

# 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

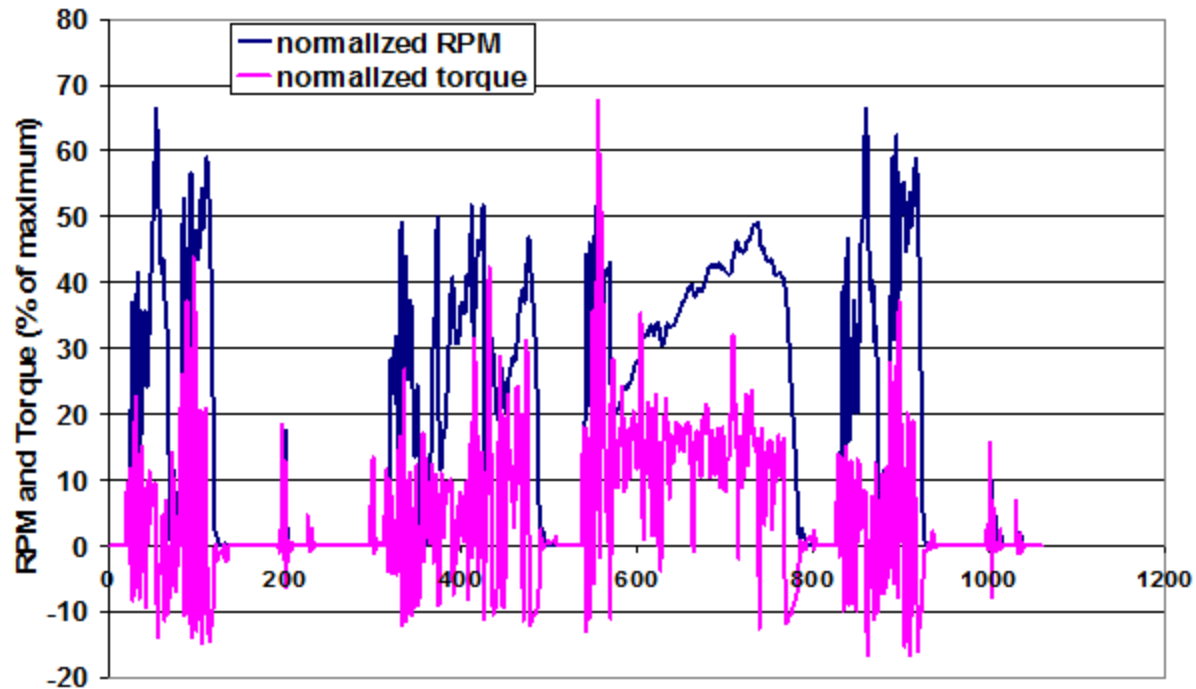
- \* Baseline Commercial CARB diesel
- \* Two biodiesel feedstocks
  - \* Soy
  - \* Animal
- \* Two biodiesel blends
  - \* B5
  - \* B10

# 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

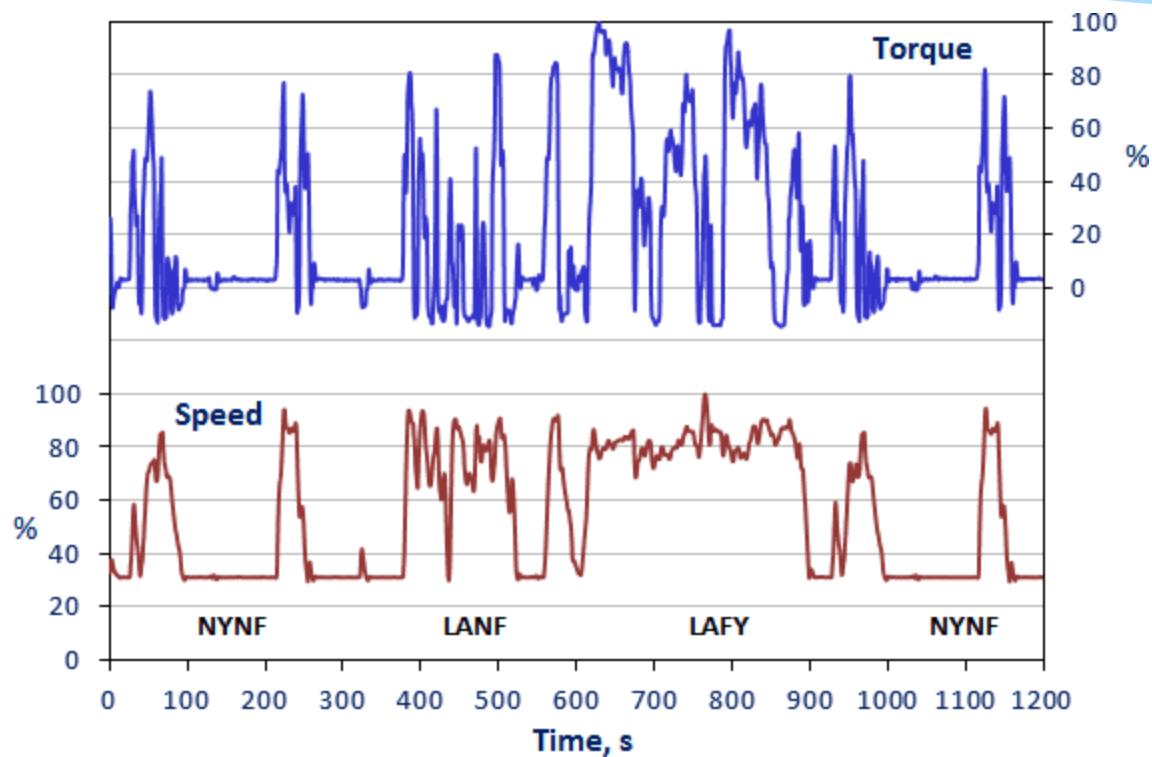
## \* UDDS





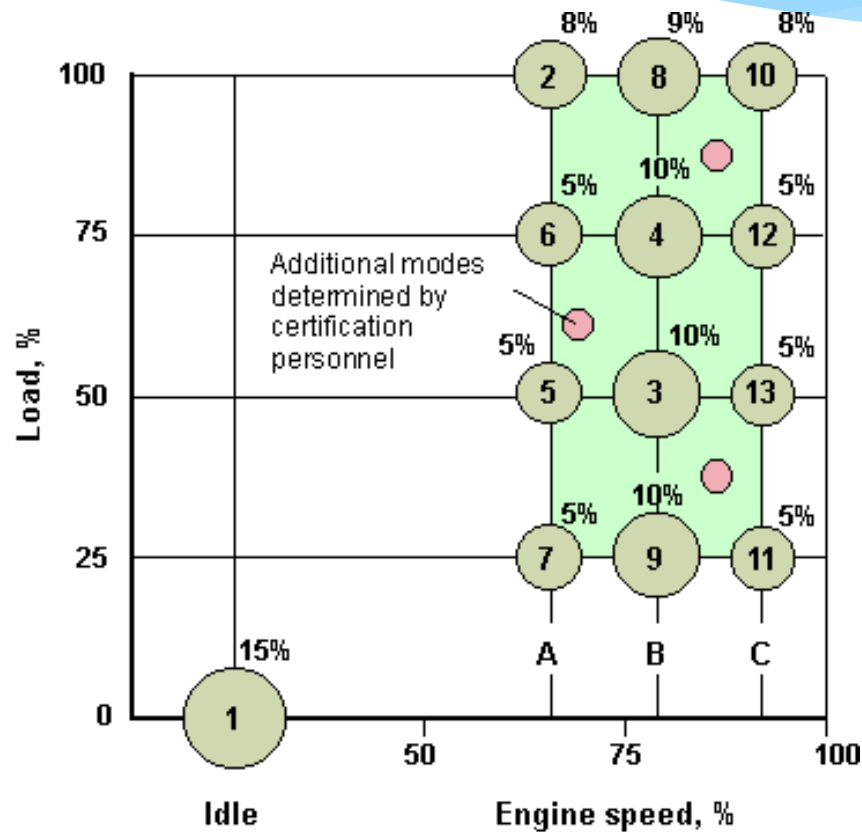
# Study Overview-Cycles

## \* 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

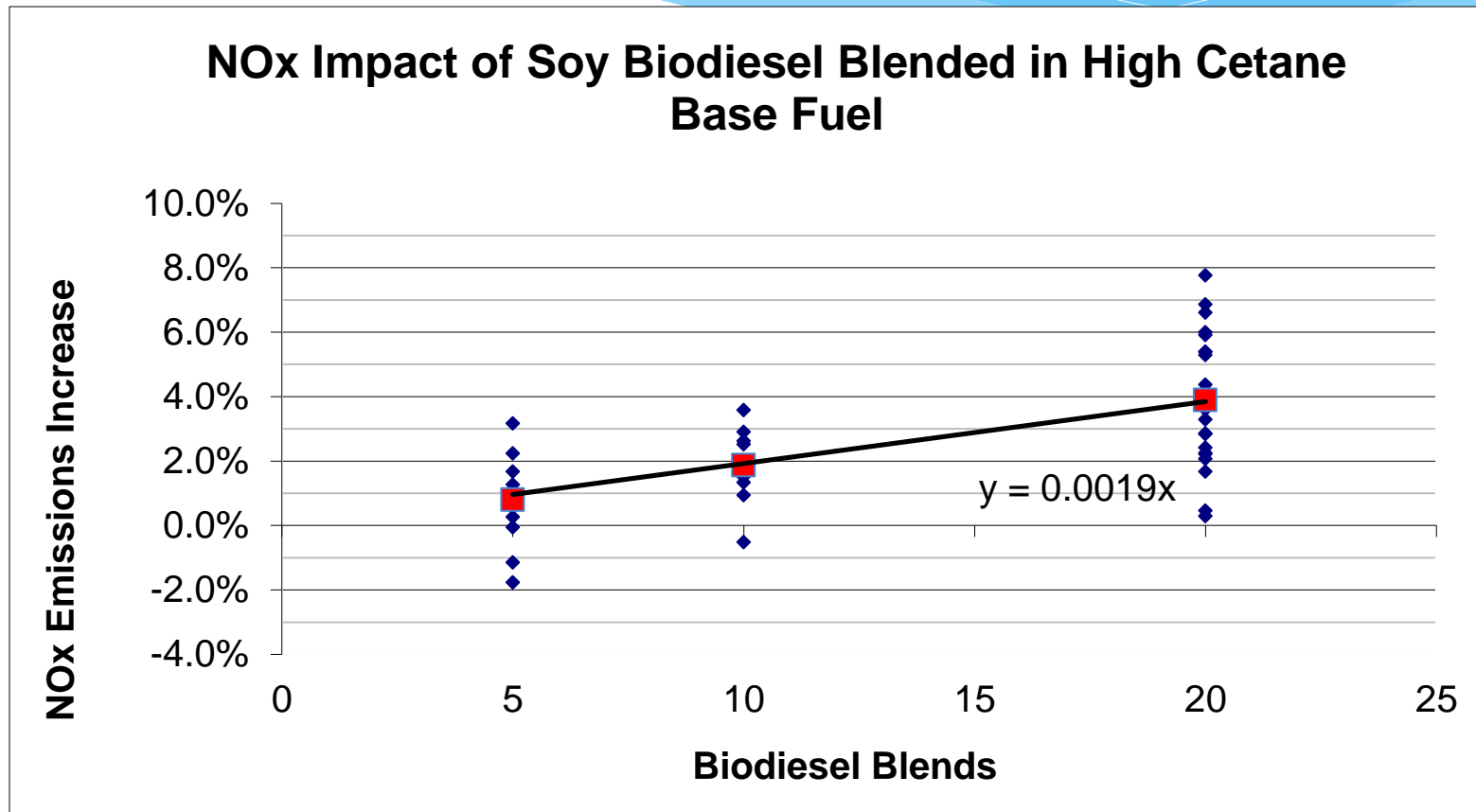
# Results

- \* 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 NOx 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>