EU regulatory framework on HDV CO_2 emissions

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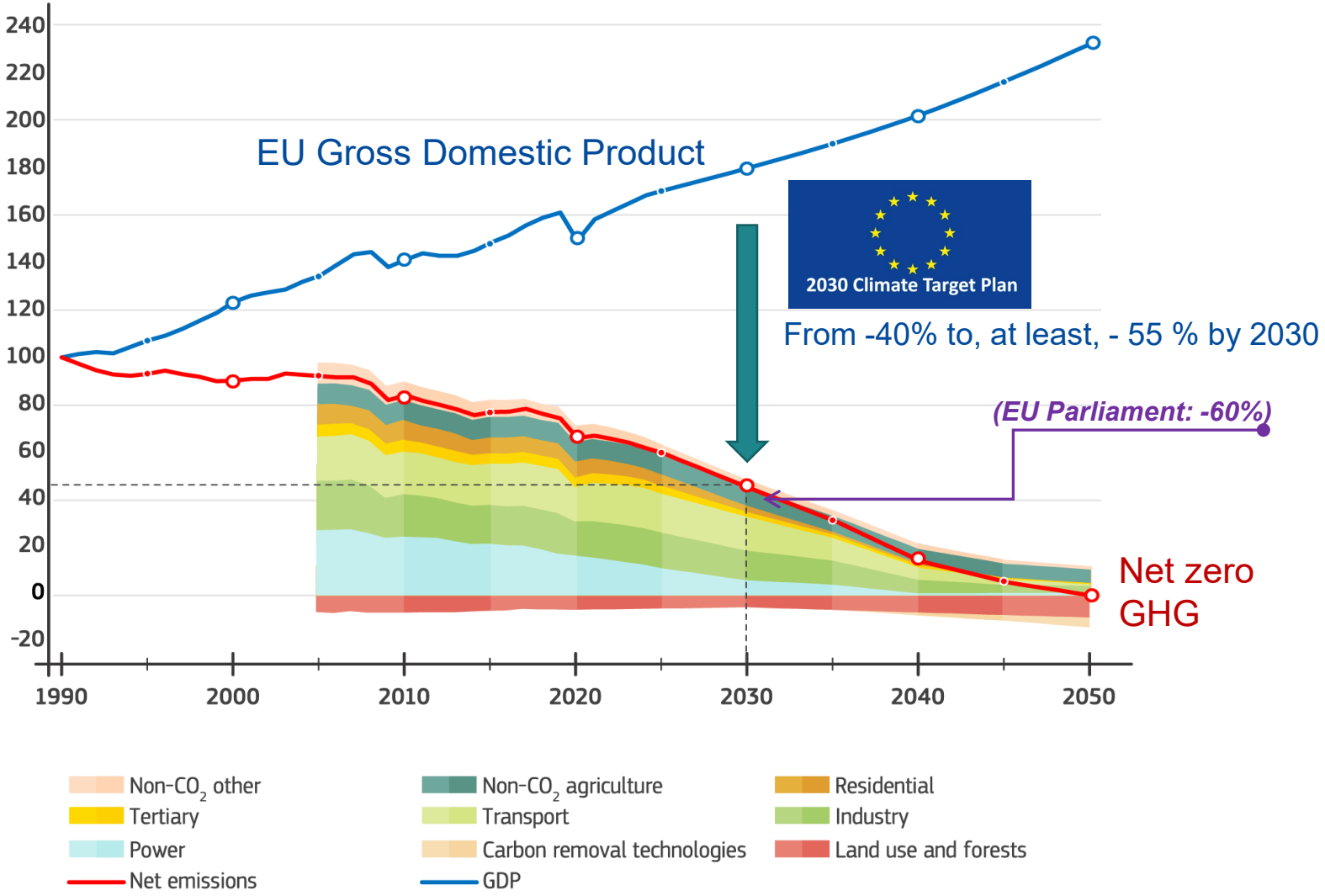
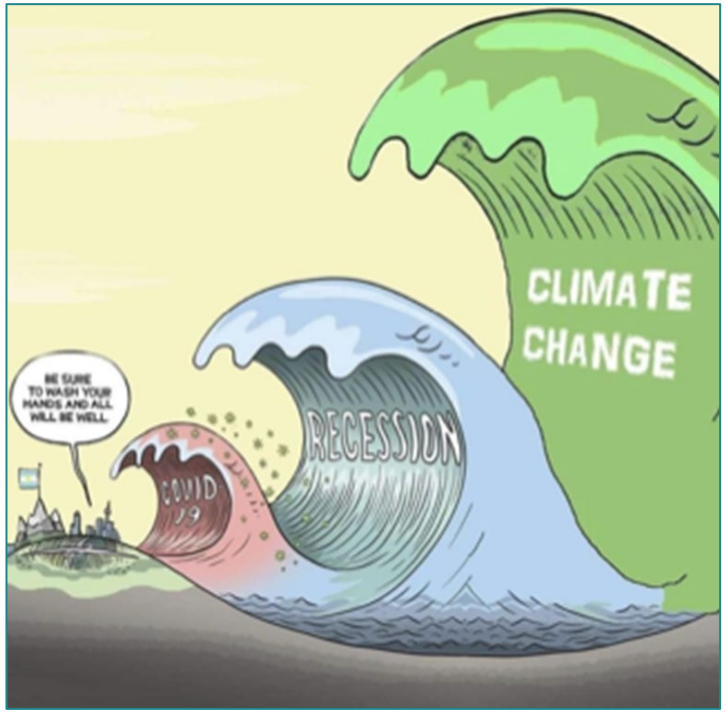
EU pathway to 2050 climate neutrality





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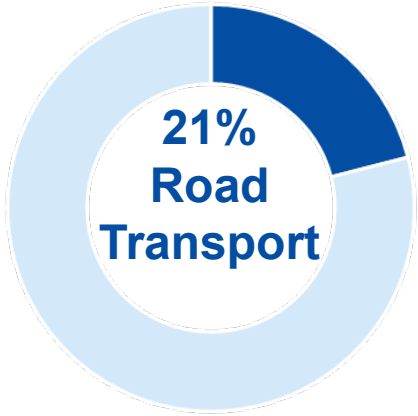
How: Legislative framework

- Climate Law: net-zero carbon emissions by 2050
- Target Plan: EU's CO_2 emissions to be reduced by 55% in 2030 with regard to 1990
- Updating sectoral legislation under European Green Deal Commitment by June 2021

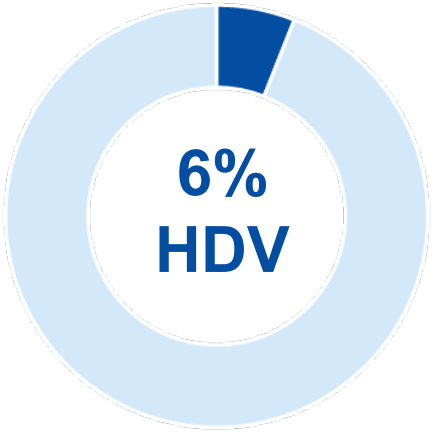
  - EU Emissions Trading System / Market Stability Reserve
  - Carbon Border Adjustment Mechanism
  - Land use, land use change and forestry
  - Effort Sharing
  - Energy Efficiency/Buildings
  - Energy Taxation Directive
  - State Aid guidelines
  - Fluorinated gases
  - Sustainable fuels (shipping, aviation)
  - LDV CO_2 efficiency standards
  - **HDV CO_2 efficiency standards**
  - Fuel Quality Directive (FQD) / Renewable Energy Directive (RED)
  - Trans-European Networks (TEN-T, TEN-E)
  - Alternative Infrastructure Directive (AFID)
  - Eurovignette (road charges) Directive

Key: Vehicle supply, vehicle demand, infrastructure

Green Deal - Sustainable and smart mobility

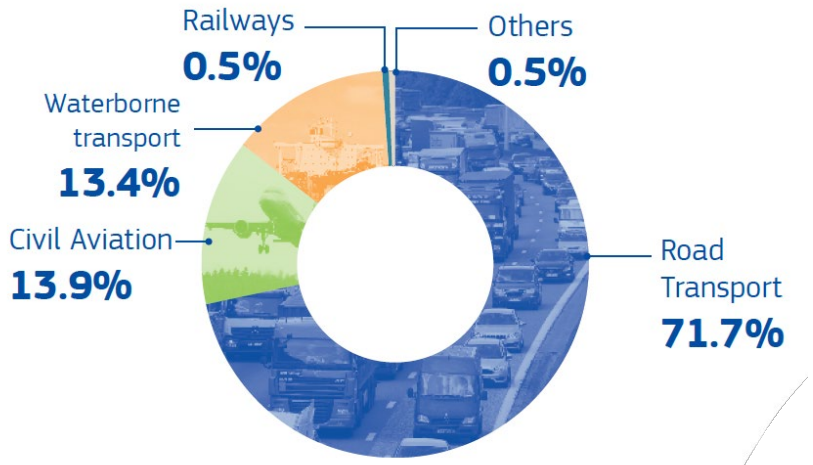


Of total EU CO_2 emissions

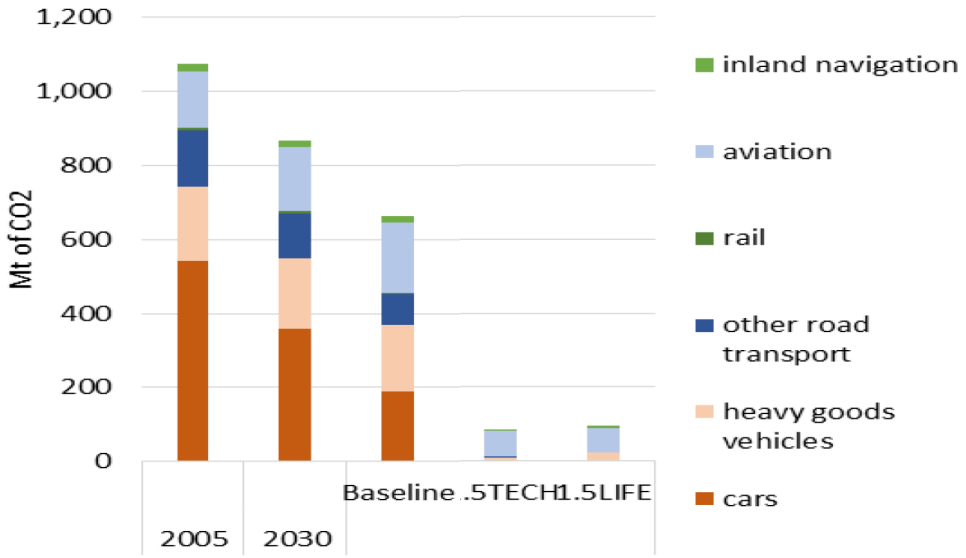


90%
reduction
greenhouse gas emissions in transport by 2050

Share of Greenhouse Gas Emissions by Mode of Transport (2017)



Source: Statistical pocketbook 2019



Source: PRIMES.

Decarbonisation of HDV: technologies

Technology	Local & regional transport (overnight return of vehicles to the base)	Long-haul transport
Battery electric	Feasible, electric infrastructure probably even less demanding than for cars & vans	Significant challenges for infrastructure development; high battery costs; significant reduction of payload capacity by battery weight
Catenary electric (combined with some limited battery range)	Infrastructure development challenging if not impossible	Infrastructure development seems to be possible with “reasonable” costs but needs long-term planning for permits; EU-wide standardisation is necessary; probably only applicable in regions with sufficiently dense HDV traffic
Green Hydrogen	Infrastructure development is possible but challenging; energy conversion efficiency of hydrogen produced from renewable electricity is significantly lower than for HDV solutions with electric propulsion; challenges for transport and on-board storage of hydrogen	
Sustainable bio-fuels	Limited global availability, can probably not be used in significant quantities in road transport in a global decarbonised economy	
e-fuels	Very low energy conversion efficiency; very high costs; production using ambient CO2 (compared to today’s CO2 from the flue, which will not exist in a decarbonised economy) is fragile and requires at least even more energy; use on a large scale for road transport is highly questionable	

How are HDV CO_2 emissions regulated? (1)

Software tool based on tests

- Step-wise approach
- **VECTO** simulation tool determines fuel consumption and CO_2 emissions of HDVs based on vehicle component (engine, air drag, gearbox, axles, tyres,…) input data
- CO_2 emissions determined at type approval according to **Regulation (EU) 2017/2400**
- Only for newly registered HDVs placed on the EU market
- Monitoring & reporting by Member States and manufacturers; registration period: 1 July Y -> 30 June Y+1

VECTO
Vehicle Energy Consumption Calculation Tool

Certification regulation

Monitoring and reporting

- CO_2 emission standards
- Setting of baseline

2017 2018 2019

First official data to be published in 2021

***(Buses and coaches at a later stage)*

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How are HDV CO_2 emissions regulated? (2)

Trucks are divided within Regulation 2017/2400 (CO_2 determination) into 18 different vehicle groups

Description of elements relevant to the classification in vehicle groups			Vehicle group	Allocation of mission profile and vehicle configuration						
Axle configuration	Chassis configuration	Technically permissible maximum laden mass (tons)		Long haul	Long haul (EMS)	Regional delivery	Regional delivery (EMS)	Urban delivery	Municipal utility	Construction
4x2	Rigid lorry	> 3,5 –7,5	(0)							
	Rigid lorry (or tractor)**	> 7,5 – 10	1			R		R		
	Rigid lorry (or tractor)**	> 10 – 12	2	R+T1		R		R		
	Rigid lorry (or tractor)**	> 12 – 16	3			R		R		
	Rigid lorry	> 16	4	R+T2		R		R	R	
	Tractor	> 16	5	T+ST	T+ST+T2	T+ST	T+ST+T2	T+ST		
	Rigid lorry	> 16	4v***						R	R
	Tractor	> 16	5v***							T+ST
4x4	Rigid lorry	> 7,5 – 16	(6)							
	Rigid lorry	> 16	(7)							
	Tractor	> 16	(8)							
6x2	Rigid lorry	all weights	9	R+T2	R+D+ST	R	R+D+ST		R	
	Tractor	all weights	10	T+ST	T+ST+T2	T+ST	T+ST+T2			
	Rigid lorry	all weights	9v***						R	R
	Tractor	all weights	10v***							T+ST
6x4	Rigid lorry	all weights	11	R+T2	R+D+ST	R	R+D+ST		R	R
	Tractor	all weights	12	T+ST	T+ST+T2	T+ST	T+ST+T2			T+ST
6x6	Rigid lorry	all weights	(13)							
	Tractor	all weights	(14)							
8x2	Rigid lorry	all weights	(15)							
8x4	Rigid lorry	all weights	16							R
8x6 8x8	Rigid lorry	all weights	(17)							

* EMS - European Modular System
** in these vehicle classes tractors are treated as rigid lorries but with specific curb weight of tractor
*** sub-group "v" of vehicle groups 4, 5, 9 and 10: these mission profiles are exclusively applicable to vocational vehicles

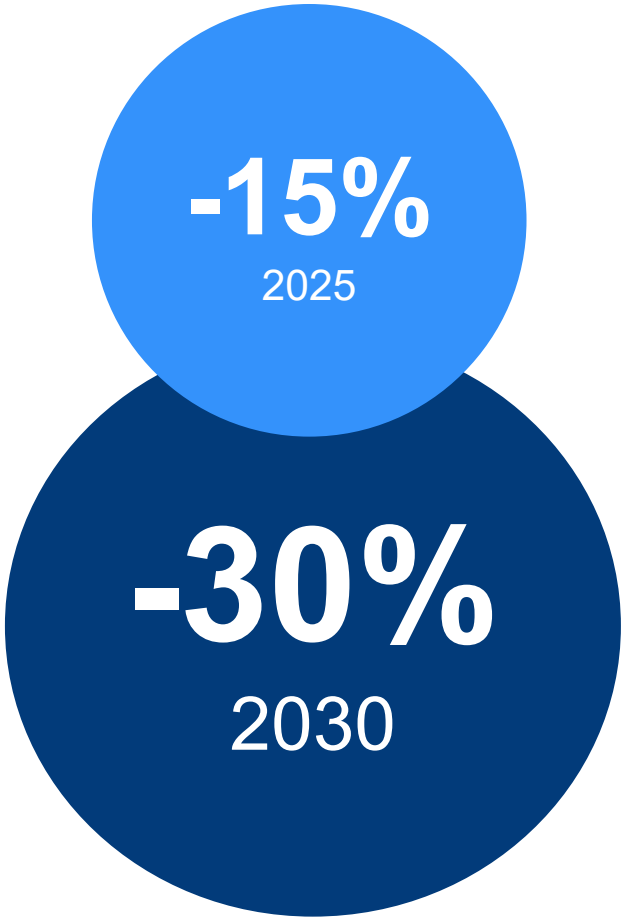
				T	=	Tractor
				R	=	Rigid lorry & standard body
				T1, T2	=	Standard trailers
				ST	=	Standard semitrailer
				D	=	Standard dolly".

4 categories summing up to 2/3 of the total CO_2 emissions from HDVs

HDV CO_2 Standards (Reg. 2019/1242)

Binding CO_2 reduction targets for fleets of new trucks for the regulated HDV categories (TPMLM > 16t):

- For each manufacturer ('specific CO2 emissions target')
- Reduction as compared to the 2019 baseline (= average of all manufacturers): **15% as from 2025, 30% as from 2030**
- **Unit:** g CO_2/t km
- **Tailpipe based approach**. Based on type-approval values from Regulation 2017/2400 and VECTO simulations.
- Full flexibility for manufacturers to balance emissions between the different groups of vehicles within their portfolio
- Incentives for zero- and low-emissions vehicles (ZLEV), even from non-regulated vehicle categories



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To-Do's (adoption in Q3 2021): HDV CO_2 emissions/energy consumption certification

- Buses, coaches, smaller trucks (TPMLM < 7,5 t) to be included
- Certification of "multi-stage" manufactured vehicles
- Coverage of various new technologies: WHR, ADAS, automated driving, platooning, catenary,…
- Vehicles with electrified powertrain (pure and hybrid electric)
- Hydrogen HDVs (fuel cell and internal combustion engine)
- Energy efficiency of (semi-)trailers to be determined

Review of HDV CO_2 Standards Regulation (EU) 2019/1242

Art 15 - Reg 2019/1242

Review proposal for 2022

- Assessment based on cost-efficient CO_2 reduction technical potential

Other concerned policies pending of revision

- TEN-T
- Eurovignette
- Fuel Quality Directive

CO_2 emission targets review

- Overall ambition assessment for 2025, 2030
- Possible targets for 2035 and 2040

Review of existing targets

2025 & 2030

New binding targets

- 2025 and beyond (depending on HDV categories)

ZEV / LEV

- Key role for 2030
- Deployment assessment and potential

Incentives

- Evaluation of current incentive mechanism
- Assessment to stimulate ZEV/LEV market uptake

Bio- and e-fuels

- Including hydrogen
- Assessment of ccontributions to decarb.
- CO_2 credits for manufacturers?
- Life-cycle assessment of CO_2 emissions?

VECTO

Vehicle Energy Consumption Calculation Tool

- Assessment to ensure tool updating
- More certificated HDV categories

CO_2 Standards scope extension

- Smaller trucks' categories
- City buses and coaches
- Trailers and semi-trailers
- Vocational vehicles
- EMS concept
- Pooling

Refueling infrastructure

- Assessment within revised AFID (Alternative Fuels Infrastructure Directive)

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Timeline

2019
Regulation 2019/1242 force entry

2022
HDV CO_2 standards review

2025
-15% CO_2 compared to 2019

2027
Manufacturer's targets adjustment? (real-world assessment)

2030
-30% CO_2 compared to 2019

2035
-XX% CO_2

2040
-(XX+YY)% CO_2

2050

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