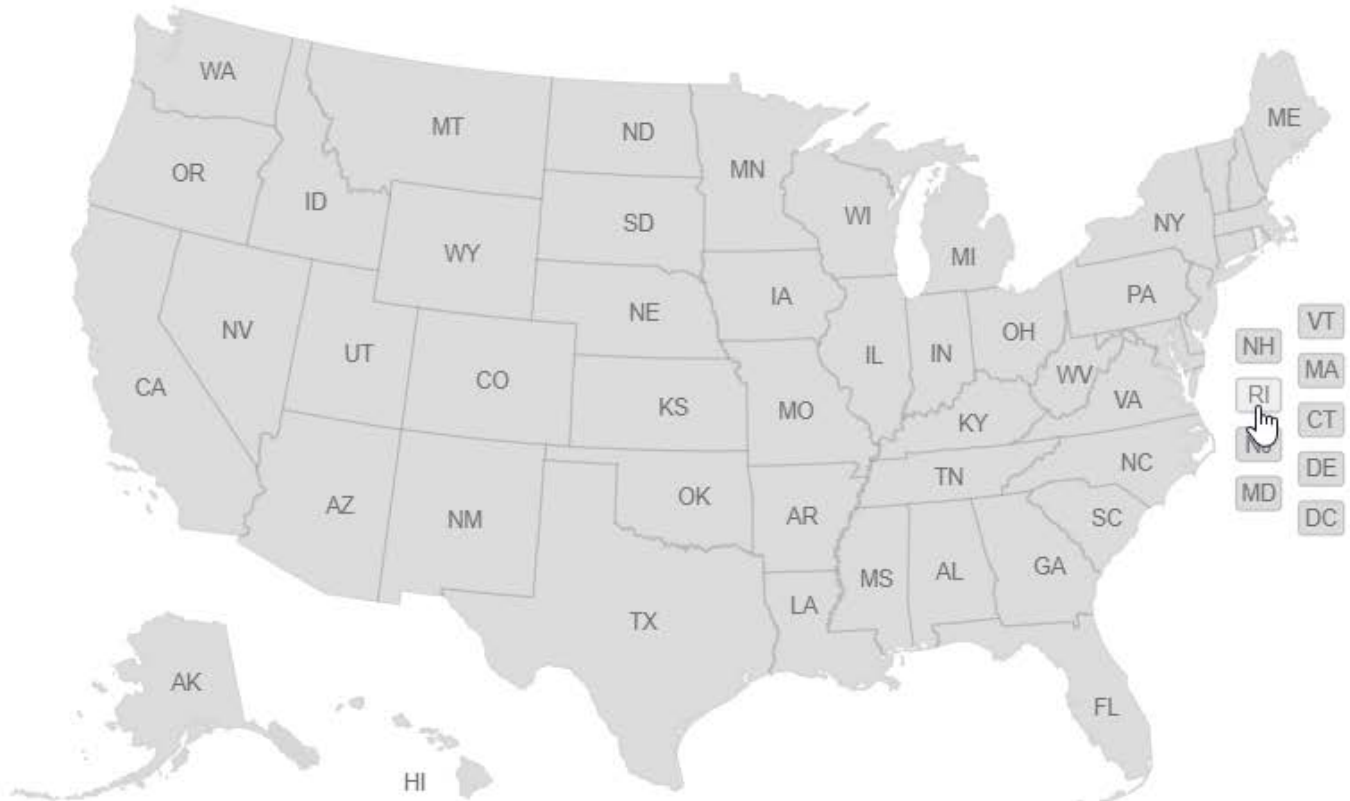
How Much Electric Vehicle Charging Do I Need in My Area?

State | City/Area | Vehicles | Results

Start Over

# Choose a State

Select State



How Much Electric Vehicle Charging Do I Need in My Area?

State | City/Area | Vehicles | Results

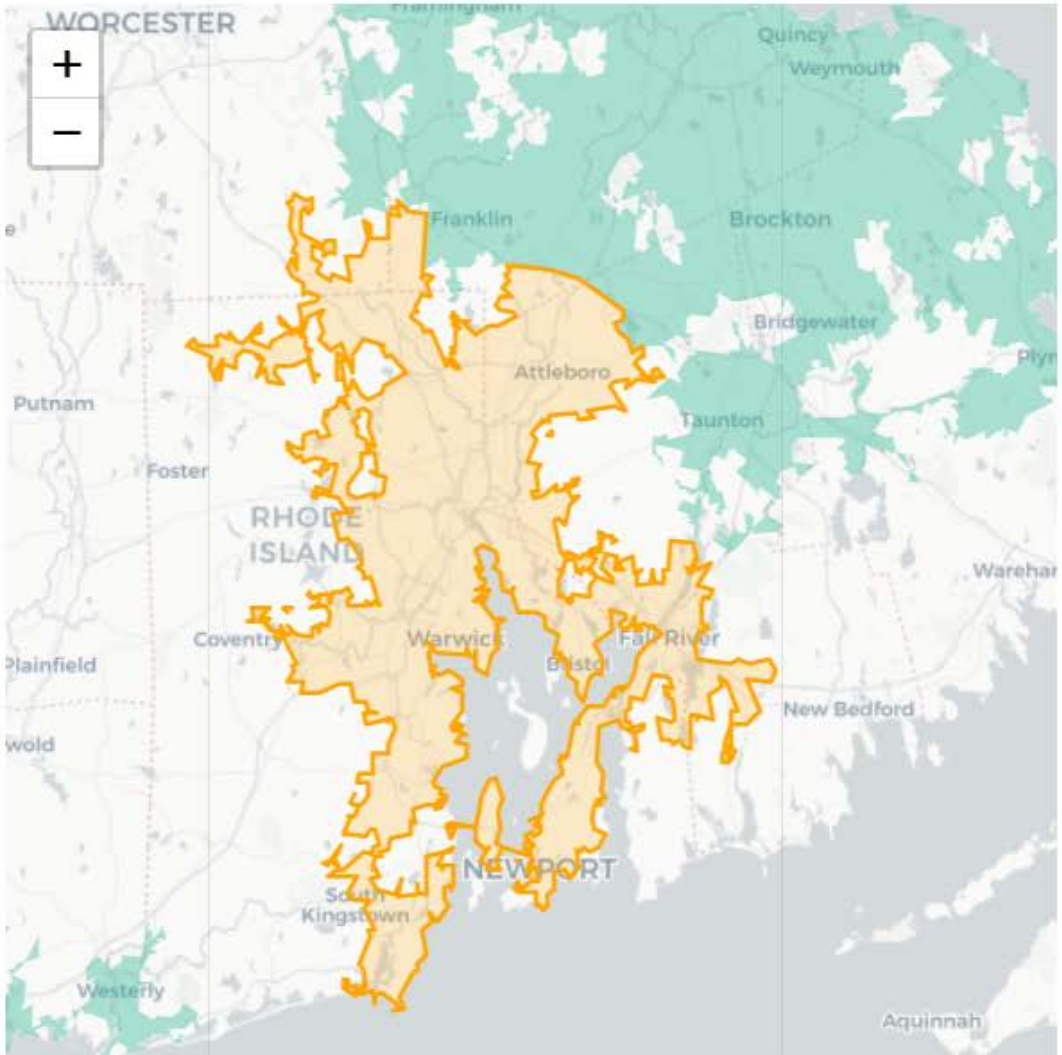
Start Over

# Choose a major urban area in Rhode Island

Boston

Norwich–New London

Providence



How Much Electric Vehicle Charging Do I Need in My Area?

State — City/Area — Vehicles — Results

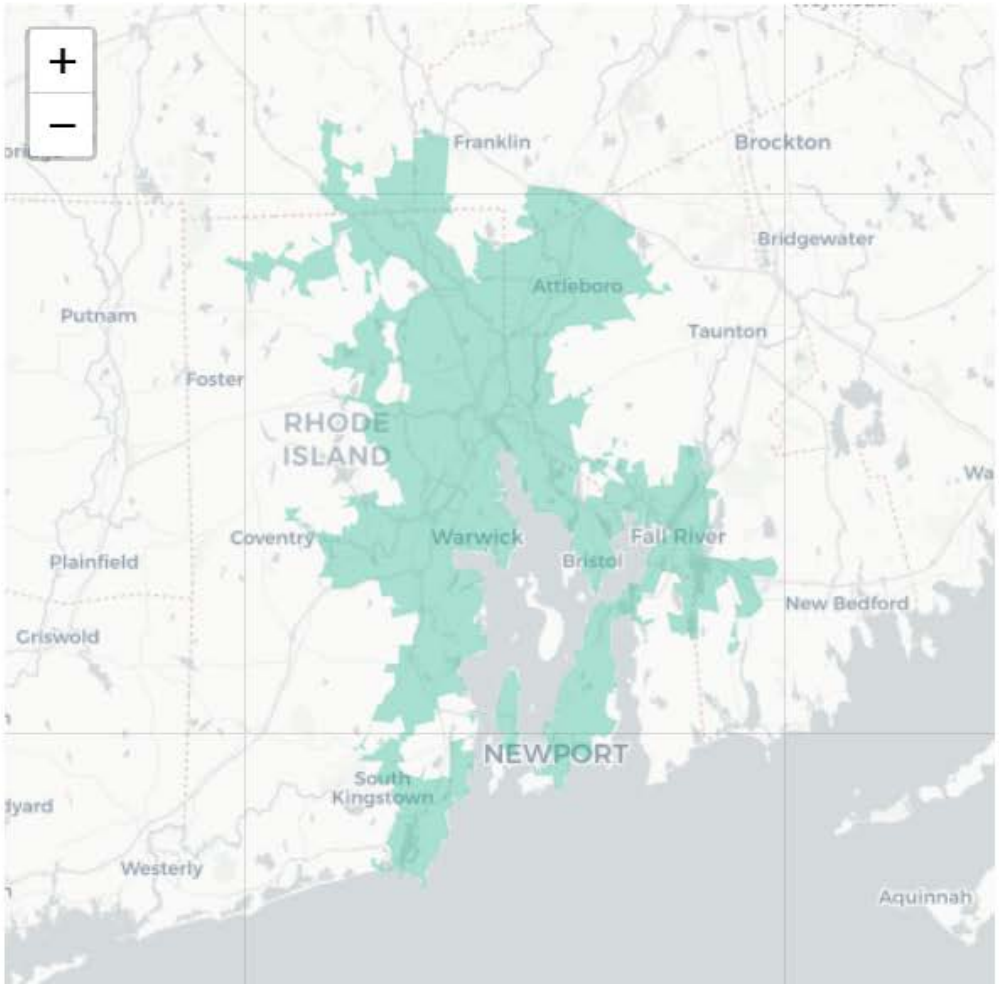
Start Over

# How many plug-in electric vehicles would you like to support in Providence?

5,500

**For reference, there were 1,155,400 light-duty vehicles on the road in the Providence area as of the end of 2016 and 1,100 of those were plug-in electric vehicles.**

Calculate



How Much Electric Vehicle Charging Do I Need in My Area?

State — City/Area — Vehicles — Results

Start Over

# Your Results

In the Providence area, to support 5,500 plug-in electric vehicles you would need:

**133** Workplace Level 2 Charging Plugs

**104** Public Level 2 Charging Plugs

*There are currently 201 plugs with an average of 2.6 plugs per charging station per the Department of Energy's Alternative Fuels Data Center Station Locator.*

**20** Public DC Fast Charging Plugs

*There are currently 23 plugs with an average of 2.6 plugs per charging station per the Department of Energy's Alternative Fuels Data Center Station Locator.*

## Where Do I Start?

Planners may want to prioritize installation of fast charging infrastructure above Level 2 charging.

**Build DC Fast First:** Establishing fast charging networks that enable long-distance travel, serve as charging safety nets, and provide charging for drivers without home charging is critical to support all-electric vehicles that have no other alternative for quickly extending their driving range.

**Build Level 2 Second:** EVI-Pro typically simulates the majority of Level 2 charging demand coming from plug-in hybrid electric vehicles, which have the ability to use gasoline as necessary for quickly extending driving range.

### Change Assumptions

Plug-in Electric Vehicles (as of 2016): 1,100

Light Duty Vehicles (as of 2016): 1,155,400

**Number of vehicles to support** 5,500

**Vehicle Mix**

| | |
|---|---|
| Plug-in Hybrids 20-mile electric range | 15 % |
| Plug-in Hybrids 50-mile electric range | 35 % |
| All-Electric Vehicles 100-mile electric range | 15 % |
| All-Electric Vehicles 250-mile electric range | 35 % |
| **Total** | **100%** |

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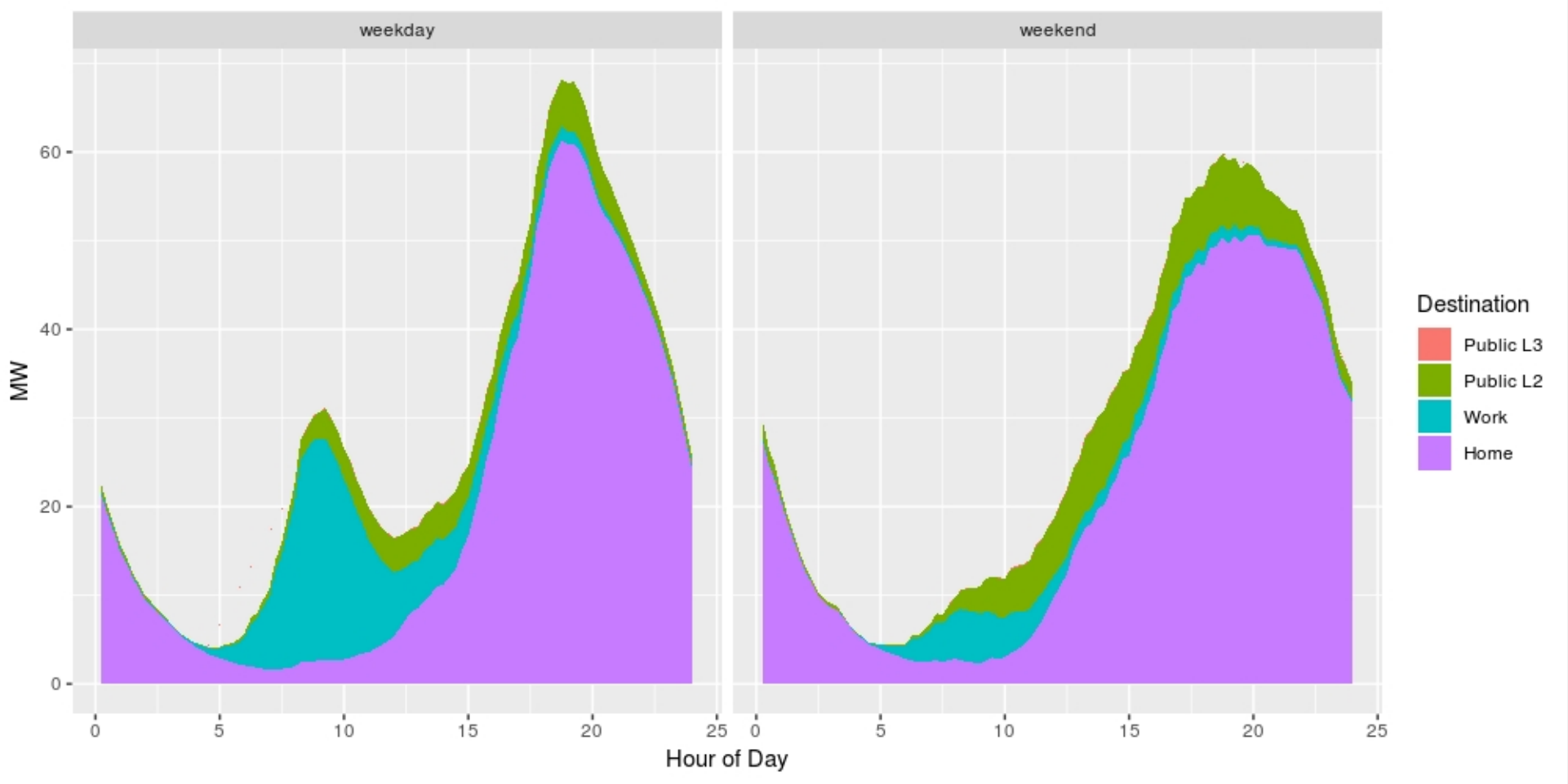
- ○ **Full Support** — *Most PHEV drivers wouldn't need to use gasoline on a typical day.*
- ◉ **Partial Support** — *Calculate using half of full support assumption.*
- ○ **Do not count PHEVs in charging demand estimates.**

**Percent of drivers with access to home charging** 100 %

Recalculate

See all assumptions.



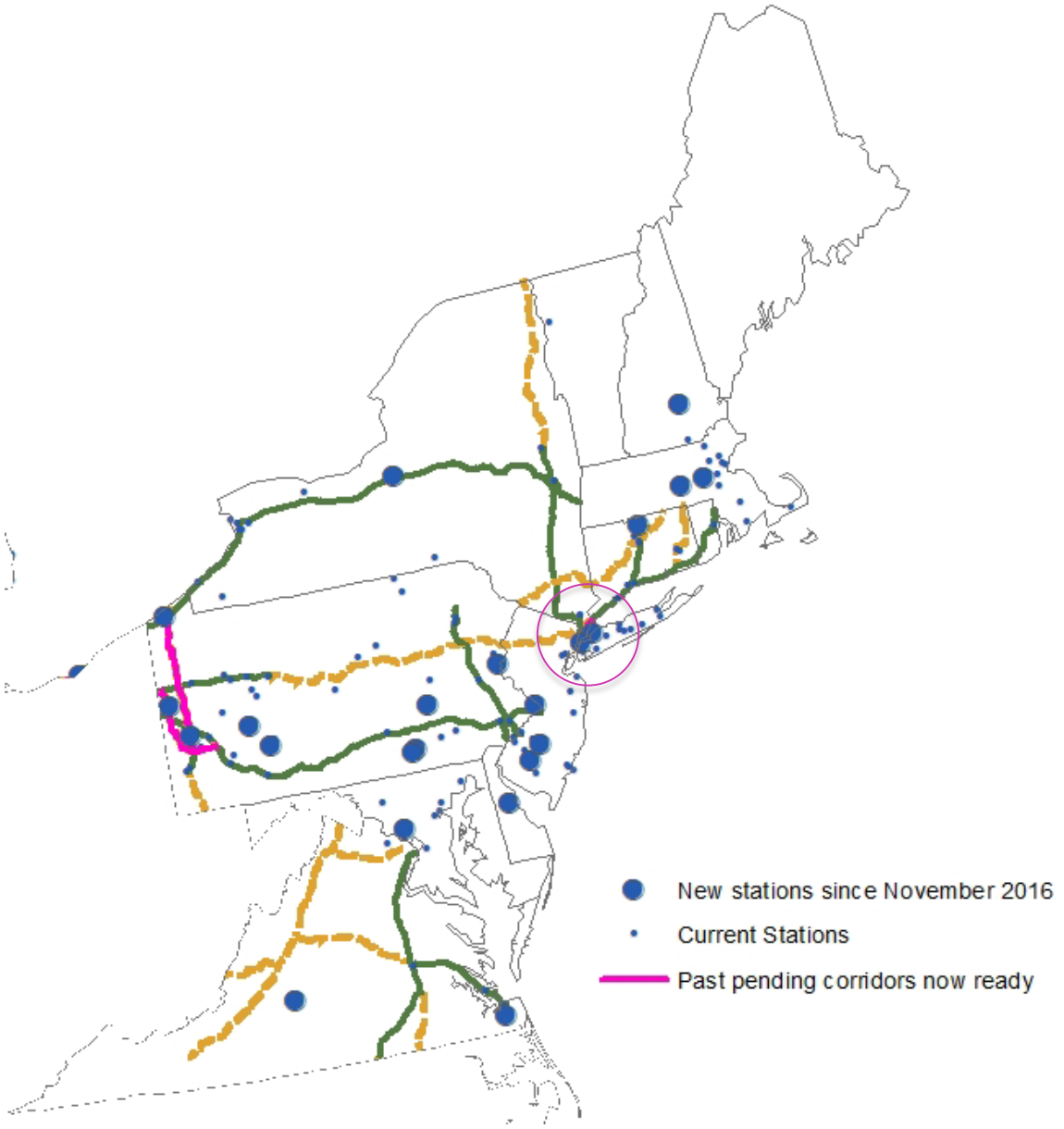

Coming September 2019, the EVI-Pro Lite tool will also estimate load profiles for EV charging.

Coming in 2020, more discreet city/town areas can be evaluated.

# Future Enhancement – Load Profile & Discreet Geographies

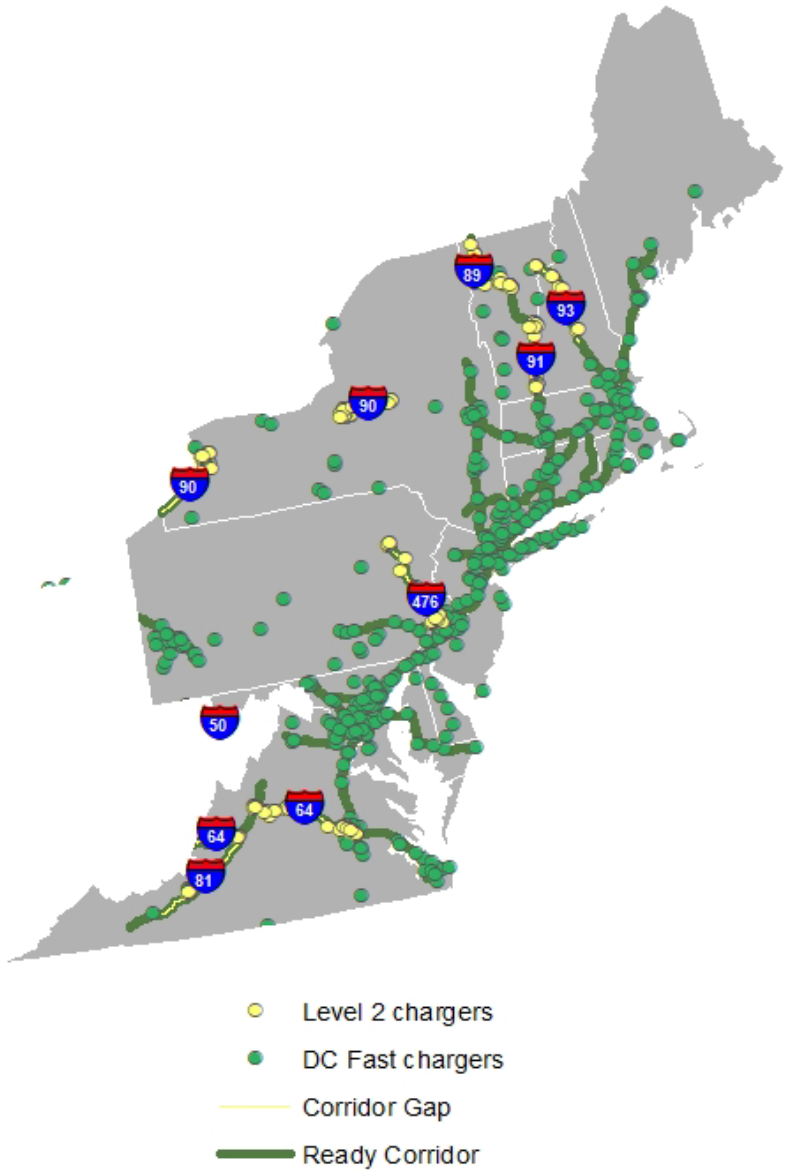
# Round 1 and 2 Corridor Refresh – CNG Example

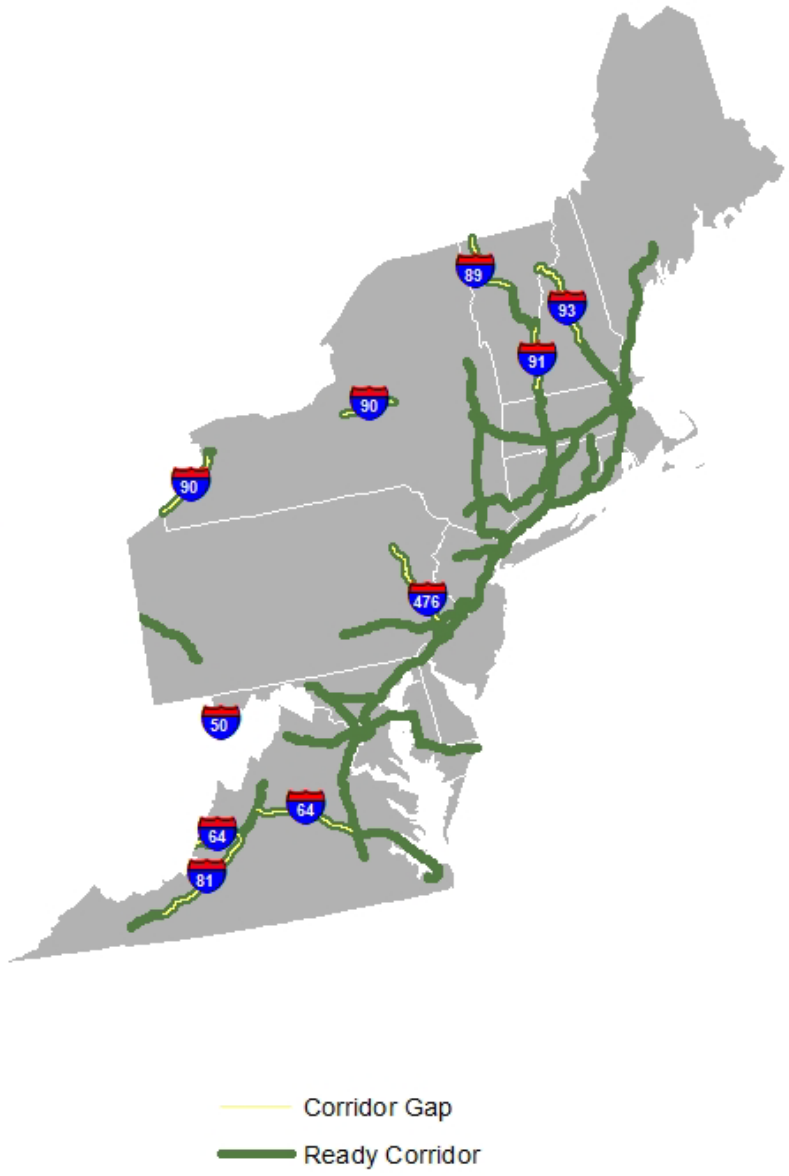
- Corridors designated as pending in rounds 1 and 2 are being reevaluated to determine if criteria are met for ready status.
- Methodologies are being developed to evaluate pending corridors.
- Example: Find CNG stations opened since round 1 nominations and evaluate pending corridors near those stations.



# Round 1 Electric Corridor Resiliency Evaluation

Highway sections, shown in yellow, were awarded corridor status in Round 1 with Level 2 chargers, but need additional DC Fast installations for future designation.

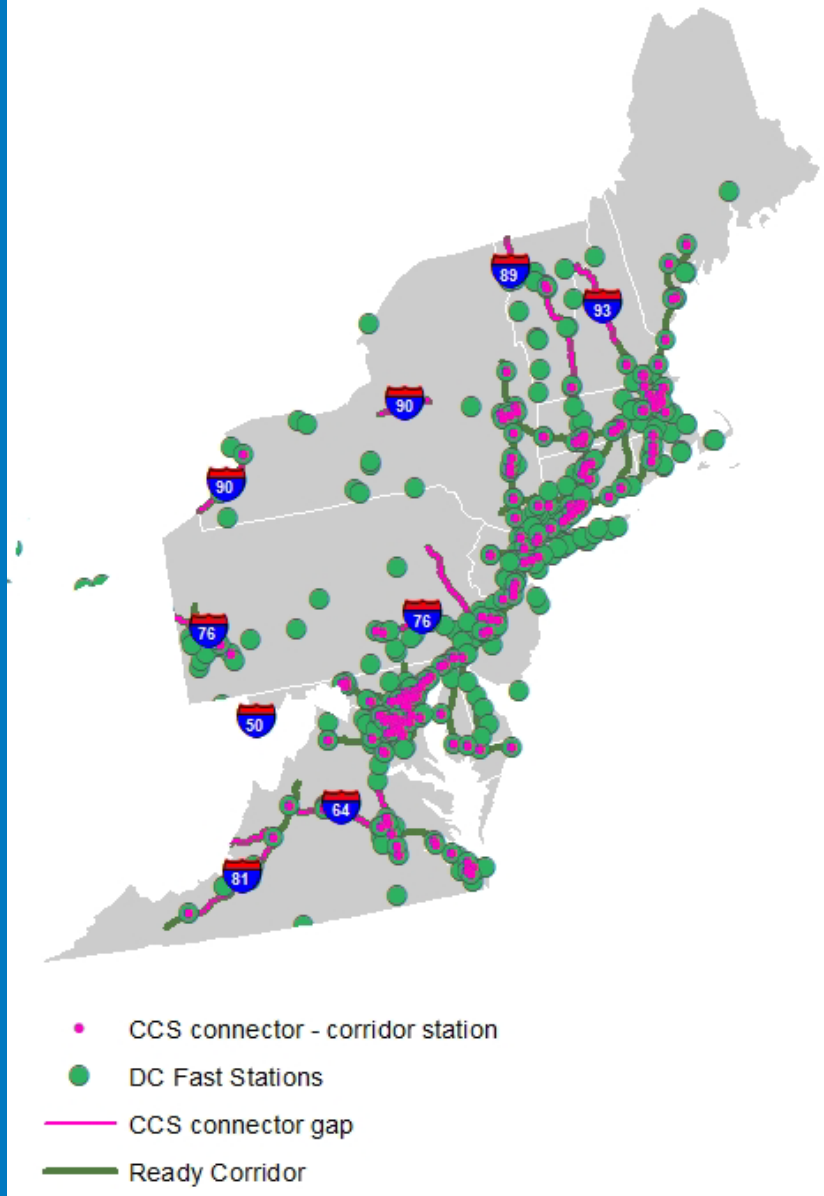


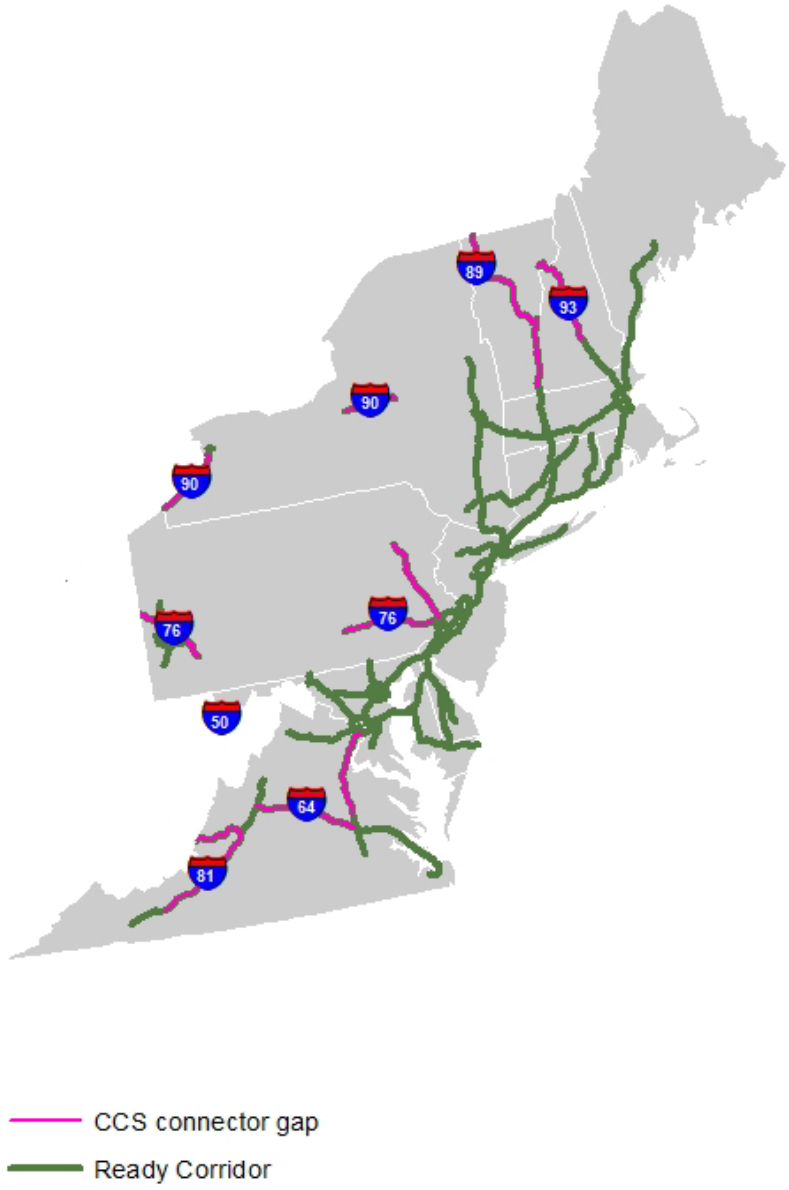



# Future Electric Corridor Considerations – DC Fast Charger Types

Electric vehicles charge using a specific connector. A CCS connector vehicle would have gaps charging along corridor segments shown in pink.

Note, some gaps are due to level 2 chargers.

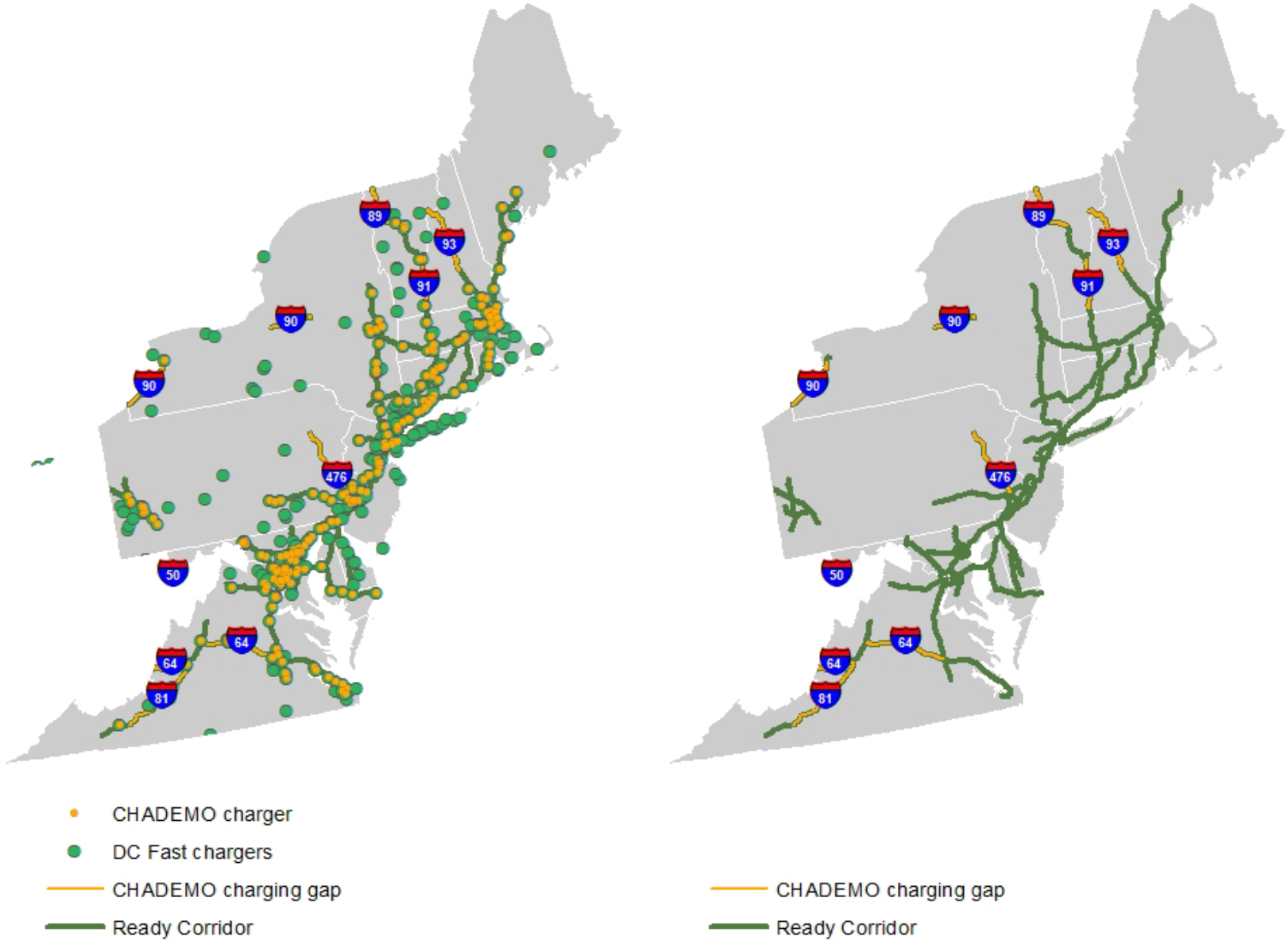


# Future Electric Corridor Considerations – DC Fast Charger Types

Electric vehicles charge using a specific connector. A CHAdeMO connector vehicle would have gaps charging along corridor segments shown in gold.

Note, some gaps are due to level 2 chargers.



# Thank You

**www.nrel.gov**

johanna.levene@nrel.gov
matt.rahill@nrel.gov

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