

WEBINAR

Biodiesel B5 and B10 Studies

July 1, 2014

Industrial Strategies Division
California Air Resources Board

Agenda

- * Background
- * Study Overview
- * Results
- * Conclusions
- * Next Steps

Webinar Purpose

- * Follow up on April 15, 2014 workshop comments
- * Release all rulemaking NOx data
- * Share initial CARB thoughts on newest dataset

Background

- * Biodiesel Characterization and NOx Mitigation Study 2011
 - * B5: wide statistical variance with no demonstrable NOx emissions impact
 - * B10: data points were limited
- * Identified need for supplemental NOx emission study at B5
- * Need for emissions comparison of Cummins ISM vs. DDC series 60

Study Design

- * Stakeholder feedback from 2011 Durbin study informed supplemental B5 and B10 study
- * Feedback on test sequence led to use of back-to-back replicates for increased statistical confidence
- * Questions about similarity of results for Cummins and DDC led to use of DDC in the study
- * No cruise cycles included due to issues within 2011 Durbin study

Study Overview-Fuels

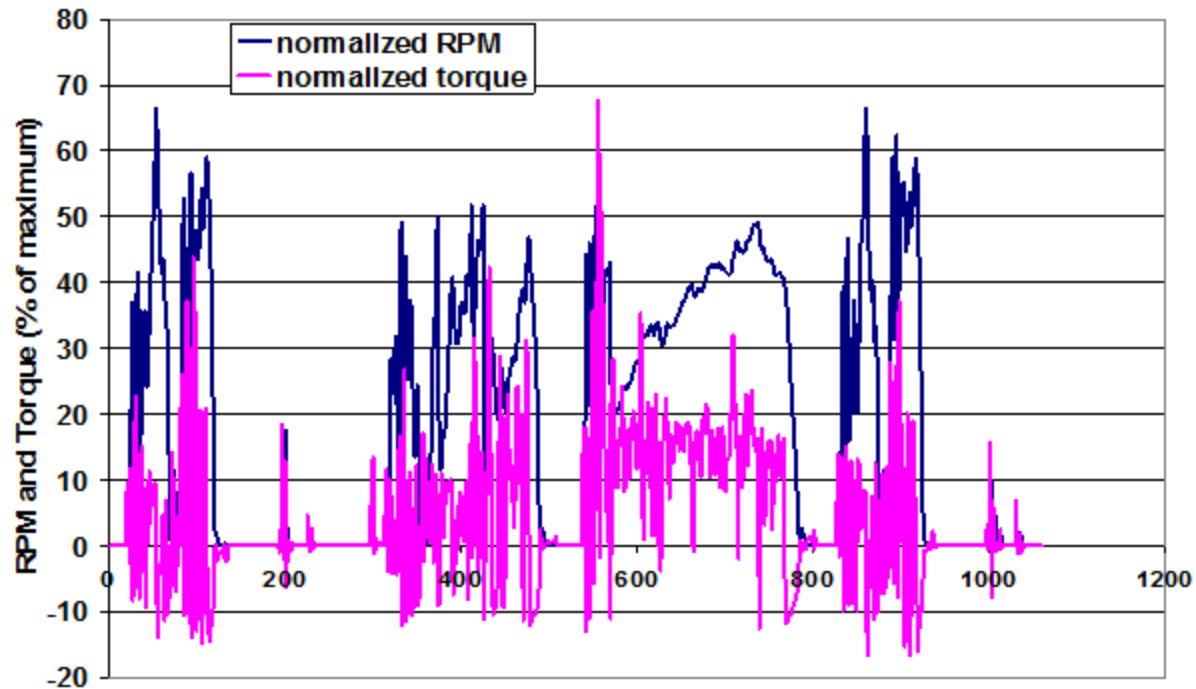
- * Baseline Commercial CARB diesel
- * Two biodiesel feedstocks
 - * Soy
 - * Animal
- * Two biodiesel blends
 - * B5
 - * B10

Study Overview-Engine

- * Two engines
 - * 2006 Cummins ISM
 - * 1991 DDC series 60
- * Three duty cycles
 - * Urban Dynamometer Drive Schedule (UDDS)
 - * Federal Test Procedure (FTP)
 - * Supplemental Emissions Test (SET)

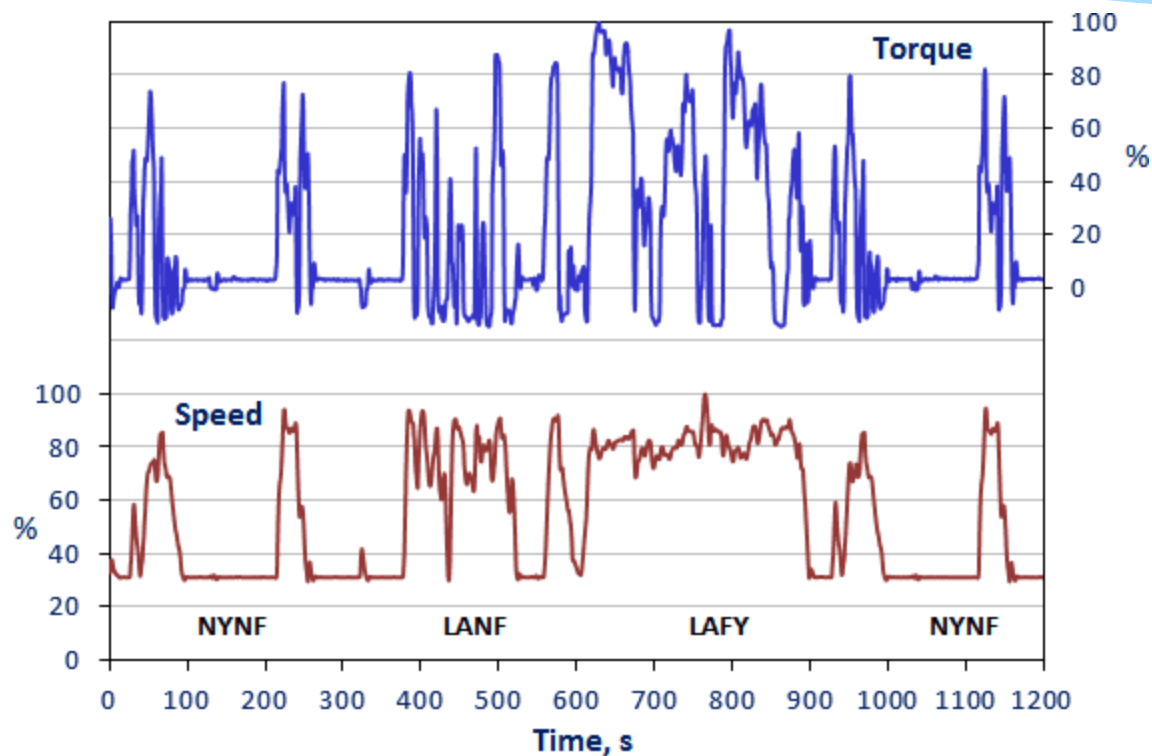
Study Overview-Cycles

* UDDS



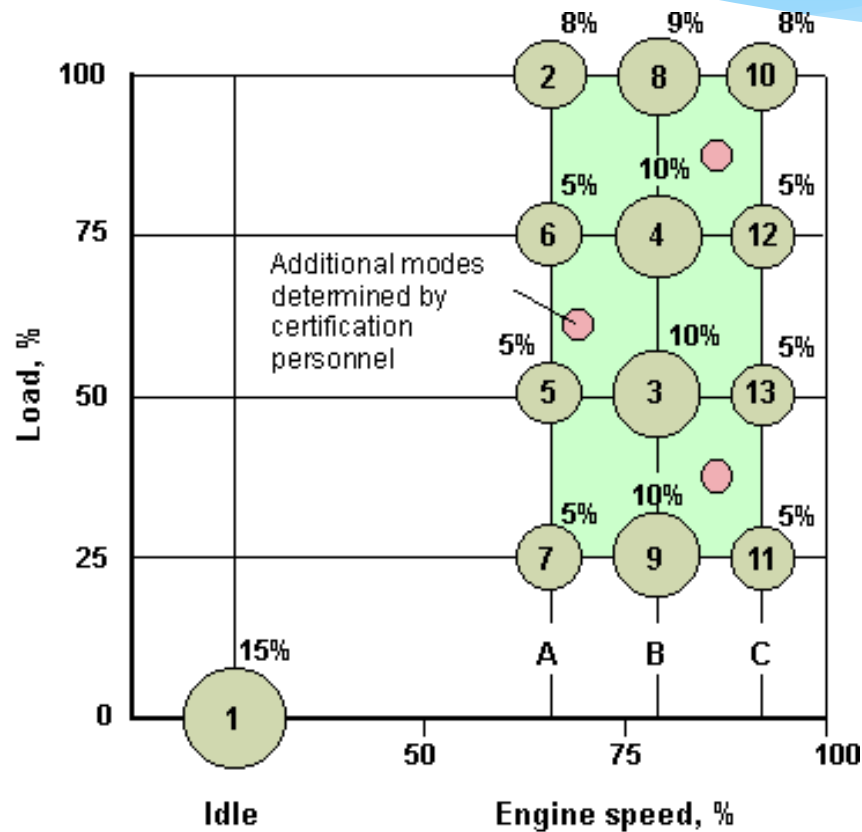
Study Overview-Cycles

* FTP



Study Overview-Cycles

* SET



Study Overview-Test Sequence

- * Test cycle pattern RCCR-RCCR, where R is reference fuel (CARB diesel) and C is candidate biodiesel blend (e.g. B5, B10)
- * Eliminates diurnal variability
- * 8 replicates on FTP and UDDS
- * 4 replicates on SET

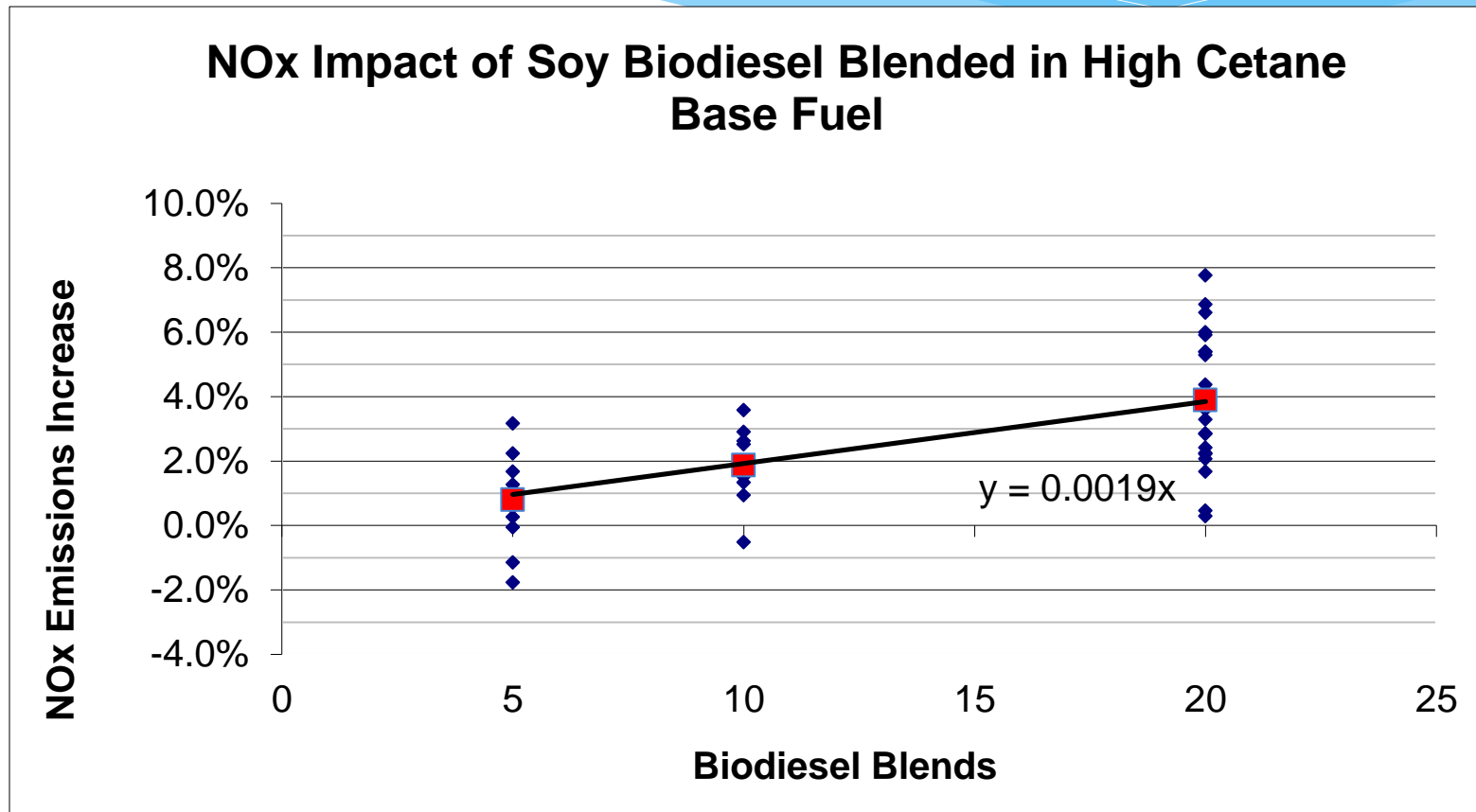
Results

- * Study generated 24 distinct average data points based on differences in blend, feedstock, engine, and cycle
- * More detail in next presentation

Literature Context

- * Literature on B5 soy:
 - * Number of average data points increased from 8 to 14
 - * Number of total replicates on BD increased 40 to 78
- * Literature NO_x results range from -1.77% to +3.17%
- * Strong clustering between 0.5% and 1.5% increase

NOx Impact of Soy Biodiesel



NTDE Discussion

- * NTDEs with SCR have no fuel based NOx difference at higher biodiesel blends
 - * Presumably no NOx increase at lower levels
- * Technological justification supports no NOx increase

Applicability of Data

- * Differences in base fuels, duty cycles, and engines exist within the HD truck fleet
- * Studies in literature examined differing base fuels
 - * Percent difference was largely similar regardless of differences in base CARB diesel
- * Studies covered newer and older legacy vehicles, and found directionally similar results
- * Duty cycles vary in magnitude of response, but directionally similar

Next Steps

- * Solicit stakeholder feedback on data and need for biodiesel use NOx mitigation
- * Internal evaluation of data ongoing, and new external statistical analysis
- * Public workshop tentatively scheduled for July 31
- * Board hearing scheduled for November 2014

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Alternative Diesel Fuel Website:
<http://www.arb.ca.gov/fuels/diesel/altdiesel/biodiesel.htm>