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Impacts of the Euro VI heavy duty emission standard for the Netherlands

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Summary

The European Commission recently presented its proposal for Euro VI emission standards for vehicles with heavy duty diesel engines (trucks and buses). The proposal calls for reductions in 2013 in the emissions of particulate matter (-67%) and NO_x (-80%) compared to the Euro V requirements.

In the Netherlands, the implementation of this proposal will lead to a reduction of the total NO_x emissions from road traffic by approximately 5% in 2015 and 21%-23% in 2020. Due to the Euro VI standards, the combustion-related $PM_{2.5}$ emissions from road traffic will increase by 2% to 3% in 2015 and 11%-13% in 2020. The CO_2 emissions of vehicles with heavy duty diesel engines will probably increase as well, but to a more limited extent: by 0.1% in 2015 and 0.3% in 2020. More stringent emission requirements for vehicles with heavy duty diesel engines is one of the most cost-effective measures for improving air quality near motorways with respect to NO_2, PM_{10} and $PM_{2.5}$.

The implementation of Euro VI emission standards in 2013 is expected to reduce the number of local exceedences of the NO_2 air-quality norm – which the Netherlands must comply with in 2015 – by about 30%. The more stringent Euro VI standards will be too late to contribute to solving problems with the local exceedances of the PM_{10} norm in the Netherlands, because the deadline for compliance with this norm is 2011. However, the Euro VI standards will contribute to compliance with the new $PM_{2.5}$ norms in 2015 and 2020. According to the most recent insights, it is especially the reduction in exposure to the combustion-related $PM_{2.5}$ that will lead to positive effects on human health. As a result, the Euro VI standards will lead to health benefits for people living near motorways.

The European Commission recently presented its proposal for Euro VI emission standards for new vehicles with heavy duty diesel engines (trucks and buses). The present report evaluates the consequences of this proposal for the Netherlands. The Euro VI proposal is in the form of a regulation and will be subject to the co-decision procedure.

In this report, the Euro VI proposal will be evaluated based on the following questions:

1) What is the contribution of Euro VI to reduced emissions of air pollutants?
2) How much does Euro VI contribute to solving exceedences, local and otherwise, of the air quality norm?
3) What is the effect of Euro VI on public health?
4) How cost-effective is this measure?

This report primarily addresses the consequences of the emission standards on air quality for particulate matter (PM_{10}), the finer fraction of particulate matter ($PM_{2.5}$) and nitrogen dioxide (NO_2). The consequences for eutrophication, acidification and ozone formation will not be addressed in this analysis.

The proposal of the European Commission

1. Content of the proposal

On 21 December 2007, the European Commission published a proposal for new emission standards for vehicles with heavy duty diesel engines (trucks and buses). This 'Euro VI' proposal contains, among other requirements, an emission standard of 0.01 g/kWh for particulate matter (PM) and 0.4 g/kWh for nitrogen oxides (NO_x) (*Table 1;* also see the textbox *Reactions of stakeholders during the public consultation*). Compared to the Euro V emission standards, this involves reductions of 67% for PM and 80% for NO_x . The proposed standard for particulate matter concerns the exhaust emissions. This particulate matter is combustion-related and is composed entirely of $PM_{2.5}$. This is the fraction of PM with particles smaller than 2.5 micrometers; according to the most recent insights, this faction is the most relevant to health (WHO, 2006). For the Netherlands, the proposed requirements for PM and NO_x are the most important in view of the localized problems in this country regarding compliance with the European air quality norms. Therefore, the emphasis in this analysis is on these two components.

According to the proposal, the new emission standards will go into force in April 2013 for new vehicle types and in October 2014 for all existing vehicle types. The current Euro IV standards have been in force since October 2005 for new vehicle types and since October 2006 for all new vehicle sales. The Euro V standards will go into force according to the same system in October 2008 and October 2009 (*Figure 1*).

Table 1 Characteristics of the Euro VI proposal

Emission standard		Increase in CO2 emissions	Average cost per vehicle
PM	NO_x		(minimum - maximum)
g/kWh		*%*	*€*
0.01	0.4	2 - 3	2,500 – 4,000

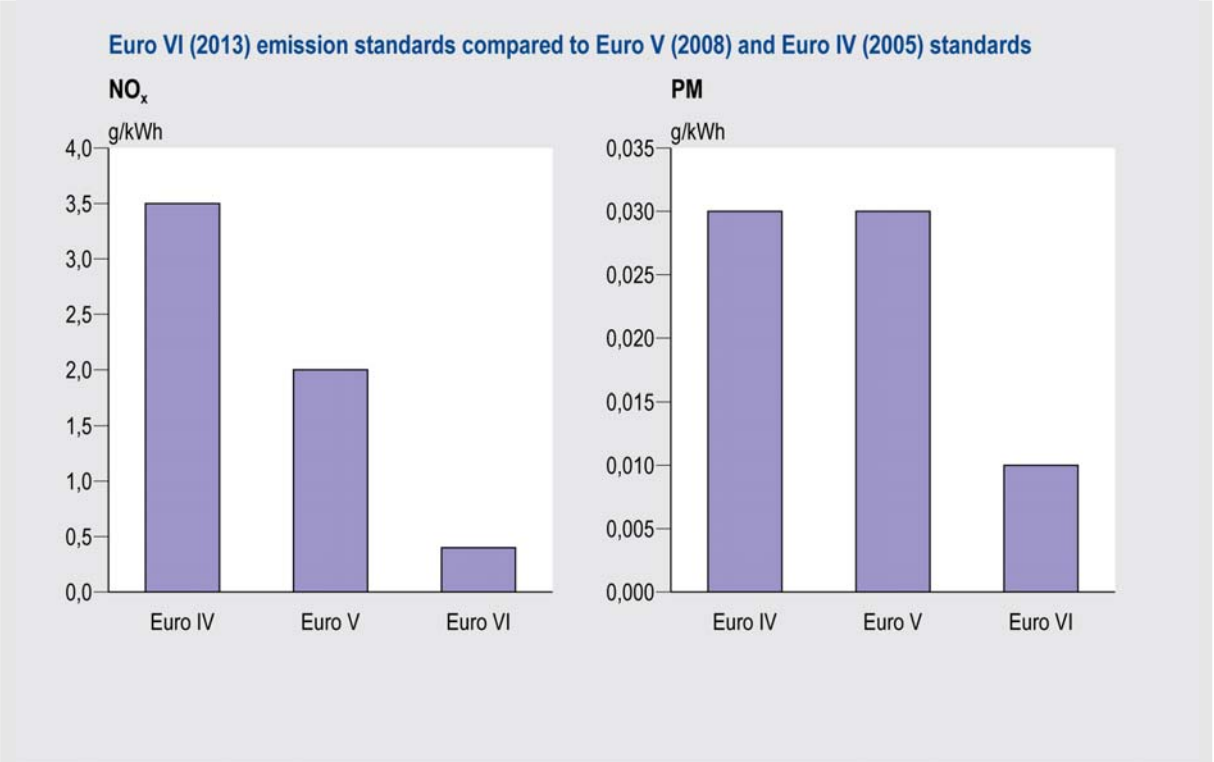

Figure 1 Euro VI emission standards compared to Euro V and Euro IV standards.

Reactions of stakeholders during the public consultation

To prepare for its Euro VI proposal, the European Commission drew up four emission scenarios. For each of these scenarios, the table below shows the emission standards for particulate matter (PM) and nitrogen oxides (NO_x), the estimates of the effect on CO_2 emissions and the estimates of the costs for manufacturers. Scenario A ultimately became the Commission proposal.

During a public consultation, interested parties were invited to present their views on four scenarios for the Euro VI emission standards. The majority of the responding parties (55 in total) expressed a preference for scenarios A or D, because these are the closest to the American emission standards for vehicles with heavy duty diesel engines. The European automobile industry, represented by the umbrella organization ACEA, expressed its preference for scenario A.

During this consultation, the Netherlands Ministry of Housing, Spatial Planning and the Environment (VROM) also expressed its preference for scenario A, partly for the same reason. The effect of the new measure at locations where the air-quality norm for nitrogen oxide (NO_2) will not be attained in 2015 was given the most weight by the Ministry. In its response, the Ministry therefore argued for accelerated implementation of the new standards, preferably in 2011/2012. The exact level of the NO_x emission standard was less important for the Ministry, on the condition that this would lie between 0.2 and 0.5 g/kWh. This is the case for scenarios A, B and D.

Summary of the four scenarios

Scenario	Emission standard		Increased	Average cost per vehicle
	PM	NO_x	CO_2 emissions	(minimum - maximum)
	g/kWh		*%*	*€*
Scenario A	0.01	0.4	2 – 3	2,500 – 4,000
Scenario B	0.02	0.2	5 – 6	2,800 – 4,423
Scenario C	0.015	1	-	1,000 – 1,700
Scenario D	0.015	0.5	-	1,200 – 2,000

2. Aim of the proposal

The aim of Euro VI proposal of the European Commission is a further reduction of the emissions of vehicles with heavy duty diesel engines. The basic idea is to improve air quality and limit the negative effects of air pollution on human health and nature. The emission standards will be established at the European level. Consequently, the operation of the internal market will be assured.

The Euro VI proposal contributes to achieving the aims of the Thematic Strategy on air pollution from 2005. The Thematic Strategy set down ambitions for reducing the hazardous effects of air pollution on human health and nature by 2020 (European Commission, 2005a). In addition, reducing vehicle emissions is important for realizing the norms from the EU air-quality directives. These directives established norms for air quality and they established deadlines for compliance with the norms.

Because they will be applied at the EU level, the proposed Euro VI standards will not create trade barriers for manufacturers of vehicles with heavy duty diesel engines from the EU. The proposal also states that Euro VI vehicles will eventually be tested according to the Worldwide Harmonized Heavy-Duty transient Cycle (WHDC). In the future, this test cycle must be applied worldwide. The intention is to both reduce the testing costs for manufacturers and to implement worldwide emission requirements over the long-term (European Commission, 2007b). Access to a global market with harmonized norms could improve the competitiveness of European manufacturers (European Commission, 2007a). Partly for the latter reason, the Euro VI proposal is very similar to the American emission requirements for vehicles with heavy duty diesel engines.

Air pollution issues in the Netherlands

In recent decades, the air quality in the Netherlands has improved greatly. Nevertheless, there are still locations in the Netherlands, as in the rest of Europe, where exceedences of the air-quality norms for particular matter (PM_{10}) and nitrogen dioxide (NO_2) occur. In the Netherlands, these locations – called hotspots – are found along motorways near the major cities and the busiest urban streets in the *Randstad* (urban agglomerations in the west of the country).

On 11 December 2007, the European Parliament approved a new European air-quality directive. In the new directive, the existing air-quality norms for particulate matter (PM_{10}) and nitrogen dioxide (NO_2) will remain in force. However, the directive does give the Member States the possibility to postpone compliance with the limit values if they can show they are making adequate efforts to improve the air quality. For PM_{10}, postponement until 2011 is possible, and for NO_2, compliance can be postponed until 2015. For the first time, the new directive also establishes norms for the finer fraction of particular matter, $PM_{2.5}$. This concerns a binding limit value of 25 µg/m^3 for the yearly average $PM_{2,5}$ concentration in 2015 and a target value of 20 µg/m^3 in 2020. Moreover, the directive establishes a target for reducing exposure to $PM_{2.5}$ in urban agglomerations. The amount of this reduction will be between 15% and 20%, depending on the level of the mean exposure index in 2010 (MNP, 2007b). This is a value that will be based on measurements that have yet to be conducted.

The Netherlands is working on a programme of national and regional measures to achieve timely compliance with the air quality standards at the hotspots. These measures have been combined within the National Air Quality Cooperation Programme (*National Samenwerkingsprogramma Luchtkwaliteit* - NSL). In addition, the Netherlands is striving for more far-reaching measures within Europe to tackle emissions at the source, such as cleaner engines and cleaner industrial installations. The current Euro VI proposal for vehicles with heavy duty diesel engines is an example of such a European source-oriented policy. The proposal is the second in a series of announced European source measures, including measures in industry and agriculture. First measures involved stricter emission standards for passenger cars and light delivery vehicles, the Euro 5 and Euro 6 norms, which were approved in 2007 (Wesselink *et al.*, 2006).

The emissions from local truck traffic largely determine the local air quality for NO_2. Trucks with cleaner-burning diesel engines therefore have the potential to contribute to a significant reduction in the number of NO_2 hotspots. For example, without Euro VI measures, 35% of the NO_2 concentration along motorways in the Rotterdam/Dordrecht agglomeration in 2015 is expected to be caused by vehicles with heavy duty diesel engines. The PM_{10} hotspots involve a much larger scale problem, where sources other than road traffic, including natural sources and sources abroad, contribute relatively more to this problem than is the case with NO_2. Without Euro VI measures, the contribution of trucks to the PM_{10} concentration along motorways in 2011 would be 13% on average.

Environmental effects

1. Effects on air-quality hotspots

Implementation of the Euro VI emission standards in 2013/2014 will reduce the number of locations where the air-quality norm for nitrogen dioxide (NO_2) will be exceeded in 2015 by approximately 30%. However, the Netherlands is aiming accelerated implementation in 2011. In that case, the number of NO_2 hotspots in 2015 on urban roads would decline by 40% and on motorways by 46% (see Figure 2). The Euro VI proposal, which would take effect in October 2013, will be too late to contribute to solving problems with the local exceedances of the PM_{10} norm, because the deadline for compliance is 2011. However, the Euro VI proposal can contribute to compliance with the new $PM_{2.5}$ norms in 2015 and 2020. This is because the proposal tackles the combustion-related component of particulate matter, which is composed entirely of $PM_{2.5}$.

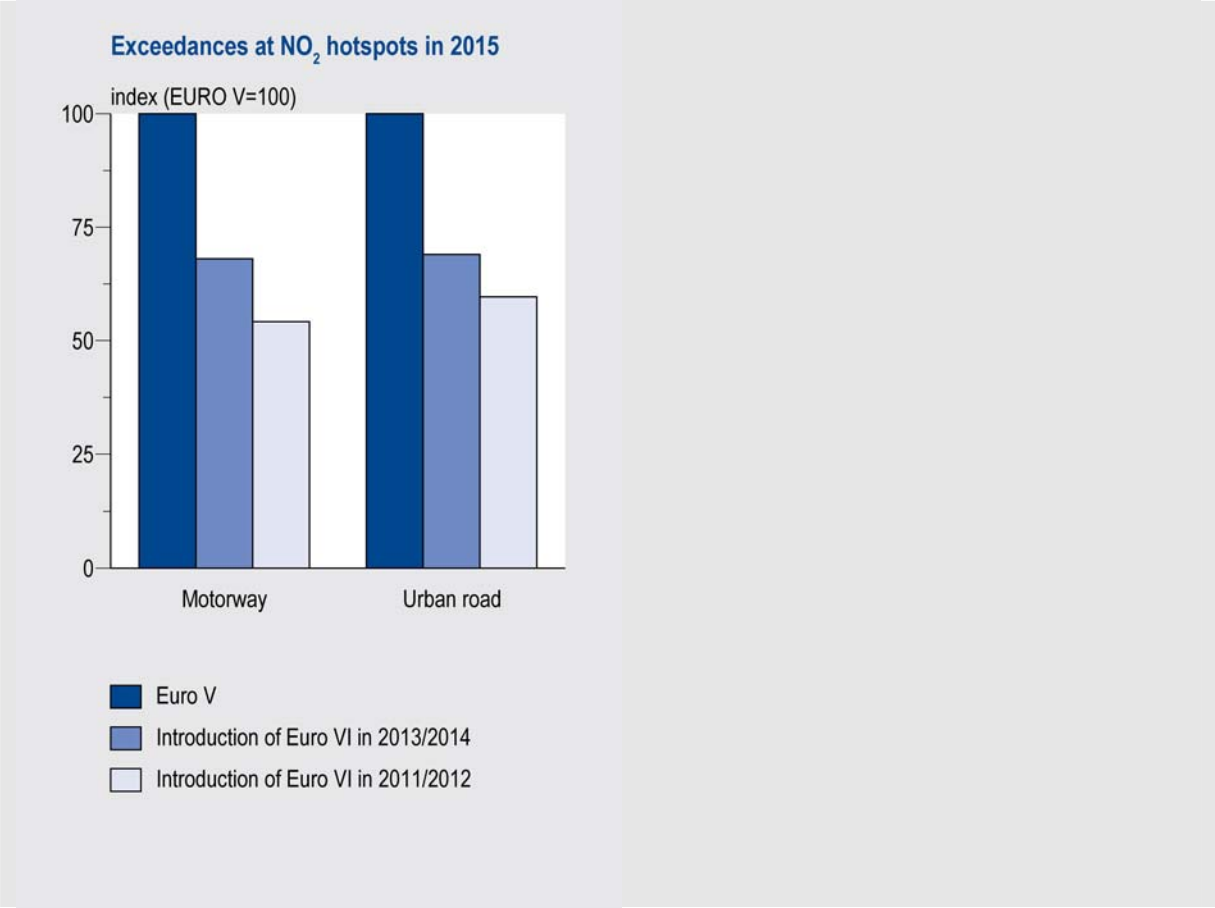

Figure 2 Exceedances at NO_2 hotspots in 2015 with various assumptions.

The calculation of the number of exceedences of the norm for nitrogen dioxide in 2015 has a substantial degree of uncertainty. The uncertainties in the estimated concentrations along motorways and in streets can be traced back to uncertainties in the assumed macro-economic developments, the degree of policy implementation and enforcement and limited knowledge about local emissions and their dispersal, especially at short distances from the road (MNP, 2007). Moreover, the concentrations of these components at hotspots during these years will exceed European limit values only by a small amount. In combination with the above-named uncertainties, this results in the estimate of the number of hotspots being extremely uncertain.

The technologies that will probably be used to comply with the Euro VI emission standards will lead to a decline in total NO_x emissions. However, the share of directly emitted NO_2 in these NO_x emissions could increase (Gense *et al.*, 2006b, Verbeek, 2007). As a result, the positive effects of the proposed standard on the number of exceedences of the NO_2 air-quality norm along roads could be partly counteracted.[1] At the present time, there are no standards for direct NO_2 emission. However, in its Euro VI proposal, the European Commission announced that a standard for the share of NO_2 in the NO_x emissions may be established at a later stage (European Commission, 2007a).

2. Effects on emissions

In the Netherlands, the implementation of the Euro VI proposal is expected to lead to an emission reduction of 3 to 4 kt NO_x in 2015 and 11 to 12 kt NO_x in 2020. This is equivalent to a reduction of 5% to 6% of the NO_x emissions of all road traffic in 2015 and 21% to 23% in 2020. In addition, the implementation of the proposal will lead to an emission reduction of 0.03 to 0.05 kt $PM_{2.5}$ in 2015 and 0.12 to 0.13 kt $PM_{2.5}$ in 2020. This is equivalent to a reduction of 2% to 3% of the combustion-related $PM_{2.5}$ emissions of all road traffic in 2015 and 11% to 13% in 2020. With respect to the total national emissions of NO_x and $PM_{2.5}$ in 2020, this is equivalent to a reduction of approximately 5% for NO_x and 1% for $PM_{2.5}$ (*Table 2*). Moreover, it appears that the effect in 2020 will be 3 to 4 times greater than the effect in 2015. This increased effect is caused by the gradual influx of new Euro VI trucks between 2015 and 2020. The reference situation for the estimated effects is the scenario with existing policy from Velders *et al.* (2007). The bandwidths are caused by uncertainties in the sales of Euro VI vehicles preceding the date when the measure definitively comes into force in October 2014[2].

Table 2 Effect of the Euro VI emission standards on NO_x and $PM_{2.5}$ emissions [1)].

Effect	Nitrogen oxides (NO_x)		Finer fraction of particulate matter ($PM_{2.5}$)	
	2015	2020	2015	2020
	kton			
Emission reduction	3 - 4 (6 - 8)	11 - 12 (12 - 13)	0.03 - 0.05 (0.06 - 0.1)	0.12 - 0.13 (0.13 - 0.14)
	%			
Reduction in combustion emissions from road traffic	5 - 6 (11 - 12)	21 - 23 (23 - 25)	2 - 3 (3 - 5)	11 - 13 (13 - 14)

[1)]The numbers without parentheses indicate the effects with implementation in 2013/2014. The numbers inside the parentheses indicate the effects with implementation in 2011/2012, as advocated by the Netherlands Ministry of Housing, Spatial Planning and the Environment.

The table also shows that accelerated implementation of the Euro VI emission standards in 2011 for new vehicle types and in 2012 for all new sales, as advocated by the Netherlands Ministry of Housing, Spatial Planning and the Environment, will lead to an approximate doubling of the reduction in both the NO_x and the $PM_{2.5}$ emissions in 2015. The effect of

[1] Due to the uncertainty regarding the effect of the Euro VI emission standard on the NO_2 share in the NO_x emissions of vehicles with heavy duty diesel engines, in this indicative effect estimate we have assumed there will be no effect on the NO_2 share.

[2]The effect calculations are based on the estimated effect on the NO_x and PM_{10} emissions per truck kilometre in practice. This estimate was made by TNO and is uncertain. This uncertainty cannot be quantified and has therefore not been included in the presented bandwidths.

accelerated implementation on the reduction of emissions in 2020 is smaller; this is because the fleet of vehicles in 2020 will already be composed largely of Euro VI vehicles, also with implementation in 2013/2014. However, by implementation of the standard in 2013/2014, the Dutch government does have possibilities to accelerate the market penetration of Euro VI vehicles, which would increase the positive environmental effect in 2015. This could be done, for example, by differentiating road-use pricing, establishing local environmental zones or providing tax benefits for Euro VI vehicles before the official implementation date.

The more stringent NO_x and PM emission standards that have been proposed will most likely be accompanied by a small increase in fuel consumption. This is because of the relationship between NO_x emissions and fuel consumption with diesel engines. Reducing the NO_x emissions often leads to an increase in fuel consumption (see the text box *Relationship between NO_x and $PM_{2.5}$ emissions and fuel consumption*). It is expected that manufacturers will attempt to limit this increase as much as possible, for example because low fuel consumption is an important sales argument for new trucks (Gense et al., 2006). It is therefore quite possible that a Euro VI truck will have lower fuel consumption on average than a current Euro IV truck. In its Impact Assessment (European Commission, 2007c), the European Commission assumes that the fuel consumption of Euro VI vehicles will be 2% -3% higher than Euro V vehicles. Consequently, the CO_2 emissions of vehicles with heavy duty diesel engines would increase slightly: by less than 0.1 Mton in 2015 and by 0.2 to 0.3 Mton in 2020. This is equivalent to an increase in the CO_2 emissions of vehicles with heavy duty diesel engines of 0.1% in 2015 and 0.3% in 2020.

Relationship between NO_x and $PM_{2.5}$ emissions and fuel consumption

When a diesel engine is tuned, there is a relationship between NO_x and $PM_{2.5}$ emissions: the engine can be tuned for low emissions of one of these components, resulting in relatively high emissions of the other component. To comply with the Euro IV and V emission standards, many truck manufacturers have decided to tune their engines for low $PM_{2.5}$ emissions and then treat the exhaust gasses using an SCR catalyzer (Selective Catalytic Reduction). This would limit the NOx emissions. Several manufacturers have chosen to use Exhaust Gas Recirculation (EGR) to limit the NO_x emissions from the engine. In addition, to sufficiently reduce $PM_{2.5}$ emissions the exhaust gas can be passed through a soot filter and/or an oxidation catalyzer.

The disadvantage of an SCR catalyzer is that it requires the addition of ammonia (NH_3, in the form of urea) to the exhaust gas. This means that the vehicle must also carry a supply of urea in addition to fuel. Moreover, excesses of ammonia in the SCR catalyzer are emitted to the outside air. Due to the emission standards for ammonia in the Euro VI proposal, the latter must be prevented. By installing an Ammonia Slip Catalyst (ASC) behind the catalyzer, the emission of NH_3 excesses can be prevented. The advantage of the SCR catalyzer over the soot filter and/or oxidation catalyzer is that the fuel consumption is lower due to an engine setting that is more beneficial for fuel consumption.

Compliance with the proposed Euro VI emission standards will probably require the use of SCR, EGR and soot filter technologies (Gense et al., 2006). However, a half-open soot filter will probably be sufficient; a closed soot filter is not essential. The advantage of a half-open soot filter is that it leads to a more limited increase in fuel consumption than a closed filter because there is less pressure build-up behind the filter and because active regeneration of the filter is not required. The disadvantage of the half-open filter is lower filter efficiency than that of a closed filter. In addition, half-open filters are less effective in reducing the ultrafine particles that are now assumed to be the most hazardous to health. In this context, the Commission has announced that it will also propose a standard for the number of PM particles. A test procedure is currently being developed for this purpose.

3. Effects on health

Implementation of the Euro VI norm will have positive effects on human health in the Netherlands. This is because the proposal tackles the finer, combustion-related fraction of particulate matter, $PM_{2.5}$. According to recent insights of the World Health Organization (WHO), this finer fraction is now considered to be the most health-relevant (WHO, 2006). The health benefits will be the greatest for people who live near roads with large amounts of truck traffic.

The effect of the Euro VI standard on the large-scale particulate matter concentration in the Netherlands will be small, and the uncertainties are great. Therefore, the health effect of this

specific measure has not been quantified in the Netherlands. The European Commission also did not quantify these health effects in its Impact Assessment of the Euro VI proposal.

Cost aspects

1. Cost-effectiveness of Euro VI compared to measures in other sectors

Determining the cost effectiveness of Euro VI in comparison to other measures is not unambiguous. This is because such a comparison depends on whether one looks at the effects at the local or national level. Measures in sectors rather than road traffic often appear to be more cost-effective for reducing national emissions and improving large-scale air quality than the implementation of the Euro VI standards for vehicles with heavy-duty diesel engines (Smeets *et al.*, 2007). However, for improving air quality near motorways with respect to NO_2, PM_{10} and $PM_{2.5}$, Euro VI appears to be one of the most cost effective measures. This can be explained by the high contribution of local road traffic emissions to the local air quality near motorways. The implementation of the Euro VI standard for NO_x is 2 to 7 times more cost-effective for reducing the NO_2 concentration near motorways than measures in other sectors (*Figure 3*). For PM_{10} and $PM_{2.5}$ as well, this measure is more cost-effective than measures in other sectors. Calculations of the $PM_{2.5}$ concentrations near motorways in the Netherlands have shown that the implementation of Euro VI is more cost-effective by a factor of 3 to 10 than particulate matter control measures in sectors such as industry and agriculture (Matthijssen and Ten Brink, 2007). Regarding the PM_{10} concentration near motorways, the cost-effectiveness of Euro VI is comparable with particulate matter measures in industry and approximately twice as cost-effective as measures in agriculture (Smeets *et al.*, 2007).

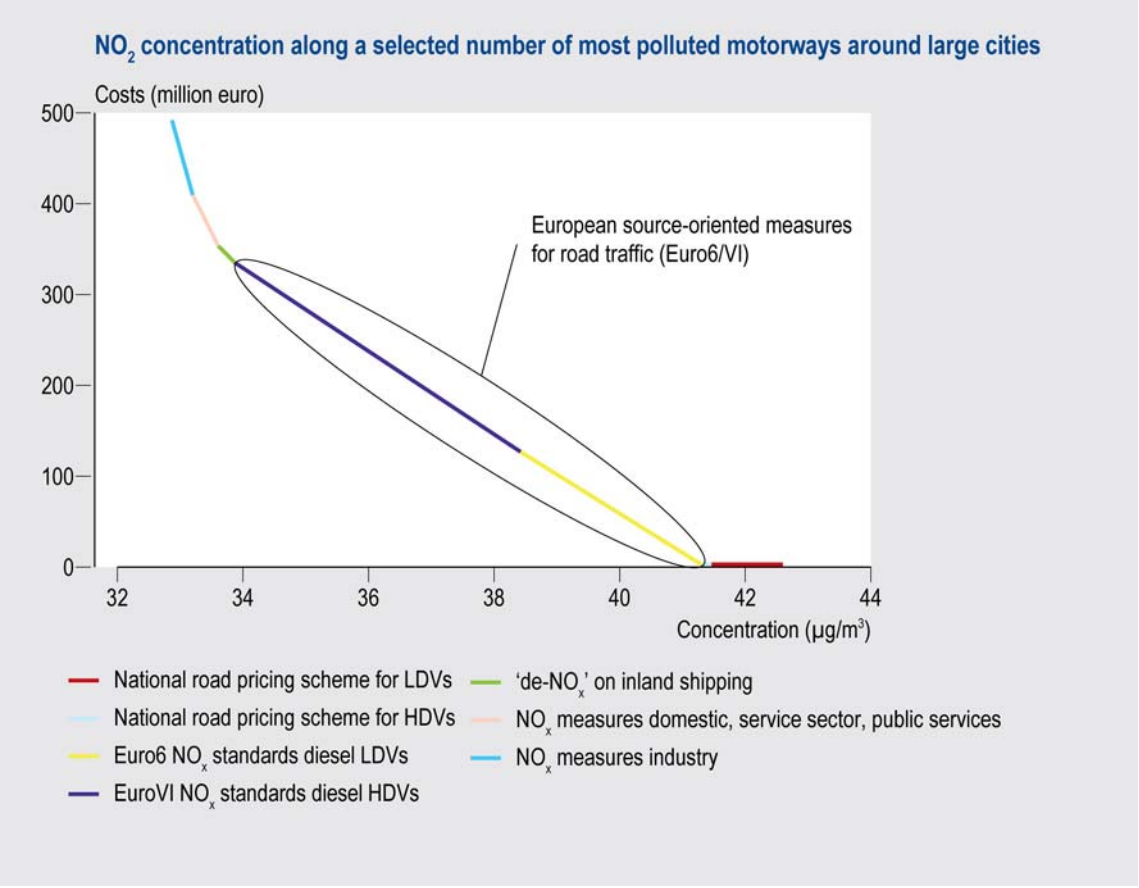

Figure 3 Cost-effectiveness of measures to reduce the local NO_2 concentration near motorways (Smeets et al., 2007).

The marginal cost curve begins at the right on the horizontal axis with the estimated NO_2 concentration near motorways in 2020 (42.5 µg/m³). The cumulative costs of the measures are shown on the vertical axis. As the slope of the line becomes steeper, the measure to improve the NO_2 air quality near motorways becomes less cost-effective.

2. Costs for truck manufacturers and the transport sector

The additional costs of the Euro VI technology with respect to the current standard for vehicles with heavy duty diesel engines (Euro V) are estimated at € 2,500 to € 4,000 per vehicle, depending on engine capacity (European Commission, 2007c)[3]. Not only the expected advantages of scale, but also unexpected innovations, are often insufficiently considered during cost estimations for these types of environmental measures. The costs ex-post are therefore usually lower than they are estimated ex-ante (CE, 2007). In the present report as well, the cost estimate of € 2,500 to € 4,000 per vehicle did not include such advantages of scale and innovations; the costs are therefore a worst-case estimate (European Commission, 2007c). The costs of the previous Euro standards for vehicles with heavy duty diesel engines were overestimated by a factor of 1.4 on average (IVM, 2006). The costs of European emission and fuel norms have been overestimated by a factor of 2 on average (TME, 2006).

Besides the additional costs of the new technology, the small increase in fuel consumption that would result from compliance with the Euro VI emission standard can also lead to additional costs for the transport sector. The competitive position of this sector with respect to other transport modalities, such as inland shipping and rail, will worsen somewhat due to this small increase in the cost of road transport. As stated previously, however, it is very possible that the Euro VI vehicles will consume less fuel on average than Euro IV vehicles, due to the application of new or improved engine technologies.

The introduction of the Euro VI emission standards is expect to have limited economic consequences for truck manufacturers and the road transport sector in the Netherlands. As a result, the competitiveness of Dutch truck manufacturers will not be negatively affected. This is because every manufacturer, both inside and outside the EU, will have to use the more costly Euro VI technology if they want to sell their trucks in the EU. Moreover, the standard will be implemented at the European level, so that the internal market will not be distorted. As a result, the level playing field for the manufacturers will be assured.

At the beginning, the transport sector will be confronted with higher prices for trucks. This cost increase will amount to approximately 1% of the total purchase price of a truck (ICCT, 2007). It is therefore questionable whether this increase will be reflected in the transport price; besides the purchase cost for the trucks, the transport price also depends on many other factors. The Dutch transport sector has many suppliers (12,000 companies) that operate in a highly competitive market. Therefore, the sector will first attempt to absorb any cost increases itself before charging higher prices to its clients (TLN, 2002).

3. Costs and benefits

In this report, no cost-benefit analysis of the Euro VI proposal was conducted for the Netherlands. The reason for this is that the positive effects on human health – which are the greatest benefit – have not been calculated for the Netherlands. However, in its Impact Assessment of the Euro VI proposal, the European Commission did conduct an analysis of the costs for households, manufacturers and the government that result from the implementation of Euro VI compared to the benefits of reduced emissions (European Commission, 2007c). The avoided tonnes of emissions were valued with the external costs per emitted tonne. For all of Europe in 2020, these benefits were € 3 billion higher than the costs that would be incurred to comply with the Euro VI proposal.

[3] See also *Table 1* and the textbox *Reactions of stakeholders during the public consultation* on pages 4 and 5.

Conclusions

The implementation of the new Euro VI standards, as recently proposed by the European Commission, will lead to a reduction in the emission of nitrogen oxides (NO_x) and the finer fraction of particulate matter ($PM_{2.5}$). Emissions of NO_x in 2015 will decline by 3 to 4 kt and emissions of $PM_{2.5}$ by 0.03 to 0.05 kt compared to the situation with Euro V standards. This is equivalent to a reduction of 5% tot 6% of the NO_x emissions from all road traffic in 2015 and a 21% to 23% reduction in 2020. The effect on emissions in 2020 is greater, because the percentage of Euro VI vehicles on the market in that year will be larger. These emission reductions amount to 11 to 12 kt for NO_x and 0.12 to 0.13 kt for $PM_{2.5}$. This is equivalent to a reduction of 2% to 3% of the combustion-related $PM_{2.5}$ emissions of all road traffic in 2015 and 11% to 13% in 2020.

The Euro VI norm requires the use of technologies that will probably lead to a slight increase in fuel consumption of between 2% and 3%. This will result in a slight increase in the CO_2 emissions from vehicles with heavy duty diesel engines of less than 0.1 Mton in 2015 and of 0.2 to 0.3 Mton in 2020. Lower fuel consumption is an important sales argument for trucks. Therefore, manufacturers will attempt to at least partly compensate for this increased fuel consumption by means of improved or new engine technologies.

The reduction in traffic-related emissions of NO_x and $PM_{2.5}$ will lead to an improvement in air quality near motorways and other roads with a large amounts of truck traffic. Nevertheless, in 2015 there will still be local exceedences of the NO_2 air-quality norm at some NO_2 hotspots near motorways in the Netherlands. Assuming that the share of NO_2 in the NO_x emissions does not increase, the implementation of Euro VI standards will reduce the number of NO_2 hotspots in 2015 by approximately 30% compared to the situation with Euro V standards. With accelerated implementation on 1 October 2011/2012, the reduction would be greater: between 35% and 40%. In its Euro VI proposal, the European Commission does not place any requirements on the admissible share of NO_2 in the NO_x emissions, but has announced that such requirements may be established at a later stage. The air quality with respect to PM_{10} will also improve due to the implementation of the new standards. However, this improvement will be too late to have an effect on timely compliance with the PM_{10} air quality norms. According to EU legislation, the Netherlands must comply with these air quality norms no later than 2011. However, the Euro VI norm will be in time to contribute to compliance with the recently established $PM_{2.5}$ norms for 2015 and 2020.

The Euro VI standard for particular matter will lead to lower emissions of $PM_{2.5}$ from vehicles with heavy duty diesel engines. As a result, the air quality with respect to $PM_{2.5}$ will improve near motorways and other roads which have large amounts of truck traffic. People at these locations will be exposed to lower concentrations of $PM_{2.5}$. This will have positive local effects on human health; according to new insights of the WHO, the $PM_{2.5}$ fraction of particular matter is considered to be the most health-relevant.

Compared to other measures, Euro VI is less cost-effective for reducing national emissions and for achieving a large-scale improvement in air quality. However, Euro VI is one of the most cost-effective measures for improving local air quality near motorways. In this respect, Euro VI is 3 to 10 times more cost effective than other measures for reducing NO_2 concentrations. Compared to measures in other sectors such as industry and agriculture, the Euro VI standard is between 2 and 7 times more cost-effective for reducing $PM_{2.5}$ and 1 to 2 times more cost-effective for reducing PM_{10}.

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