

Title: Colorado Greenhouse Gas Emission Tool (CO-GT) associated with article “A Colorado-Specific Life Cycle Assessment Model to Support Evaluation of Low-Carbon Transportation Fuels and Policy”

Abstract: The transportation sector accounts for over 20 percent of greenhouse gas (GHG) emissions in Colorado which without intervention will grow to over 30 million metric tons (MMT) of GHG emissions per year. This study seeks to develop a specific characterization of the Colorado fuel and transportation system using a customized life cycle assessment (LCA) model. The model (CO-GT) was developed as an analytical tool to define Colorado's 2020 baseline life cycle GHG emissions for the transportation sector, and to examine Colorado-specific pathways for GHG reductions through fuel types and volumes changes that might be associated with a state clean fuel standard (CFS). By developing a life cycle assessment of transportation fuels that is specific to the state of Colorado's geography, fleet makeup, policies, energy sector and more, these tools can evaluate various proposals for the transition towards a more sustainable state transportation system. The results of this study include a quantification of the Colorado-specific roles of clean fuels, electricity, extant policies, and fleet transition in projections of the state's 2030 transportation sector GHG emissions. Relative to a 2020 baseline, electrification of the vehicle fleet is found to reduce state-wide lifecycle GHG emissions by 7.7 MMT CO₂e by 2030, and a model CFS policy able to achieve similar reductions in the carbon intensity of clean fuels as was achieved by California in the first 10 years of its CFS policies is found to only reduce state-wide lifecycle GHG emissions by 0.2 MMT CO₂e by 2030. These results illustrate the insensitivity of Colorado's transportation fleet GHG emissions reductions to the presence of CFS policies, as proposed to date.

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Format of data files – Excel Macro-Enabled Workbook (*.xlsm)

Location where data were collected – The state of Colorado.

Time period during which data were collected – 2014-2020

File Information

This dataset includes two .xlsm (Excel Macro-Enabled Workbook) files:

- CO-GT_V3.xlsm – The Colorado Greenhouse Gas Emission Tool (CO-GT_v3.xlsm) is a Colorado-specific fuel life cycle model, that adopts many of the assumptions and methods of the Greenhouse Gases, Regulated Emissions and Energy Use in Transportation (GREET 2020) model developed by Argonne National Laboratory (Wang et al., 2020), excluding regulated emissions and energy use. The CO-GT encompasses the energy and transportation fuel system for the state of Colorado. The scope of this model is to define the well-to-wheels (WTW) GHG emissions for in-state production of fuels, production of imported crude oil and fuels and consumption of fuels along the fuel life cycle. Data used in this model were updated

until 12/09/2020.

The model was customized and uses Colorado-specific data for:

- Crude oil imports
 - Crude oil transportation modes and distances
 - API gravity and S content of crude oil imports
 - Electricity mix for transportation and stationary use
 - Coal type percentages
 - Natural gas type percentages
 - Ethanol production for type of plant #7, with dry mill and only WDGS as co-product and NG as process fuel
 - Only domestic land use change emissions are accounted
- Colorado LDH-HDV Fleet Model v12.xlsm – This model is used to estimate on-road LDV and HDV Fuel Consumption in Colorado state. The model uses:
 - Total number of LDV/HDV registered
 - Share of vehicles type within each fleet (LDV/HDV)
 - Vehicle miles travel for each vehicle type
 - Fuel economy per vehicle type per technology
 - Current and projected vehicle technology share within each vehicle type
 - Projection of registered vehicles (LDV/HDV)

References

Wang, Michael, Elgowainy, Amgad, Lee, Uisung, Bafana, Adarsh, Benavides, Pahola T., Burnham, Andrew, Cai, Hao, Dai, Qiang, Gracida, Ulises, Hawkins, Troy R., Jaquez, Paola V., Kelly, Jarod C., Kwon, Hoyoung, Liu, Xinyu, Lu, Zifeng, Ou, Longwen, Sun, Pingping, Winjobi, Olumide, Xu, Hui, Yoo, Eunji, Zaimes, George G., & Zang, Guiyan. (2020, October 09). *Greenhouse gases, Regulated Emissions, and Energy use in Technologies Model ® (2020 Excel)*. [Computer software]. <https://doi.org/10.11578/GREET-Excel-2020/dc.20200912.1>.