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**COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE  
EUROPEAN PARLIAMENT**

**Report on the possibilities of further improving  
the environmental characteristics of recreational craft engines,  
submitted pursuant to Article 2 of Directive 2003/44/EC,  
amending Directive 94/25/EC relating to recreational craft**

{SEC(2007)770}  
{SEC(2007)819}

## 1. INTRODUCTION

Directive 94/25/EC (the “Recreational Craft Directive” - RCD) lays down the essential requirements for the design and construction of recreational craft to be fulfilled to enable the free circulation of these products in the Internal Market. The RCD has been amended by Directive 2003/44/EC, which specifies harmonised limits for exhaust and noise emissions craft have to comply with to have free access to markets throughout the Union.

Article 2 of Directive 2003/44/EC, requests the Commission to submit by end 2006 “a report on the possibilities of further improving the environmental characteristics of engines and to consider inter alia the need to revise the boat design categories” and by end 2007 “if deemed appropriate, in the light of this report, appropriate proposals to the European Parliament and the Council.” It also requests to take account of the following elements “in the light of the experience gained”:

- (a) the need to further reduce emissions of air pollutants and noise in order to meet environment protection requirements;
- (b) the possible benefits of a system for “in-use compliance”;
- (c) the availability of cost efficient techniques for controlling emissions;
- (d) the need to reduce evaporation and spill of fuel;
- (e) the possibility of agreeing on international standards for exhaust and noise emissions;
- (f) possible simplifications of the system for conformity assessment procedures.

In response to this request, the Commission has undertaken the following actions:

- (1) A stocktaking study, making a detailed inventory and comparative assessment of the current status and developments in technology and legislation worldwide concerning the environmental performance of recreational marine engines. This study resulted in the identification of four possible scenarios for further reducing the exhaust emission limits. It also addressed in detail the elements (a) to (f) mentioned above.
- (2) An impact assessment study, identifying and measuring in detail the impacts and distributive effects of the four possible scenarios for further reducing the exhaust emission limits and comparing these impacts through a multi-criteria analysis, using the “status quo” as the baseline option for this comparison.
- (3) A series of consultation meetings with stakeholders (Member States Authorities, Industry and User Associations), to inform concerned parties about the work undertaken and the progress achieved in the course of the above mentioned studies, and collect their comments on the findings.
- (4) In the context of the EU-US Trans-Atlantic Business Dialogue, a round of meetings have taken place between the Commission services, the US Environmental Protection Agency and recreational marine industry to explore the possibilities for aligning future recreational craft emission legislation in the US and the EU.

## **2. OBJECTIVES**

This Report considers the possibilities of further improving the environmental characteristics of recreational marine engines and the need to revise the boat design categories. It also addresses the elements, which the Commission is requested to take account of in the light of the experience gained. In line with the general objectives of the Better Regulation Action Plan and the Community's guidelines on Impact Assessment, it aims at identifying suitable policy options and considers the appropriateness of submitting legislative proposals. It identifies the need to further explore the possibilities for maximising the emission reduction potential of recreational craft and concludes that depending on the outcome of this assessment the Commission could consider tabling appropriate proposals at a later stage.

## **3. EXPERIENCE GAINED**

The experience gained with the application of the exhaust and noise emission amendments to the RCD is very limited. This is due to the short time period between the date of full entry into application of these amendments and the deadline for the submission of this Report. The amendments have given rise to some difficulties with regard to their timely implementation by Member States and their application by manufacturers and notified bodies.

Despite the five years elapsed between the submission of the amending proposal in 2000 and the entry into application of the amendments in 2005, it emerged that part of the industry had not started timely to prepare itself for their application. As a result, the transitional period of 1 year intended to enable manufacturers to sell their stocks of products manufactured in line with the national rules in force before the adoption of the amended RCD, has been used by manufacturers and notified bodies to adjust to the new conformity assessment procedures and environmental requirements introduced by the amended RCD.

The delays encountered by Member States in transposing the amended RCD, on the one hand, and the limited number of notified bodies initially available to perform the conformity assessment tasks related to the emission requirements, on the other, have been contributing to the difficulties encountered.

The Commission has been concentrating on mitigating these difficulties to the maximum by supporting all involved parties in implementing the amendments to the Directive, and where necessary, by launching the appropriate procedures against Member States which had not timely notified their national implementing measures. These actions have enabled to clarify the situation before the amendments entered into full application on 1 January 2006.

In the light of this experience, careful attention should be given to the time needed by all concerned parties to adapt themselves to any further changes that may be envisaged, as well as to the legitimate expectations of enterprises about the legal stability and certainty they need to plan their design and production processes and the related investments in the light of any possible envisaged further changes to the Directive's requirements.

## 4. THE NEED AND POSSIBILITIES FOR FURTHER REDUCING EMISSIONS

### 4.1. The impact of recreational boating on the overall and local air quality

From the findings of the stocktaking study<sup>1</sup> can be concluded that with the current emission limits in force, the contribution of recreational boating to the overall air pollution is minor.

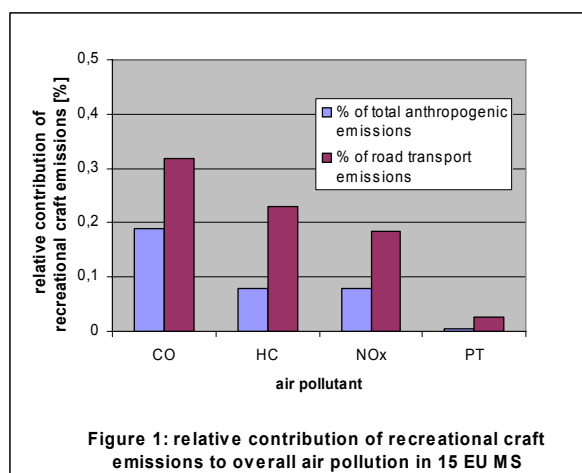


Figure 1 shows that the estimated amount of carbon monoxide (CO), hydro-carbons (HC), nitrogen oxides (NOx) and particulates (PT) emitted by a recreational craft fleet complying with the current emission limits is not significant when compared to the total amount of anthropogenic emissions and overall road transport emissions in 15 EU Member States (basis: 1998 figures reported by the European Environmental Agency).

Simulations have been carried out in the stocktaking and impact assessment study to assess to what extent a further tightening of the current emission limits could contribute to minimising the environmental impact of recreational boating.

### 4.2. Identification of possible further improvements and scenario options

The stocktaking study identified the following possibilities for improvements:

- For outboard spark ignition (SI) engines, changing from two-stroke (2S) technology to direct injection 2S and four-stroke (4S) technology.
- For inboard SI engines, updating of the technology equivalent to the developments in other applications, in particular automotive, and possibly the use of oxidation catalysts as after-treatment technology.
- For inboard compression ignition (CI) engines, updating of the technology equivalent to the developments in other fields, in particular that of engines used in non-road mobile machinery.

<sup>1</sup> [http://ec.europa.eu/enterprise/maritime/maritime\\_regulatory/doc/rc\\_study\\_exec\\_sum.pdf](http://ec.europa.eu/enterprise/maritime/maritime_regulatory/doc/rc_study_exec_sum.pdf)

Based on these technical feasibility considerations, and after consultation with stakeholders, a scenario based approach was developed in the stocktaking study, identifying following options for further reducing the exhaust emission limits:

- Option 1: All 2S and 4S SI engines would have to comply with the Directive's current exhaust emission limits for 4S SI engines. CI engines would have to comply with stage IIIA emission limits for commercial marine engines used in inland waterway vessels as specified in the Non-Road Mobile Machinery Directive (NRMM).
- Option 2: All 2S and 4S SI engines would have to comply with exhaust emission limits which are at 75% of the Directive's current limits for 4S SI engines. CI engines would have to comply with stage IIIA emission limits for general use of the NRMM Directive.
- Option 2A: Same as for Option 2, but for SI engines with a power output of less than 30 kW the Directive's current exhaust emission limits for 4S SI engines would apply.
- Option 2B: for SI engines Option 2A would apply and CI engines would have to comply with stage II emission limits of the NRMM Directive.

#### **4.3. Impact assessment of the scenario options compared to the baseline option**

The above scenario options and the baseline option, i.e. maintaining the Directive's current emission limits, have been submitted to a detailed impact assessment, to identify and measure in detail the technical, environmental, economic and social impacts and the distributive effects of these options and to compare their impacts through a multi-criteria analysis.<sup>2</sup>

##### *4.3.1. Technical impact and compliance cost assessment*

The technical impact of the scenario options has been assessed by identifying for each engine segment the suitable key technologies for complying with the scenario options and by calculating the cost of the technology changes required, taking into account, where necessary, the need for converting these technologies to the marine environment and their availability to the recreational marine industry. A summary of the detailed cost compliance analysis is annexed (see Impact Assessment Summary).

##### *4.3.2. Environmental impact assessment*

The environmental impact of the scenario and baseline options has been assessed by developing models for marinas with a recreational craft fleet and their usage patterns in typical lake, coast and inland waterway environments in the EU. These models have been used to estimate the effect of the scenario options on the yearly amount of air pollutants emitted by the recreational craft fleet in the EU. The results are summarised in Table 1.

| Air pollutant→ | CO | HC + NO <sub>x</sub> | PT | Total |
|----------------|----|----------------------|----|-------|
|----------------|----|----------------------|----|-------|

<sup>2</sup>

[http://ec.europa.eu/enterprise/maritime/maritime\\_regulatory/directive\\_03\\_44.htm](http://ec.europa.eu/enterprise/maritime/maritime_regulatory/directive_03_44.htm)

| ↓Scenario       | kton/y | % | kton/y | %   | kton/y | %   | kton/y | %    |
|-----------------|--------|---|--------|-----|--------|-----|--------|------|
| Baseline option | 153,1  |   | 40,9   |     | 0,6    |     | 194,6  |      |
| Option 1        | 153,1  | 0 | 32,7   | -20 | 0,4    | -33 | 186,2  | -4,3 |
| Option 2        | 153,1  | 0 | 28,2   | -31 | 0,4    | -33 | 181,7  | -6,6 |
| Option 2A       | 153,1  | 0 | 27,4   | -33 | 0,4    | -33 | 180,9  | -7,0 |
| Option 2B       | 153,1  | 0 | 31,5   | -23 | 0,4    | -33 | 185,0  | -5,0 |

Table 1: estimated amount of EU recreational marine exhaust emissions in kiloton per year and emission reduction potential in % for the scenario options compared to the baseline option.

#### 4.3.3. Economic, social and competitive impact assessment

A detailed overview of the economic, social and competitive impact of the scenario options is provided in the Annex to this Report. Table 2 summarises the key findings for the three engine sectors considered: CI and SI engines and Personal Watercraft (PWC).

|           | average gross compliance cost (€m) |       |     |       | price effect (%) |      |      | employment effect (number of job losses) |     |     |       |
|-----------|------------------------------------|-------|-----|-------|------------------|------|------|------------------------------------------|-----|-----|-------|
| sector→   | CI                                 | SI    | PWC | total | CI               | SI   | PWC  | CI                                       | SI  | PWC | total |
| option 1  | 147,1                              | 6,4   | 2,0 | 155,5 | +4,4             | +0,7 | +1,9 | -37                                      | -86 | -6  | -129  |
| option 2  | 245,2                              | 121,0 | 5,1 | 371,3 | +10              | +10  | +4,9 | -85                                      | -86 | -16 | -187  |
| option 2A | 245,2                              | 104,7 | 2,0 | 351,9 | +10              | +7,7 | +1,9 | -85                                      | -86 | -6  | -177  |
| option 2B | 150,2                              | 104,7 | 2,0 | 256,9 | +4,4             | +7,7 | +1,9 | -37                                      | -86 | -6  | -129  |

Table 2: estimated gross compliance cost, price effect and impact on employment of the four scenario options compared to the baseline option

#### 4.3.4. Comparing the options: Multi-Criteria analysis

In line with the Commission's Impact Assessment Guidelines, the four scenario options and the baseline option have been compared through a multi-criteria analysis, based on following criteria: effectiveness (how well can the emission reduction objective achieved), efficiency (direct and indirect costs of compliance) and consistency (balance of positive and negative impacts - cost/benefit ratio). The results are summarised in Table 3.

| Criterion → | effectiveness (total emission reduction) | efficiency (total compliance & social cost) | consistency (cost / benefit = compliance & social cost per kton/y emission reduction) |
|-------------|------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------|
| Option 1    | 8,4 kton/y (-4.3%)                       | +155,5 m€ -129 jobs                         | +18,5 m€ -15,4 jobs                                                                   |
| Option 2    | 12,9 kton/y (-6.6%)                      | +371,3 m€ -187 jobs                         | +28,8 m€ -14,5 jobs                                                                   |
| Option 2A   | 13,5 kton/y (-7.0%)                      | +351,9 m€ -177 jobs                         | +26,1 m€ -13,1 jobs                                                                   |
| Option 2B   | 9,6 kton/y (-5.0%)                       | +256,9 m€ -129 jobs                         | +26,8 m€ -13,4 jobs                                                                   |

Table 3: results of the multi-criteria analysis for the scenario options compared to the baseline option

From the results it emerges that each of the scenario options would have a social cost with 13 to 15 jobs lost for each kiloton annual pollution reduction, combined with a relatively low reduction potential (between 4.3% and 7%) on the contribution by recreational craft to overall pollution.

On the other hand, using methodologies developed to estimate the monetary cost of damage associated with emissions of air pollutants<sup>3</sup>, the monetary valuation of damage avoided by reducing emissions amount between 2500 to 8200€ for each ton of NOx emissions avoided per annum, and between 13000 to 51000 € for each ton of PT emissions avoided per annum. These figures indicate that the compliance costs for emission reduction of these pollutants do not outweigh the monetary environmental benefits, and should be an incentive for trying to achieving a higher emission reduction while maintaining a positive cost/benefit ratio.

In view of the conclusions of the Brussels European Council of March 2007 on climate protection and the Commission's commitment to lead this policy process, a maximum effort has to be made to further optimise this reduction potential, taking due account of the Thematic Strategy on Air Pollution and related environmental objectives already put in place<sup>4</sup>.

To achieve this goal the Commission intends to assess further scenarios based upon the most stringent and technology driving emission rules already applied or envisaged in other parts of the world, in particular in the US. Such approach would also have to take into account the need for EU engine manufacturers operating on the global market to maintain and strengthen their competitive position vis-à-vis third country competitors. In balance, careful consideration will need to be given to the vulnerable position of EU small and medium sized enterprises (SME) operating on the EU market only.

Indeed, the social impact assessment has identified that the social cost of any further emission reduction measures would mainly be borne by SME established in the EU, and case study evidence indicates that implementation of any of the scenario options would seriously endanger the future of the only outboard engine manufacturer genuinely established in the EU. Therefore, appropriate accompanying measures might be envisaged to provide an optimum balance between maximum emission reductions and minimal social costs.

More time and study work will be needed to assess the impact and appropriateness of such an ambitious approach towards minimising the contribution of motorised recreational craft to climate change whilst at the same time mitigating the associated social costs and negative impacts on the competitiveness of SME established in the EU. The Commission will do this through a complementary impact assessment study, in close consultation with all stakeholders, and report back to the European Parliament and the Council at a later stage, with a view to establishing whether proposing legislative measures in support of such an ambitious approach would be appropriate.

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<sup>3</sup> [http://ec.europa.eu/environment/air/cafe/activities/pdf/cafe\\_cba\\_externalities.pdf](http://ec.europa.eu/environment/air/cafe/activities/pdf/cafe_cba_externalities.pdf)

<sup>4</sup> The references are listed in Chapter 2 of the Impact Assessment Summary

## **5. THE NEED TO FURTHER REDUCE NOISE EMISSIONS**

The stocktaking study has shown that further reduction of engine noise can only be effective for low power craft, but this category has already the lowest noise impact. For high power craft the noise impact is greater due to the combined effect of engine and hull noise. For such craft the noise impact cannot be reduced by measures on the engine alone and would need also noise reducing measures to the hull. As the latter are not always technically feasible, the study concludes that noise abatement in environmentally sensitive areas should be achieved by other means, such as operational measures regulating the use of such craft.

## **6. THE POSSIBLE BENEFITS OF A SYSTEM FOR “IN-USE COMPLIANCE”**

An “in-use compliance” system is aimed at verifying the durability of the engine, i.e. its continued compliance with the emission requirements under actual conditions of use. The stocktaking study concluded that with the Directive’s current emission limits durability is not an issue. Practical experience has demonstrated that in general durability of emission abatement measures is not a serious problem unless after-treatment systems are introduced. In cases where such measures would entail a calibration of the engine that may be considered as disadvantageous by the user, there is a risk the user may change this calibration (tampering). In addition, calculations carried out for Euro3 motorcycles have demonstrated that the potential effect of an in-use compliance system is limited to 0.002 to 0.12% of the total motorcycle emissions. It should also be noted that a system of “in-use compliance” would not be possible unless all EU Member States put in place a reliable system for registration of the engines and the craft in which they are installed. Moreover, the possibilities to carry out such measurements on a small recreational craft during its operation are rather limited and no suitable and reliable testing methods have been developed so far which could readily be used in practice. In view of the limited environmental benefits and the technical and logistical difficulties associated with an “in-use compliance” system, it would not be appropriate to submit proposals for the establishment of such a system for the EU recreational craft fleet.

## **7. THE AVAILABILITY OF COST EFFICIENT TECHNIQUES FOR CONTROLLING EMISSIONS**

The available techniques for controlling emissions have been identified and the associated costs have been addressed in Chapter 4. From the compliance cost estimates emerge that emission control technology that goes beyond calibration of existing components on the engine or replacing such components by more advanced ones readily available from engine applications in other sectors may be possible but at considerable cost. In particular after-treatment technology using oxidation catalysts is being developed and tested on its reliability for an application in a marine environment and may prove to become an efficient technique for maximising the emission reduction potential of marine recreational craft.

## **8. THE NEED TO REDUCE EVAPORATION AND SPILL OF FUEL**

The main sources of fuel evaporation in recreational craft are permeation of hydrocarbons through tanks and fuel lines (70%) and diurnal breathing losses (23%).

These losses are due to the daily atmospheric temperature changes which cause the air in a fuel tank to expand and to contract, causing a release of an air/fuel mixture during warming-up. The technical solution to reduce the diurnal breathing losses is to let the fuel tank breath over a vapour recovery system, consisting of a canister filled with active carbon. However, the use of such canisters is not sufficiently tested and has not been proved effective in a marine environment, where moisture or water may enter into the canister and prevent it from operating correctly. Tank permeation could be reduced by coating the tank surfaces through fluorination or sulfonation. However these techniques represent environmental hazards and further research is needed to develop environmentally friendly tank coating techniques. Fuel hose permeation can be reduced by using appropriate materials for these hoses, and this should be addressed in the relevant harmonised standards developed in support of the RCD.

Spillage of fuel mainly occurs where boat users refuel their craft by means of jerry-cans. This problem has to be addressed locally and in accordance with the subsidiarity principle, the Commission considers it would be for the Member States to envisage operational measures where needed to reduce pollution caused by spillage.

## **9. THE POSSIBILITY OF AGREEING INTERNATIONAL STANDARDS FOR EXHAUST AND NOISE EMISSIONS**

In the context of the EU-US Transatlantic Business Dialogue attempts have been undertaken to explore with the US Environmental Protection Agency possible synergies between the US and EU legislation on exhaust emissions for recreational craft. However, from these discussions emerged that the divergences in political objectives and legislative approaches between the US and the EU considerably reduce the possibilities of agreeing on transatlantic alignment of future emission legislation for recreational craft.

Nevertheless, the Commission considers it important to continue monitoring the future developments in the US on emission reduction legislation for recreational craft and to assess to what extent these could serve as a basis for a more ambitious approach towards minimising the impact of recreational marine exhaust emissions. As already mentioned before, the Commissions intends to assess the impact of such an approach in further detail and to report back on the outcome of that assessment at a later stage.

Substantial progress has been made on international standardisation for noise emission testing, based on the results of the EU funded 'Soundboat' research project. This will enable, within the context of the international standard ISO 14509, to develop an alternative and less-expensive methodology for noise emission compliance testing. As this standard is already referred to in the RCD, there will be no need for further legislative proposals to incorporate this methodology, which once adopted, will significantly reduce the burden for manufacturers to demonstrate their craft's compliance with the noise emission requirements.

## **10. POSSIBLE SIMPLIFICATIONS OF THE SYSTEM FOR CONFORMITY ASSESSMENT PROCEDURES**

With the 2003 amendments to the RCD, the modular choice offered to enterprises for the conformity assessment procedures has already been considerably extended. However, experience with this extended modular choice is too limited to assess whether these procedures could possibly be simplified. In addition, the Commission considers that the simplification of the system of conformity assessment procedures should be dealt with in a wider context. It recommends awaiting the outcome of the inter-institutional discussions on the Commission proposal on the review of the principles governing New Approach legislation, before considering any further specific action in the context of the RCD.

## **11. THE NEED TO REVISE THE BOAT DESIGN CATEGORIES**

As a result of the inter-institutional discussions on the proposal to amend Directive 94/25/EC, an agreement has already been reached on the revision of boat design categories A and D. Stakeholder consultation on the need for further revision of the boat design categories has resulted in diverging views, with the recreational craft industry pleading against and the boating associations in favour of a further revision. Taking all elements and views in consideration, the Commission considers that there is no strong evidence to suggest that the overall safety of recreational craft could be improved by changing the current or by adding new boat design categories.

## **12. CONCLUSION**

In the light of the limited experience gained with the application of the amended RCD and taking into account the findings of this report with regard to each of the elements specified in Article 2 of Directive 2003/44/EC, the Commission envisages to further explore the possibilities for maximising the emission reduction potential of recreational craft. This would require an assessment of the impact the application of the most stringent, technology driving emission limits for recreational craft engines could have on climate protection and on the competitiveness of the EU industry and any accompanying measures that would be necessary to mitigate the social costs. Depending on the outcome of this further assessment the Commission could consider tabling appropriate proposals at a later stage.