WWH-OCE

- **Evaluation of the WNTE control area**
- **The Netherlands**
- André Rijnders

- Geneva, 17 January 2006
- 12 th meeting of Working group on Off-Cycle Emissions

- Data from TNO automotive

Introduction

Main question:

Is the WNTE control area sufficiently wide enough?

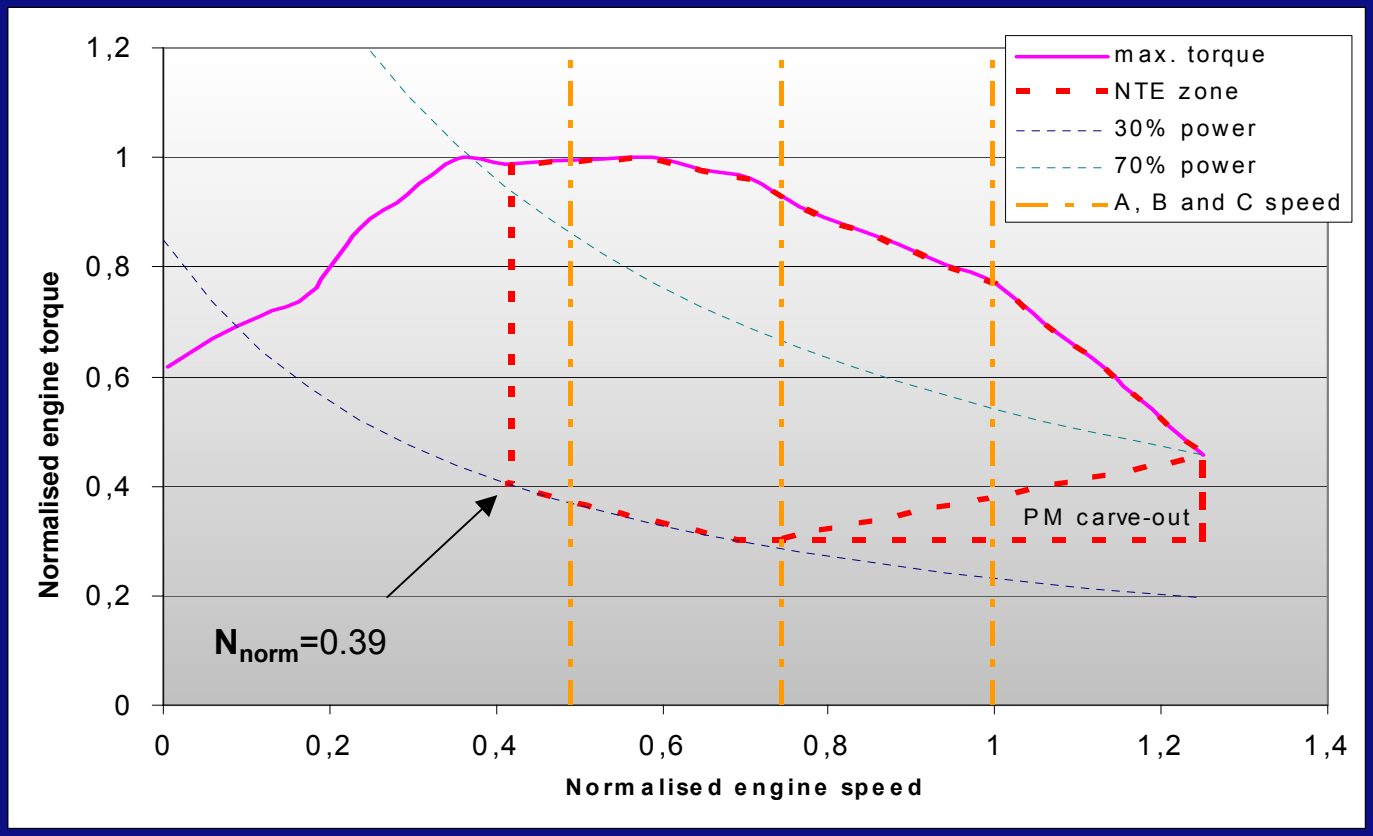
or

Are there spots in the engine map (outside the control area) that have a significant emission contribution in real life operation?

Approach

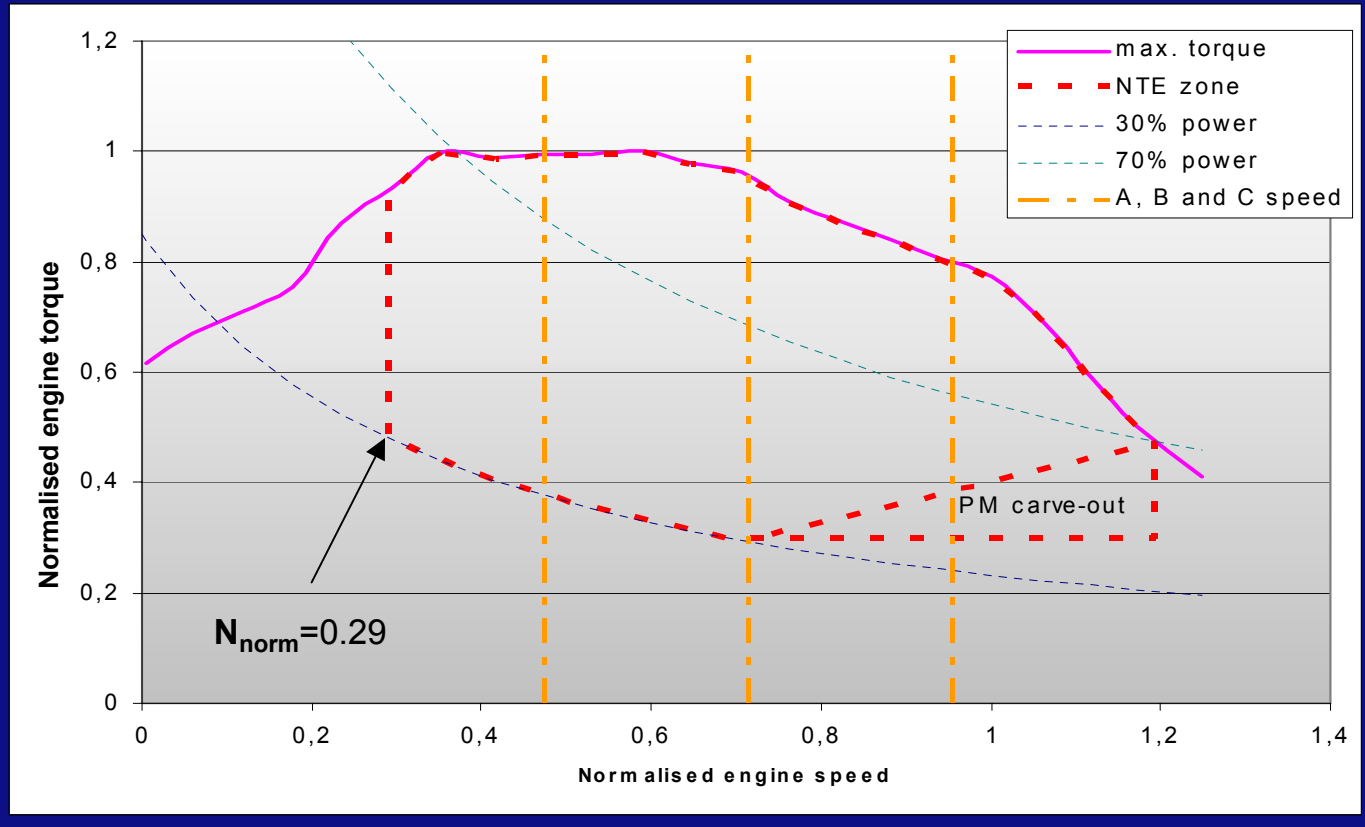
1. Determine the WNTE area for an ‘average’ engine
2. Simulate a number of representative case
3. (representative vehicle types over representative real-life driving cycles)
4. Calculate the emission contribution for each part of the engine map
5. Evaluate the emission contributions in- and outside the control area

WNTE control area (work.doc. version 8)



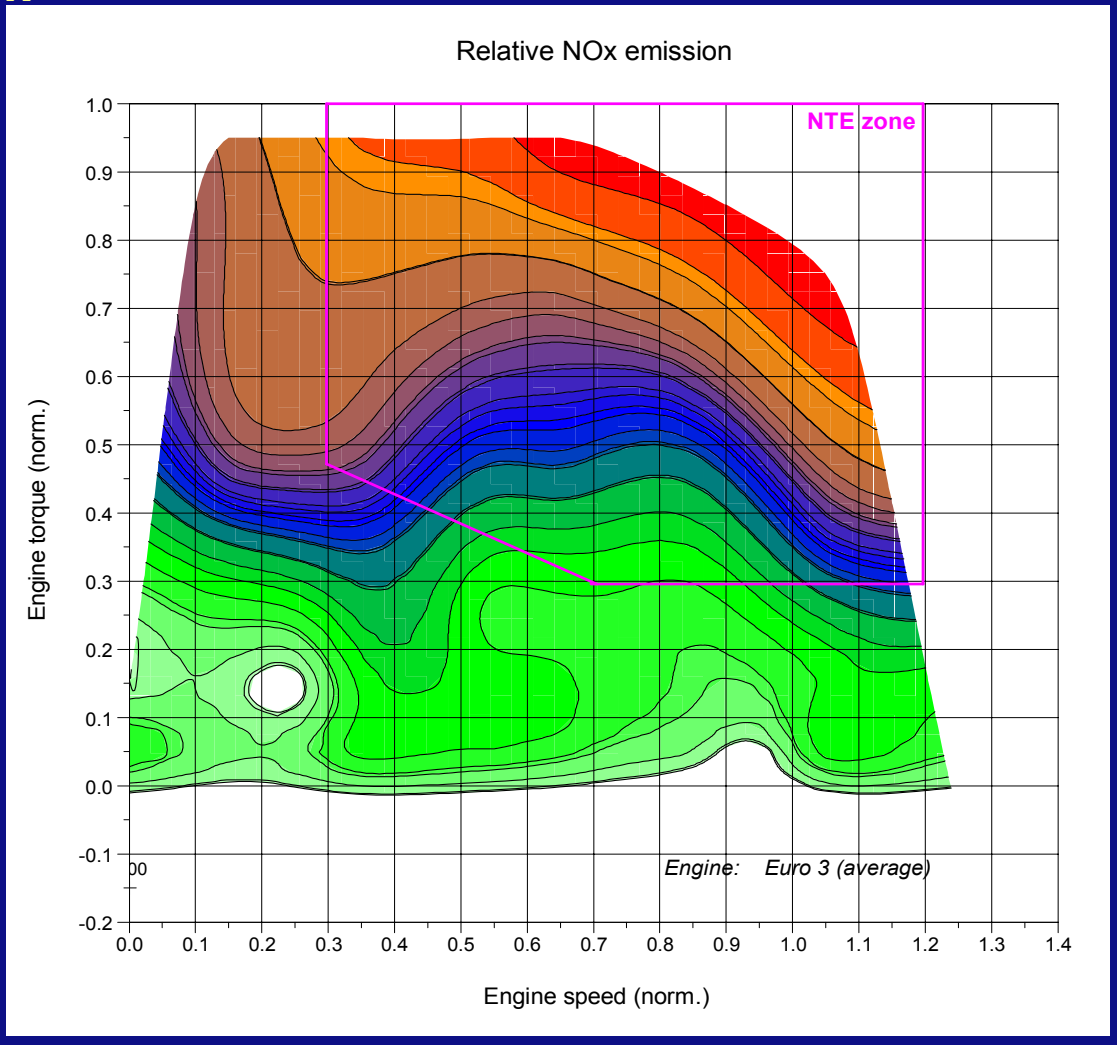
Control area for ‘average’ Euro 3 engine (11 engines)

WNTE control area (work.doc. version 9)

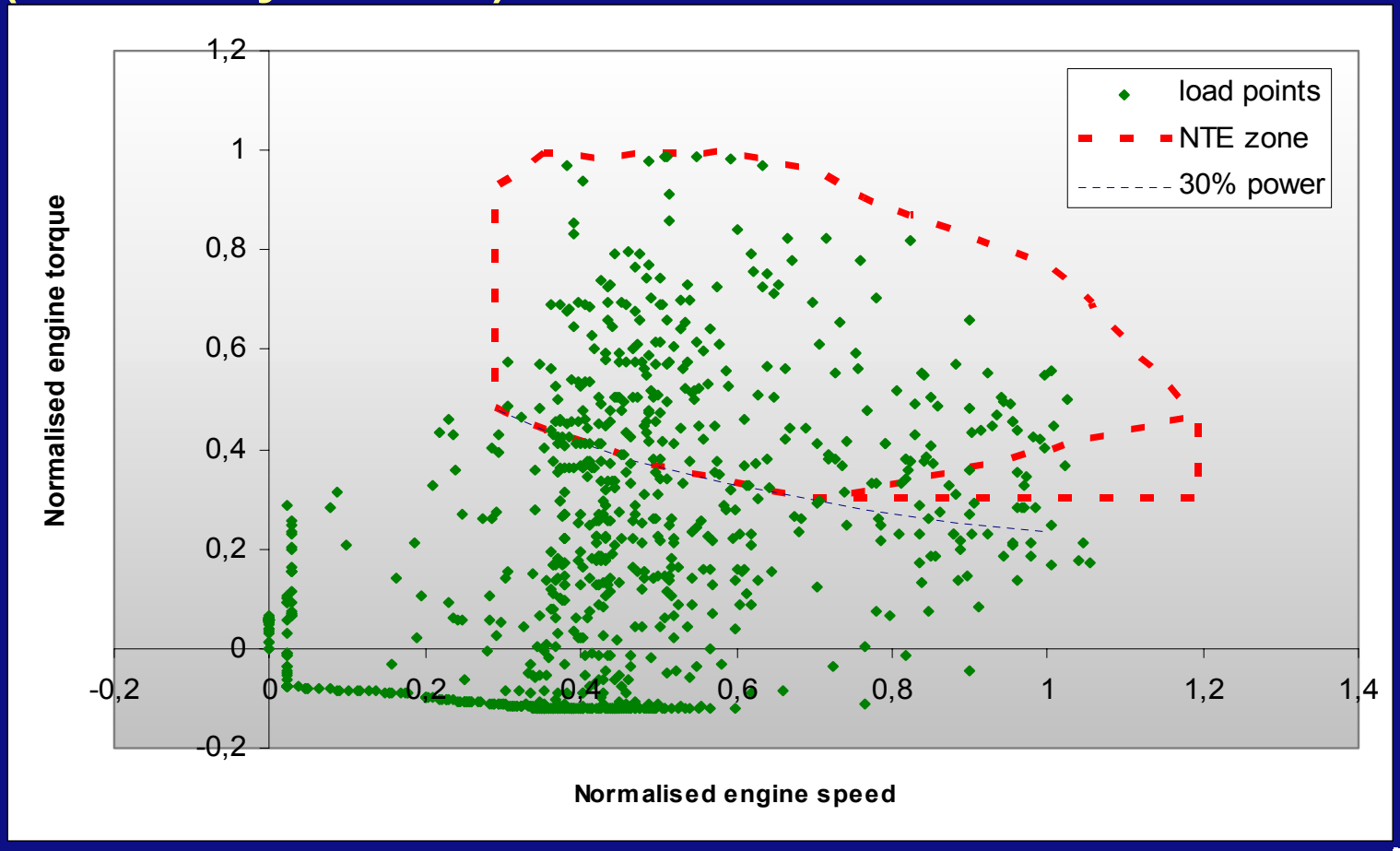


Control area for ‘average’ Euro 3 engine

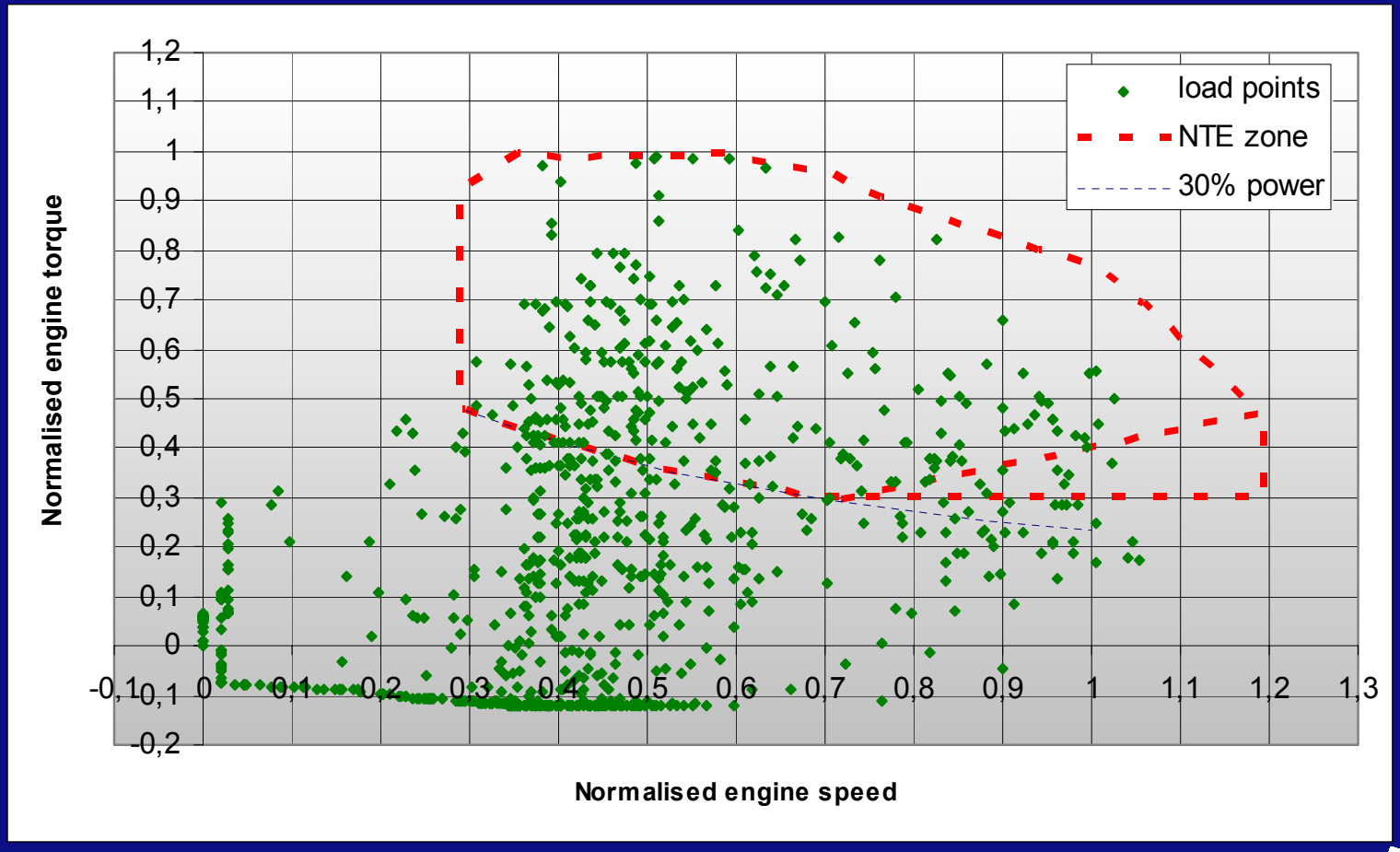
NO_x emission map (average Euro 3)



Simulated city driving cycle for truck with trailer (second by second)

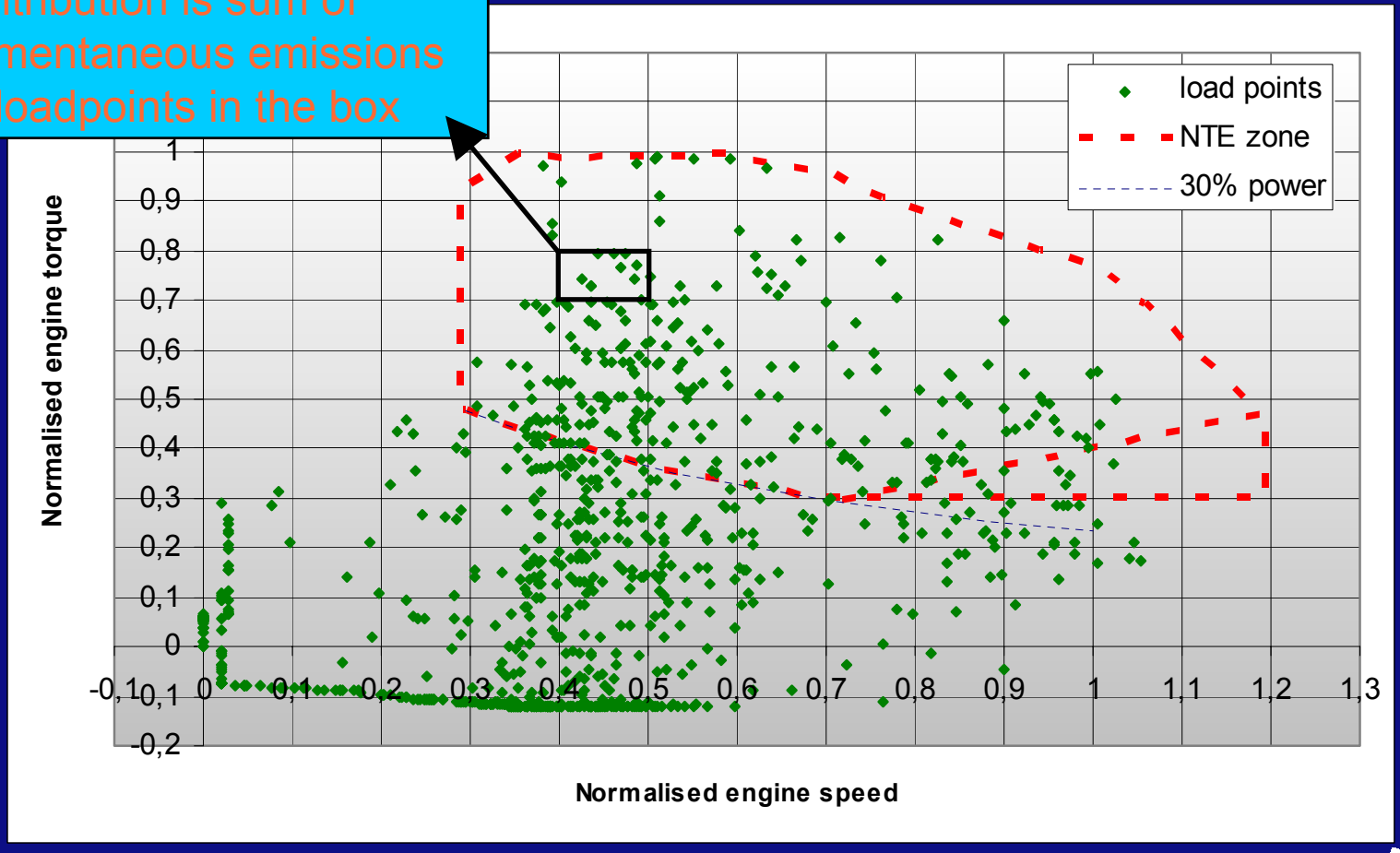


Grid is placed over the engine map

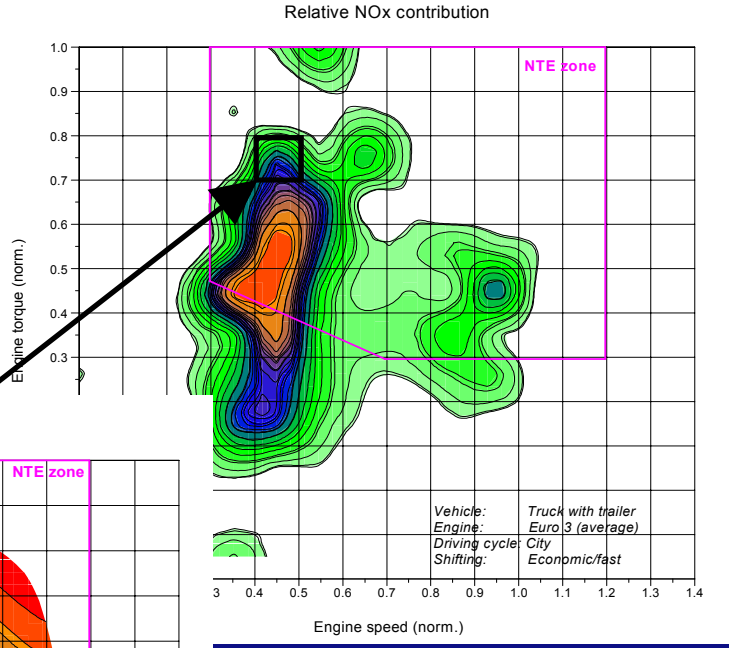


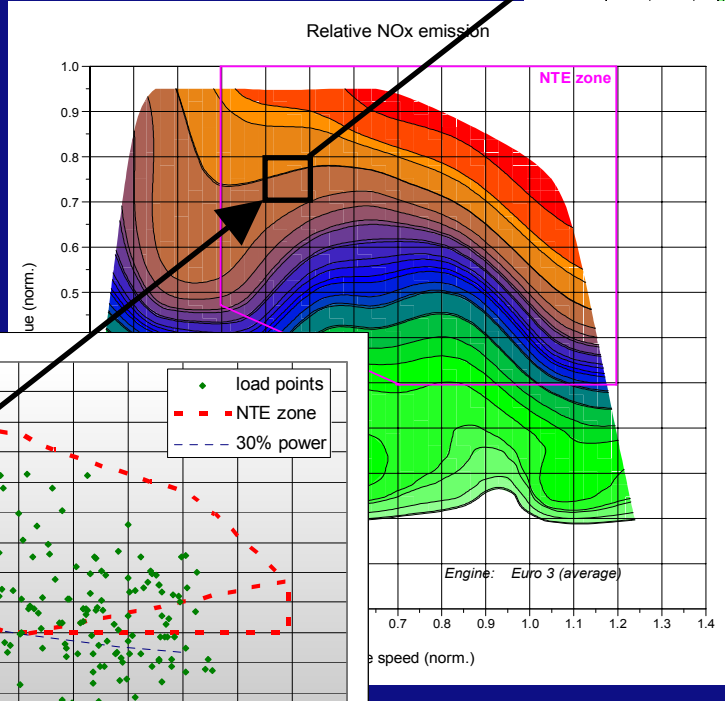
Emission contribution per box is calculated

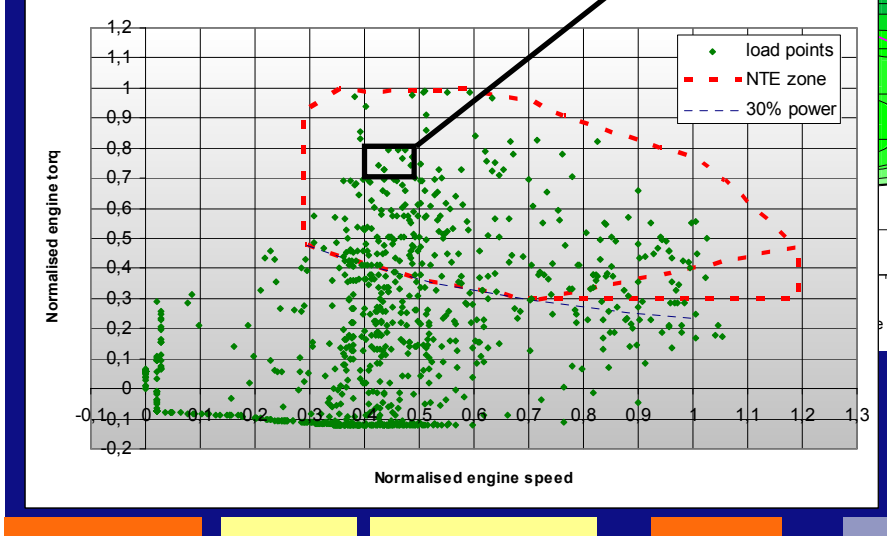
Contribution is sum of momentaneous emissions for loadpoints in the box



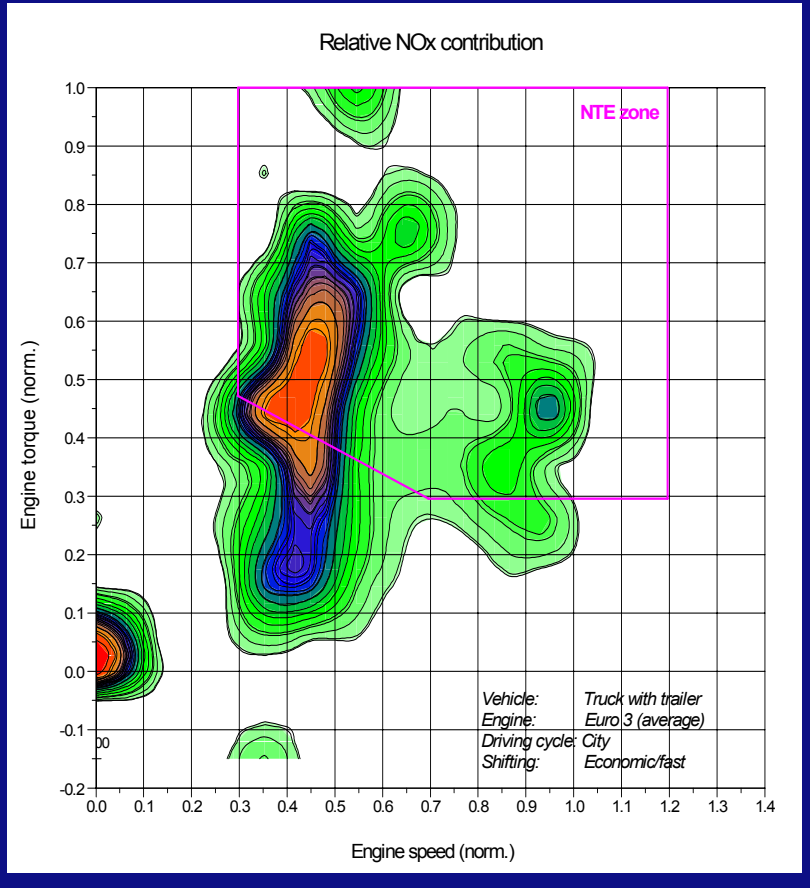
Graphical representation

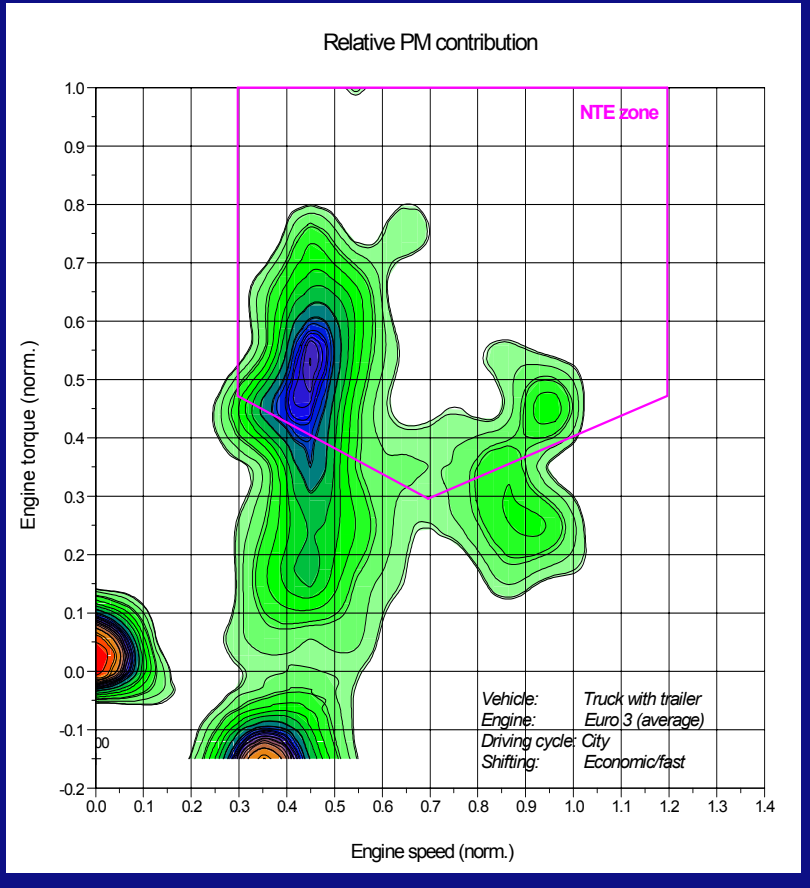






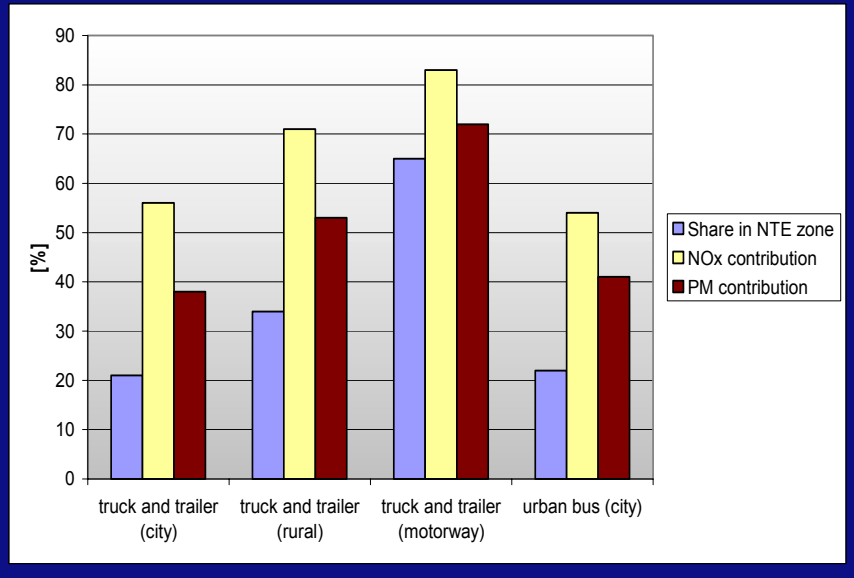
Results for NO_x and PM (truck/trailer in city driving)



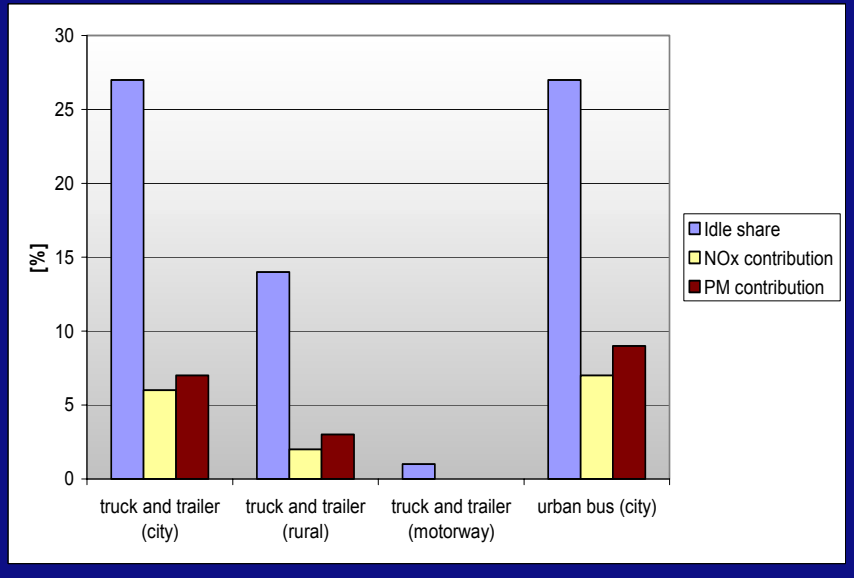


Results for different cases

NTE zone contribution



Idle contribution



Conclusions

- **WNTE control area sufficient wide enough?**
- **High emission NOx and PM in NTE**
  - NOX 54 % - 83 %
  - PM 38 % - 72 %
- **Timeshare in NTE**
  - City 20 % (low because of idle)
  - Highway 65 %
- **<u>WNTE control area is reasonably wide enough</u>**
  - Nevertheless optimization of manufacturer still possible

Conclusions

- **Are there spots in the engine map (outside the control area) that have a significant emission contribution in real life operation?**
- **High timeshare below lowest NTE line**
  - Specific between 20%-60% engine speed
  - Relative low emission contribution (euro 3)
- **Idle is hot spot with high timeshare**
  - WHSC item
- ***Not taken account in this study the 30 second procedure***

Thanks