



RDE Discussion of Conformity Factors

- *JRC views on the ACEA proposal -*
- *August 2015 – RDE Data Evaluation group*

European Commission - Joint Research Centre (JRC)
IET - Institute for Energy and Transport

ACEA proposal:

- Variability of emissions may still occur within the normal conditions
- Normal = Moderate + Extended

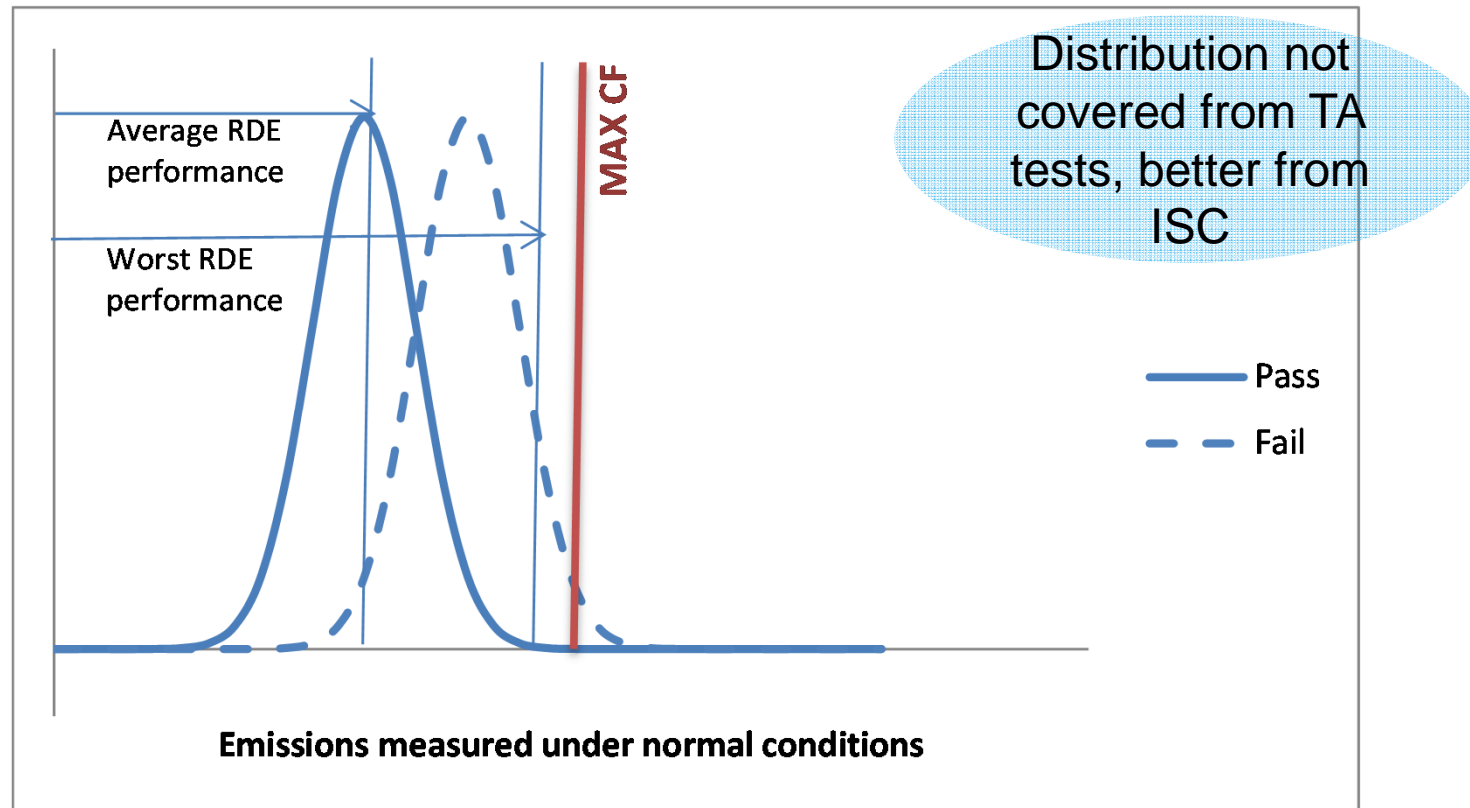
Preliminary JRC remarks:

- Evidence of the variability is/seems available for current diesel NOx after-treatment technologies?
- Such a variability is - most probably – **specific to some pollutants their currently associated technologies**, in particular NOx for current diesel after-treatment technologies
- *(*) The ability to find a test route which meets the ex-ante requirements (road profile?) and has the highest probability to fulfill all the ex-post verifications (dynamics, average speeds, etc...)*

Baseline CF concept

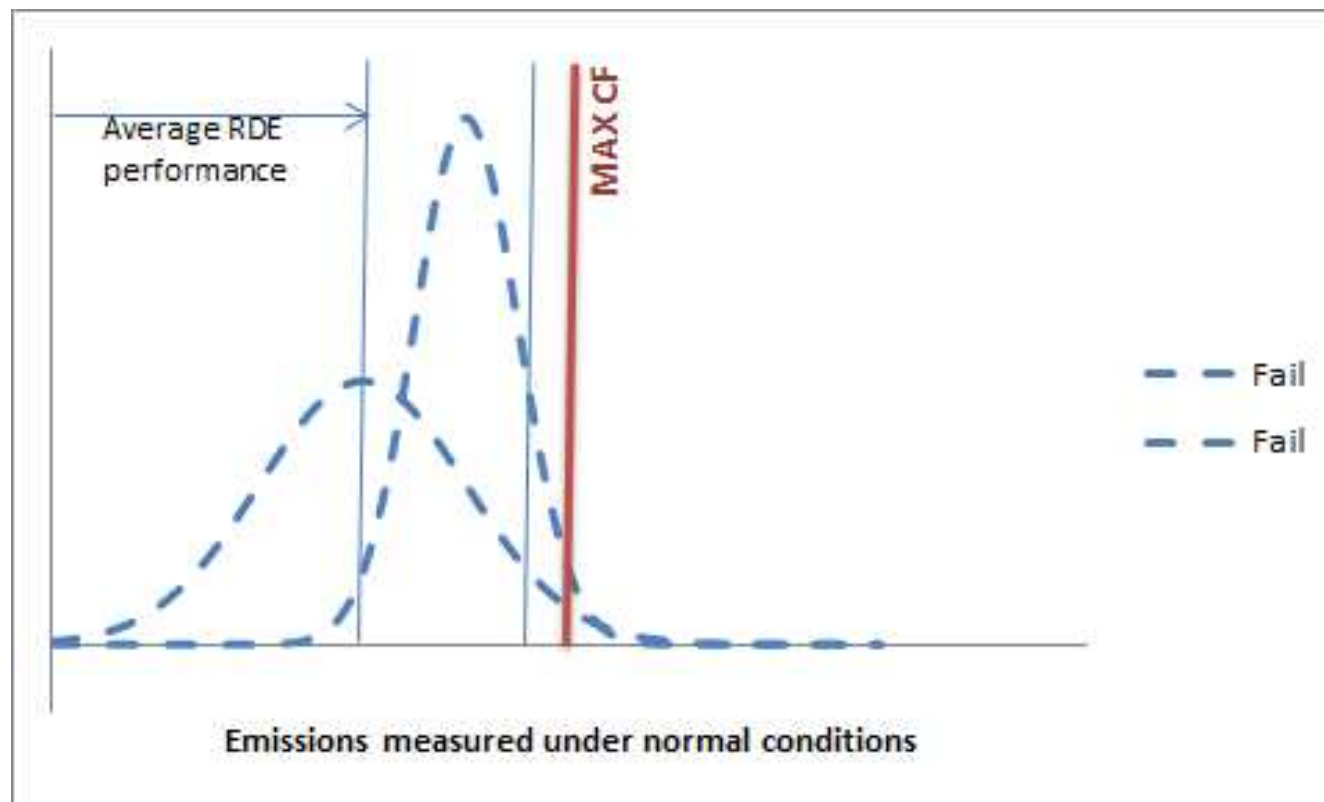


European
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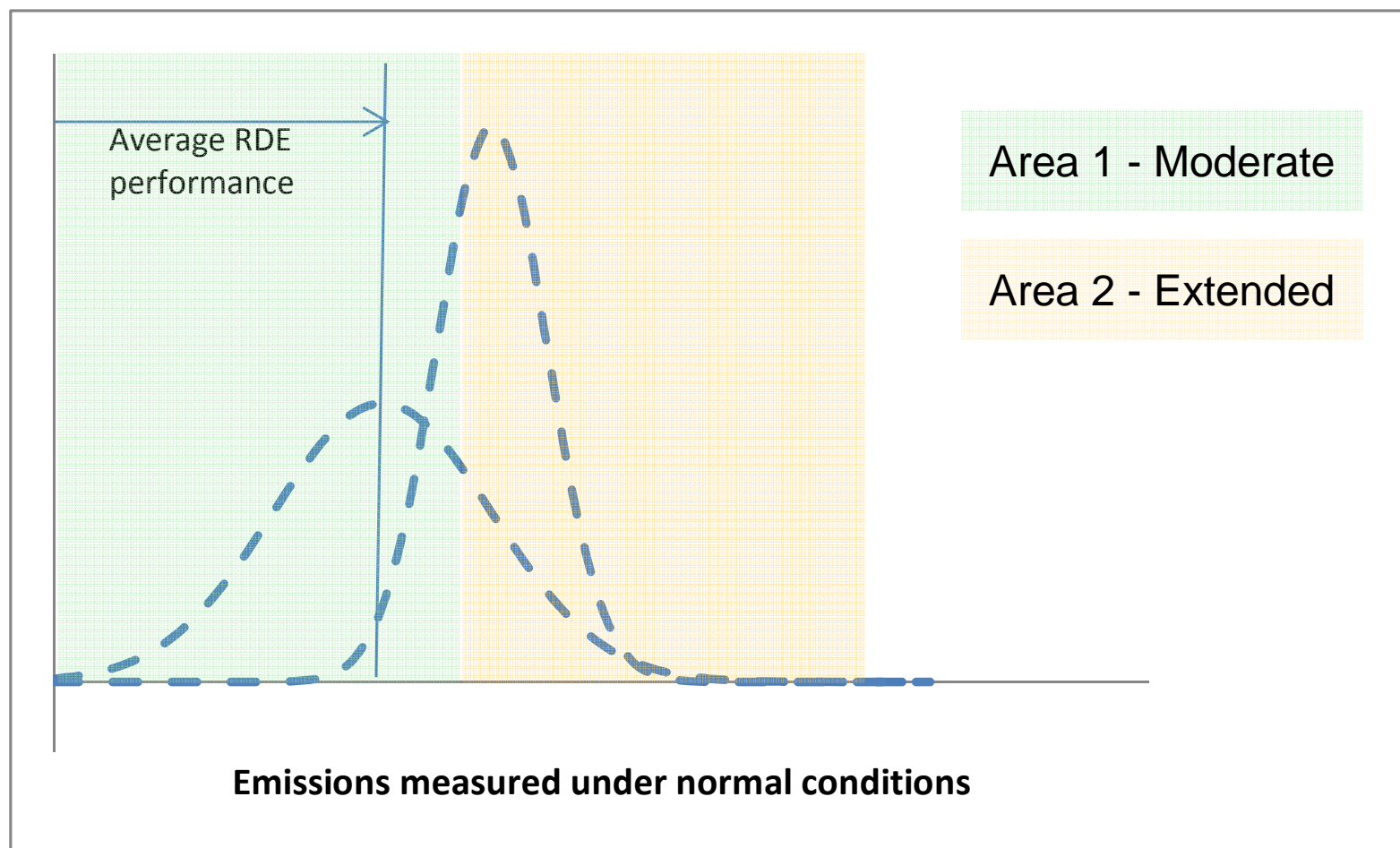
- The (theoretical) distribution represents the emissions **of a single vehicle on several RDE (normal) compliant routes**.
- Highest RDE emissions (which might be associated with the most severe RDE route or NOT) must be below the maximum CF

ACEA concern

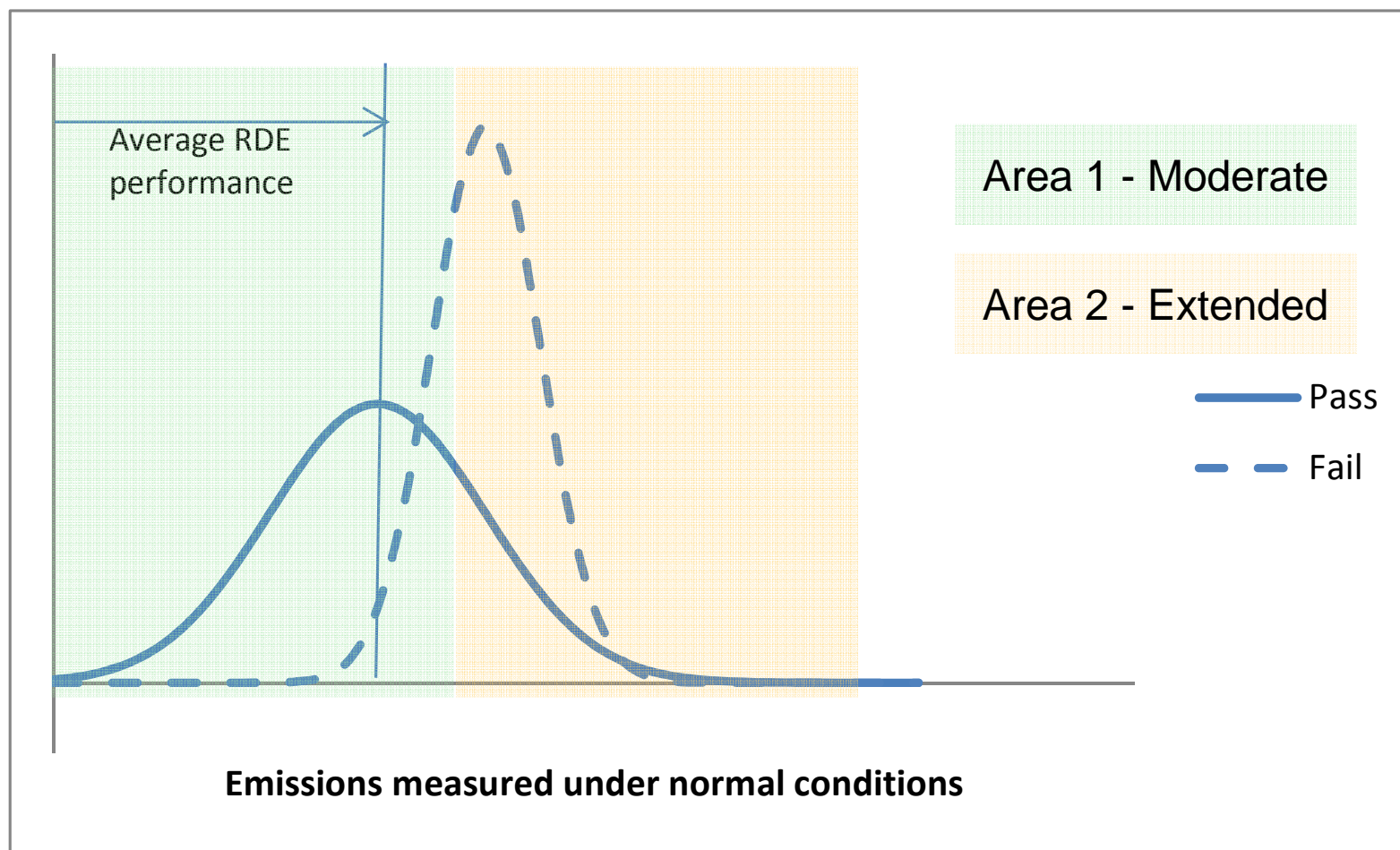


- **Higher route to route variability** without changing the average vehicle emissions RDE performance could cause the vehicle to fail under the most severe routes.
- Would result as similar compared to a poorly performing vehicle

ACEA Proposal



ACEA Proposal



Regulatory options - Overview



Option	Area 1 (Moderate)	Area 2 (Extended)
Baseline	Constant CF	
Option 1	Variable CF	
Option 2	Constant CF1	Constant CF2
Option 3	Constant CF1	Variable CF2

- **Another option would be to have a “narrow” Area 2**, to include only “exceptional” cases. In this case, there could also be the option to re-test the vehicle on another route instead of applying a variable CF

Points to address



- **Definition of the boundary between Area 1 / Area 2:**
Which indicators?
- **For variable CFs (if adopted)**
Which parameters for $CF = f(p1, p2...)$?

List of parameters influencing emissions



Parameters that may influence NOx emissions

1. Vehicle speed / Vehicle acceleration / Road grade / Weight / Wind

Resulting in > Power / Inst. CO2 (Micro) or Work / Cum. CO2 (Macro)

The $V \cdot A$ and Power are not independent quantities. When $V \cdot A$ is a significant contributor to the P value, there is a risk for high NOx emissions on diesels.

2. Ambient temperature, Effect on after-treatment behaviour and management (e.g. EGR)

3. Altitude, effect on engine management

What do we have currently (1)?



Macroscopic boundary conditions (trip or U/R/M) - Annex IIIa

Altitude range > Trip definition

Cumulative altitude gain > Trip definition (2nd Package)

Urban average speed > Trip verification, ex-post

Temperature > Trip definition

Excess or absence of dynamics for U/R/M parts > Trip verification, ex-post (2nd Package)

What do we have currently (2)?



	Micro level (PBM) - Appendix 6	Meso level (MAW) - Appendix 5
	<p>Instantaneous power values classified into power bins</p> <p>Indicator: Average power in the bins</p>	<p>Distance-specific CO2 values in the windows verified against a reference</p> <p>Indicator: Distance specific CO2 / Reference</p>
<p>Sensitivity to transients (type 2)</p> <p>Vehicle speed-acceleration Road grade Cumulative altitude gain Wind Weight</p>	<p>Effect upon the power distribution in the bins?</p>	<p>Effect of V*A upon window CO2 and NOx for diesel and gasoline engines?</p>
<p>Effects</p>	<p>When occurring, the increased power scatter may be partially absorbed by the normalization process, giving a lower weight to the high power values</p>	<p>When occurring, the increased power scatter may be partially absorbed by the windows with higher distance-specific CO2 (compared to the reference) which receive a lower weighing factor</p>

Next steps?



- Selection of 1 or 2 regulatory concepts, which shall be compared to the baseline CF concept
- Technical approach: selection of a short list of indicators
- Data collection and validation...?
- Benchmarking – how to define CF values...?
- Environmental impacts...?