

EN

EN

EN



COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 13.11.2008
SEC(2008) 2860

COMMISSION STAFF WORKING DOCUMENT

Accompanying document to the

Proposal for a

DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on labelling of tyres with respect to fuel efficiency and other essential parameters

IMPACT ASSESSMENT

{COM(2008)779}
{SEC(2008)2861}

TABLE OF CONTENTS

1.	Procedural Issues and Consultation of Interested Parties	5
1.1.	Organisation and Timing	5
1.2.	Consultation and Expertise	5
2.	Problem Definition	7
2.1.	Fuel-efficient Tyres: the Potential.....	7
2.2.	Possible Trade-Offs.....	9
2.3.	Underlying Drivers of the Problem.....	9
2.4.	Impact on Stakeholders	11
2.5.	Interactions with Type-Approval Legislation	12
2.6.	Evolution of the Problem without EU Action.....	12
2.7.	Legal Basis for EU Action	12
3.	Objectives.....	13
3.1.	General, Specific and Operational Objectives	13
3.2.	Consistency with Other EU Policies	13
4.	Policy Options.....	14
4.1.	Identified Policy Options	14
4.2.	Options Discarded at an Early Stage.....	15
5.	Analysis of Impacts	16
5.1.	Option 1: No EU Action.....	16
5.1.1.	Drivers of RR Improvement.....	16
5.1.1.1.	Type-Approval Legislation governing Vehicles.....	17
5.1.1.2.	Type-Approval Legislation governing Tyres.....	17
5.1.1.3.	Market Demand.....	17
5.1.2.	Expected Market Transformation – Baseline Scenario.....	18
5.2.	Option 2: Labelling Scheme for RR with Minimum Requirements on Wet Grip and External Rolling Noise for C1 Tyres.....	19
5.2.1.	Minimum Requirements Set for Wet Grip and External Rolling Noise	19
5.2.2.	Factors Determining the Design of a Banding Scheme	20
5.2.2.1.	State of the Art	20
5.2.2.2.	Production Costs	20
5.2.2.3.	Cost-Effectiveness of Fuel-Efficient Tyres – Case Study.....	22
5.2.2.4.	Precision of Testing Methods	22
5.2.2.5.	Relative versus Absolute Labelling	23
5.2.3.	Proposal for a Grading Scheme.....	23

5.2.4.	Expected Market Transformation and End-User Benefits.....	25
5.3.	Option 3: Dual-Labeling Scheme for C1 Tyres regarding RR and Wet Grip ..	27
5.3.1.	Potential for Wet Grip Improvement above Minimum Requirements.....	27
5.3.2.	Assessment of Safety Gains.....	28
5.3.3.	Factors Determining the Design of a Banding Scheme for Wet Grip.....	29
5.3.3.1.	State of the Art.....	29
5.3.3.2.	Production Costs of Optimised Wet Grip and RR.....	30
5.3.3.3.	Cost-Effectiveness – Case Study.....	30
5.3.4.	Grading Scheme for Wet Grip.....	30
5.3.5.	Expected Market Transformation regarding Fuel Efficient Tyres and End-User Benefits.....	31
5.4.	Option 4: Multi-Criteria Labeling Scheme for C1 Tyres regarding RR and Wet Grip Extended to External Rolling Noise	32
5.4.1.	Potential for External Rolling Noise Improvement above Minimum Requirements.	32
5.4.2.	Effectiveness of a Low-Noise Mark in Promoting Lower External rolling noise	34
5.5.	Option 5: Extension of the Labeling Scheme Developed for C1 Tyres (Option 2, 3 or 4) to C2 and C3 Tyres	36
5.5.1.	Wet Grip and External Rolling Noise Minimum Requirements.....	36
5.5.2.	Design of a Banding Scheme for C2 and C3 Tyres and Expected Market Transformation.....	36
5.5.3.	Inclusion of Wet Grip in a Labeling Scheme for C2 and C3 Tyres.....	39
5.5.4.	Inclusion of External rolling noise in a Labeling Scheme for C2 and C3 Tyres	39
5.6.	Option 6: Economic Instruments and Public Procurement.....	40
6.	Comparing the Options	42
6.1.	Qualitative Assessment.....	42
6.2.	Aggregated Cost-and-Benefit Analysis.....	45
6.2.1.	C1 Tyres – Options 2, 3 and 4	45
6.2.1.1.	Fuel and CO ₂ Aggregated Net Savings.....	45
6.2.1.2.	Administrative Costs.....	48
6.2.1.3.	Costs of Testing	48
6.2.1.4.	Costs of Display of the Labeling Scheme.....	50
6.2.1.5.	Potential Impact on Import/Export.....	51
6.2.2.	C2 and C3 Tyres – Option 5	52
6.2.2.1.	Fuel and CO ₂ Net Savings	52
6.2.2.2.	Further Costs	53
6.2.3.	Summary	53

7. Monitoring and Evaluation 58

COMMISSION STAFF WORKING DOCUMENT

Accompanying document to the

PROPOSAL FOR A DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on labelling of tyres with respect to fuel efficiency and other essential parameters

FULL IMPACT ASSESSMENT

Lead DG: TREN

Other involved services: ECFIN, ENTR, ENV, LS, RTD, SANCO and SG (also invited: EMPL, MARKT, INFSO, JRC, RTD, TAXUD and TRADE)

Agenda planning or WP reference: 2008/TREN/079*

1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

1.1. Organisation and Timing

In its “Energy Efficiency Action Plan”, the European Commission committed to consider drawing up a proposal for energy labelling of tyres by 2008. The Annual Policy Strategy (COM(2008) 72) announced an initiative for 2009, but the urgent need to act on energy savings led to acceleration of the process with the aim of tabling a proposal before the end of the legislature, as announced in the Communication on Greening Transport (COM(2008) 433).

The impact assessment (IA) work was launched in January 2008 supported by an Inter-Service Steering group (ISG) including SG, LS, ENTR, ENV, ECFIN, SANCO, RTD. The agreement of the ISG was forthcoming during all critical steps of the impact assessment, namely: design of the IA and policy options at the 7 March meeting, drafting and publication of the stakeholders’ consultation working document, results of the 26 May workshop and feedback on the preliminary draft IA on 12 June.

1.2. Consultation and Expertise

An external study was contracted from December 2007 to July 2008 with the European Policy Evaluation Consortium (bringing together the consultancy firms GHK and TNO), further referred to as [EPEC 2008], to give input to this IA. The external study looked at the technical background supporting the design of a labelling scheme, including market structure and cost/benefit analysis.

The opinion of stakeholders was gathered consistently throughout the process through bilateral meetings and various consultations, including a dedicated stakeholder workshop, and thus the Commission's minimum standards on public consultation can be considered to be met.

- First reactions were gathered during ENTR's¹ public consultation on the Advanced Safety of Motor Vehicles from August to October 2007, which included a proposal for a grading of tyre fuel efficiency². This provision was finally withdrawn from ENTR's proposal so as to allow for a more in-depth analysis within this impact assessment, but feedback on this grading proposal has been taken into account.
- An expert group meeting with representatives of the tyre industry took place on 21 April 2008 in order to clarify technical issues (see minutes in Annex 1).
- A stakeholder workshop was held on 26 May 2008 with Member State representatives, NGOs, consumer and business organisations, the tyre industry and car producers (see minutes in Annex 2). The working document containing questions on various policy choices to be addressed at the workshop and stakeholders' replies were published on the Europa website³.

Stakeholder consultation was instrumental in defining policy options and the design of a labelling scheme. **All respondents throughout the consultation process in general supported the introduction of a labelling scheme** but with reservations on some technical issues:

- The first public consultation by ENTR highlighted the need not to downgrade tyre safety performance characteristics when designing a labelling scheme to support fuel-efficient tyres (see Box 1). The tyre industry developed the concept of a "Tyre Performance Integrated Approach" calling for simultaneous consideration of all relevant parameters. This concern was taken into account in two ways: (1) extensive research, as part of the external study, on the technical relation and possible trade-offs between tyre parameters, and (2) consideration of additional policy options which would include, together with rolling resistance, a grading of wet grip (relevant for safety) and possibly external rolling noise.
- Of the seven respondents taking a position on the specific fuel efficiency grading of tyres presented by ENTR in August-October 2007 (ENTR initially proposed four bands from A to D, "A" being the most energy-efficient), six asked for band A to be more demanding and for the banding scheme to be the same as the one in place for household appliances (labelling which grades products on an "A to G" scale, see sample in Annex 4). The rationale is that the actual range of tyre performance allows for seven bands and that the "A to G" scale is already a labelling scheme well known by consumers and makes for better differentiation between products (see Section 5.2.2).
- Some stakeholders requested the inclusion of external rolling noise in the labelling scheme. External rolling noise, which was not originally included within the scope of the IA, was consequently addressed in the fourth policy option: multi-criteria grading scheme.

¹ Directorate-General for Enterprise and Industry of the European Commission.

² See <http://ec.europa.eu/enterprise/automotive/pagesbackground/safety/consultation/index.htm>.

³ See http://ec.europa.eu/energy/demand/legislation/under_discussion_en.htm.

- The International Road Transport Union (IRU) representing the road transport industry was in favour of including C2 and C3 tyres in the labelling scheme. This possibility was addressed in one of the policy options.

Box 1: **Fuel-efficient tyres** refer to tyres with lower rolling resistance hence lower fuel consumption. They are also referred to as eco-tyres, green tyres, or **low-rolling-resistance tyres (LRRTs)**. Currently there is no common definition of such tyres, though the designation LRRTs is sometimes used for all tyres made with silica (50% of the market), but this cannot be considered as a valid definition as there is still a significant range of RR performance among those tyres. In this study, the terms fuel-efficient tyres or LRRTs will be used in the same way, and will refer to tyres with rolling resistance lower than the average level on the market.

2. PROBLEM DEFINITION

2.1. Fuel-efficient Tyres: the Potential

Against the backdrop of current concern to reduce the environmental footprint of transport, the Commission is looking into vehicle components as formulated in the new integrated strategy to reduce CO₂ emissions from passenger cars and light-duty vehicles (COM(2007) 19).

Tyres are an important component of cars as they **account for 20% to 30% of fuel consumption** depending on vehicle speed (over 70km/h, aerodynamic drag exceeds rolling resistance as a parameter influencing consumption). This share of fuel is used to overcome **rolling resistance (RR)** caused mainly by what is called “hysteretic loss” (loss of energy through the heating and deformation of the wheels while rolling). There has been constant improvement on rolling resistance over the past decades but at a low rate, with a 5% decrease in RR per decade according to OECD/IEA 2005⁴ (after accounting for performance improvements).

New technologies have made it possible to significantly lower the RR of tyres without downgrading other tyre performance characteristics such as safety or handling, so that today the **RR of tyres put on the market** (usually measured with a coefficient expressed in kg/t or ‰) **can vary by up to 100%:** between 7kg/t and 14kg/t for passenger cars, according to the ETRMA⁵ state of the market in 2004. Studies and tyre manufacturers demonstrate that **a 1kg/t decrease in rolling resistance** of passenger car tyres **leads to about a 1.5% fuel saving** independent of the drive cycle⁶, which means a difference in total vehicle fuel consumption between the best- and the worst-performing tyre of up to 10%. This is equivalent to a reduction of 15 to 20 g/km CO₂ emission for a medium-size car depending on whether it is a diesel or petrol car. For **truck tyres, a 1kg/t variation in RR means on average a 5% fuel saving.**

⁴ European Conference of Ministers of Transport, *Making Cars more Fuel-Efficient – Technology for Real Improvements on the Road*, OECD/IEA, 2005, p.44.

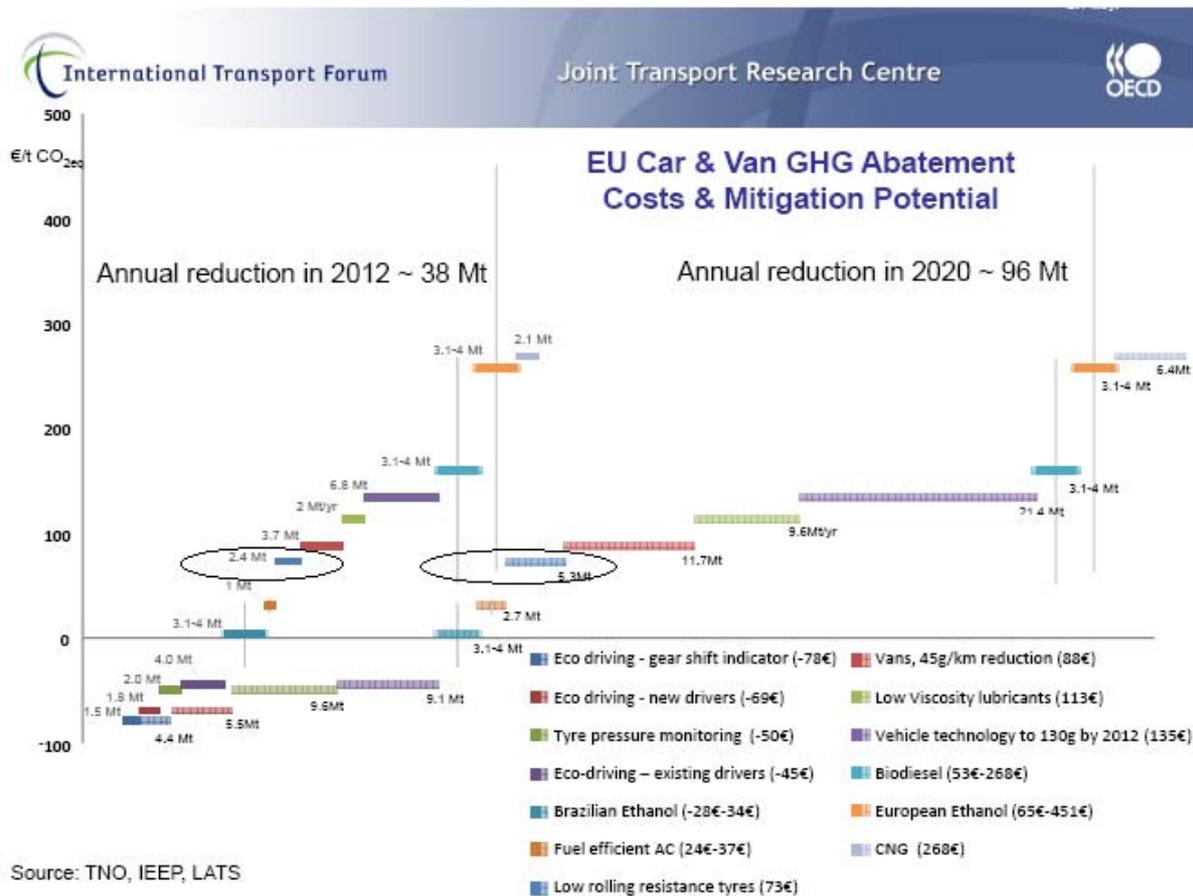
⁵ ETRMA is the European Tyre and Rubber Manufacturer Association representing the tyre industry.

⁶ Drive cycle refers to urban, extra-urban or motorway driving. RRC remains almost constant up to 120km/h. See *Reducing Tire Rolling Resistance to Save Fuel and Lower Emissions*, Jerome Barrand, Jason Bokar, Michelin, April 2008, available on <http://www.sae.org/technical/papers/2008-01-0154>.

Fuel efficient tyres (see Box 1) are **cost-effective**⁷. The increased production costs, i.e. the purchase price paid by consumers, will be compensated by fuel savings made in the in-use period with a payback period of less than eight months (including tax) for the most fuel-efficient tyres (see Tables 9 and 11).

They have also been identified as a **relatively low-cost way of reducing CO₂ emissions**, as illustrated by **Figure 1**.

Figure 1: Road Transport CO₂ Abatement Costs by Policy Options



Source: Joint Transport Research Centre 2007⁸

⁷ Life cycle analysis shows in addition that no adverse impacts on the environment are to be expected from the increased use of fuel efficient tyres – see, for example, *Review and Analysis of the Reduction Potential and Costs of Technological and Other Measures to Reduce CO₂ Emissions from Passenger Cars*, TNO, 2006, p. 119.

⁸ <http://internationaltransportforum.org/docs/SPnordwijk07.pdf>.

Studies⁹ differ on the exact CO₂ abatement costs due to the use of fuel efficient tyres, some estimating it to be negative, others to be at €73 t/CO₂eq depending on the fuel price and reduction assumptions in fuel savings due to rolling resistance, but it is very clear, as shown in Figure 1 above, that CO₂ abatement costs due to the increased use of fuel efficient tyres are relatively low compared to other policy options to reduce greenhouse gas emissions. One could also point out that the graph above is based on conservative estimates (€50 per oil barrel); with the recent increases in the fuel price, CO₂ abatement costs due to market take-up of fuel efficient tyres were calculated to be indeed negative (see Section 6.2.1.1).

It is clear from all the above that the promotion of market transformation towards fuel efficient tyres may be in the interest of both consumers and society.

2.2. Possible Trade-Offs

Preliminary results of the IA and the opinions expressed during the stakeholder consultation have shown that **lowering rolling resistance may have an adverse impact on other tyre parameters**, the most important of which is wet grip (see Box 2), but also tread wear (life duration of tyres) and external rolling noise. Numerous surveys show indeed that while it is possible to improve different tyre attributes at the same time but often at higher production costs, it is also possible to optimise at no additional cost one parameter within a given technology but at the expense of another.

The potential trade-off between tyre performance characteristics **has therefore been included in the analysis.**

Box 2: **Wet grip** refers to the safety performance of tyres; it reflects the capacity of a tyre to brake on a wet road. There are other parameters which are relevant for safety (namely road holding ability, directional control, deceleration ability on wet and dry surfaces at higher speed and aquaplaning behaviour) but existing testing methods make it possible only to measure wet grip. Since the expert group meeting concluded on 21 April that the correlation between wet grip and the other safety parameters is good (see minutes in Annex 1), the impact assessment will consider only wet grip.

2.3. Underlying Drivers of the Problem

The development of fuel efficient tyre tends to be hampered by **a market failure arising from the lack of information for end-users** on tyre fuel efficiency (including road transport companies, according to interviews with the International Road Transport Union). This is especially true for the replacement market, constituting 78% of market share (see Box 3).

Box 3: The **original equipment** (OE) market refers to the market of tyres originally fitted on new vehicles before sale. Those OE tyres are developed and selected by car producers in close cooperation with tyre suppliers in the design phase of a given vehicle. It accounts for 22% of the entire tyre market (see details in Annex 5). The **replacement market** in contrast refers to tyres designed to replace those originally fitted on new vehicles once they are worn out, usually after 40 000 km in Europe. It constitutes 78% of market share. Legislation makes the replacement of tyres mandatory once the tread wear indicator has reached 1.6 mm¹⁰.

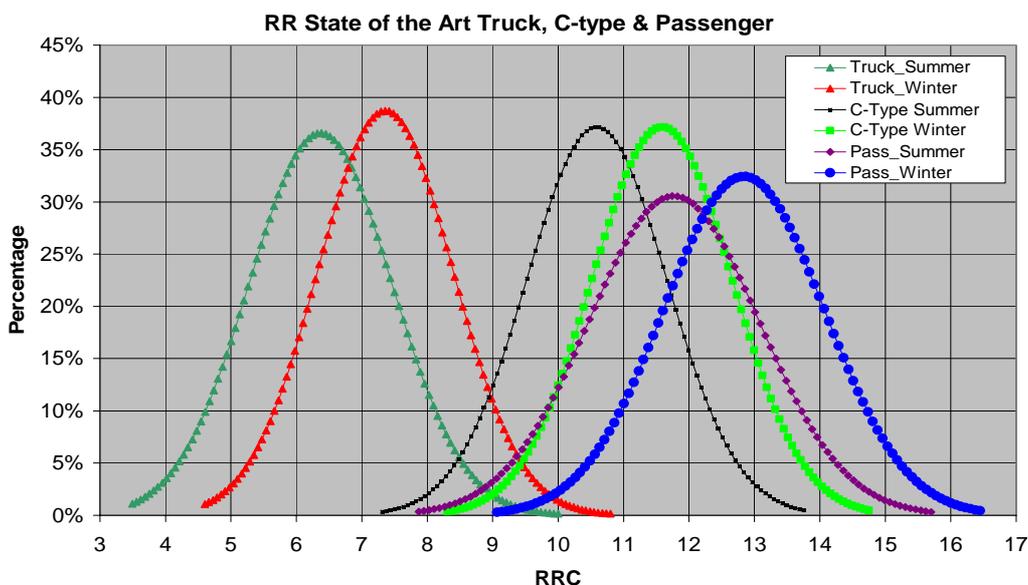
⁹ See Cost-Effectiveness of Greenhouse Gases Emission Reductions in Various Sectors, INFRAS, November 2006, p. 111 or [OECD/IEA 2005] and [TNO 2006].

¹⁰ UNECE Regulation No 30:
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:201:0070:0096:EN:PDF>.

Figure 2 shows the distribution of RR for all tyre classes (see Box 4).

Box 4: **Tyre classes** reflect the different market segment of tyres related to the type of vehicles for which they are designed. They are defined in the proposal for a Regulation on the general safety of motor vehicles (COM(2008) 316) as **C1, C2 and C3 tyres** representing respectively tyres fitted on passenger cars (87% of total tyre sales), light-duty vehicles (8% of tyre sales) and heavy-duty vehicles (5% of tyre sales). Each class may then be broken down into winter and summer tyres, respectively 28% and 72% of the EU market.

Figure 2: Market Distribution of RR by Tyre Classes in 2004



Source: ETRMA

The graph clearly illustrates the existence of a market failure. For C1 summer tyres, for example, (“Pass_Summer” curve on the graph), more than 80% of tyres sold on the market (OE and replacement markets included) have a rolling resistance above 10.5kg/t, and only 2% under 9kg/t, even though the latter tyres are cost-effective (around 3% fuel savings compared to average – see Section 5.2.2).

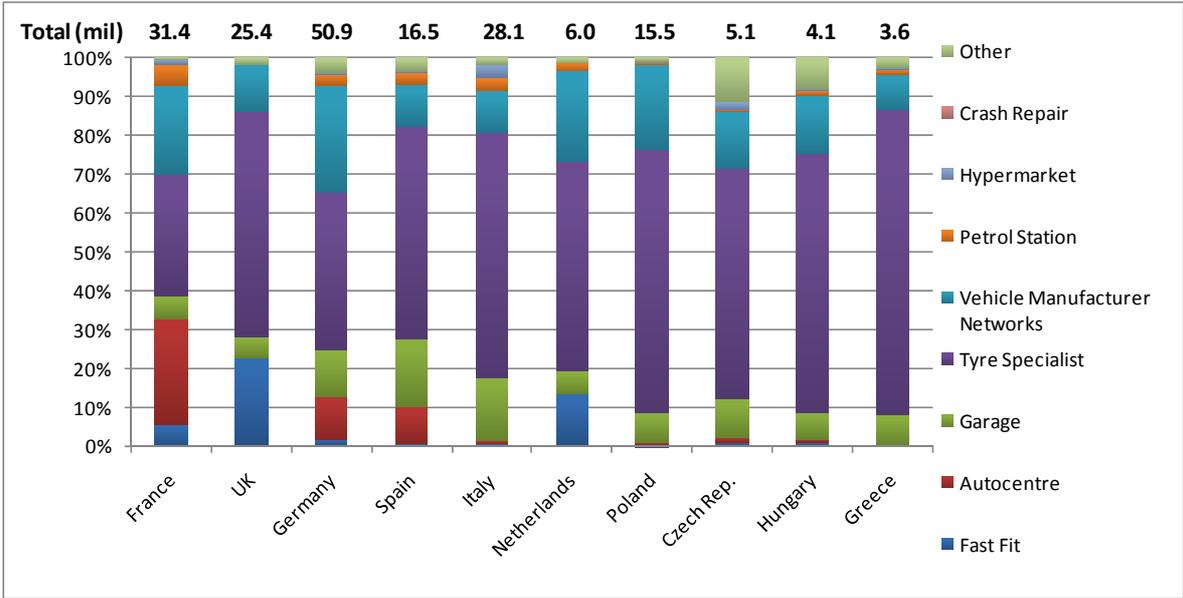
The tyre market has traditionally been a concentrated one. Recent trends on the tyre market (i.e. increasing imports¹¹, demand from specialised tyre retailers for exclusive brands, and new brand strategies by the tyre industry) have greatly strengthened competition, so that today consumers are confronted by an increasing number of tyre brands. In the Netherlands and the UK, for example, consumers may be faced respectively by as many as 140 and 250 different brands. This increase in competition obliges producers to work more on product differentiation and improving product quality. The lack of a harmonised labelling scheme, however, does not enable tyre producers to communicate objectively with consumers on the quality of their products.

¹¹ Imports from third countries (China, India and South Korea) for example have increased by 300% over the last five years.

Up to now the information available to consumers/end-users regarding the fuel efficiency of tyres is provided by manufacturers only. Various claims have indeed been made as regards tyre impact on fuel consumption, but the information provided does not enable fair comparison between tyres and is sometimes difficult to understand¹². Consumers/end-users cannot reliably compare tyre purchase costs with prospective fuel savings in the in-use phase of the tyres.

Finally, the distribution market has also considerably changed over the past years with the development of new distribution chains, such as hypermarkets and specialised branches (Figure 3) which would increase the visibility and effectiveness of a labelling scheme if it were introduced.

Figure 3: Share of Replacement Market by Point of Sales



Source: Datamonitor, quoted in [EPEC 2008]

2.4. Impact on Stakeholders

This market failure impacts:

- **End-users** (consumers, companies or local authorities owning small or larger fleets such as leasing companies, and road transport operators) who do not benefit from the net savings that they could obtain with fuel efficient tyres.
- **Tyre producers** who have more difficulties in obtaining a return on their investments in R&D (R&D is already instrumental in obtaining market share on the OE market as car producers have the know-how on tyres, but is less rewarding on the replacement market).
- **Society** as a whole, with potential social benefits exceeding consumer benefits due to transport externalities (reduced greenhouse gases (GHG) emissions, health effect from air pollution caused by vehicles’ pollutant emissions (NOx, particulate matter, etc.) and increased security of supply (from increased fuel efficiency).

¹² See in-depth description of the tyre market in VTI, *Consumer Label for Tyres in Europe*, U. Sandberg, March 2008.

A labelling scheme could also improve competition between tyre producers while providing a level playing field for all. Producers may both have incentives to provide better-performing tyres on the market and benefit from reduced entry barriers as brand reputation may lose its importance compared to objective tyre performance characteristics.

2.5. Interactions with Type-Approval Legislation

Type-approval legislation refers to the framework setting mandatory quality standards in the automotive sector. It includes the proposal for a Regulation on the general safety of motor vehicles (COM(2008) 316) which defines new minimum requirements for tyres including wet grip, external rolling noise and rolling resistance (see Annex 6). This proposal partly addresses the market failure described above: new requirements on wet grip will greatly improve road safety since they will ban 30% of the worst-performing tyre from the market. New minimum requirements on external rolling noise will reduce traffic noise, and the minimum requirements on RR will progressively improve tyre fuel efficiency.

However, given the urgent need to improve transport energy intensity, momentum exists for going beyond these minimum requirements. It is proposed to follow an integrated approach in order to improve tyre fuel efficiency. While type-approval legislation addresses the supply side, this impact assessment considers additional measures addressing the demand side. The objective is to support **dynamic improvement of tyre fuel efficiency** above the minimum requirements **through the operation of market forces**. As for energy-using products, combined action through eco-design (the setting of minimum requirements) and labelling have proven to be the most effective way of supporting fuel efficiency and innovation. This approach was also favoured for passenger cars, with type-approval legislation defining emission requirements on the one hand and the Car Labelling Directive on the other: minimum requirements ban the worst-performing product while energy labelling gives incentives and rewards to producers to put better-performing products on the market.

Another interaction is related to the test procedures. It is proposed to follow the same test procedures as those defined in the type-approval legislation and its implementing measures.

2.6. Evolution of the Problem without EU Action

Improvements in RR (relevant for tyre fuel efficiency) have been and will be further driven first by the OE market, due to the regulatory pressure put on producers to reduce car emissions, and second by the minimum requirements governing RR which are laid down in the proposal for a Regulation on the general safety of motor vehicles (COM(2008) 316) described above. Demand from road transport professionals interested in reducing their costs per km must also have driven the market towards lower RR, but to a lesser extent (see Section 5.1 for detailed explanation).

Estimation of tyre market distribution by RR in 2020 without EU action shows that the market will go towards lower RR but still not at an optimum level (see Section 5.1.2). For C1 summer tyres, for example, tyres below 7.5kg/t will make up only 1% of the market and only 12% will be below 8.5kg/t, even though the technology exists and is cost-effective.

No measures have been put in place on the replacement market to respond to the identified market failure, even though the periodic tyre replacement during vehicle lifetime provides the opportunity to gradually fit road transport fleets with energy-efficient tyres.

2.7. Legal Basis for EU Action

The legal basis for a legislative proposal is Article 95 of the Treaty. In order to achieve a level playing field for all and to avoid fragmentation of the internal market, it is proposed to set a harmonised labelling scheme European-wide.

3. OBJECTIVES

3.1. General, Specific and Operational Objectives

The above problem definition and its drivers lead to the setting of the following objectives.

- **General Policy Objectives**

- Reduce fuel consumption and related CO₂ and pollutants emissions due to road transport in the framework of sustainable mobility and the fight against climate change.
- Promote fuel efficiency, hence contributing to security of supply as part of the Community objective of saving 20% of the EU's energy consumption by 2020.
- Promote competitiveness of the tyre industry through innovation within the internal market.

- **Specific Objectives**

- Promote market take-up of fuel-efficient tyres.
- Drive investments in R&D towards environmentally friendly tyres.
- Maintain other tyre parameters at least at the same level (especially wet grip and external rolling noise).

- **Operational Objective**

- Create a level playing field for the provision of information on the performance of tyres (C1 and possibly C2 and C3 vehicles) (i.e. a labelling scheme) with targeted and easy-to-understand information for consumers, companies and retailers.
- This may include performance grading that would be made available to users via different media (e.g. electronic, catalogues, label) allowing fair and objective comparison between tyres¹³.

3.2. Consistency with Other EU Policies

Increased market take-up of fuel-efficient tyres, through the introduction of an energy labelling scheme, will **contribute to achieving the 20% energy savings potential by 2020 identified** in the Energy Efficiency Action Plan (COM(2006) 545) – subsequently endorsed by the Energy Council and the European Council as well as the European Parliament¹⁴. It is also in line with the input of the CARS 21 high-level group (COM(2007) 22) and the new integrated strategy to reduce CO₂ emissions from passenger cars (COM(2007) 19, see Box 5).

¹³ The measured RR coefficient is by definition independent of vehicle load. This allows comparison across all tyres irrespective of vehicle size.

¹⁴ TTE, (Energy) Council on 23 November 2006, 15210/06; Brussels European Council 8/9 March 2007, Presidency Conclusions, 7224/07; European Parliament resolution of 24 October 2007 on the Community Strategy to reduce CO₂ emissions from passenger cars and light commercial vehicles (2007/2119 (INI)), point 32.

Box 5: The revised Commission strategy on CO₂ from passenger cars and light commercial vehicles is based on an integrated approach to reach the 120g/km CO₂ target by 2012. It includes a target of 130g/km CO₂ achieved by means of a legislative instrument on car emissions as measured at type approval (COM(2007) 856) and a further 10g/km or equivalent achieved by means of a closed list of additional measures (COM(2007) 19). These additional measures include the setting of minimum requirements on tyre rolling resistance but not a labelling scheme. The benefits of the market take-up of LRRTs beyond these legal requirements discussed in this impact assessment will therefore add up to the 10g/km CO₂ target.

Promotion of market transformation towards fuel efficient tyres complies with the Lisbon and renewed Sustainable Development Strategy¹⁵ as it will encourage investment in R&D, provide for a level playing field for all and reduce the carbon footprint of road transport, thereby contributing to the policy goal towards sustainable mobility as expressed in the Communication on Greening Transport (COM(2008) 433).

One of the key objectives defined in the Community Lisbon Programme for 2008-2010 (COM(2007) 804) is the promotion of an “industrial policy geared towards more sustainable consumption and production”, as further elaborated on in the Action Plan on Sustainable Consumption and Production and Sustainable Industrial Policy (COM(2008) 397/3).

Tyre labelling will also play an important part in the objective of “empowering consumers” formulated in the EU Consumer Policy Strategy 2007-2013 (COM(2007) 99) since it will enable consumers to make an informed and better choice when buying replacement tyres. **It will be reinforced by the revised car labelling scheme** (Directive 1999/94/EC) which will lay down a harmonised label for passenger cars across Europe. It is proposed to use the same energy class design (grading on an "A to G" scale) for both cars and tyres in order to enhance recognition of the label.

Energy savings due to fuel efficient tyres would also be increased by the proposal for a Regulation on the general safety of motor vehicles (COM(2008) 316) which will make a tyre pressure monitoring system mandatory on passenger cars.

4. POLICY OPTIONS

4.1. Identified Policy Options

Several policy options have been identified for promoting market transformation towards more fuel-efficient tyres.

- **Option 1:** No EU action. This is the baseline scenario, including the adoption of minimum requirements governing RR as proposed in COM(2008) 316 and existing incentives for car producers to fit their vehicles with fuel efficient tyres in order to reduce type-approved (TA) emissions measured levels.
- **Option 2:** Single-criterion labelling scheme for passenger car tyres (C1 tyres, see Box 3) regarding fuel efficiency (RR), with minimum requirements on other parameters (wet grip and external rolling noise), but no labelling of truck and van tyres (C2 tyres) and for trucks and buses (C3 tyres).
- **Option 3:** Dual-labelling scheme for C1 tyres regarding fuel efficiency (RR) and wet grip, with minimum requirements on external rolling noise, but no labelling for C2 and C3 tyres.

¹⁵ OJ L 242, 10.9.2002, and Council Document 10917/06 of 26.6.2006.

- **Option 4:** Multi-criteria labelling scheme for C1 tyres regarding fuel efficiency (RR) and wet grip extended to external rolling noise, but no labelling for C2 and C3 tyres.
- **Option 5:** Extension of the labelling scheme developed for C1 tyres (Option 2, 3 or 4) to C2 and C3 tyres.
- **Option 6:** Economic instruments and public procurement. This option does not necessarily substitute Options 2 to 5 but could complement them.

In Options 2 to 5, the width of the bands and the design of the grading scheme will greatly influence the impact of tyre labelling; they will therefore be assessed in detail.

4.2. Options Discarded at an Early Stage

Five options have been discarded at an early stage:

- **Self regulation/voluntary agreements:** Although there is a rather high concentration of sales among EU producers, voluntary agreements appear difficult in practice because of recent changes in the tyre market resulting in an increasingly scattered market: tyre imports now account for 30% of the market, with a 300% growth in imports from Asian countries (China, India and South Korea) over the past five years. Consequently, there appear to be too many actors on the market for a voluntary agreement to be effective and to avoid free riders. The tyre industry itself did not table a voluntary agreement, but asked instead for a harmonised labelling scheme. In addition, consumer organisations are sceptical about the value of such voluntary agreements and favour a harmonised labelling scheme¹⁶.
- **Use existing regulatory initiatives:** a possibility could have been to include tyres as an implementing measure of a revised Energy Labelling Directive (Directive 92/75/EC on the energy labelling of household appliances) if extended to “energy-related products”. However, considering the complexity and the number of other relevant Community measures already affecting them, vehicles and their components will not be covered in the reviewed Directive.
- **Implement a CO₂ bonus scheme for car producers using fuel efficient tyres on the OE market:** some stakeholders called for a bonus scheme which could reward car producers (for instance with a rebate on the CO₂ emissions threshold) for using energy-efficient tyres or tyres below the worst one used for “type-approval” emission measurements (mandatory measurement of emissions to check whether a car complies with the EU standards defined in the “type-approval” legislation). A bonus scheme would run the risk of interfering with the ongoing co-decision process on the proposed Regulation on CO₂ from cars, or with the agreed shares of emission reductions under the integrated approach (see Box 5 above). It is therefore not pursued further at this stage.
- **Inclusion of retreaded tyres:** Retreaded tyres are truck tyres whose life is extended by replacing the worn-out tread. It accounts for approximately 50% of the C3 market. The state of the knowledge and data on this market is too low to design concrete policy actions. Though the majority of stakeholders agreed that the inclusion of retreaded tyres in a labelling scheme would be desirable, in practice it may be impossible to implement. This is mainly due to the interaction between tread and carcasses, which would require each individual retreaded tyre to be tested and would therefore involve too high testing costs (see minutes of the workshop, Annex 2, answer to question 6).

¹⁶ See *i.a.* ANEC/BEUC contribution to the revision of the Energy-Using Products Directive (Directive 2005/32/EC), *Consumer interests in Eco-design (of energy-using products)*, Sylvia Maurer, 2008.

Regarding the design of the labelling scheme, some possibilities were also rejected at an early stage:

- **Endorsement label** or “label of excellence” such as the European eco-label (the green flower) declaring that a specific product complies with high-quality criteria: Experience from voluntary endorsement labels for tyres such as the Nordic Swan in the Nordic countries, the Blue Angel in Germany or the Ecologo in Canada proved to have a minor impact on the tyre market and to raise little interest from the tyre industry itself. Stakeholders, including the tyre industry, asked for a “**performance label**” instead – a scheme that would enable objective comparison between products, such as the banding scheme with the A to G scale used for household appliances (see sample in Annex 4).
- **Inclusion of tread wear** (life duration of a tyre) in a multi-criteria grading scheme: technical analysis shows that there may be a trade-off between RR and tread wear in a given technology, but this was not taken any further for two reasons (see minutes of the 21 April 2008 expert group meeting in Annex 1).
 - The life duration (tread wear) of tyres is a parameter consumers can take clear notice of when they have to change their tyres. Market surveys show that “long-lasting tyres” constitute the most important criterion in consumers’ purchasing decisions. The market is therefore considered to be self-regulating: no established tyre manufacturer would take the risk of decreasing the lifetime of a tyre, knowing that consumers will notice it (even if a few years after the purchasing decision) and lose confidence in the brand.
 - There are no reliable testing methods for tread wear and testing would be very costly (due to the necessity to test tyres over 10 000 km).
 - Aware of the necessity to avoid the potential adverse impact on the environment of reduced tread wear (which would increase tyre waste, hence compensate for the gains due to fuel efficiency), tyre experts agreed that it may be necessary, some time after the implementation of a labelling scheme, to reassess the situation and its impact on tread wear.
- **Distinguishing between winter/summer tyres** in the labelling scheme: First figures seemed to indicate that a different grading scheme should be implemented in both market segments accounting respectively for 28% and 72% of the market [EPEC 2008]. However, there are two major concerns opposing such an approach: (1) the absence of a satisfactory definition of winter tyres and summer tyres, which is still being discussed at UNECE level, and (2) contradictory data on the average RR of winter and summer tyres, which makes it impossible to draw any conclusions on the design of a distinct grading scheme. ETRMA’s 2004 state of the market shows a difference in the average RR of winter and summer tyres of 1kg/t (winter tyres 1kg/t above summer tyres), while VTI and M+P found the opposite results (winter tyres 1kg/t less than summer tyres).

5. ANALYSIS OF IMPACTS

5.1. Option 1: No EU Action

5.1.1. Drivers of RR Improvement

Option 1 is the baseline scenario and includes EU initiatives already in the pipeline – namely (1) type-approval legislation for vehicles, which puts pressure on motor vehicle producers to reduce emissions, (2) type-approval legislation governing tyres and (3) market demand.

5.1.1.1. Type-Approval Legislation governing Vehicles

Directive 2007/46/EC provides a framework for all requirements with which car producers have to comply, including mandatory requirements on pollutant emissions¹⁷ measured in what is known as the type-approval (TA) procedure. New future requirements for car CO₂ emissions¹⁸, and tax incentives to encourage the purchase of cars with lower emissions, are putting additional pressure on vehicle producers. This has led them to request their suppliers to deliver tyres with lower RR (as tyres have a direct impact on fuel consumption and hence TA measured emissions).

It is also likely that the considered provision on mandatory measurement of CO₂ and pollutant emissions in connection with tyres with the highest rolling resistance¹⁹ (out of those developed for a specific vehicle) will have a positive impact on the average RR of the OE market (tyres fitted on new vehicles, see Box 3). The rationale is that car producers who have to comply with stringent emission limits will put more pressure on their suppliers for reduced rolling resistance of all OE tyres as they will be obliged to do the testing with the worst-performing.

Improvements on tyre fuel efficiency have therefore been driven mainly by the OE market which accounts for 22% of market share. Consumer surveys vary on the real impact of the OE market on the replacement market, some showing that around 20% of consumers replace their tyre with the same brand as the original one ([EPEC 2008] based on tyre producers' surveys), other estimating it at about 50% (ETRMA contribution at the 26 May workshop). While it is certain that car producers' choice on the OE market has a **spillover effect** on the replacement market, it can be expected that consumers will turn back to cheaper replacement tyres unless they are properly informed about the monetary, safety and environmental benefits of buying better-performing ones.

5.1.1.2. Type-Approval Legislation governing Tyres

Standards for tyres were defined in Directive 1992/23/EC and its subsequent amending Directives. They will be replaced by the proposal for a Regulation on the general safety of motor vehicles (COM(2008) 316) which lays down the gradual introduction of minimum requirements regarding rolling resistance (see Annex 6).

5.1.1.3. Market Demand

Improvement in RR must also be driven to some extent by road transport companies wishing to reduce their costs per km. Bilateral interviews with large fleet managers show, however, that their knowledge about the relation between rolling resistance and fuel consumption is very diverse, with (i) some fleet managers aware of the issue but complaining about the difficulty of comparing tyre RR performance and its impact on fuel consumption²⁰, and

¹⁷ E.g. Regulation (EC) No 715/2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6), proposal for a Regulation with respect to emissions from heavy-duty vehicles (Euro VI) (COM(2007) 851).

¹⁸ Proposal for a Regulation setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO₂ emissions from light-duty vehicles (COM(2007) 856).

¹⁹ Or second-highest – if there are more than three sizes of tyre. See implementing measure of Regulation 715/2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6), Annexes III, point 3.5 and Annexes XII point 3.2, see <http://ec.europa.eu/enterprise/automotive/directives/proposals.htm>.

²⁰ Fleet managers willing to test fuel-efficient tyres will have to use them on a wider fleet over a year on average to obtain reliable results on related fuel consumption. It is understandable, therefore, that their capacity to test different products is limited.

(ii) fleet managers sceptical or unaware of the fuel savings potential. Market surveys show that price and mileage are currently the first and only parameters which fleet managers take into account in their purchasing decision. This is confirmed by the actual market distribution of C3 tyres (high variation between tyre fuel-efficiency performance and sub-optimal average at 6.5kg/t instead of 4kg/t to 5kg/t, the current state of the art) which shows that there must be some barriers to the development of fuel efficient tyres on this market as well. It is also likely that leasing companies, even though they may have the knowledge about technical issues related to tyre fuel efficiency, will not take it into account as, in the end, they do not pay the fuel bills.

5.1.2. *Expected Market Transformation – Baseline Scenario*

Continuous improvements in rolling resistance and market share over time due to the combination of these three factors have been evaluated by [EPEC 2008]. For the sake of this impact assessment and to facilitate comparison between policy options and the reference case, the expected market distribution is represented, in Tables 2, 3 and 4, using the same banding scheme which is proposed in the other policy options. It assumes, because of the market failure, that there will be no C1 and C2 tyres below 7kg/t and 6.5kg/t, even though the technology should be available in the years to come.

Table 1: Market Distribution of C1 Replacement Tyres (Summer and Winter), Baseline Scenario

RRC (kg/t)	below 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	Above 12
2012	0%	1%	6%	5%	16%	29%	44%
2013	0%	1%	7%	6%	19%	37%	29%
2014	0%	1%	8%	7%	22%	43%	19%
2015	0%	1%	9%	8%	27%	54%	/
2016	0%	1%	9%	8%	27%	54%	/
2017	0%	1%	11%	12%	39%	36%	/
2018	0%	1%	13%	13%	47%	25%	/
2019	0%	2%	17%	17%	63%	/	/
2020	0%	2%	17%	17%	63%	/	/

Source: [EPEC 2008]

Table 2: Market Distribution of C2 Tyres (Summer and Winter), Baseline Scenario

RRC (kg/t)	below 6.5	6.5 to 7.5	7.5 to 8.5	8.5 to 9.5	9.5 to 10.5	above 10.5
Base SOA 2004		0%	5%	18%	36%	41%
2013	0%	1%	4%	18%	42%	35%
2014	0%	1%	4%	21%	50%	23%
2015	0%	1%	6%	27%	66%	0%
2016	0%	1%	6%	27%	66%	0%
2017	0%	1%	8%	46%	45%	0%
2018	0%	1%	10%	58%	30%	0%
2019	0%	1%	14%	84%	0%	0%
2020	0%	1%	14%	84%	0%	0%

Source: [EPEC 2008]

Table 3: Market Distribution of C3 Tyres (Summer and Winter), Baseline Scenario

RRC (kg/t)	below 4	4 to 5	5 to 6	6 to 7	7 to 8	above 8
Base SOA 2004/2008	1%	8%	23%	33%	23%	10%
2013	1%	9%	24%	34%	25%	7%
2014	1%	9%	24%	35%	26%	4%
2015	1%	9%	25%	36%	26%	3%
2016	1%	9%	25%	36%	26%	2%
2017	2%	13%	36%	30%	19%	0%
2018	2%	16%	43%	26%	12%	0
2019	3%	17%	48%	24%	8%	0
2020	3%	19%	51%	22%	6%	0

Source: [EPEC 2008]

5.2. Option 2: Labelling Scheme for RR with Minimum Requirements on Wet Grip and External Rolling Noise for C1 Tyres

5.2.1. Minimum Requirements Set for Wet Grip and External Rolling Noise

The proposed minimum requirements for wet grip and external rolling noise (if adopted as such in the ongoing co-decision procedure, see Annex 6) will already guarantee that improved rolling resistance will not be achieved at the expense of a deterioration in these two parameters.

The proposed minimum requirements for wet grip were defined at UNECE level during the adoption of new external rolling noise limits in order to avoid the latter from being achieved to the detriment of safety. At the time of the negotiations (from 1999 to 2005), the safety performance characteristics of tyres were considered to be satisfactory by all stakeholders (confirmed by ENTR and the UK government in its written reply during the public consultation). This judgement seems to be confirmed by the Nordic Ecolabel as it requires that an eligible tyre demonstrates a wet grip that is as good as or better than other equivalent tyres on the Nordic market – in other words, the minimum grip for an equivalent tyre on the market sets the level at which safety is determined.

5.2.2. *Factors Determining the Design of a Banding Scheme*

The design of a banding scheme is based on several factors: (1) the state of the art, (2) production costs to achieve a certain level of RR which – compared to the related fuel savings – will determine the (3) cost-effective levels towards which the market can be rationally expected to be driven, (4) the precision of testing methods which may limit the width of the bands, and (5) the market structure which may call for a relative grading scheme or an absolute one.

5.2.2.1. State of the Art

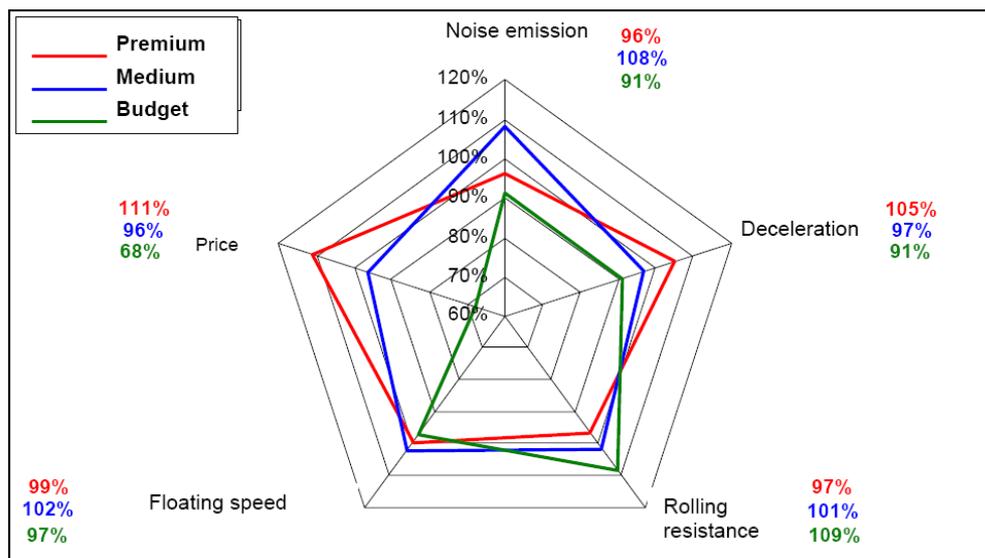
According to [EPEC 2008] and figures provided by tyre producers, the best tyres on the market in 2008 (with good wet grip performance) are around 7.5kg/t but only on the OE market. On the replacement market, the state of the art in 2008 is between 8kg/t and 8.5kg/t, while a prototype at 5kg/t already exists. Interviews with the tyre producers showed that it would be possible to produce tyres at 6kg/t to 6.5kg/t within a few years.

It may be possible to reduce RR below this level, some spoke of 3.5kg/t by 2030, but existing technologies and know-how make it impossible to anticipate the production costs of such innovations. It is likely that above a certain level fuel efficient tyres will cease to be cost-effective, as any increased gain in RR will be achieved through a disproportionate increase in production costs.

5.2.2.2. Production Costs

Since tyres parameters are interrelated, production costs are related to the performance balance achieved (Figure 4).

Figure 4: Performance Optimisation and Production Costs



Notes

- Relative noise emission: a higher percentage means a higher noise emission (i.e. >100% is worse).
- Relative deceleration: a higher percentage means a better braking performance (i.e. >100% is better).
- Relative rolling resistance: a higher percentage means a higher rolling resistance (i.e. >100% is worse).
- Relative floating speed: a higher percentage means a better aquaplaning behaviour (i.e. >100% is better).
- Relative sales price: a higher percentage means a higher sales price (i.e. >100% is worse).

Source: TÜV, quoted in [EPEC 2008]

The chart clearly shows that it is possible to reduce RR at lower costs, while decreasing wet grip performance. The optimisation of both wet grip and RR can be achieved, but at higher production costs.

A single-labelling scheme promoting the optimisation of RR while allowing the possibility to keep wet grip at the minimum legal requirement will therefore lead to reduced production costs compared with a dual-labelling scheme that would be pushing producers to optimise both wet grip and RR. The table below, based on extensive surveys by tyre producers under the external study [EPEC 2008], summarises increased production costs for a given gain in RR. It is also likely that production costs will decrease over time when fuel efficient tyres achieve mass production level, with economies of scale.

Table 4: Production Costs for Reductions in RRC by Fuel Efficiency Class, 2012, compared to band F

	A	B	C	D	E	F	G
RRC (kg/t)	below 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	above 12
Single Labelling (Option 2)	16.1%	11.1%	7.6%	4.8%	2.3%	0.0%	0.0%
Dual Labelling (Option 3)	32.2%	22.2%	15.2%	9.6%	4.6%	0.0%	0.0%

Source: [EPEC 2008]

The table shows a non-proportional relationship between production costs and RR reduction. This is due to a rising marginal cost curve (a given gain in RR implies increasingly higher R&D investments and production costs).

It is not possible to quantify the exact market transformation and price evolution should a labelling scheme be introduced. It is also likely that in reality a labelling scheme will change retailer strategies and prices accordingly. In addition, empirical surveys show that prices do not always reflect tyre quality²¹. For the sake of this impact assessment, however, one can assume, taking into account that the market is competitive, that retail price will largely reflect production costs.

Increased production costs applied to the average price of tyres (€87 including VAT and €70 excluding VAT) make it possible to make the following price assumption. Costs of testing RR are not included in the calculation as they are considered marginal, between €0.02 and €0.006 per tyre (see Section 6.2.1.3).

Table 5: Price Premium for Moving from Band F to any Other Band, C1 Summer Tyres

	A	B	C	D	E	F	G
RRC kg/t	below 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	above 12
Price premium (%)	16.10%	11.10%	7.60%	4.80%	2.30%	0%	0%
Price premium (€, incl. VAT)	14.0	9.6	6.6	4.2	2.0	0	0
Price premium (€, excl. VAT)	11.3	7.8	5.3	3.4	1.6	0	0

Source: [EPEC 2008]

5.2.2.3. Cost-Effectiveness of Fuel-Efficient Tyres – Case Study

Estimations of increased production costs by tyre producers show a potential price increase for end-users of 16% compared to average price (€87 including VAT, €70 excluding VAT), which means that a consumer would have to pay €14 more to buy an A tyre compared to an average tyre (in band F). So the price increase for a set of four tyres will be €56 including VAT with 7.5% fuel savings, i.e. €280 fuel savings for a medium-size car²², hence a **net saving of €224** including VAT. The payback period (return on investment) in that case is six months.

This case study shows that it will be cost-effective for consumers/end-users to buy tyres below 7kg/t once they are on the market. It therefore seems reasonable to expect a labelling scheme to drive the whole market towards this limit in the short to medium term. New technological improvements will make the revision of the labelling scheme necessary at a later stage (around 2020 according to interviews with tyre manufacturers).

5.2.2.4. Precision of Testing Methods

It is planned to base the precision of testing methods on the ISO 28580 measuring method which should be adopted in the first half of 2009. It seems that the precision of the tests will be sufficient so as to impose no specific constraints on the design of the bands.

²¹ The Transportation Research Board (TRB) in the USA performed several multiple regression analyses to see how tyre prices relate to various tyre characteristics and found that a substantial proportion of the variation in tyre prices remained unexplained by the tyre characteristics. See TRB Special Report 286, *Tires and Passenger Vehicle Fuel Economy, Informing Consumers, Improving Performance*, 2006, pp. 110–112.

²² Based on [EPEC 2008] calculations/average fuel savings on a medium car, fuel price at 0.61 €/l excl. VAT, 1.28 €/l incl. VAT, see also footnote 25.

5.2.2.5. Relative versus Absolute Labelling

The European Commission has consistently, within the existing labelling Directive on household appliances (Directive 1992/75/EC), favoured relative grading as against absolute grading. The rationale behind this is to allow consumers to compare products which provide similar functionalities and correspond to consumers' needs. Someone needing a big refrigerator because he/she has a large family will not change his/her purchasing decision because smaller fridges obviously consume less energy. The same argumentation may well be true for tyres, as consumers have a limited choice in the dimension of the tyres they have to replace on a given vehicle.

A relative grading scheme would make sense only if there is a proven correlation between rolling resistance and other parameters, such as external diameter (OD) and/or load index (LI). Although the available figures from the tyre industry point to the existence of a correlation, it is considered too weak to call for a relative grading scheme (see Annex 3 for a detailed explanation).

5.2.3. Proposal for a Grading Scheme

Since the labelling scheme for household appliances ("A to G" scale, see sample in Annex 4) is very well known to consumers, it is highly recommended – and this was indeed requested by the majority of stakeholders, consumer organisations included²³ – to follow the same scale design²⁴. The introduction of a car labelling scheme also using the same "A to G" scale at the request of car producers²⁵ (on the same grounds) will also reinforce the impact and recognition of a labelling scheme for tyres.

Taking into account the abovementioned elements, including the technological threshold, evaluated around 6kg/t, which provides the starting point for the A class and the legal minimum requirements which provide the basis for the lowest class (see Annex 6), the following grading scheme is a feasible option by 2012.

Alternative 1: Medium Approach

	A	B	C	D	E	F	G
RRC (kg/t)	below 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	above 12

Comments: Band A could be set for any tyre below 7 on the following grounds.

- The level of band A depends on the date of entry into force of the labelling scheme. Experience from other product groups shows that for the credibility of the scheme it is important to have a band A which can be populated with some products on the day of entry into force. If band A is to be populated say in January 2011 or 2012, it should be set below 7kg/t (if the scheme were to be implemented a few years later, say 2013 or 2014, band A could probably be set below 6.5kg/t).
- If it is proposed to go for an absolute grading scheme (see Annex 4), a too stringent limit for band A would make it likely that no smaller tyres may achieve this class.

²³ E.g. as part of the public consultation undertaken by ENTR on the Advanced Safety of Motor Vehicles and Tyres

²⁴ There is an ongoing discussion on a possible revision of the labelling scheme for household appliances (for example by replacing the A to G scale by numbers). If the outcome were indeed a revision, it is proposed for consistency's sake that the tyre labelling scheme follows the same design.

²⁵ Positions expressed in the 5 June 2008 workshop on car labelling.

- Since tyres parameters are interrelated, setting band A at too high a level would imply increased costs to maintain other parameters (wet grip, external rolling noise, etc.) at a satisfactory level, so that it may be less attractive for consumers to buy band A.
- In the case of amendments to the proposed minimum requirements on RR (annex 6), the labelling scheme would still be valid: either the requirements are less demanding, then there will be more tyres in band G and the labelling scheme would become more important in driving market transformation. Either the requirements are made more stringent (which is unlikely as the average RR on the market in 2008 is around 11.5 kg/t) then band G would become empty but this would reflect the important improvements which have occurred on the market.

The cost-benefit analysis in Section 6 is based on this banding proposal. Other alternatives are discussed below taking into account the same elements.

Alternative 2: More Demanding Approach

	A	B	C	D	E	F	G
RRC (kg/t)	below 6.5	6.5 to 7.7	7.7 to 9	empty	9 to 10.5	10.5 to 12	above 12

Comments:

- The bandwidth of the classes is decreasing to reflect the non-proportional relationship between production costs and RR reduction (due to a rising marginal cost curve); in other words, the investments necessary to achieve a 1 kg/t reduction from 8 to 7 kg/t are significantly higher than the same reduction from 12 to 11 kg/t, this is why the bandwidth is decreasing in upper bands.
- Another advantage of larger bandwidth in the lowest bands (E to G) is that the thresholds better reflect the minimum requirements set in the proposal for a Regulation on the general safety of motor vehicles (12 kg/t by 2012/14, 10.5 kg/t by 2016/18).
- The empty band in class D would allow for a greater differentiation between products. This in turn is likely to give both greater incentives to the industry to place on the market tyres in bands A to C and greater incentives to consumers to pay slightly more for a better graded product (the gap between the bad and better performing tyres is greater).
- Band A seems still feasible though very challenging and slightly more likely to drive innovation than when it is set at 7 kg/t. Since tyres at 7.5kg/t are already on the market in 2008 and 6kg/t was targeted as technologically feasible in the short run, it is expected that band A could be populated by the end of 2012.
- The drawback of this proposal compared to the preceding one is related to consumer information: while a linear bandwidth of 1kg/t is easy to understand (1 band = 1.5% fuel saving), empty classes and decreasing bandwidth blur the message to consumers on related fuel savings. But commercial messages can be developed by retailers and manufacturers to highlight the benefits of opting for the higher classes.

Alternative 3: Less Demanding Approach

	A	B	C	D	E	F	G
RRC (kg/t)	below 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	above 13

Comments:

- Since tyres at 7.5kg/t are already on the market in 2008, band A below 8 would not provide an incentive for further innovation. In addition, bands F and G would become empty in 2014 – the presumed date of entry into force of the minimum requirements governing RR for all tyre types – if the proposal for a Regulation on the general safety of motor vehicles (COM(2008) 316) is adopted.

5.2.4. *Expected Market Transformation and End-User Benefits*

The table below, based on the first banding proposal, summarises the expected market transformation and benefits for consumers/end-users due to a single-criterion grading scheme (total economic benefits excluding VAT are presented in Section 6). It presents two scenarios, a **slow and a fast pace of change** (i.e. market transformation towards fuel efficient tyres), in order to reflect unavoidable uncertainties surrounding the effectiveness of a labelling scheme. This is confirmed by the experience with household appliances where certain products experienced a very fast market transformation while others took more time to develop²⁶.

²⁶ Europe Economics, Impact assessment study on a possible extension, tightening or simplification of Framework Directive 92/75 EEC on energy labelling of household appliances, October 2007, pp. 13–18.

Table 6: Possible Grading Scheme and Consumer Benefits per Set of 4 C1 Tyres (Winter and Summer, VAT incl.) for Moving from Band F (the average RR in 2012) to any Other Band

	A	B	C	D	E	F	G	
RRC (kg/t)	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	above 12	
Price premium (€)	56	38.4	26.4	16.8	8	0	-8	
Total fuel savings (€) ²⁷	280	224	168	112	56	0	-56	
Payback period (months) ²⁸	6	5	5	4	4	0	/	
CO ₂ real world savings (g/km)	13.6	10.9	8.2	5.4	2.7	0	-2.7	
Market share	in 2012	0%	1%	4%	15%	16%	23%	23%
	in 2020 (slow pace)	4%	12%	27%	36%	22%	0%	0%
	in 2020 (fast pace)	21%	23%	27%	16%	14%	0%	0%
	in 2020 (baseline scenario)	0%	2%	17%	17%	63%	0%	0%

Source: [EPEC 2008]

The table illustrates that once the market failure caused by lack of information is removed (labelling scheme, Option 2), the market take-up of fuel-efficient tyres is expected to be faster than with no policy intervention (baseline scenario, Option 1) even in the most conservative scenario, with between 16 and 44% of tyres in band A and B compared to 2% in the baseline scenario and the average RR in band D or C in Option 2 (slow or fast pace of change) compared to E in Option 1.

²⁷ The calculation is based on average EU passenger car fleet consumption in 2012, where 1.5% fuel savings (due to 10% reduction in RR) means 0.11 l/100km, i.e. 44 litres saved over 40 000 km (the average lifetime of a tyre set) for a monetary value of €56 with a fuel price assumption of 1.28 €/l incl. VAT (€75/bbl).

²⁸ Assuming that the average mileage of a set of tyres before they are worn out (40 000 km) is achieved within 2.5 years.

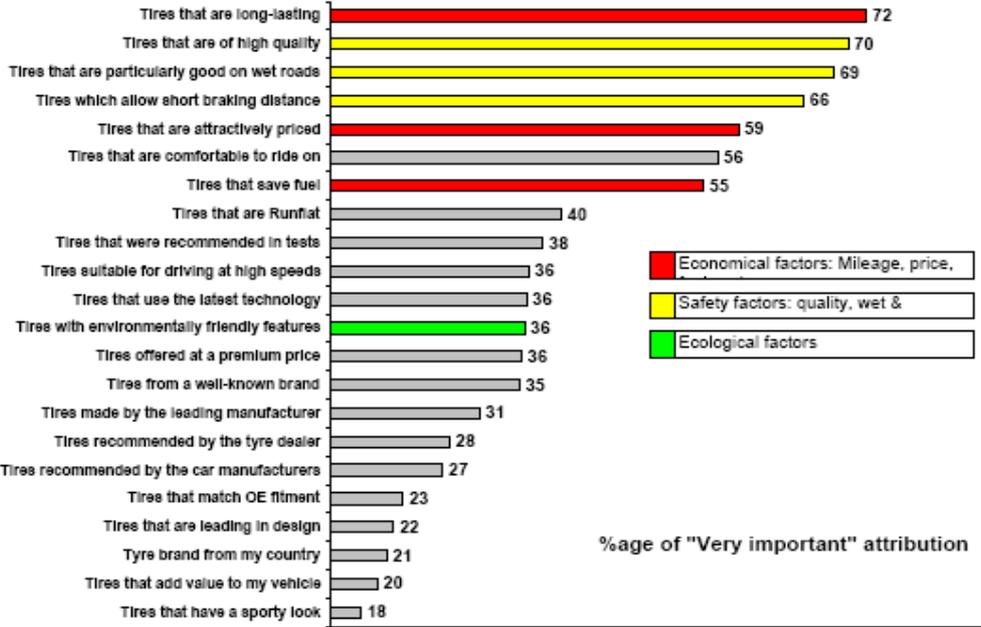
5.3. Option 3: Dual-Labeling Scheme for C1 Tyres regarding RR and Wet Grip

In a competitive market a dual-labelling scheme will provide incentives to optimise all parameters on which information is provided. A significant drawback of this measure is that it will blur the information given to consumers. Figure 5 below illustrates consumer preferences.

Figure 5: Consumer Preferences for Tyre Parameters, 2006

Needs Hierarchy chart:

“Needs” are ordered on the chart according to the %age of “Very important” answers. %ages are weighted according to number of motorists in each of the surveyed countries.



Source: (TAAS) Tyre Awareness and Attitude Study, Frequency & Methodology: Yearly (since 1999) quoted in [EPEC 2008]²⁹.

This shows that between 66% and 69% of consumers consider wet grip and braking performance to be very important and 55% of them deem fuel efficiency to be very important. It is difficult to predict the impact on consumers of providing information on both parameters, but it is likely, given the above, that consumers will choose safety first and pay less prominent attention to fuel efficiency. This would slow down market transformation towards fuel efficient tyres. It is therefore important to assess the real safety gains above the minimum requirements set for wet grip to know if it is worth losing on potential fuel savings.

5.3.1. Potential for Wet Grip Improvement above Minimum Requirements

Data on the market distribution of tyres related to wet grip are scarce. The figure below shows the market distribution of tyres according to wet grip measured using ISO 23671 and compared to the UNECE Regulation 117 minimum requirements.

²⁹ Includes face-to-face (or online) interviews and a 30-minute structured questionnaire (incl. physical tyre check). Countries & No of respondents (2006): France, Italy, UK, Spain, Switzerland, Portugal, Belgium, Austria, Greece, Denmark: 6 908 respondents + Germany (run by IPSOS): 1 038 respondents. Total: 7 946 respondents. Contracted agency: Open Air Market Research www.open-air.fr.

Figure 6: Tyre Distribution by Wet grip

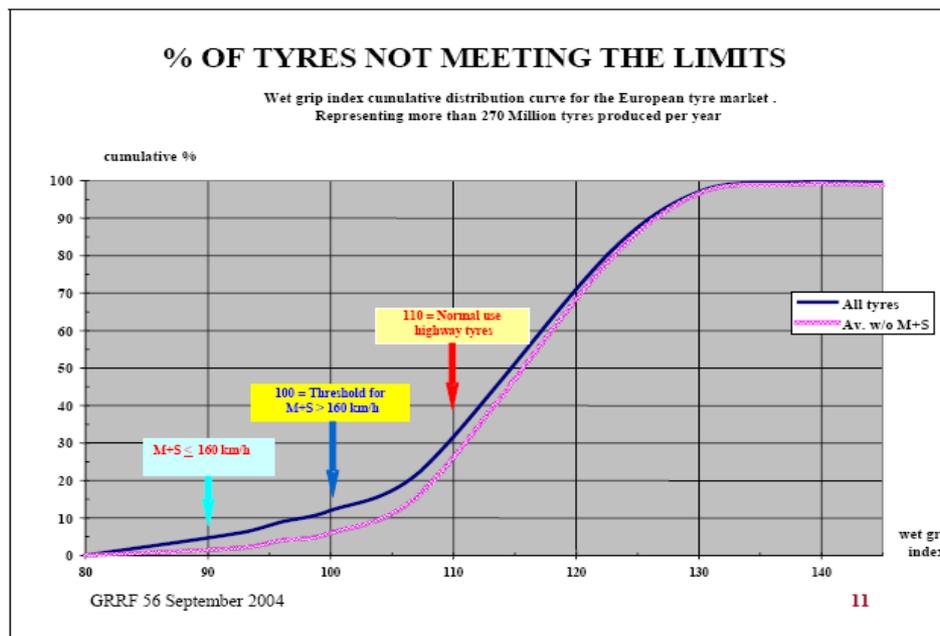


Fig. 29. Cumulative frequency distribution of the wet grip index (G) for a large number of tyres on the European market [GRRF 56-28, 2004]. The limiting values according to the ECE R117 are indicated. The curve in lilac colour (lighter) shows data for "normal" ("summer") tyres, whereas the blue curve (darker) shows data for all tyres together. Note that "M+S" are the same as "snow" or "winter" tyres.

Source: GRRF quoted in [VTI 2008]

The chart shows that potential indeed exists for improving wet grip performance (up to 140% in 2004) above the wet grip minimum requirements. In 2008, the limit is closer to 160% according to tyre producers. For example, for a car travelling at 80km/h on a wet road with a friction coefficient of 0.5 (corresponding to a road polished by traffic), the gain in braking distance between the best- and worst-performing tyres may be up to 18 metres above the wet grip minimum requirement; at higher speed the gain would obviously be higher.

5.3.2. Assessment of Safety Gains

The gains due to improved braking distance are difficult to assess. First, vehicle-tyre interactions will play an important role in the real on-road braking performance of a tyre. Second, there are few solid analyses of the relation between tyres and accident rates³⁰.

National statistics and accidents databases do not make for an in-depth analysis of accident causes and the impact of tyre performance. Accidents, due for instance to running into an unexpected traffic jam on the motorway and which may have been avoided with a better-performing tyre, will be attributed to "excessive speed" or "insufficient safety distance". Gain in braking distance may make the difference in avoiding an accident, but it will be impossible to quantify and will never be reported in statistics as the cause of the accident.

³⁰ The EC project "safety net" started extensive research into accident causes including tyres, but results are expected only in five years.

Although knowing the shortcomings of the data available, [TÜV 2004]³¹ nevertheless made an estimation of tyre-related accidents. It shows that tyres account for a large share (45%) of vehicle accidents due to technical failures (25% of all accidents resulting in personal injury or fatalities), but for a relatively low share in all reported motor vehicle accidents (0.4% in Germany and Switzerland, 0.1% in Italy³²).

Analysis of tyre-related accidents shows, first, that the main causes of accidents are deficient maintenance (tread depth below legal limit value) and under-inflation, and, second, that accidents more often occur on wet and snow-covered roads (around 60%)³³. In addition, 16% of passenger car casualties involving personal injury were found to occur with skidding³⁴. This does not make it possible to draw a direct conclusion on the relationship between wet grip and accidents, but as it shows a direct link between low friction (occurring on wet or snow-covered road and with low tread depth below the legal requirement³⁵) and accidents, it is likely, by extrapolation, that tyre wet grip must also play a non-negligible role in avoiding accidents. As [TÜV 2004] points out: “It is hardly possible to reconstruct an accident to establish the case as whether or not a better tyre would have helped to prevent the accident under the given circumstances or would have at least reduced its severity and consequences (...). From the technical point of view, it can be assumed with maximum probability that there is a non-negligible number of unknown cases of tyre-related accidents related to inadequate tyre performance.³⁶”

Social benefits in the form of reduced accident rates due to improved wet grip performance – above the minimum requirement to be set for 2012 – are therefore difficult to predict. But a calculation made by [EPEC 2008] based on the social cost of one road traffic accident, estimated at €1 million³⁷, shows that only a small reduction in road traffic casualties would need to be achieved (around 0.01 to 0.02%) to compensate for the economic loss occurred by the implementation of a dual-labelling scheme instead of a single-labelling scheme. It also goes without saying that human lives take precedence over economic considerations.

5.3.3. *Factors Determining the Design of a Banding Scheme for Wet Grip*

5.3.3.1. State of the Art

As already highlighted above, there are few data on the state of the art on wet grip and the related increased production costs. There seems to be a consensus among the tyre industry that the state of the art in 2008 is around 160%.

³¹ TÜV Automotive, Survey on motor vehicle tyres and related aspects, June 2004 http://ec.europa.eu/enterprise/automotive/projects/report_motor_vehicle_tyres.pdf.

³² According to an unpublished report by S. Reed, A. Morris and R. Elliman, within the Safety Net Work Package 5 (issued in June 2008 for the purpose of this impact assessment) and based on a database of around 2 000 accidents, a tyre defect was recorded in only 1.5% of fatal accidents and tyres were identified as a possible contributory factor in 3% of all recorded accidents.

³³ Results from [TÜV 2004], confirmed by the [Safety Net Work Package 5 2008].

³⁴ Analysis of a database of 20 349 accidents 1985-2006 by GIDAS (German In-Depth Accident Study). Written contribution to this impact assessment by Otte, Dietmar, Medizinische Hochschule Hannover, VerkehrsUnfallForschung, 2008.

³⁵ Tread depth refers to the “sculpture” on tyres to enable evacuation of water, thus increasing wet grip. It can vary between 8 to 9mm depth when a tyre is new and 1.6mm which is the legal limit indicating when a tyre must be replaced.

³⁶ *ibid* pp. 33 & 34.

³⁷ Cordis Europe and Trawn et al, 2001.

5.3.3.2. Production Costs of Optimised Wet Grip and RR

Production costs and the related price premium (the assumption that price reflects production costs in a competitive market) for optimisation of both wet grip and RR are presented in Table 7. Costs of wet grip testing are not included as they can be considered marginal, around 0.01 cent per tyre (Section 6.2.1.3).

Table 7: Price Premium for Moving from Band F to any Other Band (Dual Labelling), C1 Summer Tyres

	A	B	C	D	E	F	G
RRC (kg/t)	below 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	above 12
Increased production costs (%)	32.2%	22.2%	15.2%	9.6%	4.6%	0%	0%
Price premium (€, incl. VAT)	27.9	19.2	13.2	8.3	4.0	0	0
Price premium (€, excl. VAT)	22.6	15.6	10.7	6.7	3.2	0	0

Source: [EPEC 2008]

5.3.3.3. Cost-Effectiveness – Case Study

Estimates of increased production costs by tyre producers indicate a potential price increase for end-users of 32% compared to the average price (€87 including VAT, €70 excluding VAT), which means that a consumer/end-user would have to pay €28 more to buy an A tyre. So the price increase for a set of four tyres will be €112 including VAT, with 7.5% fuel savings compared to the average (in band F), i.e. a €280 fuel saving, hence a **net saving of €168** including VAT³⁸ with a payback period (return on investment) of eight months. So band A would still remain cost-effective in a dual-labelling scheme even with the increased production costs it may entail.

5.3.4. Grading Scheme for Wet Grip

Taking these elements into account and the current precision of the ISO 23671 test method, which currently does not make for bands narrower than 15%, the following banding schemes seem feasible.

Alternative 1: Medium Approach

	A	B	C	D	E	F	G
Wet grip index	above 145	145 to 130	130 to 115	below 115	empty	empty	empty

Comments: This proposal would leave three classes (bands E, F and G) empty and set band D above the legal requirement for wet grip, first, to reflect the improvement which the legal requirement will bring about (30% of the worst-performing tyres will be banned), and second, to convey the information to consumers that tyres in band D are already safe. They would indeed comply with the proposed legal requirement considered by all stakeholders at the time

³⁸ Based on [EPEC 2008] calculations/average fuel savings on a medium car, fuel price at 0.61 €/l excl. VAT, 1.28 €/l incl. VAT.

of adoption at UNECE level to be satisfactory in guaranteeing drivers’ safety (see Section 5.2.1).

Alternative 2: More Demanding Approach

	A	B	C	D	E	F	G
Wet grip index	above 155	155 to 140	140 to 125	empty	125 to 110	below 110	empty

Comments: This proposal is reflecting alternative 2 on fuel efficiency grading. Class D empty would allow for more differentiation between product performance characteristics and give more incentives both on consumers to buy better performing tyres regarding wet grip and on the industry to place on the market better tyres regarding wet grip. Class A is more ambitious compared to the alternative 1 and is therefore likely to give more long-term incentives for innovation. A drawback of this proposal however is that "Alternative 2" both for RR (class A below 6.5 kg/t) and wet grip (class A above 155) would mean that in practice no tyres, in the short term, will be able to qualify in class A for both parameters. It is also likely that no winter tyres would perform in class A, above 155. However, it gives in the long run greater incentives for innovations and is likely therefore to last longer without having to amend the classes.

5.3.5. Expected Market Transformation regarding Fuel Efficient Tyres and End-User Benefits

The table below on expected benefits due to a dual-labelling scheme for fuel efficiency and wet grip (Option 3) shows a slower market transformation than in Option 2 (single-criterion labelling scheme for tyre fuel efficiency), for the reason presented in the previous Section: consumers are likely to give priority to wet grip over fuel consumption. On the other hand, a label putting the emphasis on fuel efficiency but still providing grading of wet grip would combine the advantage of achieving higher fuel savings without affecting safety.

Market transformation regarding wet grip is not reflected in the following table because the related social benefits are uncertain (Section 5.3.1). It is, however, very likely that consumers will choose tyres above the minimum wet grip requirements and drive the market towards dynamic optimisation of both wet grip and RR.

Table 8: Market Transformation and Consumer Benefits per Set of 4 C1 Tyres (Winter

		A	B	C	D	E	F	G
RRC (kg/t)		below 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	above 12
Price premium (€)		112	77	53	33	16	0	-16
Total fuel savings (€) ³⁹		280	224	168	112	56	0	-56
Payback period (months) ⁴⁰		8	8	7	7	7	0	0
CO ₂ real world savings (g/km)		13.6	10.9	8.2	5.4	2.7	0	-2.7
Market share	in 2012	0%	1%	4%	15%	16%	23%	23%
	in 2020 (slow pace)	3%	10%	25%	38%	24%	0%	0%
	in 2020 (fast pace)	10%	15%	25%	25%	25%	0%	0%
	in 2020 (baseline scenario)	0%	2%	17%	17%	63%	0%	0%

and Summer, VAT incl.) for Moving from Band F to any Other Band – Dual-Labeling Scheme

Source: [EPEC 2008]

Market transformation is slower than in Option 2 but still higher than in the baseline scenario (no EU action, Option 1) with 14% to 30% of tyres in band A and B (slow and fast pace of change) and only 2% in the baseline scenario.

5.4. Option 4: Multi-Criteria Labelling Scheme for C1 Tyres regarding RR and Wet Grip Extended to External Rolling Noise

5.4.1. Potential for External Rolling Noise Improvement above Minimum Requirements

Figure 7 below shows that there is a potential for further reducing external rolling noise above the minimum requirements set out in the proposal for a Regulation on the general safety of motor vehicles (COM(2008) 316) (see Annex 6). However, the cost implication of optimisation of all three parameters (wet grip/RR/external rolling noise) is not well known, the main trade-off lying between wet grip and external rolling noise. It is likely that they will be higher than the assumed production costs for optimising both wet grip and rolling resistance presented in Table 8 in the previous Section.

³⁹ Assumption: fuel price at 1.28 €/l incl. VAT, see footnote 26.

⁴⁰ See footnote 30.

Figure 7: Distribution of Tyre Market According to External rolling noise

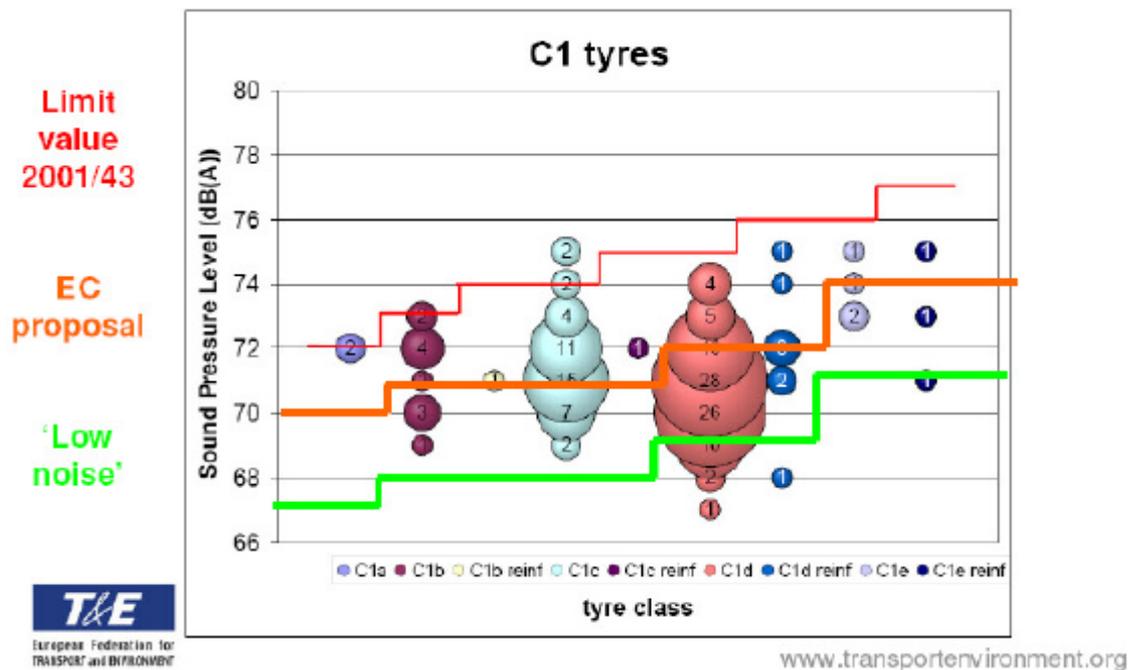


Figure adapted from VTI, 2008, based on measurements from de Graaff and van Blokland, 2007.

Source: T&E contribution to the stakeholder consultation.

Since the range of tyre performance in terms of noise does not seem sufficient for a labelling scheme (e.g. with 1dB bandwidth), a **low-noise mark** was proposed instead by T&E for all tyres 3dB below the minimum requirement proposed for 2012/16 (see design example in Annex 5). An alternative would be simply to include the **external rolling noise measured value** in a labelling scheme as is the case with several household appliances, something which may not be very straightforward to understand for consumers but could be useful for professionals and public authorities willing to take action on traffic noise reduction.

Some stakeholders often refer to the necessity to act on road surfaces instead of tyres in order to reduce traffic noise. If the potential for reduced traffic noise is indeed higher with low-noise road surfaces, various studies⁴¹ show that external rolling noise abatement costs due to technical improvement of tyres are lower than the costs of low-noise road surfaces, which does not exclude the necessity to act on road surfaces, but shows that acting on tyre external rolling noise is cost-effective. According to [VTI 2008], reducing road surface external rolling noise by 5dB to 6dB increases road costs, compared to the average road surface in Europe, by a factor of 2 or 3⁴² (with a later depreciation of 1dB per year), while current market research shows no evident correlation between tyre prices and external rolling noise (also for tyres

⁴¹ See for instance http://circa.europa.eu/Public/irc/env/noisedir/library?l=/position_papers/workingpaper_sept2005pdf/_EN_1.0_&a=d.

⁴² Another study by the Chalmers University of Technology estimated this factor at 4, see *Reduction Potential of Road Traffic Noise, a Pilot Study*, W. Kropp, T. Kihlman, J. Forseen and L. Ivarsson, 2007.

with good wet grip performance)⁴³. In any case, production costs of low-noise tyres would certainly not imply the same scale of cost increase.

5.4.2. *Effectiveness of a Low-Noise Mark in Promoting Lower External rolling noise*

If it is indeed possible to improve external rolling noise above the minimum requirements proposed for 2012/14, the question arises whether its inclusion in a labelling scheme would be effective in achieving this potential.

- **Consumer Preferences**

The first question crucial for the effectiveness of a labelling scheme is whether consumers are likely to consider external rolling noise in their purchasing decision. If not, external rolling noise may be better addressed through minimum requirements in order to reduce its negative externalities.

Two elements make it possible to answer this question: the first is the correlation between interior and exterior noise (since the measured value is the exterior noise, consumers will want to know if they will benefit inside their vehicles from lower rolling-noise tyres), the second are consumer surveys.

(1) According to [M+P 2007], the correlation is good around 1 000 Hz which are the most disturbing frequencies for human ears, but not at 250–300 Hz due to different noise sources (inside the car, noise mainly comes from the power train at low frequencies while outside the car aerodynamic noise at high frequencies will dominate). Noise coming from the power train is due to the interaction between the vehicle and the tyre; it therefore depends much more on the vehicle design characteristics rather than on the tyre itself. For some stakeholders this correlation is satisfactory for a labelling scheme covering external rolling noise, for others it is considered insufficient (see minutes of the workshop in Annex 2).

Empirical experiments show in addition a discrepancy between subjective perceptions of a noise level and the external rolling noise measured value. Two tyres demonstrating the same noise level in the ISO test procedure may be perceived very differently by the human ear, one being perceived to be much louder than the other, even though both have the same measured noise value. Since each vehicle will also significantly change the inside noise perception of the same tyres, a grading scheme for tyre external rolling noise might be considered unreliable by consumers and affect its credibility also with regard to the other parameters covered (RR and wet grip).

(2) There have been few surveys on consumer preferences as regards rolling noise. However, the existence of various marketing campaigns initiated by the tyre industry on low-noise tyres may demonstrate that there is a demand for such products, or that they consider that there is a potential for it. According to research done in Austria by Fallast et al⁴⁴, 94% of respondents would be willing to buy low-noise tyres and 70% of them to pay a small price premium. However, it is not clear if respondents differentiated between interior and exterior rolling noise on the one hand, and on the other if they would indeed pay more for less noisy tyres, possibly at the expense of wet grip.

⁴³ See M+P, *Exterior Noise, Grip and Rolling Resistance Levels of C1, C2 and C3 Tyres in Relation to the Tyre Noise Directive (EU Directive 2001/43/EC) and Consumer Interests*, Erik de Graaf and Gijsjan van Blokland, Inter-Noise 2007, Istanbul, Turkey, p. 6.

⁴⁴ Quoted in [VTI 2008], pp. 39–41.

- **Effectiveness in Reduced Traffic Noise**

Since the aim of including external rolling noise in a labelling scheme would be to reduce traffic noise, one has to consider whether it would be an effective tool for this purpose. Given the logarithmic scale of noise, the effect of a grading scheme on traffic noise may be marginal as long as high-noise tyres are on the market.

Example: If an entire tyre population rolls with a external rolling noise value of 71dB, the overall traffic noise level will be 74dB. Now if the introduction of a grading scheme leads to half of the tyre population having a 68dB noise level (3dB less), and the other half remains at 71dB, the overall traffic noise level will decrease to 72.8dB, and so the overall gain is only 1.2dB which is inaudible for normal ears (at these frequencies ears start to hear a difference in noise level when such difference is 3dB to 4dB).

At EU level however, a 1.2dB reduction in traffic noise may be considered significant. A 1dB reduction on 74dB has been attributed a value of €15 per person exposed to traffic noise⁴⁵. To illustrate the potential in economic terms, a study conducted in Denmark in 2005 estimated benefits of a 1dB noise reduction at €11.4m per year⁴⁶. The same calculation extended to the remaining 26 EU Member States would give impressive results. The FEHRL report also attributed a value for the EU-27 of €5.5 billion benefit per 1dB reduction per year⁴⁷, which may be an overestimate but still gives a good insight into the potential benefits the promotion of low-noise tyres may bring.

Minimum requirements seem the most effective tool for reducing traffic noise levels as they ban the loudest tyres. On the other hand, technological improvements are needed for setting more ambitious minimum requirements, and they are driven by the demand side. Without a labelling scheme, consumers have no access to the information, and this therefore provides tyre producers with fewer incentives to further optimise and innovate above the minimum requirements. A labelling scheme for external rolling noise may also contribute to awareness-raising which is one of the objectives of Directive 2002/49/EC on environmental noise.

In addition, transparency of data on external rolling noise may facilitate the implementation of public policies (e.g.. financial incentive schemes) against traffic noise, especially within the framework of Directive 2002/49/EC which provides for implementation of action plans to reduce traffic noise (for cities with more than 250 000 inhabitants, airports, railways and roads with more than six million vehicles per year). Access to external rolling noise values may also be useful for public procurement officers and fleet owners anticipating the implementation of the revised Eurovignette Directive (Directive 1999/62/EC) (proposal expected by July 2008) and its related report on the internalisation of external costs, including noise emissions.

The main concern as regards feasibility (of the inclusion of external rolling noise in a labelling scheme) is related to the variation in measured values among ISO 10844 certified test tracks which was estimated at 5dB to 6dB. There is a risk that specialist magazines or consumer organisations would contest the claimed low-noise mark if they found different results due to variability of test tracks, and hence discredit the labelling scheme. Work is in progress at ISO and UNECE level to monitor the extent of this variation and address it where

⁴⁵ CE Delft, *Handbook on Estimation of External Costs in the Transport Sector*, produced within the study on Internalisation Measures and Policies for All External Cost of Transport (IMPACT), February 2008, p. 67.

⁴⁶ *Cost-Benefit Analysis on Noise-Reducing Pavements*, VI report 146, Schultz Information, 2005, http://www.vejdirektoratet.dk/publikationer/VIrap146/html/entire_publication.htm#Section7.7, p. 20.

⁴⁷ FEHRL, *Tyres/Road Noise*, May 2006, Volume 1, p. 91.

necessary. According to M+P and T&E, work is under progress at ISO level to limit this variation between test tracks to +/- 1.5dB.

To conclude, there is no clear evidence as to the effective impact on road traffic noise of including external rolling noise in a labelling scheme, though it is clear that it would provide further incentives to innovate above the minimum requirements and contribute to raising awareness. The evaluation of Option 4 will therefore greatly depend on the values and priorities given to noise reduction by each stakeholder. An alternative would be to simply indicate the external rolling noise measured value on the label (in the light of what is already done for white goods) so as to make it possible for Member States or end-users to develop targeted policies if they so wish.

5.5. Option 5: Extension of the Labelling Scheme Developed for C1 Tyres (Option 2, 3 or 4) to C2 and C3 Tyres

C2 and C3 tyres account respectively for 8% and 5% of tyre sales in the EU but as they consume more fuel and drive more annually, the potential for fuel savings in absolute term will be higher in these two markets than for C1 tyres (see Section 6.2.2). This chapter does not discuss in-depth each policy option (single-, dual- or multi-criteria labelling scheme) because the same argumentation as for C1 tyres applies. In other words, the same option preferred for C1 tyres should apply to C2 and C3 tyres.

5.5.1. Wet Grip and External Rolling Noise Minimum Requirements

Minimum requirements for external rolling noise are already laid down regarding C2 and C3 tyres in the proposal for a Regulation on the general safety of motor vehicles (see Annex 6) but for the time being no minimum requirements are laid down for wet grip because of the lack of harmonised testing method. The adoption of Standard Reference Testing Tyres for these two categories is under way at ISO level⁴⁸ and should be ready by 2010. Transposal at UNECE level and adoption of wet grip minimum requirements are expected at the same time. ENTR's objective is to transpose minimum requirements governing wet grip for C2 and C3 tyres into EU law as soon as they are adopted at UNECE level, i.e. before the implementation of external rolling noise minimum requirements for C2 and C3 tyres (by October 2012/16). The adoption of a single-labelling scheme for RR with minimum requirements for wet grip and external rolling noise could therefore be possible by October 2012.

5.5.2. Design of a Banding Scheme for C2 and C3 Tyres and Expected Market Transformation

It has been argued by some stakeholders that there was no need for RR labelling of C3 tyres on the grounds that they are sold to professionals who already have all the information necessary for their purchasing decision. A labelling scheme would therefore not bring any added value. This is objected to by road transport companies themselves, including their European federation, the International Road Transport Union, and is also contradicted by the current state of the market (showing a large range of RR variation). Since "costs per km" is one of the first parameters road transport companies want to optimise, if there were indeed no barrier to the development of fuel efficient tyres, the range in RR tyre performance of C3 tyres would be much narrower (see more in-depth analysis in Section 5.1.1.3).

⁴⁸ Wet grip is evaluated on a relative performance basis compared to a Standard Reference Testing Tyre (SRTT).

Based on the same criteria as for C1 tyres, the state of the art of C2 and C3 tyres was estimated respectively at around 5.5kg/t⁴⁹ and 4 kg/t at affordable production costs. With the same calculations as in the preceding sections, the following market transformation due to labelling can be expected. The same market transformation path as for C1 tyres is assumed. This is likely, however, to be a conservative assumption since fleet managers are professionals and will have the know-how as well as stronger incentives to reduce fuel expenditure in their total running costs. This is confirmed by the fact that tyres on average account for only 6% of total running and maintenance costs compared to 80% for fuel.

Table 9: Possible Grading Scheme and Consumer Benefits in 2012 per Set of 4 C2 Tyres (Winter and Summer, VAT incl.) for moving from Band F to any Other Band

	A	B	C	D	E	F	G
RRC	5.5 to 6.5	6.5 to 7.5	7.5 to 8.5	8.5 to 9.5	9.5 to 10.5	above 10.5	/
Price premium	45.2	31.2	21.2	13.6	6.4	0	/
Total fuel savings ⁵⁰	460	368	276	184	92	0	/
Payback period ⁵¹ (months)	2.4	2	1.8	1.7	1.5	0	/
CO ₂ g/km savings	22.5	18	13.5	9	4.5	0	
Market share in 2004	0%	0%	5%	18%	36%	41%	/
in 2020 (slow pace)	7%	24%	39%	27%	0%	0%	/
In 2020 (fast pace)	45%	23%	21%	10%	0%	0%	/
Baseline scenario in 2020	0%	1%	14%	84%	0%	0%	/

Source: [EPEC 2008]

⁴⁹ For C2 tyres designed to be fitted on vehicles above 3.5t.

Contrary to what was done for C1 tyres and C2 tyres, Table 10 for C3 tyres shows the calculation of fuel savings and payback period starting from band D. This is to reflect the fact that the market is segmented⁵². There is a distinction, for instance, between highway and motorway use and between steer, drive and trailer axles. Not all tyres may be substituted so that transport companies will rarely have the choice of buying tyres in the whole RR range of the C3 market. It is agreed, however, that a 1kg/t reduction for C3 tyres means 5% fuel savings which at a diesel price of €1.02/l (including tax, assuming that 100% of heavy-duty vehicles run on diesel) for an annual mileage of 60 000 km means an €800 saving per year. This leads to very significant fuel savings, a **3kg/t reduction in RR for a truck for example will give a cumulated fuel saving of €3 800 assuming an average tyre lifetime of 100 000 km** (which is very conservative, most tyres last more than 200 000 km).

The table below has bands with 1kg/t width in order to give an indicative estimate of market transformation. It could also be possible for C3 tyres to make a distinction between traction (drive axle) and normal tyres (steer and trailer axles) as in the proposal for a Regulation on the general safety of motor vehicles (COM(2008) 316). The RR measured value (as suggested in [VTI 2008]) could also be displayed together with the fuel efficiency classes. In any case, narrower bandwidth should be defined for a grading scheme for C3 tyres, pending on the accuracy of the testing method, in order to reflect the significant impact on fuel savings of a given reduction in RR.

⁵⁰ Assumption: fuel price at 1.28 €/l incl. VAT.

⁵¹ Assumption: 40 000 average total mileage (in km) over 1.8 years.

⁵² See Annex 5 of [EPEC 2008], Section 5.4., for an estimate of price premium and related payback periods.

Table 10: Possible Grading Scheme and End-User Benefits in 2012 per Set of 10 C3 Tyres (Winter and Summer, VAT excl., Fuel Tax incl.) for Moving from Band D to Higher Bands

	A	B	C	D	E	F	G
RRC	below 4	4 to 5	5 to 6	6 to 7	7 to 8	above 8	/
Price premium	1080	650	310	0	/	/	/
Total fuel savings ⁵³	3780	2520	1260	0	/	/	/
Payback period ⁵⁴ (months)	5	5	5	0	/	/	/
CO ₂ g/km savings	99	66	33	0	/	/	
Market share in 2004	1%	8%	23%	33%	23%	10%	/
in 2020 (slow pace)	11%	28%	43%	14%	3%	0%	/
In 2020 (fast pace)	39%	35%	21%	4%	1%	0%	/
Baseline scenario in 2020	3%	19%	51%	22%	6%	0%	/

Source: [EPEC 2008]

As for C1 tyres, the two tables clearly show that a labelling scheme for C2 and C3 tyres is expected to speed up the market take-up of fuel-efficient tyres compared to the baseline scenario.

5.5.3. Inclusion of Wet Grip in a Labelling Scheme for C2 and C3 Tyres

There are no reliable data, nor endorsed wet grip measurement methods for C2 and C3 tyres, that would support the extension of wet grip grading to these tyre classes. The tyre industry considers that the inclusion of wet grip in a labelling scheme is not appropriate for C3 tyres because wet grip varies too much with the load of the trucks (see Annex 1). Road transport companies on the contrary seem to be in favour, but emphasise that it is not a priority (as opposed to RR and external rolling noise). It is proposed for the time being not to consider wet grip grading for C2 and C3 tyres. This may be introduced into tyre labelling at a later stage once testing methods become available.

5.5.4. Inclusion of External rolling noise in a Labelling Scheme for C2 and C3 Tyres

Some stakeholders have emphasised that minimum requirements on noise in the proposal for a Regulation on the general safety of motor vehicles (COM(2008) 316) have been

⁵³ Assumption: fuel price at 1.28 €/l incl. VAT, for a mileage of 100 000 km.

⁵⁴ Assumption: 100 000 average total mileage (in km) over 1.6 years (19 months).

downgraded in comparison to the initial proposal put forward in the FEHRL study for C2 and C3 tyres, and the implementation date postponed to 2016 for existing tyre types. They believe that this makes the inclusion of external rolling noise for C2 and C3 tyres in a labelling scheme more necessary (see minutes of the 26 May workshop in Annex 2).

Possible Design of a Low-Noise Mark for C2 and C3 Tyres

Figure 8 below representing the state of the market in 2007 shows that a low-noise mark for tyres below 3dB will request further innovations but seems feasible in the short run and will provide incentives for further improvements. It is suggested for C2 and C3 tyres that the external rolling noise measured value is also displayed to facilitate the design of targeted policies at Member State or local level in favour of low traffic noise (see costs of testing in Section 6.2.1.3.).

Figure 8: Distribution of Tyre Market According to External rolling noise

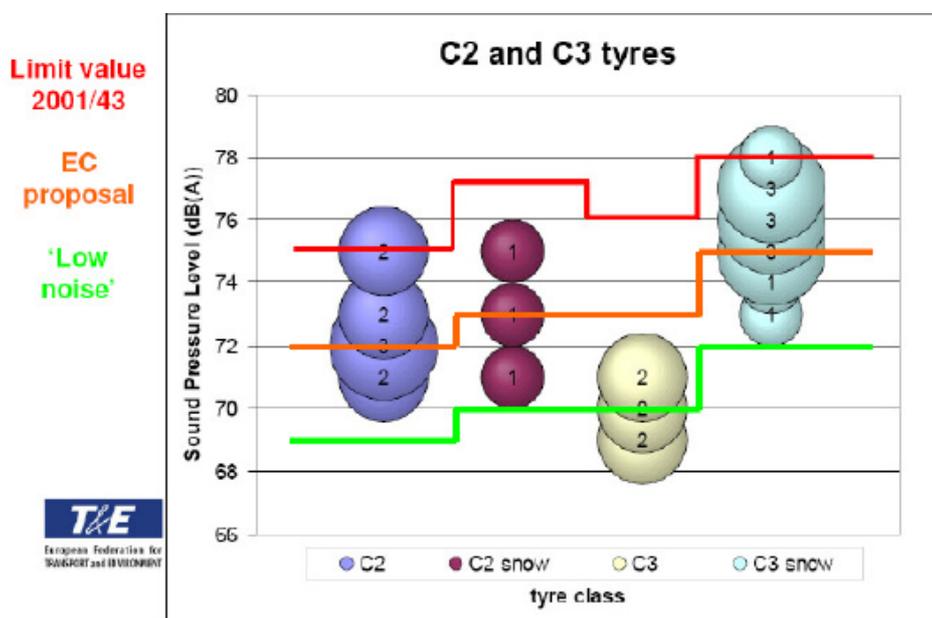


Figure adapted from VTI, 2008, based on measurements from de Graaff and van Blokland, 2007.

Source: T&E contribution to the stakeholder consultation.

To sum up, there is clear evidence that extending the grading scheme for RR to C2 and C3 tyres would be beneficial. The same conclusion as for C1 tyres in Section 6.5.2 is valid for external rolling noise, but inclusion of a low-noise mark or simply the external rolling noise measured value would be an option.

5.6. Option 6: Economic Instruments and Public Procurement

Market transformation can be accelerated by public procurement specifications and incentives in line with the Community guidelines on State aid for environmental protection⁵⁵, through either quotas, specification of minimum bands above which public authorities may buy tyres, or guidelines (e.g. incentives to include in-use costs in the award criteria such as in the proposal for a Directive on the promotion of clean and energy-efficient road transport vehicles (COM(2007) 817)).

⁵⁵ OJ C 82, 1.4.2008, pp. 1–33.

The Action Plan on Sustainable Consumption and Production and Sustainable Industrial Policy (COM(2008) 397/3) suggests that implementing measures of the revised Energy Labelling Directive 1992/75/EC setting the banding schemes for “energy-related products” should identify one of the labelling classes as a level below which public authorities (1) would not be allowed to procure and (2) will not be allowed to set fiscal incentives. The following criteria are given for the designation of this level:

- (1) It should be based, as a minimum, on the least life-cycle costs taking into account intended use of the product (this may be very difficult to predict at EU level for tyres, depending on vehicle use).
- (2) It should ensure an adequate level of competition in the market, taking into account product availability.

There are already some precedents for this approach such as (1) in the Regulation on a Community energy-efficiency labelling programme for office equipment (Regulation (EC) No 106/2008) which requires EU institutions and central Member State government authorities to use energy-efficiency criteria no less demanding than those defined in the ENERGY STAR programme when purchasing office equipment; or (2) in Directive 2005/55 (Article 6) relating to the measures to be taken against the emission of gaseous and particulate pollutants from compression ignition engines for use in vehicles, which provides a framework for the implementation of fiscal incentives in Member States.

Economic or market-based instruments⁵⁶ may indeed boost market change by, for example, decreasing levies on energy-efficient tyres and increasing it on worst-performing tyres as is being done in France and the UK in relation to vehicles (indexing taxes to vehicle emissions as reported in the car labelling scheme). This would improve price signals by placing a value on the external costs and benefits. This may be especially effective on the fleet market, which accounts for up to 50% of the passenger car market in some Member States, since fleet owners do not pay fuel bills, and may therefore have less interest in buying more fuel efficient tyres.

A labelling scheme could be also instrumental for cities, companies and public authorities in the design of proactive purchasing policy or fiscal incentives, and would be in line in this sense with the Green Paper on market-based instruments for environment and related policy purposes (COM(2007) 140).

If the same approach were followed as the one proposed in the Action Plan on Sustainable Consumption and Production and Sustainable Industrial Policy for C1 tyres, band B or C should be set as the minimum level for public procurement. Band A provides for the highest fuel savings, but today band B to C would seem appropriate, taking into consideration the necessity to ensure an adequate level of competition. It may indeed happen that only a few tyre producers may be able to produce tyres under 7kg/t (or 6.5kg/t depending on the grading alternative chosen), so there may be some concerns about free competition and product availability in the A band for public procurement procedures. Since fuel savings may not be achieved in a **stop-and-go driving** cycle⁵⁷, exemptions in public procurement procedures may be provided for such specific driving.

⁵⁶ See Green Paper on market-based instruments for environment and related policy purposes (COM(2007) 140).

⁵⁷ This is mainly due to the fact that RR varies with tyre operating temperature: a cold tyre has on average 30% more RR.

Estimates of the total number of public procured replacement tyres made by [EPEC 2008] (Table 11) show, however, that they constitute a small share of the replacement market and are therefore unlikely to have a significant impact on market transformation.

Table 11: Total Number of Public Procured Replacement Tyres (2005)

	Passenger Cars (C1)	Light-Duty Vehicles (C2)	Trucks and Buses (C3)	Total
Total Replacement Tyres	173 000	361 000	281 000	815 000
Share of Total Replacement Market	0.1%	2%	2%	0.3%

Source: [EPEC 2008] estimates.

6. COMPARING THE OPTIONS

6.1. Qualitative Assessment

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Market take-up of fuel efficient tyres	+ Bans worst tyres from the market and progressively improves (i.e. decrease) average RR – Does not harness all potential benefits from fuel efficient tyres	+ Information on RR only → faster market take-up of fuel efficient tyres	– Lower market take-up of fuel efficient tyres + May avoid concerns of consumers that a fuel-efficient tyre, i.e. lower rolling resistance, implies lower safety	– Lower market take-up of fuel efficient tyres	– Lower market take-up of fuel efficient tyres	+ Speeds up market take-up – Matter for subsidiarity: better dealt with at Member State or local level depending on national preferences
Market failure	– Does not address the market failure on the replacement market	+ Removes the market failure caused by lack of information				
R&D	+ Improvement on RR driven by the OE market with spillover effect on the replacement market – No incentives for innovation on the replacement market	+ Strong incentives and rewards for investment in R&D	+ Strong incentives and rewards for investment in R&D + Optimisation of wet grip and RR at the same time	+ Strong incentives and rewards for investment in R&D + Optimisation of wet grip, RR and external rolling noise at the same time	+ Strong incentives and rewards for investment in R&D	
Safety	+ Wet grip requirements considered satisfactory by all stakeholders	– No incentives for improvement of wet grip beyond	+ Incentives to optimise wet grip beyond minimum requirements – No information on other safety	No specific impact expected on road safety / wet grip		No specific impact expected on road safety

	+ Wet grip requirements will significantly improve road safety, they will ban 30% of the worst-performing tyre from the market	minimum requirements	parameters: aquaplaning, handling in curve, etc. + Possible gain in reduced accident rates but impossible to quantify – Risk of giving an incentive for unsafe driving by those buying an “A” tyre	grading not considered for the time being given the lack of measurement standards		
Noise	– No incentives for improvement of external rolling noise above minimum requirements	– No incentives for improvement of external rolling noise beyond minimum requirements	– No incentives for improvement of external rolling noise beyond minimum requirements	– No evidence as to the effect on real traffic noise – May not be feasible in practice due to test track variation + Relatively low noise abatement costs	+ Noise grading may boost innovation and market take-up of low-noise tyres	+ Noise grading would allow public authorities to promote low-noise tyres
Response to consumer preferences	NA	+ Simple message to consumers, raises awareness – Does not reflect consumer preferences (safety first)	+ Responds to consumer interest in tyres – Potential difference between TA value and real on-road performance because of vehicle/tyre interaction	– Subjective perception of noise does not always reflect the measured values – No correlation between exterior and interior noise at low frequencies, + Raises awareness	NA	NA

6.2. Aggregated Cost-and-Benefit Analysis

6.2.1. CI Tyres – Options 2, 3 and 4

6.2.1.1. Fuel and CO₂ Aggregated Net Savings

The table below summarises aggregated production costs and benefits due to fuel savings and CO₂ reduction in Options 2, 3 and 4 compared to the reference case over the period 2012-2020 reported as the net present value (NPV) using a discount rate of 4%. They can therefore be considered to be the net added value of implementing a labelling scheme. The calculation assumes October 2012 as the date of entry into force of the labelling scheme for simultaneous adoption with the proposal for a Regulation on the general safety of motor vehicles (COM(2008) 316), but the sub-section on the “intensity of the measure” considers an earlier implementation date. As a reminder, total benefit in Options 3 and 4 is lower than in Option 2 (single-criterion labelling) because of increased production costs due to optimisation of both RR, wet grip and possibly external rolling noise, and because of the assumed lower market take-up of fuel-efficient tyres (on the grounds that consumers will very likely favour wet grip over tyre fuel efficiency).

The calculation encompasses benefits only from the replacement market. It is assumed that car producers already have enough pressure to reduce the RR of OE tyres (Section 5.1.1.1) and will not significantly change their behaviour in the event of a labelling scheme. However, it is not excluded that a labelling scheme will have a spillover effect on the OE market, as some car producers (further confirmed by ACEA in a bilateral interview) agreed that they could use a labelling scheme in their marketing strategies and would benefit from it. Total benefit could in this case be slightly higher than the estimations below.

In addition, total benefit in Options 3 and 4 (multi-criteria labelling) is considered the same though in reality the benefit from Option 4 should be significantly higher if a monetary value were given to noise reduction. According to the FEHRL report, for instance, a €5.5 billion benefit should be added per one dB reduction per year at EU-27 level (see Section 5.4.2). The exact benefits due to traffic noise reduction were not calculated in the framework of this impact assessment, as they will depend on each road and city, and the number of persons exposed to noise⁵⁸.

⁵⁸ See calculation method proposed in the technical annex to the strategy on internalisation of external costs of transport (COM(2008) 435).

Table 12: Cumulated Impact of Energy Labelling of C1 Summer and Winter Tyres on the EU Economy, NPV of Costs and Savings, 2012-2020, 2008 Prices (VAT excl.)

	Additional Tyre Costs (€m, NPV)		Fuel Cost Savings (€m, NPV)		Net Cost Savings (€m, NPV)		CO ₂ Savings (mill. tonnes)		CO ₂ Savings (€m NPV)		Total EU Benefit (€m NPV)	
	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast
Option2	1 042	3 690	2 031	6 915	989	3 224	11	38	208	709	1 198	3 933
Options 3 and 4	1 653	4 516	1 628	4 320	-25	-196	9	23	167	443	142	247

Source: [EPEC 2008] GHK estimates based on unit cost and cost savings and estimates of market transformation, values exclude VAT and tax, discount rate of 4% and fuel price at €75/bbl, i.e. 0.61 €/l excl. tax and 1.28 €/l incl. tax.

Cumulated CO₂ savings translated into g/km would mean between 1.2 (slow pace of change) and 4.1 CO₂ g/km (fast pace) under the single-labelling scheme (Option 2) and between 1 to 2.6 CO₂ g/km under the multi-criteria labelling scheme (Options 3 and 4), which can be considered significant as it represents almost one fifth of the 10g/km CO₂ savings target by 2012 formulated in the new integrated strategy to reduce GHG emissions from passenger cars (COM(2007) 19).

Conclusion 1: The table clearly shows that net benefits in terms of CO₂ reduction and fuel savings would be higher for Option 2 in the event of a single-criterion labelling scheme, but Options 3 or 4 may be considered valid options balancing fuel savings loss with marginal safety gains.

Sensitivity Analysis

Benefits will depend on fuel prices. Table 13 shows the average annual benefit depending on fuel prices. The fuel price scenarios are consistent with the energy outlook published by the European Commission up to 2030⁵⁹.

⁵⁹ *European energy and transport: Trends to 2030 – Update 2007*, http://ec.europa.eu/dgs/energy_transport/figures/trends_2030_update_2007/energy_transport_trends_2030_update_2007_en.pdf.

Table 13: Impact of Energy Labelling of C1 Tyres on the EU Economy, Average Annual Benefit, 2012-2020, 2008 prices (sensitivity analysis to oil price scenario)

	Total EU Benefit (€m) – Scenario 1 (€50/bbl)		Total EU Benefit (€m) – Scenario 2 (€75/bbl)		Total EU Benefit (€m) – Scenario 3 (€100/bbl)		Range in Total EU Benefit Compared to Scenario 2	
	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast
Option 2	50	157	115	376	179	594	+/-56%	+/-58%
Options 3 and 4	-40	-120	11	18	62	155	+/-463%	+/-761%

Source: [EPEC 2008] based on Eurostat⁶⁰ Note: scenario 1, fuel price at €50/bbl means 0.41 €/l excl. tax and 1.03 €/l incl. tax; scenario 2, fuel price at €75/bbl means 0.61 €/l excl. tax and 1.28 €/l incl. tax; and scenario 3, fuel price at €100/bbl means 0.8 €/l excl. tax and 1.53 €/l incl. tax.

It shows that in the case of a lower fuel price (at €50/bbl) increased production costs may not be compensated by fuel savings (if VAT excluded) in Options 3 and 4. This is, however, unlikely to happen given recent trends in fuel prices.

An estimation of CO₂ abatement costs was also made taking into account different fuel prices (Table 14).

Table 14: CO₂ Abatement Costs (Average Annual) in €/tonne

	Scenario 1 (€50/bbl)		Scenario 2 (€75/bbl)		Scenario 3 (€100/bbl)	
	Slow	Fast	Slow	Fast	Slow	Fast
Option 2	-59	-55	-138	-135	-211	-207
Options 3 and 4	47	50	-33	-29	-112	-109

Source: [EPEC 2008] Note: excludes the economic value of the environmental benefits of CO₂ emissions reduction.

CO₂ abatement costs are mostly negative except for the lower fuel price in scenarios 1 and 2 in the event of multi-criteria labelling (Options 3 and 4), but abatement costs in this case are still below €50, which can be considered to be relatively effective compared to other measures (see Figure 1 in Section 2.1).

60

http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996_39140985&_dad=portal&_schema=PORTAL&screen=detailref&language=en&product=Yearlies_new_environment_energy&root=Yearlies_new_environment_energy/H/H2/H21/ebc24848.

http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996_39140985&_dad=portal&_schema=PORTAL&screen=detailref&language=en&product=Yearlies_new_environment_energy&root=Yearlies_new_environment_energy/H/H2/H21/ebc25360.

Intensity of the Measure

The benefits from the introduction of a labelling scheme two years earlier than 2012, according to the [EPEC 2008] calculation (with a 4% annual discount rate) are equal to 8% of the annual average benefit (assuming the benefit of early implementation is simply the effect of avoiding the discount of annual benefits). Under oil price scenario 2, this ranges between €1m in Options 3 and 4/slow pace of change, and €30m in Option 2/fast pace of change.

It may, however, not be the best option as the tyre industry needs time to invest in testing machines – which they will have to do anyway by October 2012 – once the proposal for a Regulation on the general safety of motor vehicles is adopted (if the implementing date is not changed). It therefore seems appropriate to target a similar date for implementing the labelling scheme.

6.2.1.2. Administrative Costs

Regulatory costs were derived from [Europe Economics 2007] which assumed the costs of a new Directive to be around €720 000, with additional transposition costs in Member States of about €4.04 million. Assuming the regulatory costs are higher for a multi-criteria grading scheme, the regulatory costs for all options should lie between €4.76 million and €7.14 million. Given the high transposition costs of a Directive in Member States, it is proposed to adopt a framework directive and then establish implementing measures under the comitology procedure for adaptation to technological changes.

Monitoring costs will depend on the type of test procedure chosen: self-declaration and ex-post control or declaration with third-party approval, though it is not possible to quantify them.

6.2.1.3. Costs of Testing

Rolling Resistance (RR)

RR will be tested according to the future ISO 28580 which is intended to refine the precision of the testing methods in preparation for a grading scheme (see Annex 3 for further details). The costs of testing rolling resistance are summarised in Table 15 based on ETRMA input.

Table 15: Costs of Rolling Resistance Testing for C1/C2 Tyres

	Number of Tests per Year	Average Cost per Test	Total Annual Cost
Reference Case – tests necessary to show compliance with minimum requirements	400	€260 (250~300)	€0.1m
Grading for C1/C2	3 000	€260 (250~300)	€0.8m plus annualised fixed cost of €0.3m
Additional costs of grading compared to reference case (see Box 6)			€1m

Note: Fixed costs include maintenance and laboratory alignment tests and one-off start-up costs or RR grading, estimated to be approximately €2m with an annualised cost of €0.3m at 4% discount rate 2012-2020.

Box 6: In the reference case, the tyre industry will have to measure the RR of new tyre types within the framework of the type-approval (TA) procedure to show compliance with the minimum requirements set in the proposal for a Regulation on the general safety of motor vehicles. There are ongoing discussions on the measuring procedure to be followed, but it is likely that the same approach will be favoured as for external rolling noise and wet grip: tyre families are defined by producers and agreed by TA authorities, with the worst case being identified so that it is only necessary to measure the worst tyre by a simple pass/no pass test to demonstrate the compliance with the minimum requirement of all the others. This procedure has the advantage of reducing the number of tests to be done and hence the costs of the measure.

This approach, however, cannot be strictly followed for a grading scheme. Tyre producers will want to measure more tyres or reduce the range of tyre families in order to optimise the grading of each tyre type and size. A grading scheme will therefore imply a greater number of tests and hence higher costs than in the reference case (minimum standards).

The table shows that annual testing costs for rolling resistance are approximately €1m (costs of grading minus costs for TA testing, which will have to be done anyway to prove compliance with the minimum requirements governing RR) which means **€0.006 per tyre**. If a more conservative approach is taken, assuming that a labelling scheme with 1kg/t bandwidth implies more tests, the testing costs could rise up to €0.02 per tyre, which is still marginal. It is assumed that these costs can be passed on to end-users without any significant impact.

Wet Grip

Wet grip could be tested according to ISO 23671 (transposed in UNECE Regulation 117) or according to a new revised testing method after agreement by the tyre industry aimed at decreasing the standard deviation of testing methods and thereby decreasing the risk margin for a tyre to be wrongly graded. The costs of wet grip testing are summarised in the table below based on ETRMA input.

Table 16: Costs of Wet Grip Testing for C1/C2/C3 Tyres

	Number of Tests per Year	Average Cost per Test	Total Annual Cost
Reference Case – tests necessary to show compliance with minimum requirements	364	€2 000 (600~3 800)	€0.7m
Grading for C1 tyres	1 100	€2 311 (800~4 017)	€2.5m plus fixed cost (annualised) of €0.7m
Grading for C2 and C3 tyres			€0.4m
Additional cost of grading compared to reference case (see Box 7)			€2.5m

Note: Fixed costs include maintenance and laboratory alignment tests and one-off start-up costs or RR grading, estimated to be approximately €4.6m with an annualised cost of €0.7m at 4% discount rate 2012-2020.

The table shows that annual testing costs for wet grip are approximately €2.9 million (costs of grading minus costs for TA testing, which will have to be done anyway to prove compliance with the minimum requirements, added to initial start-up costs spread equally over the years) which means **€0.01 per tyre sold**. It is assumed that these costs can be passed on to end-buyers without any significant impact.

External Rolling Noise

Giving information on external rolling noise is likely to entail only marginal extra costs given that it has to be measured already according to the TA legislation on tyres (following the ISO 13325 measuring methods, transposed in UNECE Regulation 117), and a low-noise mark would imply the same “pass/no pass” test procedure.

Conclusion 2: Costs of testing per tyre sale can be considered to be marginal.

6.2.1.4. Costs of Display of the Labelling Scheme

The **costs of the display of the labelling scheme** will depend on the way the label/information would be provided. Possible measures and related cost estimates are presented in the table below. The setting-up of a database has not been included in the table. Given its complexity and the burden of properly managing a database as well as the principle of proportionality of costs and related liability issues, it is proposed not to include it in a legislative proposal but to leave it up to subsidiarity and consumer organisations.

Table 17: Costs of the Display of the Labelling Scheme

Type of communication	Costs	Assessment
Mandatory display of the measured value/class in technical documentation, tariffs and/or websites made publicly available	Marginal → will add only one line on existing advertising tools and can be easily included in existing communication practices)	Would convey the information to consumers and retailers before sale
Stickers on tyres tread	€10m per year, i.e. €0.04 per tyre sold (C1/C2), according to ETRMA estimates	- Would contribute to the visibility of varying tyre performance in RR and to awareness-raising - Especially adapted to tyre dealer shops (see Figure 3)
Moulding on tyre sidewall	€13 per mould if implemented for new tyre types only (see Box 6)	Guarantees the <u>reliability</u> of the displayed information on tyre quality and makes control on compliance easier, but would be difficult for non-professionals to read
Mandatory display of the information on tyre grading (class) with the bill provided to the consumers or end-users	Marginal	Allows for greater transparency of the tyre grading
Mandatory display of the information on tyre grading on catalogues and advertising for distance selling	Marginal	Will be essential in reaching consumers/end-users <u>before</u> their purchase decision

Conclusion 3: The real added value of moulding the information on the tyre sidewall is uncertain – the information may be too difficult to understand and to read. It is proposed to make the information mandatory in all catalogues and advertising tools and possibly to add a sticker on tyres' tread (except for the OE market, e.g. car showrooms).

6.2.1.5. Potential Impact on Import/Export

The labelling scheme is likely to have no significant impact on the import of tyres, though import tyres were found most of the time to have low RR but unsatisfactory wet grip performance. Underperforming tyres (30% of the market under the current proposal (COM(2008) 316)) will be banned anyway as a result of the minimum requirements set out for type approval. It is likely that a proportion of low-income consumers will continue to buy budget tyres (accounting for 21% of the total passenger car replacement market) with or

without a labelling scheme as they probably have no other choice. In addition, a labelling scheme, providing a level playing field for all, will allow new entrants to demonstrate that they produce well-performing tyres. A labelling scheme in that sense will reduce entry barriers due to brand reputation.

The market take-up of fuel efficient tyres will also have an impact on the chemical industry as they are produced with silica instead of carbon black. Since silica and carbon black are both produced in Europe⁶¹, it is likely to have no significant impact on external trade.

6.2.2. C2 and C3 Tyres – Option 5

6.2.2.1. Fuel and CO₂ Net Savings

Table 18 summarises total fuel and CO₂ savings due to Option 5. The monetary value of reduced traffic noise has not been included. Total benefits in the case of external rolling noise inclusion should therefore be deemed higher than the values given below.

Table 18: Cumulated Impact of Energy Labelling of C2 and C3 Tyres (Summer and Winter) on the EU Economy, NPV of Costs and Savings, 2012-2020, 2008 prices (VAT excl.)

	Additional Tyre Costs (€m, NPV)		Fuel Cost Savings (€m, NPV)		Net Cost Savings (€m, NPV)		CO ₂ Savings (mill. tonnes)		CO ₂ Savings (€m NPV)		Total EU Benefit (€m NPV)	
	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast
Single Labelling C2	159	314	636	1 202	476	888	4	7	69	130	545	1 018
Single Labelling C3	704	2 308	1 587	4 920	883	2 611	9	28	171	530	1 054	3 142
Total (C2/C3)	863	2 622	2 223	6 122	1359	3 499	13	35	240	660	1 599	4 160

Source: [EPEC 2008] Note: GHK estimates based on unit cost and cost savings and estimates of market transformation, values exclude VAT and tax., discount rate of 4% and average fuel price of diesel at €75/bbl, i.e. 1.02 €/l incl. tax. (assumption that 100% of light- and heavy-duty vehicles run on diesel).

Conclusion 4: Total cumulated net fuel savings and CO₂ benefits for C2 and C3 tyres over the period 2012-2020, between €1 599m and €4 160m, would add significantly to the total benefit for C1 tyres, between €142m and €3 933m (depending on the options and pace of change). This is because a given fuel savings percentage for commercial vehicles or trucks and buses is much higher in absolute terms than the same percentage fuel savings on smaller cars (consuming far less by definition). Option 5, the extension of a labelling scheme to C2 and C3 tyres, is therefore highly recommended.

⁶¹ *Chemical Economics Handbooks on Carbon Black and Silica*, SRI consulting, 2005.

Sensitivity Analysis

Table 19: Impact of Energy Labelling of C2 Tyres on the EU Economy, Average Annual Benefit, 2012-2020, 2008 prices (sensitivity analysis to oil price)

	Total EU Benefit (€m) – Scenario 1 (€50/bbl)		Total EU Benefit (€m) – Scenario 2 (€75/bbl)		Total EU Benefit (€m) – Scenario 3 (€100/bbl)		Range in Total EU Benefit Compared to Scenario 2	
	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast
Single Labelling (C2)	32	57	52	93	71	129	+/-38%	+/-39%
Single Labelling (C3)	40	115	85	254	130	393	+/-53%	+/-55%

Source: [EPEC 2008]

Table 20: CO₂ Abatement Cost (Average Annual)

	Scenario 1 (€50/bbl) (€/t CO ₂)		Scenario 2 (€75/bbl) (€/t CO ₂)		Scenario 3 (€100/bbl) (€/t CO ₂)	
	Slow	Fast	Slow	Fast	Slow	Fast
Single Labelling (C2)	-107	-105	-183	-181	-259	-257
Single Labelling (C3)	-44	-39	-120	-115	-196	-191

Source: [EPEC 2008]

CO₂ abatement costs are found to be negative in all fuel price scenarios.

6.2.2.2. Further Costs

Administrative costs and monitoring costs should obviously be higher than for labelling C1 tyres only. Costs of testing RR for C2 tyres were estimated between €0.01 and €0.06 per tyre (Table 15). For C3 tyres, no estimates were provided by ETRMA, but the average cost per tyre can be assumed to be similar to that for C1 and C2 tyres, with an aggregated cost proportional to the C3 market share (i.e. 5% of €1m which is equal to €0.05m per year).

Regarding the display of the labelling scheme for C2 and C3, it is proposed only to make the grading available in catalogues, websites and advertising tools as this market is addressed to professionals. It should be sufficient to make the information available for end-buyers without further communication tools. The cost of display of the labelling scheme can therefore be considered marginal.

6.2.3. Summary

- **Impact on customers:** Customers will benefit from a labelling scheme as they will have the opportunity to objectively compare tyres and make an informed choice. Since fuel savings exceed the related increase in production costs, they will make increasing net savings the higher the grading of the tyres they buy. The impact assessment shows that a multi-criteria labelling scheme (Options 3 and 4) provides for lower cost saving than a single-criterion labelling scheme (Option 2) but this can be considered offset by an improved level of wet grip, even though it is impossible to quantify the benefits in terms of improved road safety.
- **Impact on producers:** Producers will benefit from a higher return on R&D investment, though a labelling scheme may increase competition and increase pressure towards better-

performing tyres. A labelling scheme will imply higher costs due to testing, stickers and display of the labelling scheme via advertising tools. Producers are likely to pass on these costs to customers, which per tyre sale remain marginal (not more than €0.1 per tyre all included).

- **Impact on the EU Economy:** The impact on the EU economy is summarised below.

Table 21: Impact of Energy Labelling on C1, C2 and C3 on the EU Economy, Average Annual Benefit, 2012-2020, 2008 Prices (Oil Price Scenario 2)

Vehicle Type	Total Annual Average EU Net Benefit (€m)	
	Slow	Fast
C1 – Option 2 (Single labelling)	115	376
C1– Option 3 and 4 (Multi-criteria labelling)	11	18
C2 – Option 5 (Dual Labelling RR/noise)	52	93
C3 – Option 5 (Dual Labelling RR/noise)	85	254
Total Option 5	226	591

Source: [EPEC 2008]

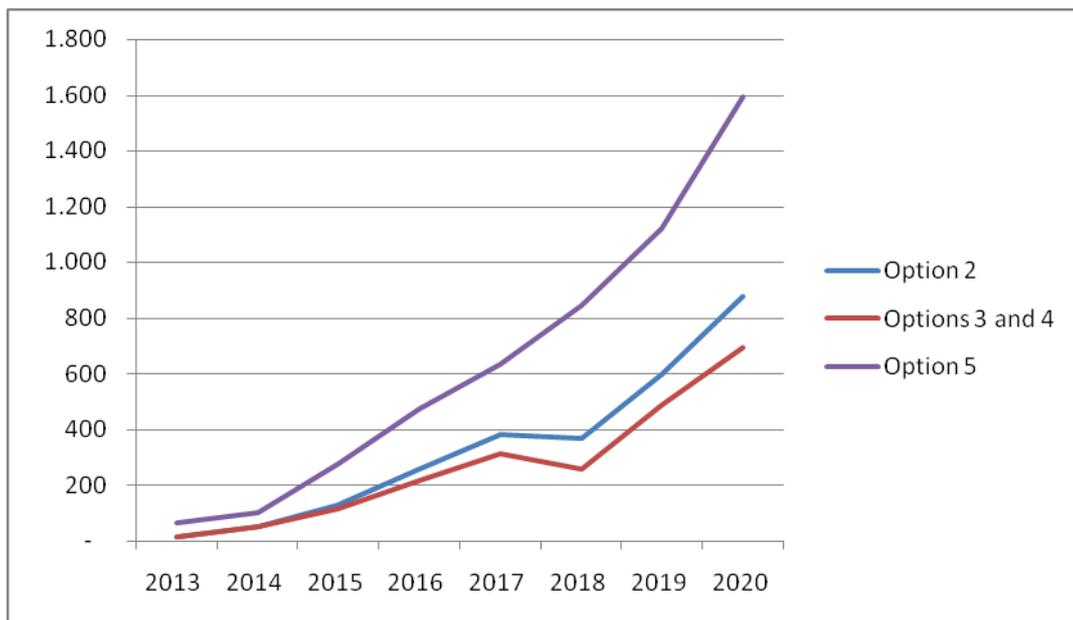
Options 3 and 4, multi-criteria labelling scheme for C1 tyres makes for a slower annual benefit than Option 2 because of higher production costs and the assumed lower market transformation. In fuel savings, however, the difference between Option 2 and Options 3 and 4 is less significant (Table 22 and Figures 8 and 9).

Table 22: Average Annual Fuel Savings

Tyre class	Annual Average Fuel Savings (mill. litres)		Average Annual Fuel Savings (Mtoe)		Equivalent to x vehicles less per year on EU roads		Share of new vehicle registrations in Europe (2006)	
	Slow	Fast	Slow	Fast	Slow	Fast	Slow	Fast
C1 (labelling RR)	326	1 104	0.3	1.02	253 420	858 210	2%	6%
C1 (multi-criteria label)	260	694	0.24	0.64	202 114	539 490	1%	4%
C2 (labelling RR)	99	181	0.1	0.18	36 000	65 818	2%	3%
C3 (labelling RR)	226	701	0.22	0.69	14 504	44 987	3%	10%
Total (Option 5)	585	1576	0.56	1.51	252 620	650 295		

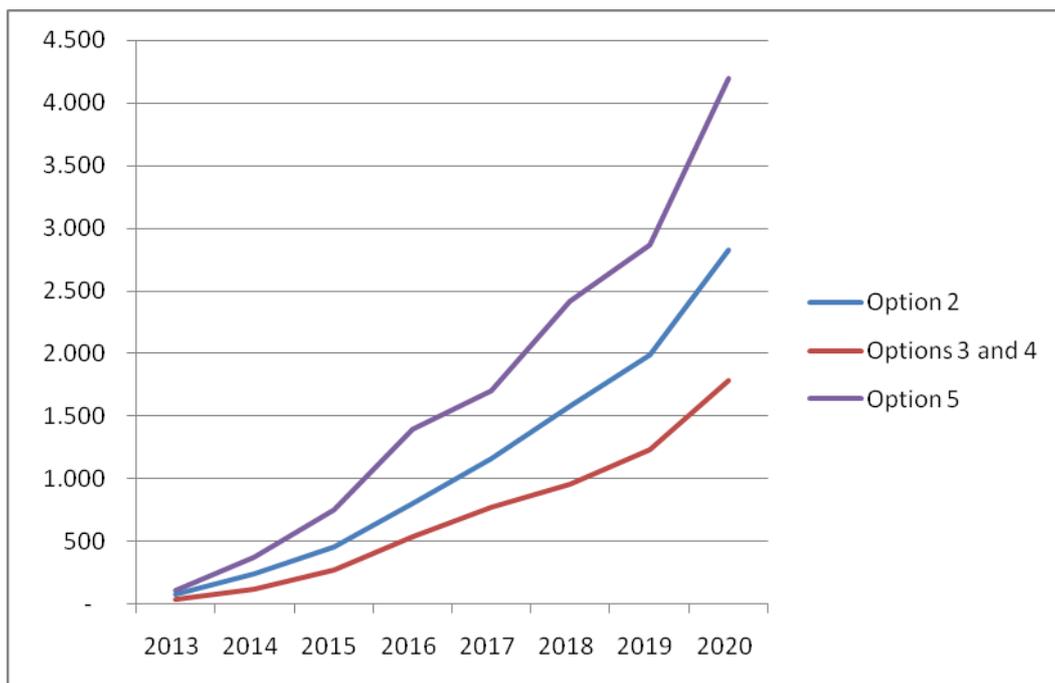
Source: [EPEC 2008] Note: Assumption for C1 tyres (passenger car fleet): 50% fuel, 50% diesel. Assumption for C2 and C3 tyres (vans, trucks and buses): 100% diesel.

Figure 9: Fuel Cost Savings (€n) for the EU Economy for the Labelling Options in C1/C2/C3 Replacement Market (Slow Pace) – Oil Price Scenario 2



Source: [EPEC 2008]

Figure 10: Fuel Cost Savings (€n) for the EU Economy for the Labelling Options in C1/C2/C3 Replacement Market (Fast Pace), Source: [EPEC 2008]



Source: [EPEC 2008]

The impact on the EU economy proves to be greater in Option 2 (single-criterion labelling scheme) than in Options 3 and 4 due to faster market transformation, however Options 3 and/or 4 might be the preferred option due to safety gains (see Section 6.1). In any case, the impact assessment clearly shows that Option 5, extension to C2 and C3 tyres, provides the most significant benefits.

- **Impact on society** (health – safety and external rolling noise – and security of supply): A labelling scheme ensuring market take-up of fuel efficient tyres would reduce fuel consumption and hence have a positive effect on security of supply. In total for Option 5, all tyre classes (C1/C2/C3) included, the average annual fuel savings over the period 2012-2020 are estimated at between 0.56 and 1.51 Mtoe, which exceeds the annual oil consumption of Latvia (in the fast-pace-of-change scenario).

A multi-criteria labelling scheme including wet grip would also have a positive impact on safety, which is likely to offset the additional costs of tyre purchase. Option 4, inclusion of external rolling noise in a labelling scheme for tyre fuel efficiency and wet grip, does not give clear evidence in terms of effectiveness and its assessment will depend on the subjective and political weight attached to traffic noise reduction.

- **Impact on the environment:** A labelling scheme is a win-win policy – it will generate both economic and environmental benefits even in the most conservative scenario. **In total for Option 5, CO₂ savings from all vehicle types per year ranges from 1.5m tonnes to 4m tonnes**, which is equivalent to removing 0.5m to 1.3m passenger cars from EU roads per year (equal to from 3% to 8% of new passenger cars per year)⁶².

The table below assesses each policy option compared to the initial policy objectives defined in Section 3.

Legend

Very Positive	+++
Positive	++
Slightly Positive	+
Negligible or No Impact	0
Slightly Negative	-
Negative	--
Very Negative	---

⁶² It is also worth emphasising that life cycle analysis shows that LRRTs will have no adverse impact on the environment. First, the greatest environmental impact (86% of total impact) of a tyre occurs during its use phase. Second, the partial substitution of black carbon by silica will reduce the environmental impact of tyres because carbon black, which is produced from fossil fuel, has a higher CO₂ footprint.

Table 23: Summary Assessment of Policy Options

	General policy objective			Specific objective			Operational objective	Administrative burden
	Reduce CO ₂ and pollutants emissions	Promote fuel efficiency	Promote competitiveness of the tyre industry	Promote market take-up of fuel-efficient tyres	Drive investments in R&D towards environmentally friendly tyres	Maintain other parameters at least at the same level	Provide easy-to-understand information to consumers/ overcome market failure	
Option 1	+	+	0	--	-	0	--	0
Option 2	++	++	++	++	++	0	+++	-
Option 3	+	+	+++	+	+	+++ exceeds objective	++	--
Option 4	+ same as Option 3	+ same as Option 3	+++	+ same as Option 3	+ same as Option 3	+ depends on national preferences and feasibility	++	--
Option 5	+++	+++	+++	++	++	+++	++	--
Option 6	+	+		++ will speed up market transformation	+	+	+	---

Conclusion 5: Summary Table 23 shows that Option 5 should be the preferred option with a labelling scheme for C1 tyres on tyre fuel efficiency including wet grip and a labelling scheme for C2 and C3 tyres on RR. The impact assessment was unable to find clear evidence in favour of including external rolling noise. The decision will mainly depend on the precision and availability of testing methods (problem with test track variation) and the subjective weight given to traffic noise reduction.

7. MONITORING AND EVALUATION

The main monitoring element will be the tests carried out for new product grading. Monitoring of the effects should be done via market surveillance by Member State authorities ensuring that the grading of tyres is truthful. An effective market shift towards the upper band will be the main indicator of progress towards market take-up of fuel-efficient tyres (and possibly wet grip).

The appropriateness of scope, definitions, concept and possible trade-offs will be monitored via ongoing dialogue with stakeholders and Member States. The main issues for a possible revision of the proposed labelling scheme are:

- Appropriateness of an absolute grading scheme – seeing whether tyres with a smaller outside diameter manage in practice to make it into the “A” class.
- Possible adverse impact on tread wear.
- Necessity to revise the banding scheme in line with technological improvements.
- Development of a more precise information scheme covering safety which may include, if proven necessary, safety parameters other than wet grip, namely road-holding ability, directional control, deceleration ability on wet and dry surfaces at higher speed and aquaplaning behaviour.
- Implementation of new minimum requirements governing RR, wet grip and/or external rolling noise.

Revision and adaptation to technical progress (e.g. availability of suitable measurement or testing standards, upgrading of classes following market evolution, etc.) could be implemented through comitology.

Taking into account the time necessary for collecting, analysing and complementing the data and experience related to implementation of the labelling scheme and to assess technical progress, it would be possible to present a review of the main elements of the framework five to eight years after entry into force of a labelling scheme.

Annex 1: Minutes of the Technical Expert Group Meeting – 21 April

Annex 2: Minutes of the Workshop – 26 May

Annex 3: Relative versus Absolute Grading

Annex 4: Sample of Labelling Scheme

Annex 5: Economic Data Relevant for the Impact Assessment

Annex 6: Minimum Requirements on Tyre defined in the Proposal for a Regulation on the general safety of motor vehicles (COM(2008) 316)

Annex 1: Minutes of the Technical Expert Group Meeting – 21 April



EUROPEAN COMMISSION

DIRECTORATE-GENERAL FOR ENERGY AND TRANSPORT

DIRECTORATE D – New and Renewable Energy Sources, Energy Efficiency & Innovation
Energy efficiency of products & Intelligent Energy – Europe

Brussels, 15.05.2008
TREN/D3/AC D(2008)

Final Minutes of the expert group meeting on tyre labelling – 21 April 2008

Attendees: Johannes-Josef BAUMHÖFER (Continental), Alix CHAMBRIS (DG TREN), Fazilet CINARALP (ETRMA), Georges DIMITRI (Michelin), Simone FALCIONI (Bridgestone), Bernd HARTMANN (Continental), Stefan KÖPEEN (Good Year), Jean-Paul LAMBOTTE (Good Year), Christophe PENANT (Michelin), Adarsh VARMA (GHK)

An expert group meeting took place on 21 April to reply to technical questions in preparation for the workshop on tyre labelling scheduled for 26 May. The discussion was divided into two parts: one on rolling resistance and tread wear, the other on wet grip.

1. Working document on absolute versus relative grading and tread wear

-see original working document in annex A below

1.1 Assessing the relevancy of a relative grading scheme for rolling resistance versus absolute grading (questions 1 to 3)

A relative grading scheme would make sense only if there is a proven correlation between rolling resistance coefficient (RRC) and other parameters such as external diameter (OD) and/or load index (LI).

The tyre industry position was that there was indeed a correlation for C1 and C2 tyres but that it was too weak to justify a relative grading scheme, with some disagreement from one of the tyre manufacturers (answer to Q1). For C3 tyres, no correlation could be found between RRC and OD or LI.

The discussions could not provide enough evidence against a relative grading scheme, with all data provided showing the existence of a correlation even if the regression coefficient (R2) was low. In addition more accurate measurement for RR would increase the significance of correlations between RRC and OD or LI (Q2).

A relative grading scheme would have two advantages:

- It would provide equal incentives to improve RRC for all tyre dimensions. As the RRC decreases when the tyre external diameter or load index increases, an absolute grading scheme would make it easier for bigger tyres to be better graded, so that the incentives for upgrading products would be larger for smaller tyres.
- It would guarantee that consumers will find A tyres in all tyre dimensions.

The advantage of an absolute grading scheme was the simplicity of the scheme.

It was agreed that the tyre industry would work on the design of a relative grading scheme for C1 and C2 tyres to enable a proposal to be made before the workshop due on 26 May (Q3).

1.2. Assessing the trade-off between RR and tread wear (questions 4–6)

The tyre industry agreed unanimously that the market was self-regulating as regards tread wear, so that it was not necessary to provide information on tread wear in a labelling scheme (Q4). In addition to this, existing testing methods would not allow a satisfactory information scheme for tread wear (Q5): there was agreement that the only testing method available, the one defined in the US UTQG (Uniform Tyre Quality Grading System), was totally unsatisfactory, and that the costs of testing would be too high for a labelling scheme to be cost-effective on this specific tyre parameter.

Figures showed no trade-off between RR and tread wear on C1 tyres, but one on C2 tyres, and a clear trade-off between wet grip and tread wear for both C1 and C2 tyres. As a grading of wet grip may be introduced, an adverse effect on tread wear could not be excluded, but the industry still believed that, for the time being, no further measure was necessary as no tyre manufacturer would take the risk of losing market share, knowing that tread wear was a parameter consumers could clearly assess when they have to replace them (Q6).

2. Working document on tyre safety and wet grip grading

-see original working document in annex B below

2.1. Assessing the relevance and feasibility of a grading on wet grip (questions 1 to 2.2 and 5 to 7)

Tyre experts were unanimous about the fact that a grading scheme of RR alone would have an adverse effect on wet grip above the minimum requirement set for 2012 according to UNECE Regulation 117 and the draft proposal on the general safety of motor vehicles. The objective of the labelling scheme should therefore be to give incentives for optimisation of both RR and wet grip (Q1 and Q2.2).

The experts agreed that the range of tyre performances on wet grip were wide enough for a banding scheme for both C1 and C2 tyres provided tests method would allow for enough accuracy for a significant number of bands (minimum 15% band width, if not 10%) (Q2.1).

There was agreement that the accuracy of wet grip testing methods could be improved in the next 1.5 years within the existing ISO 23671 test for C1 tyres to allow for a grading scheme for wet grip (Q5.1 and 5.2). This would take the form of a testing method defined within the profession (a revised ISO method on wet grip would take at least three years.) No test methods were currently available on wet grip for C2 tyres as an SRTT still needed to be adopted at ISO level, but it should be a priority to adopt a wet grip grading for C2 tyres as soon as it became available.

No figures could be provided on the extra costs of additional testing due to the introduction of a grading scheme. ETRTO would send cost estimations to GHK in the framework of the impact assessment study before 30 April (Q6).

The tyre industry believed that no wet grip grading was necessary for C3 tyres as wet grip varied too much according to the load of the trucks, but no serious study underpinned this statement for the time being.

2.2. Assessing the correlation between wet grip performance and other tyre safety performance (questions 3 & 4)

Figures showed a good correlation between wet grip performance and other tyre safety performance characteristics, namely road-holding ability, directional control, deceleration ability on wet and dry surfaces at higher speed and aquaplaning behaviour, with one industry thinking that there may be an adverse relation between wet grip and adherence (dry grip) and handling (Q3). According to the expert group, there was no risk in communicating to consumers just the wet grip safety parameter (Q4).

The widening of a grading of wet grip to include other safety parameters should in any case be based on a specific impact assessment, the tyre industry said.

3. Other issues discussed

It was agreed that ETRTO would send estimations of the extra costs of testing necessary for a grading scheme regarding RR to GHK as input to their study before 30 April.

Representatives from ETRTO presented the results of the work going on within the new ISO 28580, an agreement was found within the ISO working group – against the position of one of its members – on the use of two tyres for the alignment of testing machines which were considered to be sufficient. Knowing that this result would imply less accurate testing results, some of the experts concluded that a 1,5kg/t width should be defined for the grading scheme.

The question of the width of the bands remained open as long as no evidence was provided on the real increase in costs for more accurate tests. It was clear that the success of a banding scheme was directly linked to the differentiation it provided to consumers regarding products.

Annex A: Working Document on rolling resistance and tread wear

Working document –expert group meeting on rolling resistance / absolute versus relative grading and tread wear -21st of April 2008

The European Commission has consistently, within the existing labelling directive on household appliances, favoured relative versus absolute grading⁶³. The rationale behind is to allow consumers to compare products which are relevant to them. A person needing to buy a big fridge because it has a big family will not change its purchasing decision because smaller fridges obviously consume less energy. The same may well be true for tyres as a consumer has little choice in the dimension of the tyres he wants to replace.

The aim of the expert meeting is to assess the relevancy of this logic for tyres.

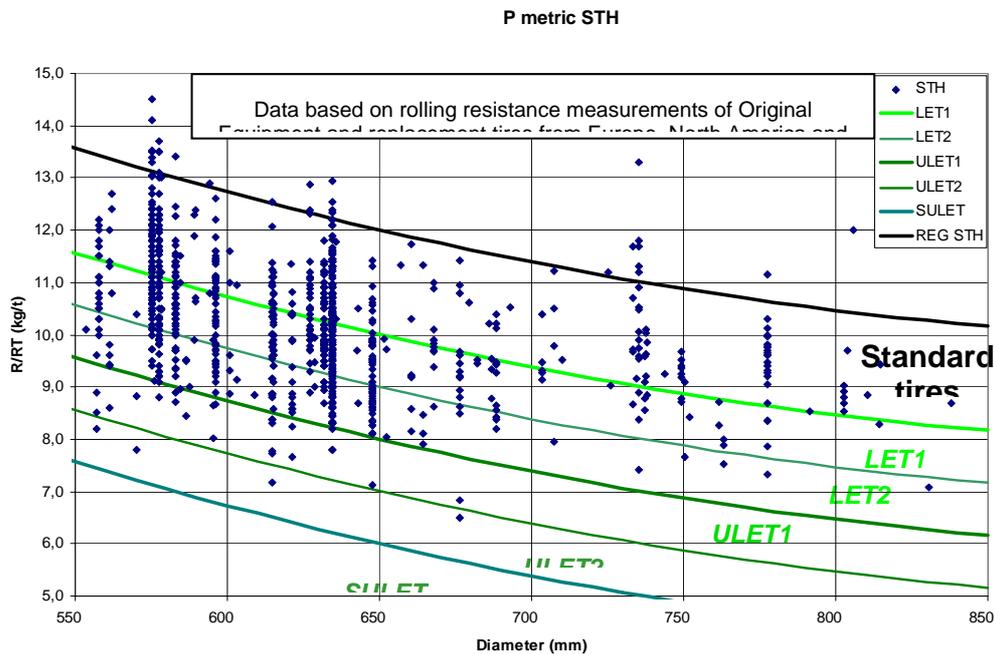
Given the possibility of a trade off between rolling resistance and tread wear, the expert group will also be asked to consider this question in the last section.

1. Distribution of RRC according to tyre categories

A public contribution made by Michelin at the IEA in November 2005 gives clear evidence that the performance of a tyre in regards RRC is directly linked with its size (in this case it is diameter). This assumption seems to be validated by the Smithers study made in California. Those are the only figures which are available for the time being.

⁶³ For tyres, a relative grading would mean a grading within a particular class of tyre consistent with consumer choice largely based on tyre size dimensions as opposed to absolute grading across the whole tyre output.

- The following graph from Dominique Aimon (Michelin) presentation clearly shows that bigger tyres demonstrate a mean RRC lower than smaller tyres. An absolute grading in that case (horizontal bands on the graph) would allow unfair comparison between tyres with no small tyres performing in the A grade and no bigger tyres in the G grade.



Source: Dominique Aimon (Michelin), Supporting the development of Low Energy Tires, slide 7, <http://www.iea.org/dbtw-wpd/Textbase/work/2005/EnerEffTyre/aimon2.pdf>

Bruce Lambillotte (Smithers Scientific Services) presentation seems to confirm this statement (slide 33, see link bellow) but shows that load index may also be a relevant factor for differentiation (slide 35).

Source: Bruce Lambillotte, Task 4 Rolling Resistance Testing: California Energy Commission's Fuel Efficient Tire Program, Workshop on the Fuel Efficient Tire Program, Smithers Scientific Services, 07/12/2007, http://www.energy.ca.gov/transportation/tire_efficiency/documents/2007-12-07_workshop/presentations/Lambillotte_Bruce_Task%20%20Rolling%20Resistanc%20Testing.pdf

Q1: Do you agree with these assumptions?

Apparently, the relationship between RR and tyre outside diameter (OD) is a function of the accuracy of the RR tests. An accuracy of testing methods with a confidence interval of ± 0.5 kg/t compared to ± 0.75 kg/t will influence the strength of correlation (size and direction) between RR and tyre diameter.

Q2: How might a more accurate measurement for RR effect the currently estimated correlations between RRC and OD?

2. Relative grading

If there is an agreement on the variation of RRC according to tyre categories (diameter, LI or another parameter), then the question of the design of a relative grading scheme arises.

Dominique Aimon in its presentation proposes apparently a simple formula to allow for a relative grading. See slide 6: $RR\ threshold = 0.0000212 (OD \times OD) - 0.041 OD + 27.7$

Q3: Do you suggest an alternative? Can you agree on a formula or a simple way to define tyres categories (for example by car sizes) for a relative grading scheme?

3. Trade off between rolling resistance and tread wear

Given the fact that it is technically possible to reduce rolling resistance at wear costs, a grading on rolling resistance alone may have an adverse effect on wear which if significant may even offset the environmental benefit of market transformation towards rolling resistance. Market surveys in addition show that wear (i.e. "long lasting tyre") is the most important criteria in consumers purchasing decision.

Taking into account however that no testing methods are currently available on tread wear and that they may be very costly, it has been argued, that tread wear should not be included on a labelling scheme. The rationale behind is that no tyre manufacturer would take the risk to decrease the lifetime of a tyre -as he knows that consumers will notice it, even few years after the purchasing decision- and hence lose market share in the long run. The market could in this case be considered as self regulating.

Q4: Do you agree with this argumentation, i.e. that the market is self-regulating as regards tread wear?

Q5: What are the testing methods available or feasible on tread wear and at which costs?

Q6: Do you have any suggestion on how to avoid negative effect of promoting low rolling resistance tyres on tread wear?

Annex B: Working Document on wet grip

Working document –expert group meeting on tyre safety / wet grip grading -21st of April 2008

Given the possibility of a trade off between rolling resistance and safety performances of tyres, the tyre industry has requested a labelling scheme that includes both wet grip and rolling resistance. The expert group is to assess the relevance and feasibility of this approach.

1. Assessing the effect of a grading on rolling resistance on tyre safety performances

The draft proposal for a Regulation on general safety of motor vehicles foresees that minimum requirements on wet grip for C1 tyres will be mandatory by 2012/14. This will guarantee that improvement on improvements on rolling resistance will not deteriorate safety bellow this minimum requirement which was considered within the UN-ECE working group as sufficient (at that time experts considered that there were no need to increase the safety performances of tyres, but only to avoid their deterioration).

It has been argued however that a grading scheme on rolling resistance could have a negative impact on tyre safety performances given the high range of improvement possible above this minimum requirement for wet grip. The rationale is that a grading scheme on rolling resistance alone could push tyre manufacturers to optimize this parameter at the cost of other tyre performances in the absence of relevant information being given to consumers.

Q1: Do you agree with this statement, i.e. that improved rolling resistance alone may have an adverse effect on safety (above the minimum requirement set for wet grip)?

2. Labelling tyres on wet grip

A possibility to address this risk is the inclusion of a grading on tyre safety performances together with a grading on rolling resistance. Considering that the only testing method available today regarding tyre safety performances is on wet grip, a labelling scheme could address only wet grip in a first stage, with possible improvements/revisions at a later stage, if proved appropriate.

2.1. Feasibility of a banding scheme on wet grip

For a banding scheme on wet grip to be introduced such as for rolling resistance there should be sufficient differentiation on the market between products performances on that criterion. It is generally agreed that tyre performances on wet grip vary between 110% and 160% on the wet grip index (see also graph bellow).

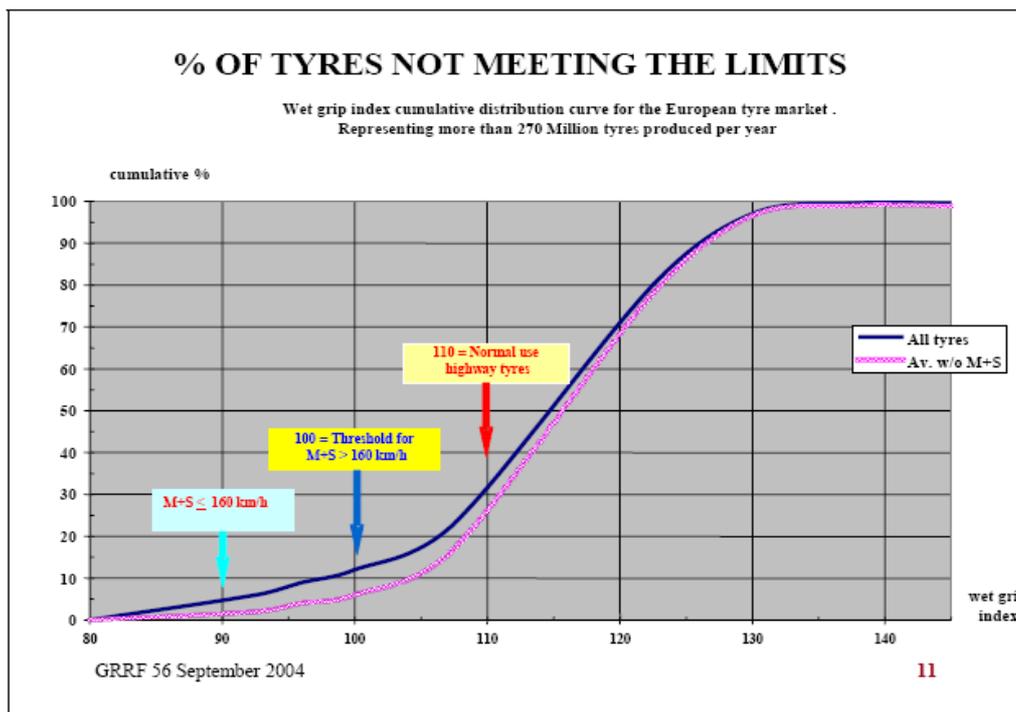


Fig. 29. Cumulative frequency distribution of the wet grip index (G) for a large number of tyres on the European market [GRRF 56-28, 2004]. The limiting values according to the ECE R117 are indicated. The curve in lilac colour (lighter) shows data for "normal" ("summer") tyres, whereas the blue curve (darker) shows data for all tyres together. Note that "M+S" are the same as "snow" or "winter" tyres.

However these figures do not show the range of performance in a given tyre dimension. Consumers having little choice in the dimension of the tyre they need to replace, there should be a sufficient wide range of tyre performances on wet grip for a given tyre dimension. The figures from TÜV (see graph bellow) show a small difference in wet grip index for a given tyre dimension (20% in average). Only 106 tyres have been tested though, a state of the art of the market may show a very different picture.

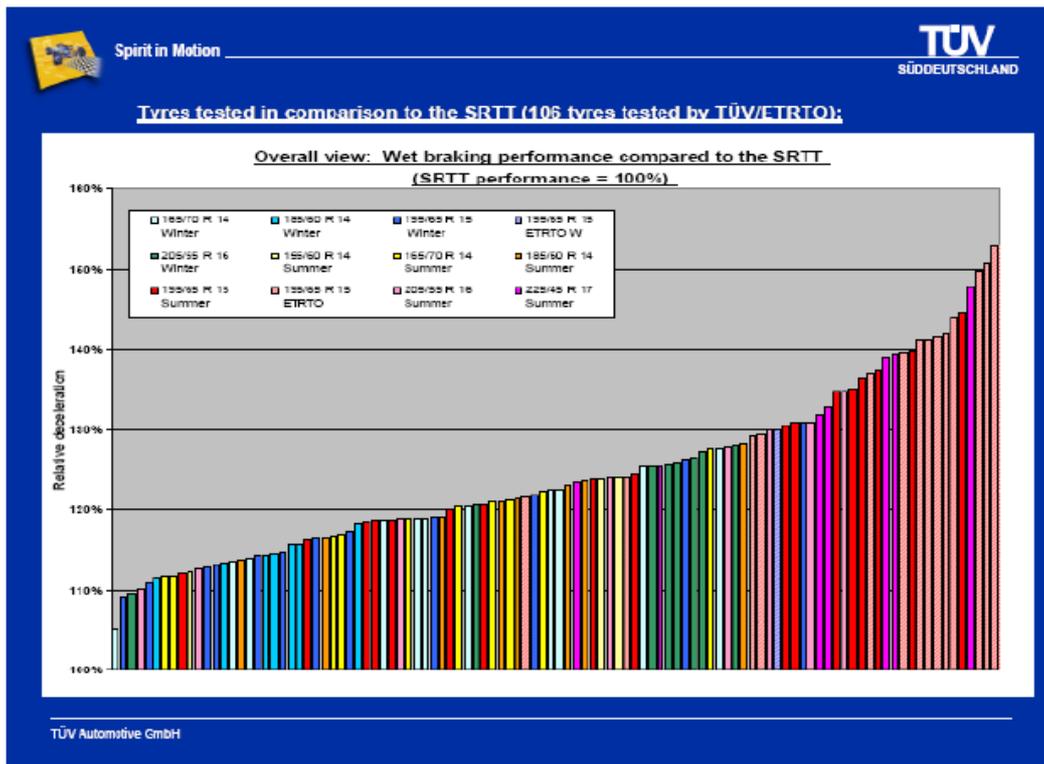


Fig. 28. Measurements of wet braking performance according to the ECE R 117 method (the deceleration method) on 106 tyres, made by TÜV and ETRTO [GRRF 56-28, 2004]. The results are normalised to the values for the SRTT, the latter of which are plotted as 100 %.

Q2.1: Is the range of tyre performances on wet grip wide enough for a banding scheme, e.g. 4 or 7 bands (also in a given tyre dimension relevant for consumer)?

Q2.2: Could a parallel grading on wet grip help avoiding overall deterioration of the safety performance of tyres under the influence of improved RR?

2.2. Communicating on tyre wet grip performance: assessing the risks and potential benefits

Giving information to consumers on tyre safety performance implies a strong responsibility of tyre manufacturers which may be subject to liability.

Therefore the question arises as to the correlation of the wet grip index with other tyre safety performances: road holding ability, directional control, deceleration ability on wet and dry surfaces and aquaplaning behaviours.

Q3: What is the correlation of the tyres performance on wet grip with the other safety parameters?

Q4: Is there a risk to convey misleading information to consumers when communicating on the sole wet grip performance as a safety parameter? Is the risk marginal or significant, taking into account that currently other parameters are not (and cannot be) regulated?

3. Design and costs of a labelling scheme:

The tests on wet grip, which will be mandatory from 2012 (date of implementation of minimum requirements on wet grip) as set in the draft proposal for a regulation on general

safety of motor vehicles, will be those defined in the UN-ECE regulation 117 (i.e. ISO 23671) by tyre type. The ISO working group has started to review this existing testing method in order to reduce its tolerances so as to allow for a grading scheme on wet grip.

Q5.1: Are the current testing and certification methods accurate enough for a banding scheme?

Q5.2: What is reasonably achievable within the ISO working group? To what extent can the standard deviation of the existing tests be reduced?

Testing tyres to comply with a minimum requirement on wet grip implies to test only the worst tyre of a given family such as for noise. A grading scheme will imply additional tests as no tyre manufacturers will want to have better performing tyre being graded with the same value of the worst tyre of the same family.

Q6: What will be the extra-costs of these additional tests for tyre manufacturers?

The tests currently cover C1 tyres only as no Standard Reference Testing Tyre has been adopted yet for C2 and C3 tyres.

Q7: What is the time table foreseen for the adoption of SRRT for C2 and C3 tyres?

Annex 2: Minutes of the Workshop – 26 May



EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR ENERGY AND TRANSPORT

DIRECTORATE D – New and Renewable Energy Sources, Energy Efficiency & Innovation
Energy efficiency of products & Intelligent Energy – Europe
DIRECTORATE E – Inland Transport
Road Safety

Brussels, 09.06.08
TREN/D3/AC D(2008)

FINAL MINUTES of the Stakeholder Workshop on tyre labelling – 26.05.08

Centre Albert Borschette (CCAB), Brussels

Participants: see Annex A

The Chair opened the meeting by highlighting that the Workshop was part of the consultation process started under the impact assessment for a possible legislative initiative for a labelling scheme for tyres. He gave a brief overview of the context within which the impact assessment on tyre labelling was taking place. Further improvements needed to be achieved on transport fuel efficiency if the EU were to reach the post-Kyoto target and a sustainable transport pattern. The promotion of Low-Rolling-Resistance Tyres (LRRTs) had been identified in the Integrated Strategy to reduce CO₂ emissions from passenger cars and light-duty vehicles (COM(2007) 19) and in the Energy Efficiency Action Plan (COM(2006) 545) as one of the operational policy tools for reaching the 20% energy savings potential by 2020.

Technological improvements allowed the reduction of rolling resistance (RR) by up to 50% which meant a difference in fuel consumption between the best- and the worst-performing tyre of 10% (a 10% reduction in RR meant on average 2% fuel savings). LRRTs were cost effective but their development tended to be hampered by lack of consumer information, and thus a market failure. Various studies had identified a fuel savings potential due to the market take-up of LRRTs of approximately 3%, leading to a saving of 100 billion euros from 2008-2030 and a CO₂ emissions reduction of 600 million tonnes^{64,65}.

The Chair recalled that the Commission had adopted a proposal for a Regulation on the general safety of motor vehicles on Friday 23 May (COM(2008) 316). The proposal set out requirements for the type approval of tyres, including:

- Minimum requirements governing RR which would ban the worst-performing tyres from the market in a two-step approach in 2012/14 and 2016/18 for C1 and C2 tyres (respectively passenger cars and light-duty commercial vehicles) and 2012/16, 2016/20 for C3 tyres (heavy commercial vehicles).
- Maximum external rolling noise minimum requirements for 2012/2016.

⁶⁴ Europe Economics, *Impact assessment study on a possible extension, tightening or simplification of Framework Directive 92/75 EEC on energy labelling of household appliances*, 2007, http://ec.europa.eu/energy/demand/legislation/doc/2008_02_22/2008_consultation_energy_labelling_appendix2_en.pdf

⁶⁵

- Minimum requirements regarding wet grip of C1 tyres for 2012/14 (transposal of UNECE Regulation 117).
- The aim of the workshop was to gather stakeholders' views on the possible introduction of an energy labelling scheme for tyres allowing for improvements of tyre performances above the minimum requirements set in the abovementioned package. Special emphasis was given on possible trade-off between the optimisation of RR and other parameters such as wet grip (relevant for safety) and external rolling noise (RN).
- The meeting was structured according to the questions discussed in the working document that was published for consultation on 28 April 2008 on http://ec.europa.eu/energy/demand/legislation/under_discussion_en.htm. Written replies had been downloaded onto the same webpage.

	Yes	No
<i>Q1: Do you agree that a grading on rolling resistance, for C1/C2 and C3 tyres, being made available to end users and retailers, would be effective in fostering market transformation towards LRRT? What conditions would need to be met (e.g. simplicity of markings, transparency of data)?</i>	X	

All parties agreed that a grading scheme which would provide end-users with an objective comparison between tyre performances would be effective in promoting market transformation towards LRRTs. The Netherlands had experienced a very good feedback on their programme on “safe, silent and climate-friendly tyres⁶⁶” which proved the momentum for policy action on this issue. The programme included the testing of a great number of tyres, with publication of the measured value and a wider awareness-raising campaign.

There was divergence of views on the categories of tyres to be included in the labelling scheme with, on the one hand some stakeholders against the inclusion of C3 tyres (ETRMA/German Ministry for Transport/BIPAVER) on the grounds that road transport companies already had thorough information on the RR of their fleet, and on the other hand other stakeholders opposing this statement. FNTR, the French Federation of Road Transport, argued that its members would benefit from a harmonised labelling scheme and it would allow them to use potential “A grading” (i.e. the use of LRRTs) in their Corporate Social Responsibility Strategies and outside communication. Ulf Sandberg from VTI also pointed out that some big and medium fleet companies had contacted him to ask whether a transparent and objective grading scheme existed, which proved an interest in the development of such a scheme on their part. T&E and the Dutch government highlighted that public authorities would benefit from a grading scheme and could use it in their public procurement policies including C3 tyres (e.g. for buses).

The range in RR tyre performance for C3 tyres which had emerged from the Dutch measurement programme and reflected the 2004 state of the market provided by ETRMA (showing a difference in RRC of up to 100%) seemed also to confirm that the market might not be functioning that well. The range in RR tyre performance of C3 tyres would be much narrower if road transport companies were well informed – knowing that “costs per km” was one of the first parameters they wanted to optimise.

⁶⁶ <http://www.destilleband.nl>.

A question on the costs of RR measurement according to ISO 28580 was put forward by the German Ministry for Transport with the concern that not all tyres should be tested. DG TREN reinsured that a similar approach could be taken as for testing of external rolling noise where only the worst tyre of a given family was to be measured. Tyre families for rolling resistance, however, had not yet been defined and would be the subject of discussion at the Geneva GRRF working group in September when proposals for the introduction of rolling resistance testing into the relevant UNECE tyre regulation (either Regulations 30 and 54 or Regulation 117) would be considered. Once agreed, it was intended that the implementing measures of the proposal for a Regulation on the general safety of motor vehicles (COM(2008) 316) would refer to the revised UNECE Regulation(s). DG TREN would work together with DG ENTR in this framework. In the meantime cost estimations would be made within the external study on tyre labelling contracted with EPEC (GHK/TNO). For a grading scheme though, it was likely that more tests would need to be done in comparison to those necessary to ensure compliance with a minimum requirement, as tyre producers would want to grade their tyres at the best possible level (families might also be defined more strictly so as to have a small range of tyre performance inside one family). First figures provided by ETRMA estimated these extra costs for C1 tyres at 0.006cent per tyre on average, but this would be further developed in the impact assessment.

Conditions noted as being necessary for the success of an energy labelling scheme in fostering market transformation towards LRRT included:

- Simplicity of information provided to end users.
- Transparency of data, which could be achieved in different ways:
 - Public database advocated by T&E and VTI but engendering reservations from DG TREN (past experience showed that databases are extremely complex to update, subject to liability, and costly) and Germany (no budget for this).
 - Display of the measured value on the label (T&E/VTI) but which might not be understandable by consumers (ETRMA).
 - Mandatory display of the measured value/class on technical documentation, tariffs and/or websites made publicly available (suggested by DG TREN).
- Design of the banding scheme:
 - Minimum bandwidth of 1kg/t (VTI/T&E) – opposed by ETRMA on the ground that the precision of testing methods did not allow for bandwidth below 1.5kg/t. DG TREN would further investigate this point.
 - More bands allowed for better differentiation amongst products and a stronger message towards consumers (DG TREN experience from other labelled products).
 - No tyres in band A (T&E) in order to provide incentives for further innovations, with a different point of view raised by DG TREN (experience with other products showed that the credibility of the label increased when consumers could see that there were products in band A).
 - The Chair highlighted that the design of a possible banding scheme would depend on the outcome of analysis of the precision of measuring methods (feasibility) and the potential for market transformation.

- Good correlation between “indoor” measurements (according to the future ISO 28580) and in-use performance of tyres (in “real-world” conditions).
 - VTI highlighted a problem arising from the difference in tyre grading measured according to the future ISO testing method and on actual road surface: for 50% of “real-world” measurements, the grading would be different to the ISO “indoor” tests. This should not delay the implementation of a grading scheme but should be improved in the long run. This needed to be further investigated in the framework of the impact assessment, as experts from the ISO working group on rolling resistance seemed to disagree with this statement.

A request was made to introduce the labelling scheme by 2010 (T&E).

	Yes	No
<i>Q2: Is there a need to adopt different grading schemes on rolling resistance for winter (M+S) and summer tyres (assuming that suitable criteria to distinguish the two categories can be agreed)?</i>	(X?)	X

The 2004 state of the market provided by ETRMA showed a difference in average rolling resistance between winter and summer tyres of +1kg/t (winter tyres 1kg/t above summer tyres) while VTI and M+P found the opposite results (winter tyres 1kg/t less than summer tyres). These contrasting results might be the consequence of different designs of winter tyres: tyres for Scandinavian countries are made to roll on ice and snow, in other countries they are made to roll on mud and wet road, with different techniques and tread patterns used in both cases. According to VTI, this difference was too small and the results too contradictory to justify a different grading scheme. Norway suggested including only summer tyres in the labelling scheme given the fact that under winter conditions other factors such as snow or ice influenced RR; however this would take out 28% of the EU tyre market.

	Yes	No
<i>Q3: Are you in favour of a grading of both rolling resistance and wet grip for C1 and C2 tyres? If not, why?</i>	X	

The possible trade-off between rolling resistance and wet grip in a given technology was confirmed by all stakeholders, even though evidence indicated that it was technically feasible to improve all tyre performance characteristics at the same time – results of the Dutch measurement programme, for instance, found tyres performing very well on rolling resistance and excellent on other tyre performance characteristics (for example, one tyre performed 6dB lower than the current external rolling noise minimum requirement and 140% on the wet grip index).

With the objective of avoiding improved rolling resistance being achieved at the expense of safety, all respondents supported the inclusion of a grading for wet grip in the labelling scheme together with rolling resistance.

At present, only information on wet grip could be provided to consumers because it is the only safety parameter on which there exists an agreed testing method (ISO 23671) which is also the basis of UNECE Regulation 117 setting minimum requirements governing wet grip for C1 tyres (in order to avoid lower external rolling noise being achieved while decreasing wet grip). According to a technical experts’ meeting, which took place on 21 April, there was

a good correlation between tyre performance regarding wet grip and other parameters relevant for safety such as aquaplaning, handling in curves, dry grip and wet grip at higher speeds. Stakeholders did not contest this outcome, but highlighted the necessity in the long run to refine testing methods in order to incorporate other safety parameters (VTI) and to inform consumers that tyre safety performance also depended on end-users (e.g. regular control and replacement of worn-out tyres) (VTI/BIPAVÉR).

	Yes	No
<i>Q4: Should a grading on wet grip also include C3 tyres?</i>	X	X

The possibility of including C3 tyres in a wet grip grading would depend on the speed of the work at UNECE level in adopting a Standard Reference Testing Tyre (SRTT) in the C3 category (the same was valid for C2 tyres). According to the 21 April technical expert meeting, the SRTT should be adopted by 2010. DG ENTR recalled that it intended to make minimum requirements governing wet grip for C3 tyres mandatory in an implementing measure of the proposal for a Regulation on the general safety of motor vehicles (COM(2008) 316) as soon as Regulation 117 had been extended to cover C2 and C3 wet grip requirements.

For some stakeholders (ETRMA, German Ministry of Transport) the inclusion of C3 tyres in a wet grip grading was not necessary for the same reasons as for RR: professional road transport operators already had thorough information on tyre performance and did not need an additional labelling scheme. This was opposed by the other half of the respondents (same discussion and divides as in the answer to Q1, second paragraph). According to the German Ministry for Transport, the inclusion of C3 tyres in a wet grip grading would not be useful since the results on the ISO 23671 wet grip index did not reflect real-world performance of tyres.

	Yes	No
<i>Q5: Is the display of the measured noise value in a labelling scheme technically feasible and understandable for consumers? Do you think that it would have any significant effect on the market below the minimum requirements set for external rolling noise?</i>	X	X

This question was controversial, with one side heavily in favour of introducing external rolling noise into the labelling scheme and the other side opposing it. Some were neutral, arguing that if wet grip were included in the labelling scheme then there would be no reason not to include noise as well (German Ministry for Transport).

Considering the opposition of the tyre industry to a banding scheme for tyre external rolling noise, T&E proposed a low-noise mark for tyres 3dB below the minimum requirement (see proposal in Annex 2). M+P/T&E/the Netherlands/VTI/Eurocities/NW/German Ministry for the Environment supported the inclusion of a low-noise label. Arguments in favour of the inclusion of external rolling noise included:

- Trade-off between optimisation of noise and of wet grip and external rolling noise in a given technology. If wet grip were to be included on the label, then noise should be also included in order to give incentives for optimisation of all three parameters (RR, wet grip and external rolling noise).

- Information to be provided under the labelling scheme would reflect exterior noise measured according to the ISO 13325 method but as correlation between exterior and interior noise was “sufficient”, this would still give valuable information to end-users. There appeared to be a good correlation around 1 000 Hz (>70%) but a weak correlation at low frequencies (“because it is masked by other noise sources like drive line or tyre induced vibrations”), thus giving an overall moderate correlation (about 25%) (M+P).
- Transparency of data on external rolling noise would greatly facilitate the implementation of public policies against traffic noise, and be useful for public procurement and fleet owners (NL/ Eurocities/Norwegian delegation).
- Standard deviation within a tyre family was estimated at 0.5dB according to research made by M+P. In other words, only the worst tyres were measured according to the current testing protocol, but given the established standard deviation, the best tyres within the same family would be at maximum 0.5dB below. So the proposal to adopt a low-noise label for tyres 3dB below the minimum requirement would entail no extra costs as external rolling noise by tyre family had already to be measured in the type-approval procedure.
- Minimum requirements on noise in the proposal for a Regulation on the general safety of motor vehicles (COM(2008) 316) had been downgraded in comparison to the initial proposal put forward in the FEHRL study for C2 and C3 tyres, and the implementation date postponed to 2016 for existing tyre types. This made the benefits of including external rolling noise in a labelling scheme more important and necessary (VTI/NL/T&E).
- Considering the technical possibility to produce tyres with external rolling noise far below the minimum requirements, it was necessary to give that information to end-users (NL/NW/VTI/T&E).
- Consumer survey and tyre industry marketing campaign on low-noise tyres demonstrated that there was a demand for low-noise tyres. According to research done in Austria by Fallast et al, 94% of respondents would be willing to buy low-noise tyres and 70% of them to pay a small price premium (T&E/VTI).
- External rolling noise abatement costs due to technical improvement of tyres was much less important than improvement of road surfaces (VTI).
- Including external rolling noise on the label would increase consumer awareness on this issue (German Ministry for the Environment).

ETRMA/PSA/SP/UK/WDK resisted the inclusion of external rolling noise in the labelling scheme on the following grounds:

- Little priority given by consumers to the environmental performance characteristics of tyres when making their purchasing decision (German Ministry for Transport/ETRMA).
- Problem due to variability of test tracks estimated at 5dB (ETRMA). Specialised magazines or consumer organisations could contest the claimed low-noise mark if they found different measured values due to variability of test tracks.

- No correlation between exterior and interior noise (ETRMA/VTI) for low frequencies coming from other noise sources which depend much more on the design characteristics of the vehicle.

	Yes	No
<i>Q6: Do you consider that some of the issues raised in the preceding questions should be considered for retreaded tyres?</i>	(X)	X

Though the majority of stakeholders agreed that in theory retreaded tyres should be included in the labelling scheme, there was currently insufficient knowledge for designing concrete policy actions and the issue deserved a focused background study (FNTR/T&E). VTI highlighted, however, the potential interest of retread companies themselves as the Scandinavian experience shows that five retread companies applied voluntarily for the Nordic Swan logo, but only for a limited number of tyre dimensions (ETRMA).

BIPAVER representing the independent tyre retread industry, supported by the German Ministry for Transport and ETRMA, said that the introduction of a labelling scheme for retreaded tyres was not feasible in practice: due to interaction between tread and carcasses, each individual retreaded tyre would have to be tested. “With 100 brands of tyres, and more than 80 brands of pre-cured and hot-cured treads, that makes a matrix of more than 8 000 varieties in one size alone”. BIPAVER suggested as an alternative the adoption of a Code of Conduct by the retread industry.

	Yes	No
<i>Q7: Do you think that a grading scheme could be used by car manufacturers to offer better performing tyres to their consumers? Do you think that car manufacturers can take advantage in their marketing strategy from a tyre labelling scheme?</i>	X?	
<i>Q8: Should the grading of OE tyres (tyres originally fitted to new vehicles) be made available on catalogues and advertising tools on cars?</i>		
<i>Q9: What will be the likely impact of the worst tyre principle defined for emissions measurement, on average rolling resistance of OE tyres? Is there a need to encourage car manufacturers to offer tyres with improved rolling resistance compared with the ‘worst case’ tyre used for the mandatory tyre-approval measurement?</i>		

As no representatives from the car industry were present, these questions were not tackled. The only written reply received came from PSA answering positively to the first two questions (Q8 and Q9) and with an interest in being able to provide consumers with objective information on OE tyres.

It was, however, underlined that the choice of tyres fitted on new vehicles by car producers was crucial since it might influence consumers when they replaced their tyres. 58% of consumers replaced their tyres with the same ones as the OE tyres, according to one member company survey by ETRMA (other consumer surveys show a share of around 20%).

Q10: How do you suggest the information on tyres should be provided (how, to whom and when)?

Q11: What should be the role of the retailers?

The Chair began by recalling the difference between endorsement labels such as the Nordic Swan (declaring that a specific product complied with high-quality criteria) and performance labels which provided the grading of a product compared to others. Experience from the labelling Directive on household appliances (Directive 1992/75/EC) showed the effectiveness of performance labelling in pushing market transformation towards energy-efficient products; this would be the type of label favoured by DG TREN for tyres.

On the question raised by the German delegation whether the grading scheme would be static or dynamic, the Chair replied that this depended on the speed of technological change in one product. The discussion about dynamic and static labelling schemes was being addressed within the revision of the abovementioned Directive on household appliances, a labelling scheme for tyres would certainly follow the outcome.

There was a wide consensus on the mandatory display of the labelling scheme in catalogues, communication tools and on the internet. Disagreement emerged, however, on the necessity or not of displaying the label on a sticker on tyres. According to the tyre industry, this would not prove effective as (1) consumers most of the time do not see the tyres, and (2) would be complex and costly to implement because of language constraints (tyres were produced in one production centre for export in all EU Member States and third countries).

Availability of measured values/grading was recalled by VTI and T&E asking for a public database, with reservations on costs and complexity of implementation (updates, liability of information, etc.) expressed by DG TREN and the German delegation. The Chair suggested also giving the information on tyre grading on the bill provided to the consumers or end-users so as to ensure reliability and transparency of the information given to end-users.

Some stakeholders asked for the information to be moulded into tyre side walls (Eurocities/VTI/T&E/German Ministry for the Environment) but faced strong opposition as regards the costs/benefits of this measure (ETRMA/BIPAVÉR/German Ministry for Transport). No figures could be given, however, on both sides. Eurocities noted that moulding information on tyre performance on the side wall may be instrumental for those cities wishing to restrict worst-performing cars' access to the city centre which could include tyres (such as in London).

On the design of a labelling scheme, several proposals were put forward, see Annex 2 for T&E and Annex 3 for ETRMA proposals. The Dutch delegation proposed a three-colour system (green, orange and red) used for each tyre performance, green reflecting the best performance and red the worst. It was agreed that the braking distances in metres should not be displayed to consumers as it may lead to misunderstanding and only reflected braking distances in strict conditions (at 80km/h speed with road surface friction of between 0.6 and 0.8 according to ISO 23671) and would differ from one vehicle to another (German delegation). DG TREN, Unit E3 on Road Safety, also pointed out that the reference to the testing methods used to rank tyres should be explicitly mentioned on the label.

See also on this matter the answers to Q1 on conditions to be met for the success of a labelling scheme regarding RR.

	Yes	No
<i>Q12: Do you think that the labelling scheme should be associated with other types of measures designed to accelerate the market take up of LRRT (e.g. specific criteria or guidelines for public procurement of replacement tyres, fiscal incentives...)?</i>	X	X

Incentive schemes through public procurement procedures had (1) already been put in place in the Regulation on a Community energy-efficiency labelling programme for office equipment (Regulation (EC) No 106/2008) which required EU institutions and central Member State government authorities to use energy-efficiency criteria no less demanding than those defined in the ENERGY STAR programme when purchasing office equipment, or (2) were being considered such as in the revision of the energy labelling Directive on household appliances (Directive 92/75/EC) (input by the Chair).

According to the Netherlands and T&E, this could be a possibility to explore for tyres.

In any case, the majority argued that a labelling scheme would be instrumental for cities, companies and public authorities in the design of proactive purchasing policy or fiscal incentives.

Annex A: List of participants

EU Member States

Germany, Ministry for the Environment and Ministry for Transport

Spain, University Institute for Automobile Research in the name of the Spanish Interior Ministry, Road Traffic Directorate

The Netherlands, Ministry for the Environment and Ministry for Transport

EFTA Member Countries

Norway, Public Road Administration and Pollution Control Authority

NGOs, European organisations and research centres

Eurocities

GHK

M+P

T&E

VTI

Consumer/road transport organisations

ANEC

Test-Aankoop

FNTR (Fédération Nationale des Transporteurs Routiers (FR))

Industry

BIPAVER (Independent Retreader organisation)

ETRMA (Goodyear, Bridgestone, Michelin, Pirelli, Continental)

ORGALIME

European Commission

DG TREN (D3/E3), DG ENTR (F1)

Additional written comments received:

United Kingdom, Department for Transport

Environment, Nature and Energy Department of the Flemish Government

PSA Peugeot Citroën

WDK (Wirtschaftsverband der deutschen Kautschukindustrie)

IRU (International Road Transport Union)

Rhodia

Annex 3: Relative versus Absolute Grading

Physics behind RR: Variation in RR, i.e. the dissipation of energy, is a function of three factors: (1) volume, (2) loss property of the compounds (textile fabrics) and (3) deformation of the tyre material (visco-elasticity) which depends itself on three factors: inflation pressure, tyre geometry (i.e. outside diameter (OD), load index (LI), aspect ratio, and width) and compound. The loss property of the material is the main factor which may influence RR through the use of silica instead of black carbon. LI and outside diameter are found in the third factor⁶⁷.

Empirical correlation: Empirical measurements show a correlation between OD or LI and RR, but its significance varies among tyre producers. Some figures provided by tyre producers show a regression coefficient (relevant to prove the significance of the correlation) R^2 of between 0.6 and 0.8 in a given tyre line (which means that up to 60% to 80% of RR variation can be explained with the OD or LI⁶⁸). Others show a regression coefficient of around 0.2 in all tyre lines on the OE market, which is still significant, and around 0.02 on the replacement market all tyre lines included. This shows that the correlation will vary across tyre populations.

Impact of a relative versus absolute grading scheme: The proven correlation between OD or LI means that an absolute grading scheme (horizontal lines on a graph showing RR and OD) will favour larger tyres and discriminate smaller ones. It will be easier for larger tyres to reach the upper bands due to their size advantage, there may be a risk on the contrary that no small tyres (low OD) are found in the A class. A relative grading scheme would give equal incentives for all tyre dimensions.

The environmental impact of either scenario may be neutral: a relative grading scheme will put more pressure on bigger tyres where absolute fuel savings and CO₂ reduction are bigger (2% fuel saving on a high-consuming car is more important than on a small one). But an absolute grading scheme will put more pressure on smaller tyres, which constitute the majority of the tyre market.

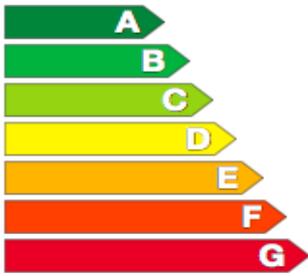
The tyre industry itself took a position in favour of an absolute grading scheme but with no unanimity of its members. Given the uncertainties on this issue, it is suggested to start with an absolute scheme and to see at a later stage if a relative grading scheme would be justified. In any case a relative grading scheme would have no impact on consumers if the measured value is not displayed on the label but just the grading.

⁶⁷ LI and OD are interrelated as bigger cars need bigger tyres (higher OD) but are also heavier and hence need higher LI.

⁶⁸ In this case – correlation measured in only one tyre line – the high regression coefficient is due to the fact that factor 2 (property of the material) does not enter into play. R^2 is not equal to 1 because some tyre dimensions will be adapted to the specific need of a given car producer (on the OE market) and will change therefore the overall performance of the tyre (as each parameter is integrated).

Annex 4: Sample of Labelling Scheme

- Existing labelling scheme used on household appliances

Energy		Dishwasher
Manufacturer	acme	
Model	ACM 123 E	
More efficient 	A	
Less efficient Energy Consumption kWh/cycle <small>(Based on test results for manufacturer's standard cycle using cold fill)</small>	0.81	
<small>Actual consumption will depend on how the appliance is used</small> Cleaning Performance <small>A: higher G: lower</small>	A B C D E F G	
Drying Performance <small>A: higher G: lower</small>	A B C D E F G	
Standard Place Settings Water Consumption //cycle	9 14	
Noise (db(A) re 1 pW) <small>Further information is contained in product brochures</small>	<small>(2000)</small>	
<small>Norm EN 50242 Dishwasher Label Directive 93/17/CE</small>		

- Proposal for a low-noise label by T&E



Annex 5: Economic Data Relevant for the Impact Assessment

Market data

Table 1: The EU Market for Tyres Sold for Original Equipment (OE) and as Replacements (million)

Market Segment	2005	2006	2007	2007 Share (%) by Vehicle Type	2007 Share (%) of Total Tyre Sales
PC replacement – EU production	181	189	182	61%	53%
PC replacement – Imports	43	45	48	16%	14%
Total PC replacement	224	235	231	78%	68%
PC OE – EU production	61	64	63	21%	18%
PC OE – Imports	1	0	2	1%	1%
Total PC OE	62	64	65	22%	19%
TOTAL Passenger Car (PC)	286	299	296	100%	87%
LT replacement – EU production	15	15	16	57%	5%
LT replacement – Imports	4	4	4	14%	1%
Total LT replacement	19	19	20	71%	6%
LT OE – EU production	7	7	7	25%	2%
LT OE – Imports	1	1	1	4%	0%
Total LT OE	7	8	8	29%	2%
TOTAL Light Truck (LT)	26	27	28	100%	8%
TBs replacement – EU production	11	11	11	61%	3%
TBs replacement – Imports	4	5	5	28%	1%
Total TBs replacement	15	16	16	89%	5%
TBs OE – EU production	0	2	2	11%	1%
TBs OE – Imports	0	0	0	0%	0%
Total TBs OE	0	2	2	11%	1%
TOTAL Trucks & Buses (TBs)	0	18	18	100%	5%
All Vehicle Tyre Sales in EU	312	344	342		100%
Total replacement sales	258	270	267		78%
Total OE sales	69	74	75		22%

Source: Europol (courtesy ETRMA), ACEA

PC – passenger cars, LT – light transport vehicles, TBs – trucks and buses

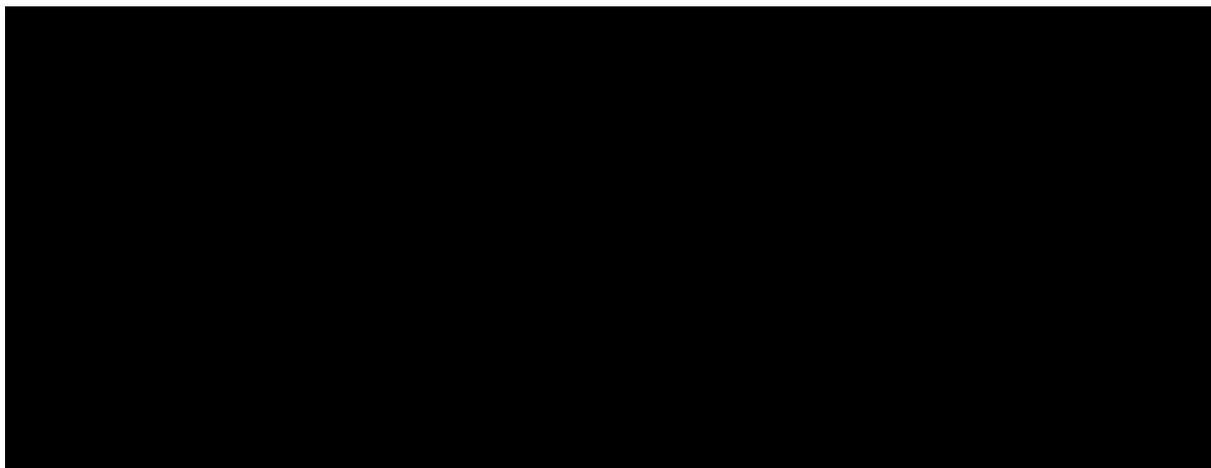
Tyres sold in the replacement market for passenger cars can be broken down by price into premium, mid-range and budget segments, accounting for 54%, 25% and 21% of the total passenger car replacement market respectively.

Table 2: Replacement Market Share of Winter and Summer Tyres by Tyre Class

Market Share	C1 (PC)	C2 (CV/LT)	C3 (TB)	All Tyres
Summer	70%	69%	74%	70%
Winter	30%	31%	26%	30%

Source: Europool (courtesy ETRMA), ACEA
PC – passenger cars, LT – Light transport vehicles, TBs – Trucks and buses

Table 3: Projected EU Market for Replacement Tyres C1, C2 and C3 (millions), including imports



Source: Europool (Courtesy ETRMA), ACEA and DG TREN Pocket Book

Annex 6: Minimum Requirements governing Tyres defined in the Proposal for a Regulation on the general safety of motor vehicles (COM(2008)316)

Minimum Requirements for Rolling Resistance (COM(2008) 316, Annex 1, Part B) – see Box 7 for further explanation

	Oct 2012	Oct 2014	Oct 2016	Oct 2018	Oct 2020
C1	12kg/t (new TT)	12kg/t (existing TT)	10.5kg/t (new TT)	10.5kg/t (existing TT)	
C2	10.5kg/t (new TT)	10.5kg/t (existing TT)	9kg/t (new TT)	9kg/t (existing TT)	
C3	8kg/t (new TT)		8kg/t (existing TT) 6.5kg/t (new TT)		6.5kg/t (existing TT)

Box 7: A distinction is made between **new tyre type** (TT), i.e. a new production line or brand which has to pass through the type-approval procedure, and the **existing tyre type** which has already been type-approved before the date of entry into force of the new requirements. Since the product life cycle of tyres lasts maximum between 6 to 8 years for C1 tyres (usually between 3 and 4 years) and 8 to 10 years for C2 tyres⁶⁹, a time lag is set down for the existing tyre type to comply with the requirements.

Minimum Requirements for Wet Grip for C1 Tyres by 2012/14 (COM(2008) 316, Annex 1, Part A)

Category of use	Wet grip index (G)
Snow tyre with a speed symbol (“Q” or below minus “H”) indicating a maximum permissible speed not greater than 160 km/h	≥ 0.9
Snow tyre with a speed symbol (“R” and above, plus “H”) indicating a maximum permissible speed greater than 160 km/h	≥ 1.0
Normal (road type) tyre	≥ 1.1

⁶⁹ Figures from FEHRL, *Tyres/Road Noise*, May 2006, Volume 1, p. 34. It is difficult to tell what the product life cycle of C3 tyres is, as it is a highly specialised market segment with some specific tyres which may be produced lasting up to 15 years, this is why no estimation is given for C3 tyres.

Minimum Requirements for External rolling noise by 2012/16 (COM(2008) 316, Annex 1, Part C)

Tyre class	Nominal section width (mm)	Minimum requirements in dB(A)
C1 A	≤ 185	70
C1 B	$> 185 \leq 215$	71
C1 C	$> 215 \leq 245$	71
C1 D	$> 245 \leq 275$	72
C1 E	> 275	74

Tyre class	Nominal section width (mm)	Minimum requirements in dB(A)
C2	Normal	71
	Traction tyres	72
C3	Normal	72
	Traction tyres	74