

## Influence of the diesel emission scandal on greenhouse gas emissions

Relevance to the Automotive Industry:	In 2015, the United States Environmental Protection Agency (EPA) found, that some car manufacturers had intentionally programmed diesel engines to activate their emission controls only during laboratory emission testing. As a result, the so-called diesel emission scandal started, developing worldwide repercussions. Consequently, in Germany, for example, driving bans were imposed on certain vehicles. The share of diesel drivetrains in passenger car sales decreased, and the share of gasoline engines increased—which emit more greenhouse gases during operation than diesel engines.	
Research Location:	Technische Universität Darmstadt Institute for Internal Combustion Engines and Powertrain Systems (VKM)	
Homepage (Engl.):	<a href="http://www.vkm.tu-darmstadt.de">http://www.vkm.tu-darmstadt.de</a>	
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Project Description:	<p>The Technische Universität Darmstadt Institute for Internal Combustion Engines and Powertrain Systems (VKM) investigates vehicle powertrain systems with focus on emission and efficiency optimization. Thus, the institute is also interested in the repercussions of the diesel emission scandal.</p> <p>The goal of this NSF REU project is to quantify the additional greenhouse gas emissions that resulted from the increased gasoline vehicle sales that replaced of diesel-powered vehicles from 2015 onwards. This includes considering the number of diesel vehicles that were replaced, the additional greenhouse gas emission of these replacements, and the influence of driving bans for the distance travelled by vehicles.</p> <p><b>PHASE A</b> (2 weeks): First, the NSF REU students will perform a detailed literature review to collect the data necessary for the calculations.</p> <p><b>PHASE B</b> (4 weeks): Next, the NSF REU student will develop a greenhouse gas emission model for the passenger car fleet, which considers all aspects influenced by the diesel emission scandal.</p> <p><b>PHASE C</b> (2 weeks): Then, the NSF REU student will feed the model with projected data from the years before the diesel emission scandal and quantify the effects of the change in the number of diesel vehicles on the climate change.</p> <p><b>PHASE D</b> (2 weeks): Finally, the NSF REU students will document the research performed, prepare a written report, and deliver an end-of-summer presentation on the research performed.</p>	
May 30 - Aug 06, 2022 (10 weeks, 40 h/week)		
Target publications:	<ul style="list-style-type: none"> <li>10th International Engine Congress, February 28 - March 1, 2023, Baden-Baden, Germany: <a href="https://www.atzlive.de/en/events/international-engine-congress/">https://www.atzlive.de/en/events/international-engine-congress/</a></li> </ul>	
Necessary Skills/ Knowledge:	<ul style="list-style-type: none"> <li>Basic Knowledge about automotive technologies and industry</li> </ul>	
Desirable Skills/ Knowledge:		
Additional Online Resource(s):	<ul style="list-style-type: none"> <li><a href="https://en.wikipedia.org/wiki/Volkswagen_emissions_scandal">https://en.wikipedia.org/wiki/Volkswagen_emissions_scandal</a></li> </ul>	

NSF REU Students must have completed at least two semesters of engineering studies prior to the proposed summer research, and they must have at least one semester remaining before they can earn their BS in Engineering.