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fit for the future



Reducing transport's impact on climate change and energy consumption: The role of the EU's vehicle CO₂ emissions Regulations

Achilleas Tsamis, Ricardo Energy & Environment
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- Evaluation of EU CO₂ standards for passenger cars (Regulation (EC) No 443/2009) and vans (Regulation (EU) No 510/2011).
- Aim of Regulations : Contribute to reductions in actual (real-world) CO₂ emissions from passenger cars and vans without undermining sustainable mobility and competitiveness of the automotive industry
- Adopted following the voluntary agreements with industry in 1998 that did not achieve the level of reduction set by 2008
- Targets set in two phases: 2015/2017 (cars/vans) ; 2021 (cars) and 2020 (vans)
- Ricardo evaluation study in 2015 for the EC (DG Climate Action) focused on the first phase.

Evolution of the regulatory landscape

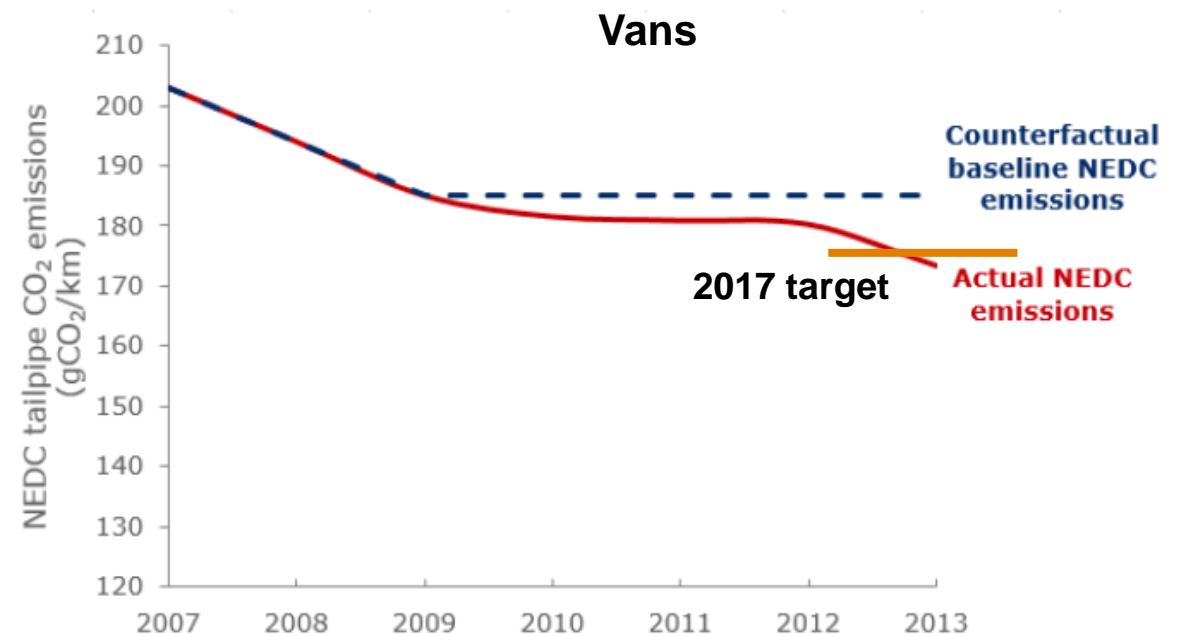
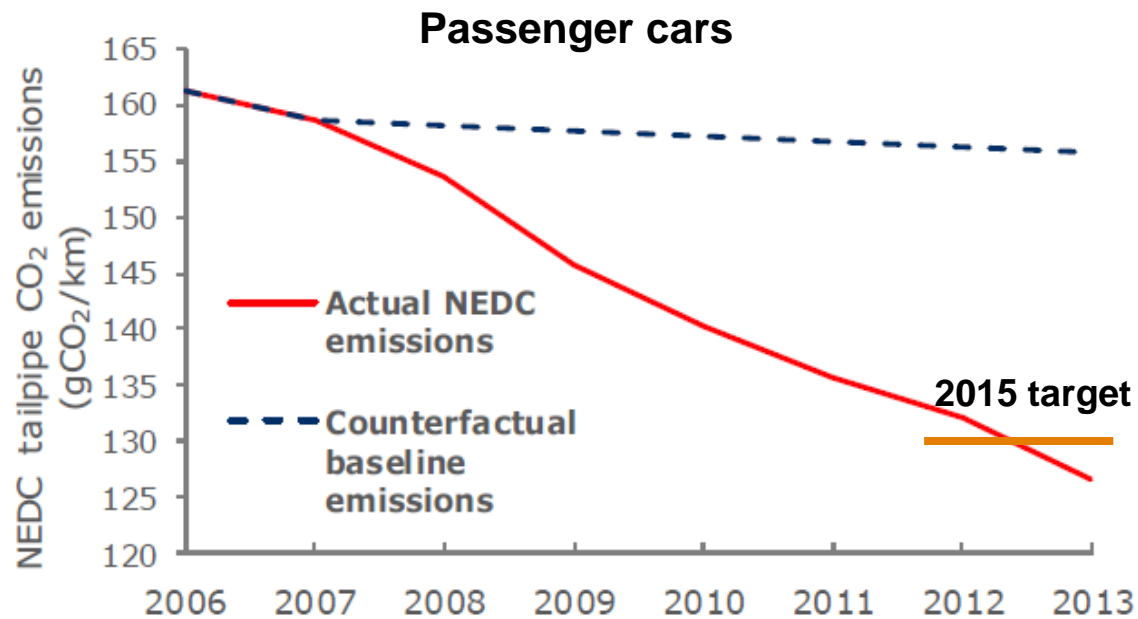
Year	Instrument	Fleet average targets (gCO ₂ /km) – NEDC cycle	
		Passengers cars	Vans
1998	Industry voluntary agreement	140 by 2008	
2009	Regulation (443/2009)	130 by 2015	
2011	Regulation (510/2011)		175 by 2017
2014	Regulation (333/2014)	95 by 2021	147 by 2020
2019	Regulation (2019/631) Target set as % improvement from previous step	81 by 2025 (15% reduction)	125 by 2025 (15% reduction)
		59 by 2030 (37.5% reduction)	101 by 2030 (31% reduction)

- Vehicles emissions measured using the earlier New European Drive Cycle (NEDC)
- For 2020/2021 measurements with Worldwide Harmonised Light Vehicle Test Procedure (WLTP) translated into NEDCe (equivalent) to check compliance

- Analysis of data on average CO₂ emissions against counterfactual
- Regression analysis : establish link between the change in CO₂ emissions over time and the presence of the Regulation controlling for other key relevant factors
- Desk and field research : inform/support analysis, understanding of mechanisms, analyse costs

Data analysis - Counterfactual

- **Passenger cars:** Assumed annual improvements of 0.5 gCO₂/km per year linked to the voluntary agreement
 - **Vans:** Assumed fleet-average emissions remained static from 2009 (year Regulation was announced) as no voluntary agreement in place
- Data suggest difference from baseline - targets already met in 2013
- But do not prove causal relationship with intervention



Establishing causal relationship - Regression analysis (passenger cars)



Factor	Findings	Comment
Car CO ₂ Regulation	65% of total reduction (3.5 gCO ₂ /km per year)	Positive impact over and above the impact of voluntary agreement and autonomous technical improvements.
Voluntary agreement and autonomous technical improvement	33% of total reduction (1.6 gCO ₂ /km per year)	Linked to knowledge, technologies, and manufacturing techniques and role of voluntary agreement
Diesel share	2% of total reduction	Diesel share increase by 2% 2006-2013
Number of new registrations	No contribution	No effect on fleet average emissions
<i>Relevant parameters not controlled (qualitative based on literature)</i>	<ul style="list-style-type: none"> <i>Changes in vehicle mass over time (small reduction to emissions)</i> <i>Changes in vehicle segments share (unclear direction but limited)</i> <i>Fuel prices and taxes (small reduction)</i> <i>Other national policies and incentives (expected to lead to reduction)</i> 	

Efficiency – Cost of achieving the targets



- Costs for manufacturers much lower than originally anticipated
- Lifetime fuel savings achieved but smaller than initially expected due to divergence between test cycle and real-world emissions performance
- Negative CO₂ abatement costs as a combination of emissions reduction and fuel efficiency benefits

	Vehicle type	Ex-ante estimate	Evaluation
Average cost per vehicle to meet fleet average gCO ₂ /km target (€s)	Passenger cars	€430-984	€183
	Vans	€1,037	€115
Lifetime fuel expenditure savings (€s)	Passenger cars	€2,649-3,709	€981-1,336
	Vans	N/A	€982-1,466
Abatement costs (€ per CO ₂ abated)	Passenger cars	N/A	- €46.4
	Vans	N/A	- €173

Conclusion : Positive impacts but also some issues/limitations



- Clear positive overall impacts in a cost-effective manner
- But, NEDC test cycle emissions did not reflect real-world emissions – erosion of expected benefits
- No consideration of lifecycle and embedded emissions – not significant for conventional vehicles, but relevant for electric vehicles
- Modalities of Regulation did not weaken the targets in practice.
- Small negative impact from “Rebound effect”

➤ *Report with detailed presentation of methodology and findings available in [DG CLIMA webpage](#)*



Achilleas Tsamis
Associate Director
Ricardo Energy & Environment

Achilleas.Tsamis@Ricardo.com