In-use fuel economy
Current status and recent findings

Peter Mock
Managing Director ICCT Europe

GFEI workshop on in-use fuel economy
London, July 16, 2014
ICCT is working with governments in the top vehicle markets worldwide

Number of light-duty vehicles on the road in 2010
The EU’s CO$_2$ regulation shows a strong effect: Type-approval emission levels are decreasing.

But how does it look for real-world emissions?
There is different levels of representing ‘real-world’ driving during testing.

**On-road data recording**
With data-logger or manual recording (e.g. car magazines, websites, fleet owners, …)

**On-road testing**
With PEMS or data-logger or manual recording (e.g. EU RDE procedure)

**Laboratory testing (enhanced)**
On a chassis dyno (“enhanced” settings)

**Laboratory testing**
On a chassis dyno (type-approval)
There is different levels of representing ‘real-world’ driving during testing.

**On-road data recording**
With data-logger or manual recording (e.g. car magazines, websites, fleet owners, …)

**On-road testing**
With PEMS or data-logger or manual recording (e.g. EU RDE procedure)

**Laboratory testing (enhanced)**
On a chassis dyno (“enhanced” settings)

**Laboratory testing**
On a chassis dyno (type-approval)
The problem with on-road data recording:
Everyone drives differently …
Everyone drives differently …
… but aggregating data reveals clear trends.
Gap between ‘real-world’ and type-approval emissions is continuously increasing.
Gap between ‘real-world’ and type-approval emissions is continuously increasing.
There is different levels of representing ‘real-world’ driving during testing.

**On-road data recording**
With data-logger or manual recording (e.g. car magazines, websites, fleet owners, …)

**On-road testing**
With PEMS or data-logger or manual recording (e.g. EU RDE procedure)

**Laboratory testing (enhanced)**
On a chassis dyno (“enhanced” settings)

**Laboratory testing**
On a chassis dyno (type-approval)
Upcoming ICCT meta-study analyzes PEMS data for a total of currently 13 vehicles.

Plots are combined to produce standard, complete report charts in pdf format.
PEMS testing data confirms real-world CO\textsubscript{2} discrepancy (+ demonstrates NO\textsubscript{x}-exceedances).

Raw distance-specific emissions, by vehicle

![Graph showing raw distance-specific emissions by vehicle. The x-axis represents average CO [g/km], ranging from 0 to 0.5, and the y-axis represents average NO\textsubscript{x} [g/km], ranging from 0 to 1.5. Different colored areas and markers indicate various emission levels in relation to type approval and Euro limits.](image-url)
PEMS testing data confirms real-world CO$_2$ discrepancy (+ demonstrates NO$_x$-exceedances).

Real-world to type-approval CO$_2$ ratios, all vehicles, all windows

- **Average** = 1.43
- **Median** = 1.31
- **St. dev./Average** = 0.42
How can we find a good compromise of representativeness and repeatability?

**On-road data recording**
With data-logger or manual recording (e.g. car magazines, websites, fleet owners, …)

**On-road testing**
With PEMS or data-logger or manual recording (e.g. EU RDE procedure)

**Laboratory testing (enhanced)**
On a chassis dyno (“enhanced” settings)

**Laboratory testing**
On a chassis dyno (type-approval)