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*Accompanying document to the*

Proposal for a

**DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL**  
amending Directive 2000/25/EC as regards the implementation provisions for tractors placed on the market under a “flexible scheme”

**Impact Assessment**

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## 1. INTRODUCTION AND POLICY CONTEXT

The tractors emissions Directive 2000/25/EC<sup>1</sup> regulates the exhaust emissions (carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NO<sub>x</sub>) and particulate matter (PM)) from diesel engines installed in agricultural and forestry tractors (hereafter: tractors). The Directive includes a series of emission limit stages of increasing stringency with corresponding compliance dates. These limits are based upon those contained in Directive 97/68/EC, which covers emission limits for *non-road mobile machinery* (NRMM) because engines used for these two applications are of a similar technical nature, and it is logical that their emission requirements should be aligned to allow interchangeability between engine designs used for NRMM and tractor applications.

The original directive on tractors emissions was introduced in 2000 and its decisions on deadlines and criteria were based on data available at that time. The emissions limits set in the Directive were particularly ambitious for the later stages (for PM, a reduction by 88 to 94 % was required) therefore in order to ease the burden for manufacturers, an amendment to the Directive was introduced in 2005 (2005/13/EC). This introduced a flexibility scheme, based upon a similar scheme already introduced for NRMM, to facilitate the transition between the different emission stages. The flexibility scheme allows the manufacturers to place on the market, during the period between two successive stages of exhaust emissions limit values, a limited number of tractors fitted with compression ignition engines that comply only with the exhaust emission limits of the previous stage. A manufacturer has the option either to place on the market for each engine power category a limited number of machines not exceeding 20% of the manufacturer's annual sales (calculated as the average sales in the EU of the latest 5 years) or a fixed maximum number of units as stipulated in the Directive. This second option was intended to be used by smaller enterprises producing lower volumes of engines.

The present level of emission limits is aligned with those of the USA, the major difference being the system and level of implementing measures (flexibility).

### 1.1. Basis for the introduction of the flexibility scheme, relation between the machinery and the tractors directive

The *tractors emissions directive*<sup>2</sup> was set up fully in line with the *non-road mobile machinery* (NRMM) Directive and implemented the same requirements specifically for tractors under Framework Directive 2003/37/EC; separating the requirements into two directives allowed the creation of a stand-alone tractors Directive which could be incorporated into the whole-vehicle type-approval system for tractors. Since the provisions for tractors are aligned with those for machinery, this impact assessment draws on the IA for flexibility for non-road mobile machinery. Nevertheless it was considered necessary to treat the proposals separately because of differences in timing (work on NRMM being more advanced).

For the various types of *non-road mobile machinery* (NRMM), Directive 97/68/EC stipulates the maximum permitted engines exhaust emissions as a function of the power of the installed

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<sup>1</sup> OJ L173, 12.7.2000, p.1

<sup>2</sup> OJ L 173, 12.7.2000, p. 1, as amended by 2005/13/EC in OJ L 55, 1.3.2005, p.35 and 2006/96/EC in OJ L 363, 20.12.2006, p. 81.

engine. Moreover, the Directive includes a series of emission limit stages of increasing stringency with corresponding compliance dates. NRMM manufacturers must ensure that new engines used in their machines comply with these limits when placing them on the market.

Directive 2004/26/EC<sup>3</sup> amended the original NRMM Directive and introduced the currently applicable stage of emission limits for the majority of diesel engines (referred to as Stage IIIA). These limits will be replaced by the more stringent Stage IIIB limits entering into force progressively, depending on the power category, as of 1<sup>st</sup> January 2011 with regard to the placing on the market. From 1<sup>st</sup> January 2010 the type-approval period for these engines has started. As the Stage IIIB limits are stricter for PM and NO<sub>x</sub>, current engines will need to be modified and re-designed in order to respect the new limits. This redesign affects manufacturers who have to adapt the design of their machines to accommodate the modified engines. This is a time and resources consuming procedure; the efforts needed depend heavily on the required changes to the engines and to the body of the machine in which the engine is to be installed.

The reductions in PM and NO<sub>x</sub> emissions resulting from stricter emission limits are significant, as can be seen in **Annex III**, in the last table. For PM, a reduction by 88 to 94 % is required for the next emission limit stage.

Directive 2004/26/EC introduced a so-called "flexibility scheme"<sup>4</sup> to facilitate the transition between the different emission stages. The flexibility scheme allows the manufacturers 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 fitted with compression ignition engines (with power from 19kW to 560 kW) that still comply with the exhaust emission limits of the previous stage. A manufacturer 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 manufacturer's annual sales of machinery (calculated as the average 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<sup>5</sup> to:

- permit smooth integration of regulations applicable to the NRMM machinery; the majority of manufacturers do not produce their own engines, but have to purchase these from engine manufacturers. Once the engine manufacturer is satisfied that engine and after-treatment development<sup>6</sup> is satisfactory and ready for production, then the manufacturer can follow-up with its integration and optimisation in the vehicle and arrange for type-approval. This situation is unique compared with other (namely road) vehicle manufacturers, who can develop and produce both vehicle and engine at the same time.

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<sup>3</sup> OJ L 225, 25.6.2004, p.3

<sup>4</sup> Additional clarifications on provisions of the flexibility scheme can be found in Annex IV

<sup>5</sup> As stipulated in the COM (2002) 765 final and COM (2000) 840, amending proposals

<sup>6</sup> Additional equipment installed with the engine, that chemically or physically reduces the exhaust emissions emitted from the engine before releasing them to the atmosphere e.g. Diesel Particulate Filters, NO<sub>x</sub> adsorber Catalytic or Selective Catalytic Reduction systems

- provide the necessary environment for the manufacturers to develop and adapt, initially, machinery with bigger volume sales and fewer problems and then utilise the experience gained to adapt the rest of the machinery, produced at smaller volumes for niche markets. This experience makes the adaptation of the rest of the machinery less costly.
- avoid excessive impacts during the transition to the next Stage on low volume products since development in these series requires relatively high fixed costs.

The *tractors emissions directive* 2000/25/EC implemented the same requirements specifically for tractors as the requirements for non-road mobile machinery, including the Stages IIIA, IIIB and IV, the timeframe and the flexibility scheme. Both with the help of an external consultant who had extensive contacts with industry (organisations as well as individual companies, as listed in the study report) and through direct contacts the Commission services have obtained the best information available to show the need for the present action.

For the specific categories of ‘**special tractors**’ (T2, C2 and T4.1, designed for use in vineyards and orchards, also known as 'narrow-track tractors') the proposal for enlarged flexibility is not sufficient to address the problems – of a purely technical nature - encountered with the upcoming introduction of Stages IIIB and IV emission limits. The Commission is therefore considering a separate amending proposal to the directive, with a specific impact assessment. For the same reason as described above, this project should be treated separately from the current one and the one for machinery.

## 1.2. Overview of the tractor sector

Manufacturers cannot easily be categorised; many produce tractors and/or other agricultural (and forestry) machinery and/or other non-road mobile machinery, like construction equipment. Some produce their own engines, but most outsource them. This makes it difficult to aggregate specific data on production, economic and financial performance and resources. This is aggravated by the fact that industry and EU legislation do not use the same categorisation. Also, registration (for use on the road) is different among Member States, with some where tractors are not subject to registration at all.

Global overview of some typical products:

- **agricultural tractors**: ‘normal’ wheeled tractors, crawler tractors, fast tractors, narrow-track tractors (for use in vineyards and orchards), for mountainous areas (low centre of gravity); see **Annex VIII** for detailed definitions;
- **self-propelled agricultural machinery** (in EU definitions they are part of NRMM): planting, spraying, irrigating machinery etc.; smaller agricultural machinery like machinery where the user is following on foot; harvesters for cotton, wheat, corn etc,
- **other (self-propelled) NRMM**, some examples: landfill compactors, pipe-layers, construction machinery (wheel loaders, bulldozers, off-highway trucks, hydraulic excavators etc.), forestry machinery (tree cutters, tree loaders etc.), road maintenance machinery, mobile cranes, fork-lift trucks, generator sets, pumps, inland waterways vessels, railcars and locomotives.



The NRMM Directive 97/68/EC covers emissions from the machines in the 2<sup>nd</sup> and 3<sup>rd</sup> indent; the tractors Directive 2000/25/EC covers only those in the first indent.

Tractors are divided into two broad categories: "T" comprising wheeled tractors and "C" comprising track laying tractors. These are further divided into sub categories depending on the vehicle characteristics (for details see: **Annex VIII**). Categories T2/C2 and T4.1/C4.1 representing narrow tractors and high clearance tractors, i.e. machines specifically developed for fruit and vine cultivations and adapted to extremely restricted spaces (see comment under 1.1).

Tractor manufacturers are part of the agricultural machinery industry, which in Europe consists of around 1 500 manufacturers producing various types of (self propelled) harvesters, ploughs, cultivators, tillers, seeders, spreaders etc. In 2008 the total turnover for the agricultural machinery reached around € 30 billion<sup>7</sup>; for tractors CEMA estimated the turnover for 2008 at € 10 billion. In the 1st quarter of 2009<sup>8</sup>, hit by the financial crisis, the EU tractors market started to drop sharply. Following the decrease in downstream demand, the sales of tractors decreased by 20% in units. Consequently, according to the information provided by CEMA, the turnover in 2009 decreased by 20-25% compared to 2008. For 2010, tractor manufacturers are expecting a further 5 to 10% decrease<sup>9</sup>. Figures for the 1<sup>st</sup> quarter of 2010 for EU15 show a decrease of 22% compared to 2009<sup>10</sup>.

Directly linked jobs reach 24 000 for tractors manufacturing, with another 10 000 indirect jobs (suppliers of parts and components, dealers / distributors etc).

In Europe there are six major groups that actively manufacture tractors and some smaller manufacturers, with a total of more than 40 brand names. Among those, some 15 can be considered as SMEs. None of the engine manufacturers qualify as SME. On the other hand probably (almost) all end-users are SMEs: both farmers and contract workers.

Additional information on the market situation of tractors is included in **Annex VIII**.

Tractors use compression ignition engines (CI, diesel) with a power rating between 19 and 560 kW. Only 4 out of 40 tractor manufacturers are integrated engine and equipment manufacturers. The other manufacturers rely on the supply of engines from 10 large engine manufacturers operating on the EU market. The latter sell their products to tractor manufacturers. The contracts between the engine manufacturers and the tractor manufacturers usually last for at least 3 years, as it is very difficult to redesign equipment for a new engine.<sup>11</sup>

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<sup>7</sup> Source: CEMA

<sup>8</sup> Reference: CEMA letter and attached "Background material for the Request to Enlarge Flexibility from 20% to 50% for Stage IIIB", 14-07-2009, addressed to Commission VP G. Verheugen. 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](http://ec.europa.eu/enterprise/mechan_equipment/companalysis-eu-mechengin.pdf)

<sup>9</sup> Source: email from CEMA to ENTR-F.1 dated 18.02.2010.

<sup>10</sup> Source: CEMA, June 2010.

<sup>11</sup> Source: ARCADIS study

In 2005, the latest available information indicated that there were 2 500 420 tractors in use<sup>12</sup> (for a detailed breakdown data per engine type, please refer to **Annex VI**).

When engines are sold to a tractor manufacturer, the transaction takes place without intermediary and the prices are kept secret – this business practice is an important constraint on the availability of data. An additional difficulty in obtaining tractor-specific information results from the fact that such sources such as EUROSTAT treat tractors as part of the agricultural machinery. Nonetheless, due to similarities between NRMM and tractors as to the engines used, the present report will build on the findings for NRMM sector.

### 1.3. Emissions from tractors

Data on emissions from tractors cannot be obtained from emissions inventories like those on the web site of the European Environment Agency<sup>13</sup> as tractors are not defined separately therein.

The key air pollutants from the tractors sector contributing to overall air pollution are PM and NO<sub>x</sub> emissions<sup>14</sup>. According to the RAINS model<sup>15</sup> the estimated PM10<sup>16</sup> emissions from the entire NRMM sector for EU27 are 7% compared to 13% for road transport. In 2005, the contribution of tractors to all NRMM PM emissions was 43% or 57 kt per year for EU15 and 47% or 11 kt per year for EU 12.<sup>17</sup> In terms of NO<sub>x</sub> emissions, the NRMM sector is responsible for 16% of all NO<sub>x</sub> emissions in the EU27 while the road sector contributes to 42% of all NO<sub>x</sub> emissions. In 2005, the contribution of tractors to all NRMM NO<sub>x</sub> emissions was 36% or 539 kt per year for EU15 and 43% or 120 kt per year for EU12<sup>18</sup>. This contribution from tractors to the overall air pollution in the EU provides the rationale for increasing the efforts to reduce the emissions in the coming years. Care will be taken not to endanger the overall objective of the tractors emissions Directive to progressively reduce emissions.

Although the Directive covers exhaust emissions from internal combustion engines, it does not address CO<sub>2</sub>. CO<sub>2</sub> is not regulated under Directive 2003/37/EC. As a result no inventory or data is available on CO<sub>2</sub> emissions of engines in the various types of tractors. As tractors applications and type approval procedures are different from those of other sectors like heavy and light duty vehicles or cars, the methodology, limits and implementation dates for CO<sub>2</sub> emissions still need to be identified. According to industry sources and based on the accumulated knowledge and practices of other sectors the development of necessary legislation and monitoring systems still require a transitional and testing period of about three to four years.

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<sup>12</sup> Source: CECE-CEMA-EUROMOT, 2006, Arcadis study, p. 295

<sup>13</sup> <http://dataservice.eea.europa.eu/PivotApp/pivot.aspx?pivotid=468>

<sup>14</sup> Definitions of the gaseous and particulate pollutants are the same as in Directive 97/68/EC Annex I, as amended, and 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 (NO<sub>2</sub> 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).'

<sup>15</sup> Regional Air Pollution Information and Simulation model and database.

<sup>16</sup> Particulate matter below 10 µm

<sup>17</sup> JRC Technical Review, p. 24-25

<sup>18</sup> JRC Technical Review, p. 26-27

## 1.4. Competitiveness issues

World-wide, only the EU and the USA and to a lesser degree Japan have similar ambitions with regard to engine emission legislation for NRMM and tractors. In other important geographical areas like China, India, Russia or Latin-America these requirements do not exist, or are lagging stages behind. The main geographical market is the transatlantic market hosting the key manufacturers of engines and tractors, but also the main 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 UNECE<sup>19</sup> adopted a Global Technical Regulation (GTR) for this purpose in November 2009. Only the administrative approval procedures remain different between the EU and the other countries that accept this GTR.

Flexibility measures in this area have also been adopted in the USA. In addition to the existing flexibility (for tractor manufacturers), the USA system introduced an additional 'flexibility', the so-called ABT-system<sup>20</sup> (for engine manufacturers), one of the main aspects of which is that emission limits must not be met by each individual product line, but as an average over the manufacturer's production sold over the year, so that a "dirty" product needs to be compensated by selling a "cleaner" one. In addition the US scheme foresees a cap, a higher emission limit that has to be met by each individual product. With all these measures at the disposal of the US industry, it is noteworthy that the present situation in the USA allows more than the EU flexibility (up to 80% and more<sup>21</sup>). An amendment allowing more flexibility for tractors on the European market would reduce the competitive difference compared to the US market.

## 2. PROCEDURAL ISSUES AND POSITIONS FROM CONSULTATION OF INTERESTED PARTIES

### 2.1. Consultation and external expertise

This IA Report builds on the report prepared for a flexibility proposal for NRMM prepared in 2009. The current analysis takes into account elements of the ongoing process to study a revision of Directive 97/68/EC, including:

- a Technical Review of Directive 97/68/EC<sup>22</sup> 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 carried out by ARCADIS<sup>23</sup> to assess the impacts of the policy options as laid down in the Technical Review by JRC.

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<sup>19</sup> See reference in Annex I

<sup>20</sup> Averaging, Banking and Trading system - see Annex IV – 2.

<sup>21</sup> See JRC page 97.

<sup>22</sup> 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](http://ec.europa.eu/enterprise/mechan_equipment/emissions/projstudies.htm)

<sup>23</sup> The final report of the IA study by ARCADIS N.V. is available on the Europa website: [http://ec.europa.eu/enterprise/newsroom/cf/newsbytheme.cfm?displayType=library&tpa\\_id=163&lang=en](http://ec.europa.eu/enterprise/newsroom/cf/newsbytheme.cfm?displayType=library&tpa_id=163&lang=en)

- a complementary study to further assess, inter alia, the impacts of the options of the Technical Review of JRC, including the amendment of the flexibility scheme's percentage, to SMEs. The present report builds on the findings of this study which have been made available to the public and stakeholders through the NRMM web page<sup>24</sup>.

For a possible revision of the flexibility scheme as a response to the current difficult economic situation of the engine manufacturers and the tractor manufacturers, 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)<sup>25</sup>. Meetings were organised with the following main industry federations: the Committees for European Construction Equipment (CECE) and European Agricultural Tractors (CEMA). In a letter of 16 June 2009 Member State authorities and Non Governmental Organisations (NGOs), the European Environmental Bureau<sup>26</sup> and the European Federation for Transport & Environment<sup>27</sup> 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 as 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 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 (GEME). During those consultations much work was directed to the NRMM Directive, but all along it included work on flexibility for tractors (and on narrow-track tractors). The forum (GEME) was used to consult relevant stakeholders on the tractors flexibility. Italy expressed its support for extending the flexibility to the tractors' field, also repeatedly in messages to the Commission services.

The issue of wider flexibility for tractors was also discussed with all relevant stakeholders in the Commission's Working Group on Agricultural Tractors (WGAT) on 22 June and 18 December 2009 and in the Commission's Working Group on Motor Vehicles on 26 January 2010. Apart from general support for wider flexibility expressed by some MS and CEMA / EUROMOT no further comments were made in those meetings.

CEMA and ORGALIME<sup>28</sup> addressed the Commission in writing<sup>29</sup> and at a meeting with the then Commissioner for Enterprise and Industry, Günter Verheugen with the request to support a wider flexibility allowance (50% instead of 20%), explaining why the tractor industry would need such mitigating measure.

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<sup>24</sup> More relevant information can be found on the link:

[http://ec.europa.eu/enterprise/newsroom/cf/newsbytheme.cfm?displayType=library&tpa\\_id=163&lang=en](http://ec.europa.eu/enterprise/newsroom/cf/newsbytheme.cfm?displayType=library&tpa_id=163&lang=en)

<sup>25</sup> Summarised information on the contributions of the public consultation on this proposal may be found in Annex V

<sup>26</sup> More relevant information can be found on the link: <http://www.eeb.org/>

<sup>27</sup> More relevant information can be found on the link: <http://www.transportenvironment.org/>

<sup>28</sup> **Organisme de Liaison des Industries Métalliques Européennes** is the European Engineering Industries Association, speaking for 33 trade federations representing some 130 000 companies in the mechanical, electrical, electronic and metalworking & metal articles industries of 22 European countries.

<sup>29</sup> See footnote 9.

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) while assessing environmental, social and economic impacts on large manufacturers, SMEs, workers, consumers and users.

A summary of the views of various stakeholders can be found in **Annex V**.

In support of this IA, an Impact Assessment Steering Group (IASG) was created with invitations for participation sent to DG Joint Research Centre, DG Research, the Secretariat-General, DG Environment, DG Mobility and Transport, DG Employment, DG Trade and DG Agriculture. The IASG met twice on 15 March 2010, and 13 April 2010, with participation by DG ENTR, ENV (15-3), MOVE (13-4) and SG (13-4); written contributions came from ENV and ECFIN. 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 meeting of 2 June 2010. Following a negative opinion of the Board the report has been considerably changed, using the best information available in order to address the main concerns expressed in the opinion. The main changes are as follows:

The baseline scenario has been reworded in order to distinguish the effects of preparation for the new requirements and the impact of the crisis (paragraph 6.1). Modifications have been made throughout the text to emphasise how the different players have been affected by the current situation.

As suggested, additional options have been added (paragraphs 5.2, 6.4 and later); in particular we have explained what the effect of 80% flexibility would be and why the introduction of the USA-like ABT system is not feasible.

Future compliance with Stage IV has been addressed in 5.1, 6.4 and 7.1.1.

We have added the latest information on the readiness to comply of the different players (in paragraph 3.3).

Text has been added (i.a. in paragraph 5.1) to explain and discuss the choice of the different options presented.

The report explains (i.a. in paragraph 3.3) why it is not possible to give data on compliance costs for the industry; it provides the available information on competition impacts.

In chapter 2 and especially in Annex V all the information about stakeholders' views has been clearly established. The additional comments sent separately have been taken into account.

Paragraph 6.1 and others have been amended in order to support the need for EU action. It should be noted however that specific evidence could not be made available to the Commission because of the sensitive nature of this information.

Paragraph 7.5 has been revised in order to better show possible impacts of the preferred option on the competition.

On the basis of the opinion of the Board after resubmission of the report the following paragraphs have been amended in order to address IAB recommendations:

In paragraph 2.1 and Annex V we have clarified the stakeholder consultation.

In paragraph 3.3 and later the position (of continuous support for more flexibility) of the manufacturer who informed the Commission services that he will be ready by the present deadlines has been inserted.

In paragraph 5.2 a new intermediate option 4.2 proposing 35% flexibility (halfway between 20 and 50%) is introduced which is discussed in 6.4.2 and further<sup>30</sup>.

In paragraph 5.2 and later the option (new number 4.4) of 80% is further discussed.

In paragraphs 7 and 7.7 the text relating to the present 20% flexibility has been improved.

The last lines of paragraph 7.1 have been modified to state the Commission's intention not to extend the flexibility for the future Stage IV and to inform stakeholders of this position.

As a consequence of the above, the text of annex VIII was completed for 35 and 80% and the whole text was moved to annex IV (old annexes IX to XII being renumbered to VIII to XI). Also annex X (new) has been completed.

### **3. PROBLEM DEFINITION**

#### **3.1. Background**

The technological challenge for tractor manufacturers is that the next generation of engines must achieve emission reductions in PM and NO<sub>x</sub> comparable to those required and deployed in on-road engines and vehicles (trucks, buses etc.). Although technical solutions to meet these targets are becoming available, the physical implementation of these solutions across a full range of products is particularly challenging. This is due, not only to the technical modifications required for the engines, but also the additional complexities involved in designing the installation of the engine and ancillary equipment to the vehicle itself. In cases where a manufacturer produces a large range of specialist equipment, often produced in relatively low volumes, this can take up a considerable amount of design resources.

Despite the introduction of the flexibility scheme, many manufacturers were finding the timetable of the Directive impossible to comply with. This is largely due to the economic crisis which caused the tractor market in Europe to decline by 20-25 % in units between 2008 and 2009. Steep falls in sales caused a large decrease in income and available capital to finance the necessary technology research and development for tractors with suitably compliant engines in all power categories and applications within the time limits in the Directive. Consequently, there is a danger that some products in certain sectors of the market will become unavailable, leading to end users (farmers and contract-workers) retaining older, more polluting, tractors or replacing them only with second hand machines not compliant

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<sup>30</sup> Introduction of the new option 4.2 (35% flexibility) caused renumbering of many paragraphs.

with even the current IIIA emissions standards: neither of these solutions can be considered as environmentally beneficial.

At around the time that the engine development would have come to its final stages, in early 2009, the tractor industry was hit by the crisis. This may have caused delays for the engine development, but most of the problem rests with the tractor industry.

The purpose of the impact assessment is to examine possible solutions which will seek to maintain, as far as possible, the environmental benefits envisaged in the original Directive, whilst taking into account the changed circumstances with regard to the current economic situation, and the desirability of maintaining the competitiveness of the industry.

### **3.2. Developing New Engine Technology**

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

Substantial changes to the design of engines are necessary to meet the stringent emission limits of Stage IIIB. Engines must be fitted with electronic control systems that deliver fuel at high pressures at the right time and in the right quantity for a cleaner burning process in the combustion chamber. In addition new, sophisticated after-treatment systems and increased cooling capacity are necessary. These engine modifications have implications on for instance the mass and the size of the engines and on the location of its components, like connectors. This means that also the configuration of the tractor body (the chassis parts) in which the engines are installed need to be redesigned in order to accommodate a new engine. For tractor manufacturers this implies that they are not able to develop and design the tractor until the engine is ready, i.e. until the dimensions and mass of the engines are known.

### **3.3. Ability to Comply**

Since technical solutions for Stage IIIB engines are in general not yet finalised, tractor manufacturers are not in a position to fully redesign the body of the tractor where the engine is to be installed. The research on technological solutions, followed by the redesign of the engine, testing its performance both in terms of the emissions requirements and aspects like maintenance and durability can easily take 5 to 10 years. The original schedule allowed five years (2005 – 2010) for this process. This timetable was probably feasible in order to allow the manufacturer to develop technical solutions, but the implementation of these solutions throughout a complete range of engines may provide a greater challenge, depending on the basic configuration of the engine. In addition, for tractors it is important to note that the complexity of the redesign varies depending on different tractor types.

For some of them, the Stage IIIB emissions requirements will not pose very significant problems for tractor manufacturers. For other types, a Stage IIIB compliant engine is far from being finalised and thus the tractor manufacturers have not been in a position to redesign their tractors accordingly.

Tractor manufacturers, producing tractors 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. Despite many efforts made to obtain data on the level of preparedness of various actors for the next stage, the industry was reluctant to disclose such sensitive information for reasons linked to commercial interests.

Based on information received from the tractor manufacturers, the time required for the adaptation of tractor bodies ranges between 12 and 18 months in order to accommodate the new IIIB engine and the accompanying after-treatment system. The exact duration of the adaptation period depends on the number of tractors produced with various engines and the types of tractor in each engine power category.

Apart from the redesign of the body, the adaptation of the tractor production line (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 could be two production lines, one for a Stage IIIA compliant tractor and one for Stage IIIB (see also point 2.1 on non-EU markets). Operating two production lines means that the manufacturer will need more operating staff, space, equipment and support, thus additional costs.

Technical solutions for tractor manufacturers still need to be found and consequently increased R&D efforts are necessary.

Engine manufacturers: in June 2010 the Commission learned that the first engines for tractors have now been approved for Stage IIIB.

Integrated manufacturers: There are four integrated manufacturers (who produce at least for a part their own engines and who also produce the tractors). According to anecdotal evidence, one integrated manufacturer hopes to have tractors ready by the required deadlines. Others confirm not to be ready with engine approval nor with tractors. CEMA, with support of the manufacturer who might be ready by the imposed deadlines, maintains that the sector still needs the requested action.

Therefore, with the best information available today and while engines may be ready by 2011 and after-treatment systems are ready today for most purposes, most tractors will not be ready to be fitted with such engines by the deadlines specified in the currently applicable legislation.

### **3.4. Compliance costs**

The compliance costs for tractor manufacturers to cope with the new emission limits are significant. These include costs for research and development, redesign of equipment, after treatment devices, documentation and labelling, etc. The external contractor has put a lot of effort in obtaining data as listed in his report; for the present project this did not bring any useful result. The same applies to additional efforts by DG Enterprise although one manufacturer estimated to have spent € 1,5 billion on R&D for Stage IIIB.

Existing Stage IIIA production lines may continue to be used – depending on demand for tractors with IIIA engines from third countries that do not have the same exhaust emission limits like the EU or the USA. In this case new production lines for tractors with IIIB engines must be set up with additional cost of equipment and personnel (hiring, training etc). For other costs than R&D no data have been made available.



### 3.5. Regulatory issues

The original directive on tractors emissions was introduced in 2000 and its decisions on deadlines and criteria were based on data available at that time.

The strict timetable of transition from Stage IIIA to Stage IIIB with a duration of only 3 years compared to the 5 years of transition from Stage II to Stage IIIA (see **Annex III**) may have been too ambitious for developing technical solutions for tractors to meet Stage IIIB requirements. The changes in PM and NO<sub>x</sub> limits are substantial, as can be seen in Annex III, last table: for PM, a reduction by 88 to 94 % is required.

This was recognised in 2005 in Directive 2005/13/EC and the flexibility scheme was introduced as a solution.

### 3.6. Influence of the economic crisis and other relevant factors

From early 2009 onwards most of the EU based industry producing tractors has been unexpectedly and severely hit by the global financial and economic crisis. Steep falls in sales caused a large decrease in income and available capital to finance the necessary technology research and development for tractors with Stage IIIB 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 tractors the market in Europe started to drop sharply in the 1st quarter of 2009<sup>31</sup>; the sales over the year 2009 have dropped by 20 % in units compared to 2008 (approximately 180 000 in EU15 for 2008. No figures are available for EU12; for all tractors this is estimated to be 15% of the total). According to CEMA the turnover in 2009 decreased by 20 to 25% compared to 2008. This is the consequence of the decrease in downstream demand. For 2010 tractor manufacturers are expecting a further 5 to 10% decrease<sup>32</sup>. Figures for the 1<sup>st</sup> quarter 2010 show a 22% decrease compared to 2009.

Clients of tractor manufacturers are currently much more prudent towards buying new tractors as a result of the economic climate, including the lower prices that farmers generally get for their products. For various products like oats, wheat, barley etc the lowest price level in 10 years according to AGRIVIEW (EC-AGRI). CEMA reported a drop in farm income for 2009 of 12% for EU27, up to 25% for Italy and 21% for Germany, compared with 2005 (source: EUROSTAT). Users cut capital costs by extending the use of old tractors and not purchasing newer, cleaner tractors, thus causing a larger negative environmental impact in the short term.

The end-user may not be able to buy a new tractor, at least not from his regular source, because of unavailability of a compliant type from his manufacturer. As a consequence he

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<sup>31</sup> Reference: CEMA letter "Background material for the Request to Enlarge Flexibility from 20% to 50% for Stage IIIB", 14-07-2009, addressed to Commission Services. 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](http://ec.europa.eu/enterprise/mechan_equipment/companalysis-eu-mechengin.pdf)

<sup>32</sup> Email from CEMA to ENTR-F.1 dated 18.02.2010.

will have to continue using his old tractor, which is even more polluting than the IIIA tractors. Alternatively he could buy a used, older tractor, with poor emission performance.

The old tractors will be more costly in maintenance and fuel consumption, as well as less efficient in performing the work. For some additional information on increased maintenance costs, see Annex XI. However, there are severe limitations to the available data, such that no estimate can be provided on the overall magnitude of increased maintenance cost.

### **3.7. How will the situation develop?**

If the current regulatory framework is maintained without additional measures to alleviate the burdens of the crisis, the following developments are expected:

- Tractor manufacturers will place tractors on the market under the currently allowed flexibility scheme of 20% until the completion of this allowance. Only a limited number of new tractor types compliant with Stage IIIB will be available in early 2011. Users / buyers will have to postpone buying a new tractor of their choice, change to another brand (if available) or buy a used tractor.
- Due to the drop of sales, the funds to further develop and finalise the required adaptations of tractor bodies and production lines will not be available as estimated and planned incoming cash flow will be limited.
- One likely course of action will be that the tractor manufacturers will reduce the number of types of tractors they produce, to cut compliance costs, which will consequently lead to the loss of the market and of customers, making tractor manufacturers' future incoming cash flows smaller.
- In order to fund their activities, tractor manufacturers usually tend to turn to the financial institutions for loans. However, in particular against an environment characterised by a general financial crisis, banks are expected to more systematically require a solid turnover in order to provide financing. The risks of funds not being obtained are increased.
- The tractor manufacturers, after having exhausted the flexibility allowance would not be in a position to produce next stage compliant tractors as they would not generate revenues from sales necessary to cover expenditure on R&D and would thus not have a product to place on the market.<sup>33</sup>
- This would negatively affect not only tractor manufacturers and their suppliers but also end users. End users (farmers and contract workers) would not be able to purchase any new tractor where a IIIB compliant tractor model is not available when the new stage enters into force. This would mean that the only way to buy a tractor would be through the second hand market. Such tractors would only comply with earlier emission limit stages.

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<sup>33</sup> In the extreme case of 0% compliance this would be the case after 2,4 months; the allowed 20% would then be fully used.

### 3.8. Does the EU have the right to act?

The legal basis of this initiative is the same as for the tractors emissions Directive 2000/25/EC, namely Art. 114 of the TFEU.

The Directive already harmonises the laws of the Member States relating to emission limits and the type-approval procedure for engines to be installed in tractors. Any modifications to the Directive can only be done at EU level. There is, however, a risk that Member States might resort to national measures once the current flexibility scheme is exhausted and no more tractors can be put on the market. This might lead to a fragmentation of the internal market and unlevel playing field between different Member States.

Therefore EU action is necessary and provides value added in maintaining the internal market for tractors.

## 4. OBJECTIVES

The **general objective** of the proposal is to maintain the internal market for tractors and to maintain a high level of environmental protection.

The table 1 below describes the general, specific and operational objectives.

<b>GENERAL</b>	<b>SPECIFIC</b>	<b>OPERATIONAL</b>
1. Maintain the functioning of the internal market for tractors	<p>1. Maintain a level playing field for tractor producers by upholding a harmonised regulatory framework across all Member States (and thus eliminating the risk of national deviations).</p> <p>2. Prevent the foreseeable aggravation of an already difficult economic situation for the tractor industry that has been caused by the economic crisis.</p> <p>3. Ensure that demand for new tractors can be satisfied by industry.</p>	<p>1. Introduce a cost-effective and timely measure that will allow EU producers to keep selling tractors under the same rules across the EU and will allow users to replace end of life tractors.</p> <p>2. Allow tractor manufacturers to generate revenues that can be used to invest in the necessary R&amp;D to comply with foreseen emission limits.</p>
2. Protect the environment	<p>1. Reduce the risk that older, more polluting (pre-Stage IIIA) tractors cannot be replaced by newer cleaner tractors, i.e. make sure that the potential for emission reductions from replacing end of life tractors is</p>	<p>1. Enable the replacing of older, more polluting and fuel consuming engines and tractors by cleaner ones by adjusting the emission requirements in such a way that demand for new tractors can be met by the cleanest available models.</p>

	<p>not jeopardised.</p> <p>2. Maintain the incentive for the industry to invest in R&amp;D necessary to develop cleaner tractors compliant with the foreseen future emission limit stages.</p>	<p>2. Send a clear signal to industry that further emission reductions are required and that the current path of reducing emissions is maintained.</p>
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#### 4.1. Consistency with other horizontal objectives of the European Union

##### 4.1.1. *The European Economic Recovery Plan and EU2020 Strategy*

The present proposal is in line with the objectives of the EU 2020 Strategy and complements the European Economic Recovery Plan (EERP)<sup>34</sup>. Adopted in November 2008, the EERP addresses the difficulties of the wider economy brought about by 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.

Such immediate action needs to focus on improving business conditions through maintaining the competitive industrial base and through promoting knowledge based and low carbon economy as set out in the EU2020 Strategy.

##### 4.1.2. *Environmental EU Policies*

The tractors emissions Directive, which provides an important contribution to a progressive reduction of targeted emissions, is also in line with the EU environmental policies, in particular with the Sixth European Environment Action Programme and one of its initiatives - Clean Air For Europe (CAFE). The initiative sets out 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<sup>35</sup> 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 manage the

<sup>34</sup> COM (2008) 800

<sup>35</sup> Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (AAQD) entered into force on 11 June 2008. It merges existing legislation into a single directive with no change to existing air quality objectives for PM<sub>10</sub> and NO<sub>x</sub> contained in Directive 1999/30/EC; maintains two limit values for NO<sub>x</sub> based on hourly and annual average concentrations; sets (new) air quality objectives for PM<sub>2.5</sub> including the limit value and exposure related objectives – exposure concentration obligation and exposure reduction target; creates the possibility for time extensions for compliance up until June 2011 for PM<sub>10</sub> (where the limit values entered into force on 1 January 2005) or up until 31 December 2014 for NO<sub>2</sub> and benzene) based on conditions and the assessment by the European Commission. Single most important condition is that the notification must include an air quality plan that delivers compliance by the extended deadline for compliance.

ambient air quality. Besides this instrument it remains important to combat emissions of pollutants at the source and to implement the most effective emission reduction measures.

## **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 options described hereafter are based on the recent IA for Non-Road Mobile Machinery. In addition a scrapping scheme is also considered based on experience with the passenger car sector.

It should be emphasised, that it is not envisaged to introduce an amendment to the flexibility scheme for the transition from Stage IIIB to IV. According to industry, the R&D work for Stage IIIB is at the same time a good basis for getting Stage IV approvals in due time. It is therefore expected that adaptation costs for transition from Stage IIIB to Stage IV will be significantly lower than those from Stage IIIA to Stage IIIB; therefore the Commission services consider that no additional flexibility is needed for the transition to Stage IV.

### **5.2. Options**

- Option 1 - No action = Baseline scenario

The provisions of the current flexibility scheme remain unchanged, i.e. 20% (or absolute numbers of engines) continue to apply.

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

Article 4 of Directive 2000/25/EC states that '*requirements shall be postponed by two years in respect of engines with a production date prior to the said date*', the 'said date' being one of the deadlines specified in point 2 of that article, after which non-compliant engines and tractors shall not enter into service anymore.

While Stage IIIA is in force, industry may produce engines and tractors and stock them in the EU territory. These Stage IIIA engines and tractors are manufactured to keep industries running and to cover the needs of other countries that do not have exhaust emissions limitations as strict as EU. After the beginning of implementation of Stage IIIB (between 1-1-2010 and 1-1-2013 depending on the power category) these stocked engines and tractors may be placed on the market for a period of two years. This option suggests the use of government backed loans in the form of loan guarantees provided by Member States to tractor manufacturers in order to enable them to purchase Stage IIIA engines on stock.

- Option 3 - Implementation of a scrapping scheme.

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

Under this option, the owner of an older, more polluting tractor will deliver the tractor for scrapping (destruction-recycle etc). A national public authority would grant a lump sum to the

owner of the scrapped tractor. The owner will receive the money via banking or the tax system when the purchase of new the tractor is proven.

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

Under this option additional flexibility will be granted for the transition from Stage IIIA to Stage IIIB. No additional measures for future stages are envisaged. Several different sub-options are considered:

- Option 4.1 - Implementation of a scaled percentage of the flexibility scheme for the various categories of tractors, depending on the particular transitional problems from Stage IIIA to Stage IIIB plus a similar approach with regard to the fixed numbers of engines as set in Table 2.

- Option 4.2 - Increase of flexibility percentage to 35% for all tractors and proportionate adjustment of the fixed numbers of engines.

The maximum number of engines placed on the market under a flexibility scheme is increased to **35%** (midway between 20 and 50%) of the manufacturer's past annual sales of tractors with engines in that power category.

The tractor manufacturer would have the choice to alternatively not exceed the fixed maximum number of engines (see Table 2 and Annex IV).

The system of flexibility and fixed numbers is explained in Annex IV, with calculation of new fixed numbers for 35, 50 and 80% flexibility.

- Option 4.3 - Increase of flexibility percentage to 50% for all tractors and proportionate adjustment of the fixed numbers.

The maximum number of engines placed on the market under a flexibility scheme is increased to **50%** of the tractor manufacturer's past annual sales of equipment with engines in that engine category. This change would be coherent with the Commission's proposal for the NRMM sector.

The tractor manufacturer would have the choice to alternatively not exceed the fixed maximum number of engines (see Table 2 and Annex IV).

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

Initially a figure of **40%** was proposed as an option to be further investigated for mobile machinery, in order to amend the provisions of the flexibility scheme during the first steps of the Technical Review of the Directive in 2006. This initial figure was decided via numerous consultations with contributions from Member States, industry and various stakeholders. It was assessed as the figure that would generate sufficient revenues for the tractor manufacturers in order to fund the R&D and compliance costs for the transition from Stage II to Stage IIIA and have the least environmental burden. During the course of the Technical Review however and after reassessing the non-road inventory, as mandated in Article 2 of Directive 2004/26/EC, it emerged that an increase to 50% would be needed in order to allow

manufacturers to comply with the Directive. It was considered, additionally, that the new figure would provide better alignment of the EU provisions of the flexibility scheme to the ABT system used in the USA (see 1.4 above).

For those engines in power categories for which no Stage IIIB and/or IV exists and for those engine categories where implementation of Stage IIIB starts at a later date than 1 January 2011, a time limit should be included so as to restrict the placing on the market of tractors under the revised flexibility scheme until 31 December 2013. This date is selected in order to comply with the main objective of the proposal: to alleviate the burden 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 IIIB differs.

- Option 4.4 - Increase of flexibility percentage to 80% for all tractors and proportionate adjustment of the fixed numbers of engines.

The maximum number of engines placed on the market under a flexibility scheme is increased to **80%** of the tractor manufacturer's past annual sales of equipment with engines in that power category. This option would seek to align the European system of flexibility to the U.S. ABT system to the largest extent possible while still maintaining a fundamentally different system (no averaging, banking or trading in the EU). As mentioned earlier, the U.S. system is similar to granting flexibility of 80% in the EU system.

The tractor manufacturer would have the choice to alternatively not exceed the fixed maximum number of engines (see Table 2 and Annex IV).

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

<b>Engine category (kW)</b>	<b>Number of engines (existing scheme up to Stage IIIA, 20%)</b>	<b>Number of engines (revised scheme for transition from IIIA to IIIB, 35%)</b>	<b>Number of engines (revised scheme for transition from IIIA to IIIB, 50%)</b>	<b>Number of engines (revised scheme for transition from IIIA to IIIB, 80%)</b>
<b>19-37<sup>36</sup></b>	<b>200</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>37-56</b>	<b>150</b>	<b>140</b>	<b>200</b>	<b>320</b>
<b>56-75</b>		<b>123</b>	<b>175</b>	<b>280</b>
<b>75-130</b>	<b>100</b>	<b>175</b>	<b>250</b>	<b>400</b>
<b>130-560</b>	<b>50</b>	<b>88</b>	<b>125</b>	<b>200</b>

- Option 4.5 - Conditional expansion of the flexibility scheme, with penalty mechanism.

<sup>36</sup> Stage IIIB is not applicable to this power category.

In order to maintain the incentives to develop Stage IIIB engines, a system could be introduced where additional flexibility used in the transition from stage IIIA to Stage IIIB will trigger payment of a penalty after several years.

This would maintain the incentive for the tractor manufacturers to develop tractors with IIIB engines and use only the minimum additional flexibility they need. It requires a penalty to be set at the right level.

A variant of this option would be to not have a financial penalty but to deduct any additional flexibility used for the transition from IIIA to IIIB from the flexibility that will be available for the transition from IIIB to IV (20%).

#### - Option 4.6 - 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.

#### - Option 4.7 - Replace the flexibility scheme by a combination of flexibility for tractor manufacturers and ABT, as applied in the USA.

An ABT scheme similar to the one used in the USA could be developed for engine manufacturers, together with a flexibility scheme for the tractor manufacturers.

## **6. OPTION ANALYSIS – PRELIMINARY ANALYSIS**

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

### **6.1. Analysis of Option 1 – Baseline**

The situation under the baseline scenario would be as follows: engine manufacturers (around 10 companies in the EU) will continue the engine development programme that was started following publication of the amending directive in 2005. A variation of technologies was known in principle, ranging from optimising the engine (internal combustion aspects, high-pressure injection in stead of diesel pumps etc) to various options for after-treatment, all with their advantages and drawbacks. The known technologies also needed to be adjusted to the specific application of the tractors and their working environment and conditions, compared to road vehicles for which they were often developed. Based on the fact that most engine manufacturers are independent from the tractor manufacturers, the latter will have to adapt their vehicles once the design of the engine is final (normally: after it has been shown that the engine has been approved compliant with the directive). Only in the few cases of "integrated" manufacturers, who produce their own engines, the adaptation of the tractor design (and its production line etc) can be done earlier.



The 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 tractors ready for Stage IIIB. Industry would then not be able to place products on the market beyond what is offered in the 20% flexibility scheme; they may have to close down certain product lines if they are not able to get their products adapted to the new stage of requirements; they will not be allowed to sell their Stage IIIA compliant tractors.

Some firms would subsequently go (temporarily) out of business which would lead to job losses. Especially for SMEs this might mean risk of closing down their business, due to the limited number of products and their limited resources

The baseline scenario assumes that industry will in general be unable to fund the R&D necessary for Stage IIIB. Most companies face serious difficulties to finance the investment necessary to ensure compliance of equipment with IIIB emission limits.

## **6.2. Analysis of Option 2 - Provision of government backed loans for purchasing stocked engines manufactured under the so called sell-off period.**

Due to the economic crisis, private banking institutions are reluctant to provide credit to industry. A government backed loan (in form of a loan guarantee offered by national administrations or the European Investment Bank), would enable tractor manufacturers to purchase engines from an engine manufacturer, stock them and continue selling IIIA compliant tractors after the entry into force of the stage IIIB. The revenues generated from these sales would enable tractor manufacturers to finance the R&D necessary to develop Stage IIIB tractors.

Moreover, the incentive to produce more Stage IIIA engines would result in a large number of Stage IIIA engines being produced and bought by tractor manufacturers, instead of the development of cleaner Stage IIIB engines; this would act as a counter incentive to innovate and develop more environmentally friendly machines.

There would also be the risk that extra demand for stocked Stage IIIA engines might lead to higher prices for those engines in the short term (particularly due to capacity constraints), which would subsequently require increasing the level of loans requested by tractor manufacturers. One other important issue related to the use of stocked engines is that special treatment<sup>37</sup> is required for those engines that had been stocked for over three months. Such treatment is time consuming, costly and can reach up to 5% of the sale price of the engine. Therefore this option is not feasible as a timely measure.

In addition, this option raises issues regarding compatibility with the EU state aid provisions.

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<sup>37</sup> When the engine is manufactured to be stocked, it is filled with a special oil. When it is placed on the tractor, 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.

### **6.3. Analysis of Option 3 - Implementation of a scrapping scheme (on a national basis)**

The use of a **scrapping** subsidy will provide an incentive to the users to buy new tractors with a cleaner Stage IIIB engine, under the condition that they officially destroy their older, more polluting tractor.

This will encourage the purchase of Stage IIIB tractors and will have positive environmental impacts. However, it will not assist tractor manufacturers in financing the R&D to make Stage IIIB tractors available. Whether the prospect of a scrapping scheme would be sufficient to induce banks to hand out additional loans to tractor manufacturers 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.

In any event, no plans from any MS to introduce a scrapping scheme for this sector are known to the Commission and given the currently tight national budgets, no financial means might be available for it.

### **6.4. Analysis of Option 4 – Implementation of alternative types of provisions under the existing flexibility scheme**

6.4.1. Option 4.1 - Implementation of scaled percentages of flexibility for the different types of tractors, depending on the problems they encounter for the transition from Stage IIIA to Stage IIIB.

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

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

However, gathering information on the amount of problems for each specific type of tractor is very difficult. It is a common approach for engine and tractor 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 as being unfeasible.

6.4.2. Option 4.2 - Increase of flexibility percentage to 35% and proportionate adjustment of the fixed numbers of engines.

As to effectiveness 35% would not alleviate the burden for manufacturers enough. In addition this would not be coherent with the solution chosen for NRMM, where both sectors are facing the same situation. As to environmental effects the option would lead to slightly more IIIA tractors coming on the market (see: table 2 for exact numbers), thus a negative effect on environment, but on the other hand these IIIA tractors would mostly replace more polluting older tractors. The same would apply to safety and efficiency of these tractors: a slight positive effect when compared to the baseline.

6.4.3. Option 4.3 - Increase of flexibility percentage to 50% and proportionate adjustment of the fixed numbers.

Allowing an extended flexibility in all tractor categories will facilitate the adjustment process to stage IIIB by allowing tractor manufacturers to not have to redesign all tractor models at once. The additional flexibility does not require any up-front payments from industry. This change would be coherent with the Commission's proposal for the NRMM sector.

However, there would be environmental harm from allowing more Stage IIIA tractors on the market. The environmental impacts will be analysed in detail in section 7.1.

6.4.4. Option 4.4 - Increase of flexibility percentage to 80% and proportionate adjustment of the fixed numbers of engines.

This option would allow industry to put existing tractors on the market to a larger extent than options 4.2 and 4.3. It should therefore lower compliance costs of industry and allow more time to carry out the required R&D. In addition, this option would further align the EU system to the U.S. system, even though this is much more complicated and cannot be used in the EU.

However, this option would lead to additional environmental harm by allowing more Stage IIIA tractors on the market than necessary for industry to overcome the problems relating to introduction of the new emission limits at this time of crisis. In line with the reasoning given in footnote 39, 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 80% flexibility the manufacturer can delay by 40 weeks. Therefore, assuming constant sales, this is an extension of 30 weeks (if he would use the full allowance for all types straight away).

Industry representatives have informed the Commission services that 50% flexibility would be all that is necessary for industry to comply with the Directive.

To cause unnecessary environmental damage would not be consistent with the fundamental environmental policy objectives of the EU. In addition this would not be coherent with the solution chosen for NRMM (50%), while both sectors are facing the same situation.

6.4.5. Option 4.5 - Conditional use of the flexibility scheme, with penalty mechanism.

The users of the additional flexibility for transition from Stage IIIA to IIIB would be subject to a penalty. This could either take the form of a financial penalty that would need to be paid

at a later point in time or, alternatively, it could be a "penalty" in kind that would consist of a reduction of future flexibility, e.g. for the transition from Stage IIIB to Stage IV.

This approach would limit concerns that competitive distortions may occur from enlarged flexibility. For instance, those firms that have already invested in getting Stage IIIB compliant tractors 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 would therefore reduce the adverse incentives of Option 4.3. However, there is a lack of information available and complications that makes this option unrealistic: No information exists that would help to determine the correct amount of a penalty that would incentivise tractor manufacturers to limit the amount of additional flexibility to the optimal level from an environmental and economic point of view. Furthermore, there is a risk that a firm would use the maximum established percentage under the enlarged flexibility scheme to gain the advantage for the transition from Stage IIIA to IIIB and then if obliged to pay a penalty, it could be tempted to change name or ownership status to avoid paying it.

Moreover, it is noteworthy that according to the industry, Stage IV engines will be based mostly on those compliant with Stage IIIB. It is therefore expected that adaptation costs for transition from Stage IIIB to Stage IV will be lower than those from Stage IIIA to Stage IIIB; therefore the Commission services consider that no additional flexibility (above the 20% already included in the Directive for stage IV) are necessary.

Further, creating and implementing such a system would place additional administrative burden on MS since they have to put a system in place to either impose the financial penalties later or to manage databases that would allow to determine how much flexibility needs to be reduced per power category for each manufacturer in the next transition phase from IIIB to IV. If the measure was to be harmonised and implemented with the same terms to all MS, additional costs and problems would arise regarding funding resources, notification and surveillance costs in EU level, translation costs, etc. The implementation cost of such a measure would be substantial. Therefore this option is considered unfeasible.

#### 6.4.6. Option 4.6 - Implementation of a trading system.

This option foresees a scheme in which firms that require additionally flexibility buy it from those that do not need it. This option has the effect of maintaining the incentives to innovate for those firms that have the lowest cost to do so while at the same time allowing firms with higher costs to comply with the tighter emission limits to postpone the adjustment (at least for some models). Such an option would set incentives to innovate at an efficient level. The price of the permit would be determined by the market and would reflect the costs of development to comply with Stage IIIB (on the margin, i.e. for the firm that is just indifferent between using flexibility or selling it): if it was cheaper for a firm to spend the extra resources to reach Stage IIIB rather than purchase the flexibility, then they would not buy the flexibility but they would invest in R&D instead.

As in the case of government backed loans, a trading system would be very complex to put in place in a short time. This would not be effective in meeting the immediate requirements of industry. Additional EU and 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 to

dedicate to R&D to reach Stage IIIB. Those firms not ready for Stage IIIB would either have to pay for flexibility or for additional R&D.

#### 6.4.7. Option 4.7 – Introduction of ABT scheme.

Alternatively an ABT scheme for engine manufacturers similar to the one used in the USA could be developed, together with a flexibility scheme for the tractor manufacturers. Advantages of ABT would be that manufacturers that are quick with their new products can build up credits, to be used to compensate for their engine types that are not yet compliant, or can be sold to competitors that are slower. Also, use of an ABT system might allow an earlier introduction of new requirements.

The introduction of an ABT system in the EU was proposed when the amendments to Directive 2002/88/EC were discussed. However, this idea was rejected by Member States and Parliament because it was too complex for implementation in the legislation of MS and too difficult to monitor. In addition it would not work for smaller manufacturers. To be noted that ABT would bring serious administrative burden to manufacturers, who have to predict their production in different engine families before the year (numbers, engine emissions performance etc) and calculate the outcome at the end of the year, keeping records of all shipments. National authorities would have to check these.

### 6.5. Comparison of the Options

The options will now be qualitatively assessed against their effectiveness, efficiency and coherence in meeting the objectives. A table with a detailed comparison of the options can be found in **Annex X**. A summary comparison is presented in Table 3 at the end of this chapter.

The opinion of the stakeholders is reproduced in **Annex V**.

- Option 1 - No action = Baseline scenario

A no-action option is not effective in reaching the objectives as industry would continue to struggle and would not have compliant tractors ready for Stage IIIB.

- Option 2 - Provision of government backed loans for purchasing stocked engines

This option would provide tractor manufacturers with the access to finance the purchases of Stage IIIA engines and would allow them to continue to generate revenue necessary to develop Stage IIIB compliant tractors. 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 tractor manufacturers to put Stage IIIA compliant engines on the market during Stage IIIB, but will front load engine sales which could introduce capacity constraints for the production of Stage IIIA engines. This option would be more expensive for tractor manufacturers due to the stocking (additional fees and transportation costs) involved, it is much more difficult to monitor by authorities and includes the associated administrative costs of providing loan guarantees and the actual loans. Therefore this option is not efficient compared to option 4.3.

- Option 3 – Implementation of a scrapping scheme

A scrapping scheme will stimulate demand for Stage IIIB compliant tractors but will not assist in helping tractor manufacturers develop compliant tractors; it may be effective in reaching environmental objectives on condition that the scheme as well as compliant tractors are available. Substantial funds will be required to provide loans under a scrapping scheme, which may at present not be available and distortions of the internal market could occur from diverging national schemes. If technical solutions are not yet available a scrapping scheme will not work. It raises additional concerns regarding compliance with state aid rules.

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

This system would be effective and efficient 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 - Increase of flexibility percentage to 35%

Similar to what is described below for option 4.3, with the following differences: 35% would not be coherent with the NRMM proposal (50%); it would bring less reduction of the distortion with the US market; for impact on the environment this option would be the equivalent of a 13 week delay in the introduction of Stage III B. For safety and efficiency of working with the tractors this option is better than the baseline (as more of the older tractors will be replaced by Stage IIIA tractors which are also modernised and improved in these respects), but less than option 4.3.

- Option 4.3 - Increase of flexibility percentage to 50%

A uniform increase to 50% would avoid the information issue from the 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. The option would be coherent with NRMM and reduce the distortion with the US market where an even larger flexibility is allowed.

To put this extension into context, the 50% flexibility is the equivalent of a 16 week delay in the introduction of Stage III B<sup>38</sup> (if the manufacturer would choose to use the flexibility for all of his models fully from the start date). If a tractor manufacturer will not be in a position to produce Stage IIIB engines after the use of its allowance of 50% of engines of Stage IIIA, then it may disappear from the market.

There is a trade off between the economic incentives and the environmental pressures. In order that industry can ensure production of Stage IIIB tractors, and thus be able to continue

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<sup>38</sup> The flexibility scheme today basically allows that a manufacturer sells 'old' tractors up to 20% of his annual sales, meaning that 80% must already comply with the new limits; this allows him to concentrate his R&D work on a limited number of 'best selling' types and update the others types later (e.g. in the second or third year). He is free to choose when he uses this allowance; he can use it fully in the first few months, but then all models should be ready soon and at the same time. 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 (if he would use the full allowance for all types straight away).

selling in the future, there is a negative impact on the environment as the introduction of stricter Stage IIIB compliant tractor is being delayed.

According to information from industry, Stage IV engines are considered as a not too different from Stage IIIB engines. Depending on the type of technology used, and in order to comply with the stricter NO<sub>x</sub> emissions limits in Stage IV engines, compared to those of Stage IIIB, 'minor' adaptations are expected by installing a more efficient anti-NO<sub>x</sub> after-treatment system. Therefore it would be logical to assume that, in order to diminish R&D and compliance costs, firms might try to accomplish the redesign of the engines as soon as possible and only once (from Stage IIIA to Stage IIIB covering as much as possible the needs for Stage IV) instead of having to do similar adaptation twice (once for the transition from Stage IIIA to Stage IIIB and then from Stage IIIB to Stage IV). This is the only option favoured by industry stakeholders.

- Option 4.4 - Increase of flexibility percentage to 80%

This is similar to option 4.3, with the following differences: 80% would not be coherent with the NRMM proposal (50%); it would bring maximum alignment with the US market while maintaining a fundamentally different system; the negative impact on the environment from this option would be larger than from option 4.3. Also, industry could comply with the Directive with only 50% flexibility.

- Option 4.5 - 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 IIIB compliance in time, by penalising them in the future. However, such a system would be difficult and costly to implement and enforce. The option would be effective regarding the internal market and environmental objectives if the optimal level of the penalty could be determined and is uniform across firms. Creating and implementing a penalty system would place administrative burden on MS. Moreover if the measure was to be harmonised and implemented identically in all MS, additional costs would be involved at the EU level. It is therefore not considered to be efficient. It would be rather coherent with environmental and competition objectives and providing incentives to innovate, but due to the lack of data this option is not feasible.

- Option 4.6 - 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 IIIB, 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. If it were possible to set up such a system it would in principle be effective in reaching the internal market and environmental objectives. Additional EU and national resources would be needed in order to put the trading scheme in place. However, the advantage of such a system is its built-in mechanism leading to efficient avoidance of pollution and efficient innovation. This option would be coherent with environmental and competition objectives and providing incentives to innovate. The time taken to develop a trading system would not be effective in meeting the immediate requirements of the industry. It is not feasible in the scope of a few years.

- Option 4.7 - ABT scheme

ABT is not considered to be a feasible option as described before; it was already turned down by Council and Parliament.

Table 3: Comparison of the listed options:

	<b>Effectiveness</b>	<b>Efficiency</b>	<b>Coherence</b>	<b>Feasibility</b>
<b>Option 1 – Baseline</b>	Not effective	Not efficient	Partly coherent	Feasible
<b>Option 2 - Provision of government backed loans to finance stocking of IIIA engines</b>	Partly Effective	Not efficient	Not coherent	Feasible, if MS would be willing
<b>Option 3 - National scrapping schemes</b>	Partly effective	Not efficient	Partly coherent	Unfeasible
<b>Option 4.1 – Scaled Flexibility</b>	Effective	Efficient	Coherent	Unfeasible
<b>Option 4.2 – 35% Flexibility</b>	Somewhat effective with respect to objective 1	Not fully efficient	Not coherent with NRMM	Feasible
<b>Option 4.3 – 50% Flexibility</b>	Effective	Efficient	Coherent	Feasible
<b>Option 4.4 – 80% Flexibility</b>	Effective only with respect to objective 1	Not efficient due to environmental trade-off	Not coherent with environmental policy	Feasible
<b>Option 4.5 – Penalty mechanism</b>	Effective	Not Efficient	Coherent	Unfeasible
<b>Option 4.6 - Trading scheme</b>	Effective	Partly efficient	Coherent	Unfeasible
<b>Option 4.7 - ABT</b>	Effective	Partly efficient	Coherent	Unfeasible



## **6.6. 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. The impacts of the preferred option will be assessed against the baseline in a quantitative way in section 7.1.

## **7. IMPACTS OF PREFERRED OPTION**

The environmental, social and economic impact of the preferred policy option will be analysed in the following sections.

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

The major cost categories that can be taken into account include: research and development costs, variable production engine costs, tractor redesign costs, after treatment devices costs and fuel costs<sup>39</sup>.

Environmental impacts have been determined based on external costs of calculated emissions. Emissions have been calculated taking into account tractor / engine stocks, average use and lifetime of tractors.<sup>40</sup> These environmental costs as a consequence of enlarged flexibility should partly be compensated by the avoided costs of prolonged cost of using older tractors, but no figures are available.

As the preferred option results in a proposal for a Directive amending Directive 2000/25/EC, to be approved by the co-legislators and then implemented by Member States, this procedure will take time. After submission by the Commission it could be adopted in 6 months; time to implement differs between Member States, from almost zero to 12 months. This means that the option would not be available yet in some MS as of the first deadline (for engines between 130 and 560 kW), i.e. 1.1.2011. This is a serious drawback, but there is no other and better solution. On the other hand the remaining period of time, where industry would be able to use the proposed 50% flexibility would still be important for them and allow the recuperate some of the investments, which then can be used for further preparation for Stage IV. MS are aware of the problem and expect an amending proposal from the Commission. They will do what they can to help industry to overcome the problems by implementing the amending directive as soon as possible. Therefore it remains to be hoped that following the Commission's adoption of the revised proposal, MS will take prompt actions to transpose the amended Directive so that the manufacturers could benefit from the revised flexibility as soon as possible.

### **7.1. Environmental impact**

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

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<sup>39</sup> ARCADIS IA study page 28, point 0.10

<sup>40</sup> Same as footnote 40.

scheme. As mentioned before, the additional flexibility has the impact of increasing the availability of Stage IIIA by 16 weeks (see footnote 39).

The overall impact from the additional amount of emissions is not expected to significantly affect the Member States obligations under the CAFE program. Legislation requires MS to meet certain ceilings for ambient air quality in defined geographical areas<sup>41</sup>.

The effect on the environment will be even smaller than the one estimated in the Technical Review due to the impact of the crisis as there will be a reduced number of new engines placed on the market than what was the basis of the calculation. An average drop of sales of at least 25% up to 60% for some types is expected (2009 vs. 2008). This, combined with diminished fuel consumption in the tractors sector may lead to a small decrease in the emissions. However, an exact assessment of the environmental impact of placing on the market a smaller number of engines as a result of the economic crisis is not yet available and the environmental impacts may thus be overstated.

As the tractors are rarely used in problematic and highly populated areas which have the highest local concentrations of pollutants, the overall impact from this additional amount of emissions is not expected to be significant.

Emission limits as set by Directive 2005/13/EC are around 30% lower for NO<sub>x</sub> and around 90% lower<sup>42</sup> for PM in Stage IIIB than in the Stage IIIA. The environmental impact of a modified flexibility scheme is estimated under the assumption that all tractor manufacturers will use the full percentage of the flexibility scheme in the first year after the introduction of the new limits of Stage IIIB. This assumption is based on the information available to Commission Services via the notification requirements of Directive 97/68/EC on the use of the flexibility scheme, for the transition from Stage II to Stage IIIA. They clearly indicate that the total allowance of tractor manufacturers to place on the market 'flexed' engines was not depleted in most of the power categories (more than 50% was still available). For the very small power engines category however, the total allowance is used almost in 100%. In the case of 50% flexibility, from all new tractors (100%) placed on the market only 50% would comply with Stage IIIB emissions limits, while the remaining 50% would comply with the emission limits of Stage IIIA.

Building on the 2005 figures<sup>43</sup> for the **NRMM** sector, where the average share of emissions exhausted by new engines put on the market during one year accounts for around 5% of the total emissions of NRMM, while the remaining 95% comes from the engines already operating on the market, we can assume that the situation looks similar in case of the tractors sector.

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. However, the **overall** machinery CI 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

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<sup>41</sup> Directive 2008/50/EC L 152 11.6.2008 p1, Annex III

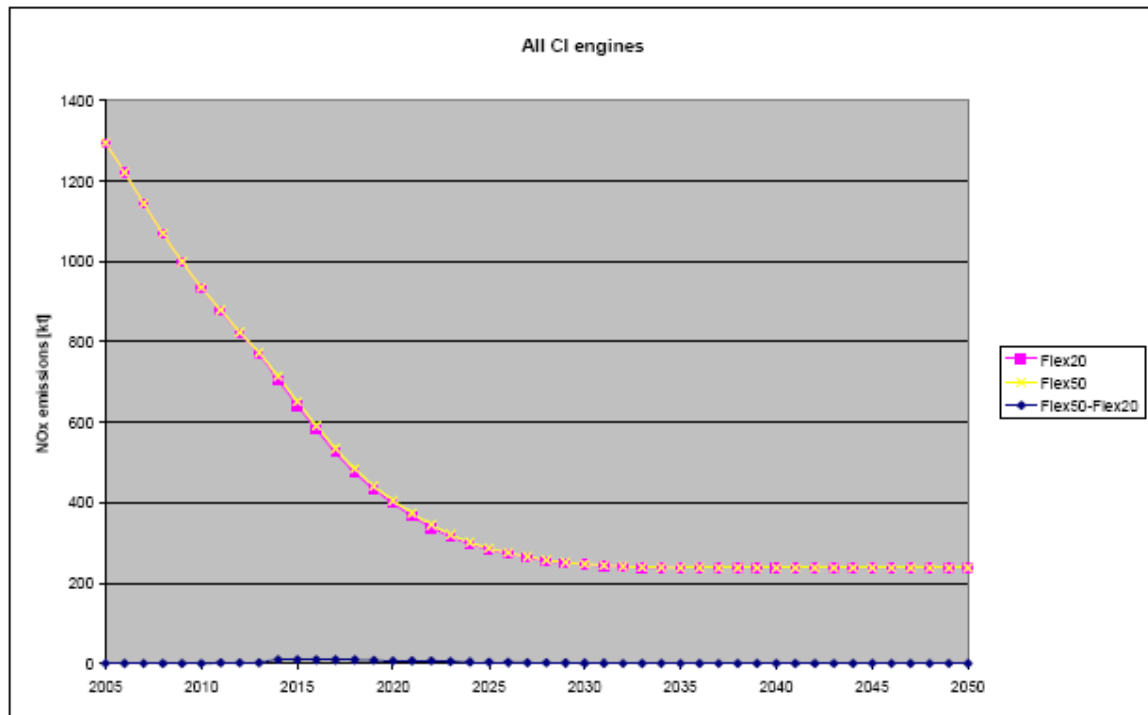
<sup>42</sup> More information on the reduction % of pollutants of the different stages of the Directive can be found in table 3. of Annex III.

<sup>43</sup> Summarised sales table of new tractor to be placed on the market and table of existing tractors, covered by the tractors Directive, are available in Annex V

NO<sub>x</sub> per year for all NRMM. For tractors this is estimated to be about 0,3 kt for PM and 3,9 kt for NO<sub>x</sub> per year<sup>44</sup>.

Comparative graphs presenting NO<sub>x</sub> and PM emissions for the current 20% and the proposed 50% flexibility scheme can be found in Figure 1 and Figure 2. They were created for NRMM, but our best estimate is that the effect for tractors is very similar.

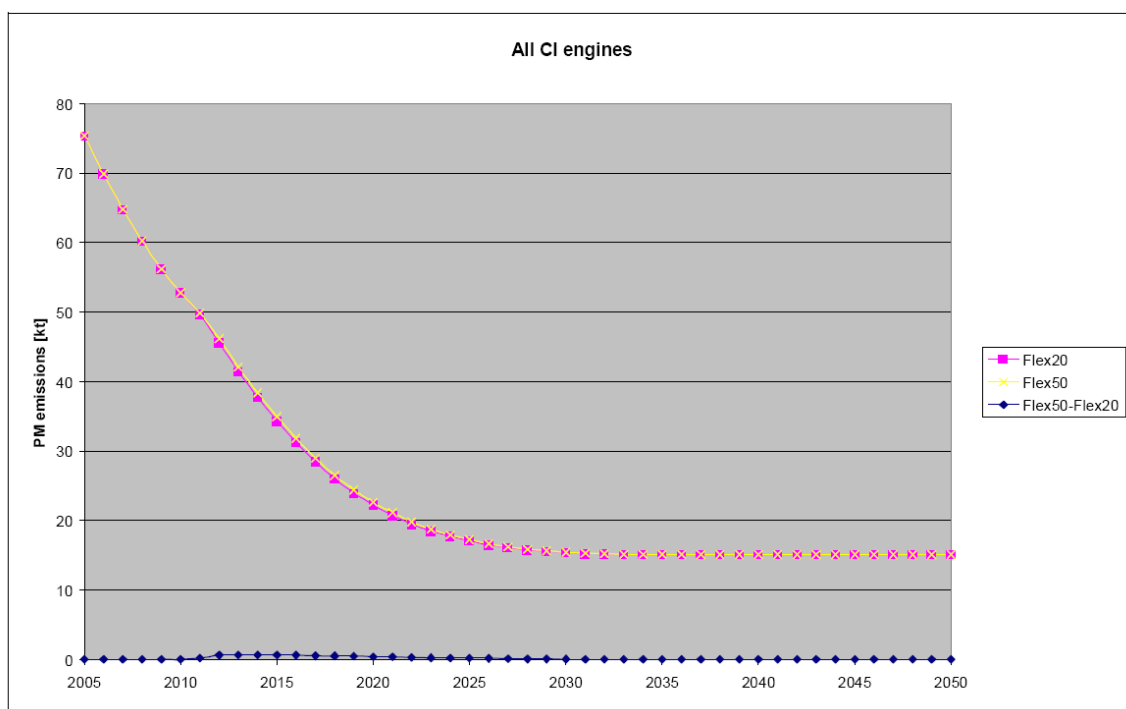
**Figure 1: Total NO<sub>x</sub> emissions for all CI engines in case of 20% flexibility and of 50% flexibility<sup>45</sup>**



<sup>44</sup> Based on JRC table 5.4 data of 26 kt PM and 515 kt NO<sub>x</sub> p.a. See Annex XII for further details.

<sup>45</sup> 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.

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



The conclusion of the study, according to the methodology based on the Net Present Value (NPV), estimates, the environmental costs per type of pollutant of the following magnitude:

Table 4: Environmental costs occurred during 2008 – 2030 (million Euros)

Pollutant	50% flexibility for all NRMM	50% flexibility for tractors
PM	200	80 – 90
NO <sub>x</sub>	350	130 – 150
<b>Total</b>	<b>550</b>	<b>210 - 240</b>

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. The figures for tractors are based on the assumption that tractors will still have the same relative share in pollution.

The estimated impact of an enlarged flexibility scheme is 0,3%<sup>46</sup> of the overall emissions (both of PM and NO<sub>x</sub>) of all NRMM in use, in the first year.

Impact on emissions of CO and HC is not discussed here since these factors are not important with regard to diesel engines; Directive 2005/13/EC did not introduce a reduction in those gases for that reason. The only change here is that HC must now be measured and approved separately from NO<sub>x</sub> whereas until now these were a combined factor.

<sup>46</sup> JRC Technical Review page 98 (see footnote 10 on page 6)

Concerning CO<sub>2</sub>, it being the natural product of burning fossil fuel, the emissions from engines are currently not reported and therefore no estimate can be given on the impacts of increased flexibility or any other tentative measure reducing CO<sub>2</sub> emissions.

As alternative to 50% flexibility, a possibility to postpone the introduction of Stage IIIB might be considered until the introduction of Stage IV. The consequence of this would be that the effect of the 90% reduction in PM limits would be delayed for three years.

The Commission is also of the opinion that a similar rise in flexibility for the introduction of Stage IV should not be considered; as stated before, the R&D work done for Stage IIIB should guarantee that this would not be justified. The Commission will send a clear signal to the stakeholders about its firm intention to maintain the deadlines for Stage IV.

## **7.2. Economic impact**

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. Despite the efforts, it was possible to obtain estimate costs of R&D from only one 'integrated' manufacturer, who stated to have invested € 1,5 billion for R&D on Stage IIIB. As mentioned before both the external contractor (who specified a long list of efforts in his report) and DG ENTR have done considerable efforts to collect further data.

Industry reported relative increases in R&D costs around the date of introduction of the new stages for NRMM. Some of the factors, not possible to be quantified due to lack of detailed information 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 for NRMM to quantify the impact of the flexibility scheme enabling the reduction of R&D costs and the possibility to amortise these costs over an extended period of time. The assumptions and clarifications of this approach are as follows:

Estimates for the potential relative gains in R&D budget, provided by manufacturers of agricultural machinery, due to the increase in flexibility for the typical period around the introduction of new emission standards, were given in the IA Report for flexibility for NRMM. The larger the flexibility percentage is, the lower the peak costs of R&D are expected in the same period of time. The same principle works for tractors.

## **7.3. Impact on SMEs**

The existing flexibility scheme already considers the need to protect small volume tractor manufacturers which have lower resources for developing new technology as the current system allows firms to either place a fixed number of tractors 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.

Data concerning possible impacts on SMEs are drawn from the impact assessment study carried out by ARCADIS, delivered in March 2010. This complementary study covers the relevant target group including manufacturers of both tractors and engines, as well as professional users of the tractors. Information collected by the study suggests that compliance

costs, mainly R&D and conformity assessment costs will weigh relatively more upon SMEs (manufacturers). 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 study also indicated that only few tractor manufacturers and no engine manufacturers are SMEs and that the professional users are mainly very small entities.

With the preferred option some SMEs (manufacturers) might be able to completely skip Stage IIIB, replacing in time their Stage IIIA tractor with a Stage IV model (because their 'normal' sales would not be more than the fixed number allowed).

Without change, the SME / end-user may not be able to buy a new tractor, at least not from his regular source. As a consequence he will have to continue using his old tractor, which is (much) more polluting than the IIIA tractor that could be available when we allow 50% flexibility. Alternatively he could buy a used, older tractor.

The old tractor will be more costly in maintenance and fuel consumption, as well as less efficient in performing the work. For maintenance, ARCADIS quotes in section 8.2.2 of the SME report figures for maintenance of older special (narrow-track) tractors, which is at € 1 339 million an order of magnitude higher than the additional environmental costs.

#### **7.4. Social impacts**

The 50% flexibility would probably allow (most) manufacturers not to close down production of certain lines as described under the baseline. This may avoid lay-offs. At present there is no information on how many of the present 24 000 jobs in the EU would be at risk. For SMEs it may mean not closing down their business. Industry should have less problems getting the qualified staff. The proposal would reduce the risk for the end-user not to be able to buy a new tractor from his regular source because that manufacturer would not be able to deliver a IIIB compliant tractor. As a consequence the number of old tractors, which are (much) more polluting, costly in maintenance and less safe and efficient in use than the IIIA tractor that could be available when 50% flexibility would be allowed, would be reduced.

#### **7.5. Competition impacts**

The preferred option could have an impact on "first mover advantage" and innovation, which in turn could affect competition in this sector.

As for "first mover advantage", anecdotal evidence suggests that integrated manufacturers might be the first to have a Stage IIIB compliant tractor on the market. An integrated manufacturer indeed can theoretically and to some extent redesign engine and tractor in parallel. By contrast, pure tractor manufacturers have to wait until the engine manufacturer has completed the work on the engine and only then start redesigning their tractor.

Under the *baseline scenario*, competition might be reduced in the long term. The tractors of first movers would be the only ones on the market - after every manufacturer has exhausted the 20% flexibility. From that point onwards, this or these manufacturer(s) would enjoy a monopolistic / oligopolistic position. Market competition would increase gradually each time another manufacturer has IIIB compliant tractors ready. There could however also be a permanent reduction in competition resulting from the (permanent) exit of a number of manufacturers unable to quickly present a IIIB tractor. Some of them are indeed probably not

able to survive an extended period without revenue (pm. no data are available to assess this risk, firms withholding information on their vulnerability for obvious reasons).

Under the *preferred option*, competition would be preserved in the short and possibly also in the longer term, with a marginal impact on those manufacturers who may be ready to produce type IIIB tractor by the current legislative deadline. The Commission services have received confirmation that these manufacturers still support the request for more flexibility.

On one hand, the preferred option would indeed allow more (non-integrated) manufacturers to remain on the market since they can sell tractors over a somewhat extended period of time and use those revenues to finance the necessary redesign.

On the other hand, manufacturers having made a major effort to comply with Stage IIIB by investing upfront into R&D would still benefit from this investment despite having to compete with possibly cheaper IIIA tractors for a limited period of time. In this sector, many elements besides price determine the buying decision of the end user. Manufacturers ready with Stage IIIB tractors would demonstrate their technological leadership which is commonly exploited for marketing purposes. First movers put quality and reputation effects at the heart of their branding strategy which in turn allow them to enjoy a price premium. The preferred option would therefore only have a marginal effect on first mover advantage.

As for innovation, the impact of the preferred option is likely to be fairly limited in scope and in time. This option maintains the obligation for manufacturers to innovate. It simply provides with some additional time to find the required solutions. The more manufacturers remain in the market, the more innovative solutions can ultimately be expected. Moreover, the preferred option is more stringent than the approach taken by US regulators, which might give an innovative advantage to EU manufacturers over time. Insofar as the main reasons underpinning the preferred option are linked to exceptional circumstances (the financial crisis), there should be no significant negative impact on compliance with EU rules in the future.

Therefore the overall impact on competition and innovation, both in a static and in a dynamic view, appears to be relatively limited and would even be positive in the short term.

## **7.6. Administrative burden**

The preferred option will not bring any major additional administrative burden. The necessary reporting requirement is already present in Directive 2000/25/EC.

## **7.7. Effect of the proposed measure compared to the base line**

Although the use of the flexibility scheme generates a negative environmental impact (partly compensated because less older, polluting tractors would remain in use), it offers a benefit for the manufacturer when it comes to the compliance cost including a decrease in peak R&D investments costs, since these costs are spread over a longer period, and less problems to get qualified staff. Additional flexibility would also mean less risk of lay-offs and better prospects for the end-user.

## 8. 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 NO<sub>x</sub> and PM emissions attributed to tractors.

Directive 2000/25/EC, **Annex IV**, requires the tractor manufacturer under the arrangements for the flexibility scheme 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. Thus, no increase in costs for manufacturers or national authorities is expected.

It is the Commission's intention to evaluate the impact of the revised flexibility measure at the end of the period defined in the accompanying proposal, i.e. in 2014 and to draw the necessary conclusions from the results obtained.



## ANNEX I: Glossary

<b>ABT</b>	Averaging, Banking and Trading system (USA)
<b>Adsorption</b>	the accumulation of atoms or molecules on the surface of a material
<b>Engine family</b>	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 Directive 2000/25/EC
<b>CECE</b>	Committee for European Construction Equipment
<b>CEMA</b>	Committee for European Agricultural Tractor Manufacturers
<b>C.I.</b>	An engine that works under the compression-ignition principle, e.g. diesel engine
<b>CO</b>	Carbon monoxide
<b>DPF</b>	Diesel Particulate Filter
<b>EGR</b>	Exhaust Gas Recirculation
<b>Engine manufacturer</b>	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
<b>HC</b>	Hydrocarbons
<b>NO<sub>x</sub></b>	Nitrogen oxides (NO, NO <sub>2</sub> , N <sub>2</sub> O)
<b>NRMM</b>	non-road mobile machinery (emissions directive 97/68/EC)
<b>NTT</b>	narrow-track tractors (categories defined in Directive 2003/37/EC as T2, C2 and T4.1, the width of which is less than 1,15 m)
<b>PM</b>	Particulate Matter
<b>UNECE</b>	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.

[http://ec.europa.eu/enterprise/newsroom/cf/document.cfm?action=display&doc\\_id=5015&userservice\\_id=1&request.id=0](http://ec.europa.eu/enterprise/newsroom/cf/document.cfm?action=display&doc_id=5015&userservice_id=1&request.id=0)

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### **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 by ARCADIS N.V., April 2008 - January 2009.

[http://ec.europa.eu/enterprise/newsroom/cf/document.cfm?action=display&doc\\_id=5028&userservice\\_id=1&request.id=0](http://ec.europa.eu/enterprise/newsroom/cf/document.cfm?action=display&doc_id=5028&userservice_id=1&request.id=0)

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### **Final Report of the SME Test Study and IA on possible options for reviewing of the Directive 97/68/EC relating to NRMM - ARCADIS - March 2010**

Additional external specific contract, under LOT5 framework contract, for an SME Test study, carried out by ARCADIS N.V., 2009 - March 2010.

**ANNEX III: Summarized Stages table of Directive 2000/25/EC**

**1. STAGE I (ENGINE CATEGORIES A, B, C)**

cat	power range (kW)	tractors - TA	tractors – all new
A	$130 \leq P \leq 560$		30-06-2001
B	$75 \leq P < 130$	31-12-2000	30-06-2001
C	$37 \leq P < 75$	31-12-2000	30-06-2001

**2. STAGE II (ENGINE CATEGORIES: D, E, F, G)**

cat	power range (kW)	tractors - TA	tractors – all new
D	$18 \leq P < 37$	31-12-2000	31-12-2001
E	$130 \leq P \leq 560$	31-12-2000	31-12-2001
F	$75 \leq P < 130$	31-12-2001	31-12-2002
G	$37 \leq P < 75$	31-12-2002	31-12-2003

**3. STAGE IIIA (ENGINE CATEGORIES H, I, J, K)**

cat	power range (kW)	tractors - TA	tractors – all new
H	$130 \leq P \leq 560$	31-12-2005	31-12-2005
I	$75 \leq P < 130$	31-12-2005	31-12-2006
J	$37 \leq P < 75$	31-12-2006	31-12-2007
K	$19 \leq P < 37$	31-12-2005	31-12-2006

#### 4. STAGE III B (ENGINE CATEGORIES L, M, N and P)

cat	power range (kW)	tractors - TA	tractors – all new
L	$130 \leq P \leq 560$	31-12-2009	31-12-2010
M	$75 \leq P < 130$	31-12-2010	31-12-2011
N	$56 \leq P < 75$	31-12-2010	31-12-2011
P	$37 \leq P < 56$	31-12-2011	31-12-2012

#### 5. STAGE IV (ENGINE CATEGORIES Q and R)

cat	power range (kW)	tractors - TA	tractors – all new
Q	$130 \leq P \leq 560$	31-12-2012	31-12-2013
R	$56 \leq P < 130$	30-09-2013	30-09-2014

Power (kW)	Year							
	2009	2010	2011	2012	2013	2014	2015	2016
Type-approval 130 / 560	H CO: 3,5; HC+NOx: 4,0; PM: 0,2		L CO: 3,5; HC: 0,19; NOx: 2,0; PM: 0,025			Q CO: 3,5; HC: 0,19; NOx: 0,4; PM: 0,025		
Type-approval 75 / 130	I CO: 5,0; HC+NOx: 4,0; PM: 0,3		M CO: 5,0; HC: 0,19; NOx: 3,3; PM: 0,025			R CO: 5,0; HC: 0,19; NOx: 0,4; PM: 0,025		
Type-approval 56 / 75	J CO: 5,0; HC+NOx: 4,7; PM: 0,4		N CO: 5,0; HC: 0,19; NOx: 3,3; PM: 0,025			R CO: 5,0; HC: 0,19; NOx: 0,4; PM: 0,025		
Type-approval 37 / 56	J CO: 5,0; HC+NOx: 4,7; PM: 0,4			P CO: 5,0; HC+NOx: 4,7; PM: 0,025				
Type-approval 19 / 37	K CO: 5,5; HC+NOx: 7,5; PM: 0,6							
	2009	2010	2011	2012	2013	2014	2015	2016



limit values: gr/kWh

CO = carbon monoxide; HC = hydrocarbons; NO<sub>x</sub> = nitrogen oxides; PM = particulate matter.

Letters H to R refer to the combination of engine power category and emissions stage, as specified before in this annex.

Percentage reductions for different engine categories are:

	NO <sub>x</sub> : IIIA → IIIB	NO <sub>x</sub> : IIIB → IV	PM: IIIA → IIIB	PM: IIIB → IV
130 – 560 kW	H → L: HC+NO <sub>x</sub> =4,0 → HC+NO <sub>x</sub> =2,19; 47 %	L → Q: 2,0 → 0,4 = 80 %	H → L: 0,2 → 0,025 = 88 %	L → Q: 0,025 → 0,025 = 0 %
75 – 130 kW	I → M: HC+NO <sub>x</sub> =4,0 → HC+NO <sub>x</sub> =3,49; 13 %	M → R: 3,3 → 0,4 = 86 %	I → M: 0,3 → 0,025 = 92 %	M → R: 0,025 → 0,025 = 0 %
56 – 75 kW	J → N: HC+NO <sub>x</sub> =4,7 → HC+NO <sub>x</sub> =3,49; 27 %	N → R: 3,3 → 0,4 = 86 %	J → N: 0,4 → 0,025 = 94 %	N → R: 0,025 → 0,025 = 0 %
37 – 56 kW	J → P: HC+NO <sub>x</sub> =4,7 → no change	No Stage IV	J → P: 0,4 → 0,025 = 94 %	No Stage IV

## **ANNEX IV: Flexibility scheme, fixed numbers and ABT**

### 1. Flexibility

As provided in Article 3A and in Annex IV of Directive 2000/25/EC, any tractor manufacturer 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 of a new emission stage, 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 to tractors with compression ignition engines (e.g. diesel) with a power from 19 kW to 560 kW.

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

As an alternative the tractor manufacturer may seek permission to place on the market a fixed number of tractors under the flexibility scheme. The number of tractors in each engine category shall not exceed the following values:

Engine Category (kW)	Number of engines
19-37	200
37-75	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 tractor manufacturer 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 tractors (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 IIIA - 5 years for the power category of 130-560 kW - the 20% can be all used in the 1<sup>st</sup> year, or 10% in the first year 10% in the second, 0% in the 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup>, or 10% in the first, 5% in 2<sup>nd</sup> and 5% in 3<sup>rd</sup>, 0% in 4<sup>th</sup> and 5<sup>th</sup>, etc.), according to the needs and business plan of the tractor manufacturer.

The tractor manufacturer may also choose for tractors 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 tractors allowed to be placed on the market under the maximum 20% per power category, is calculated as the average of sales of the tractors 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 tractor manufacturer has not been in business for 5 years, then the average is calculated for the period that the tractor manufacturer is in business.

As a result, after the approval of using the flexibility scheme, the number of tractors 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 tractor 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 tractor manufacturer cannot transfer part or the total of his flexibility allowance to another tractor manufacturer 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<sup>47</sup> 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 tractor being placed on the market under the flexibility scheme. As a result, the tractor manufacturer cannot apply for the use of the flexibility scheme to more than one Member States.

## 2. Fixed engines numbers of the flexibility scheme

Table 1- Fixed number of engines under the current flexibility scheme up to Stage IIIA

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

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<sup>47</sup> 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.



75-130	100
130-560	50

The classification of engines differs in Stage IIIB, compared to the classification of engines up to Stage IIIA. 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 <b>20%</b>	Final number of engines – <b>50%</b> (Figures in (2) multiplied by 2.5)
37-56	80	200
56-75	70	175
75-130	100	250
130-560	50	125

Table 3 - Calculation of fixed number of engines under amended flexibility: 35% and 80%

(1)	(4)	(5)
ENGINE CATEGORY (kW)	Final number of engines under flexibility scheme of <b>35%</b>	Final number of engines under flexibility scheme of <b>80%</b>
37-56	140	320
56-75	123	280
75-130	175	400

130-560	88	200
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### 3. ABT

The Averaging, Banking and Trading system, originally introduced before 2000, is built on the three pillars of

- Averaging i.e. exchange of credits between engine families of a given engine manufacturer for a specific model year,
- Banking i.e. the retention of credits by one engine manufacturer for use in future years, and
- Trading i.e. exchange of credits between engine manufacturers.

The ABT system on exhaust emissions used in the USA allows an engine 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 ABT system is addressed to engine manufacturers. In addition the USA operates a 'flexibility' system which is addressed to (machinery and) tractor manufacturers, allowing sales of tractors complying with the earlier 'Tier' for 7 years.

In the EU an ABT system was proposed when the amendments to Directive 2002/88/EC were discussed. This idea was rejected by Member States and Parliament because it was too complex for implementation in the legislation of MS and too difficult to monitor. In addition it would not work for smaller manufacturers. To be noted that ABT would bring serious administrative burden to manufacturers, who have to predict their production in different engine families before the year (numbers, engine emissions performance etc) and calculate the outcome at the end of the year, keeping records of all shipments. National authorities would have to check these.

Advantages of ABT would be that manufacturers that are quick with their new products can build up credits, to be used to compensate for their engine types that are not yet compliant, or can be sold to competitors that are slower. Also, use of an ABT system might allow an earlier introduction of new requirements.

**ANNEX V: Positions of stakeholders regarding the amendment of the provisions of the flexibility scheme for NRM and tractors**

01-06-2007	United Machinery Equipment - CECE	Industry Association	Proposing: an enlargement of flexibility to better align with the US.
03-06-09	CEMA /CECE	Industry Associations	Letter with supporting evidence for the request for extended flexibility for tractors.
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 IIIB 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 extent of the economic crisis of the NRMM sectors, 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.
30-6-2009	Department of Transport, UK		Welcomes the proposal to amend flexibility
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 IIIB compliant engines, on competitiveness issues within industry and on the reliability of the EU policies as a total.
03-02-2009	CEA	Construction Equipment Association (UK)	Strongly endorses the proposal
March 2-009	ORGALIME	Industry Association	Meeting with VP Verheugen to support the proposal for tractors.
09-07-2009	JCB	Construction Equipment Manufacturer	Strongly endorses the proposal.

10-07-2009	SMMT	<i>The Society of Motor Manufacturers and Traders (UK) off Highway Engine &amp; Equipment Group</i>	<i>Strongly endorses the proposal</i>
13-07-2009	AGORIA	<i>Belgium Employers Organisation</i>	<i>Fully support the proposal, asks for a similar measure to be proposed for tractors.</i>
14-07-2009	CEMA	<i>Industry Association</i>	<i>Letter to VP Verheugen asking for progress on the dossier for tractors.</i>
14-07-2009	AECC	<i>Association for Emissions Control by Catalyst</i>	<i>Supports additional measures acting as incentives for Stage IIIB engines to be placed on the market but not the proposed measure. Justifications include impacts on environment, EU competitiveness in the global market.</i>
15-07-2009	WKO	<i>Austrian Vehicle Industry Association</i>	<i>Supports the proposal.</i>
16-07-2009	CLAAS	<i>Agricultural Equipment Manufacturer</i>	<i>Appreciates the proposal to amend flexibility and proposes the implementation of a similar measure for tractors.</i>

In GEME discussions focussed on NRMM but did include the possibility to also enlarge flexibility for tractors (and the exemption for narrow-track tractors). On 17-7-2009 the Italian representative insisted that the Commission should include tractors in its proposal to enlarge flexibility.

To summarize the comments received from the consultation: a majority of comments were submitted by industry federations and individual manufacturing or user companies. These underlined the benefit from increasing the flexibility which would allow companies to distribute the required compliance costs more evenly over time during the crisis and ensure a relative income that would allow performing the necessary extensive changes in various types of products (engines and vehicles) over a longer period of time. Only one company stated that new emission standards could only be achieved with low-sulphur fuels which would not be available world-wide, meaning that export oriented tractor manufacturers would be compelled to produce two different sets of tractors, one for the countries that have similar stringent emission limits (EU, USA, Japan) and another for the rest of the world.

The international organisation of catalyst and filter based technology (AECC) drew the attention to the need to align the production of engines to emission standards in the USA and in Japan and concluded that any delay in the introduction of EU emission standards would jeopardise the benefits for the whole 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's 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, in particular in the context of Member State obligations to meet the ambient air quality standards. Another Member State welcomed the proposed measure. No Member State objected.

The issue of wider flexibility for tractors was also discussed with all relevant stakeholders in the Commission's Working Group on Agricultural Tractors (WGAT) on 22 June and 18 December 2009. Apart from general support for wider flexibility expressed by some MS and CEMA / EUROMOT no further comments were made in those meetings.

In the Commission's Motor Vehicles Working Group on 26-1-10 the proposed work program was discussed with all stakeholders, which included the present issue of amending the flexibility scheme for tractors. No objections were raised against this approach of allowing more flexibility.

## ANNEX VI: Fleet and annual sales of tractors

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

	Power (kW)	< 19	19-37	37-56	56-75	75-130	130-560	> 560
	average	9,5	28	46,5	65,5	102,5	345	800
Agricultural tractors	163 000	14 670	3 260	32 600	48 900	48 900	14 670	0
Percentage		10,8	2,0	20,0	30,0	30,0	9,0	0

*Table 2: Total number of tractors in use per tractor category and power class*

*(overall NRMM: 6,7 million; year 2005, EU15)*

Total engines on market	Total Nr	< 19	19-37	37-56	56-75	75-130	130-560	> 560
		9,5	28	46,5	65,5	102,5	345	800
Agricultural tractors	2 500 420	146 700	32 600	521 600	782 400	782 400	234 720	0
Percentage		5,9	1,3	20,9	31,3	31,3	9,4	0

Source: JRC

*Table 3: Western European tractors market 2007 – Q1 2010 (EU15)*

	2007	2008	2009	Q1 2010	Change (Q1 2010 - Q1 2009)
Agricultural tractors	165 83	173 615	150 083	30 387	-22%

Source: CEMA, June 2010

## ANNEX VII: Emissions of NO<sub>x</sub> and PM

Table 1: NO<sub>x</sub> and PM emissions per tractor category and power class

NO<sub>x</sub> emissions (kt)

power	< 19	19-37	37-56	56-75	75-130	130-560	> 560	Total
	9,5	28	46,5	65,5	102,5	345	800	
Agricultural tractors	0,86	0,99	36	107	185	185	0	515
Percentage	0,17	0,19	7,0	20,8	35,9	35,9	0	

PM emissions (kt)

power	< 19	19-37	37-56	56-75	75-130	130-560	> 560	Total
	9,5	28	46,5	65,5	102,5	345	800	
Agricultural tractors	0,12	0,11	2,55	7,55	8,58	7,58	0	26
Percentage	0,5	0,5	9,8	29,0	33,0	29,1	0	

Overall:	1281 kt NO <sub>x</sub>	71 kt PM
Agri. + Constr.:	605+593= 1098 kt NO <sub>x</sub>	30+29= 59 kt PM
RAINS (Agri. + Constr.):	539+248 = 787 kt NO <sub>x</sub>	57+23= 80 kt PM

Source: JRC

## ANNEX VIII: Market of agricultural vehicles

### 1. Number of tractors sold in 2001, 2004, 2005, average prices and turnovers

Tractor category	Number sold (units)			Average price (€)			Turnover (€ million)		
	2001 (EU12)	2004	2005 (EU25)	2001 (EU12)	2004	2005 (EU25)	2001 (EU12)	2004	2005 (EU25)
T1			120 000						
T2			15 000						
T3			1 650						
T4			15 000						
T4.1									
T4.2						100 000 - 150 000			
T4.3									
T5			13 000			100 000-150 000			1,3 – 2
C			5000						
Total	154 000	156 200	169 650	40 130	46 700		6 180	7 300	8 000

(2005 figures based on TRL final report, 2009, p. 73; 2001 and 2004 figures based on CEMA information)

### 2. Definition of tractor categories <sup>48</sup>

#### 1. Category T: Wheeled tractors

- Category T1: wheeled tractors with a maximum design speed of not more than 40 km/h, with the closest axle to the driver<sup>49</sup> having a minimum track width of not less than 1 150 mm, with an unladen mass, in running order, of more than 600 kg, and with a ground clearance of not more than 1 000 mm.

<sup>48</sup> Directive 2003/37/EC and TRL Study:  
[http://ec.europa.eu/enterprise/newsroom/cf/document.cfm?action=display&doc\\_id=4501&userservice\\_id=1&request.id=0](http://ec.europa.eu/enterprise/newsroom/cf/document.cfm?action=display&doc_id=4501&userservice_id=1&request.id=0)

<sup>49</sup> For reversible driver's position tractors (reversible seat and steering wheel), the closest axle to the driver to be considered must be the one fitted with the biggest diameter tyres.



- Category T2: wheeled tractors with a maximum design speed of not more than 40 km/h, with a minimum track width of less than 1 150 mm, with an unladen mass, in running order, of more than 600 kg and with a ground clearance of not more than 600 mm. However, where the height of the centre of gravity of the tractor<sup>50</sup> (measured in relation to the ground) divided by the average minimum track for each axle exceeds 0,90, the maximum design speed is restricted to 30 km/h.
- Category T3: wheeled tractors with a maximum design speed of not more than 40 km/h, and with an unladen mass, in running order, of not more than 600 kg.
- Category T4: special purpose wheeled tractors with a maximum design speed of not more than 40 km/h (as defined in Appendix 1).
- Category T4.1: high-clearance tractors mainly used in France and with a small number of manufacturers;
- Category T4.2: very large tractors;
- Category T4.3: alpine tractors with a low centre of gravity to allow them to work on steep inclines.
- Category T5: wheeled tractors with a maximum design speed of more than 40 km/h.

## 2. *Category C: Track – laying tractors*

Track – laying tractors that are propelled and steered by endless tracks and whose categories C1 to C5 are defined by analogy with categories T1 to T5.

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<sup>50</sup> In accordance with standard ISO 789-6: 1982.

3. Tractors - new registrations per MS, 2006 – 2008  
(source: TRL final report 2009).

Registrations	2006	2007	2008
Austria	7 152	6 792	7 737
Belgium	2 748	2 680	
Bulgaria			
Cyprus			
Czech Republic	2 225	2 730	
Denmark	3 110	3 479	
Estonia			437
Finland	4 172	4 245	
France	27 388	29 129	
Germany	29 009	28 469	
Greece	3 518	4 170	
Hungary	1 045	2 045	
Ireland	4 221		
Italy	29 752	26 837	
Latvia			
Lithuania			
Luxembourg			
Malta			
Netherlands	3 823	4 054	
Poland			
Portugal	5 415	6 122	
Romania			1 077
Slovakia			1 450
Slovenia	1 853	2 084	
Spain	16 605	17 241	
Sweden	4 233	4 465	
United Kingdom	13 829	14 941	
<b>Total</b>	<b>160 098</b>	<b>159 483</b>	10 701

(Empty boxes: no information was received)

4. Import/export of new agricultural tractors, 2007, EU27 (Comext database)<sup>51</sup>

	Track-laying tractors				Wheeled agricultural tractors			
	Import	Import	Export	Export	Import	Import	Export	Export
	Value	Units	Value	Units	Value	Units	Value	Units
Belarus					95.038.622	7.378	12.964.865	95
Canada	200.412	9			2.677.990	295	62.964.860	2.328
Chile			137.999	7			11.756.464	706
China	130.670	25	114.480	5	25.851.834	8.488	10.044.776	283
Croatia			96.146	4	450.727	13	34.752.302	1.160
Iceland			40.539	8			15.522.714	422
Iran							17.239.503	514
Israel	32.256	2			15.063	4	11.423.125	505
Japan	439.696	206			147.060.521	25.068	45.213.966	1.183
Malaysia							6.269.559	455
Mexico					213.457	28	9.413.104	454
Morocco			198.088	21			28.016.583	1.747
New Zealand			16.205	1	8.135	1	61.428.357	1.874
Norway	438.338	29	599.060	60	1.626.906	93	154.734.409	5.354
Russia	287.813	8	6.981.647	170	151.558	20	72.359.710	1.370
Serbia	17.439	1	151.341	4	511.653	38	17.239.770	413
South Africa			3.463.204	34	166.840	41	71.097.548	2.829

<sup>51</sup> Values in Euros and units

South Korea					20.661.795	2.248	36.586.678	1.200
Switzerland	580.763	28	416.682	16	7.732.927	210	93.881.975	2.921
Tunisia							9.230.970	585
Turkey	4.482.968	1.467	246.126	2	9.754.638	621	67.533.886	3.060
Ukraine			3.181.355	26	469.873	52	25.702.010	358
United States	37.641.319	368	2.082.490	188	476.626.178	42.049	742.673.712	25.882
Venezuela	8.000	1	336.321	12			7.440.827	280
<b>Total</b>	<b>44.259.674</b>	<b>2.144</b>	<b>18.061.683</b>	<b>558</b>	<b>789.018.717</b>	<b>86.647</b>	<b>1.625.491.673</b>	<b>55.978</b>

**ANNEX IX: the SME Test (ARCADIS report 30-03-2010)**

<b>(1) Consultation with SMEs representatives</b>	See sections 3.2, 3.4, 3.5, Table 1 and 7: little response; 2 case studies.  Representatives of manufacturers and suppliers as well as end-users were contacted with enquiries, meetings and phone calls, as listed in the study.
<b>(2) Preliminary assessment of businesses likely to be affected</b>	See sections 3 and 7: few manufacturers but some specialised firms (T4.1 etc.); most (or all) end-users.
<b>(3) Measurement of the impact on SMEs</b>	See section 7. Few replies available. One manufacturer indicates 30% price rise for new IIB engines and huge price (€ 5 000) and time (delay up to one year) problems because with the new engine the tractors (otherwise unchanged) needs new national homologation, to be avoided with enlarged flexibility.
<b>(4) Assess alternative options and mitigating measures</b>	See section 7.4: 50% flexibility would solve the problems for SME manufacturers.  As alternative an "extension of the duration" of flexibility is mentioned, but this seems unacceptable.

## ANNEX X: Comparison of the options

	Effectiveness	Efficiency	Coherence	Feasibility/additional comments
<b>Option 1 - Baseline</b>	This option is not effective as it fails to achieve the objectives with regard to the functioning of the internal market for tractors and with regard to the environmental objectives of reducing emissions from older polluting tractors by replacing them with cleaner models.	This option is not efficient because it is expected to lead to a situation where for some time the market for new tractors is either not existing or supply will be very limited (some models only), which would likely lead to high prices.	Where old tractors can be replaced with new IIIB models, a positive impacts on the environment would materialise but this is unlikely to be the case for all models, leading to negative impacts on the environment and on the functioning of the internal market in tractors..	Feasible.
<b>Option 2 - Provision of government backed loans to finance stocking of IIIA engines</b>	This option would provide tractor manufacturers with the access to finance the purchases of Stage IIIA engines, would allow them to continue to generate revenue necessary to develop Stage IIIB compliant tractors and would allow them to put Stage IIIA compliant engines on the market during Stage IIIB. It would therefore achieve the policy objectives regarding the internal market. At the same time it would have only some effectiveness regarding the development of IIIB tractors if tractor manufacturers would buy large numbers of IIIA engines for stocking and thus avoid having to redesign their tractors for IIIB engines.	Resources and time necessary for setting up the control system of stocked engines and surveillance by type approval authorities of Member States would be substantial. It would be expensive for tractor manufacturers due to the additional cost of preparing engines for longer stocking. There would also be a risk that extra demand for Stage IIIA engines might lead to higher prices for those engines in the short term (capacity constraints), which would require increasing the level of loans requested by tractor manufacturers. It also includes the associated administrative costs of providing loan guarantees for MS and administrative costs for banks to provide the loans. Overall, this option is not efficient.	By providing the incentive to produce more Stage IIIA engines, this option might result in a large number of Stage IIIA engines being produced instead of the development of cleaner Stage IIIB engines. This would act as a counter incentive to innovate and to develop more environmentally friendly tractors, which makes the option not coherent with the overall policy in this domain.	Feasible, but this option raises concerns with respect to the compatibility with EU-state aid provisions. No information available on willingness of MS to support.
<b>Option 3 - National scrapping schemes</b>	A scrapping scheme will stimulate demand for Stage IIIB compliant tractors but will not assist in helping tractor manufacturers to actually develop compliant tractors. Therefore it will only partly be effective in reaching the environmental objectives. Where not all MS introduce scrapping schemes or where the conditions of the schemes differ, there is a big risk that the internal market objectives will not be reached.	Substantial funds at national level will be required to provide the scrapping subsidies. At the same time, where a technical solution is not yet available (no IIIB tractor), it would not work.	Positive impacts on environment as the use of a scrapping scheme will provide an incentive to the users to buy new tractors with cleaner Stage IIIB engines where they are available. Likely negative impacts on the internal market, where national schemes diverge.	This option raises concerns with respect to the compatibility with state aid rules. Besides, the Commission is not aware of any MS plans to introduce a scrapping scheme, which makes this option unfeasible.
<b>Option 4.1 - Scaled Flexibility</b>	This system would in theory be very effective with respect to the internal market and environmental objectives as it would provide a targeted solution for only those models where additional flexibility is needed.	This option would require the collection of information on the amount of problems for each specific type of tractor in order to determine an appropriate flexibility. If that information were available, it would also be	This option would provide a good balance between environmental and economic impacts provided that there was perfect information on the basis of which a decision on adequate flexibility for different tractors	Given that the information required for the option is not available to the Commission, this option is not feasible.

**Option 4.2 –  
35%  
Flexibility**

This option would allow tractor manufacturers to put additional Stage IIIA compliant tractors on the market during Stage IIIB.

An increase to 35% is easy to implement and would allow industry to generate revenues in the short term in order to finance R&D expenses. This additional flexibility could be introduced without setting up any new systems and therefore could provide an immediate response to the crisis, thus meeting the internal market objective

The increase to 35% flexibility is the equivalent of a 13 week delay in the introduction of Stage III B. It has thus a limited impact on emissions from tractors and would avoid a situation where old polluting tractors could not be replaced by cleaner ones. The option thus also meet the environmental objectives.

This option would be somewhat effective in relation with objective 1 – to maintain the functioning of the internal market, but it is disputable whether 35% will be enough. Industry stated that 50% would be required.

efficient as it is very targeted.

No new system to set up, no up-front payments from industry involved; in this respect the option would be efficient.

could be taken.

This option is not coherent with the Commission proposal for more flexibility for NRMM (50%).

There is some trade off between the economic incentives and the environmental impacts. There is a potential negative impact on the environment as the introduction of stricter Stage IIIB compliant tractor is effectively being slightly delayed. On the other hand, the option allows replacement of old tractors by cleaner ones at any point in time, thus reducing emissions. There also exists a risk that firms using flexibility have a competitive advantage in terms of the price over IIIB compliant models. This could somewhat affect competition in the short term.

This option is feasible and can be rather easily implemented.

**Option 4.3 –  
50%  
Flexibility**

This option would allow tractor manufacturers to put additional Stage IIIA compliant tractors on the market during Stage IIIB.

An increase to 50% is easy to implement and allow industry to generate revenues in the short term in order to finance R&D expenses. This additional flexibility could be introduced without setting up any new systems and therefore could provide an immediate response to the crisis, thus meeting the internal market objective

The increase to 50% flexibility is the equivalent of a 16 week delay in the introduction of Stage III B<sup>52</sup>. It has thus a limited impact on emissions from tractors and would avoid a situation where old polluting tractors could not be replaced by cleaner ones. The option thus also meets the environmental objectives.

No new system to set up, no up-front payments from industry involved, therefore this option would be efficient.

There is some trade off between the economic incentives and the environmental impacts. There is a potential negative impact on the environment as the introduction of stricter Stage IIIB compliant tractor is effectively being slightly delayed. On the other hand, the option allows replacement of old tractors by cleaner ones at any point in time, thus reducing emissions. There also exists a risk that firms using flexibility have a competitive advantage in terms of the price over IIIB compliant models. This could somewhat affect competition in the short term.

This option is feasible and can be rather easily implemented. Industry strongly supported this option and did not raise the issue of possible competition distortion.

**Option 4.4 –  
80%  
Flexibility**

This option would allow tractor manufacturers to put additional Stage IIIA compliant tractors on the market during Stage IIIB.

An increase to 80% is easy to implement and would allow industry to generate revenues in the short term in order to finance R&D expenses. This additional flexibility could be introduced without setting up any new systems and therefore could provide an immediate response to the crisis, thus meeting the internal market objective

This option would be effective only in relation with objective 1 – to maintain the functioning of the internal market. On the other hand industry stated that 50% would be enough.

No new system to set up, no up-front payments from industry involved; in this respect the option would be efficient. But it is not efficient due to the environmental trade-off, more 'old' tractors coming on the market that do not comply with the new requirements.

This option is not coherent with the Commission proposal for more flexibility for NRMM (50%).

The option is not coherent with environmental policy, as the introduction of stricter Stage IIIB compliant tractor is effectively being delayed. There also exists a risk that firms using flexibility have a competitive advantage in terms of the price over IIIB compliant models. This could somewhat affect competition in the short term.

This option is feasible and can be rather easily implemented.

<sup>52</sup>

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.



<b>Option 4.5 – Penalty mechanism</b>	This option would be effective regarding the internal market and environmental objectives if the optimal level of the penalty could be determined and is uniform across firms. This is however not possible.	Creating and implementing a penalty system would place administrative burden on MS. Moreover if the measure was to be harmonised and implemented identically in all MS, additional costs would be involved at the EU level (funding resources, notification and surveillance, translation costs etc.). It is therefore not considered to be efficient.	This option would be rather coherent with environmental and competition objectives and providing incentives to innovate.	Due to the lack of data this option is not feasible.
<b>Option 4.6 - Trading scheme</b>	If it were possible to set up such a system it would in principle be effective in reaching the internal market and environmental objectives.	Additional EU and national resources would be needed in order to put the trading scheme in place. However, the advantage of such a system is its built in mechanism leading to efficient avoidance of pollution and efficient innovation.	This option would be coherent with environmental and competition objectives and providing incentives to innovate.	The time taken to develop a trading system would not be effective in meeting the immediate requirements of the industry. It is not feasible in the scope of a few years.
<b>Option 4.7 - ABT</b>	In principle it might be effective but it would take too much time to implement; in addition EP and Council disapproved it before.	See option 4.6 above.	See option 4.6 above.	See option 4.6 above.

## ANNEX XI: Calculation of environmental impact and maintenance costs

### 1. Calculation of environmental costs (paragraph 7.1.2)

Building on the 2005 figures<sup>53</sup> for the **NRMM** sector, where the average share of emissions exhausted by new engines put on the market during one year accounts for around 5% of the total emissions of NRMM, while the remaining 95% comes from the engines already operating on the market, we can assume that the situation looks similar in case of the tractors' sector.

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. However, the **overall** machinery CI 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 NO<sub>x</sub> per year for all NRMM.

When we assume that the contribution of tractors to overall agricultural machinery emissions will not change (45% for PM and 40% for NO<sub>x</sub> – JRC study), the same approach would lead to 0,3 kt for PM and 3,9 kt for NO<sub>x</sub> per year<sup>54</sup>.

### 2. Maintenance of old tractors (paragraph 6.1)

Copy from ARCADIS SME study:

"In Section 8.1 we had reported that if a high clearance tractor is used beyond its economic lifetime, annual maintenance costs can be expected to increase from 1500-2000 EUR per year to 3000-4000 EUR per year.

For illustrative purposes, we assume that the cost increase is 2 500 EUR per year per tractor, and that all special tractors face the same increase in maintenance costs as the high clearance tractors. To remain consistent with the IA study, we assume that a technical solution can be found 5 years after the planned introduction date of the next emission stage, that a total of 25 600 units are sold per year in the EU and that a discount rate of 4% applies.

For the T4.1 tractors, based upon the response received during the consultation, we assume that 400 units are sold per year.

To the best of our knowledge, no data on the sales of C2 tractors are publicly available. Thus, in total we assume that 26 000 special tractors are sold per year. We assume that all sales correspond to replacement sales and that, once the technical solution has been developed, old tractors are replaced at a rate of 26 000 units per year. The table below gives then, for each year after the planned introduction of stage IIIB until all "old" tractors have been replaced by stage IIIB compliant tractors, the increase in the number of tractors that are kept in use beyond their economic lifetime and the implied extra maintenance costs at the EU level.

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<sup>53</sup> Summarised sales table of new tractor to be placed on the market and table of existing tractors, covered by the tractors Directive, are available in Annex V

<sup>54</sup> Based on JRC table 5.4 data of 26 kt PM and 515 kt NO<sub>x</sub> p.a. See Annex XII for further details.

Table 5: Extra maintenance costs for special tractors used beyond economic lifetime

Year	Number of tractors kept in use	Extra cost per year
1	26 000	65.000.000
2	52 000	130.000.000
3	78 000	195.000.000
4	104 000	260.000.000
5	130 000	325.000.000
6	104 000	260.000.000
7	78 000	195.000.000
8	52 000	130.000.000
9	26 000	65.000.000

The net present value of these costs (discounted to the planned introduction of stage IIIB) is 1 339 million EUR. This is an order of magnitude higher than the environmental benefits linked to not postponing stage IIIB with 5 years (120 million EUR).

Thus, even if actual higher maintenance cost would be significantly lower than suggested by the manufacturers, the costs of not postponing stage IIIB would still be much higher than the benefits."