**Northeast Florida's Electric Vehicle Overhaul and Low-Emission Transit (E-VOLT) Technical Appendix**

**High-Level Overview:** To measure the GHG reduction measures from the activities of Northeast Florida’s E-VOLT programs, a technical spreadsheet was created to estimate the reduction quantity for the three implementation measures. It is estimated that greenhouse gas (GHG) emissions will be reduced by 1,559,457 mtCO2e by 2030 and 9,630,644 mtCO2e by 2050.

* **Mass Transit Expansion & Mobility Hub Initiative**
* Duval County, St. Johns County, and Clay County populations were gathered from the United States Census Bureau.
* The percentage of the population currently using public transit was gathered from homearea.com which also uses data from the Census Bureau.
* An estimated percentage of 0.75% increase in public transportation users per year was estimated by review of data from similar mobility hub projects in San Francisco.
* Average Vehicle Miles Traveled (VMT) and Average gasoline passenger vehicle Miles Per Gallon (MPG) were gathered from The Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool by the Argonne National Laboratory.
* An average VMT reduction from passenger vehicles to public transport was estimated and a reduction of gallons of gasoline was calculated based on average VMT, MPG, and VMT reductions.
* The EPA Greenhouse Gas Equivalencies Calculator was used to estimate metric tons of CO2 equivalent (mtCO2e) per gallon of gasoline and or diesel fuel.
* Equations used: (current population \* percentage of population currently using public transit) = current # of transit users. (current # of transit users \* % conversion of increased transit users) = # of new transit users per year. (# of new transit users per year \* # of gallons of gasoline reduced) = # of gallons of gasoline reduced per year. (# of gallons of gasoline reduced per year / mtCO2e per gallon) = mtCO2e reduced per year. (mtCO2e reduced per year \* 5) = mtCO2e reduced through 2030. (mtCO2e reduced per year \* 25) = mtCO2e reduced through 2050.
* Considerations: These reductions are based on a constant population. We know the population will increase over time, which will likely cause an increase in public transportation use, making our estimates more conservative.
* **Bicycle-Pedestrian Program Initiative**

1. ***Protected/separated bike lane citywide project/initiative***

* The total number of workers in Jacksonville that commute to work via bicycle was gathered from the United States Census Bureau’s American Communities Survey (ACS).
* It was estimated that protected/separated bike lanes citywide would create a 35% rise in cyclists that now feel comfortable enough to ride to work and jobs.
* The estimated reduction of Internal Combustion Engine (ICE) VMT per week was estimated based on data from the City of Denver’s E-bicycle program follow up report.
* The estimated CO2e per ICE vehicle mile was gathered from the EPA’s website on Greenhouse Gas Emissions from a Typical Passenger Vehicle.
* Equations: (# of bicycle commuters \* 0.35%)= # of new bicycle commuters. (# of new bicycle commuters\*# of ICE VMT reduced per week)= # of ICE VMT reduced per week. (# of ICE VMT reduced per week\*52)= # of ICE VMT reduced per year. (# of ICE VMT reduced per year\*estimated mtCO2e per VMT)=M mtCO2e reduced per year. (mtCO2e reduced per year \* 5) = mtCO2e reduced through 2030. (mtCO2e reduced per year \* 25) = mtCO2e reduced through 2050.

1. ***E-bike Voucher Pilot Program***

* It was estimated that 300 new E-bikes would be distributed resulting in 300 new bicycle commuters.
* Equations: (# of new bicycle commuters\*# of ICE VMT reduced per week)= # of ICE VMT reduced per week. (# of ICE VMT reduced per week\*52)= # of ICE VMT reduced per year. (# of ICE VMT reduced per year\*estimated mtCO2e per VMT)= mtCO2e reduced per year. (mtCO2e reduced per year \* 5) = mtCO2e reduced through 2030. (mtCO2e reduced per year \* 25) = mtCO2e reduced through 2050.

1. ***E-bike Share (Micromobility) Program***

* It was estimated that the E-bike share program would result in a 50% rise in cyclists that now feel comfortable enough to ride to work and jobs.
* Equations: (# of bicycle commuters \* 0.50%)= # of new bicycle commuters. (# of new bicycle commuters\*# of ICE VMT reduced per week)= # of ICE VMT reduced per week. (# of ICE VMT reduced per week\*52)= # of ICE VMT reduced per year. (# of ICE VMT reduced per year\*estimated mtCO2e per VMT)= mtCO2e reduced per year. (mtCO2e reduced per year \* 5) = mtCO2e reduced through 2030. (mtCO2e reduced per year \* 25) = mtCO2e reduced through 2050.
* Considerations: These reductions are based on a constant population of cyclists. We know the population will increase over time, which will likely cause an increase in cyclists, making our estimates more conservative.
* **Fleet Transition to Electric Vehicles Initiative**
* All fleet data (vehicle type, fuel type, # of vehicles to be replaced, type of vehicle as replacement etc.) was gathered from each respective fleet. For unknown fleets (NEFL counties) a conservative mix of vehicle types was estimated based on other known fleet data.
* Fleet VMTs were gathered and if VMT was unknown VMT estimates were based on AFLEET numbers.
* Approximate MPG of vehicles were estimated based on AFLEET numbers or vehicle information gathered online from manufacturer websites.
* Gallons of fuel per vehicle fleet were based on VMT and MPG of said vehicles.
* The EPA Greenhouse Gas Equivalencies Calculator was used to estimate metric tons of CO2 equivalent (mtCO2e) per gallon of gasoline and or diesel fuel.
* An average kilowatt hour (kWh) per mile was estimated from EV data online.
* Emission rate projections for the electrical grid were based on The National Renewable Energy Laboratory (NREL) projections using the FRCC CO2eassessment from NREL and were adjusted every year out to 2050 based on the predictions. Projected emission rates were used to calculate emissions from charging EVs each year.
* kWhs required to charge replacement EVs was based on the average kWh per mile and VMT of each vehicle being replaced.
* Equations: (VMT\*MPG)=# of gallons of fuel reduced. (VMT/mile per kWh)=kWh required for charging. (kWh required for charging\* mtCO2e per kWh emitted by electricity production)=emissions created by charging. (# of gallons of fuel reduced/ mtCO2e per gallon)= mtCO2e reduced. (mtCO2e reduced- emissions created by charging)=final mtCO2e reduced. A sum of all final mtCO2e reductions for each fleet for 5 years was compiled and used for mtCO2e reduction through 2030. A sum of all final mtCO2e reductions for each fleet for 5 years was compiled and used for mtCO2e reduction through 2050.
* Considerations: The 2050 projections are only based on the number of vehicles being replaced with this grant and being used for 25 years. Although the lifespan of an EV is likely closer to 15-20 years, it is expected that this is only the first step in EV transitions for these entities. It is expected that EV transitions will steadily grow and continue with this grant.