



THE UNIVERSITY OF AUCKLAND
FACULTY OF ENGINEERING



EECA Biofuels Conference

Wellington, 21 April 2006

Biodiesel developments in Auckland: Bus emissions pilot test programme

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Overview

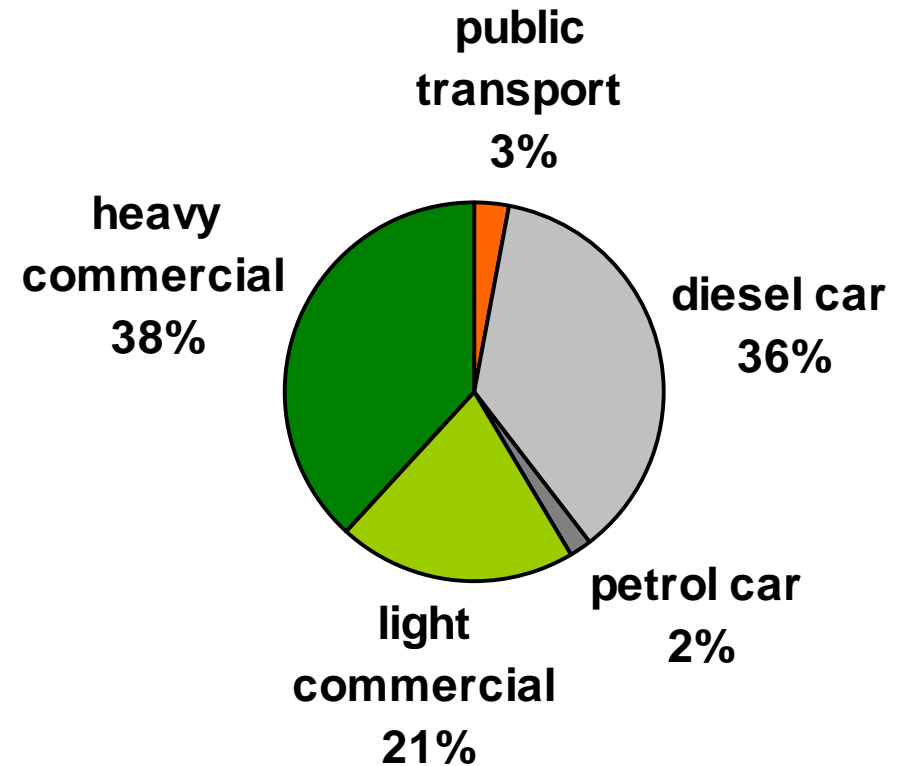
- Introduction/context
- Auckland biodiesel bus emissions tests
- Comparison to Bus Emissions Prediction Model
- Future work

Introduction/context

Contribution of Diesel Vehicles to PM Emissions in Auckland

Air pollution costs are
dominated by diesel vehicles

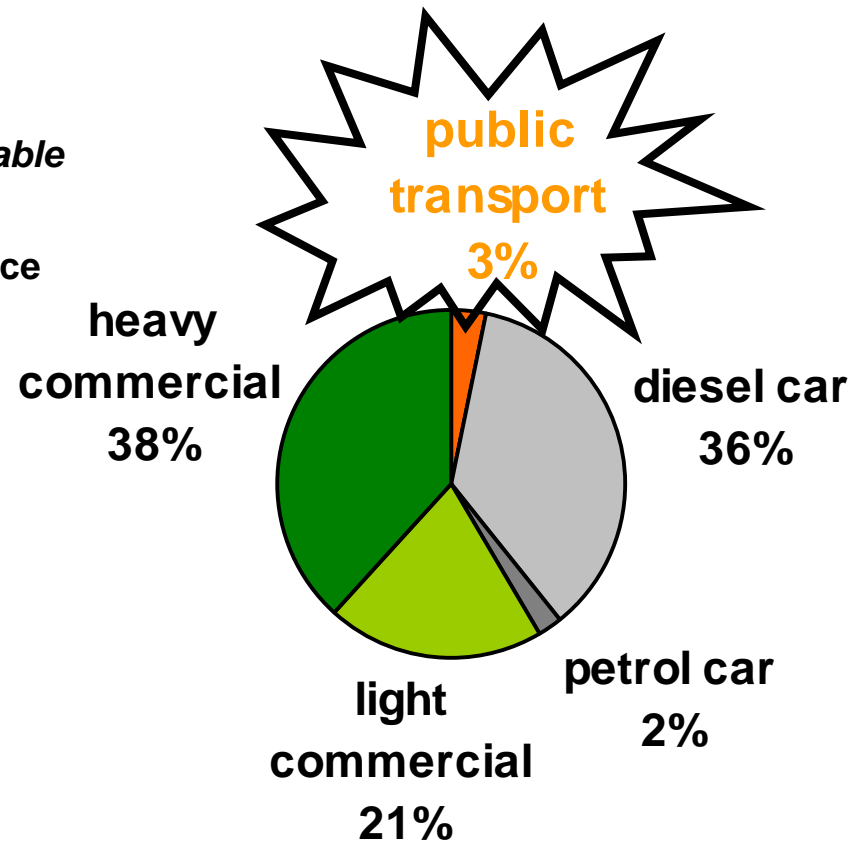
~91%!



Introduction/context

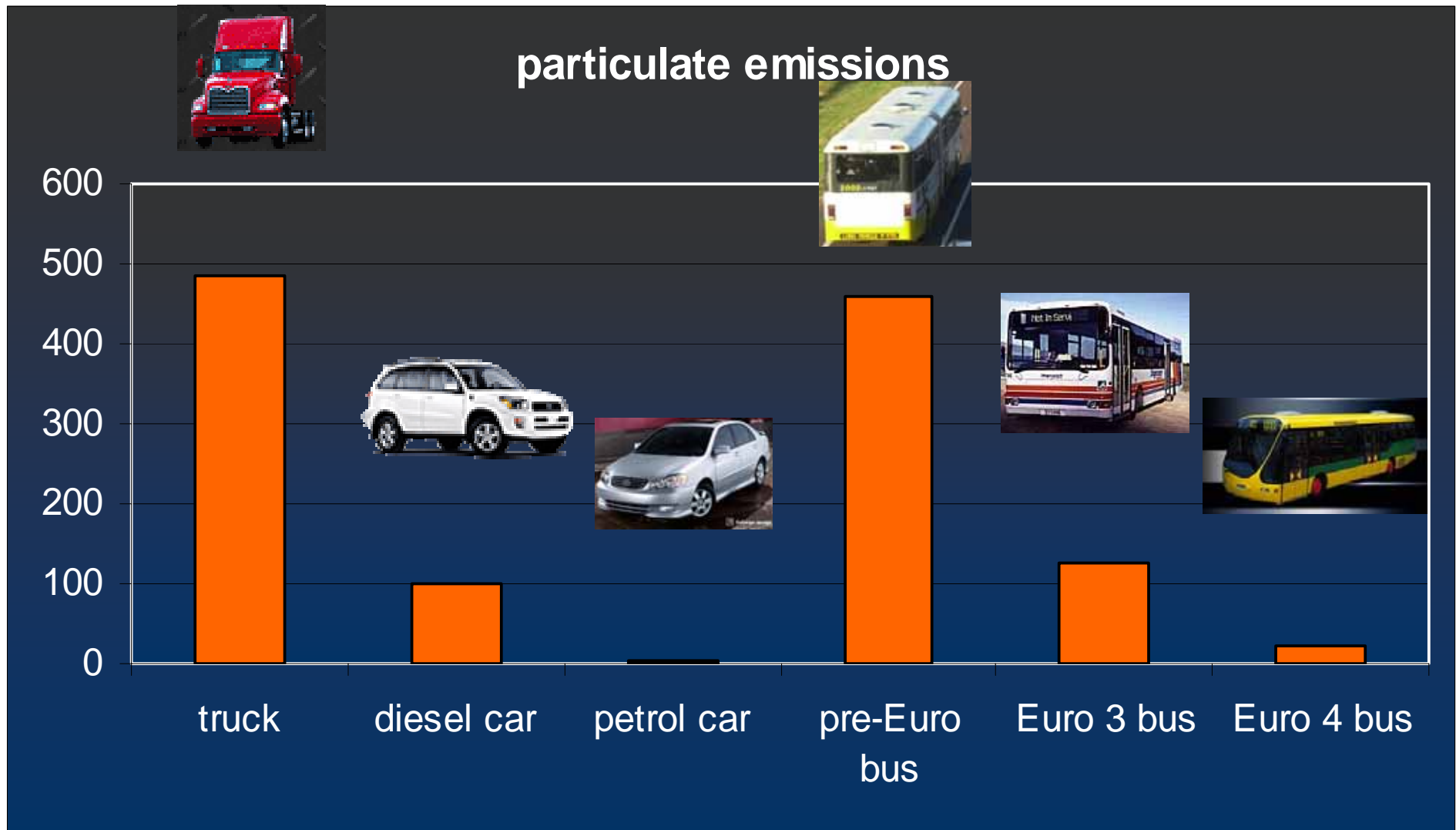
Why Target Buses?

- Bus companies are in the business of *sustainable transport* and social inclusion
- Buses are the *logical leaders* in efforts to reduce emissions from large diesel fleets



Introduction/context

Comparison of Vehicle Emissions



Introduction/context

- Biodiesel contributes to two of the New Zealand Transport Strategy objective:
 - o “ensuring environmental sustainability” (from renewables/GHG benefits)
 - o “protecting and promoting public health” (from air quality benefits)

Emissions

- Bus emissions tests:
 - o Chassis dynamometer facility with GGH
 - o Performance, emissions and fuel consumption
 - o Comparison to 50 ppm sulphur diesel as reference
 - o Oxides of nitrogen (NO_x) and particulate matter (PM) of primary interest

Emissions

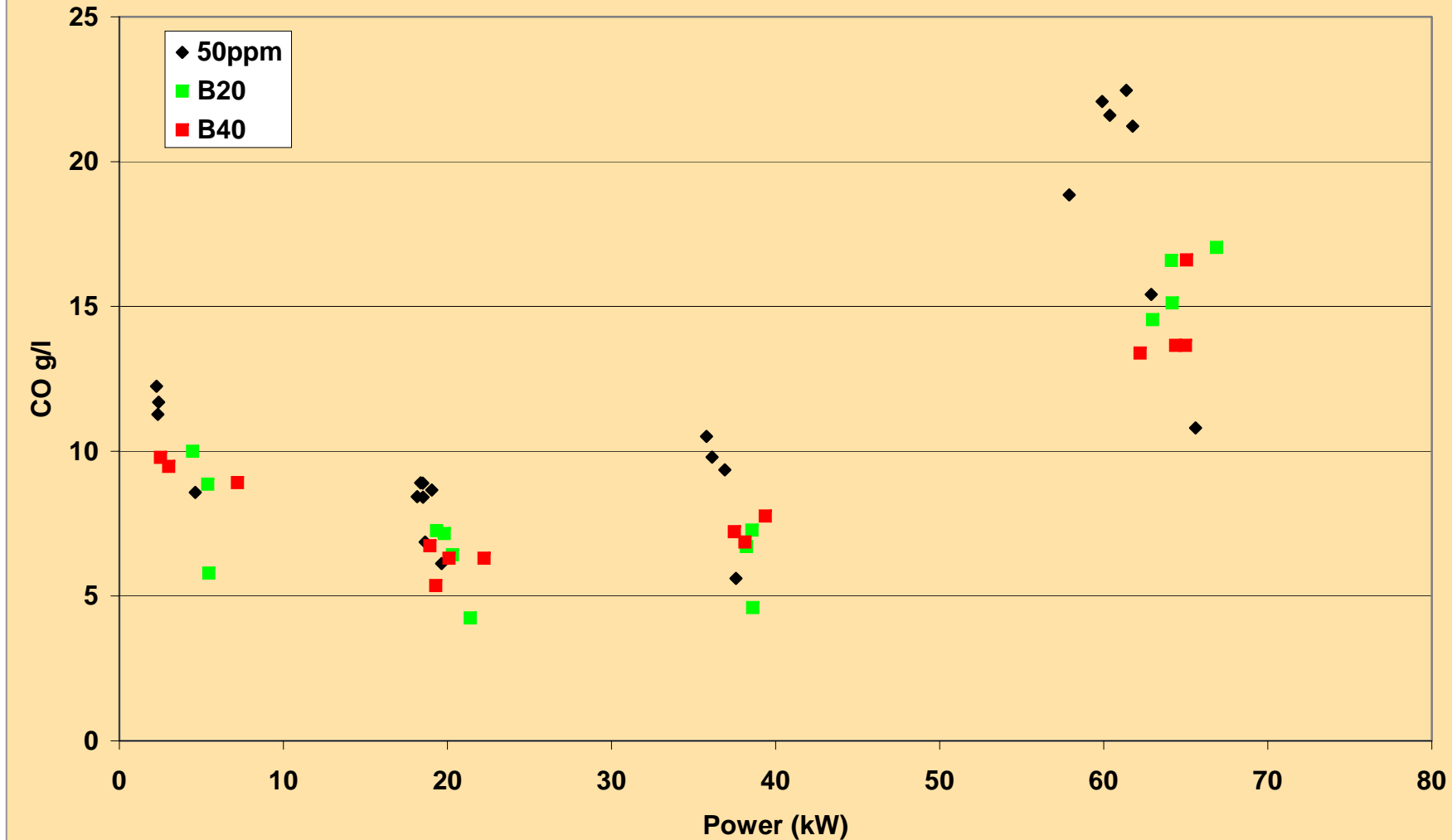


Emissions



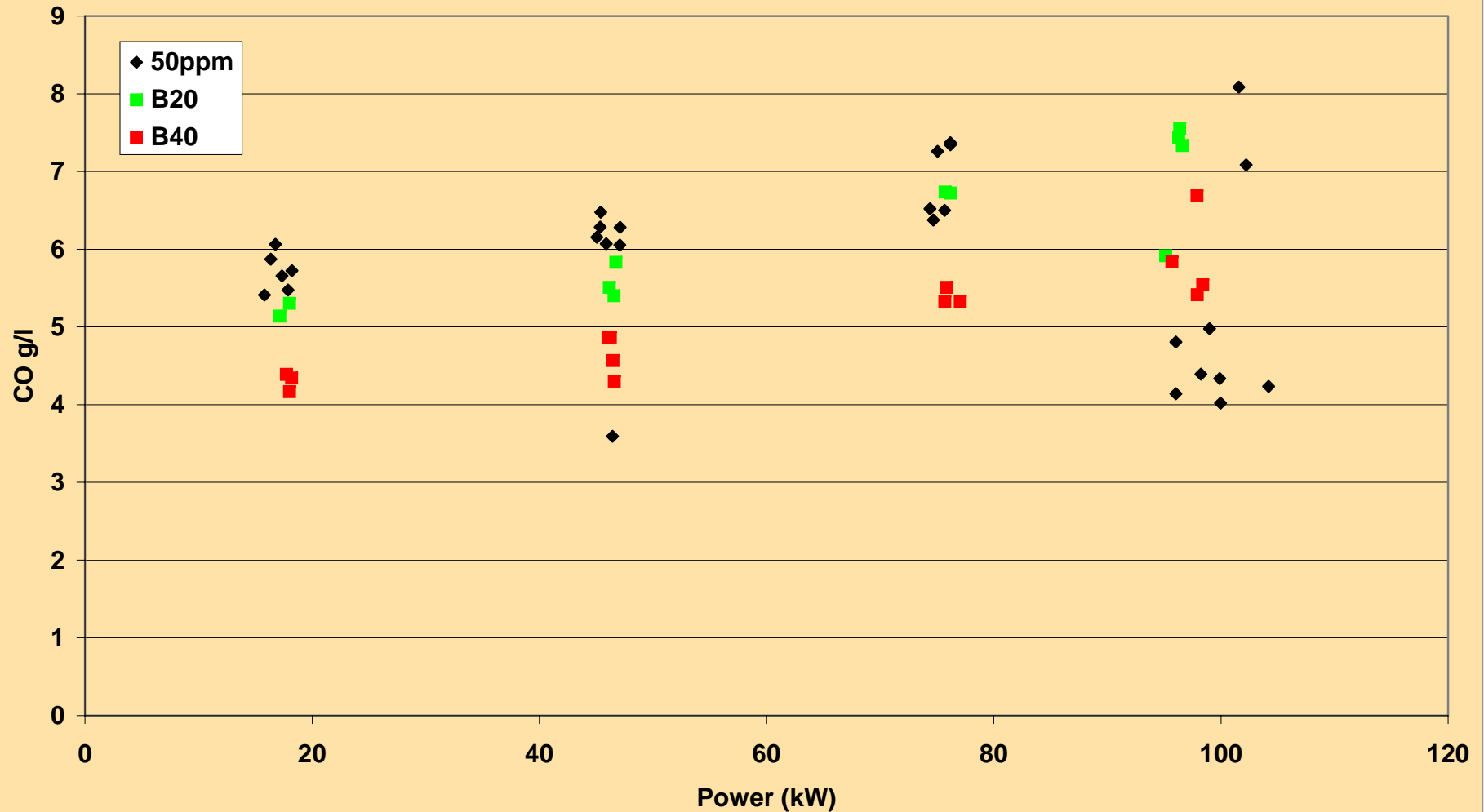
Emissions

Bus A CO emissions at one engine speed and varied load



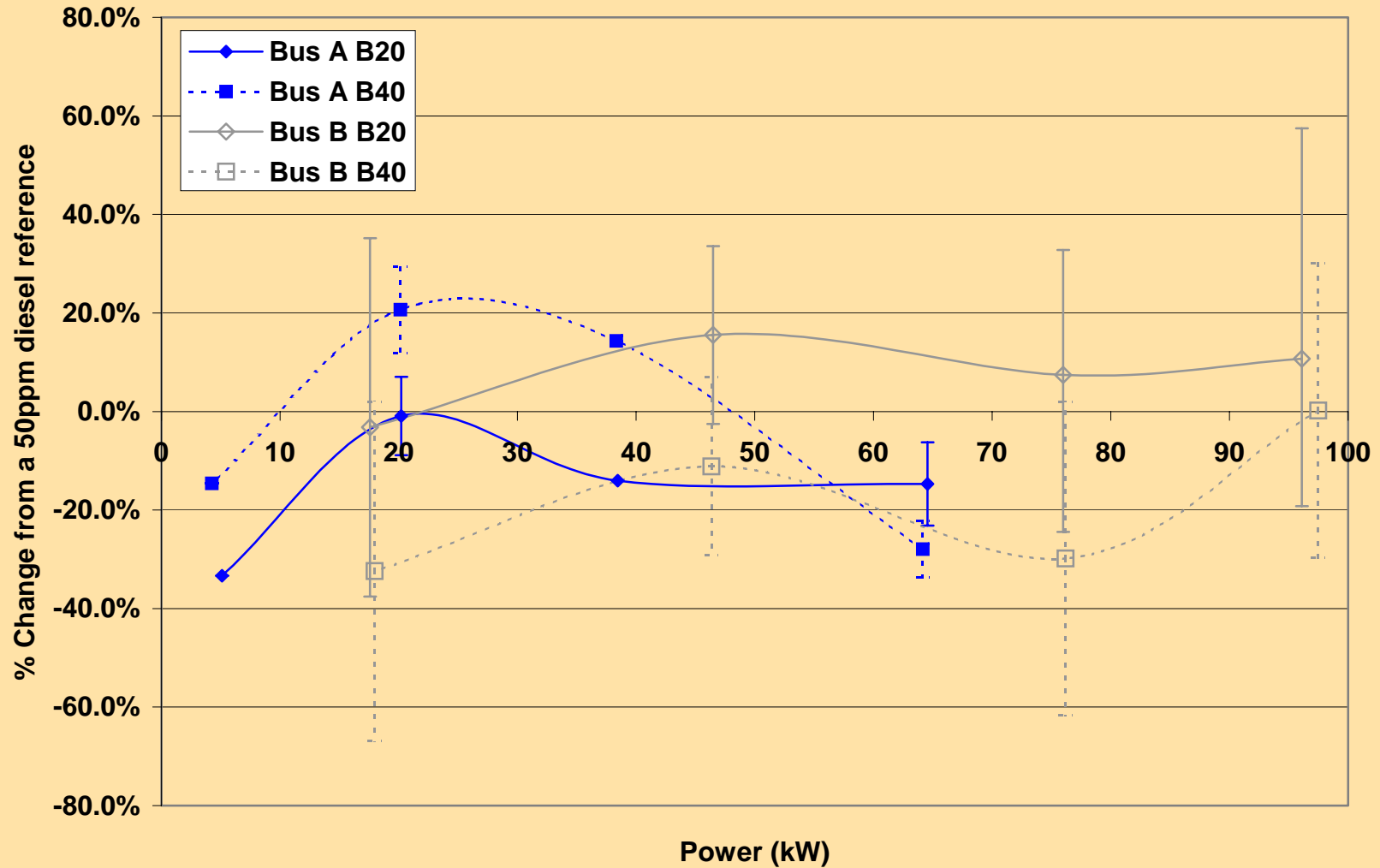
Emissions

Bus B CO emissions at one engine speed and varied load



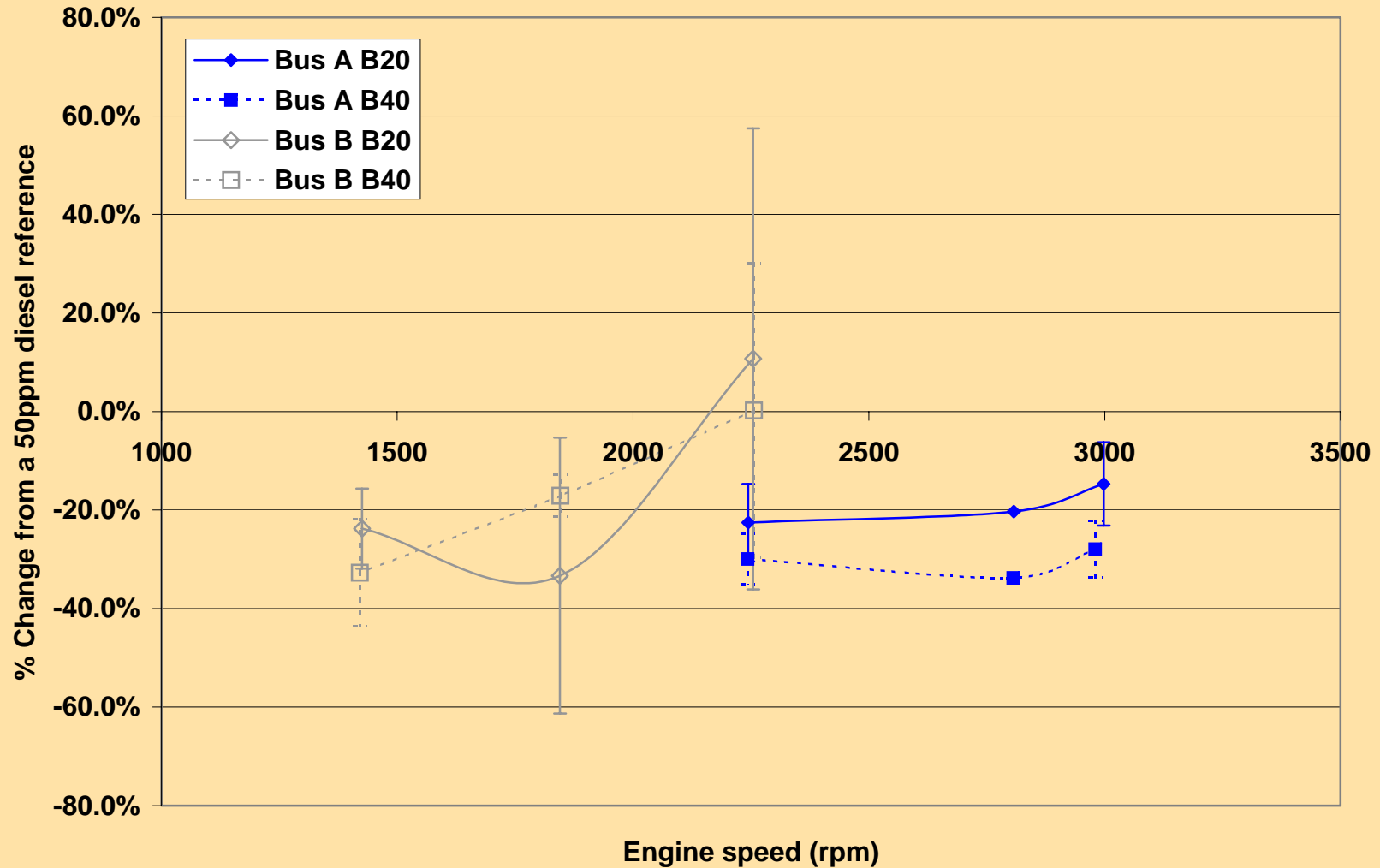
Emissions

Particulate Matter (g/l) at one engine speed and varied load



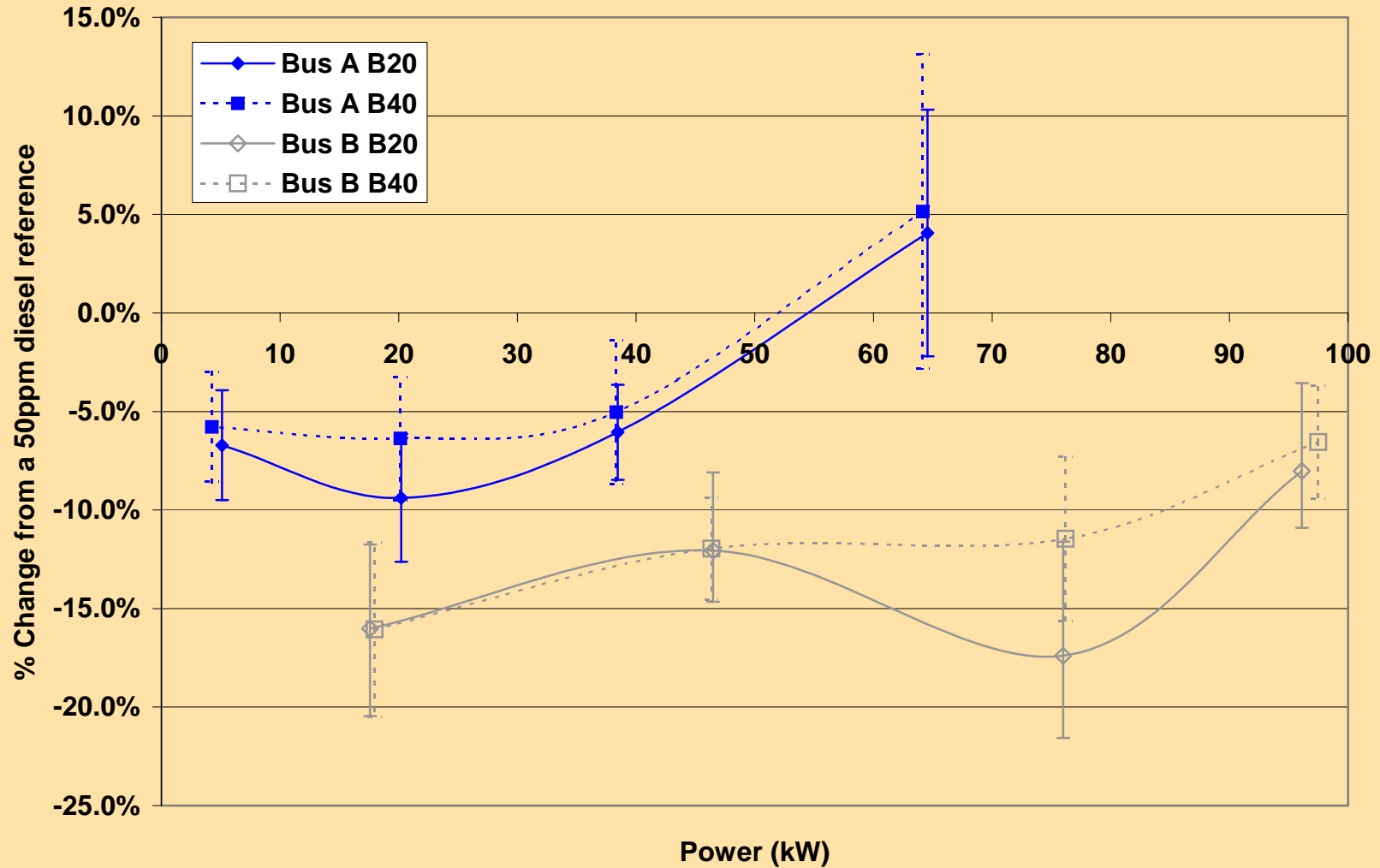
Emissions

Particulate Matter (g/l) at full load and varied engine speed



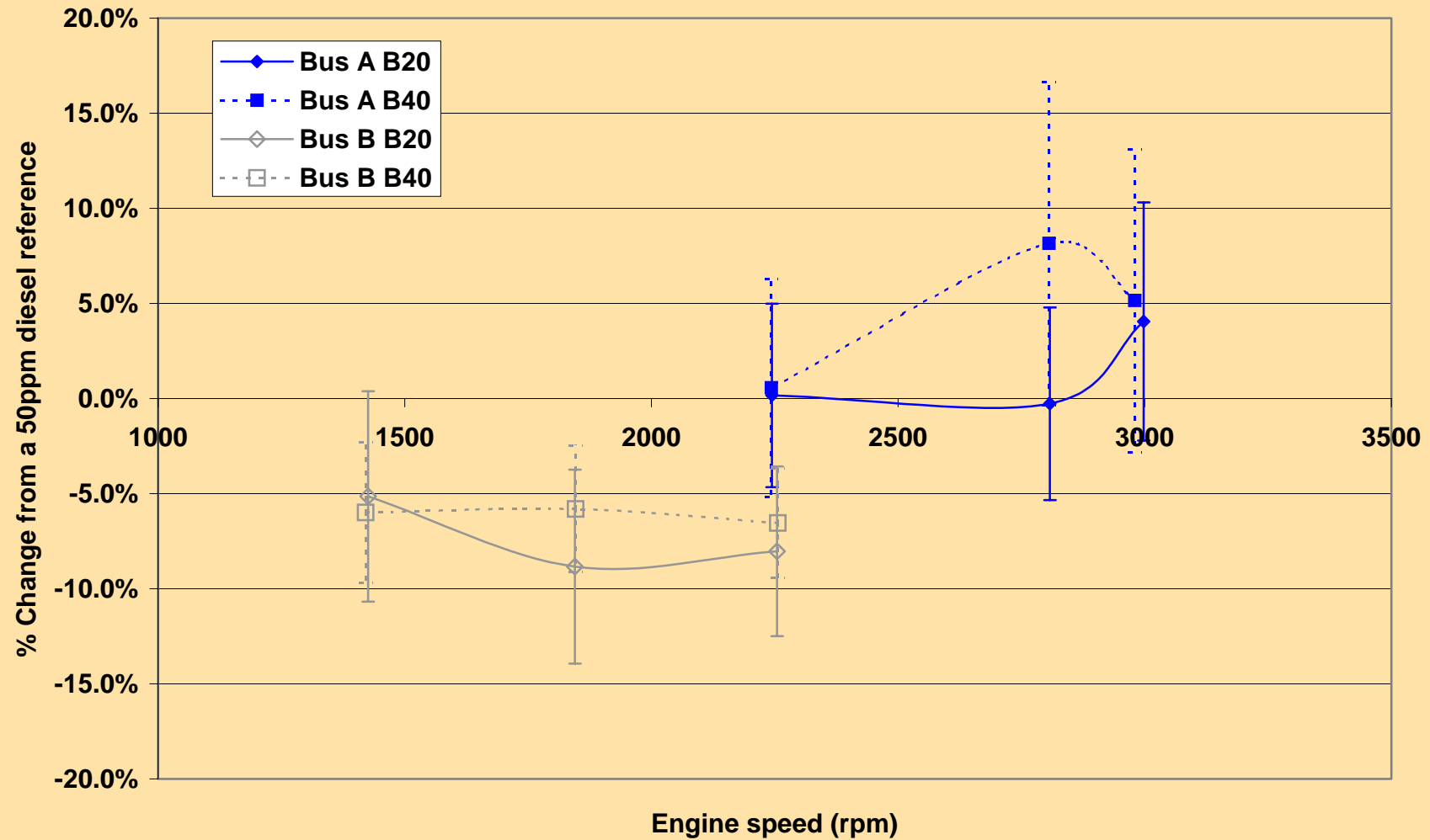
Emissions

Nox emissions (g/l) at one engine speed and varied load



Emissions

NOx emissions (g/l) at full load and varied engine speed



BEPM comparisons

Emission species:		CO	CO2	HC	NOx	PM	FC
B20							
BEPM		-14%	0%	-21%	0%	-11%	1%
Actual Full Load		8%	-1%	-2%	-3%	-17%	0%
Actual Part Load		-15%	-2%	-12%	-11%	-4%	1%
Actual Combined		-3%	-2%	-7%	-7%	-10%	0%
B40							
BEPM		-26%	0%	-38%	0%	-21%	3%
Actual Full Load		-4%	-1%	-6%	1%	-22%	2%
Actual Part Load		-19%	-2%	-23%	-7%	-8%	2%
Actual Combined		-11%	-2%	-14%	-3%	-15%	2%
Comparison between BEPM predictions and actual measurements							
Actual results from buses A and B combined							
PM particulate matter							
FC fuel consumption							

Emissions

- Future work:
 - o Buses with catalysts
 - o Detailed engine experiments



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