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### Expanding Electric Vehicle Alternatives on Florida Tech's Campus

Cheyenne Potter

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# Expanding Electric Vehicle Alternatives on Florida Tech's Campus

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## Introduction

Ground transportation generates approximately 23% of global CO<sub>2</sub> emissions (IEA, 2009). Electric vehicles (EVs) are one of the most promising substitutes for internal combustion engines on the market today. EVs have no tail pipe pollution and are nearly 100% clean running vehicles with rechargeable batteries and quiet engines. EVs convert 60% of energy to power at the wheel whereas conventional gas power only converts about 20% of the gas energy to power (IEA, 2009). In addition, electricity has many modes of generation (including solar, hydro, wind, and nuclear) making it an abundant resource.

Currently, the Florida Tech campus has only one EV charger, in the Panther Dining Hall parking garage. Florida Tech is developing its first campus sustainable transportation plan. This project will create a plan for a campus fleet centered on additional EV charging stations for faculty, staff and students and expand the sustainable transportation plan to reflect these new opportunities. Specific objectives are as follows:

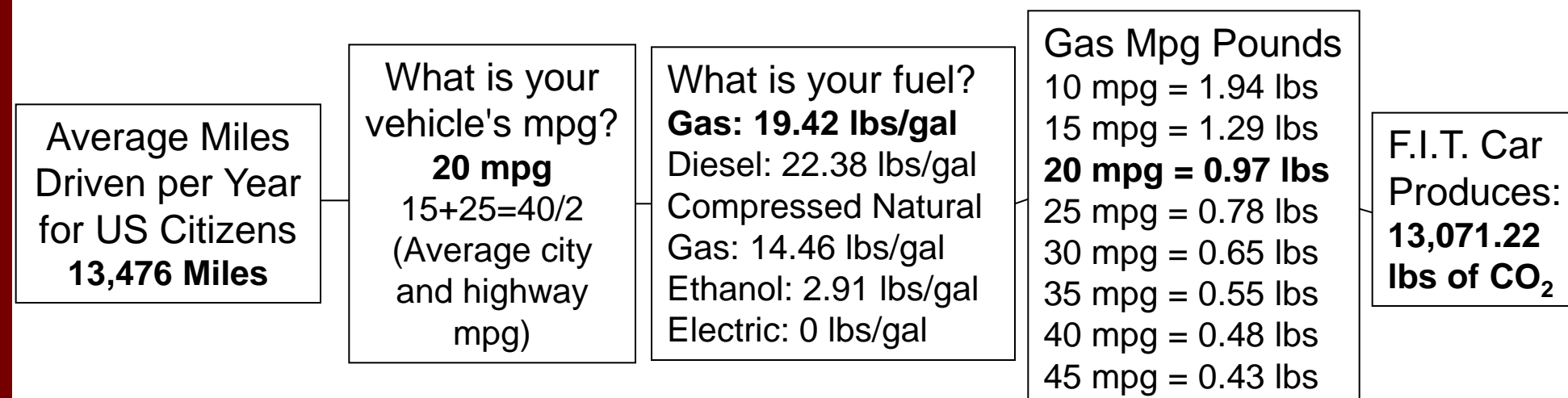
1. to develop and apply a protocol for assessing CO<sub>2</sub> emissions of all vehicles that are currently registered to park at Florida Institute of Technology.
2. to educate and encourage students to learn more and potentially drive electrical vehicles.
3. to work with campus staff to initiate the installation of multiple EV charging stations in convenient Florida Tech facility locations (Commons, Design Building, Babcock Oaks).

## Methods

### Protocol to Estimate Campus CO<sub>2</sub> Emissions

In order to identify current approximate CO<sub>2</sub> emissions for each vehicle on Florida Tech's campus, a protocol to estimate CO<sub>2</sub> emission of almost all F.I.T. vehicles was developed. This will establish a benchmark to allow future, standardized inventories of potential reductions in campus CO<sub>2</sub> emissions due to more EV chargers and from other advances in the sustainable transportation plan. The following information was required: campus vehicle year, make, and model; all data was obtained from the campus offices of Facilities Operations and Security.

The protocol has four steps that yield an estimate of CO<sub>2</sub> emission per year per car:



### EV Awareness

To measure the awareness of EV information on campus, an online survey using Survey Monkey was distributed to campus list serves to address four questions on EV knowledge and interest.

### EV Charging Station Installation

In order to evaluate the installation of EV chargers several meetings were held with Facilities staff to scope opportunities and funds. The decision was subsequently made to move forward at several locations with installations occurring by late fall 2015.

### References

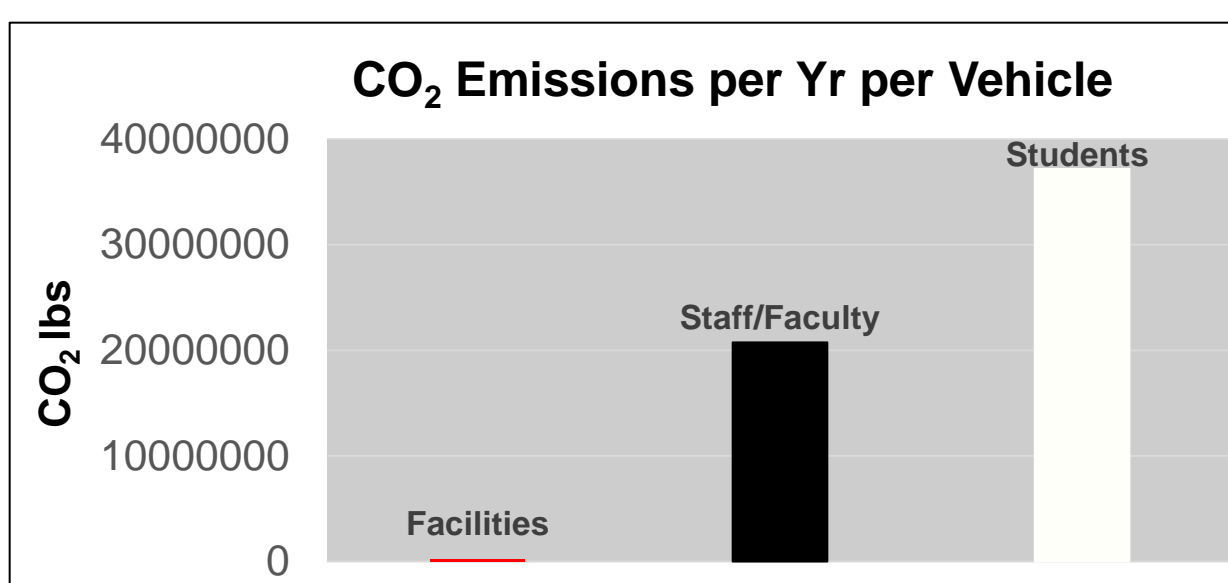
- "Transport, Energy, and CO<sub>2</sub>: Moving Toward a Sustainable Future." IEA (International Energy Agency). 2009. Web. 8 Feb. 2015. <<http://www.iea.org/textbase/nppdf/free/2009/transport2009.pdf>>.
- "Average Annual Miles Per Driver by Age Group." Average Annual Miles per Driver by Age Group. Federal Highway Administration, 20 Feb. 2015. Web. 26 Mar. 2015. <<http://www.fhwa.dot.gov/ohim/onh00/bar8.htm>>.
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## Results

### Campus Vehicle CO<sub>2</sub> Emissions

All vehicles currently registered on campus were inventoried for CO<sub>2</sub> emission using the protocol shown. Totals were calculated and tabulated (N=5306) in the table below.

Departments	Number of Vehicles	CO <sub>2</sub> Emissions per Year (lbs)
Facilities	71	200,830.5
Faculty/Staff	1,784	20,747,132.1
Student	3,451	37,159,996.7
<b>Total</b>	<b>5,306</b>	<b>58,107,959.3</b>

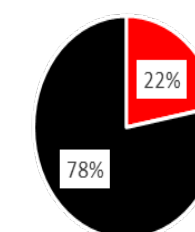


### EV Awareness

100 students were surveyed. The survey showed that 22% of the campus knew where the current EV charger is located, however, 78% did not know we had an EV charging station or its location.

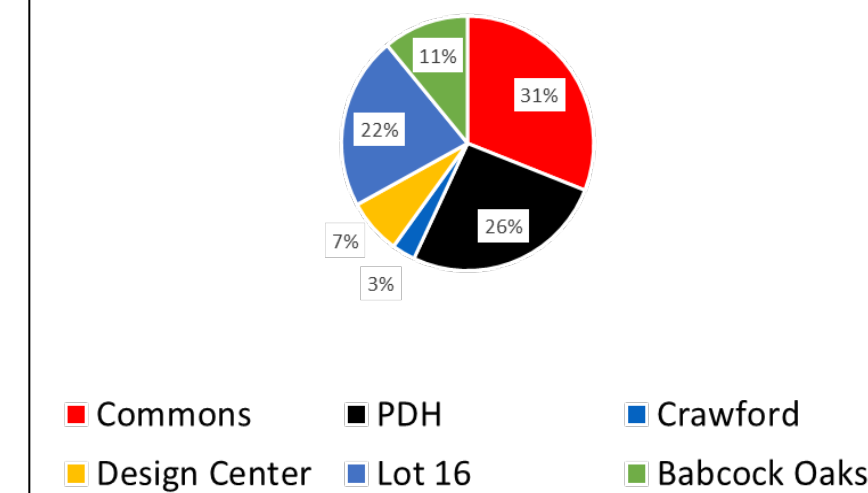
52% of those surveyed said they would switch to driving electric vehicles if there were more chargers on campus. When asked where EV chargers should be placed on campus, respondents stated: 31% Commons, 26% in front of PDH, 22% parking lot 16 behind Evans Library, 11% Babcock Oaks, 7% Design Center, and 3% Crawford Lot.

### Knowledge of EV Charger Location

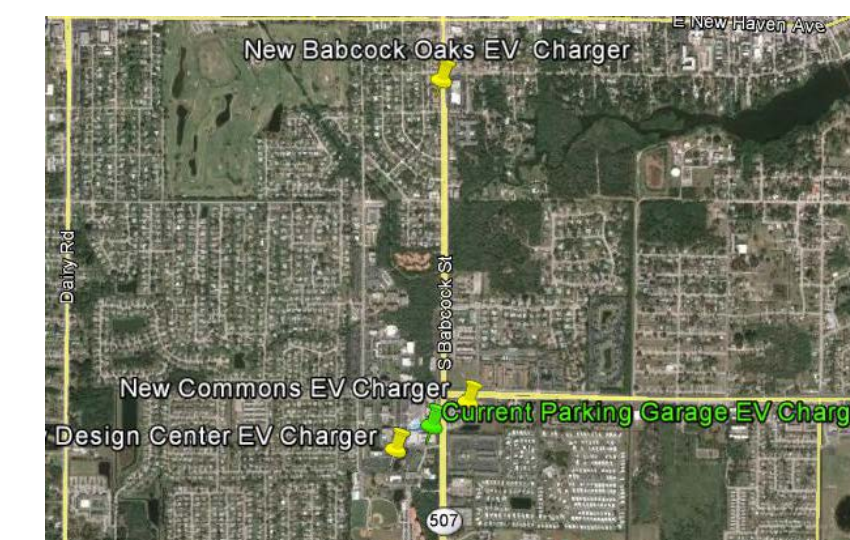


■ Know ■ Do Not Know

### Demand for EV Chargers



### EV Charging Station Installation Sites:



### Discussion

This project established a baseline estimation of CO<sub>2</sub> emissions of campus vehicles. The advances needed to move forward as a green university include more EV options and incentives. An assessment of CO<sub>2</sub> emissions, based on measured use of EVs, in part due to new charging stations, should be done every 1-2 yr. This will allow F.I.T. to track the changes EVs and chargers have on the overall carbon footprint of the university.

The currently approved EV charger locations should be done by Fall 2015 with a hope of establishing even more convenient locations for university participants. Education and advertising about the new EV charger installations should be a priority to advance the current sustainable transportation plan.

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