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**COMMISSION STAFF WORKING DOCUMENT**  
**EXECUTIVE SUMMARY OF THE IMPACT ASSESSMENT**

*Accompanying the document*

**A Strategy**

**for Reducing Heavy Duty Vehicles' Fuel Consumption and CO<sub>2</sub> Emissions**

{ COM(2014) 285 final }  
{ SWD(2014) 160 final }

## 1. PROBLEM DEFINITION

### The nature of the problem

Greenhouse gas emissions from road transport increased by 29% during the period 1990 to 2007 but have since fallen on the back of high oil prices, increased efficiency of passenger cars and slower growth in mobility. According to the Commission's Roadmap for moving to a competitive low carbon economy in 2050<sup>1</sup> and Transport White Paper<sup>2</sup>, transport as a whole has to reduce its CO<sub>2</sub> emissions by 2050 of about 60% vs their 1990 level.

Heavy Duty Vehicle (HDV) CO<sub>2</sub> emissions, that represent about one quarter<sup>3</sup> of road transport CO<sub>2</sub> emissions, are currently not regulated, contrary to car and van emissions. In view of increasing freight volumes in the EU, except for the economic crisis period, these emissions have been rising in spite of some improvements in vehicle fuel consumption and CO<sub>2</sub> performance. Estimates suggest that between 1990 and 2010 the CO<sub>2</sub> emissions of HDVs increased by around 36%<sup>4</sup>. Without action HDV CO<sub>2</sub> emissions are expected to remain some 35% above their 1990 level in 2050. In view of their absolute size, trend and relative share HDV CO<sub>2</sub> emissions need to be addressed and curbed.

HDV CO<sub>2</sub> emissions are currently not measured in a standard way. The market lacks transparency in this respect and this creates a bottleneck that will have to be addressed. Furthermore, Japan, the US and Canada have already legislated and China is considering action on how to measure and curb HDV CO<sub>2</sub> emissions.

In June 2007 the Council invited the Commission "to develop and implement policy instruments and measures to reduce greenhouse gas emissions from those HDV vehicles"<sup>5</sup>. The Commission, in its April 2010 Communication on "A European strategy on clean and energy efficient vehicles"<sup>6</sup>, announced that it would propose a strategy targeting fuel consumption and CO<sub>2</sub> emissions from HDVs.

### How will the problem evolve without new EU action?

The main drivers of HDV CO<sub>2</sub> emissions are (i) overall transport demand which is linked to economic activity, (ii) modal split among road, rail, air and waterways, (iii) the uptake of technological change influencing vehicle performance, (iv) the fuel carbon content and (v) the HDV fleet operating mode.

Under the business-as-usual "baseline" scenario of the Commission PRIMES-TREMOVE model, based on no policy change assumptions, total transport activity is projected to grow in the next 40 years<sup>7</sup>. A certain degree of decoupling can however be observed in the baseline

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<sup>1</sup> COM/2011/0112 final

<sup>2</sup> 'Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system', COM/2011/0144 final

<sup>3</sup> Estimated at 26.6% of total EU GHG emissions by AEA-Ricardo in "Lot1" Report, Reduction and Testing of GHG emissions from Heavy Duty Vehicles, February 2011, p 170. Available under [http://ec.europa.eu/clima/policies/transport/vehicles/docs/ec\\_hdv\\_ghg\\_strategy\\_en.pdf](http://ec.europa.eu/clima/policies/transport/vehicles/docs/ec_hdv_ghg_strategy_en.pdf)

<sup>4</sup> Source: Odyssee-Mure database, available under: <http://www.odyssee-mure.eu>

<sup>5</sup> <http://register.consilium.europa.eu/pdf/en/07/st11/st11483.en07.pdf>

<sup>6</sup> COM(2010)186 final, p 6, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0186:FIN:EN:PDF>

<sup>7</sup> The "Reference scenario 2010" has been finalised at the beginning of 2012.

model results and GDP trends, with road transport growing at slower rates. Notwithstanding EU policy to promote less carbon intensive modes such as rail transport, road transport is expected to maintain its dominant role in both passenger and freight transport within the EU, with a rather moderate shift of freight from road to rail. As regards HDVs, after two decades devoted to reducing pollutant emissions to comply with EU legislation, HDV manufacturers are expected to focus their efforts on reducing fuel consumption and CO<sub>2</sub> emissions. As a result, HDV CO<sub>2</sub> emissions should broadly remain constant over the period 2010-2050.

### **Subsidiarity**

EU action is necessary in order to avoid the emergence of barriers to the Single Market in the automotive sector and because of the transnational nature of climate change. The absence of action at the European level could result in a series of national schemes to reduce CO<sub>2</sub> emissions of HDVs, hence to market fragmentation and losses in economies of scale.

### **HDV CO<sub>2</sub> emission reduction potential**

Studies by AEA-Ricardo<sup>8</sup> and TIAX<sup>9</sup> have identified possible fuel and CO<sub>2</sub> saving technical improvements to HDVs. According to the TIAX study, which broadly concurred with the AEA-Ricardo findings, 30% to 50% fuel savings and CO<sub>2</sub> emission reductions would be possible on new vehicles as of 2014, translating into a HDV fleet emissions reduction of some 28% by 2030. Mainly based on TIAX estimates, a study by CE Delft produced marginal abatement cost curves<sup>10</sup> and identified a high potential for cost effective technologies, possibly translating into 35% average reductions for new HDV fuel consumption and CO<sub>2</sub> emissions.

### **Market barriers to uptake of HDV fuel saving and cost effective technologies**

Market barriers to the uptake of more efficient fuel cutting technical improvements are difficult to assess due to the interaction of the different business models of vehicle manufacturers, body and trailer manufacturers, HDV operators and financial and leasing companies. A study from CE Delft<sup>11</sup> looked into this issue and identified the most obvious market barrier to the uptake of the most fuel efficient technologies as the inability of transport operators to assess fuel saving and CO<sub>2</sub> reduction effects of technologies and to compare the various HDV manufacturers' sales offers in this respect. Other barriers are also evident in specific situations. For example, in some countries limited access to financial instruments makes it hard to finance fleet modernisation. In some but not all cases, the technology purchase is separated from the fuel-saving benefits from the efficiency technology (i.e. split incentives).

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<sup>8</sup> [http://ec.europa.eu/clima/policies/transport/vehicles/docs/ec\\_hdv\\_ghg\\_strategy\\_en.pdf](http://ec.europa.eu/clima/policies/transport/vehicles/docs/ec_hdv_ghg_strategy_en.pdf)

<sup>9</sup> [http://ec.europa.eu/clima/policies/transport/vehicles/heavy/docs/icct\\_ghg\\_reduction%20potential\\_en.pdf](http://ec.europa.eu/clima/policies/transport/vehicles/heavy/docs/icct_ghg_reduction%20potential_en.pdf)

<sup>10</sup> [http://ec.europa.eu/clima/policies/transport/vehicles/heavy/docs/hdv\\_2012\\_co2\\_abatement\\_cost\\_curves\\_en.pdf](http://ec.europa.eu/clima/policies/transport/vehicles/heavy/docs/hdv_2012_co2_abatement_cost_curves_en.pdf)

<sup>11</sup> <http://www.theicct.org/market-barriers-increased-efficiency-european-road-freight-sector>

## 2. OBJECTIVES

The general objective is to contribute to meeting climate goals by reducing CO<sub>2</sub> emissions in the HDV transport sector.

**Specific** objectives include:

*"Effectiveness"*: effectively contributing to reducing HDV fuel consumption and CO<sub>2</sub> emissions in the EU in view of the overall objective to reduce transport GHG emissions by 60% in 2050 (compared to their 1990 level); and contributing to reducing economy-wide CO<sub>2</sub> emissions being relevant in assessing instruments which have a scope beyond the HDV sector, such as the ETS.

*"Efficiency"*: efficiently, in a cost effective and proportionate way, contributing to reducing HDV fuel consumption and CO<sub>2</sub> emissions in the EU.

*"Predictability"*: providing EU industry, transport operators, public sector and consumers with a clear and coherent vision on the policy framework and likely regulatory developments as regards HDV CO<sub>2</sub> emissions, thereby facilitating decision making and investment planning.

**Operational** objectives consist of:

- *Monitoring, reporting and verifying* EU-wide CO<sub>2</sub> emissions of new HDVs;
- And *setting a carbon constraint* on CO<sub>2</sub> emissions from HDV transport to achieve emission reductions.

## 3. POLICY OPTIONS

### **Baseline "no policy change" scenario**

This scenario incorporates a number of decided or proposed developments, including the revised Energy Taxation Directive<sup>12</sup>. The baseline scenario notably assumes the implementation of recent legislation on public procurement for road vehicles, road user charging, and the incentivised use of alternative fuels.

### **Option 1: improve knowledge, comparability and accountability of HDV CO<sub>2</sub> emissions**

This option examines two alternatives (i) the certification and reporting of HDV engine-only fuel consumption and CO<sub>2</sub> emissions pursuant to the entry into force of the Euro VI Regulation; or (ii) the certification and reporting of HDV whole vehicle fuel consumption and CO<sub>2</sub> emissions for new registered vehicles. The latter would require the entry into operation of the VECTO HDV CO<sub>2</sub> emissions simulation tool currently under development.

### **Option 2: include road transport CO<sub>2</sub> emissions in the EU Emissions Trading Scheme**

The ETS would be extended to the whole road transport sector. The inclusion would take place upstream, at the level of fuel suppliers defined as the participating entities in the ETS.

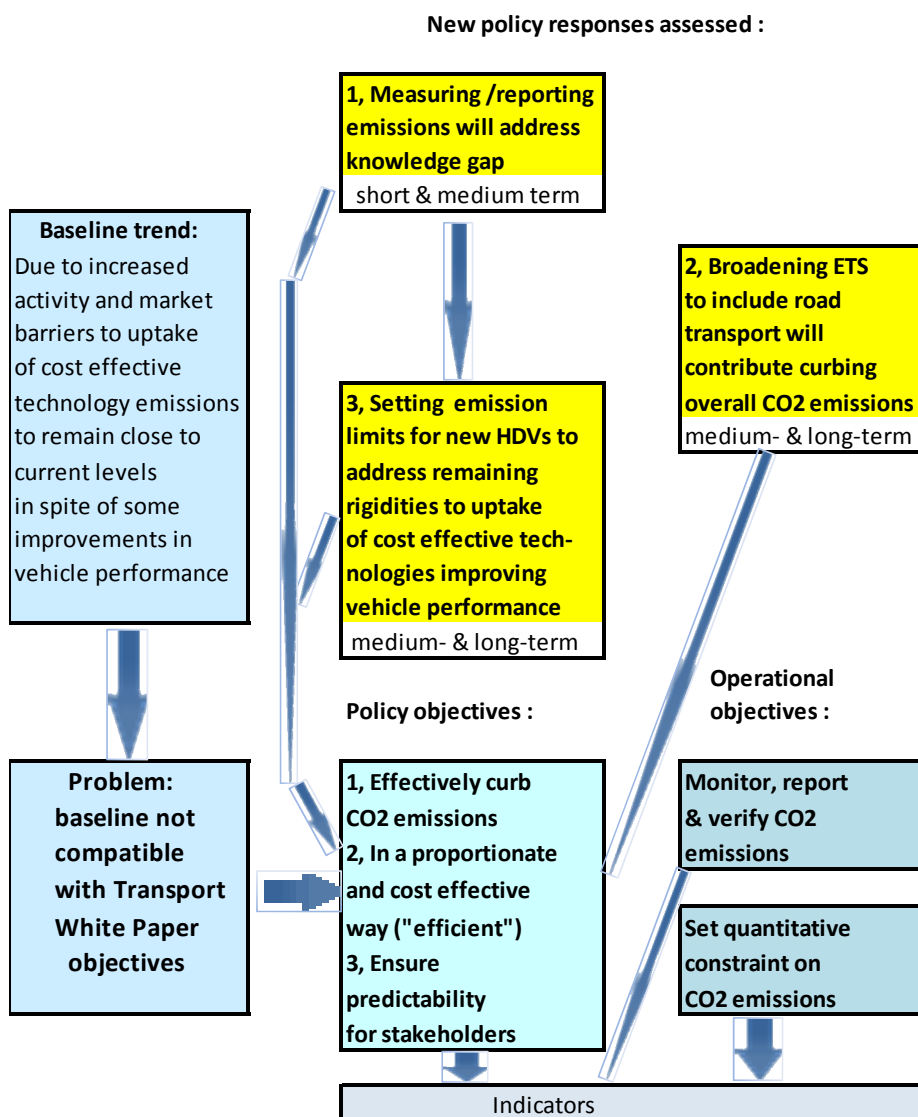
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<sup>12</sup> COM(2011) 168/3.

### Option 3: introduce legislation setting mandatory HDV CO<sub>2</sub> emission ceilings

In line with option 1 which is a pre-requisite for option 3, such ceilings could be introduced: either on (i) engine-only emissions; or (ii) on whole vehicle emissions. The aim of this option is accelerating the roll-out of technologies enabling significant HDV CO<sub>2</sub> emission abatement.

#### Addressing HDV CO<sub>2</sub> emissions



#### 4. ASSESSMENT OF IMPACTS

##### Baseline "no policy change" scenario

The baseline "no policy change" scenario was assessed with the support of the Commission PRIMES-TREMOVE model. The conclusion was that without further action HDV CO<sub>2</sub>

emissions would remain roughly constant over the long term (2030-2050), i.e. significantly above their 1990 level (about +35%), which is incompatible with the Transport White Paper's objectives to curb overall transport emissions by 60% in comparison to the 1990 baseline level.

### **Option 1: improve knowledge, comparability and accountability of HDV CO<sub>2</sub> emissions.**

Option 1(i) on the certification and reporting of engine-only emissions, while *efficient* as it requires limited action and involves low costs, would not be expected to *effectively* address HDV CO<sub>2</sub> emissions and curb them. Option 1(ii) on the certification and reporting of whole vehicle CO<sub>2</sub> emissions could only be implemented upon the completion of the VECTO simulation tool currently under development. It will be more *effective* than 1(i) as it will provide a comprehensive knowledge of new vehicle CO<sub>2</sub> emissions, facilitating the market uptake of the most energy efficient ones. Overall, in view of its expected limited costs the latter sub-option would also meet the *efficiency* objective. Both options, while contributing to increased awareness and transparency, would not on a stand-alone basis be sufficient to provide stakeholders with long-term guidance and *predictability* on the regulatory environment.

The *economic, social and environmental* impacts of both options are either negligible or very limited.

### **Option 2: include road transport CO<sub>2</sub> emissions in the EU Emissions Trading Scheme**

Including HDV emissions, together with other road transport emissions, in the ETS would contribute to reducing GHG emissions EU-wide, as the *effectiveness* of meeting the cap on emissions for all sectors covered by the scheme is fairly certain. However, in view of relative carbon prices and fuel excises, and of fuel price elasticities, including HDV emissions in the ETS would not trigger any sizeable improvements in fuel efficiency. The allocation within ETS sectors of emission abatement efforts along the most *efficient* cost structure ensures a high level cost effectiveness and efficiency of this instrument. *Predictability* with regard to compliance with the overall quantitative emission cap would be ensured by the ETS mechanism, at the cost of price uncertainty. *Economic impacts* are to a large extent contingent upon the evolution of carbon prices. Overall *social impacts* are expected to be limited. *Environmental impacts*, beyond the achievement of overall CO<sub>2</sub> objectives, would be related to the sectors where abatement takes place.

### **Option 3: introduce legislation setting mandatory HDV CO<sub>2</sub> emission ceilings**

Option 3(i) on HDV engine-only limits on CO<sub>2</sub> emissions would *effectively* contribute to curbing fuel consumption and CO<sub>2</sub> emissions, but would leave an untapped potential of emission cuts. Option 3(ii) on the setting of limits for whole vehicle emissions (for new registered vehicles) would more satisfactorily address the full potential of emission abatement cuts and thereby have a higher effectiveness. It would thereby contribute more to meeting the long-term Transport White Paper objective. Both options would require limited means to achieve their objectives. Assuming standards are defined in such a way that investment costs to improve vehicles translate into higher prices for HDVs, which are recovered by end-users through savings in fuel consumption, option 3 would overall rank well in terms of *efficiency*. Both options would contribute to an increased *predictability* in the regulatory environment.

An indicative quantitative *assessment of economic and social impacts* shows that the HDV manufacturing industry, due to the added value of its vehicles, and HDV transport operators, due to lower fuel consumption, would be expected to reap substantial benefits. Similarly in terms of *environmental* performance lower fuel consumption would lead to a lower level of other pollutant emissions.

## 5. COMPARISON OF OPTIONS WITH REGARDS TO THE MAIN OBJECTIVES

Options Objectives	Baseline	Option 1: Improve knowledge, comparability and accountability of HDV CO <sub>2</sub> emissions	Option 2: Include road transport CO <sub>2</sub> emissions in EU ETS	Option 3: Set mandatory CO <sub>2</sub> emission limits for new registered vehicles
Effectiveness in reducing fuel consumption and CO <sub>2</sub> emissions	- (low)	+ Modest reduction of HDV emissions	+ likely (low) for HDV, though potentially high (+++) for the rest of the economy in sectors with lower marginal abatement costs	(i) engine-only emissions ceiling: ++ (medium)  (ii) whole-vehicle emissions ceiling +++ (high)
Efficiency	=	+ Modest costs	+ Could use existing fuel taxation infrastructure,	(i) motor-only emissions ceiling: +++ (ii) complete vehicle emissions ceiling ++
Predictability of regulatory environment	Currently no clear perspective	+ some partial degree of improvement calling for further clarifications	++ on emission levels (fixed by cap) - on costs due to uncertainty of carbon price evolution	(i) motor-only emissions ceiling: + (ii) complete vehicle emissions ceiling : ++

## 6. CONCLUSION

This Impact Assessment underpins a Commission strategy for reducing HDV fuel consumption and CO<sub>2</sub> emissions in the EU. Any subsequent legislative proposal will be subject to a more specific Impact Assessment.

Options 1(i) on the recording of engine-only emissions and subsequently 3(i) on setting limits on engine-only emissions would only have been considered further if the VECTO simulation tool feasibility were not confirmed. In April 2013 however the Joint Research Centre issued a report on the "proof of concept" of the VECTO simulation approach confirming that it can provide accurate and reliable estimates of HDV fuel consumption and CO<sub>2</sub> emissions and that a future certification scheme of CO<sub>2</sub> emissions can be based on such a simulation tool. In view of this latest positive development options 1(i) and 3(i) will hence not need to be considered any further.

The successful deployment of the VECTO tool and the implementation of option 1(ii) on the certification and reporting these emissions are expected remedy this situation.

These are necessary priority short and medium-term steps before more ambitious actions can be envisaged in the medium and longer term:

- either to curb HDV CO<sub>2</sub> emissions – option 3(ii) on the setting of emission limits;
- and/or to consider including HDV transport with road transport as a whole into the ETS as foreseen under option 2.

Both options would require further in depth analysis in the framework of future Impact Assessments.

## **7. MONITORING AND EVALUATION**

Upon completion of VECTO simulation tool and the implementation of option 1 the Commission will monitor HDV fuel consumption and CO<sub>2</sub> emissions, as well as the costs of implementation. It will also monitor market and technological developments. These monitoring actions will permit subsequent evaluation of this initiative.