

Bringing EVs To Connecticut Municipalities

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Abstract

Although humans have been living on Earth for over 200,000 years, it was not until 1751 that we began using fossil fuels for energy.¹ Since then, we have emitted 345 billion metric tons of CO₂ from fossil fuel consumption,¹ which has resulted in ~1°C increase in global temperature. A large contributor of this fossil fuel use comes from cars. An average car emits about six tons of CO₂ every year.¹ Now multiply this by the 1.5 million registered vehicles in Connecticut (CT) and the 253 million cars in the U.S.¹ Given that the U.S. transportation system is dependent on cars, it is critical that we switch to vehicles that run on alternative energy sources.

Electric vehicles (EVs) are now becoming more affordable and have witnessed a number of technological advances; however, they are still mostly over looked by consumers. Why is that? It is because EVs are usually priced higher than gasoline-powered cars, and many do not know what to expect in terms of performance and battery life nor are unaware of the environmental impacts of gasoline vehicles.

This is where my project comes into play. I worked with CT municipalities to inform them about the economic and environmental benefits of EVs as well as make them aware of the various incentives in place to promote EV use. I used other municipality EV use (e.g. Stafford) to demonstrate feasibility.

Electric Vehicles VS Gas-Powered Vehicles

Electric Vehicles (EVs)³

- **EV MARKET IS GROWING FAST:** More than 7,000 plug-in and all-electric vehicles were sold in October 2015, making it the highest month of electric car sales to date (Fig. 1).
- **EVs ARE A HIGHLY EFFICIENT:** Up to 80% of battery energy is transferred directly to power the car versus 14-26% of energy from gasoline.
- **CHEAPER ENERGY SOURCE:** In the U.S., electricity costs between 3-25 cents per kilowatt-hour while February 2017's national average for a gallon of gasoline was \$3.42. It costs \$1 for today's all-electric vehicles to travel the same distance as a similar-sized gasoline car would on a gallon of fuel. This adds up to savings of > \$2 a gallon or \$1,000 a year in refueling costs (Fig. 2).
- **EVs REQUIRE LITTLE MAINTENANCE:** Consumers will save money over the life of the car due to less maintenance. For example, EV break pads last longer because they use regenerative braking to slow down—a method of converting energy used to reduce the car's speed into stored battery power.

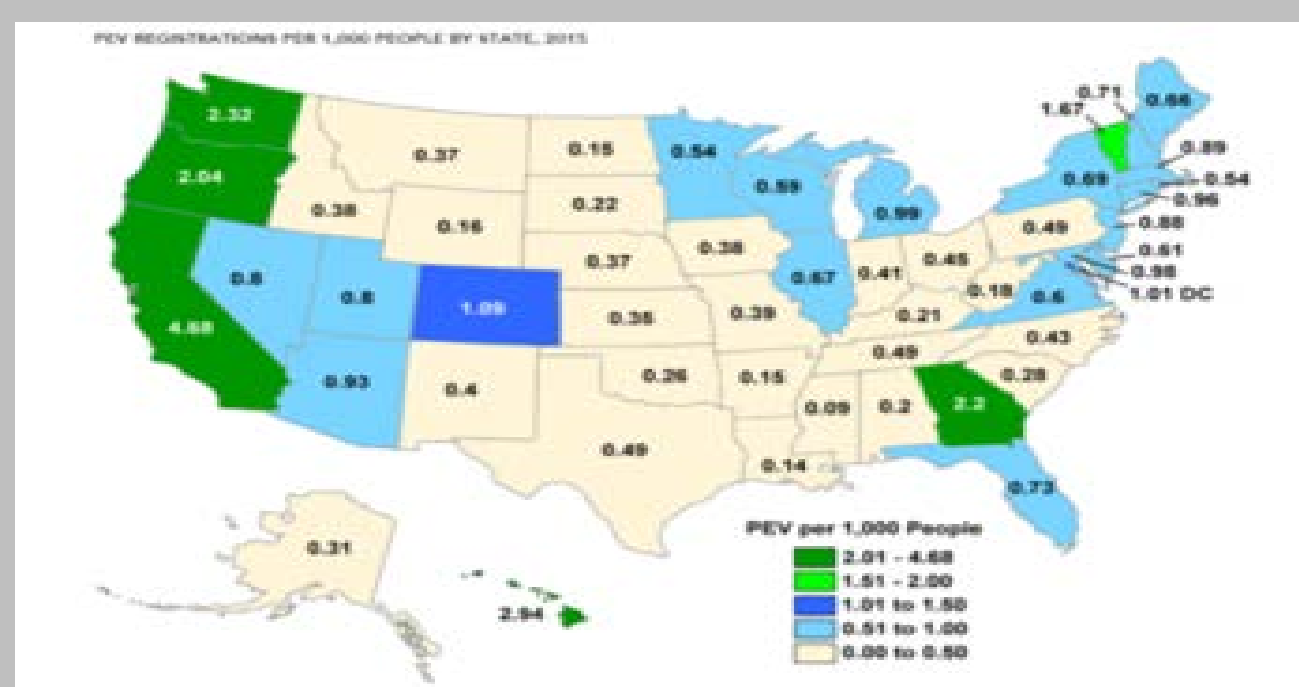


Fig. 1 A national geographic map of EV's sold in the U.S.

Gasoline-Powered Vehicles⁴

- **NOT JUST ENVIRONMENTAL PROBLEM, BUT HUMAN HEALTH PROBLEM:** According to the American Medical Association, air pollution prematurely kills about 21,000 U.S. Citizens a year. Recent studies show that close to eight per cent of all non-traumatic mortality in U.S. cities is attributable to air pollution.
- **FOSSIL FUEL SUPPLY IS DWINDLING:** The move into extreme fossil fuel resources is partly driven by increasing demand and dwindling supply, but it is also driven by unrealistic and unsustainable forecasts of energy demand that completely ignore climate change. It is a particularly worrying trend because as billions of dollars of capital are expended opening these resources for extraction we are locking in a supply of fossil fuels beyond which we can afford to burn.
- **SIGNIFICANT CONTRIBUTOR TO FOSSIL FUEL EMISSIONS & GLOBAL WARMING:** An average car emits about six tons of CO₂ every year, and if we multiply that by 1.4 billion cars in the world, that equals out to 1.68 x 10¹³ tons of CO₂ per year.

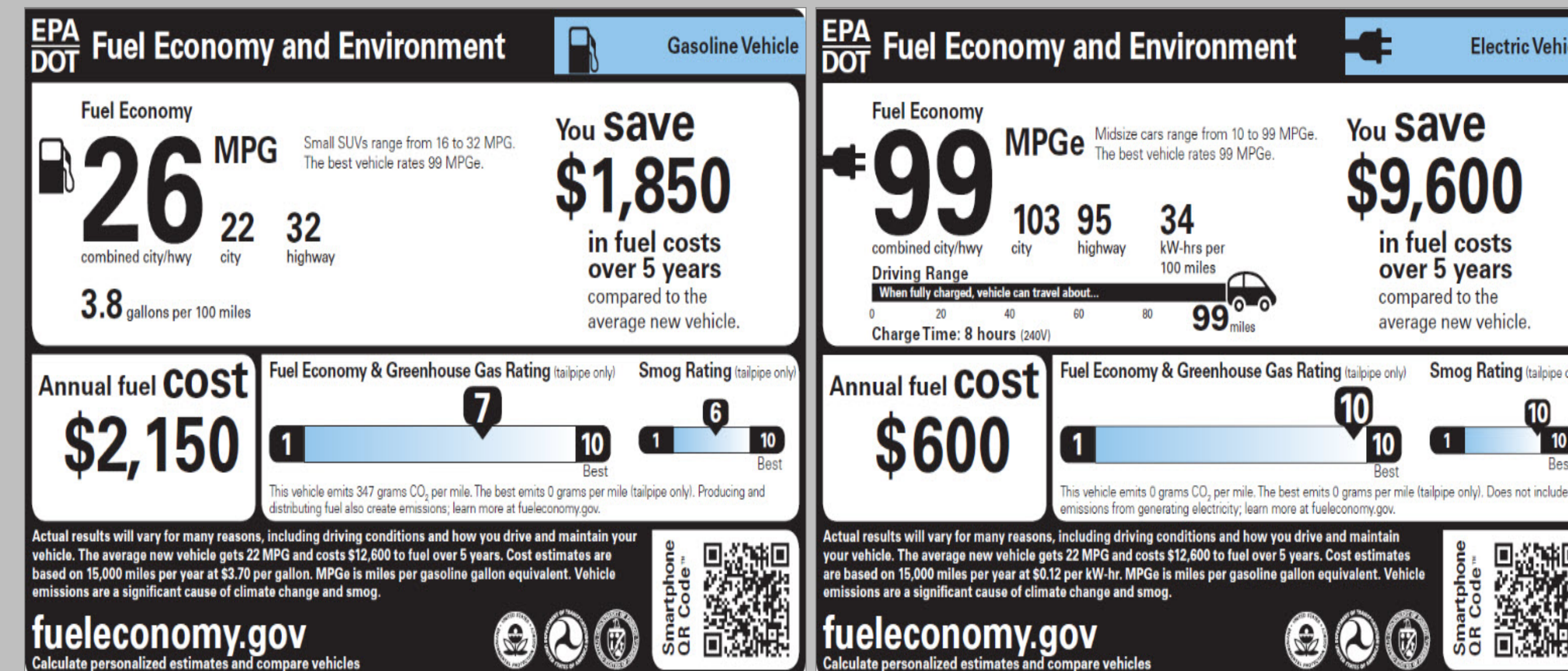


Fig 2. Infographics from the Environmental Protection Agency and Department of Transportation showing the environmental and economic benefits of electric vehicles (right panel) versus a gasoline vehicle (left panel).

Project Objectives

1. Compile resources needed to introduce EVs to towns with energy committees.
2. Work with at least three towns in CT and introduce them to the idea of starting a fleet of EVs.

EVs Resources Guide

Car Options^{2,3}

- **CHEVROLET VOLT PACKAGE** (Fig. 3): I focused on the 2017 Chevrolet Volt because it is currently the most affordable EV on the market and is not a full EV in that it uses a gasoline-powered motor to recharge batteries and can be turned off and on manually or automatically. Cost → \$32,197.00
- **KIA SOUL EV:** Cost → \$34,000.00
- **FIAT 500E:** Cost → \$32,600.00
- **VW E-GOLF:** Cost → \$33,495.00



Fig. 3 These are a couple of images of the new 2017 Chevrolet Volt from General Motors Corporated. These images show he attention to detail of the vehicle with fuel efficient aerodynamic bits.

Rebates/Incentives

- **REBATE FROM STATE OF CT:** All EVs qualify for rebate of \$3,000.
- **MANUFACTURER REBATE:** Most manufacturers offer \$1,000-\$3,000 rebate on their EVs. For example, Chevrolet offers a \$1,000 rebate on the Volt.

EVCONN & the CHEAPR Rebate^{2,3}

GRANTS:

- Connecticut Federal Tax Credit Grant allows for plug-in hybrid-electric vehicles (PHEVs) purchased in or after 2010 eligible for a federal income tax credit of up to \$7,500. Fill out Form 8936, Qualified Electric and Plug-in Electric Vehicle Credit for full function PEVs.
- EVConnecticut is working to introduce more EVs in CT. CT Hydrogen and Electric Automobile Purchase Rebate (CHEAPR) offers rebates of up to \$5,000 for CT residents who purchase or lease a new eligible battery EV.

CHARGING STATIONS (Fig. 4):

- The towns of Stafford and Elington installed charging stations when purchasing their EVs. The stations are located outside of the town hall where the EVs are usually parked.
- Utilizing funds made available through the Regional Greenhouse Gas Initiative (RGGI), DEEP will provide a reimbursement of up to \$15,000 per vehicle and up to \$10,000 per charger meeting the program guidance specifications, with a maximum of six EVs and chargers per grant recipient.

Working with CT Towns

Hartford

- I worked with the Chief of Staff, Thea Montañez, from the town of Hartford. I contacted her because there was no established energy committee.
- Although the town of Hartford is very supportive of the idea of establishing a fleet of EVs, low funds are prohibiting them to do so.
- I reccomend that the town of Hartford should still be able to buy the EV's because of the grants and incentives offered from the town of CT. The cars would cost them much less than they expect.

Windsor

- I worked with Community Developement Leader, Jim Hallisey, of the town of Windsor. Like the town of Hartford, there was no energy committee.
- The town of Windsor was not interested in my project because of the cut funds and stated they are not willing to welcome EVs into their fleet until another 4 - 6 years.
- The town of Windsor needs a first selectman that I can work with alongside a dedicated energy committe. This is because there is no one in the town who I can present this sinformation to.

Suffield

- I worked with First Selectman, Melissa Mack, of the town of Suffield.
- The town of Suffield was very interested in my project and stated the town could use something new.
- I provided her my resource guide on EVs and incentive programs.
- Currently, the town of Suffield is working on buying two Chevy Volts from Carter Chevrolet in Manchester (Fig. 3).

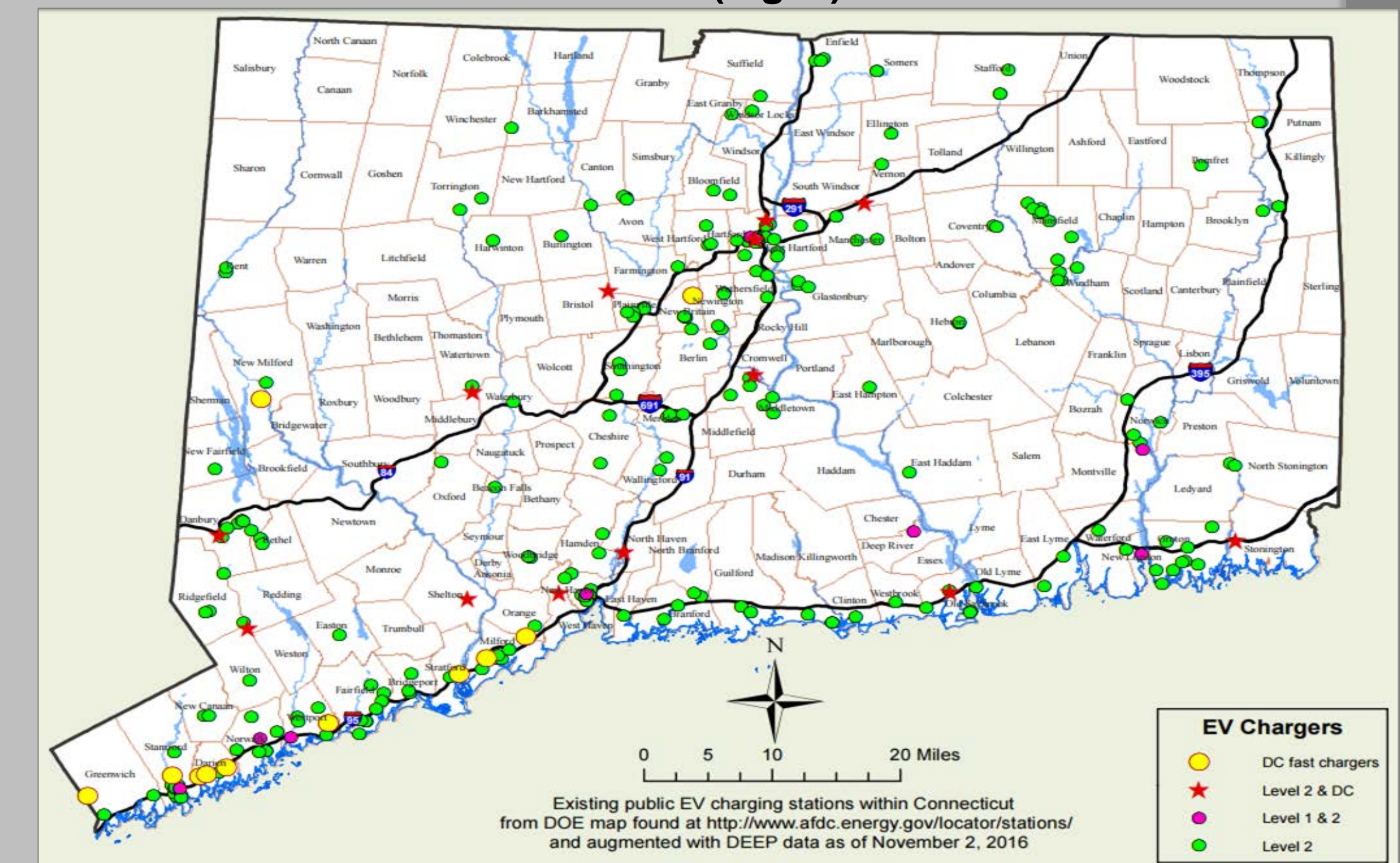


Fig 4. Map showing the locations of different types of charging stations in CT.

Acknowledgements

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