

Procedures for Rolling Stock Procurement with Environmental Requirements phase II

PROSPER II

Final Report

Commissioned by UIC



September 2005

Die Bahn 

Project manager:

Henning Schwarz
DB AG
Bahn-Umwelt-Zentrum
Caroline-Michaelis-Str. 5-11
D-10115 Berlin
Tel.: 0049(0) 30 297-565 17
Henning.Schwarz@bahn.de

IZT 

Institut für Zukunftsstudien und Technologiebewertung
Institute for Futures Studies and Technology Assessment

Project consultant:

Dr. Roland Nolte / Timon Wehnert/
Christian Kamburow
IZT – Institute for Futures Studies and
Technology Assessment
Schopenhauerstr. 26
D-14129 Berlin
Tel.: 0049 (0) 30 803088-11 / -13/ -42
r.nolte@izt.de / t.wehnert@izt.de /
c.kamburow@izt.de

Contents

| | |
|--|----|
| <u>Acknowledgements</u> | 3 |
| <u>Executive Summary</u> | 4 |
| <u>1 Introduction</u> | 7 |
| <u>2 Process</u> | 8 |
| <u>2.1 Project Design</u> | 8 |
| <u>2.2 The Reference Group</u> | 10 |
| <u>2.3 The Network Meeting</u> | 10 |
| <u>2.4 Feedback Process in Leaflet Development</u> | 11 |
| <u>3 Results</u> | 12 |
| <u>3.1 Deliverables</u> | 12 |
| <u>3.2 Framework</u> | 13 |
| <u>3.2.1 Set of Specifications</u> | 14 |
| <u>3.2.2 Procedures</u> | 15 |
| <u>3.3 Roadmap</u> | 16 |
| <u>4 Suggestions for Further Activities</u> | 16 |
| <u>4.1 Issues</u> | 16 |
| <u>4.1.1 Good practise</u> | 16 |
| <u>4.1.2 Procurement Process</u> | 17 |
| <u>4.1.3 Energy Consumption</u> | 18 |
| <u>4.1.4 Restricted Materials</u> | 20 |
| <u>4.1.5 Brake Friction Material</u> | 22 |
| <u>4.1.6 Definition of Recycling Rate</u> | 23 |
| <u>4.2 Design of Future Activities and Projects</u> | 23 |
| <u>4.2.1 Consultation and Communication Processes</u> | 23 |
| <u>4.2.2 The UIC Leaflet - Transfer from Theory into Practise:</u> | 24 |
| <u>4.2.3 The Rail Eco-procurement Network</u> | 25 |
| <u>4.2.4 The Rail Eco-procurement Specification Board</u> | 26 |
| <u>4.3 Overview of Proposed Activities</u> | 27 |

Acknowledgements

The PROSPER II project (Procedures for Rolling Stock Procurement with Environmental Requirements phase II) was commissioned by the UIC in September 2003 to develop the UIC leaflet “*Environmental Specifications for New Rolling Stock*”. It was finalised in July 2005.

We would like to thank all those who contributed with their expertise and who gave feedback on the various drafts of the UIC leaflet – this input was a vital prerequisite for the success of the project. Especially we would like to thank the members of the PROSPER reference group:

UIC Members

Markus Halder (DB)
Rikke Naerra (DSB)
Roger Müller (SBB)
Willy Bontinck (SNCB)
Thierry Loizeau (SNCF)
Raimondo Orsini, (Trenitalia)
Mads Bergendorff (UIC)

UNIFE Members

Veronique Andries (Alstom)
Patrick de Metz (SAFT)
Uta Maria Pfeiffer (Siemens)
Susana Martins (UNIFE)
Michael Schemmer (UNIFE)

Finally we would like to thank those railways who funded this project:

| | |
|----------|---------|
| BV | NS N.V. |
| CFF | NSB AS |
| CFL | RHK |
| CP | SNCB |
| DB AG | SNCF |
| DSB | TCDD |
| Eurostar | ZSSK |
| FS SPA | |

Looking at the new role of the supplier of rolling stock, i.e. the system integrator and the supplier of standard rolling stock (...), it is important for all the operators to co-operate in their demands and wishes for new rolling stock. Otherwise there never will be the opportunity for suppliers to build the standard rolling stock with innovative but proven technology.

G.W. Fiechter, NS Netherlands Railways

Executive Summary

Good environmental performance becomes an increasingly important factor for the competitiveness of railways in comparison to other modes of transport. If environmental issues are dealt with in a pro-active manner, being more than just a mere response to public pressure they can become a part of a future oriented marketing strategy.

In this respect it is the aim of the UIC leaflet "*Environmental Specifications for New Rolling Stock*" to contribute to harmonisation of the environmental procurement framework in the rail sector at European, and in the long-term global level. By doing so the process of procurement is to become more efficient, enabling new rolling stock with a sound environmental performance to be procured more cost effectively.

The leaflet was developed within the PROSPER II project (Procedures for Rolling Stock Procurement with Environmental Requirements phase II), which was commissioned by the UIC in September 2003 and finalised in July 2005. The project was carried out in close cooperation by railway operators and manufacturers and employed a feedback process which was open to the whole railway industry.

Main results of the PROSPER project

The main results of the PROSPER project in terms of tangible products were:

- **UIC Leaflet**
Main product of PROSPER is the UIC leaflet "*Environmental Specifications for New Rolling Stock*". The leaflet addresses all relevant aspects for the integration of environmental aspects into the procurement process. It is designed to enhance the procurement of rolling stock for both setting up invitations to tender and evaluating tenders with regard to their environmental performance. It provides assistance for the procurement of new rolling stock for passenger as well as freight transport (multiple units, locomotives, wagons and coaches) in four fields of high relevance for railways: energy efficiency, noise, diesel exhaust and materials/recycling/waste. The leaflet adopts a functional approach using performance-related and not solution-related environmental specifications.
- **Documentation of Legal Aspects**
Accompanying the leaflet a background paper – "Legal Aspects of Eco-Procurement" – has been developed which gives more detailed information on the legal framework which is connected to eco-procurement.
- **Good practise**
A sketch of good practise examples in the key areas is given in the document "Compilation of Good Practise Examples for Rail Vehicles with High Environmental Performance".

- **Final report**

It is the purpose of this report to document additional findings which are not part of the leaflet itself or its background papers. It contains a description of the processes of the project and its results. Core part are the recommendations for further activities. The final report is meant as a background document for the project partners and other engaged stakeholders containing important internal know-how for the continuation of the overall process.

- **Network Meetings**

Two Network Meetings were held within the second phase of PROSPER together with the EU-funded REPID¹ project.

In addition PROSPER contributed to the development of a basis for further efforts to promote eco-procurement:

- **Methodological framework**

A consistent set of environmental specifications to be used in rolling stock procurement was developed. Further needs to harmonise measurement procedures, environmental indicators and target values are identified and described as suggested activities (see below).

- **Blueprint of development process**

The process of how the leaflet was developed is a result by itself since it can be used as a blueprint for similar processes in this field. Details of this process and how the respective stakeholders were involved are described in this report so that the experiences gained are made available for further efforts in eco-procurement. One noteworthy aspect is the strict consensus oriented approach which ensures that the voluntary agreements are supported and will be implemented by the participating actors.

Further Activities

Suggestions for further activities are elaborated in this report. The most important issues which should be addressed with combined forces from UIC and UNIFE are:

- **Set up of Rail Eco-Procurement Specifications Board**

It is vital for the success of the past activities in the field of eco-procurement that certain responsibilities are taken up by an institutionalised body which can guaranty a long-term perspective of the process that has just started with projects like PROSPER and REPID.

Specific tasks for the RES board are first of all to set the agenda and coordinate further activities. Furthermore it should address the maintenance and expansion of the eco-procurement network.

- **Bringing the leaflet into practical application**

The UIC leaflet is not meant to be complied with clause by clause, but instead is designed like a guidebook. Therefore it is necessary that railway operators adapt the leaflet to fit their individual procurement procedures. UIC should support this transfer of UIC leaflet into practise with information and training activities.

¹ REPID - *Rail sector framework and tools for standardising and improving usability of Environmental Performance Indicators and Data formats* was a EU funded project which was very much interlinked with PROSPER.

- **Revision of UIC leaflet**

A revision process of the leaflet should be started. One important input will be the experiences gained in practice. The leaflet should be revised to even better fit the practitioners' needs. Another important issue is the refinement of the environmental specifications, which includes harmonised definitions for indicators and measurement procedures and the set-up of target values.
- **Compile good practice examples**

Examples of good practice are a major source of information for operators when procuring new rolling stock. In addition to the guidelines rolled out in the UIC leaflet, databases on vehicles with good environmental performance should be developed in a joint effort by UIC and UNIFE. To be of practical use, such databases must also include economic information in order to allow for a comparison of costs of alternatives.
- **Comparable standards for energy consumption measurement**

Improving the energy efficiency of railways has a strong environmental impact and is the measure in eco-procurement with the highest potential for cost reductions. For many approaches in this field a necessary prerequisite is the availability of comparable energy consumption data for rail vehicles. Thus the development of harmonised energy consumption measurement procedures are of top priority.
- **Harmonised lists of unwanted and controlled materials**

For operators it is of high interest to gain more information on the material composition of their trains and to restrict the use of certain materials beyond what is governed by legislation. The intention is to reduce environmental and business risks for the operator. To make this effort most cost effective, voluntary standards across the whole rail sector are necessary.
- **Enhance LCC approaches for practical application in eco-procurement**

In order to effectively increase the environmental performance of new rolling stock, one decisive factor is how and when environmental issues are addressed in the procurement process of an operator. Mainstreaming Life-Cycle-Cost approaches in procurement processes will help to identify the most cost effective solutions for a better environmental performance.

1 Introduction

The PROSPER II (Procedures for Rolling Stock Procurement with Environmental Requirements phase II) project was commissioned by the UIC to develop the UIC leaflet “*Environmental Specifications for New Rolling Stock*”. It is the aim of the UIC leaflet to contribute to a harmonisation of the environmental procurement framework in the rail sector. By doing so the environmental performance of the rail sector is to be improved cost effectively and thus contributing to a better performance of the rail sector as such in comparison to other modes of transport.

This report gives background information on the PROSPER project as well as recommendations for further activities in the field of eco-procurement. It contains very helpful information, which is not documented in the UIC leaflet itself nor in the two background papers (“Documentation of Legal Aspects” and “Compilation of Best Practise Examples”). It focuses on possibilities to promote the leaflet, possible future revisions and the development of new standards and specifications in the field of rail eco-procurement.

It is not the intention of this report to give further advise on how to handle eco-procurement in practise or the like. Technical information on eco-procurement is given in the UIC leaflet itself and the two background documents.

Contents of this report

Chapter one describes the design of the PROSPER project and how it was run. This chapter may be helpful especially for actors who are engaged in similar projects and wish to learn from the experiences made in PROSPER. Chapter two shortly summarises what kind of results were gained in the PROSPER project. It gives you an overview of the achievements if you are not familiar with the project. Chapter three outlines recommendations for further activities in the field of eco-procurement. The information contained there will be especially helpful for actors who are involved in eco-procurement on a strategic level, e.g. the members of the Rail Eco-Procurement Specifications Board.

2 Process

The PROSPER project was designed towards developing a commonly agreed approach for handling environmental aspects at procurement level within the whole rail industry – including both rail operators and rail vehicle manufacturers. To this aim a consensus oriented communication and feedback process was launched. The establishment of this process is in itself one major result of the PROSPER project. In this chapter this process will be described in more detail so that the communication strategy employed and the network, which has been established can be used for further work in the area of rail-eco procurement.

2.1 Project Design

In the first project phase of PROSPER 2 existing information was collected and compiled. Input came from previous projects and other sources like UIC reports, scientific literature, articles etc. This information was enhanced with interviews of various stakeholders and experts. All information on legal aspects was compiled into a separate document².

Great part of the structure and the outline of the specifications were taken from the first phase of the PROSPER project. This was combined with input from the Nordic Environmental Manual – a manual established by the Nordic railways in 1999 to harmonize their procurement efforts with respect to environmental performance. The specifications and underlying methodology were, wherever feasible, chosen to be in line with the methodology developed in REPID (Rail sector framework and tools for standardising and improving usability of Environmental Performance Indicators and Data formats). The REPID project is the continuation of the RAVEL project (which ended in November 2001). The RAVEL project developed a methodology of how to handle environmental requirements in the rail design (design for Environment) as well as in railway procurement projects. Input for the energy efficiency section was taken from the former UIC project EVENT (Evaluation of Energy Efficiency Technologies for Rolling Stock and Train Operation of Railways).

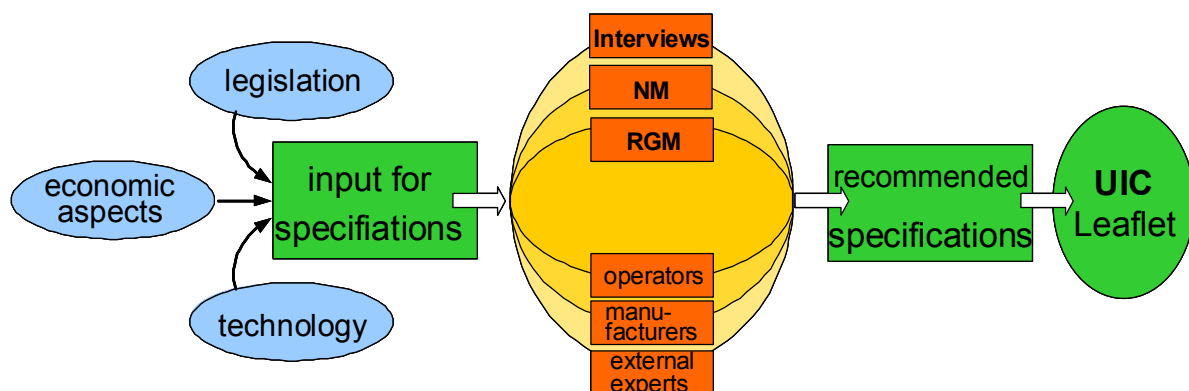


Figure 1: Project design

A draft of the leaflet was developed comprising elements of the PROSPER 1 guideline and the Nordic Manual. An inner circle for feedback was provided by the Reference Group. In addition to continuous e-mail and phone communication

² Documentation of Legal Aspects available for download from UIC website.

altogether five Reference Group Meetings (RGM) were held. In a broader sense the “railway community” was invited to participate in the development of the leaflet in two Network Meetings (NM) and in two feedback loops in which comments on drafts of the leaflet were requested (see Figure 1 for project design and Figure 2 for the timeline of the project).

Time Scheme

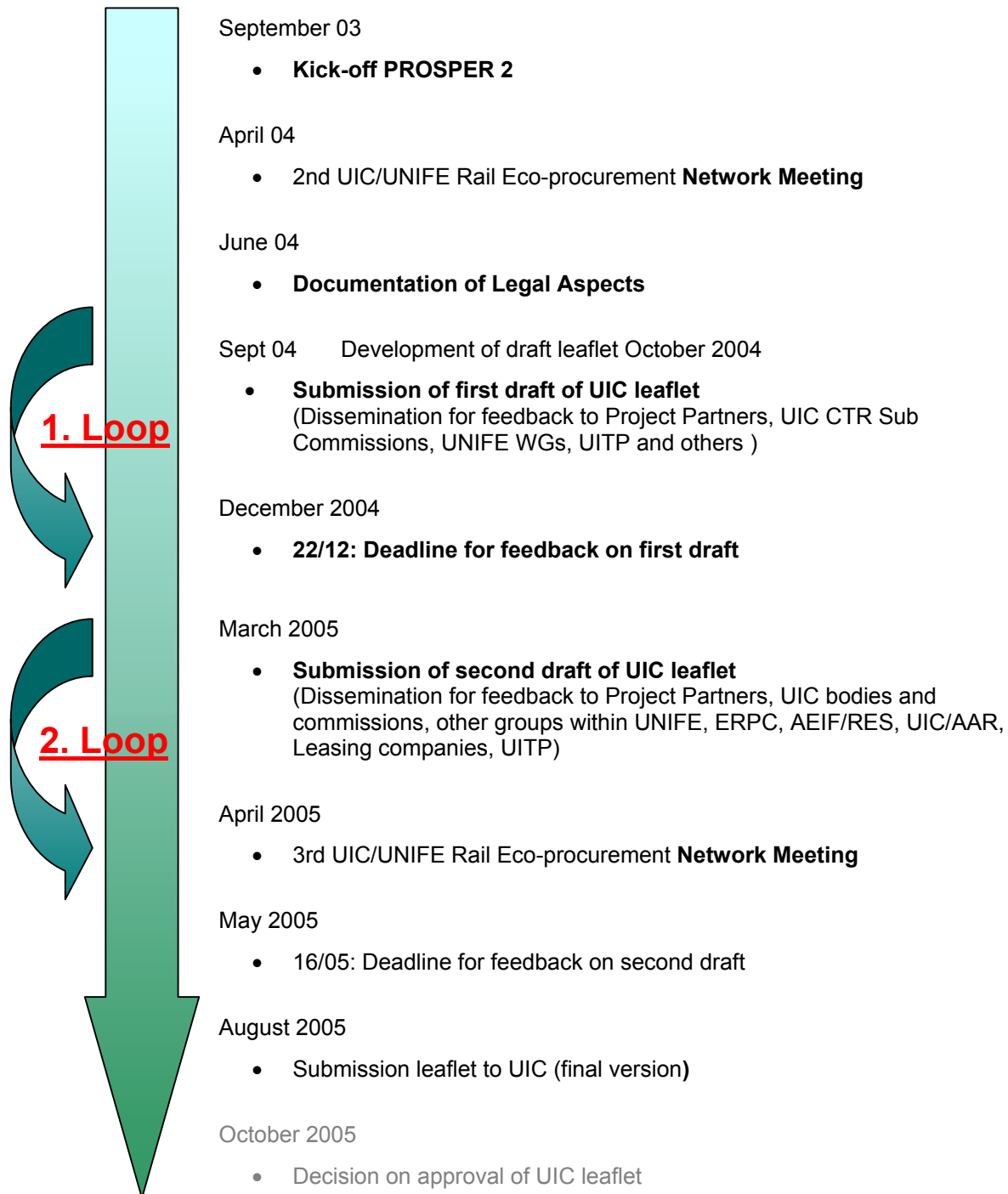


Figure 2: *Time line of PROSPER 2 project*

2.2 The Reference Group

The core group being in charge to give feedback to the Prosper project was the Reference Group (RG). The RG members themselves reviewed all documents which were developed within the PROSPER project. Furthermore the RG members were the links into the participating institutions (providing contacts, collecting information, structuring review processes). Members came from both UIC and UNIFE and respective member organisations:

| UIC Members | UNIFE Members |
|-------------------------------|------------------------------|
| Markus Halder (DB) | Veronique Andries (Alstom) |
| Rikke Naerra (DSB) | Patrick de Metz (SAFT) |
| Roger Müller (SBB) | Uta Maria Pfeiffer (Siemens) |
| Willy Bontinck (SNCB) | Susana Martins (UNIFE) |
| Thierry Loizeau (SNCF) | Michael Schemmer (UNIFE) |
| Raimondo Orsini, (Trenitalia) | |
| Mads Bergendorff (UIC) | |

Assessment

The reference group proved to be a very successful and effective working forum. Beyond a mere review of the various working papers and drafts of the leaflet the RG became *the* forum in which major questions were discussed and solutions were developed. In most cases consensual solutions could be found.

The RG contributed towards the development of a common understanding and common language between operators and manufacturers on issues concerning rail eco-procurement.

2.3 The Network Meeting

Two Network Meetings (NM) were held during PROSPER 2. On the network meeting in March 2004 (in Krefeld) a draft set of specifications was discussed with and assessed by the participants of the meeting. In this way a direct feedback on the so far results of Prosper was provided. The meeting was organised together with the REPID project and the final results of REPID were presented and discussed there. There the idea of the Rail Eco-Procurement Specifications Board was introduced.

The network meeting in April 2005 (in Paris) was used to present and discuss the final draft of the leaflet.

Assessment

The Network Meetings have been very successful both to develop the leaflet and to disseminate the results of the project. The manifold experience of the participants helped to build the basis that the leaflet in the end becomes a practical, easy to apply and effective tool in eco-procurement, which will be commonly accepted by both railways and system integrators and thus broadly used. The meetings brought the discussion of eco-procurement to a truly global level.

Network meetings can be a viable tool to stimulate a continuous discussion on issues

of eco-procurement in the rail sector. They should be held regularly (every year or every two years). However it is very important to maintain their attractiveness. Two features which added to the success of the NMs should be kept and enhanced: On the one hand participants profit directly from the NMs by gaining practical input for their daily work. On the other hand their expertise and input was used to for current UIC activities (REPID and PROSPER projects). This twofold approach should be apparent to the participants.

To keep the network alive and powerful, it is on the one hand crucial to progress from a conceptual to a practical application phase of the developed eco-procurement approaches and on the other hand it will become even more important to reach a broader spectrum of participants:

- So far the majority of participants came from the environmental departments. In future especially people from the procurement and technical departments must also be addressed more intensively.
- Representatives from a broader range of organisations should attend the meetings. Especially organisations, which have not yet been so active in eco-procurement should be actively invited as well as organisations which are not yet an established part of the network like some of the Middle and Eastern European rail operators.

2.4 Feedback Process in Leaflet Development

It quickly became apparent that not only technical solutions were to be sought for. Different perspectives with high potential for dissent also stem from different working environments (operator or manufacturer; technical or environmental department etc.) as well as from different environmental priority settings of the companies. The strategy of PROSPER was to come as close to a consensus as possible.

Already in drafting the leaflet inputs from a wide variety of stakeholders were incorporated: members of the Reference Group, participants of the Network Meetings as well as external experts who were addressed in interviews. In the two feedback rounds most of the comments were collected by the members of the RG (in addition we received some comments directly by representatives of companies who are not part of the PROSPER project). Strong efforts were made to make it transparent how conclusions were drawn. All comments were documented and made available for all RG members.

Assessment

Since there was no formal procedure of approval within the RG it was extremely important to establish a high level of mutual trust. E.g. it had to be made clear that the UIC members would not dominate the outcome, just because it was a UIC funded project. Consequently it was very important to establish some formal communication procedures, which would enhance the transparency of the whole process (e.g. all the comments were documented and made available to the members of the RG).

By collecting feedback via the members of the RG, they were enabled to defend their companies' perspectives in the RG meetings. This enhanced the representativeness of the discussions within the RG, thus putting the established compromises on a solid basis. Together with the fact that the process was very much consensus oriented, the leaflet should receive a broad support in the rail sector.

It should be noted that the strict consensus orientation of the approach being a precondition for the success of the harmonisation efforts produced at the same results often represent only least common denominators (for a more detailed assessment see the introduction to chapter 3).

3 Results

In this chapter the main results of the PROSPER project are summarised. Some of the results – mainly the “deliverables” and foremost the leaflet itself - are very tangible whereas the others which represent mainly the process side of the project are more difficult to assess. However, especially some of the latter may become of high importance for a continuation of the rail eco-procurement process, which has just started with the REPID and PROSPER projects.

In the original outline of the project the target was very much oriented towards “identifying values for environmental performance indicators”. However, it soon became obvious that stronger efforts were necessary to clearly define the framework of eco-procurement and the respective environmental specifications thus launching a process within which this framework and methodology could be developed consensually.

It became very obvious that the strictly consensus oriented approach of PROSPER was a necessary precondition for the development of a common language and understanding for eco-procurement issues as well as for building up mutual trust and a broad acceptance of the obtained results. In this qualitative and process oriented respect the outcome of the PROSPER project is far more ambitious than it was anticipated in the project planning phase and provides the overall framework setting as well as specific tools and detailed information for the successful continuation of the harmonisation process.

On the other hand the strict consensus orientation led to accepted quantifiable specifications and indicators and respective target values often representing least common denominators. As far as the quantification aspect is concerned the obtained results are less ambitious than previously anticipated – especially from the perspective of some RG members. The outcome of the quantification efforts shows that the harmonisation process in itself is more complex and time-consuming than expected and that there is still a long way to go towards ambitious harmonised business standards. The respective values incorporated into these standards will have to be substantially different from the legal baseline. Otherwise the whole process of eco-procurement as a pro-active strategy of the rail sector will lose its appeal for both outsiders (politicians and public) as well as for active members.

3.1 Deliverables

The following products were developed and delivered during the second phase of the PROSPER project:

- **UIC Leaflet**
Main product of PROSPER is the UIC leaflet “*Environmental Specifications for New Rolling Stock*”. It is written as a guidebook addressing all relevant aspects for the integration of environmental aspects into the procurement process. It is designed to enhance the procurement of rolling stock for both setting up invitations to tender and evaluating tenders with regard to their

environmental performance. Thus setting the framework how to handle environmental aspects in the procurement.

- **Documentation of Legal Aspects**

Accompanying the leaflet a background paper – “Legal Aspects of Eco-Procurement” – has been developed which gives more detailed information on the current status of the legal framework which is connected to the procurement of new rolling stock from an environmental perspective. This document is referred to in the leaflet and will be made available through the website <http://www.railway-procurement.org/>

- **Good practise**

A sketch of good practise examples in the key areas is compiled in the document “Compilation of Good Practise Examples for Rail Vehicles with High Environmental Performance”. The document will be made available through the website:

<http://www.uic.asso.fr/environnement/>

There is a great interest from the operators side to develop and augment such a compilation. Further possible activities in this direction are named in the recommendations chapter.³

- **Final report**

A final report was delivered (this document) which contains a description of the processes of the project and its results. Core part are the recommendations for further activities. The final report is meant as a background document for the engaged stakeholders containing important internal know-how for the continuation of the overall process.

- **Network Meetings**

Two Network Meetings were held within the second phase of PROSPER. The first was held in Krefeld on 30-31 March 2004. The second was held in Paris on 26 April 2005. About 50 registered participants attended each meeting.

3.2 Framework

One major outcome of PROSPER is that a framework has been set-up which helps to develop and promote new tools in the field of eco-procurement. Among the participants of the project a common understanding and common language has been developed. These achievements will be very helpful for further activities in this field and will certainly add to even more efficient execution of follow-up activities. However, it has to be kept in mind that as soon as new actors are going to be involved (which is highly desirable) common understanding and common language

³ The consensus oriented development of harmonised specifications became more of an focus in PROSPER compared to the identification target values. Consequently the analysis of state of the art technologies and the compilation of good practise was not a major task within PROSPER and for various reasons the contributions of manufacturers and operators were only very limited. Thus the good practise document is only a working paper and no direct reference in the UIC leaflet was made. It is neither representative nor does it go into detail for the examples listed. Essentially missing are an assessment of the given examples with regards to economic aspects and a comparison to other state of the art alternatives.

will have to be re-established. Consequently, the strong process orientation of the approach should be kept and further developed (see 3.2.2).

3.2.1 Set of Specifications

Selection Criteria

The set of environmental performance specifications defined in PROSPER 1 were taken as a starting point to identify a set of 20 environmental performance specifications to be used in the UIC leaflet. They were chosen to

- address **issues of high environmental impact** which can be influenced by the procurement of new rolling stock. The respective indicators should have a high impact on the environmental performance of rail vehicles.
- be **easy to handle in the procurement process**. Underlying measurement procedures and assessment routines should be commonly accepted.
- be **verifiable on a technical and contractual level**. The costs induced by the introduction of the specification (and the consequent measurements / validation) should be balanced by the anticipated positive environmental impact.

Many changes to the PROSPER 1 set of specifications were made, taking into account input from REPID, the 2004 network meeting and discussions within the reference group. Important changes in wording of the selected specifications were made from draft 1 to draft 2 of the leaflet elaborated in PROSPER II with view to practicability and verifiability.

Categories of Specifications

Initially the specifications were prioritised (priority 1 and priority 2) in order to give especially newcomers a guideline which specifications to implement first. However, this prioritisation was abandoned. This was done for two reasons: A) Most railways have or will develop their own priority setting independent of the suggested priorities. B) The priority 2 specifications might be labelled as unimportant and would then not be implemented, despite the fact that some of them can have a great impact in certain situations or for certain operators.

The specifications were categorised according to three characteristics:

- mandatory (legally compulsory) - voluntary
- dependence of the environmental performance on the operational context in which the new rolling stock is to be used (Environmental performance mainly dependent on operation or mainly dependent on design)
- degree of quantification (Target Specification, Performance Specification, Compliance Specification, Design Provision)

The second category links to the recommendations on the procurement process which are given in the leaflet. For those specifications the design is certainly a precondition to obtaining a good performance. But whether or not it is reached in practice depends to a large extent on operational patterns and the infrastructure on which the rolling stock is used.

Concerning the degree of quantification there are several specifications, which are in principle quantifiable but for which no target value could be given, due to one of the following reasons:

1) **No harmonised measurement routines**

Example 1: Traction energy consumption. No harmonized energy cycles exist which would allow easy comparison of different trains, which are used by different operators.

Example 2: There is no standard measurement routine for emissions from Brake Friction Material (specification no. 19). Consequently the indicator aims at “Concentrations of defined hazardous materials in brake friction *material*” which can be handled quite easily but which is a weak approximation of the environmental impact.

2) **Information gaps**

For certain specifications the comparable information or data basis is too poor to define target values. If the operator asks for performance values the data basis will be gradually improved

3) **High Complexity**

Certain specifications strongly depend on framework conditions (e.g. according to specific national or operational conditions) or too many special cases exist (e.g. type of vehicle, comfort class, ...) and therefore yield very complex sets of values. In this case it does not make sense to define a target value for every single constellation of framework conditions. By using performance values operators still have the possibility to assess individual cases.

Example 1: The on-board energy consumption strongly depends on climate conditions. In the north demand for heating and insulation is quite different from southern regions where air-conditioning/cooling increasingly becomes an issue.

Example 2: The vehicle mass is quite easy to access and well documented for all trains. However a large number of classes would have to be introduced (e.g.: high-speed, main-line, regional, local as one category; single-deck and double-deck as another category) make it difficult to collect a sufficient number of cases from which a target value could be deduced.

3.2.2 Procedures

Within the PROSPER project a variety of procedures have been established which will be useful for further upcoming activities in this field.

1) **Informal Code of Conduct**

An informal code of conduct has been set up mainly for the members of the Reference Group but partly also been extended towards other actors involved (e.g. stakeholders consulted in the feedback processes, participants of the network meetings). Governed by the code of conduct are questions of how to communicate, how to reach agreements and how to handle disagreement. Important elements are how participation of stakeholders is organised and how transparency is guaranteed (see also chapter 2.2).

2) **Participation of stakeholders**

Experiences were gained within PROSPER how the participation of stakeholders can be organised with respect to the specific conditions in the

rail industry. The two main instruments – the feedback loops in drafting the UIC leaflet and the Network Meetings – are described and assessed in chapters 2.3 and 2.4 respectively.

Follow-up activities in the field of eco-procurement should actively build upon the established procedures. However, the involvement of new actors in the future will make it necessary to re-establish the code of conduct within the enlarged group or to adapt it to new situations.

3.3 Roadmap

One result of the various activities within the PROSPER project is a roadmap of future activities in the field of eco-procurement. Open questions which arose in the development of the UIC leaflet were formulated as “suggestions for further activities” in chapter 4 (below) of this report. Next steps and future goals are identified and can be taken as an input for the work of the RES board which in itself to a great extent is an outcome of the REPID and PROSPER projects.

4 Suggestions for Further Activities

4.1 Issues

4.1.1 Good practise

| Activity | Who | When | To be considered |
|---------------------------------------|--------------------------------|------------|--|
| Compile good practise examples | Joint project of UIC and UNIFE | Short-term | Collection of good practise examples should be detached from standardisation processes |

The knowledge of the current technical state of the art is vital for operators in order to design and assess tenders for the procurement of new rolling stock. Consequently efforts should be intensified to identify and document good and best practise examples:

- Compilation of good practise**
 An enhanced and commonly approved compilation of good and best practise examples should be developed. The existing good practise compilation could be used as a starting point, but needs to be completed and the listed examples need assessment with regards to alternatives and economic implications.
- Internet database**
 A web-based open and interactive database similar to the database on energy resulting from the EVENT project (<http://www.railway-energy.org>) would guaranty easy accessibility and at the same time allow gathering of further contributions on a global level. It has to be noted that such a database will need updating to be attractive and useful. The experiences with the railway-energy.org database show that users very scarcely feed in new information by themselves. The launch of such a database needs to be accompanied by strong marketing efforts.

- **Bilateral and multilateral exchange between operators**
Especially the big operators run their own research and development units and consequently have very detailed knowledge on the environmental performance of various technical alternatives. A stronger exchange on UIC level or in bilateral co-operations could be highly beneficial.

How to improve information exchange

During the PROSPER project it was not easy to access information on good practise. In many cases data was not provided with reference to confidentiality. For successful further activities in this direction, two aspects are of high importance:

- **Separation of data collection from target setting**
Environmental issues are generally highly sensitive with regards to public attention and political pressure. In particular the development of the UIC leaflet with its specifications had a highly political component since the official leaflet marks a commitment from the operators. Among many of the participating stakeholders concerns existed that too ambitious specifications or target values could be selected which would set standards that are economically not feasible.
For the future collection of good practise examples it will be of high importance to disconnect any such project from any process which is considered as politically critical by the stakeholders.
- **Assess and handle confidentiality**
Some operators were very reluctant to give out data if there was a risk that this data could be made available for other operators. This was justified by the liberalisation of the European railway sector, which in principle makes all European railways competitors. Disregard whether or not such an attitude is generally justified at the present degree of competition of railways in Europe, it seems counter productive to the operators aim to gain ground against other modes of transport and furthermore neglects mutual benefits operators could have from an intensified know-how exchange.
Operators should carefully assess which data is to be treated confidential and how the exchange of confidential data could be handled with selected partners. In order to strengthen the field of eco-procurement, members of the environmental departments should seek appropriate ways to allow maximum data exchange (in bilateral projects or on UIC level) e.g. by high-level management backing.

4.1.2 Procurement Process

| Activity | Who | When | To be considered |
|--|-------------------------------------|------------------|--|
| Enhance LCC approaches for practical application in eco-procurement | RES Board in co-operation with ERPC | Mid-to Long term | Two way approach: <ul style="list-style-type: none"> • Gain more knowledge on LCC implementation strategies for environmental department • Mainstream LCC in procurement departments Demonstration of good practise as short term activity |

In order to effectively increase the environmental performance of new rolling stock one decisive factor is how and when environmental issues are addressed in the procurement process of an operator. The UIC leaflet gives some very general suggestions on this issue. However, further optimisations of eco-procurement is necessary:

- **Analysis of existing procurement models**
An analysis and exchange of how the different operators handle environmental issues in their procurement process should be promoted involving members of both the environmental and procurement departments.
- **Globalisation calls for harmonised eco-procurement**
Despite very regional markets, i.e. national rail networks requiring specific design solutions for rolling stock, there is also in the rail sector a trend towards globalisation. Manufacturers will increasingly act and compete on a global level. Consequently there will be a trend away from tailor made solution solutions towards “mass market” products or modular design solutions. For eco-procurement this means that it will be harder (or more expensive) to demand for operator-specific environmental requirements. A harmonisation of environmental specifications could be a solution to bring forward ambitious targets at reasonable costs.
- **Enhancement of LCC Approaches**
One detail which has great impact on the environmental performance is how Life-Cycle-Cost are addressed in different companies. There are widespread and controversial discussions on how to implement LCC going on already. Activists in eco-procurement should link up to these discussion. An assessment of the different approaches in different companies could prove very fruitful and should be undertaken as a UIC project. However, great care has to be taken not to come up with an academic solution, but to develop a method or tool to calculate LCC which could easily be implemented at various companies of the rail sector.

4.1.3 Energy Consumption

| Activity | Who | When | To be considered |
|--|---|----------|--|
| Develop comparable standards for energy consumption measurement | Joint project of UIC and UNIFE ⁴ | Mid-term | Possibly under head of CTR or RES Board Both traction and on-board energy consumption should be addressed |

Establish a knowledge base

The most prominent feature in the key area energy is that the data base is extremely poor. For none of the specifications (except vehicle mass) it was possible to get comparable figures. Even worse, there are hardly any commonly accepted measurement procedures which would allow comparing the energy performance from one vehicle to another. Consequently it is currently impossible to fix target

⁴ An Integrated Project “Railenergy” was proposed to the European Commission for funding on September 1st 2005

values – very much in contrast to the automobile sector where the *three-litre-car* is a well established idiom and political goal.

Following the accounting truism “what gets measured gets managed” this lack of comparable data is one major barrier in achieving higher performance in the energy field. A common and standardised methodology to measure energy consumption is thus very much needed to exploit the potential in the energy field, both in environmental as well as economic terms.

First actions are already on their way: A feasibility-study "Harmonisation of test cycles for energy consumption of rolling stock" has been approved by the CTR (Technical and Research Commission of the UIC). Based on this study a joint project of railways and railway industry is foreseen to define an appropriate approach and develop comparable energy consumption standards. This issues is also addressed (as one of many items) in an integrated research project (“Railenergy”) which was submitted to the European Commission for funding.

Traction energy consumption

Efforts to come to a harmonisation of test cycles for energy consumption of rolling stock seem very necessary as a fundamental basis to compare and improve the energy performance of trains.

A major difficulty to come to comparable data is the large number of different train types used in different operational patterns. It generally would have to be distinguished between: electrical and diesel traction; high-speed, main-line, regional and local use; passenger and freight trains. But even on this level requirements (and thus data) may not be comparable due to specific framework conditions (e.g. driving patterns, inclination of the tracks). On top a standardized measurement procedure does not yet exist. Thus the difficulty of the task will be to define appropriate classes which on the one hand adequately mirror the complexity of the subject and on the other hand allow a comparability bearing in mind that only few technical solutions exist for each class (e.g. the number of different high-speed trains).

On-board energy consumption

The energy consumption of auxiliaries may increase in the future due to an increasing share of trains with air condition or consumer appliances (entertainment, power plugs etc.). In order to minimise on-board energy consumption several steps should be taken:

- Awareness has to be raised on this issue so that the question of energy consumption is addressed at an early stage of the procurement process (The definition of comfort specifications must be critically assessed). The issue has to be brought on the agenda in the respective UIC working groups and on events like the Rail Eco-procurement Network Meeting.
- In order to assess the technical alternatives, operators need a good overview on good practises in the field. If the existing databases (e.g. www.energy-procurement.org) will be updated on-board energy consumption must be a focus.

4.1.4 Restricted Materials

| Activity | Who | When | To be considered |
|---|-----------|----------|---|
| Develop harmonised lists of unwanted and controlled materials | RES Board | Mid-term | Consensus-oriented stakeholder participation is vital |

For operators it is of high interest to gain more information on the material composition of their trains and to restrict the use of certain materials beyond what is governed by legislation. The intention is to reduce environmental risks and health risks for both staff and customers. In many cases this is closely linked to the aim to minimise business risks for the operators, e.g. reducing end-of-life costs and minimising maintenance costs, but also occupational health issues may become of great economic importance.

In this respect especially the manufacturers pointed out that diverse requirements of individual operators will be more difficult (and thus costly) to satisfy. So a great need was expressed to come to harmonised standards for the rail industry in the field of materials, i.e. unified lists of materials which use is to be restricted. Suggestions for further activities are listed according to three specifications/indicators given in the leaflet:

- **Legally restricted materials**

The general position of the RG was that handling the legal requirements is in the manufacturer's responsibility. In certain cases assistance from the operators would be appreciated, especially to identify specific national legislation.

In general each manufacturer has its own internal process established to review legislation. So, little action is needed in this field. A guideline or help files listing applicable legislation ("material restrictions for the rail sector") could be developed to support primarily manufacturers in the design of new vehicles. However, if such an effort is made, a long-term follow-up process has to ensure that the guidelines are always updated according to current legislation.

- **Unwanted materials**

In fact, both operators and manufacturers go beyond the legal baseline of material restrictions when designing or procuring new rolling stock. It is of great interest especially for the manufacturers to come to harmonised list of such voluntarily restricted (=unwanted) materials (railway sector industry agreement).

Starting points to develop such a harmonised list could be the lists used internally by the system integrators, augmented by specific demands from the operator's side. Most important in developing such a list will be the stakeholder process in which such a list is to be developed (see below).

- **Controlled materials**

The operators expressed their need to receive more and easy-to-access information on the material composition of rail vehicles. The use of some "critical" materials should be declared. The specification of controlled materials was thus developed to provide operators with such information. It can be used e.g. in the communication with the public when operators have to deal with

public concern⁵.

It is again very much the interest of the manufacturers to develop a harmonised list of controlled materials. A starting point could be the list currently used at DSB who has implemented this specification in their procurement already.

Concerning reliability and **validation**, it has to be stated that in most cases it is not feasible for a manufacturer to guaranty that a certain substance or material (which is not legally restricted) does not exist at all in a train. Instead potential hotspots must be identified (components in which certain materials could be present). If alternatives exist, appropriate threshold values (e.g. xyz % of material a in component b) must be defined which can then be validated with reasonable effort.

How to develop such harmonised lists of unwanted and controlled materials? The process of developing such lists will be crucial if such lists are to be accepted by the whole rail sector. Building upon the experiences of PROSPER **a consensus oriented approach should be pursued** involving equally operators and manufacturers. In the first rounds technical (academic) feasibility is minor to questions of practicability and even more important, concerns of stakeholders. Special care has to be taken also to **include sub-suppliers into the process**. Some, at first glance neutral specifications may factually exclude some products or even some suppliers from the business.

The difficult task will be to **balance issues of public concern with scientific risk assessment**. The availability and cost of alternatives must also be assessed at least for the most important issues.

For the success of the **development process** of such lists it will be crucial to reach an agreement of what the result should look like in the end:

- It has to be defined what the intentions behind such list are and what purpose they should serve in application.
- How binding should the use of the lists be? How can it be assured that the lists will be used in practise?

As for the practical application it seems quite unlikely that lists can be developed which can be considered binding for the whole (European) rail sector in the sense that they exactly outline what will be asked for in call for tenders (no more – no less). Instead it seems very likely that the different operators will choose which materials to address in calls for tenders according to their companies environmental priorities or even call-specific. The lists would thus form some sort of maximum requirements to pick from. The most important advantage for manufacturers would be that they can anticipate what would be demanded and that these demands are limited to a specified set. However, such a target setting will have to be defined in the beginning of the process including all relevant stakeholders.

⁵ Operators are sometimes confronted with strong pressure from the public regarding the existence of certain materials in trains. Whether this is justified from a scientific point of view or caused by media hype (“hazardous substance of the month”) is irrelevant – the public concerns have to be dealt with. In such cases it is highly beneficial for operators to have detailed information at hand, e.g. “Yes, there is xy in our trains. It amounts to xyz kg. We know where it is located. It is part of the batteries. It is confined. Maintenance and recycling routines ensure that it will not contribute to any pollution or health risks for passengers....”

The co-ordination of the development of such harmonised material lists could be one major task of the Rail Eco-procurement Specifications Board, which is to be established with equal participation from UIC and UNIFE members.

4.1.5 Brake Friction Material

| Activity | Who | When | To be considered |
|---|-----------|----------|---|
| Measurement routines for brake pad emission | RES Board | Mid-term | Integration of brake pad suppliers into the process |

It is very likely that emissions from brake friction material⁶ will increasingly be in the centre of concern in the future. However, so far no standardised measurement procedures exist. The respective specification in the leaflet (“emissions from brake friction material”) is defined at “*Emissions from brakes which are harmful to health or the environment*” in order to point out which issue has to be addressed. However the indicator addresses only the “concentrations of defined hazardous materials *in brake friction material*”. Due to chemical processes during braking other (and possible hazardous) materials can be generated which are originally not in the brake friction material. The indicator consequently is only a first (and quite practical) but in terms of environmental impact rather weak approximation.

The most important activities in this field would be:

- **Define common measurement procedures** for emissions from brake friction material. This includes the definition of representative braking patterns.
- **Identify most relevant materials/substances** (in the brake and in the emission) which might occur and which may have the largest environmental impact. This task requires good co-operation with the manufacturers of brake pads who are generally very reluctant to specify material contents of the brake pads due to confidentiality reasons. Close collaboration with the European standardisation process (see below) should be sought.
- **Document good practise examples.** Technical solutions may not only aim at the material composition of brakes, but also other measures (surface structure) which can reduce the temperature of the brakes and thus help to reduce the generation of hazardous emissions. Furthermore the air intake into coaches and MUs can be designed in order to minimise the concentrations of brake friction material emissions in the cabin.
- **Collaboration with European standardisation process.** European standards (EN) dealing with the issue of brake friction material for railway vehicles are currently being drafted by the European Committee for Standardization CEN⁷. Existing drafts have to be considered when enhancing the specifications for brake friction material. On the other hand, input resulting from activities in this field should be given to the standardisation bodies.

⁶ Although new compound brake pads are generally the main focus, dust emissions from clad iron brakes can also be problematic. Therefore the term brake friction material is used to cover all technical alternatives in this field.

⁷ Technical Committee TC256 “Railway Applications”, Sub Committee 3 “Brakes”, Work items WI171 and 173

The European norm on “Disc brake linings and brake shoe inserts for rail vehicles - Part 1 Brake blocks” is still under development, the European Norm for brake pads has already reached the status “Under Approval” (prEN 15328). However, currently it seems that the norm can only serve as a baseline as it is referring explicitly only to certain substances (asbestos, lead, cadmium, hexavalent chrome, ceramic fibre) in the brake friction material itself, the use of which is prohibited. With reference to emissions, it is only stated that “any other material that may produce dust or fumes that could be hazardous to the health of maintenance personnel, operating staff or passengers” must be avoided. Here a more detailed and effective specification would be necessary.

4.1.6 Definition of Recycling Rate

| Activity | Who | When | To be considered |
|------------------------------|-----------|----------|---|
| Definition of recycling rate | RES Board | Mid-term | Benchmark automotive sector Develop practical solution based on existing concepts (e.g. REPID) |

Recyclability is a rather theoretical indication but which can be defined for the purposes of the procurement of new rolling stock. It gives only an upper limit for the factual recycling rate at the end of the life of vehicles, which can be reached under optimum conditions (high rates of return, use of good technological standards, well organised collecting systems).

In order to make offers from different manufacturers comparable it is necessary to develop a common methodology for a common evaluation. E.g. the “removability” of each component could be assessed as a part of the global methodology. Here the results from REPID and current standards in other industries (automotive) should be linked with current practise of the rail sector. Ongoing efforts for marking and labelling of material compositions have to be taken into consideration also.

4.2 Design of Future Activities and Projects

4.2.1 Consultation and Communication Processes

For many of the issues addressed above technical input and knowledge will be needed. But it will also be decisive how the process is structured to develop these issues further. This holds true especially for all standardisation and harmonisation activities. We strongly advise to build upon the experiences gained in the PROSPER project regarding the consultation and communication process as outlined in chapters 2.2 and 2.4. Most important are:

- **Participation of stakeholders**

All important stakeholders have to be involved into consultation and communication processes. This a necessity not only to fully exploit the technical knowledge which is available in the railway community but also to create ownership for the results of the consultation process. Many suggestions evolving from UIC/UNIFE eco-procurement activities run contrary to well established routines within operators and manufacturers. To replace these

routine by new ones it will need committed individuals who will be willing to promote the necessary changes.

- **Consensus orientation**

Running a consensus oriented process is time and resource consuming. But since there are no means to superimpose voluntary targets upon unwilling actors there is no alternative to a consensus model if a broadly accepted standard is the goal.

For future activities in eco-procurement it will however, be decisive not to sacrifice ambitious targets over easy solutions. Developing new standards is in itself no achievement – only if they contribute to the goal, in this case a higher environmental performance.

4.2.2 The UIC Leaflet - Transfer from Theory into Practise:

| Activity | Who | When | To be considered |
|---|---|------------|---|
| Support transfer of UIC leaflet into practise (training) | Co-ordination by RES Board with UIC/UINFE or external funding | Short-term | Link training measure to the collection of feedback on the leaflet (for later revision) |

The next task after the formal adoption of the UIC leaflet will be its implementation in practise. With a view to the issues raised in chapter 4.1 it becomes obvious that a revision of the leaflet will become necessary eventually.

Regular updates of the leaflet should be made with respect to:

- **Experiences gained in application**

The practical application of the leaflet will yield new insights on eco-procurement. Feedback from practise should be the main input for the first revision of the leaflet. Apart from the practicability of the individual specifications this concerns also procedures applied, structures within companies and topics addressed.

- **Changing framework conditions**

Especially changes in legislation will make adaptations of the leaflet necessary

- **Ambitious but realistic targets**

The development of new harmonised measurement procedures and standards will allow to introduce target values for existing specifications, to alter existing or to introduce new additional specifications. A focus should be put on areas which are not yet governed by legislation (especially energy related issues) and where ambitious targets can yield a large improvement in environmental performance.

- **International focus**

So far the leaflet employs mainly a European perspective. With regard to the global approach of UIC and also with the globalisation of markets a truly global perspective would be desirable in the long run.

Training and Feedback

The leaflet will need promotion within and across companies if it should add to a common European standard for rail eco-procurement. A formal and top-down adoption of the leaflet will not be sufficient to ensure its application in practise. To

successfully introduce the ideas manifested in the leaflet into railway procurement it will be necessary to create ownership among those who should use the leaflet. This can be supported by providing training for those technicians and procurement experts who are supposed to work with the leaflet. Such training

- should not only seek to spread information on the leaflet, but rather facilitate a hands-on implementation process within the respective company.
- should be linked to a feedback process in order to provide input for further revisions of the leaflet.

4.2.3 The Rail Eco-procurement Network

| Activity | Who | When | To be considered |
|--|-----------|---------------------|--|
| Maintain and expand eco-procurement network | RES Board | Short- to Long term | <ul style="list-style-type: none"> • Attract procurement experts • Extend international ties (primarily Middle and Eastern Europe) |

The Rail Eco-procurement Network, which has been established mainly around the two projects REPID and PROSPER has proven to be a powerful and important network (see chapter 2.3). Suggestions to maintain its attractiveness as well as effectiveness are:

- **Address New Issues**
With the finalisation of the two projects REPID and PROSPER it will be important to put new issues on the agenda which are appealing for the participants of the network. The agenda of the next network meeting should very much focus on practical issues which can help the participants in their daily work. Examples could be: Discussion of the application of the leaflet. Exchange on eco-procurement processes or the presentation of technological good practises with high environmental performance.
- **Attract Procurement Experts**
So far the majority of participants came from the environmental departments. In future especially people from the procurement and technical departments must also so be involved.
- **Strengthen Newcomers**
Representatives from a broader range of organisations should attend the meetings. Especially organisations, which have not yet been so active in eco-procurement should be actively invited. The network may also extend its spectrum beyond railway operators and manufacturers to also include UITP members or gain environmental organisations for alliances.
- **Extend International Ties**
The network should try hard to extend its global ties. Members from Middle and Eastern Europe should be involved more actively. Representatives from USA, Japan and Russia should be encouraged to participate in order to keep the global perspective.

4.2.4 The Rail Eco-procurement Specification Board

Many of the activities suggested in this report can only be addressed if an institution exists which can secure a continuous work on the issues raised. The newly founded Rail Eco-procurement Specification (RES) Board seems to be an appropriate body to steer the necessary activities. From what is visible of its future set-up the core experiences from PROSPER are taken into account, foremost an equal and committed engagement of UIC and UNIFE members.

In this respect the following tasks should be in the centre of the RES board activities:

- **Agenda setting**
As one of its tasks the RES board should develop a roadmap of future activities in the field of eco-procurement. Topics need to be selected and prioritised and a time frames attributed to them.
- **Management of information exchange**
A core responsibility of the RES board would be to bundle and distribute information. Linkages to the various ongoing activities need to be maintained (without necessarily being engaged actively). The network which has evolved around the PROSPER and REPID projects needs active support if it should be kept alive. Triggering the regular organisation of network meeting should be in the responsibility of the RES board.
- **Promotion and revision of the leaflet**
Many of the suggested activities relating to the promotion of the leaflet need support or will not be effective if not coordinated by one central institution. Also the gathering of feedback and input for a consequent revision of the leaflet should be in the hands of one institutional body. The RES board could be the appropriate body for both activities.
- **Further development of specifications and standards**
All activities listed above which aim at improving methodology, harmonise indicators and measurement procedures or develop new standards should be coordinated by the RES board. For various activities special task forces or projects should be set-up and funding (UIC/UNIFE or external) should be sought for. The communication process – to consult experts in the development of new specifications as well as to disseminate results – should be coordinated under the head of the RES board.

4.3 Overview of Proposed Activities

A further harmonisation of the framework and specifications of eco-procurement seems appropriate from an environmental as well as economic perspective. If conducted adequately it can be of mutual benefit for railway operators and rail vehicle manufacturers.

In a process to harmonise environmental specifications two strategic aspects have to be considered to make it successful:

- **Consensus oriented consultation and communication processes**
If voluntary specifications are to become standards for the rail sector it is inevitable that all relevant stakeholders participate in a consensus oriented development process of such standards. It is very unlikely that any stakeholder not part of the process will later on adopt and implement “foreign” standards.
- **Appropriate targets**
The harmonisation process towards a voluntary rail-industry business standard will only be successful if ambitious but realistic targets are being implemented. Only if major environmental benefit is visible the standard will be honoured by policy makers and the public.

Based on an analysis of the processes of the PROSPER project and the deliverables developed therein recommendations for further activities to promote environmental aspects in the procurement of rail vehicles are summarised in the table below:

| Activity | Type of Activity | Who | When | To be considered |
|--|--|---|---------------------|--|
| Agenda setting for further activities | Essential background activity | RES Board | Short-term | Assessment of resources and funding |
| Support transfer of UIC leaflet into practise (training) | Essential background activity | Co-ordination by RES Board with UIC/UNIFE or external funding | Short-term | Link training measure to the collection of feedback on the leaflet (for later revision) |
| Maintain and expand eco-procurement network | Essential background activity | RES Board | Short- to Long term | <ul style="list-style-type: none"> • Attract procurement experts • Extend international ties (primarily Middle and Eastern Europe) |
| Compile good practise examples | Strategic project – high priority | Joint project of UIC and UNIFE | Short-term | Collection of good practise examples should be detached from standardisation processes |
| Revision of UIC leaflet | Essential background activity | RES Board | Mid-term | Based on feedback and incorporating new harmonisation efforts |
| Develop comparable standards for energy consumption measurement | Strategic project – high priority | Joint project of UIC and UNIFE ⁸ | Mid-term | Possibly under head of CTR or RES Board Both traction and on-board energy consumption should be addressed |
| Develop harmonised lists of unwanted and controlled materials | Strategic project – high priority | RES Board | Mid-term | Consensus-oriented stakeholder participation is vital |
| Measurement routines for brake pad emission | Strategic project – secondary priority | RES Board | Mid-term | Integration of brake pad suppliers into the process |
| Definition of recycling rate | Strategic project – secondary priority | RES Board | Mid-term | Benchmark automotive sector Develop practical solution based on existing concepts (e.g. REPID) |
| Enhance LCC approaches for practical application in eco-procurement | Cross-cutting issue | RES Board in co-operation with ERPC | Mid-to Long term | Two way approach: <ul style="list-style-type: none"> • Gain more knowledge on LCC implementation strategies for environmental department • Mainstream LCC in procurement departments Demonstration of good practise as short term activity |

⁸ An Integrated Project “Railenergy” was proposed to the European Commission for funding on September 1st 2005