Update on EU Air Quality and vehicle emissions policies

The Real Urban Emissions (TRUE) Initiative City Symposium
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Air pollution in Europe - Overview

Europe's air quality is slowly improving, but fine particulate matter and nitrogen dioxide in particular continue to cause serious impacts on health.

Estimates point to about **400,000 premature deaths** in EU-28 each year due to particulate matter and 75.000 due to nitrogen dioxide

Air pollution is estimated to causes at least **€ 24 billion per year** in direct costs; add to this estimates of €330 billion to € 940 billion per year in indirect costs (e.g. related to reduced life expectancy or broader societal impacts).

63 %

Air pollution exceeds **eutrophication limits** in 63% of ecosystem area, and in 73% of Natura2000 area.

Source(s): EEA Air Quality in Europe (2017), SOER (2015)

Air pollution in Europe – Health dimension

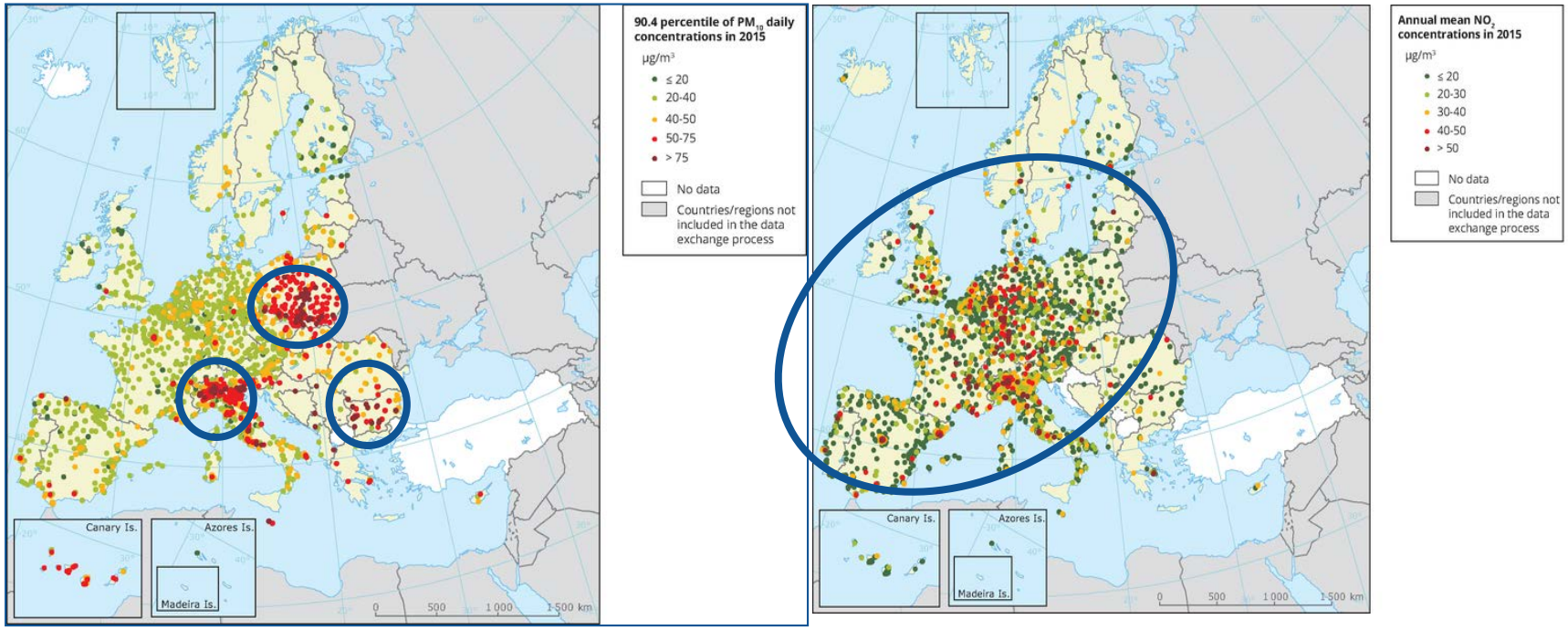
	EU urban population exposed to air pollution **above EU standards**	EU urban population exposed to air pollution **above WHO guidelines**
$PM_{2.5}$	7–8 %	82–85 %
PM_{10}	16–20 %	50–62 %
O_3	7–30 %	95–98 %
NO_2	7–9 %	7–9 %
BaP	20–25 %	85–91 %
SO_2	<1 %	20–38 %

Source(s): For 2013-2015; EEA Air Quality in Europe (2017)

Air pollution in Europe – A widespread issue

PM_{10} exceedances: often linked to fuel combustion (i.e. energy, heating)

NO_2 exceedances: often linked to traffic, in more than 130 cities in EU.



Source(s): EEA Air Quality in Europe (2017)

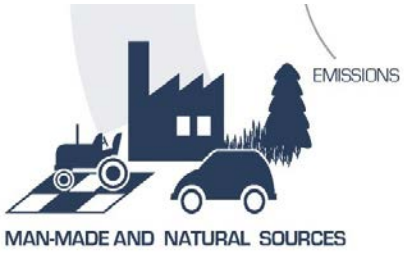
EU Clean Air Policy – The policy framework

Air Quality Directives

Maximum concentrations of air polluting substances

CONCENTRATIONS

EMISSIONS



National Emission Ceilings Directive

National emission totals (SO_2, NO_x, VOC, $PM_{2.5}$, NH_3)

Source-specific emission standards

- IED Directive
- MCP Directive
- Eco-design Directive
- Energy efficiency
- **Euro and fuel standards**

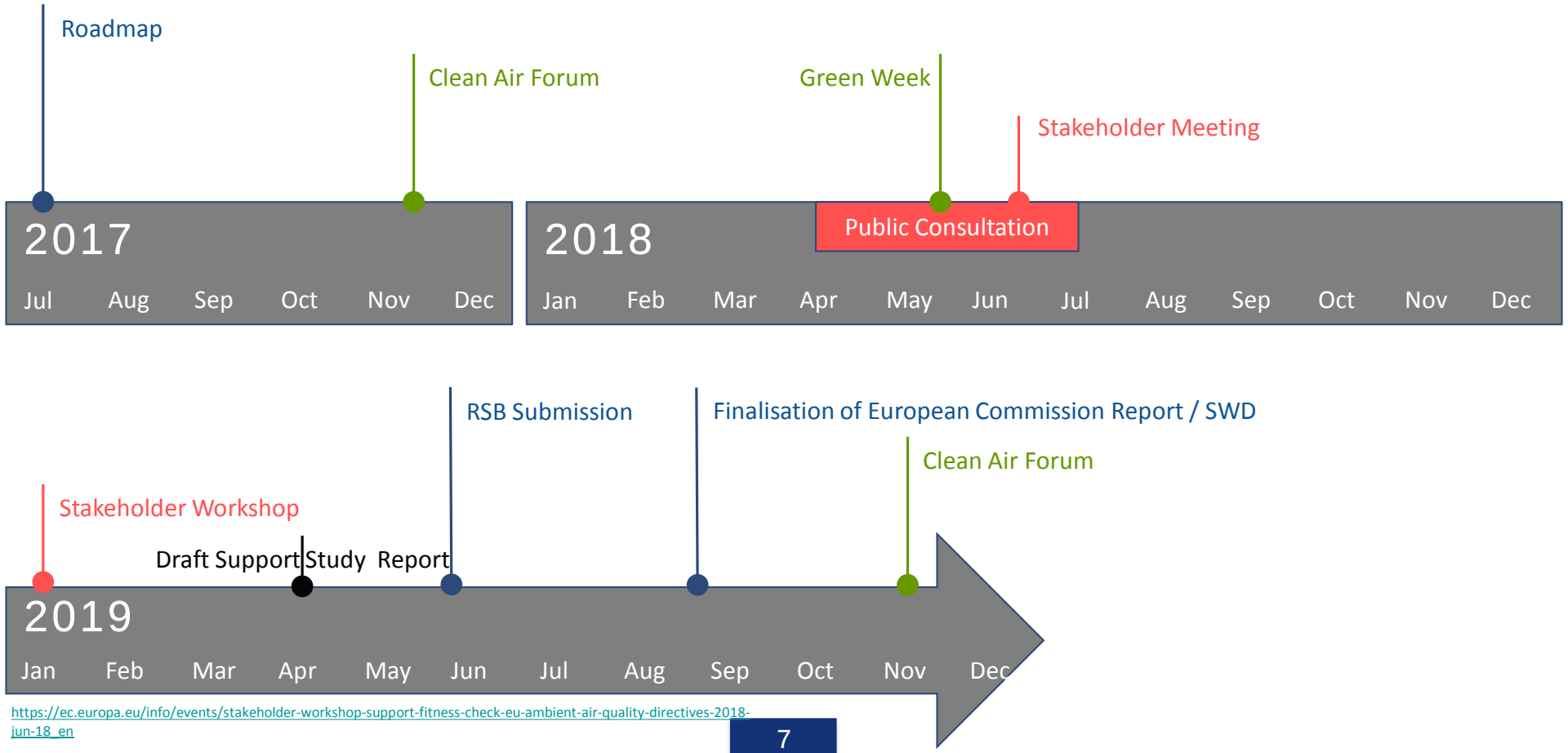
Fitness Check – Focus

This fitness check will look at two complementary EU Ambient Air Quality Directives, i.e. Directives 2008/50/EC and 2004/107/EC – see Roadmap of August 2017.

Important: A fitness checks is a retrospective exercise – to assess what has happened and looks at what caused any change and how much might reasonably be credited to EU action. This particular fitness check will focus on the period 2008 to 2018.

Key question of this evidence-based critical analysis is whether EU actions are fit for purpose and delivering as expected – to identify learning points to guide future action.

Fitness Check – Our timeline



https://ec.europa.eu/info/events/stakeholder-workshop-support-fitness-check-eu-ambient-air-quality-directives-2018-jun-18_en

Some concluding reflections on Air Quality challenges

Public (and political) awareness of **air quality challenge** has increased – but substantial implementation and compliance gaps remain across the EU.

Therefore, the Commission has taken the decision to **refer Member States to the Court of Justice** of the EU to address the significant and persistent exceedances of limit values for two key pollutants with health impacts: nitrogen dioxide and particulate matter.

Reducing air pollution effectively requires **close cooperation** between different societal actors and across governance levels (EU, national, local).

Air quality management, spatial planning and traffic management play a key role in improving local air quality – **cities require support to implement**.

With the on-going Fitness Check we are seeking to understand what works well, and what could work better: **whether the Directives are fit for purpose**.

Update on Real-Driving Emissions (RDE) and the role of Remote Sensing

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…and then came the Dieselgate:

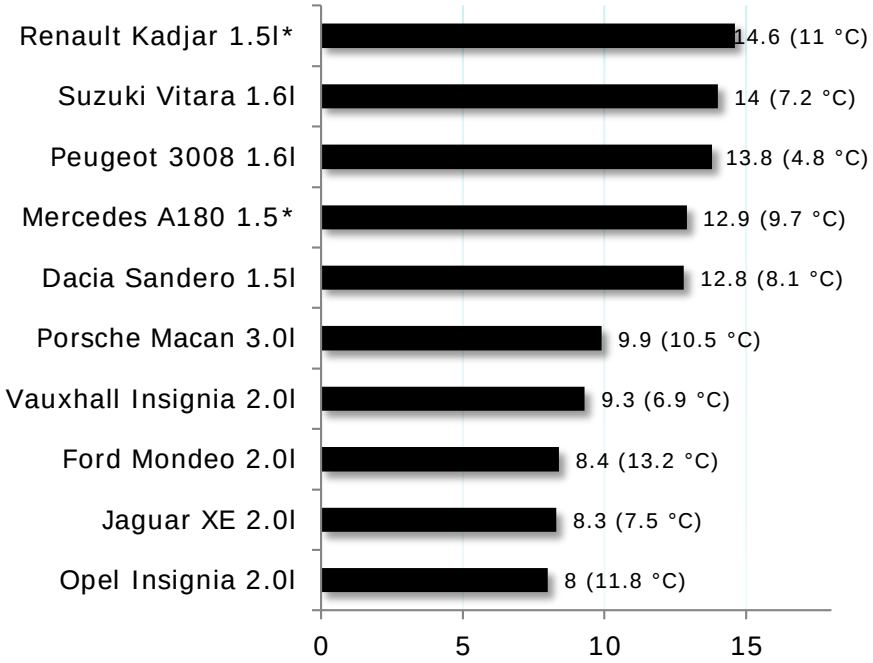
- *VW group vehicles were found with defeat devices both in the US and subsequently in Europe*
- *Investigations from MS showed that other vehicles also emit more in real world conditions*
- *Some vehicles are already below the limits in some tests on the road*
- *Conclusions drawn from a single RDE test with PEMS may be misleading*

National Investigations: EURO 6 Diesel RDE test results

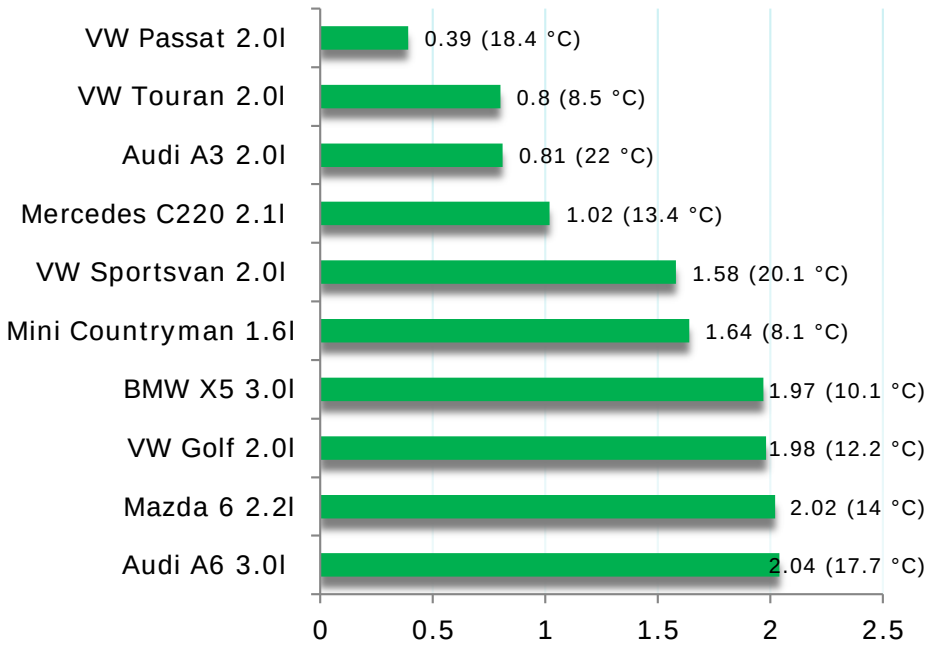
Important note: The results shown are from individual tests that were not done under similar conditions.

This diagram alone should not be used to rank or compare the car models

Worst cases



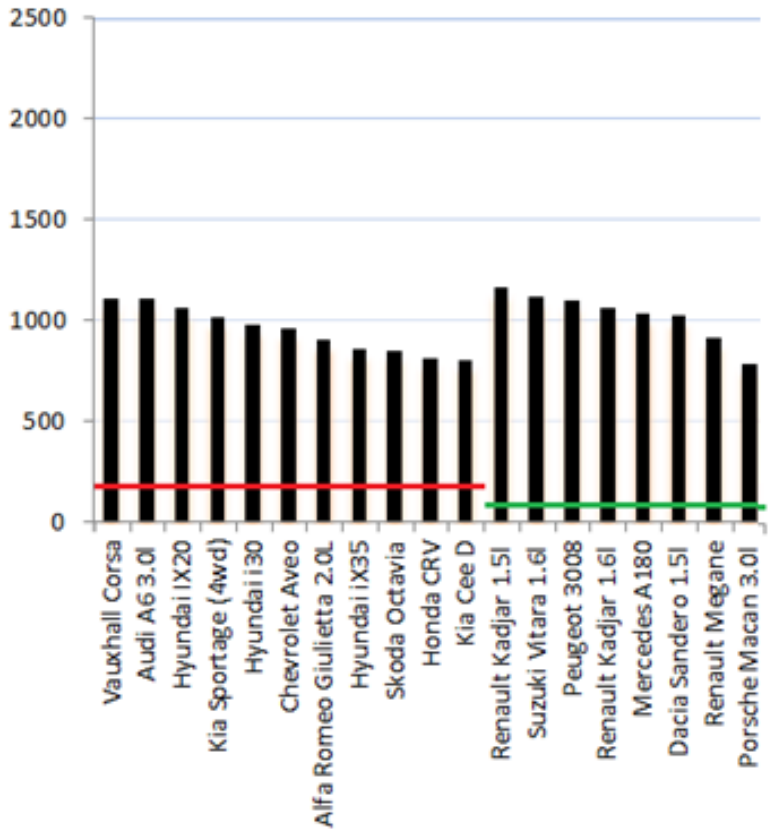
Best cases



CF (average ambient test temperature in parentheses)

*Both cars use an Renault K9K 846 engine (1.5l, 1461 cc)

EURO 5 & 6 data combined, RDE NOx (mg/km) per car model



*The EURO 5 limit 180 mg/km is indicated in **red**.*

*The EURO 6 limit 80 mg/km is indicated in **green**.*

*Some EURO 6 cars have **higher NOx** emissions than some EURO 5 cars on the road*

Properly maintained vehicles should not overemit

The technical measures taken by the manufacturer must be such as to ***ensure that the tailpipe and evaporative emissions are effectively limited, .. throughout the normal life of the vehicles under normal conditions of use.*** *Therefore, in-service conformity measures shall be checked for a period of up to five years or 100 000 km, whichever is the sooner.*

And

The use of defeat devices that reduce the effectiveness of emission control systems shall be prohibited.

'defeat device' means any element of design which senses temperature, vehicle speed, engine speed (RPM), transmission gear, manifold vacuum or any other parameter for the purpose of activating, modulating, delaying or deactivating the operation of any part of the emission control system, ***that reduces the effectiveness of the emission control system under conditions which may reasonably be expected to be encountered in normal vehicle operation and use****;*

How to avoid another Dieselgate?

- *Guidance on the evaluation of Auxiliary Emission Strategies and the presence of defeat devices*
- *Stronger and more transparent Conformity of Production (in WLTP) and In-Service Conformity rules (coming in RDE4)*
- *Regular oversight and surveillance activities by MS, Commission (New Type Approval and Market Surveillance Proposal)*

Guidance on AES / BES and Defeat Devices

Stronger clauses for the approval of Auxiliary Emission Strategies (AES) in legislation

*Complete with **Guidance document***

Adopted on 26 January 2017

- **AES / BES approval details and methodology**
- **Testing for defeat devices**
- **Regularly updated**
- **Concrete examples**

Ref. Ares(2017)427612 - 26/01/2017

EUROPEAN COMMISSION

Brussels, 26.1.2017
C(2017) 352 final

COMMISSION NOTICE

of 26.1.2017

Guidance on the evaluation of Auxiliary Emission Strategies and the presence of Defeat Devices with regard to the application of Regulation (EC) No 715/2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6)

History of RDE

2011-2015:

- Kick-off: Working group on RDE
- Complementary procedure for type approval and in-service conformity testing of LDVs
  - Covering a wide range of normal operating conditions; limiting defeat strategies
- Evaluation of candidate procedures by JRC
- Development of a PEMS on-road test; pilot testing of PN-PEMS

2016:

- Implementation of RDE Regulations 2016/427 and 2016/646 as worldwide first on-road test procedure
  - Conformity factor 2.1 – applicable from Sept. 2017/2019 (new types/all new vehicles)
  - Conformity factor 1.43 – applicable from Jan. 2020/2021(new types/all new vehicles)
  - Compliance during urban driving and the entire RDE trip

2017:

- RDE 3rd Package
- Testing of hybrid vehicles, coverage of cold-start and regeneration events, particle number emissions

2018:

- **4th Package, adopted TCMV 3rd May, publication in the OJ, later in 2018:**
  - **Provisions for in-service conformity / Reviewing RDE procedure and adapting provisions to ensure practicality and effective emissions testing**

NTE principle

The emissions in real-world driving shall not exceed the emission limits

A multiplicative conformity factor (CF) is necessary in order to account for the different measurement technique

Annual review for CF to bring it down to 1 (if possible)

Currently:

CF	NOx	PN
1 Sept 2017	2.1	1+0.5
1 Jan 2020	1+0.43	1+0.5

Possibility for manufacturer to declare a lower CF in the certificate of conformity (i.e. available to buyers)

All data in a publicly accessible database

Going lower than the limit: "RDEmax" values

RDE regulation (EU) 2017/1154 (RDE3)

In order to ensure transparency, to allow comparison with values measured during independent testing and to allow for the development of incentive schemes by local or national authorities, the ***obligation for the manufacturer to declare the maximum value of NO_X emissions and the maximum PN in RDE tests in the certificate of conformity of each vehicle*** *should be introduced*

Improving consumer information on car emissions

COM recommendation (EU) 2017/948

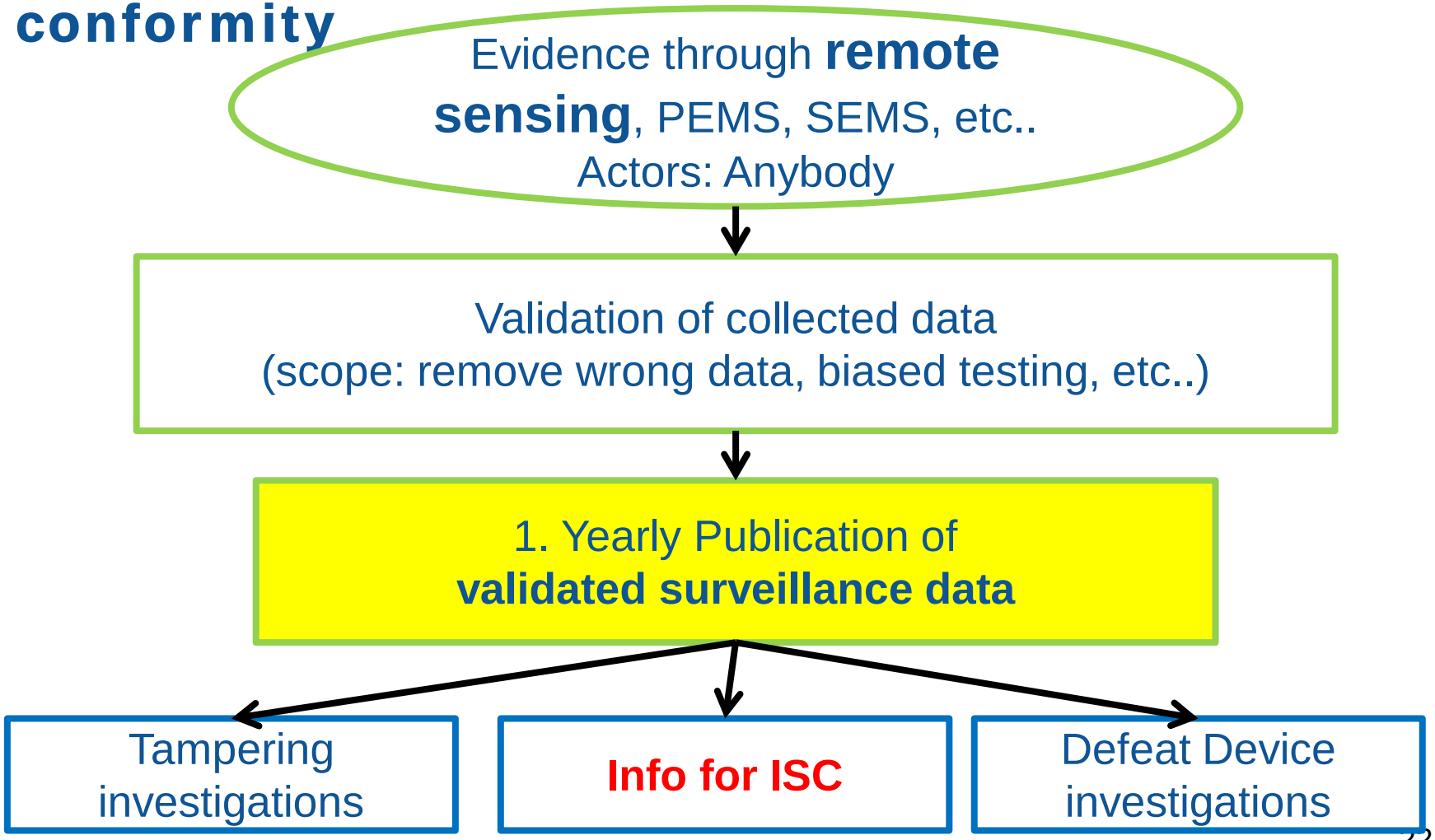
Member States should consider the possibility of also ***including the information regarding the maximum value for real-driving air pollutants declared on each vehicle's certificate of conformity*** *on the label which is attached to or displayed near each new passenger car at the point of sale.*

Issues covered by RDE 4

- *In-use compliance and independent testing*
- *Review procedure for Hybrids*
- *Review provisions for LCVs /multistage/ special purpose vehicles*
- *Review issue of heavy fuels and influence on PN emissions*
- *Review of NOx CF*
- *Review of evaluation methods*
- *Others..*

* http://ec.europa.eu/info/law/better-regulation/initiatives/ares-2018-1297632_en

Example of the new system for In-service conformity



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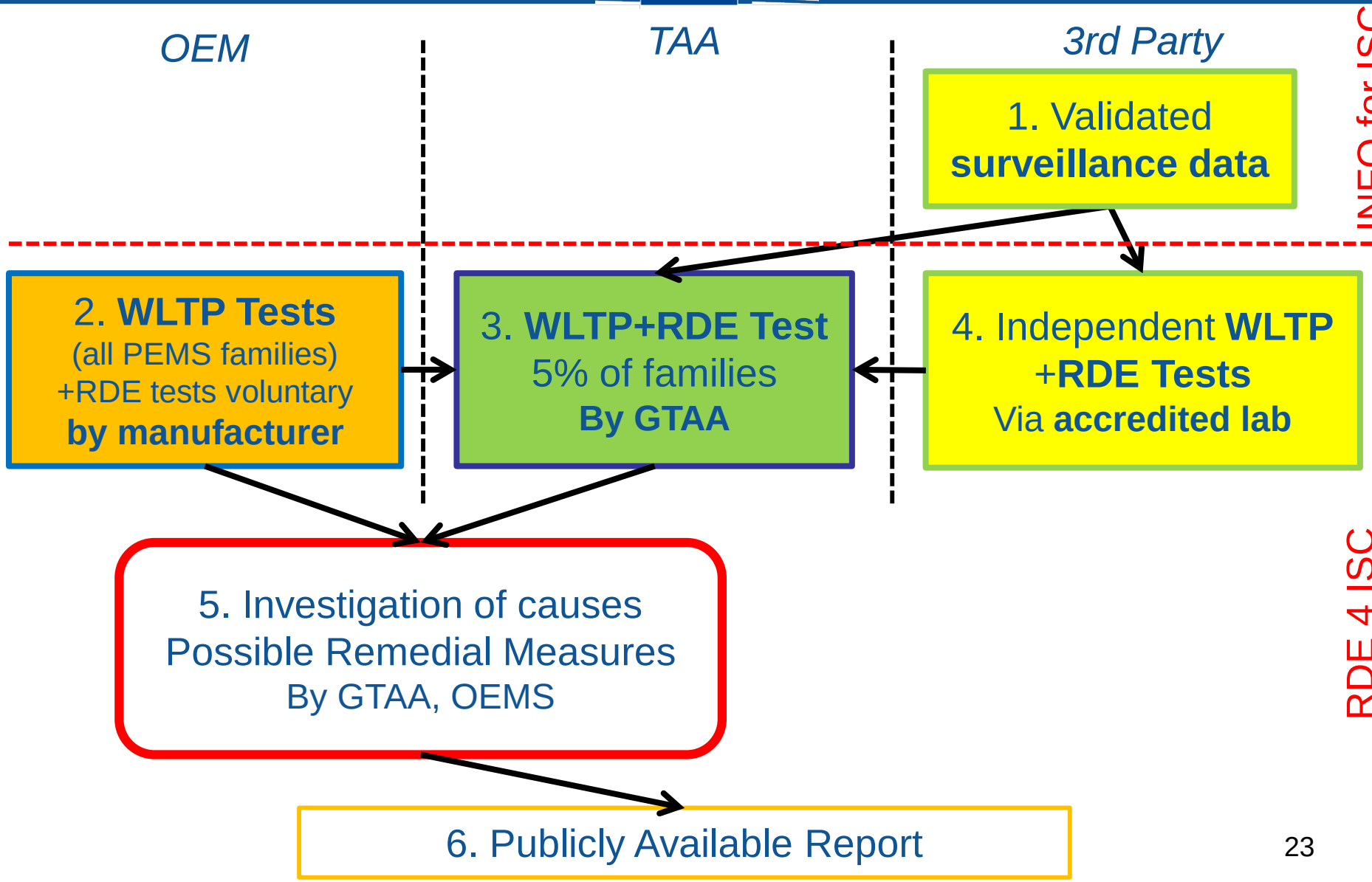
General scheme for ISC



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Use of remote sensing

Remote Sensing is a powerful tool that enables action on high vehicle emissions through:

1. *Monitoring of the vehicle fleet (defeat devices, defective components or poorly designed vehicles)*

2. *Helping to build a local picture of traffic emission (localized emission factors)*

3. *Identifying tampering (i.e. removal of essential emission control components)*

1. Monitoring of the vehicle fleet:

- *With significant European-wide coverage, real life emission performance can be monitored.*

- *Information obtained feeds into governmental or independent testing. Crucial for targeted campaigns and detailed analysis (possibilities to narrow down particular models or even model years)*

- *Public will be continuously informed about manufacturer performance – another incentive to stay clean*

2. Local picture:

- *Cities need the best possible input in order to plan effectively their Air Quality measures.*

- *Remote sensing allows for a full localisation of emission factors and fleet activity*

- *Cities can also assess enacted measures better and faster*

3. Identifying tampering:

- *A small proportion of tampered (or non-maintained) vehicles can have an outsized effect*
- *Detecting these with RS limits the take-up factor of tampering*
- *Still hurdles remain, when it comes to privacy laws, implementation and still technological issue (all RS equipment used needs to be fully robust for all pollutants – such as PM/PN from removed filters).*

A word of caution:

- *Biggest advantage of RS is the use of big data, in order to draw meaningful conclusions, good placement of stations and their variability are key.*
- *Information obtained from RS needs to be complemented with follow-up tests (can be PEMS or any other testing) which will have regulatory consequences.*

Conclusions

- *Significant part of widespread air quality problems across the Union can be traced to road transport*
- *RDE and market surveillance will bring cleaner vehicles on to our streets, especially when complemented by remote sensing*
- *Some hurdles remain, when it comes to privacy laws, implementation and still technological issues (all RS equipment used needs to be fully robust for all pollutants – such as PM/PN from removed filters).*

More Information

http://ec.europa.eu/environment/air/

Feedback

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Thank you!

European Commission
Clean Air