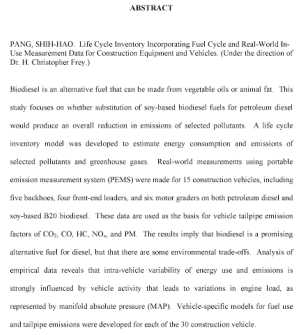

ABSTRACT

PANG, SHIH-HAO. Life Cycle Inventory Incorporating Fuel Cycle and Real-World In-Use Measurement Data for Construction Equipment and Vehicles. (Under the direction of Dr. H. Christopher Frey.)

Biodiesel is an alternative fuel that can be made from vegetable oils or animal fat. This study focuses on whether substitution of soy-based biodiesel fuels for petroleum diesel would produce an overall reduction in emissions of selected pollutants. A life cycle inventory model was developed to estimate energy consumption and emissions of selected pollutants and greenhouse gases. Real-world measurements using portable emission measurement system (PEMS) were made for 15 construction vehicles, including five backhoes, four front-end loaders, and six motor graders on both petroleum diesel and soy-based B20 biodiesel. These data are used as the basis for vehicle tailpipe emission factors of CO_2, CO, HC, NO_x, and PM. The results imply that biodiesel is a promising alternative fuel for diesel, but that there are some environmental trade-offs. Analysis of empirical data reveals that intra-vehicle variability of energy use and emissions is strongly influenced by vehicle activity that leads to variations in engine load, as represented by manifold absolute pressure (MAP). Vehicle-specific models for fuel use and tailpipe emissions were developed for each of the 30 construction vehicle.

Life Cycle Inventory Incorporating Fuel Cycle And Real-world In-use Measurement Data For Construction Equipment And Vehicles

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Summary : Free life cycle inventory incorporating fuel cycle and real-world in-use measurement data for construction equipment and vehicles pdf download - the time-based regression model has the highest explanatory ability among six models and is recommended in order to predict fuel use and emission rate for diesel-fueled nonroad construction equipment representative duty cycles for each type of vehicles were characterized by a frequency distribution of normalized manifold absolute pressure map in order to assess the variations of fuel use and emissions among different duty cycles for a given engine the inter-cycle variability is assessed in order to assess the variations of fuel use and emissions among engines for a given duty cycle the interengine variability is assessed the results indicated time-based inter-cycle and inter-engine variations of fuel use and emissions are significant fuel-based emission factors have less variability among cycles and engines than time-based emission factors fuelbased emission factors are more robust with respect to inter-engine and inter-cycle variations and are recommended in order to develop an emissions inventory for nonroad construction vehicles real-world in-use measurements should be a basis for developing duty cycle correction factors in models such as nonroad

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