

Direct Vision

Proposal on differentiation (Part 2)

- A differentiation between vehicles that are more likely to run in cities and those that very seldomly or never will enter into a city needed
- Trucks built for different operation differ from a design perspective, wherefore some correlation between a few basic vehicle characteristics and the usage of the vehicle exist
- A division based on such parameters can be introduced in order to differentiate requirements with respect to urban and rural direct vision
 - Such a division, for another purpose, is introduced in the EU CO₂ Regulations

Direct Vision

Taking advantage of the CO₂ Regulation

- Regulation (EU) 2017/2400 determines the CO₂ emissions and fuel consumption of heavy-duty vehicles
- Annex I, table 1 defines *vehicle groups* for vehicles of category N, based on:
 - Axle configuration
 - Chassis configuration
 - Technically permissible maximum laden mass (tons)

Axle config	Chassis config	Mass (tons)	Vehicle group
4X2	Rigid	>3,5 – <7,5	(0)
	Rigid/Tractor	7,5 – 10	1
	Rigid/Tractor	>10 – 12	2
	Rigid/Tractor	>12 - 16	3
	Rigid	>16	4
	Tractor	>16	5
4X4	Rigid	7,5 – 16	(6)
	Rigid	>16	(7)
	Tractor	>16	(8)

Axle config	Chassis config	Mass (tons)	Vehicle group
6x2	Rigid	all weights	9
	Tractor	all weights	10
6x4	Rigid	all weights	11
	Tractor	all weights	12
6x6	Rigid	all weights	(13)
	Tractor	all weights	(14)
8x2	Rigid	all weights	(15)
8x4	Rigid	all weights	16
8x6, 8x8	Rigid	all weights	(17)

- Regulation (EU) 2019/1242 sets the CO₂ emission performance standards for heavy-duty vehicles
- Annex I, table 1 defines vehicle sub-groups, based on:
 - Vehicle group
 - Cab type
 - Engine power
- So far, only vehicle groups 4, 5, 9 and 10 are divided into vehicle sub-groups

Vehicle group	Cab type	Engine power	Vehicle sub group
4 (Rigid 4×2 >16 t)	All	< 170 kW	4-UD (Urban Delivery)
	Day cab	≥ 170 kW	4-RD (Regional Delivery)
	Sleeper cab	≥ 170 kW and < 265 kW	
	Sleeper cab	≥ 265 kW	4-LH (Long Haulage)
9 (Rigid 6×2)	Day cab	All	9-RD
	Sleeper cab	All	9-LH
5 (Tractor 4×2 >16 t)	Day cab	All	5-RD
	Sleeper cab	< 265 kW	
	Sleeper cab	≥ 265 kW	5-LH
10 (Tractor 6×2)	Day cab	All	10-RD
	Sleeper cab	All	10-LH

- Vehicle groups 4, 5, 9 and 10, but not yet the other vehicle groups, are divided into vehicle sub-groups in the CO₂ Regulation
- For the purpose of a direct vision division between urban and rural vehicles however, the same principle (cab type and engine power) can be applied for other vehicle groups
- A vehicle sub-group, yet to be defined, is the EMS sub-group for the heaviest transports – proposed to be used for vehicles with the following performance:
 - Cab type: Sleeper cab
 - Engine power: ≥ 370 kW

Direct Vision Differentiation

Tractors >16 tons

- Tractors >16 tons are almost entirely designed for long haulage
- The ACEA report* on the CO₂ baseline estimations for Q3 and Q4 2019, production figures of sub-groups 5 and 10 (tractors 4x2, 6x2) show:
 - 5-RD 0,8% share of production
 - 5-LH 62,8% share of production
 - 10-RD 0,1% share of production
 - 10-LH 9,7% share of production
- Since the RD sub-groups comprises a very small portion of the tractors and since those also are less likely to run in cities, all tractors >16 tons should be demanded the Rural Direct Vision Requirement

*https://www.acea.be/uploads/publications/ACEA_preliminary_CO2_baseline_heavy-duty_vehicles.pdf

TRACTORS >16 TONS

5-RD
(Rural)



5-LH
(Rural)



10-RD
(Rural)



10-LH
(Rural)



Direct Vision Differentiation

Rigids 4x2, 6x2 >16 tons

- Long Haulage vehicle combinations can include rigid truck, most often 4x2 or 6x2, and full trailer
- The 265 kW division for LH, indicates cooling needs, combined with sleeper cab, also indicating long haulage, gives us sub-groups 4-LH and 9-LH to be demanded Rural Direct Vision Requirement
 - 4-LH (1,9% share of production)
 - 9-LH (9,2% share of production)
- Sub-groups to be demanded the Urban Direct Vision Requirement
 - 4-UD (0,4% share of production)
 - 4-RD (7,9% share of production)
 - 9-RD (7,2% share of production)

RIGIDS 4X2, 6X2 >16 TONS

4-LH
(Rural)



4-UD
(Urban)



9-LH
(Rural)



9-RD
(Urban)



Direct Vision Differentiation

6x4, 8x2, 8x4

- Construction vehicles, often 6x₄, 8x₂ and 8x₄ tippers and mixers, may enter into cities and should be demanded the Urban Direct Vision Requirement
- However, applying urban requirement to all those vehicles would introduce a problem since those configurations are also used for heavy road transports
- The following is proposed:
 - Vehicle group 12, 6x₄ tractor, to be included in the Rural Direct Vision group in accordance with arguments on tractors above
 - Some rigids 6x₄, 8x₂, 8x₄ may serve as construction vehicles: Urban
 - Other rigids 6x₄, 8x₂, 8x₄ may serve as heavy road transport vehicles, e.g. timber transports, and is therefore to be included in the Rural Direct Vision group since they are less likely to enter cities and need the higher power and ground clearance

- Timber trucks and over-seas heavy transports often use 6x₄ rigid plus trailer and will need the high cabs/chassis to have enough engine power and for ground clearance in e.g. the forest
- In order to separate between construction vehicles and heavy transport vehicles, the 370 kW division combined with sleeper cab for sub-group EMS should be used, since it indicates cooling and long distance needs
- Following sub-groups should therefore be included in the Rural group:
 - 11-EMS, 12, 15-EMS, 16-EMS
- While the remaining 6x₄, 8x₂, 8x₄ rigids to be included in the Urban group:
 - 11-RD, 11-LH, 15-RD, 15-LH, 16-RD, 16-LH

11-EMS
(Rural)



12
(Rural)



16-RD
(Urban)



16-EMS
(Rural)



Direct Vision Differentiation

All Wheel Drive Vehicles

- All wheel drive-vehicles (4x4, 6x6, 8x6, 8x8) are special vehicles directly qualifying for category N3G and need extra high ground clearance – they should never enter cities and should be included in the Rural group

- 6
- 7
- 8
- 13
- 14
- 17

7



13



- N3G vehicles should also be included in the Rural group

Direct Vision Differentiation

Summary Urban and Rural

- In summary, the following vehicle groups should be demanded the Urban and the Rural Direct Vision level respectively

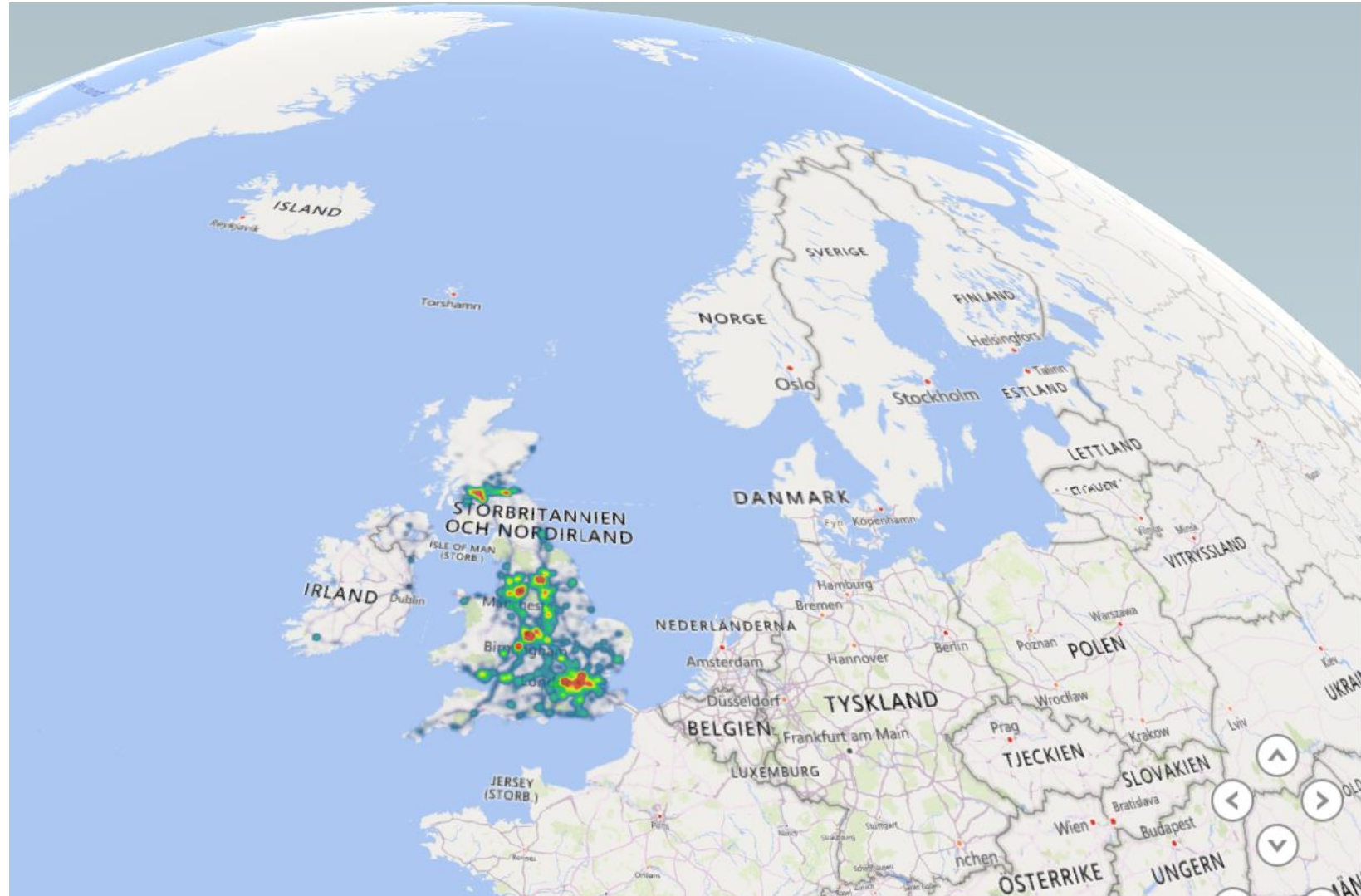
Vehicle group	(o)	1	2	3	4	5	(6)	(7)	(8)	9	10	11	12	(13)	(14)	(15)	16	(17)
Urban Requirement	All	All	All	All	UD RD					RD		RD LH				RD LH	RD LH	
Rural Requirement					LH	RD LH	All	All	All	LH	RD LH	EMS	All	All	All	EMS	EMS	All

- In other words, the following N3 vehicles – without using the CO₂ Regulations taxonomy – are proposed in the Rural Direct Vision level
 - Tractors >16 t
 - Rigid >16 t
 - 4x2, >265 kW, sleeper cab
 - 6x2, sleeper cab
 - 6x4, 8x2, 8x4 >370 kW, sleeper cab
 - All wheel drive vehicles
- All other N3 vehicles in the Urban Direct Vision level

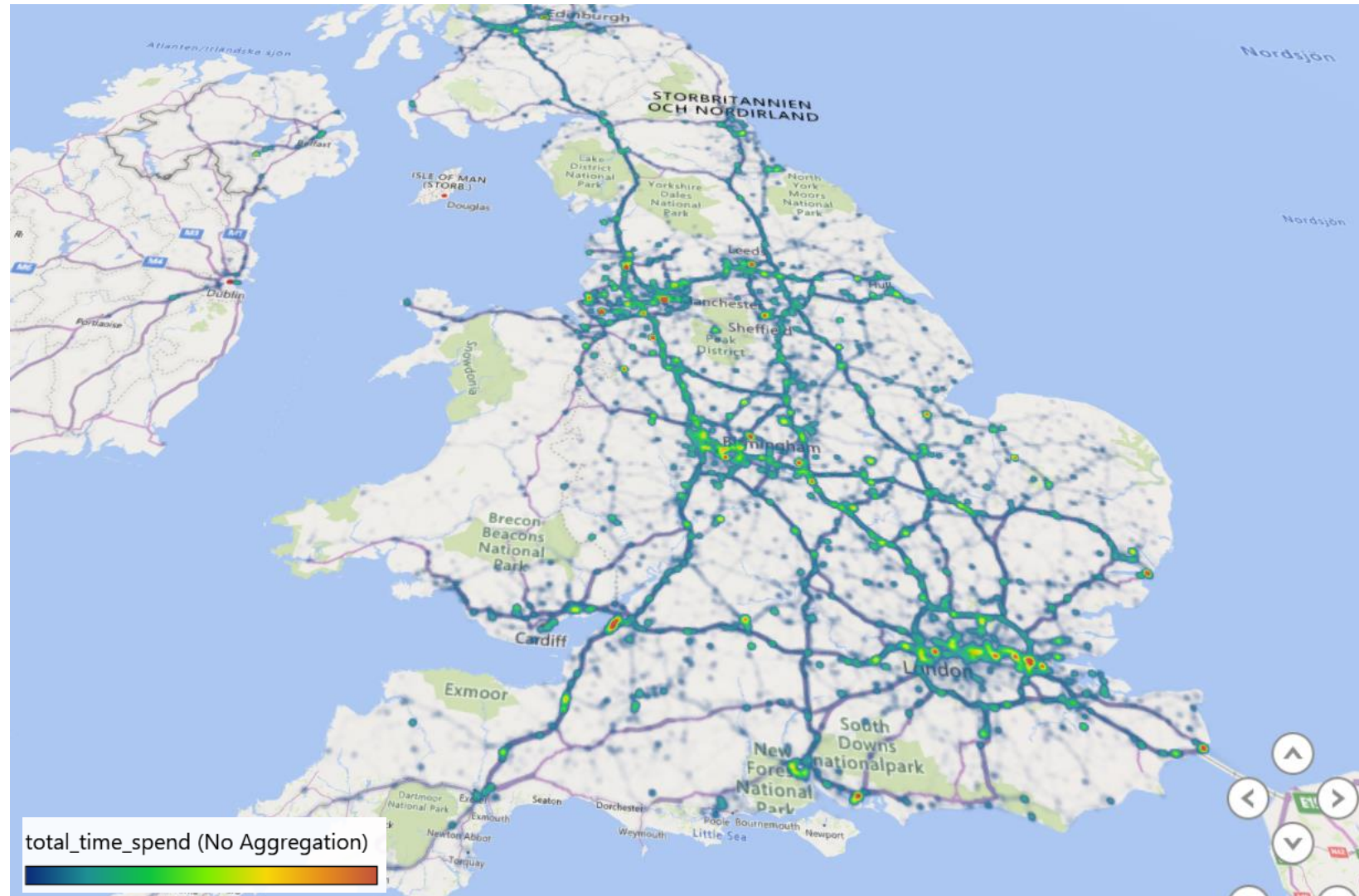
Direct Vision Differentiation

Real Driving Data

- Data from connected Scania vehicles manufactured in 2017 and later
- Positions from 2019, full year
- Connected vehicles that has produced frequent data (i.e. not all vehicles)
- UK only
- Total time spent per position
- Filter possibility according to proposal on division urban and rural direct vision vehicle sub-groups



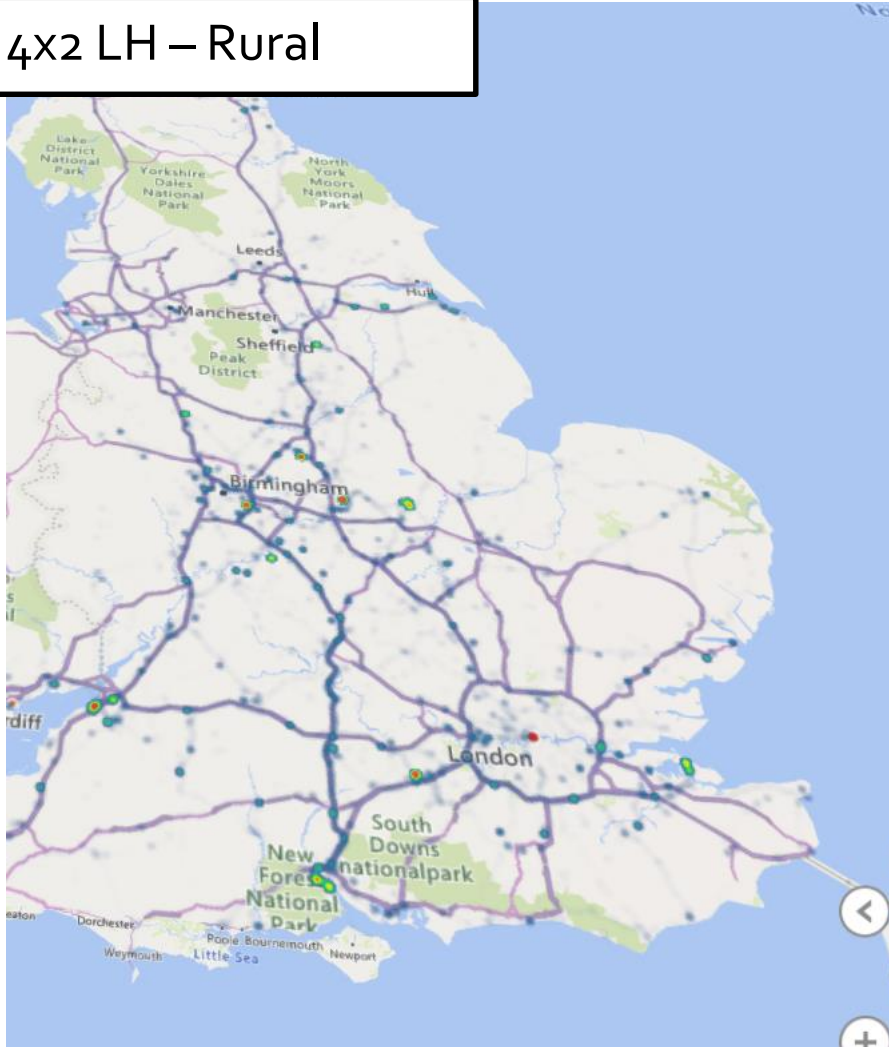
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Tractors 4x2 – Rural
 Tractors 6x2 – Rural
 Tractors 6x4 – Rural



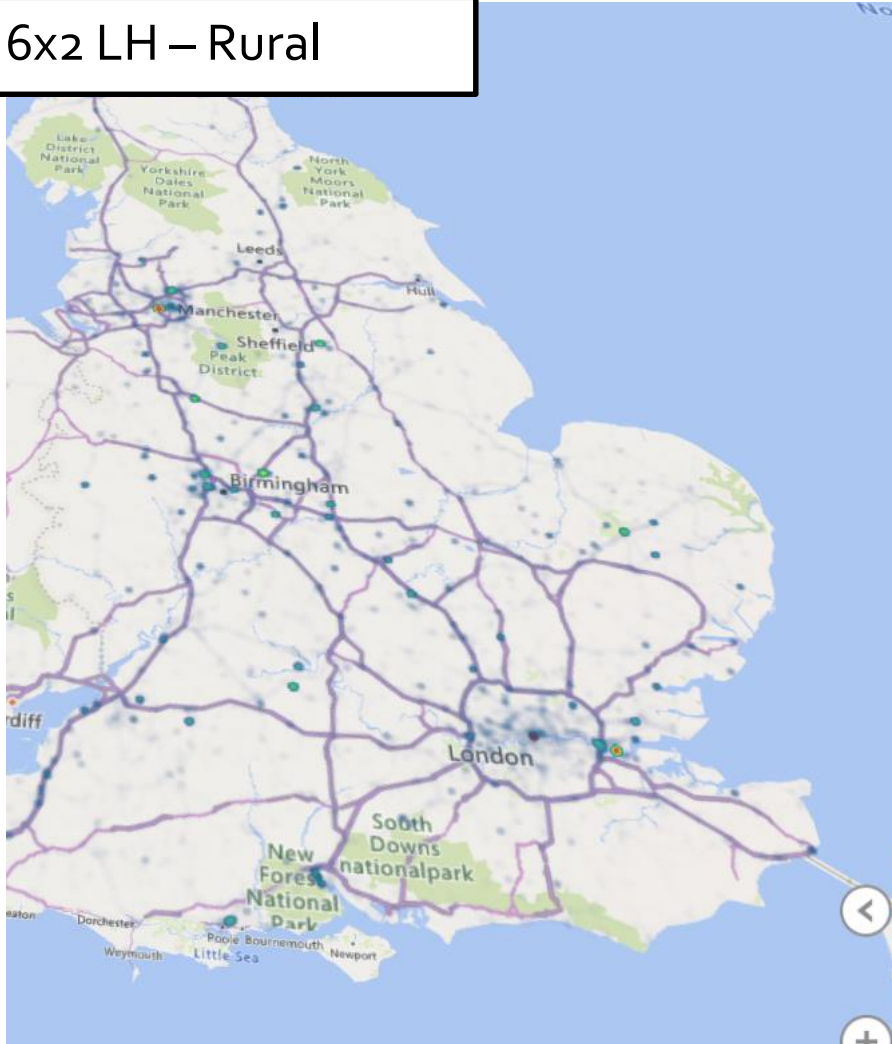
Rigids 4x2 LH – Rural



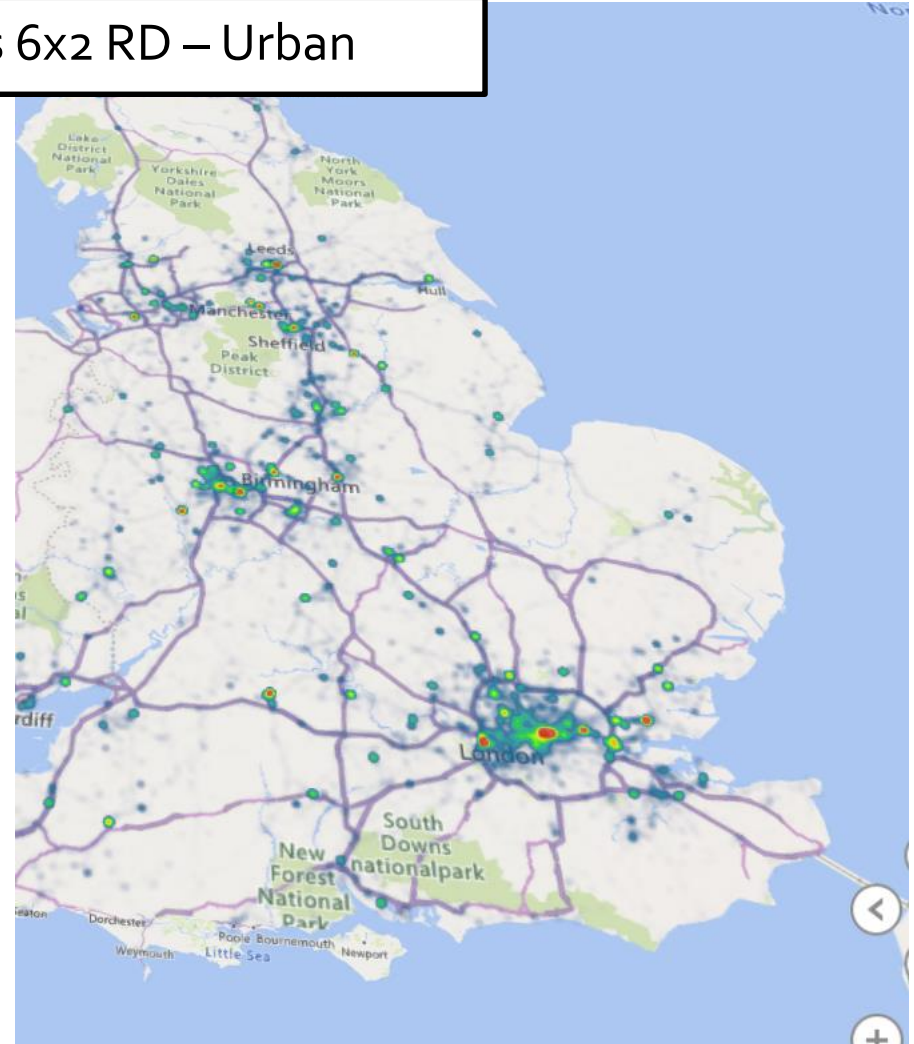
Rigids 4x2 UD/RD – Urban



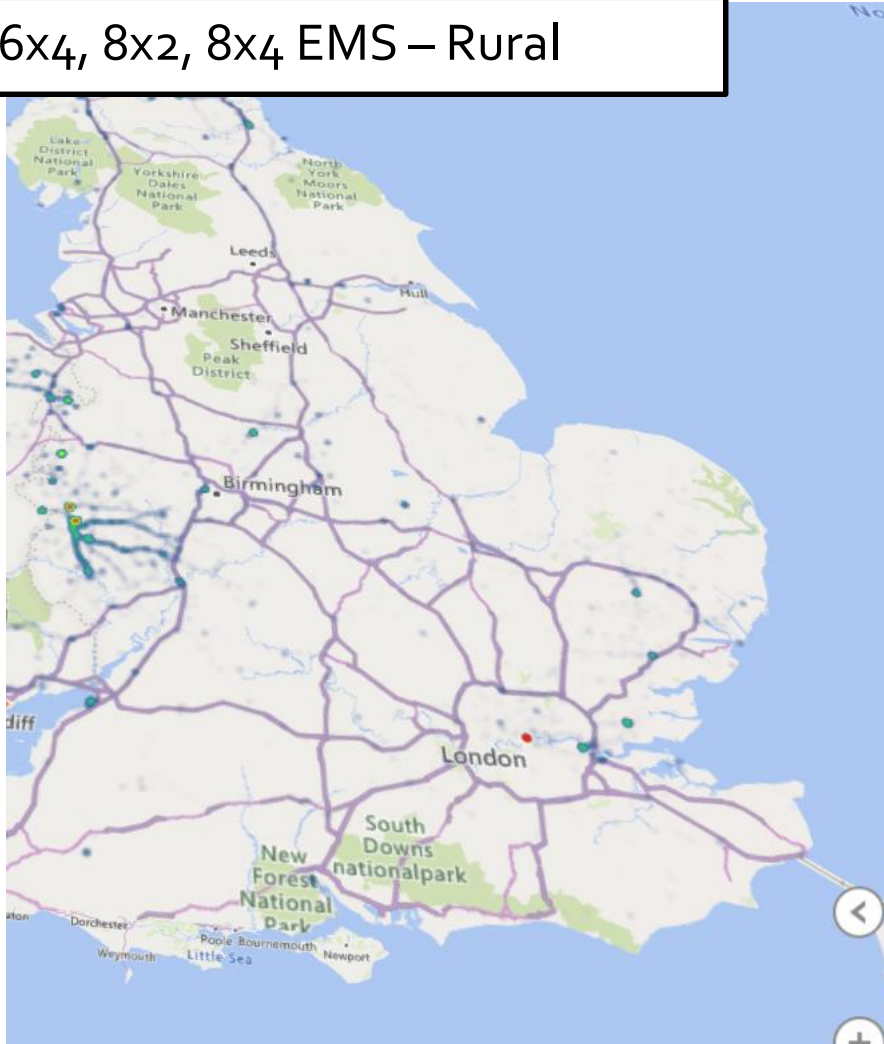
Rigids 6x2 LH – Rural



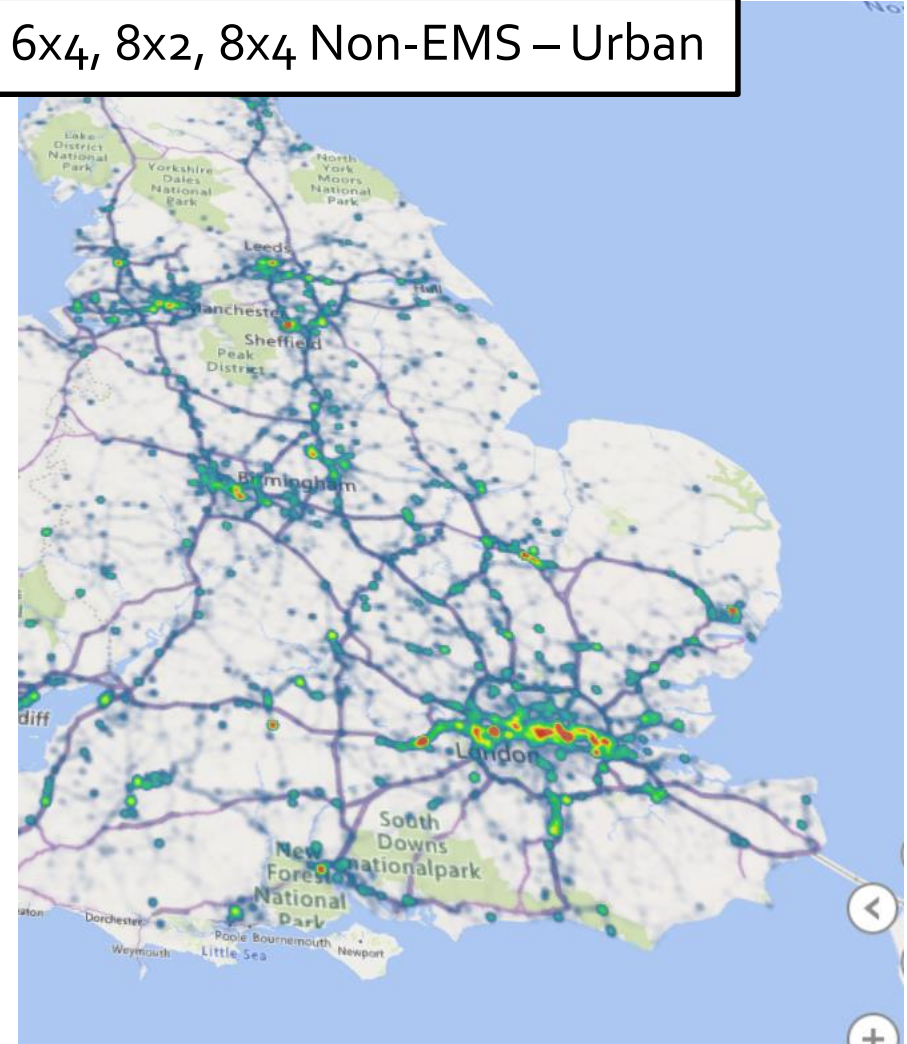
Rigids 6x2 RD – Urban



Rigids 6x₄, 8x₂, 8x₄ EMS – Rural



Rigids 6x₄, 8x₂, 8x₄ Non-EMS – Urban



Direct Vision Differentiation

Conclusions

- The Direct Vision Regulation's must be divided into different requirements for different applications, taking safety effects of active detection systems into account – for maximum overall road safety, transport efficiency and other important needs
- Such a division is proposed based on basic vehicle characteristics such as axle and chassis configuration, mass, cab type and engine power
- Data from connected vehicles show that the proposed division can be used for the purpose described