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IMPACT ASSESSMENT

Accompanying document to the

Proposal for a
DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 97/68/EC as regards the provisions for engines placed on the market under the flexibility scheme

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1. INTRODUCTION AND POLICY CONTEXT

The Non-Road Mobile Machinery Directive 97/68/EC[1] (NRMM)[2] regulates the exhaust emissions (carbon oxide (CO), hydrocarbons (HC), nitrogen oxides (NOx) and particulates (PT)) from diesel engines installed in non-road mobile machinery. This includes construction, agricultural and forestry machinery, railcars & locomotives, inland waterway vessels, constant speed engines (mostly used in generator sets and pumps, etc) and small petrol engines used in different types of machinery (including handheld machinery like chainsaws, etc).

The Commission proposal accompanying this impact assessment responds to the adverse market conditions for the non-road OEMs[3] brought about by the financial and economic crisis and only covers the flexibility scheme. A full review of the Directive is planned and a further Commission proposal is likely to be presented by the end of 2010 and will be accompanied by an IA.

1.1. Basis for the introduction of the flexibility scheme

For the various types of machinery, the Directive stipulates the maximum permitted engines exhaust emissions as a function of the power of the installed engine. Moreover, the Directive includes a series of emission limit stages of increasing stringency with corresponding compliance dates. OEMs must ensure that new engines used in their machines comply with these limits when placing them on the market.

Directive 2004/26/EC introduced the current applicable Stage of emission limits for the majority of diesel engines referred to as Stage III A. These limits will be replaced by the more stringent Stage III B limits entering into force progressively, depending on the power category, as of 1st January 2011 with regard to the placing on the market whilst from 1st January 2010 the type approval period for these engines will start. As the Stage III B limits are stricter, current engines will need to be modified, re-designed in order that the limits can be respected. This redesign affects OEMs who have to adapt the design of their machines to accommodate the modified engines. This is a time and resources consuming procedure, depending heavily on the required changes in the engines and body of the machinery to be installed.

Directive 2004/26/EC[4] also introduced the so-called flexibility scheme[5] to facilitate the transition between the different emission stages. The flexibility scheme allows the OEMs to place on the market, during the period between two successive stages of exhaust emissions limit values, a limited number of non-road mobile machinery which is fitted with compression ignition engines –with power from 19kW to 560 kW- that still comply with the exhaust emission limits of the previous stage. The flexibility scheme applies to various types of land based machinery including construction, agricultural and forestry machinery, generator sets and pumps using constant speed engines, but not to locomotives, railcars and inland waterway vessels. An OEM has the option either to place on the market (1) for each engine power category a limited number of machines not exceeding 20% of the OEM's annual sales of

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1 OJ L 59, 27.2.1998, p.1

2 Additional information on abbreviations used are available in Glossary in Annex I.

3 OEM: Original Equipment Manufacturer, also explained in Annex I

4 OJ L 225, 25.6.2004, p.3

5 Additional clarifications on provisions of the flexibility scheme can be found in Annex IV

machinery (calculated as the average machinery sales in the EU of the latest 5 years) or (2) a fixed maximum number of machines as stipulated in the Directive. This second option was intended to be used by smaller enterprises producing lower volumes of engines.

The flexibility scheme was designed[6], among other reasons, to:

- Permit smooth integration of applicable regulations to the NRMM machinery; since the majority of OEMs do not produce their own engines, but have to purchase these from engine manufacturers. Engine and after-treatment development[7] is then followed by its integration, optimisation and machinery type approval. This situation is unique compared with other vehicle manufacturers, who can develop and produce both vehicle and engine at the same time.

- Provide the necessary environment for the OEMs to develop and adapt firstly machinery with bigger volume sales and fewer problems and then utilise the gained experience to the rest of the machinery, produced at smaller/niche volumes. This experience makes the adaptation of the rest of the machinery less costly.

- Avoid excessive impacts at the transition to the next Stage of low volume products (such as harvesters-linen/grapes, landfill compactors, pipe-layers, etc), since development in these series requires relatively high fixed cost.

1.2. Competitiveness issues

World-wide, only the EU and the U.S. and to a lesser degree Japan have similar ambitions with regard to engine emission legislation for NRMM. In other important geographical areas like China, India, Russia or Latin-America these requirements do not exist. Thus the main geographical market is the transatlantic market hosting the key manufacturers of engines and machinery, but also of customers. This is why considerable efforts have been made to fully align emission limits and implementation dates of the key Stages on both sides of the Atlantic. Testing procedures are currently in the process of being harmonised at global level and a UN ECE[8] standard is to be adopted in November 2009. Only the approval procedures remain different.

Flexibility measures in this area have also been adopted in the U.S. In addition to the existing flexibility, the U.S. system has in 2008 introduced an additional 'flexibility', the so-called ABT[9]-system, which is built on the three pillars of *Averaging* i.e. exchange of credits between engine families within a given engine manufacturer for a specific model year, *Banking* i.e. the retention of credits by one engine manufacturer for use in future model year averaging or trading and *Trading* i.e. exchange of credits between engine manufacturers.

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6 As stipulated in the COM (2002) 765 final and COM (2000) 840, amending proposals

7 Additional equipment installed with the engine, that chemically or physically reduces the exhaust emissions emitted from the engine before releasing them to the atmosphere ex. Diesel Particulate Filters, NOx adsorber Catalyst or Selective Catalyst Reduction systems

8 See reference in Annex I

9 The Average Banking and Trading (ABT) system on exhaust emissions used in U.S. allows a manufacturer to produce individual products of 'cleaner' and 'dirtier' lines and place both types on the market, provided that the average emissions of the manufacturer's fleet comply with the legislated limits. A precise method, allocating points, is used in order to calculate the emissions from both engine types. In the same legislation an emissions cap is foreseen, as a higher limit that must be met by all individual products. Strict rules on the implementation and compliance of the engines placed on the market by the manufacturer followed by strict penalties in case of no compliance are set in the regulation

The U.S. introduced a modification in their current ABT system for Tier 4 engines and it is assumed that this measure provides a greater flexibility for manufacturers compared to the current EU system in place.

2. PROCEDURAL ISSUES AND POSITIONS FROM CONSULTATION OF INTERESTED PARTIES

2.1. Consultation and expertise

The current analysis of Directive 97/68/EC is part of the Commission's Legislative Work Programme for 2009 and introduced under the reference 2009/ENTR/028.

Before the onset of the financial crisis, a possible amendment of the flexibility scheme was already considered in the context of a wider revision of the Directive which is foreseen in the Commission's Legislative Work programme for 2010. The current analysis takes into account elements of this process including the following main steps:

- a Technical Review of the Directive[10] by the Joint Research Centre (JRC) which includes, inter alia, an evaluation of the need to amend the provisions of the flexibility scheme;

- an Impact Assessment study[11] to assess the impacts of the policy options as laid down in the draft Technical Review of JRC. Two complementary studies have been launched to further assess, inter alia, the impacts of a possible inclusion of the rail sector (railcars, locomotives) and the impacts of the options of the Technical Review of JRC, including the amendment of the flexibility scheme's percentage, to SMEs[12]. The final report[13] and executive summary[14] of the third study will be delivered by March 2010.

For the intended revision of the flexibility scheme as a response to the current economic situation of engine manufacturers and the NRMM OEMs, the Commission's services carried out between May and June 2009 an in depth consultation of Member States' authorities and stakeholders (industry, environmental organisations, workers associations)[15]. Meetings were organised with the following main industry federations: the Committee for European Construction Equipment (CECE) and European Agricultural Machinery (CEMA), the Association of the European Rail Industry (UNIFE). In a letter of 16 June 2009 Member State authorities and Non Governmental Organisations (NGOs), the European Environmental Bureau[16] and the European Federation for Transport & Environment[17] were informed about the proposal to revise the flexibility scheme and invited to submit written contributions. The letter was uploaded on a dedicated web-based consultation tool so to inform stakeholders more widely. On 22 June 2009 a presentation on the current and future initiatives on revising the NRMM Directive was made by DG Enterprise at the 'Clean Air seminar' organised by the

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10 The final report of the Technical Review is available on the NRMM web page at the Europa website : http://ec.europa.eu/enterprise/mechan_equipment/emissions/projstudies.htm

11 The final report of the IA study by ARCADIS N.V. is available on the NRMM web page at the Europa website: http://ec.europa.eu/enterprise/mechan_equipment/emissions/impactassessment/nrmm_iastudy_fnrep.pdf

12 The additional IA study on rail and inland waterway sector is available on the NRMM web page at the Europa web site: http://ec.europa.eu/enterprise/mechan_equipment/emissions/projstudies.htm

13 Reference at the Europa website will be included when available

14 Reference at the Europa website will be included when available

15 Summarised information on the contributions of the public consultation on this proposal may be found in Annex V

16 More relevant information can be found on the link: http://www.eeb.org/

17 More relevant information can be found on the link: http://www.transportenvironment.org/

European Environmental Bureau at which most Environmental NGOs were represented. On 17 July 2009 the proposal to amend the flexibility scheme was discussed at a meeting of the Expert Group on Emissions from NRMM.

The input from stakeholders has been taken into account, assessing different options to amend the provisions of the flexibility scheme. It has also been considered by the external contractor (ARCADIS), assessing environmental, social and economic impacts, including large industries, SMEs and individuals as workers, consumers and users. Information on the methodology used, and the interim progress was made available to the public and stakeholders through the NRMM web page[18].

To summarize the comments received from consultation: A majority of comments were submitted by industry federations and individual manufacturing or user companies. These underline the benefit from increasing the flexibility which will allow companies to distribute the required compliance costs more evenly during the crisis and ensure a relative income that would allow performing the necessary extended changes in various types of products (engines and machinery) in a longer period of time. Only one company stated that new emission standards can only be achieved with low-sulphur fuels which will not be available world-wide, meaning that export oriented OEMs will be compelled to produce two different sets of machinery, one for the countries that have emission limits (EU, U.S., Japan) and another for the rest of the world. Comments from the rail sector highlighted that the main problem to meet the new emission requirements remains the complete reengineering of the rail vehicle linked to the modification of the exhaust and cooling system which are closely related with the safety and operability requirements.

The international organisation of catalyst and filter based technology drew the attention to the need to align the production of engines to emission standards in the U.S. and in Japan and concludes that any delay in the introduction of EU emission standards jeopardise the benefits for the whole NRMM manufacturing industry, in particular with regard to the 'first mover' benefits. It also highlighted that the increased flexibility would delay the recoupment of development costs.

One environmental NGO submitted comments and referred to the recent statement of the European Environmental Agency on the impact of particle pollution, mainly emitted from diesel engines and expressed its concern that the increased flexibility could trigger lobbying for the delay of other environmental measures.

One national employer's organisation expressed its full support to the Commission initiative on extending the flexibility scheme, and identified numerous merits of this approach.

One Member State drew the attention to the need to carefully assess the possible impact of the measure on the environment and in particular in the context of Member State obligations to meet the ambient air quality standards. Another Member State welcomes the proposed measure, but invites the Commission to carefully assess the specific situation related to the railway sector.

A short summary of the arguments of the various stakeholders can be found in Annex V.

[18] More relevant information can be found on the link: http://ec.europa.eu/enterprise/mechan_equipment/emissions/index.htm

In support of this IA, an Impact Assessment Steering Group (IASG) was created with invitations for participation sent to DG Enterprise and Industry, DG Joint Research Centre, DG Research, Secretary–General, DG Environment, DG Transport and Energy, DG Employment and DG Trade. The IASG met three times on 18th June 2009, 25th June 2009 and 15 July 2009. The suggestions of the IASG group have been incorporated in the IA.

2.2. Impact Assessment Board (IAB) recommendations

The Impact Assessment was discussed at the IAB at the meeting of 9th September 2009, and according to its opinions of 11 September 2009 and of 26 October2009.

In order to accommodate the recommendations of the Board the following elements have been developed.

- Problems which are caused by the current economic crisis and more general problems related to the design and introduction of the necessary new technology.
- It was clarified that:
  - The proposed amendments of the flexibility scheme could have an impact on competition (between complying and non-complying manufactures).
  - The basis on which the new flexibility limits were determined has been specified.
  - The incentives of the manufacturers complying with the Directive in the future have been further evaluated the impacts of the preferred option were also identified.
  - The reasons that the penalty mechanism option is not feasible were explained.
- The IA has been made more specific about all environmental impacts of the proposed amendment of the flexibility scheme, especially on the efforts to develop a methodology to measure CO_2 emissions from NRMM.

Moreover, numerous detailed modifications have been introduced in the IA, incorporating the comments of the IA Board.

3. PROBLEM DEFINITION

3.1. Background

The technological challenge for non-road machinery engine manufacturers is that the next generation of engines must make emissions reductions in particulate matter (PM) and NOx comparable to those required and deployed in on-road engines and vehicles (trucks, lorries, buses etc.). This is not possible with the current technology. Further research and technological development is required by industry in order to ensure that machinery can be placed on the market with compliant III B engines.

Compliance costs include costs for the engine manufacturers but also on the OEMs.

There is a great diversity of machinery production (approximately 1500 companies) which has to comply with the emission limits laid out in the Directive, while engines are produced by only few large companies (approximately 20 companies). Only a very few large OEMs produce their own engines. The adaptation of vehicles machinery can only be done subsequently by the OEMs that do not produce their own engines, after the finalisation of the configuration of the engine, since this redesigning procedure cannot be done in parallel.

3.2. Developing New Engine Technology

Engines compliant to Stage III B emission limits are progressively going to be placed on the market as of 2011 (see Annex III about details of the timing of stages across engine categories).

Substantial changes to the design of engines are necessary. Engines must be fitted with electronic control systems that deliver fuel at the right time and quantity for a cleaner burning in the combustion chamber. In addition new, sophisticated after-treatment systems are necessary.

3.3. Ability to Comply

These engine modifications have implications on the configuration of the non-road machinery body and chassis in which the engines are installed. It is therefore not possible to develop and design the machinery until the engine is ready.

Since technical solutions for complying III B engines are not in general yet finalised, OEMs are not in a position to fully redesign the body of the machinery where the engine is to be installed. It is important to note that the complexity of the redesign varies among the different forms of NRMM applications.

For some of them, the Stage III B emissions requirements will not pose very significant problems for OEMs (e.g. some forestry equipment, some construction equipment, some agricultural machinery and inland water way vessels). In other NRMM applications, a Stage III B compliant engine is far from being finalised and thus the OEMs have not been in a position to redesign their machinery in order to insert the new engines.

Individual OEMs, producing machinery with engines of different power categories, are at various degrees of readiness depending very much on the range of products they manufacture. It is not possible to give a detailed overview of the state of preparation of each company/sub-sector as such information at that level of detail is not available.

Based on information received from the industry, the adaptation period of the bodies of the machinery ranges between 12 to 18 months in order to accommodate the new III B engine and the accompanying after-treatment system. The exact duration of the adaptation period depends on the number of machinery produced with various engines and the types of machinery in each engine power category.

Apart from the redesign of the body, the adaptation of the production line of machinery (additional space, raw material handling and storage, costs etc) must also be finalised in the same adaptation period. At the end of this period there would therefore be two production lines, one for Stage III A compliant machinery and one for Stage III B.

The situation is as follows:

- For construction and agricultural machinery, technical solutions for OEMs are still to be found and consequently increased R&D efforts are necessary.
- Railcar OEMs have fewer difficulties as they mostly use engines already developed for on-road uses but problems are encountered in the redesign of the vehicles to accommodate in a tight space the engine and the after-treatment systems.
- Locomotive OEMs have the biggest difficulties to comply with the new limits and will definitely not be ready by 1.1.2012. The adaptation of vehicles compliant to Stage III B has not yet started. A significant research program launched under the 7th Research program-CLEANER-D- has recently been initiated and the intention is to build on this experience for future orientation of the full revision of the Directive in 2010.
- Inland waterway vessels are not concerned as the directive does not at the moment foresee Stage III B emission limits for engines used in this sector.

Table 1: State of play * (2009)

	Construction Agriculture Machinery	Railcars	Locomotives	Inland Waterway Vessels
Engines	Ready by 2011	Ready by 2011	Not ready	n.a.
After-Treatment Systems	Ready	Ready	Not Ready	n.a.
Machinery	Not Ready by 2011	Not Ready	Not Ready	n.a.
Conclusion	III B not ready in time	III B not ready in time	III B not ready in time	III B does not apply to sector

* General description of the industry (few individual exceptions may exist).

3.4. Compliance costs

The compliance costs for OEMs to cope with the new emission limits are significant. These costs include for example, research and development costs, equipment redesign costs, after treatment devices costs, investment costs, documentation and labelling costs, etc...

Existing Stage III A production lines may continue to be used – depending on demand for machinery with IIIA engines from third countries that do not have the same exhaust emission limits as the EU or the U.S. In this case new production lines for machinery with III B engines must be set up with additional cost in equipment, personnel (hiring, training etc).

3.5. Regulatory issues

The original directive was introduced in 1997 and its decisions on deadlines and criteria were based on data that was available at that time.

The strict timetable of transition from Stage III A to Stage III B with a duration of only three (3) years compared to the five (5) years of transition from Stage II to Stage III A (see Annex III) has been ambitious. In 2004 when the new emission limits have been adopted it was still uncertain whether the required technology could be applied in all applications. In order to maintain the application dates for the new emission limits it was agreed to accompany the measure by a flexibility scheme which should allow OEMs allocating their limited research and development capacity to their priority markets.

3.6. Influence of the Crisis

From autumn 2008 onwards most of the EU based industry producing non road mobile machinery has been unexpectedly and severely hit by the global financial and economic crisis, particularly affecting construction equipment and agricultural machinery. Steep falls in sales caused a large decrease in income and available capital to finance the necessary technology research and development for machinery with Stage III B compliant engines in all power categories and applications within the time limits in the Directive. Firms prioritise their R&D expenditure to cover firstly those products with high existing and potential sales volumes. These sales then provide the business with revenues that can be used for R&D in order to develop technical solutions for smaller niche markets.

For **construction equipment**[19] the market in Europe started to drop[20] sharply in the 4th quarter of 2008 and is continuing to decline[21]**;** the sales over the year 2009 are expected to drop by at least 25% in units and depending on the market segment there are decreases up to 60%. This reduction in sales ultimately results in cutting down production plans.

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19 Construction equipment includes wheel loaders, bulldozers, crawler tractors, crawler loaders, truck-type loaders, off- highway trucks, hydraulic excavators, etc.

20 Reference: CECE letter "Background material for the Request to Enlarge Flexibility from 20% to 50% for III BStage III B" , 05-06-2009, addressed to Commission Services

21 Additional information on market share can be found in the study 'Competitive analysis of the EU Mechanical Engineering', p. 4, available at the link: http://ec.europa.eu/enterprise/mechan_equipment/companalysis-eu-mechengin.pdf

- Downstream demand is greatly influencing construction companies and rental companies using this type of machinery. The construction activity dropped by 6.5% in 2009 and is predicted to drop by an additional 2.5% in 2010. EUROSTAT[22] reports that many European countries still register a decline of economic activity in the construction industry. The largest quarterly decreases for the 3rd quarter 2009 were reported in LT (-18.32%), LV (111.8%) and EE(-11.4%). Only PL, LU, FI, CZ reported a positive construction output compared to the previous quarter, but stakeholders remain pessimistic about the stabilisation of the situation and a possible recovery in the coming months.. As a result, new orders for construction equipment are expected to further delayed.

- The European construction equipment industry includes around 1.200 companies which are operating with an estimated turnover of Eur 30 billion. According to industry estimates, the sector provides for 2008 around 160,000 direct jobs and an additional 450,000 indirect jobs in the supply, distribution and maintenance network. For March 2009, the indirect jobs were expected to drop by 20% and the direct jobs to be reduced to 90,000-95,000.

For **agricultural machinery**[23] the decline started in most European countries in early 2009. For the part of agricultural machinery covered by the Directive, the total number of machinery registered in 2009 is estimated at 10,000 to 15,000 units.

- According to industry 60% of all OEMs reported in May 2009 an order intake which was more than 10% below the previous year in their home markets and 50% of all OEMs declines of above 20% in incoming orders from other countries. Exports to Russia for example have dropped dramatically according to industry. 85% of all OEMs expect their turnover to further decrease in the coming months.

- No separate data concerning NRMM covered machinery and agricultural machinery (tractors not covered) is available at this time. According to information from the industry, the total turnover for agriculture machinery, in 2008, should have reached almost Eur 30 billion. Directly linked jobs reach 135,000 with another 200,000 indirect jobs.

For **railcars**, the impacts of the crisis according to industry, at the time do not seem as severe as for construction and agricultural machinery. According to information from industry, passenger numbers have not started to decline but are stagnating, and business travel is predicted to decline by 10-20%. Railcars are mostly using engines deriving from the heavy duty vehicles that are modified to comply with the overall design and use of the rail vehicle.

3.7. How will the situation develop?

If no additional measure is taken to alleviate the burdens of the crisis:

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22 Updated data on construction output is available at the link: http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/4-17062009-BP/EN/4-17062009-BP-EN.PDF

23 Agricultural equipment includes harvesters, self-propelled agricultural equipment for spraying, irrigating, planting, crop harvesting, rotary tillers (walking ploughs).

- OEMs would place on the market machinery under the currently allowed 20% until the completion of this allowance.

- Due to the drop in sales, the funds to further develop and finalise the required adaptations of machinery bodies and production lines would not be covered (estimated and planned incoming cash flow is limited).

- One course of action would be to reduce the number of types of machinery the OEM produces, so compliance costs would be less, but at the same time the OEM would lose a segment of the market and previous customers, making his future incoming cash flows smaller.

- In order to acquire the required funds, OEMs could turn to the banks for loans. However, as a consequence of the financial crisis banks revised their lending policy and will give a higher consideration to the risk profile of companies. As a result some companies may have difficulties to obtain the necessary financial means to carry out the necessary R&D.

- The OEMs, after having exhausted the flexibility allowance and since they would not be in a position to produce next Stage compliant machinery, would not have a product to place on the market.

- This could negatively affect OEMs suppliers.

3.8. Does the EU have the right to act?

Since the Directive already harmonises the laws of the Member States relating to emission limits and type approval procedure for engines to be installed in Non-Road mobile machinery it is an area of EU concern.

The legal basis of this initiative is the same as for the NRMM Directive, namely Art. 114 of the Treaty of the functioning of the European Union. The subsidiary principle is respected by the proposal, since amending the NRMM Directive is only possible at EU level. Member States cannot take action individually on emission limits for NRMM.

4. OBJECTIVES

The **general objective** of the proposal is to safeguard economic development of the NRMM industry and maintain a high level of environmental protection.

Specific objectives:

- To maintain the competitiveness of EU NRMM industry and alleviate the immediate pressures brought about by the economic crisis.

- To enable industry to continue financing R&D so that technology becomes available for all product types in Stage III B.

- To limit the emissions of NRMM by enabling the replacing of older, more polluting and fuel consuming engines by cleaner ones.

Operational Objectives:

- To introduce a cost effective and timely measure that allows EU engine and machinery producers to maintain their competitiveness and to continue selling products throughout Stage III B and therefore alleviate the immediate pressures brought about by the economic crisis.

- To maintain the incentive to invest in R&D and develop cleaner engines that are compliant with future emission limit Stages.

- To allow industry to finance expenditure on R&D in the short term to develop Stage III B compliant machinery by allowing them to continue to generate revenues from sales.

4.1. Consistency with other horizontal objectives of the European Union

4.1.1. The European Economic Recovery Plan

The November 2008 European Economic Recovery Plan (EERP)[24] addresses the difficulties of the wider economy due to the global financial crisis. The Plan outlines a series of measures to cope with the squeeze on credit, declining sales and revenues. It refers inter alia to the need for a swift stimulation of demand and consumer confidence as well as measures to lessen the human cost of the economic downturn and its impact on jobs. The EERP highlights the need to ensure full coherence between immediate actions and the EU's medium and longer term objectives. In its Communication for the Spring European Council[25] the Commission reconfirmed the unprecedented pressure in Europe from a global economic crisis and the need to pursue the efforts launched under the European Economic Recovery Plan (EERP). A joint effort of over €400 billion of immediate fiscal measures is expected to generate new investment, boost demand and rate employment. The impact from this EERP will however not be immediate and needs therefore to be complemented by action to improve business conditions.

Such complementary action needs to focus on maintaining the competitive industrial base and focus on knowledge based and low carbon economy as set in the Lisbon Strategy. The current proposal will respect the objectives of the Lisbon Strategy and complement the EERP.

4.1.2. Environmental Policies

Under the Sixth European Environment Action Programme which highlights the need to reduce pollution to levels which minimise harmful effects on human health, the Commission presented in 2002 the Clean Air For Europe (CAFE) initiative which provides an integrated and long term strategy for reducing the adverse impact of air pollution on human health and environment. These objectives are implemented through Directive 2008/50/EC on ambient air quality and cleaner air for Europe which establishes a system for the assessment of ambient air quality and provides thresholds for each pollutant. Member States have to assess and

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24 COM (2008) 800

25 COM (2009) 114

manage the ambient air quality. Besides this instrument it remains important to combat emissions of pollutants at source and to implement the most effective emission reduction measures. Also the national ceilings Directive 2001/81/EC[26] establishes legally binding limits to be attained by 2010 for the total permssable emissions from a Member State for several pollutants including nitrogen oxides (NOx). Current forecasts suggest 11 Member States will not comply with their ceilings for NOx.

The NRMM Directive provides an important contribution with a progressive reduction of targeted emissions.

The key air polluters from the NRMM sector to overall air pollution are PM and NOx emissions[27]. According to the RAINS model[28] the estimated PM10[29] emissions from the NRMM sector for EU27 are 7% compared to 13% for road transport. In terms of NOx emissions, the NRMM is responsible for 16% of all NOx emissions in the EU27 while the road sector contributes to 42% of all NOx emissions. This contribution from NRMM to the overall air pollution in the EU provides the rational for increasing the efforts to reduce the emissions in the coming years. Care will be taken not to endanger the overall objective of the NRMM Directive to progressively reduce emissions.

Although the NRMM Directive covers exhaust emissions from internal combustion engines, it does not address CO_2. As a result no inventory or data is available on CO_2 emissions of engines in the various types of NRMM machinery.

Nevertheless CO_2 emissions from combustion engines in the NRMM sector need to be addressed in the future in line with the recent development in the road sector, either by voluntary or regulatory measures.

Specific consideration must be given to the fact that NRMM applications are different than those of other sectors like heavy and light duty vehicles or cars. Consequently specific methodology, limits and implementation dates for CO_2 emissions need to be identified. Based on the existing knowledge and practices of other sectors, substantial preparatory work is still necessary especially for the large variety of NRMM applications which are characterised by variations in uses and power of the used engines.

This requires however substantial preparatory work because of the large variety of NRMM applications which results in significant variations of emissions and fuel consumption for identical engines.

These future strategies are currently discussed in the context of the overall revision of the Directive into 2010.

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26 OJ L 309, 27,11,2001, p.22.

27 Definitions of the gaseous and particulate pollutants, as stated in Directive 97/68/EC Annex I, as amended, include: '2.2. gaseous pollutants shall mean carbon monoxide, hydrocarbons (assuming a ratio of C1: H1.85 and oxides of nitrogen, the last named being expressed in nitrogen dioxide (NO2 equivalent; 2.3. particulate pollutants shall mean any material collected on a specified filter medium after diluting C.I. engine exhaust gas with clean filtered air so that the temperature does not exceed 325 K (52 °C);'

28 Regional Air Pollution Information and Simulation model and database

29 Particulate matter below 10 µm

5. POLICY OPTIONS

5.1. Introduction

The issues highlighted in the problem definition and the subsequent objectives warrant an interim measure to mitigate the impact of the economic downturn.

The approach to be taken in identifying options is to firstly identify options to provide relief for those sectors already covered by the existing flexibility (options 1A to 4.4 A) , and then to consider sectors that do not currently have access to the flexibility scheme (railcars, options 1B to 4.5 B).

5.2. Options

5.2.1. For the sectors already covered by the flexibility scheme

- Option 1A - No action = Base line option

The provisions of the current flexibility scheme remain unchanged.

- Option 2A Provision of loans for purchasing stocked engines manufactured under the so called sell-off period.

In Article 9, section 4a of the Directive, it is stated that *'For each category, the above requirements (reference to implementation dates of Stages) shall be postponed by two years in respect of engines with a production date prior to the said date*'.

While Stage III A is in force, industry may produce engines and machinery and stock them in the EU territory. These Stage III A engines and machinery are manufactured, to keep industries running and to cover the needs of other countries that do not have strict exhaust emissions limitations as EU. After the beginning of implementation of Stage III B, these stocked engines and machinery may be placed on the market for a period of two years. This option suggests the use of government backed loans to be granted to OEMs to purchase Stage III A engines on stock.

- Option 3A Implementation of a scrapping scheme at national level.

The use of a scrapping scheme would be a subsidy, given as an incentive, to the user to buy new machinery, with a Stage III B engine.

Under this option, the owner of older, more polluting machinery will deliver the machinery for scrapping (destruction-recycle etc). A National Public authority would grant a lump sum to the owner of the scrapped machinery. The owner will receive the money via banking or the tax system when the purchase of new machinery is proven.

- Option 4A - Implementation of alternative types of provisions under the existing flexibility scheme

Under this option additional flexibility will be granted for the transition from Stage III A to Stage III B. No additional measures for future stages are envisaged at this stage.

- Option 4.1A Implementation of a scaled percentage of the flexibility scheme for the various types of machinery, according to the amount of encountered problems for the transition from Stage III A to Stage III B.

The option suggests the implementation of a different percentage of flexibility to each of the various types of machinery, according to the particular transitional problems encountered from Stage III A to Stage III B plus a similar approach with regard to the fixed numbers of engines in Table 2.

- Option 4.2A Increase of flexibility percentage to 50% for all machinery eligible to use the provisions of the scheme and proportionate adjustment of the fixed numbers of engines to the relevant table of Annex IV.

This option suggests increasing flexibility from 20% to 50% for all machinery currently covered by the scheme and also adjusting the table of fixed engines numbers accordingly.

- Option 4.3A Conditional use of the flexibility scheme, with penalty mechanism.

In order to maintain the incentives to develop III B machines, a system could be introduced where additional flexibility used in the transition from Stage III A to Stage III B will trigger payment of a penalty after several years.

This would maintain the incentive for the OEMs to develop machinery with III B engines and use only the minimum additional flexibility they need in order to temporarily overcome the burdens of the economic crisis. It requires a penalty to be set at the right level.

- Option 4.4A Implementation of a trading system

A system similar to that of the EU Emissions Trading Scheme could be developed for the flexibility measure. A system could be established whereby firms that would not use the entire flexibility could sell their flexibility rights to firms that need additional flexibility. This scheme would require a mechanism to sell flexibility (permits) and a system in place to monitor the scheme. The price of each permit of flexibility would be determined by the market.

5.2.2. For the railcars sector currently excluded from the use of the flexibility scheme

The railcars sector currently does not have the flexibility scheme. The same descriptions of the options as provided above apply.

- Option 1B - No action – There is no flexibility
- Option 2B - Provision of loans for purchasing stocked engines manufactured under the so called sell-off period.
- Option 3B Implementation of a scrapping scheme
- Option 4B – Introduction of a flexibility scheme for railcars
- Option 4.1B - Introduce a flexibility of 20%

- Option 4.2B - Implementation of a scaled percentage of the flexibility scheme for the various types of machinery, according to the various power engines used and the amount of encountered problems for the transition from Stage III A to Stage III B, with a proportionate adjustment of the fixed numbers of engines table.

- Option 4.3B – Introduce a flexibility percentage to 50% for railcars.

- Option 4.4B – Introduction and conditional expansion of the flexibility scheme, with a penalty mechanism

- Option 4.5B - Implementation of trading system

6. OPTION ANALYSIS – PRELIMINARY ANALYSIS – SECTORS ALREADY COVERED BY THE FLEXIBILITY

This IA will assess the options in a qualitative way with respect to the economic, environmental and social aspects; then subsequently, compare them against the criteria of efficiency, effectiveness and coherence in order to establish a preferred option. This preferred option will then be analysed in greater detail with respect to the economic, social and environmental impacts.

6.1. Analysis of Option 1A – Baseline

This policy option of doing nothing would not be effective in reaching the objectives for the reasons described in section 3.7. To recall, by doing nothing industry would continue to struggle in the current economic climate and would not have machinery ready by Stage III B. Industry would then not be able to place products on the market beyond what is offered in the 20% flexibility scheme.

The baseline scenario would suggest that industry will in general be unable to commit to research and development of Stage III B development. According to data provided by industry, the sector of construction and agriculture equipment spends around 3% of its annual turnover of around 60 billion € to finance R&D efforts. Most companies face serious difficulties to finance the investment necessary to ensure compliance of equipment with III B emission limits.

Clients of OEMs are currently much more prudent towards buying new machinery as a result of the economic climate. Companies cut capital costs by extending the use of old machinery and not purchasing newer, less fuel consuming machinery, even though this decision has higher operating costs and a larger negative environmental impact in the short term. However, for the products that can be produced in time and compliant with Stage III B, these would be less harmful than Stage III A for the environment due to the stricter criteria.

6.2. Option 2A. Provision of loans for purchasing stocked engines manufactured under the so called sell-off period as in Article 9, section 4a of the Directive

Another possibility to continue its operation is that an OEM could buy stocked engines from an engine manufacturer so he could continue to sell IIIA compliant machinery.

These engines must be pre-ordered well in advance by the OEM from the engine manufacturer to allow sufficient time for manufacturing. The engine manufacturer is usually paid in advance or at a premium pre-agreed price at fixed delivery dates.

Additionally, in order to be used after a stocking period of more than three months, engines require a special treatment[30] that is time consuming and costly and could reach up to 5% of the sale price of the engine.

Due to the economic crisis, cash flow is limited. Private banking institutions are not providing credit to industry because of the turbulent economic times and the subsequent uncertainty. A government backed loan (provided by national administrations or the European Investment Bank) could enable OEMs to purchase these engines and continue to sell machinery using these engines after the entry into force of the next stage. This would enable OEMs to develop Stage III B machinery whilst continuing to sell Stage III A products to finance the R&D.

However, the incentive to produce more Stage III A engines would result in a huge number of Stage III A engines, instead of development of the cleaner III B engines; it would act as a counter incentive to innovate in more environmental friendly machines.

Thus, a loan to purchase stocked Stage III A engines would reduce the incentive to design compliant Stage III B machinery which is less environmentally damaging. However it cannot be excluded that extra demand for a fixed number of stocked Stage III A engines might lead to higher prices for those engines in the short term. This might require increasing the level of loans requested by OEMs.

6.3. Option 3A. Implementation of a scrapping scheme at National level.

The use of a scrapping subsidy will provide an incentive to the user to buy new machinery with a cleaner Stage III B engine, under the condition that he officially destroys his older, more polluting machinery.

This will encourage the purchase of Stage III B machinery and have positive environmental impacts; however, it will not assist OEMs in financing the R&D to make Stage III B machinery available. Whether the prospect of a scrapping scheme would be sufficient to induce banks to hand out additional loans to OEMs for R&D remains doubtful. In addition if Member States implemented the scrapping scheme in different ways. This could lead to a fragmentation of the internal market and to distortion of competition.

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30 When the engine is manufactured to be stocked, it is filled with special oil. When it is placed on the machinery, this oil must be changed to a specific one and then with a specific fuel the engine is kept running for a few hours. After that period the oil must be changed again to normal and with a normal fuel it must run for some time and then it is ready and safe to be sold. The required time and cost of the procedure depend on the size of the engine and its power.

6.4. Option 4A Implementation of alternative types of provisions under the existing flexibility scheme.

6.4.1. Option 4.1A Implementation of scaled percentages of flexibility for the different types of machinery, depending on the problems they encounter for the transition from Stage III A to Stage III B.

Industry's priority is to develop initially machinery that faces fewer problems and bigger sale volumes and progressively address smaller niche market machinery with weight and dimension constraints. Therefore, an alternative allowance under the flexibility scheme for each one of these categories of machinery would be a logical solution.

There is no specific inventory of the machinery in each machinery type when placed on the market nor a relevant system to survey the number of sales. The current system, surveying the implementation of the machinery sold using flexibility does not require such detailed information.

Gathering information on the amount of problems for each specific type of machinery is also very difficult. It is a common approach to engine and machinery development to use the experience and progress gained from one type to another. The implementation of this option would require the delivery of sensitive information to the Commission, to be used as a background for determining figures of alternative flexibility.

This measure would optimise the trade off between environmental costs and economic benefits within the flexibility scheme provided there was perfect information on the basis of which a decision on how to allocate flexibility could be taken. However, this information is not available and this makes this option unfeasible. It will therefore not be analysed any further.

6.4.2. Option 4.2A Increase of flexibility percentage to 50% for all machinery eligible to use the provisions of the scheme and proportionate adjustment of the fixed numbers of engines to the relevant table of Annex IV.

In the Technical review study referred to in point 2.1., an increase from 20% to 40% flexibility was proposed. This figure was discussed with Member States, industry and other stakeholders. The figure was considered as sufficient to generate revenues for the OEMs in order to fund the R&D and compliance costs. The study however concludes that an increase to 50% should be considered by Commission because it provides better alignment of the EU provisions of the flexibility scheme to the ABT system used in the USA.

Accordingly, the table of maximum should be amended as follows[31]:

[31] Analysis of the calculation of the new number of engines for the amended flexibility scheme is available in Annex VIII.

Table 2: Maximum number of engines to be sold under the current and the revised flexibility schemes

Engine Category (kW)	**Number of engines (existing scheme up to Stage III A)**	**Number of engines (revised scheme for transition from IIIA to III B)**
19-37	200	-
37-56	150	200
56-75		175
75-130	100	250
130-560	50	125

This new percentage or the amended fixed number of engines may be distributed, according to the OEM's production plan, over the duration of Stage III B.

For those engines in power categories for which no Stage III B and IV a time limit should be included so as to restrict the placing on the market of machinery under the revised flexibility scheme after 31 December 2013. This date is selected in order comply with the main objective of the proposal, to alleviate burdens of the current economic crisis and to provide a 'similar' three years time of implementation of the flexibility scheme to all engine power categories since starting time of Stage III B differs.

Allowing an extended flexibility in all categories will ensure that firms have the required flexibility to cover each sector and those products within each sector. The additional flexibility does not require any up front payments from industry.

6.4.3. Option 4.3A. Conditional use of the flexibility scheme, with penalty mechanism

The users of the additional flexibility for transition from Stage III A to III B would, at a later stage for instance for the transition from Stage III B to IV, have to pay a penalty.

This approach would limit concerns that competitive distortions may occur from enlarged flexibility. For instance, those firms that have already invested in getting Stage III B compliant machinery ready could be at a competitive disadvantage compared to those that have not invested yet; as the ones who are ready are going to have to price their products to recoup their investments. This system reduces the adverse incentives that could be introduced in Option 4.2.

However, the use of a penalty mechanism will be difficult to justify for the following reasons:

– First of all, the necessary information procedures for managing such a system would place additional burden on competent national authorities. Those would have to monitor the data exchanged and establish a system to allow them to impose a penalty. As OEMs can choose the approval authority among 27 Member States, criteria for the establishment of penalties (amount etc) would have to be established at EU level to ensure a non-discriminatory treatment and to avoid an unbalanced application of the Directive.

Taking into consideration the rather limited life-time of the modified flexibility scheme, the introduction of a new penalty system does not seem to be proportionate, especially against the background that recently a simplification of the management procedures on flexibility has been introduced into the Directive with the adoption of Directive 2010/26/EU.

– Secondly, the implementation of such a penalty mechanism would also entail disproportionate efforts on the market surveillance which would be continued well beyond the limited duration of the increased flexibility.

6.4.4. Option 4.4A. Implementation of a trading system

A trading system by which firms could buy additional flexibility from those firms that do not need it would provide a strong incentive to comply as soon as possible with the new emission limits. Firms that had completed all of the tasks in order to reach Stage III B would be rewarded whilst those that hadn't would be penalised.

The price of the additional flexibility would be fixed by the market. It would be necessary to establish the framework for this market.

The placing of such a complex system in a short time scale would be disproportionate to the expected achievements. The time taken to develop this trading system would be too long for meeting the immediate effects expected. Additional EU / national resources would be required to set up and regulate this system. This scheme would not help the firms who are experiencing problems in cash flow for R&D to reach Stage III B. Those firms not ready for Stage III B would either have to pay for flexibility or for additional R&D.

6.4.5. Comparison of the Options

The options will now be assessed with respect to the efficiency, effectiveness and coherence with the corresponding analysis presented in the table below.

- Option 1A - No action = Base line option

Is not effective in reaching the objectives and industry would continue to struggle and would not have compliant machinery ready for Stage III B.

- Option 2A - Provision of loans for purchasing stocked engines

This would provide OEMs access to finance to purchase Stage III A engines and would allow them to continue to generate revenue so that they could develop Stage III B compliant machinery. However, the control of stocked engines and surveillance by type approval authorities of Member States is close to impossible, since such a surveillance system currently does not exist and it would require time and financial resources to be established, certified and operated in practice. This scheme is similar in its effect to extending flexibility by allowing OEMs to put Stage III A compliant engines on the market in Stage III B, but will front load engine sales which could introduce capacity constraints for the production of Stage III A engines. It is more expensive for OEMs due to the stocking (additional fees and transportation costs) involved and is much more difficult to monitor by authorities and includes the associated administrative costs of providing loans. Therefore this option is not efficient compared to options 4.A.

- Option 3A - Implementation of a scrapping scheme

This scheme will stimulate demand for Stage III B compliant machinery but will not assist in helping OEMs develop compliant machinery. Substantial funds will be required to provide subsidies under a scrapping scheme and distortions of the internal market could occur from diverging national schemes. Its compliance with state aid rules is also questionable.

- Option 4.1A- Implementation of a scaled percentage of the flexibility scheme

This system would be very effective in meeting the objectives and providing targeted support where additional flexibility was required. However, there is no specific inventory on which these assessments could be made, therefore, this system is not feasible.

- Option 4.2 A Increase of flexibility percentage to 50%

A uniform increase to 50% would avoid the information issue that is apparent in Option 4.1 and would provide assistance to industry in the short term. This additional flexibility could be introduced without setting up any new systems and therefore could provide an immediate response to the crisis.

However, to put this extension into context, the additional flexibility to 50% is the equivalent of a 16 week delay in the introduction of Stage III B[32]. If an industry will not be in a position to produce Stage III B engines, after the use of its allowance of 50% of engines of Stage III A, then it will disappear of the market.

There is a trade off between the economic incentives and the environmental pressures. In order that industry can ensure production of Stage III B machinery, and thus be able to continue selling in the future, there is a negative impact on the environment as the introduction of stricter Stage III B compliant machinery is being delayed.

According to information from industry, Stage IV engines are strongly considered as a continuation of Stage III B engines. Depending on the type of technology used, and in order to comply with the stricter NOx emissions limits in Stage IV engines, compared to those of Stage III B, 'minor' adaptations are expected by installing a more efficient anti-NOx after treatment system. Therefore it would be logical to assume that, in order to diminish R&D and compliance costs, the preferred option would be to perform the redesign of the engines as soon as possible and only once (from Stage III A to Stage III B covering as much as possible the needs for Stage IV) instead of having to do similar adaptation twice (once for the transition from Stage III A to Stage III B and then from Stage III B to Stage IV). If this logical assumption is followed the 50% flexibility would be a strong incentive to a timely adaptation of engines since indirectly would cover the majority of the compliance costs also for Stage IV and would provide industry additional time to amortise the additional investments.

- Option 4.3A - Conditional use of the flexibility scheme, with penalty mechanism

This option introduces the idea of a penalty for those industries that did not reach Stage III B compliance in time, by penalising them in the future. However, such a system would be difficult to implement and enforce.

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[32] If all of the flexibility was used straight away in the current 20% flexibility scheme then the manufacturer could delay using Stage III B by 10 weeks, instead, under the proposed 50% flexibility the manufacturer can delay by 26 weeks. Therefore, assuming constant sales, this is an extension of 16 weeks.

- Option 4.4A - Implementation of trading system

Here the market would decide whether or not firms would purchase additional flexibility or spend the money on R&D to reach Stage III B, therefore, optimising the trade-off between economic development and environmental objectives. The system would be very complex to put into place in such a short time scale. The time taken to develop a working system would not be effective in meeting the immediate requirements of industry.

Coherence also included whether the options could be possible to be implemented in short time and also be enforceable.

Table 3: Comparison of the listed options:

	Effectiveness	Efficiency	Coherence
Option 1A – Baseline	0	0	0
Option 2A - Government loan	+	-	-
Option 3A - Scrapping scheme	+	+	-
Option 4,1A – Scaled Flex	+++	+++	--
Option 4,2A - Flex to 50%	++	+	+
Option 4,3A – Penalty	+	++	--
Option 4,4A - Trading scheme	++	+++	--

6.5. Conclusion on preliminary Analysis

As a result of the above analysis, it is concluded that extending the flexibility to 50% is the most appropriate measure to ensure that the objectives of the policy are met in the sectors where the flexibility is already available. The impacts of this will be measured against the baseline in a quantitative way in section 7.1.

OPTION ANALYSIS – PRELIMINARY ANALYSIS – SECTORS NOT COVERED BY THE FLEXIBILITY - RAILCARS

Due to the receding analysis, it is clear that some of the options, are not efficient in reaching the objectives, and are therefore unfeasible. It does not add value to repeat the analysis for those options where that is the case. The analysis of the options therefore will focus on the baseline, introducing flexibility of 20% and introducing flexibility to 50%. To avoid repeating the arguments made above that apply equally to this sector, these two options will be analysed in section 7.2 in detail against the baseline

7. IMPACTS OF PREFERRED OPTION

The environmental, social and economic impact of preferred policy option of the identified policy options will be analysed in the following section. Description of methodology for the sectors eligible to use the flexibility scheme

The analysis of the impact is based on data coming from industry, EUROSTAT and the European Handbook on External Costs[33] (CE Delft, 2008), with a quantitative estimate of the gains that the amended flexibility would provide, followed by a multi-criteria analysis.

Some of the requested economic data provided by industry, including commercially sensitive data, was submitted to the external consultant.

All contributions provided during stakeholders meetings and especially during the public consultation for this proposal have been taken into account.

Compliance costs were determined initially for a typical single machine or engine. These costs were then extrapolated to the whole EU. The major cost categories that were taken into account include: research and development costs, variable production engine costs, machinery redesign costs, after treatment devices costs and fuel costs.

Environmental impacts have been determined based on external costs of calculated emissions. Emissions have been calculated taking into account machinery/engine stocks, average use and lifetime of machinery.

Socio-economic impacts have been derived from the compliance costs and the specific market situations.

7.1.1. Environmental impact

The overall impact from this additional amount of emissions is not expected to significantly affect the Member States obligations under the CAFE program. This legislation requires MS to meet certain ceilings for ambient air quality in defined geographical areas[34].

The effect on the environment will be even smaller than that estimated in the Technical Review due to the impact of the crisis as there will be reduced numbers of new engines placed on the market than what was the basis of the calculation. An average drop of sales of at least up to 25% and for some sectors up to 60% is expected.

As a large part of the NRMM are not used in problematic and highly populated areas which face the highest local concentrations of pollutants, the overall impact from this limited additional amount of emissions is not expected to be significant. Furthermore some cities and regions in the EU are reinforcing their public procurement rules in a way that only machines will be allowed to operate in urban areas which meet the most stringent emission standards.

Emission limits as provided for by the Directive are for NOx around 30% lower and for PM around 90% lower[35] in Stage III B than in the previous Stage III A. The environmental impact

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33 The European Handbook on External Costs can be found at the link: http://ec.europa.eu/transport/sustainable/2008_external_costs_en.htm

34 Directive 2008/50/EC L 152 11.6.2008 p1, Annex III

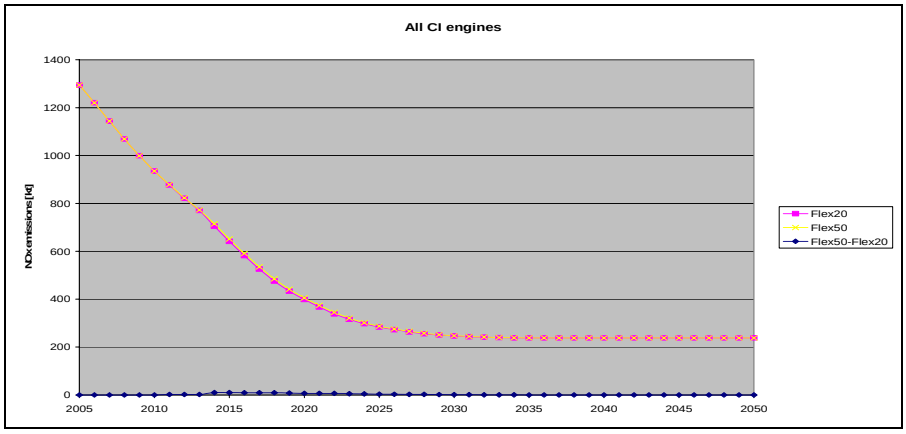
of a modified flexibility scheme is estimated under the assumption that all OEMs will use the full percentage of the flexibility scheme in the first year after the introduction of the new limits of Stage III B. In the case of 50% flexibility, from all NRMM (100%) placed on the market, only 50% of the machinery would comply with Stage III B emissions limits, while the remaining 50% would comply with the emission limits of Stage III A.

Based on 2005 figures[36], the average share of emissions resulting from new engines put on the market during one year are around 5% of the total emissions of non-road mobile machines. The remaining 95% of emissions are allocated to engines already operating on the market.

The amendment of flexibility from 20% to 50% would increase the emissions of newly produced machinery within the first year by about 9% compared to the current scheme, used as a base line. However, the **overall NRMM** compression ignition (diesel) engine **emissions would increase** for the first year under the 50% flexibility **by around 0,3%** compared to the current 20% scheme. In absolute numbers the amounts of emissions can be quantified to about 0,66 kt for PM and 9,8 kt for NOx per year.

Comparative graphs presenting NOx and PM emissions for the current 20% and the proposed 50% flexibility scheme can be found in Figure 1. and Figure 2.

Figure 1: Total NOx emissions for all CI engines in case of 20% flexibility and of 50% flexibility

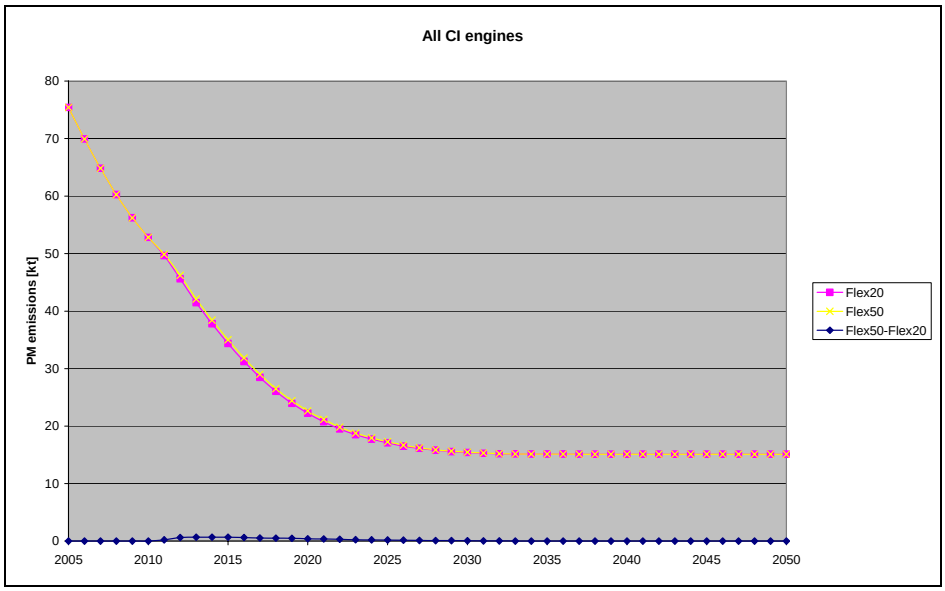


Environmental costs were calculated based on the emission model for CI engines, including assumptions and information provided by industry and the JRC emissions inventory, as described in detail in Annex 7.8 of the IA study by ARCADIS.

35 More information on the reduction % of pollutants of the different stages of the Directive can be found in table 3. of Annex III.

36 Summarised sales table of new machinery to be placed on the market and table of existing machinery, covered by the NRMM Directive, are available at Annex V

Figure 2 : Total PM emissions for all CI engines in case of 20% flexibility and of 50% flexibility



The environmental costs represent the cost generated from the additional emissions of the engines under the amended 50% flexibility scheme compared to the current 20% flexibility scheme. The conclusion of the study, according to the methodology followed based on the Net Present Value (NPV), estimates, per type of pollutant, the environmental costs resulting from a 50% flexibility compared to the current 20% flexibility, in the magnitude of:

Table 4: Environmental costs occurred during 2008 – 2030

Pollutant	50% flexibility (**Million Euros**)
PM	- 200
NOx	- 350
Total	**- 550**

The estimated impact of an enlarged flexibility scheme is 0.3 %[37] of the overall emissions (both of PM and NOx)

This figure represents the total cost over the period of 2008-2030, while for the present Impact Assessment the benefit has been calculated for the period of three years as covered by the accompanying proposal.

These conclusions on the technical review of the Directive are based on figures dating back to before the economic crisis. Reports from industry on the drop of sales and diminished fuel consumption, in the NRMM sector, indicate that a small decrease in the emissions is most probable. An assessment of the impact of placing on the market a smaller number of engines as a result of the economic crisis is not yet available.

Available information to Commission Services via the notification requirements of the Directive on the use of the flexibility scheme, for the transition from Stage II to Stage III A,

37 Draft Impact Assessment p 15

clearly indicate that the total allowance of OEMs to place on the market 'flexed' engines is not depleted in most of the power categories(more than 50% is still available). On the very small power category however, the total allowance is covered almost by 100%.

As reported, the additional flexibility has the impact of increasing the availability of Stage III A rather than Stage III B by just 16 weeks.

As CO_2 is the natural product of burning fossil fuel, its emissions will bring changes to the environment. Although it may seem obvious that the gained experience from other sectors' approach on the efforts to reduce CO_2 could be easily adapted and introduced for the NRMM, the differentiation of Directive 97/69/EC (dealing with engines not machinery) requires a different approach that only recently has been initiated.

CO2 emissions from engines are currently not reported and as no classification of machinery according to type of use is available (not mandated by the Directive), no estimate can be given on the impacts of increased flexibility or any other tentative measure reducing CO_2 emissions.

7.1.2. Economic impact

The underlying assumptions applied for the economic impact analyses are described hereafter. The main economic impact of the proposed measure are related to compliance costs which, as described under 3.1, include mainly research and development costs as well as investment costs.

The assessment is based on the data available from different sources. Industry reported relative increases in R&D costs around the date of introduction of the new stages. Additional information on the R&D budget for the sector was obtained from EUROSTAT. Some of the factors, not possible to be quantified due to lack of detailed information from the industry, and therefore not taken into account include:

- increased learning & training
- increased unavailability of manpower
- increased stock piling
- increased unavailability of low volume products
- standstill state of the art
- increased peak load certification bodies
- increased warranty cost due to rush released

A simplified approach was used to quantify the impact of the flexibility scheme enabling the reduction of peak efforts of R&D costs and the possibility to amortise these costs over an extended time period according to industry planning. The assumptions and clarifications of this approach include:

- Estimates for the potential relative gains in R&D budget, provided by industry, due to the increase in flexibility for the typical period around the introduction of new emission standards, are indicated in the second and the fourth column in Table 6. The larger the

flexibility percentage is, the lower the peak costs of R&D are expected in the same period of time. This difference in peak costs for the two different options of percentage of flexibility, are also presented in Figure 3.

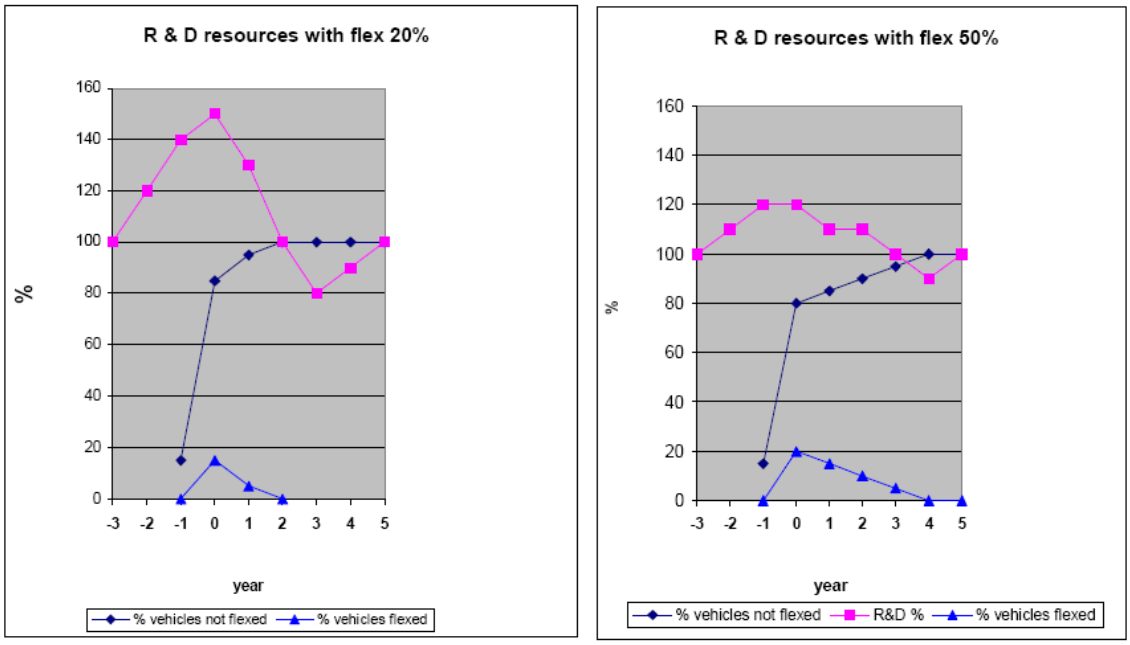


Figure 3. Illustration of how flexibility reduces peak R&D efforts

- Use of 2005 EUROSTAT figures on R&D. The concerned sectors considered are: DK29 Manufacture of machinery and equipment, DK2911 Manufacture of engines and turbines, excluding aircraft, vehicle and cycle engines. Parts of DK293_TO_DK296 were included on Manufacture of agricultural and forestry machinery; Manufacture of machine-tools; manufacture of other special purpose machinery.

- Only half (48%) of the R&D budget is considered, as only half of the machinery sales is concerned with compliance to the future emission limits for NRMM machinery with CI engines. No discrimination is taken into account on the aspect that bigger engines (with smaller series and sale figures) need probably more efforts to comply with the thresholds.

- For the calculation, the introduction of Stage III B in 2012 and Stage IV in 2015 were assumed as an average, to compensate for the different implementation dates in both stages for the various power categories of engines. The initial year is set to 0 for the year 2013. For this year, the theoretical gain has not been taken into account.

- For each year, the relative gain in R&D is multiplied with the total R&D budget and discount of the amount to 2008 (date of the beginning of the study) at a 4% discount rate.

The Net Present Value of saved compliance costs of the use of the amended flexibility are presented in more detail in Table 5 for the period of 2010 to 2013 which has been chosen for the revised flexibility scheme. The calculation is however based on a longer period ending in 2016.

Table 5: Economic Gains of 50% flexibility compared to 20% flexibility (million EUR)

	Stage X		
Year	**% gain in R&D**	**Monetized gain**	**discounted gain**
2010	0.1	496	458
2011	0.2	991	881
2012	0.3	1 487	1 271
2013	0.2	991	No gain due to overlap with next stage
Total discounted period gain			2 610
Total saved compliance cost			2 124

The NPV of saved compliance costs of the introduction of 50% flexibility compared to the 20% flexibility for the period under consideration is around Eur 2.1 billion for EU 15[38]. This is the amount of money that is saved, if the flexibility used for placing on the market machinery with engines of Stage III A is 50% compared to the current 20%.

7.2. Description of methodology for the sectors excluded from the use of the flexibility scheme

In this chapter the environmental and compliance costs are calculated for railcars which are currently not covered by the flexibility scheme. The assumptions made in the analysis of the sectors eligible to use the flexibility scheme are maintained. The unit values for external costs for EU were taken from the European Handbook on external costs (CE Delft, 2008).

The methodology used included:

- Calculation of the difference in annual NOx and PM emission between an average IIIA and an average III B engine, using the same technical assumptions already mentioned in section 6.1.1 and 6.1.2. of this IA,
- Combination of the previously mentioned data with the unit external costs to obtain the annual difference in external costs between an average IIIA and an average III B engine for each power category.
- Combination of the assumed engine lifetime expressed in hours with the average hours of use per year, to obtain the expected engine lifetime in years.
- Estimate of an external consultant of the average number of engines put yearly on the market in the 5 years preceding the beginning of Stage III B.
- Combination of the previous estimate with the allowed flexibility to obtain the number of IIIA engines that can be put on the market in the first three years of Stage III B;

[38] The calculations are based on the EU15 market due to the fact the base year has been calculated for 2005 and no data were available for EU12

The number of railcars with new engines to be placed on the market under proposed options of the flexibility scheme is summarized in the following Table 6.

Table 6: Railcar flexibility for 20% and 50% flexibility

Years for placing on the market	Annual number of engines under 20% flexibility	Annual number of engines under 50% flexibility	Year of withdrawal from the market
2012 - 2014	52	129	2018-2020

- Calculation of compliance costs is made as the additional cost of a III B engine compared to a IIIA engine. Saved expenses are thus mainly concentrated at the beginning of Stage III B.

- Since for all applications more than one technical solution for compliance to III B is possible, it is assumed that the OEM will always choose the solution with the lowest net compliance costs, and the same solution will be chosen for each application, independently of the option and the flexibility scheme under consideration.

- As the previous point suggests and with the comparative figures presented by industry on Stage III B compliance costs for railcars, the analysis of impacts on granting the use of flexibility to railcars, includes only the less costly technical solution[39]. These costs are presented in the following Table 7.

[39] Diesel Particulate Filter and Exhaust Gas Recirculation

Table 7. Compliance costs for railcars per unit and per technology in Euros

	Diesel Particulate Filter and Exhaust Gas Recirculation	1 Selective Catalytic Reactor
Investment cost	15 000	15 000
Operating cost	4 000	5 000
NPV (EUR)	38 000	50 000

- For the calculation of compliance costs, the made assumption including engine life time of 25 000 hours with a load factor fraction of 0.3 and 3 500 hours of use per year, an average life time of approximately 7 years is calculated.

- Since additional external costs are directly proportional to the number of IIIA engines that are in operation, they thus first increase until all IIIA engines allowed under flexibility have been put on the market, and remain constant until the first batch of IIIA engines are reaching the end of their economic life. After that the total additional external costs decline.

- The calculation of the net present value (NPV) of additional costs and benefits was done under the same discount rate of 4%.

7.2.1. Environmental impacts

The environmental impacts from the application of the flexibility scheme to railcars are quantified and presented in Euros, according to the used technology and under the assumption that all engines under the 20% or 50% flexibility will be placed on the market in a three year period after the implementation of Stage III B, for the fleet of railcars which are equipped of engines having a power range situated between 130 and 560 kW.

Based on the emission factors, the load factor fraction of 0.3, and the yearly operational hours (3 500 hrs), as provided by an external consultant, the difference in annual NOx and PM emissions (in quantities as expressed in Table 8) between a typical III A and III B railcar can be estimated. The cost figures are presented in the following Table 9.

Table 8. Difference of emissions between Stage III A and Stage III B for railcars per year[40]

POLLUTANT	**TONNES (per unit)**
NO_X	0.672
PM	0.0315

[40] Page 16 of Final Report of the IA for the sector not covered – ARCADIS – May 2009, as in Annex II

Table 9. Environmental costs related to flexibility % for railcars for both NOx and PM (NPV)[41].

Percentage of flexibility (%)	Environmental costs (Euros)
20%	3 400 000
50%	8 500 000

7.2.2. Economic impact

Calculations related to the compliance costs of engines placed on the market under the proposed % of the flexibility scheme, using DPF+EGR, resulted in the figures presented in the following Table 10.

Table 10. Saved compliance costs related to flexibility % for railcars (NPV for 3 years)

Percentage of flexibility (%)	NPV of saved compliance costs (Euros)
20%	4 900 000
50%	12 500 000

7.3. For the SMEs

The existing flexibility scheme already considers the need to protect small volume OEMs which have lower resources for developing new technology as the current system allows firms to either place a fixed number of machinery or a percentage of the previous Stage on the market. The proposal, by scaling the fixed number by the same proportion as the percentage increase (2.5 times), maintains the logic of a system already preferred by SMEs.

The possible impacts on SMEs which the policy options for revising the directive as suggested by JRC, were assessed in the impact assessment study carried out by Arcadis. After the adoption of the Commission's Impact Assessment guidelines in January 2009 it was agreed to commission an additional SME focussed complement which Arcadis will finalise in September 2009. This complementary study covers the relevant target group including manufacturers of both machinery and engines, as well as professional customers of the machinery. Information collected so far suggests that compliance costs, mainly R&D and conformity assessment costs will weigh relatively more upon SMEs. Raising the necessary capital may be more difficult for SMEs which also have a lesser potential for cost pass-through compared to large enterprises. The contractor also indicated that only very few OEMs are also engine manufacturers of NRMM and that the professional customers are mainly very small entities.

No SMEs are identified operating in the railcars sector according to the ARCADIS Impact Assessment study.

[41] Page 18 of Final Report of the IA for the sector not covered – ARCADIS – May 2009, as in Annex II

8. EFFECT OF THE PROPOSED MEASURE COMPARED TO THE BASE LINE

The use of the flexibility scheme generates a negative environmental impact, a benefit in compliance cost including a decrease in peak R&D investments costs, since these costs are spread over a longer period.

In order to allow the proposed measure that is limited in its duration, to produce its effect on the industry sectors covered it will be necessary that it enters into force as early as possible and is preferably applied immediately after the ordinary legislative procedure is finalised as the amended flexibility scheme will expire by 31 December 2013. For any delay in the implementation of this measure the estimated monetised gains as provided in table 5 need to be decreased accordingly.

In the present IA an analysis of the impact of an amended flexibility scheme had to be performed for the sectors already having the possibility to use a basic 20% with a proposed increase to 50% and for the sectors not eligible to use the scheme until now.

As expected and seen in the analysis, the proposed measure covers a large variety of machinery, characterised by heterogeneous user markets, a wide range of feasible technical solutions, different investment costs and retail prices, which are not easily comparable. The comparisons of the financial figures which are based on the figures reported during the short period of consultation, are presented in the following Tables:

Table 11. Comparison of options for increased flexibility for sectors already covered by the flexibility scheme (NPVs, all costs in Euros)

	FLEXIBILITY PERCENTAGE	
	20%	**50%**
Environmental cost		550 000 000
Saved Compliance costs		2 124 000 000

The adoption of the increased flexibility is estimated to have monetised impacts in the order of EUR 550 million. This compares with a saved compliance cost of EUR 2.1 billion, thus implying that the environmental costs are outweighed by the benefits.

Table 12. Comparison of options for railcars for the period applicable for the proposed measure (constant prices in Euros)

	FLEXIBILITY PERCENTAGE		
	N.A.	**20%**	**50%**
Environmental cost		3 400 000	8 500 000
Saved Compliance costs		4 900 000	12 500 000

Although it is apparent that the use of 50% flexibility for railcars results in a bigger total saved cost figure than the 20%, the preferred policy option proposed in this measure is the 20% for this sector. The reasons for this proposal include:

- Producers of railcars are for the first time proposed to become eligible to use the provisions of the flexibility scheme, so it is more logical to be granted a smaller % in order to safeguard the easier transition, as a first step, to Stage III B.

- Railcars are mostly 'borrowing' engines from the heavy duty vehicles (trucks, busses e.t.c.) and according to the industry, it is required only to adapt at some or more extend the engine to fit to the body of the railcar. Therefore the need to use Stage III A engines is not that imperative since compliant to Stage III B technology already exists and should be encouraged.

- Due to the type of the machinery (bulky and quite compact) the time required for this adaptation can be substantial and resources demanding. This proposed measure will provide some additional time so investments may be amortized in a longer period of time and the saved costs can be allocated to the better development of Stage III B engines for dedicated railcar usage.

- The incentive of the Directive and will of the legislator for cleaner engines, for technical progress and placement on the market of railcars using Stage III B compliant engines must not in any way be compromised by the granting the possibility to continue using more Stage III B engines than required to overcome the impacts of the economic crisis and stay in business seeking a competitive advantage.

- The 20% of proposed flexibility scheme is expected to act as an upper limit to the placement of Stage III A engines to the market where a lot of railcar operators exist, but at the same time provide them the opportunity to stay in business so they can finance the completion of development of Stage III B engines.

9. MONITORING AND EVALUATION

An assessment of the impacts of the enlarged provisions of the flexibility scheme after its implementation and completion will be based on information provided by the industry and by Member States.

Key indicators to assess the effectiveness of this initiative could be the use of the flexibility scheme until end of 2013, the development of the number of firms going out of business, and the development of NOx and PM emissions attributed to NRMM.

Article 4 of the Directive requires the type approval authorities of each Member State to notify to the Commission the relevant data on the type approved engines. Furthermore the flexibility scheme as provided in Annex XIII of the Directive obliges the OEM to notify all relevant data concerning the application of the scheme including inter alia the cumulative data on the number of engines placed on the market under the flexibility scheme.

It is the Commission's intention, independently from the current proposal, to invite the Member States to communicate precise information about the use of the flexibility scheme on the basis of the provisions specified in Annex XIII of the Directive 97/67/EC. It also intends to evaluate the impact of the revised flexibility measure at the end of the period defined in the accompanying proposal, i.e. in 2013 and to draw the necessary conclusions from the results obtained. If appropriate, monitoring and evaluation arrangements for this initiative could be

integrated into the monitoring of the broader revision of the Directive foreseen for the end of 2010. This will be discussed in the corresponding impact assessment.

ANNEX I : GLOSSARY

Adsorption: the accumulation of atoms or molecules on the surface of a material.

Engine family: a manufacturer's (engines) grouping of engines which, through their design, are expected to have similar exhaust emission characteristics and which comply with the requirements of this Directive

CECE: Committee for European Construction Equipment

CEMA: European Agricultural Machinery

C.I.: An engine that works under the compression-ignition principle, e.g. diesel engine

CO: Carbon monoxide

DPF: Diesel Particulate Filter

EGR: Exhaust Gas Recirculation

Engine manufacturer: means the person or body who is responsible to the approval authority for all aspects of the type-approval process and for ensuring conformity of production of the engines.

HC: Hydrocarbons

Non-Road Mobile Machinery (NRMM): means any mobile machinery, transportable industrial equipment or vehicle with or without body work, not intended for the use of passenger- or goods-transport on the road, in which an internal combustion engine is installed.

NOx: Nitrogen oxide

Original equipment manufacturer (OEM): means a manufacturer of a type of non-road mobile machinery (final product).

PT: Particulates

UN ECE: United Nations Economic Commission for Europe (Geneva)

ANNEX II: REFERENCE DOCUMENTS

Final Report Technical Review - DG JRC- 28-11-2008

Administrative arrangement for a Technical Review of Directive 97/68/EC, carried out by DG JRC, on behalf of DG ENTR, September 2006 - September 2008.

Final Report of the IA study - ARCADIS -January 2009

External specific contract, under LOT5 framework contract, for an Impact Assessment study of options presented in the Technical Review of Directive 97/68/EC, carried out be ARCADIS N.V., April 2008 - January 2009.

Final Report of the IA for the sector not covered – ARCADIS – May 2009

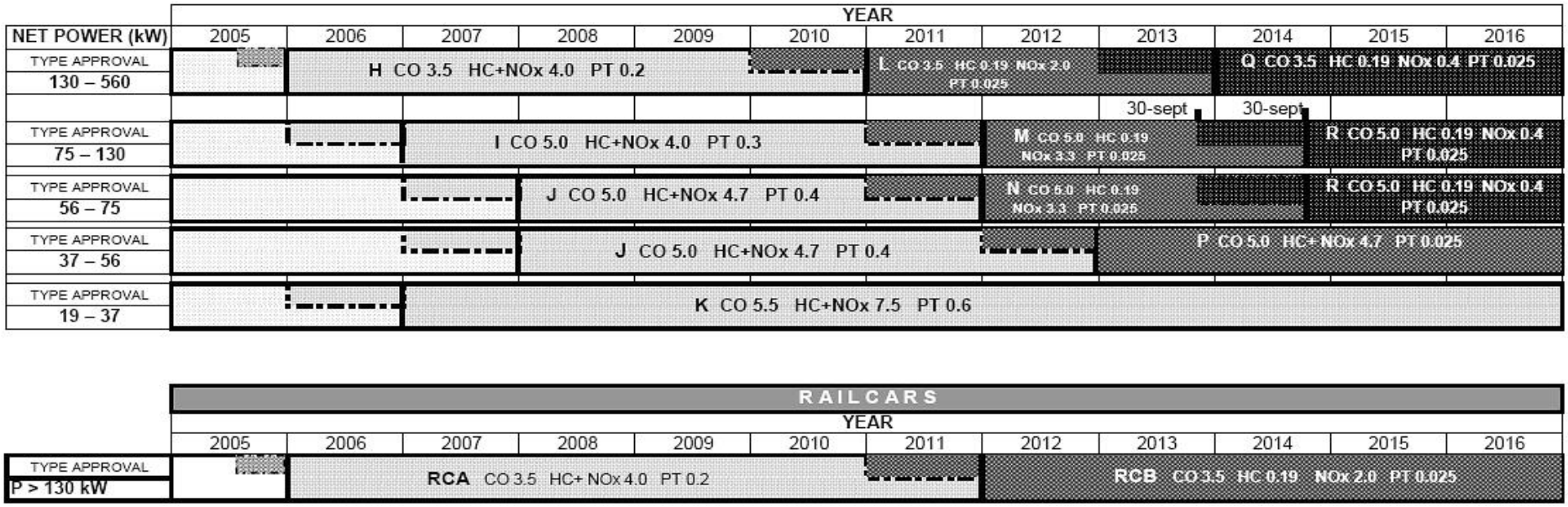
Final report of an IA study, under LOT5 framework contract, of the impacts on possible inclusion of the possible inclusion to the flexibility scheme for sectors currently not covered by Directive 97/68/EC **(rail sector, inland waterway vessels) – carried out by ARCADIS N.V. – May 2009.**

All reference documents are published on http://ec.europa.eu/enterprise/index_en.htm

ANNEX III: Summarized Stages table of Directive 97/68/EC

DIRECTIVE 97/68/EC - NON-ROAD MOBILE MACHINERY

TABLE OF EXHAUST EMISSION STAGES & ENGINE CLASSIFICATION



Type approval period is marked as

Emission limits : **gr / kWh**

Transition to next stage is indicated by the black vertical line

ANNEX IV: Flexibility scheme

As provided in Article IV and in Annex XIII of Directive 97/68/EC on NRMM emissions, any OEM that wishes to make use of the flexibility scheme shall request permission from an approval authority to purchase from his engine suppliers, in the period between two emissions stages, the quantities of engines that do not comply with the current emission limit values, but are approved to the nearest previous Stage of emission limits.

The flexibility scheme applies for machinery with compression ignition engines (eg diesel) with a power from 19kW to 560 kW.

The number of machinery placed on the market under a flexibility scheme shall, in each engine category, not exceed **20%** of the OEM's annual sales of machinery with engines in that engine category (calculated as the average of the latest 5 years sales on the EU market). Where an OEM has marketed machinery in the EU for a period of less than 5 years, the average will be calculated based on the period for which the OEM has marketed machinery in the EU.

As an alternative the OEM may seek permission for his engine suppliers to place on the market a fixed number of machinery under the flexibility scheme. The number of machinery in each engine category shall not exceed the following values:

Engine Category (kW)	Number of engines
37-56	200
56-75	150
75-130	100
130-560	50

The fixed number of engines scheme is intended for very small producers that would otherwise not be able to effectively use the scheme.

Any OEM may apply to the type approval authority of a Member state to be allowed to use the provisions of the flexibility scheme for each engine power category. The placing on the market of machinery (with new engines) under the scheme can be spread over the duration of the next 'cleaner' stage, in different ways, provided the total allowance of 20% of sales per power category is not exceeded. (ex. for the duration of Stage III A - 5 years for the power category of 130-560 kW - the 20% can be all used in the 1st year, or 10% in the first year 10% in the second, 0% in the 3rd, 4th and 5th, or 10% in the first, 5% in 2nd and 5% in 3rd, 0% in 4th and 5th , e.t.c.), according to the needs and business plan of the OEM.

The OEM may also choose for machinery with engines of one engine power category to apply the percentage of sales of the previous year and for another engine power category to use the fixed engines number as mentioned in the relevant table; he cannot use both options in the same power category.

The number of machinery allowed to be placed on the market under the maximum 20% per power category, is calculated as the average of sales of the machinery placed on the market in

EU for the previous 5 years, counting back from the day of the application to the type approval authority of a Member State for using the flexibility scheme. If the OEM has not been in business for 5 years, then the average is calculated for the period that the OEM is in business.

As a result, after the approval of using the flexibility scheme, the number of machinery to be placed on the market under the flexibility scheme remains the same and is not recalculated as years pass by in the 'cleaner' stage.

The main advantage of the scheme is that the sooner the application for using the flexibility scheme is granted, the bigger numbers of machinery may be placed on the market, especially in times where technical changes must be implemented or like the present situation when under the pressure of the economic crisis, sales are dropping.

The OEM cannot transfer part or the total of his flexibility allowance to another OEM or from one power category to the other.

The provisions of the flexibility scheme are allocated to power categories of the used engines, regardless of the number of engine families[42] type approved in that category.

It must be noted that as a result of the way that the flexibility scheme is implemented, all environmental impacts remain the same in total, regardless of the time of the placing of engines on the market, since the total allowance of 20% per power category is respected.

The application for the use of the flexibility scheme may be delivered to only one type approval authority of any Member State in the EU. The provisions of the scheme make it very clear that the type approval authorities of one Member State disseminate to other Member states information on granting approvals for machinery being placed on the market under the flexibility scheme. As a result, the OEM cannot apply for the use of the flexibility scheme to more than one Member States.

Examples of machinery, eligible to use the flexibility scheme, include:

– for construction machinery - wheel loaders, bulldozers, crawler tractors, crawler loaders, truck-type loaders, off-highway trucks, hydraulic excavators etc. ,

– for forestry machinery - tree cutters, tree loaders etc.,

– for road maintenance machinery - motor graders, road rollers, asphalt finishers etc,

– mobile cranes, fork-lift trucks, material handling equipment,

– self-propelled agricultural vehicles - planting, spraying, irrigating machinery e.t.c. (tractors are excluded and covered by a specific directive),

– smaller agricultural machinery - types of machinery were the user is following on foot,

– harvesters - cotton, wheat, corn etc,

– for generator sets, pumps – using constant speed engines

[42] Engine family: a manufacturer's grouping of engines which, through their design, are expected to have similar exhaust emission characteristics and which comply with the requirements of the Directive, as in Annex I

ANNEX V: Positions of stakeholders regarding the amendment of the provisions of the flexibility scheme

01-06-2007	EUnited Municipal Equipment - CECE	Industry Associations	Proposing: an enlargement of flexibility to better align with the US
04-2009	UNIFE	The European Rail Industry	Strongly welcomes the proposed inclusion of railcars to the measure enlarging flexibility, asks for a provision of 50% and introduction of derogation for locomotives.
16-06-2009	WIRTGEN GROUP	Road and mineral Technologies	Supports an increase of flexibility up to 50% and a relevant increase of the fixed numbers table, proposes the extension of implementation date of Stage III B be 2 years and Stage IV by 3 years and emphasises on the need to adopt a positive statement on these issues by October 2009.
29-06-2009	German Federal Ministry of Environment		Expresses doubts on the extend of the economic crisis of the NRMM sectors and inclusion of railcars in the flexibility scheme, concerns on the analysis of the presented environmental impacts, concerns over the rise of the PM concentration. Proposes to address an enlargement of flexibility, linked to limit values, in the full revision of the Directive.
30-06-2009	ATOC	Association of Train Operating Companies	Welcomes the proposal by Commission and proposes a 50% increase compared to the 20% for railcars proposed by Commission, inclusion of locomotives under the flexibility scheme and refers to additional issues that require attention, like replacement engines.
30-06-2009	SNCF	French Railways	Support the proposal, proposes an increase of 50% for railcars, a postponement of the implementation date of Stage III B for rail engines and refers to additional issues that require attention like replacement engines.
30-6-2009	CER	Community of European Railways and Infrastructure Companies	Fully support the proposal to enlarge flexibility and extend it to railcars, proposes increase up to 50% for railcars and inclusion also of locomotives in the flexibility scheme, proposes address the issue on replacement engines.
30-6-2009	UIC	International Union of Railways	Fully support the proposal, asks for 50% flexibility for railcars and inclusion of locomotives to the scheme with 50%,
30-6-2009	Department of Transport, UK		Welcomes the proposal to amend flexibility, asks for 50% for railcars and inclusion of locomotives with 50%, asks for additional measures to accommodate the specific

			railway problems of the UK.
30-06-2009	FEM	Federation of European Materials Handling	Really appreciates the amendment of flexibility.
01-07-2009	EUROMOT	The European Association of Internal Combustion Engine Manufacturers	Fully support the flexibility amendment
02-07-2009	EEB	European Environmental Bureau	Express concerns on the flexibility amendment, on the ability of MS to comply with National emission ceilings, on possible delay of placing on the market of Stage III B compliant engines, on competitiveness issues within industry and on the reliability of the EU policies as a total.
03-02009	CEA	Construction Equipment Association (UK)	Strongly endorses the proposal
09-07-2009	JCB	Construction Equipment Manufacturer	Strongly endorses the proposal.
10-07-2009	SMMT	The Society of Motor Manufacturers and Traders (UK) off Highway Engine & Equipment Group	Strongly endorses the proposal
13-07-2009	AGORIA	Belgium Employers Organisation	Fully support the proposal, ask for a similar measure to be proposed for tractors.
14-07-2009	AECC	Association for Emissions Control by Catalyst	Supports additional measures acting as incentives for Stage III B engines to be placed on the market but not the proposed measure. Justifications include impacts on environment, EU competiveness in the global market.
14-07-2009	BOMAG	Compaction equipment (used in construction sites)	Appreciates very much the proposal,
15-07-2009	WKO	Austrian Vehicle Industry Association	Supports the proposal
15-07-2009	US-EPA	United States Environmental Protection Agency	Highlights the benefits of alignment including the flexibility aspects
16-07-2009	CLAAS	Agricultural Equipment Manufacturer	Appreciates the proposal to amend flexibility and proposes the implementation of a similar measure for tractors.

ANNEX VI: Fleet and annual sales of NRMM machinery

Table 1: Annual sales estimates per machinery category and power class (year 2005, EU15)

	power	< 19 kW	19-37 kW	37-56 kW	56-75 kW	75-130 kW	130-560	> 560
	average	9.5	28	46.5	65.5	102.5	345	800
Small Equipment (Agri)	19.000	19000	0	0	0	0	0	0
Small Equipment (Constr)	50.000	35000	15000	0	0	0	0	0
Generator Sets	75.000	14250	23250	12750	9000	7500	5250	3000
Agricultural Tractors	163.000	14670	3260	32600	48900	48900	14670	0
Agricultural Harvesters	9.600	0	0	0	0	768	8640	192
Light Construction Equipment	150.000	30000	30000	25500	64500	0	0	0
Heavy Construction Equipment	33.000	0	0	0	0	18150	14190	660
total	499.600	112.920	71.510	70.850	122.400	75.318	42.750	3.852
percent		23	14	14	24	15	9	1

Table 2: Total number of machinery on the market per machinery category and power class (overall: 6.7 million, 2005, EU15)

Total engines on market	< 19 kW	19-37 kW	37-56 kW	56-75 kW	75-130 kW	130-560	> 560	Total num	Total(%)
	9.5	28	46.5	65.5	102.5	345	800		
Small Equipment (Agri)	190000	0	0	0	0	0	0	190000	3
Small Equipment (Constr)	350000	150000	0	0	0	0	0	500000	7
Generator Sets	142500	232500	204000	144000	120000	84000	47999	974999	14
Agricultural Tractors	146700	32600	521600	782400	782400	234720	0	2500420	37
Agricultural Harvesters	0	0	0	0	12287	138240	3071	153598	2
Light Construct. Equip.	300000	300000	408000	1032000	0	0	0	2040000	30
Heavy Construct. Equip.	0	0	0	0	217800	141900	6600	366300	5
Total number	1129200	715100	1133600	1958400	1132487	598860	57670	6725317	
Total (%)	17	11	17	29	17	9	1		

ANNEX VII: Emissions of NOx and PT

Table 1: NOx and PM emissions per machinery category and power class

N0x Emissions (kt)	< 19 kW	19-37 kW	37-56 kW	56-75 kW	75-130 kW	130-560	> 560	Total num	Total(%)
	9.5	28	46.5	65.5	102.5	345	800		
Small Equipment (Agri)	1.1	0	0	0	0	0	0	1	0
Small Equipment (Constr)	2.1	5.72	0	0	0	0	0	8	1
Generator Sets	0.84	4.43	14	14	20	44	86	183	14
Agricultural Tractors	0.86	0.99	36	107	185	185	0	515	40
Agricultural Harvesters	0	0	0	0	2.1	80	7.1	89	7
Light Construct. Equip.	7	14	34	175	0	0	0	230	18
Heavy Construct. Equip.	0	0	0	0	71	157	28	255	20
Total number	12	25	84	296	278	466	120	1281	
Total (%)	1	2	7	23	22	36	9		

PM Emissions (kt)	< 19 kW	19-37 kW	37-56 kW	56-75 kW	75-130 kW	130-560	> 560	Total num	Total(%)
	9.5	28	46.5	65.5	102.5	345	800		
Small Equipment (Agri)	0.16	0	0	0	0	0	0	0.2	0
Small Equipment (Constr)	0.29	0.62	0	0	0	0	0	0.9	1
Generator Sets	0.12	0.48	1.00	0.99	0.94	1.81	6.1	11	16
Agricultural Tractors	0.12	0.11	2.55	7.55	8.58	7.58	0	26	37
Agricultural Harvesters	0	0	0	0	0.10	3.27	0.5	4	5
Light Construct. Equip.	1.01	1.50	2.40	12.41	0	0	0	17	24
Heavy Construct. Equip.	0	0	0	0	3.16	5.86	1.89	11	15
Total number	1.7	2.7	5.9	21	13	19	8.5	71	
Total (%)	2	4	8	29	18	26	12		

Overall:		1281 kt NOx	71 kt PM
Agr.Contr.:	605+593=	1098 kt NOx	30+29= 59 kt PM
RAINS (Agr.+Constr.):	539+248=	787 kt NOx	57+23= 80 kt P

ANNEX VIII: Tables of fixed engines numbers of the flexibility scheme

Table 1. Fixed number of engines under the current flexibility scheme up to Stage III A

ENGINE CATEGORY (kW)	NUMBER OF ENGINES (flexibility at 20%)
19-37	200
37-75	150
75-130	100
130-560	50

The classification of engines differs in Stage III B, compared to the classification of engines up to Stage III A. Power category of 19-37 kW is not included any more in the flexibility scheme, and power category 37-75 kW is split in two separate categories of 37-56 kW and 56-75 kW. The total of engines in these two categories (80+70) as in Table 2, equal the total of the 37-75 kW.

Table 2. Calculation of fixed number of engines under the proposed amended flexibility

(1)	(2)	(3)
ENGINE CATEGORY (kW)	Number of engines under **flexibility** scheme of **20%**	Final number of engines (Figures in (2) multiplied by 2.5 times)
37-56	80	200
56-75	70	175
75-130	100	250
130-560	50	125

Table 3. Fixed number of engines of the flexibility scheme after expiration of the period of amended flexibility.

ENGINE CATEGORY (kW)	Number of engines (for the period after end of 2013)
37-56	80
56-75	70
75-130	100
130-560	50