Clarification for SYBAss-members regarding Recycling Convention

SUPERYACHT BUILDERS ASSOCIATION

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MANAGEMENT SUMMARY

In order to decrease the environmental impact of ship breaking and to enhance health and safety-circumstances of ship breaker personnel, new legislation has been developed. This legislation not only considers recycling of ships, but also impacts ship operation and ship building.

On May 15th, 2009, "The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships", (Ship Recycling Convention) was adopted. When the Convention would become effective, all new ships larger than 500 GT have to be provided with an Inventory of Hazardous Materials. Development of the information streams needed for this Inventory requires careful consideration by shipyards. This requirement applies not only to large commercial ships but also to superyachts.

Documenting hazardous materials is, however, not totally new to the superyacht industry. Various classification societies already offer formats for documenting information with regard to materials known to be potentially hazardous utilized in the construction of the ship, its equipment and systems. These documents should be maintained throughout the life cycle of the yacht. But in the case of the convention, realizing such a material inventory would be a difficult challenge for the superyacht industry.

The Convention will become effective two years after the moment it has been ratified by 15 countries (with some constraints to the type of country having ratified). Although it is impossible to predict the speed of ratification, some experts mention 2013, others mention the period 2015 – 2017 as the moment when the Convention will become effective. However, it is still possible the convention will eventually not be ratified at all.

Due to the special nature of a superyacht (custom design, exceptional systems and features), development of information systems on chemical composition of superyacht parts may be very complex and different from the complexity of getting the information for e.g. a bulk-carrier. Desk research and shipyard interviews indicate that having material information or substance information coming with all of the shipyard's purchases is not possible yet. SYBAss-members are advised to consider Convention-related issues timely and careful in order to be prepared when the Convention becomes effective. The latest edition of the convention can be found on the IMO website: www.imo.org.

Some substances mentioned in the Convention are applied in the production processes of other materials. Because of this, traces of these substances inevitably appear and complete avoidance of prohibited substances is impossible. Shipyards are advised to make a thorough inquiry into these matters. Possible strategies are to act on an individual basis, or to start a collective action or to do nothing and wait for the Convention ratification process to develop.

Since ratification of the Convention by all 15 states remains uncertain, there are no urgent precautions suggested. However, appendix 1 of the convention contains requirements for existing yachts. This would affect not only shipyards but also ship owners. Because the Inventory has to be up-

dated when ships are refitted, converted or otherwise significantly changed, in time shipyards performing refits will also have to deal with the new rules. According to the convention, existing yachts have to comply within 5 years after ratification. The yachts that are currently being built, will be existing yachts when the convention would enter into force. It could be worthwhile for SYBAss members to check the requirements of appendix 1 for their new builds. Note that in most cases new yachts already comply with requirements listed in appendix 1 due to stricter building requirements by existing legislation.

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LIST OF ABBREVIATIONS AND DEFINITIONS

Abbreviation	In full
GT	Gross Tonnage
IMO	International Maritime Organisation
MEPC	Marine Environment Protection Committee of the IMO
ILO	International Labour Organization
UNEP	United Nations Environment Programme
PIC	prior informed consent procedure (Basel Convention)
ESM	Environmental Sound Management (Basel Convention)
OEWG	Open-ended Working Group (of the Basel Convention)
PCB	polychlorinated biphenyl
ISO	International Organization for Standardization
I.H.M.	Inventory of Hazardous Materials
REACH	Registration, Evaluation, Authorization and restriction of CHemicals – European guideline
ECHA	European CHemicals Agency
E.L.V.	End of Life-Vehicle
RRR	EC directive on Reusability, Recycling and Recoverability
OEM	Original Equipment Manufacturer
IMDS	International Material Data System
GADSL	Global Automotive Declarable Substance List
MD	Materials Declaration or Materials Datasheet
IDIS	International Dismantling Information System

Item	Definition
Convention, Recycling Convention	The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, adopted May 15th, 2009
Member, Member State	IMO-member state
Inventory	Inventory of Hazardous Materials This Inventory identifies as Part I, Hazardous Materials listed in Appendices 1 and 2 to the Convention and contained in ship's structure or equipment, their location and approximate quantities; and shall clarify that the ship complies with regulation 4. of the Convention
Basel, Basel Convention	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
Recycling Plan	Ship-specific Recycling Plan. Only required for 'ships destined to be recycled'
Guidelines	Guidelines for the development of the Inventory of Hazardous Materials
Organo-tin compound	Substance used for anti-fouling purposes
Material Declaration	Declaration indicating materials from Table 1 and Table 2 of the Convention present above a given threshold level

1 INTRODUCTION

The Superyacht Builders Association (SYBAss) has asked ARN Advisory to clarify the Recycling Convention and its consequences and to indicate which strategies may be followed with regard to the Convention. ARN Advisory is an organization that helps companies by providing specific know-how on, practical advice about and effective solutions to sustainability and recycling issues in the mobility sector.

In chapter 2 of this report the Recycling Convention, Basel Convention and U.S.- and European legislation are described. Some substances mentioned in the Convention are applied in the production processes of other materials. Because of this, traces of these substances inevitably appear and complete avoidance is impossible. Shipyards are advised to make a thorough inquiry into these matters. More on issues, possible future scenarios and strategies that are advised may be found in chapter 3. Institutes active in certification of inventories of hazardous materials and companies offering the drafting of such inventories are listed in chapter 4, along with matters that require particular attention. In chapter 5 an example of the car industry is given. This industry has addressed a lot of matters with regard to hazardous materials in the past years. Both existing systems and best practices for registering and/or banning substances are highlighted.

2 AGREEMENTS AND LAWS

Scan of existing and future binding agreements concerning hazardous materials in shipbuilding and their applicability to SYBAss members.

2.1 INTRODUCTION

All ships larger than 500 GT will need a certificate of compliance with the Recycling Convention after this Convention has become effective (existing ships with a five-year grace period). In this chapter, an overview is made not only of this Convention but also of the currently applicable legislation. We will also take a look into the developments foreseen in the near future. Due to its factual legislative nature the contents of this scan are based on publicly available information sources. In case reference is made to a non-public source of information, this will be explicitly mentioned.

The starting point of the scan is the Recycling Convention of the International Maritime Organization (IMO), which imposes obligations on ship builders pertaining to the end-of-life recycling. Hereafter the scan will be extended to the additional relevant legislation which might affect the entering into force of the Recycling Convention.

2.2 INTERNATIONAL MARITIME ORGANIZATION (IMO)

2.2.1 Background

IMO is a specialized agency of the United Nations, with a main task to develop and maintain regulations for shipping. IMO's scope of activity includes the addressing of environmental concerns. However, inspection and monitoring of compliance remain the responsibility of member States. Currently there are approximately 170 Member states.
The Marine Environment Protection Committee (MEPC) is IMO's senior technical body and over the last decade the MEPC has played a leading role in ship recycling regulation, culminating in the 2009 Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships.
The environmental concerns at stake for IMO are the environmental, occupational health and safety risks related to ship recycling. Therefore all stages in the ship's lifecycle prior to recycling (resourcing, design & construction and operations phase) are involved in the regulatory framework only to the extent that they affect the recycling phase.

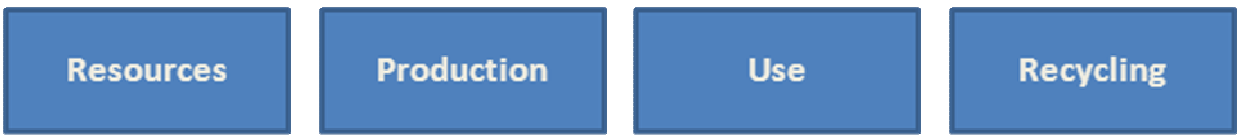

Figure 1 – stages in the ship's lifecycle

This lifecycle orientation was clearly visible in the initial MEPC concept of a *green passport*:

"A document, containing an inventory of all materials potentially hazardous to human health or the environment, used in the construction of a ship, that would accompany the ship throughout its

working life. Produced by the shipyard at the construction stage and passed to the purchaser of the vessel, the document would be in a format that would enable any subsequent changes in materials or equipment to be recorded. Successive owners of the ship would maintain the accuracy of the Green Passport and incorporate into it all relevant design and equipment changes, with the final owner delivering it, with the vessel, to the recycling yard".
The MEPC has co-ordinated this regulatory effort with the International Labour Organization (ILO) and the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal.

2.2.2 Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships

The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (Recycling Convention) was adopted 15th May 2009. It shall enter into force 24 months after the date on which the following conditions are met:

1. not less than 15 States have either signed it without reservation as to ratification, acceptance or approval, or have deposited the requisite instrument of ratification, acceptance, approval or accession in accordance with Article 16;
2. the combined merchant fleets of the States mentioned under 1. constitute not less than 40 per cent of the gross tonnage of the world's merchant shipping; and
3. the combined maximum annual ship recycling volume of the States mentioned under 1. during the preceding 10 years constitutes not less than 3 per cent of the gross tonnage of the combined merchant shipping of the same States.

As of January 31st, 2011, the Convention has been signed, subject to ratification or acceptance, by France, Italy, the Netherlands, Saint Kitts and Nevis and Turkey. There are no contracting States yet.

In a nutshell the Convention intends to bring about the following new regulations:

1. Ships to be sent for recycling will be required to carry an inventory of hazardous materials, specific to each ship
2. Of some hazardous materials the installation or use in ships will be prohibited or restricted in shipyards, ship repair yards, and ships of parties to the future Convention. These materials will be listed in an appendix to the Convention.
3. Ships will have to undergo an initial survey to verify the inventory of hazardous materials, surveys during the life of the ship, and a final survey prior to recycling.

Following the adoption, development of guidelines was started, intended to assist with the implementation of the Convention and as such crucial for any voluntary implementation of the Convention prior to its entry into force:

1. Guidelines for the development of the inventory of hazardous materials to assist compliance
2. Guidelines for safe and environmentally sound ship recycling.
3. Guidelines for the development of the Ship Recycling Plan (by the Ship Recycling Facilities).

Guidelines for the authorization of ship recycling facilities, for ship inspection and for survey and certification will also be developed in due course. Once adopted, the guidelines can possibly assist ship-recycling facilities and ship operators to start introducing any voluntary improvements to meet the requirements of the Recycling Convention.

2.2.2.1 Convention regulations relevant to the design and construction stage

Contracted parties (Member states) commit themselves to the following regulations applying to the design and construction stage (see attachment I for an overview):

- Prohibition/restriction of use of listed hazardous materials
- Preparation of the initial inventory of hazardous materials
- Initial survey before the ship is put in service, to verify that above inventory is in accordance
- Issuance of an International Certificate on Inventory of Hazardous Materials after successful completion of above initial survey

Control and enforcement is an obligation of the *Flag State:* In other words the survey and certification Regime is to ensure that a Party to the Convention takes effective measures for ships flying its flag to comply with the requirements of the Convention; By contrast, Parties to the Convention have to ensure that recycling facilities under their jurisdiction comply with the Convention: You could call this an obligation of the "*recycling state*".

Needless to say this differentiation between flag state and 'recycling state' is a critical success factor for the Recycling Convention: The European Commission addresses this issue in its communication to the council:
"At this stage it is difficult to fully assess the expected level of control and enforcement that the Recycling Convention will achieve in its entirety. The envisaged system of control and enforcement elements is adapted to the specificities of the maritime world, but the actual degree of success will depend on economic circumstances and on the diligence with which States will take regulatory and enforcement action" (EC Communication to the Council (com(2010)88).

2.2.2.2 Guidelines for the development of the inventory of hazardous materials

These Guidelines were adopted on 17 July 2009 (Resolution MEPC.179 (59)). Keep in mind that the objective of the inventory of hazardous materials is to provide specific information on the location and quantities of (potentially) hazardous materials on board of each ship in order to protect the health and safety of workers as well as to prevent environmental pollution at the recycling stage.

In appendix 2 to the guidelines, the inventory has been built up consisting of three parts:

- Part I: Materials contained in structure and equipment of the ship;
- Part II: Operationally generated wastes;
- Part III: Stores.

The material items of which Parts I, II and III in turn consist of, are categorized as follows:

TABLE A	Materials Listed in Appendix 1 of the Convention (Obligatory for New and Existing Ships)
TABLE B	Materials Listed in Appendix 2 of the Convention (Obligatory for New Ships and New Installations; voluntary for Existing Ships)
TABLE C	Potentially Hazardous Goods
TABLE D	Regular Consumable Goods

For *new ships* it is intended that the shipbuilder will prepare Part I of the inventory, mostly based on a collection of a large number of declarations made by the individual suppliers in the shipbuilding supply chain. Those suppliers may also have to rely on declarations by sub-suppliers. The resulting Part I of the inventory will be verified by the flag Administration at the initial survey.

Part I of the Inventory for *existing ships* needs to be prepared likewise by the ship-owner, who may draw upon expert assistance. The ship-owner should identify, research, request, and procure all reasonably available documentation regarding the ship. Potential sources of information could explicitly include the shipyard.

2.2.3 Reference to Basel Convention

The Recycling Convention stipulates that parties should take into account relevant and applicable technical standards, recommendations and guidance developed under the Basel Convention. The dismantling of ships under the Basel Convention will be reviewed in the next section.

2.3 THE BASEL CONVENTION ON THE CONTROL OF TRANSBOUNDARY MOVEMENTS OF HAZARDOUS WASTES AND THEIR DISPOSAL

2.3.1 Background

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted in 1989. The Secretariat is administered by the United Nations Environment Programme (UNEP). All individual EU Member States and the EU itself are Parties to the Basel Convention. The Convention was mainly given cause for by the rapid growth of shipment to- and disposal of hazardous waste in developing countries, during the nineteen-eighties.
The overall goal of the Convention is to protect human health and the environment against adverse effects resulting from trans-boundary movements and disposal of hazardous wastes.

2.3.2 Dismantling of ships under the Basel Convention

The Basel Convention does not specifically address dismantling of ships, as it pertains to the general concept of regulation of the shipment and disposal of hazardous waste. In a nutshell the Convention works on the basis of a prior informed consent procedure (PIC) for trans-boundary movements of hazardous waste between state of export and state of import. Both parties need to give a written authorisation of a shipment of hazardous waste. The concept of Environmental Sound Management (ESM) is defined in article 2.8 of the Convention as follows:

" 'Environmentally sound management of hazardous wastes and other wastes' means taking all practicable steps to ensure that hazardous wastes or other wastes are managed in a manner which will protect human health and the environment against the adverse effects which may result from such wastes."

The question is, of course, 'does the Convention apply to the dismantling of ships'? Generally speaking, a ship itself becomes waste under the Convention when it contains hazardous waste (amongst others asbestos, PCB's, oil residues and products containing heavy metals) and is sent for scrapping. So, indeed, there is a overlap as such with the Recycling Convention. We will look into the cross-reference in the following section.

At the sixth meeting of the Conference of the parties, decision VI/24 was taken, adopting the Technical Guidelines for the Environmentally Sound Management of the Full and Partial Dismantling of Ships (UNEP/CHW.6/23, annex); Focal point of these guidelines is the ban on beaching – the breaking up of end-of-life vessels at beach facilities in countries like Bangladesh, India and Pakistan. Keeping the background of the Basel Convention in mind, it is obvious that the Convention is very concerned with this "beaching" method of ship recycling in developing countries.

Reference is made in the guidelines to the ***Inventory of onboard hazardous/ polluting wastes:***
"Prior to arrival, or alternatively on arrival at the dismantling facility, an inventory survey of the vessel should be carried out. The survey will identify, quantify and locate the types of wastes on board and will result in an inventory list of hazardous wastes and other wastes".
The technical guidelines also refer to the IMO/MEPC for addressing measures to minimize the amount of hazardous materials aboard a ship prior to it being sent to a ship recycling facility (see section 2.2.2.1).

Herewith the two Conventions appear to nicely fit together in terms of an onboard inventory of hazardous materials as well as a reduction of these hazardous materials. So far so good, from the point of the need for clarity for shipbuilders. But, however, the Recycling Convention is a total set of regulations for the party states to adhere to. And it is the other end of the ship's lifecycle where the two Conventions do differ: Amongst other minor differences, the omission of a ban on beaching in the Recycling Convention is the main factor raising doubts amongst party states to the Basel Convention whether they should sign and indeed ratify. We will look into the consequences in the last three sections.

2.3.3 Reference to Recycling Convention (Hong Kong Convention)

Because the Basel Convention has already entered into force, it is obviously imperative from a legal point of view that the Recycling Convention does not contain matters which contradict the Basel Convention: This would make ratification of the Recycling Convention by parties of the Basel convention practically impossible.
However, as we have seen, not only legal assurance is at stake; from the point of view of environmental protection, the Basel Convention also wishes a re-assurement that the level of control and enforcement of the Recycling Convention is equivalent.
That is why, as a conclusion of the ninth meeting of the Conference of the parties, the seventh Open-ended Working Group (OEWG) of the Basel Convention was asked to carry out an assessment whether the Recycling Convention establishes "an equivalent level of control and enforcement as that established under the Basel Convention" (Decision IX/30 of the Basel Convention).

This OEWG met in May 2010 and will report to the tenth Conference of the Parties of Basel Convention that will meet in October 2011. Following this assessment it is expected that a decision will be made by the Parties to the Basel Convention on whether any amendments shall be introduced to the Basel Convention.

2.4 U.S., EUROPEAN AND NATIONAL LEGISLATION IN IMO-MEMBER STATES

The United States of America and the states of the European Union are often frontrunners in the development of environmental legislation. Therefore, to keep the scope of this study workable, legislative developments in Asia were not investigated.

2.4.1 United States legislation

The United States typically tend not to sign international Conventions, although when the United States are actively involved in the assessment process, Conventions can indeed be applied domestically.
The United States have signed the Basel Convention as far back as March 1990, but it was to date never ratified and thus is not legally binding for the United States.

The view of the United States towards the Recycling Convention is as follows[1]:
"

- The United States continues to supports the objective of the Recycling Convention.
- U.S. agencies with interests in the Convention are discussing whether to recommend that the United States become party to the Convention. This includes an assessment of the legislation and regulations that might be needed to implement the provisions of the Convention in the United States.
- While a decision on joining the Convention has not been reached at this point, we continue to work closely with others at the IMO on developing guidelines to assist in the implementation of the Convention.
- It is important that those guidelines be user-friendly, not create requirements beyond those in the Convention, and serve to encourage wide acceptance of the Convention. "

2.4.2 European Commission

The Basel Convention has been effectively transposed into EU legislation through means of the Waste Shipment Regulation (1013/2006/EC). This regulation has direct legislational effect in all 27 EU member states, no national implementation was needed to this effect.

Initially the European commission contemplated bringing forward the adoption of the Recycling Convention into EC legislation, prior to EU member state ratification. This was however abandoned due to a lack of internal support[2].
The Council then asked the European Commission to assess the differences between the Basel Convention, Waste shipment Regulation and the Recycling Convention. In its following report (COM(2010)88), the Commission confirms the call of the Basel Convention for an assessment of equivalent levels of control.
Meanwhile the European Commission asks Member States to prioritize the ratification of the Recycling Convention. This takes us to the final relevant step in the legislative chain: Future national implementation of the Recycling Convention by Flag States.

2.4.3 National implementation in individual European IMO-member States

As we have seen, the Recycling Convention has thus far been signed by three European party states, being France. Italy and the Netherlands.
We take the Dutch and Italian examples to exemplify the proceedings that follow before ratification can take place:

Italy has already started the administrative process towards the Treaty ratification, with an eye to the equivalence between the Hong Kong - and Basel Conventions[3]

Dutch ratification will only take place when the assessment of equivalent levels of control, as undertaken by OEWG of the Basel Convention, has been finalized[4]. The following step, national implementation into Dutch environmental law, will only commence when the Hong Kong Convention itself has entered into force. For this, ratification by at least 15 IMO-member states is required (see section 2.2.2.). So the OEWG assessment is crucial for this legislative chain.
At forehand a major Dutch objection to the Recycling Convention is, once again, the omission of a ban on beaching. Obviously this is an issue pertaining to recycling states rather than Flag states, nevertheless it is an issue with a strong tendency to rally European public appeal. For the Dutch

[1] Environment, Science, Technology and Health Counsel, U.S. Embassy London

[2] Dutch Ministry of Housing, Spatial Planning and the Environment

[3] Alternate Permanent Representation to IMO, Italian Embassy London

[4] Dutch Ministry of Housing, Spatial Planning and the Environment

Ministry of Housing, Spatial Planning and the Environment, the implementation phase is still so far away, that framework discussions with the maritime ministry have not even started yet. So there is still a very long way to go.

We conclude this chapter by stating that even an optimistic educated guess of the timing of the Recycling Convention's entering into force, is at least a couple of years away. For SYBAss members this implies that compliance will probably not be the initial driving force for adaptations; public relations, goodwill and, of course, lead time to delivery may become factors of equal weight to determine the course of action ahead.

2.5 PRACTICABILITY OF SHIP RECYCLING CONVENTION

When it would become effective, two factors define the Recycling Convention's effect on shipyards:

1. Some materials that are occasionally used in current manufacturing processes will no longer be allowed (or their use will be severely restricted).
2. An substantial administrative effort will be required to get all the necessary material information from the complete supply chain.

The materials mentioned under (1) are asbestos, polychlorinated biphenyl's (PCB's), ozone depleting substances, organo-tin compounds, some heavy-metal compounds, some brome compounds, some chlorine compounds and radioactive substances. SYBAss and ARN Advisory have investigated the situation at several superyacht shipyards. Furthermore, a Dutch merchant shipyard that has done a pilot on Convention-compliant shipbuilding was interviewed and extensive desk research was done.

Of all information obtained, the following striking observations were made:

- At this time it is impossible for a shipyard to exactly identify all materials used in the thousands of parts in all the ship's systems. Determining the impact of substance-phase out is therefore very difficult, let alone the phase-out itself.
- Complete avoidance of the prohibited materials is not possible. In some adhesives, for example, traces of PCB's inevitably appear due to their production process.
- Determining the impact of substance-phase out is therefore very difficult, let alone the phase-out itself.
- Appendix 1 contains restrictions on materials that are already banned in most new builds. Also, prefabricated systems and consumer products often already comply with product requirements that are more strict than Appendix I.
- Obtaining a complete list of all material declarations from all suppliers of all the ships systems and parts seems to be impossible. The information obtained from shipbuilders in the desk research indicated that of all the purchases done during the building of the several Recycling Convention trial-ships, the builders were able to have no more than 80% coming with a material declaration.

With regard to material declarations, the shipbuilding society is currently in a pilot situation. When moving towards a more commercialized and standardized information management, it is estimated that the number of purchases coming with a material declaration may increase to 95%. However, when asked, shipyard representatives indicate that 100% will never be possible. Their assessment is based on the level of standardization in the shipbuilding industry which is inevitably lower than that in for instance the production of consumer products and cars. Advantage hereof is that consumer products applied in a ship will already be demonstrably compliant with regulations prohibiting the use of hazardous materials.

It is not possible to predict how the different state bodies enforcing the Convention will handle situations in which an Inventory of Hazardous Materials is nearly but not 100% complete. It is advised to consult your certification authority, class society or shipping inspection on how to manage such a case.

3 SCENARIO'S AND STRATEGIES

The urgency for actions by ship yards and the amount of action necessary is determined by several factors. These factors determine different scenarios that describe the future. For each of these scenarios, appropriate strategies have been developed.

3.1 SCENARIOS

SYBAss-secretariat and ARN Advisory have analyzed the possible impact of the Recycling Convention. The impact of this Convention is determined by several factors. Some of these factors relate to the Recycling Convention becoming effective, others to practical aspects and others to possible extensions of the Convention.

3.1.1 Scenario factor 1 – ratification of Convention

Some of the scenario factors are related to whether the Convention actually becomes effective or not. These factors are defined by Article 17 of the Convention, in which the conditions for entry into force are mentioned. The factors are:

1. The **number** of countries having signed without reservation as to ratification, acceptance or approval. The Convention is not in force as long as this number is less than 15.
2. The **merchant fleet-size** of the countries having signed. The Convention indicates that "the combined merchant fleets of the States mentioned [under 1.] constitute not less than 40 per cent of the gross tonnage of the world's merchant shipping".
3. The **market share of worldwide ship recycling** of the countries: "the combined maximum annual ship recycling volume of the States mentioned [under 1.] during the preceding 10 years constitutes not less than 3 per cent of the gross tonnage of the combined merchant shipping of the same States."

As long as not all of these conditions are met, the Convention has not entered into force.

3.1.2 Scenario factor 2 – practical and administrative effects of Inventory of Hazardous Materials

The requirement of listing the different categories of materials in the so called 'Inventory of Hazardous Materials' and the prohibition of using some hazardous materials have two possible effects.

1. The Convention prohibits the use of asbestos-containing materials, ozone-depleting substances, materials containing polychlorinated biphenyls (PCB) and anti-fouling compounds and systems. This ban may cause design changes or changes in working methods to be necessary.

2. The Inventory of hazardous materials requires material specifications and declarations of conformity. Exceptional administrative efforts may be required for obtaining material specifications. Another possibility is that suppliers are not at all able to supply the required information.

3.1.3 Scenario factor 3 – possible extension of the Convention

Although the Recycling Convention has been in the drafting phase for a long time and ratification has only just begun, discussion on amendments has started. Furthermore, development of international standards may cause extension of the set of requirements:

1. New ISO-standards for ship building, ships in operation and ship recycling are being discussed. There is a possibility that these extend the demands of the Recycling Convention.
2. Some European countries would like to see elements of the Basel Convention integrated in a new version of the Recycling Convention.

3.1.4 Scenario factor 4 – Client behaviour

Owners that like to be frontrunner with regard to environmental issues may ask a shipyard for a yacht which is already Convention compliant before the Convention is effective.

3.1.5 Analysis of scenario factors

Careful consideration of the factors indicated in sections 3.1.1. through 3.1.4 indicates that the number of possible future scenarios is smaller than may be expected from the number of relevant factors:

- The factors summed up in section 3.1.1. can be summarized as 'Recycling Convention becoming effective' and 'Recycling Convention not becoming effective'.
- Potential future integration of Basel Convention-aspects or ISO standards (mentioned in section 3.1.3.) will not have a large impact on shipyards, because specific requirements with regard to the application and registration of hazardous materials in new ships are already imposed by the Recycling Convention.

Reducing the number of factors accordingly shows that four major unknown factors are important:

1. Recycling Convention becoming effective within a certain number of years or not
2. Necessary changes of design, manufacturing processes/working methods or not[5]
3. Exceptional administrative efforts in obtaining all information required for the Inventory of Hazardous Materials
4. Client behavior

[5] If materials listed in appendix 2 of the Convention are applied, these must all be recorded in the inventory with exact amount/concentration and location. This may be impossible with some designs, processes or working methods

The four mentioned unknown factors define six scenario's:

1. Convention not effective at all or not effective in the foreseeable future

2.
   - Convention effective within a certain period, situation 1
   - Compliance with list of materials allowed difficult
   - Administrative efforts workable

3.
   - Convention effective within a certain period, situation 2
   - Compliance with list of materials allowed difficult
   - Administrative efforts pose problems

4.
   - Convention effective within a certain period, situation 3
   - Compliance with list of materials allowed feasible
   - Administrative efforts workable

5.
   - Convention effective within a certain period, situation 4
   - Compliance with list of materials allowed feasible
   - Administrative efforts pose problems

6. Client asks shipyard for 'Green Ship', already Convention compliant

3.2 STRATEGIES

For each of the scenario's found, appropriate strategies may be followed. Because only six scenarios are relevant, a small number of strategies is sufficient to handle all future unknowns. The compliance with the list of materials (not using prohibited materials) is a very detailed aspect of the complete Inventory of Hazardous Materials and Recycling Convention situation and will be very different for each individual shipyard. Therefore, the advised strategies focus on the administration related to the Inventory of Hazardous Materials. Four different strategies are advised: 'do nothing', 'vertical integration', 'outsourcing' and 'collective action'. Furthermore, two alternative, more challenging, strategies are suggested.

3.2.1 Do nothing

In the case of scenario 1, 'Convention not effective at all or not effective in the foreseeable future', superyacht builders are advised to do nothing. 'Foreseeable future' is here regarded as the period until 2025. Specific matters with regard to registration of hazardous materials are only required by the Recycling Convention. Other legislation does not impose this kind of demands.

3.2.2 Individual or collective strategies

In case the Convention will be ratified and effective in the foreseeable future, SYBAss members are advised to estimate the feasibility of setting up the stream of information necessary for completion of the Inventory of Hazardous Materials (I.H.M.). When the suppliers of the shipyard are able to make all information available, an individual strategy is advised. If the information required for completion of the Inventory of Hazardous Materials is very difficult to obtain, a collective strategy is advised.

3.2.3 Individual strategies

Following an individual strategy instead of a collective one gives a yard the opportunity to stand out. However, when I.H.M.-related matters are handled individually, the request for information to suppliers should be part of the yard's purchasing procedure for all parts, equipment, systems, insulation, coatings etcetera.

Two individual strategies can be followed:

- Vertical integration
- Outsourcing

Vertical Integration

Strategy description

Shipyard approaches Tier-1 supplier for information on parts, equipment, coatings and systems purchased. This information may consist of material declarations, chemical information or declarations of conformity (indicating that certain substances are not contained in parts or systems delivered). The obligation to supply a Material Declaration may also be included in the purchase contract with suppliers. The Tier-1 supplier approaches its own suppliers (Tier-2 suppliers) et cetera. The shipyard sets up the I.H.M., keeps the administration and completes the I.H.M. Upon completion of the I.H.M., the certificate on the Inventory of Hazardous Materials is issued by or on behalf of the Flag State.

Points of attention

- Some suppliers will not be able to supply the required information, because they are not able to get it from their own suppliers.
- Some suppliers will not be willing to supply the information, for instance because the effort will be large when compared to their possible extra profit margin or because they are afraid of giving public relation-sensitive information on hazardous substances.

Outsourcing

Strategy description

Shipyard subcontracts all I.H.M.-related matters to a specialized provider of I.H.M.-services. This provider ascertains the flow of information on hazardous substances as well as completion of the Inventory.

Points of attention

- Because of all the detailed information that is required and the way the information is related to all drawings, part lists etcetera of the new ship, the effort of the shipyard will still be considerable.
- The communication shipyard-supplier may be better and easier than the communication service provider-supplier.

3.2.4 Collective action

Strategy description

For a complete Inventory of Hazardous Materials, a lot of detailed information on all parts, equipment, coatings and systems that will be purchased by the yard is required. Setting up the complete stream of information that is necessary for completion of the Inventory may prove to be impossible for individual shipyards. If this proves to be the case, it is advised to approach all Recycling Convention related issues collectively with the complete world-wide shipbuilding industry.

Points of attention

- Individual shipyards have to wait for industry-wide discussion on information systems
- Strategy aims at a collective registration system for hazardous materials that will be used by the complete shipbuilding industry and all parts- and system suppliers
- A collective information system is certainly feasible: the world-wide car industry has built such a system from scratch (see chapter 5). Re-implementation for another industry is relatively easy.
- For SYBAss-members, this strategy means that they request SYBAss to clarify, on their behalf, the concept to commercial shipbuilding organizations and interest them for the idea.

3.2.5 Alternative strategies

Two, more extreme, strategies may be followed. The first of these is to aspire a green profile by building 'green ships' and complying with the Recycling Convention independent from its date of ratification and the moment it becomes effective. Complying a long time before completion of the ratifications is in line with the image of a 'green shipyard'. A builder may also choose this proactive approach as Owners may request an I.H.M for their new yacht in order to be prepared for the retrospective compliance of the yacht after the Recycling Convention has entered into force.

The second alternative strategy is to do nothing, independent from the moment the Recycling Convention becomes effective, and await the developments in the commercial shipbuilding industry. Fact is that it is difficult to say when the first country will start enforcing the Convention.

4 INVENTORIES, CERTIFICATION / AUDITING

4.1 INTRODUCTION

To comply with Regulation 5 of the Recycling Convention, ship yards need to deliver a certified Inventory of Hazardous Materials along with the new ship's papers. This certificate of compliance will be issued after auditing of the initial I.H.M.-papers by or on behalf of the Flag State.

SYBAss members will have to contact the Flag State concerned and request from the Flag State the necessary certificates proving the validity of the Inventory of Hazardous Materials of the ship (statement of compliance) supplied with a new vessel. Depending the strategy of each SYBAss-member, I.H.M.-drafting or setting up an I.H.M.-drafting system may be subcontracted.

4.2 CLASS SOCIETIES WITH INVENTORY SERVICES

In the ship building industry, the flag state (the state where the ship is registered) is responsible for the certification of safety matters and environmental matters. This responsibility is implemented by the Maritime Administration of the flag state. In practice, the implementation is often (and increasingly) subcontracted to institutes authorized to issue the specific certificate. These institutes are often the institutes already supervising all constructive and technical designs and executions.

The Recycling Convention requires ships to be provided with an Inventory of Hazardous Materials. This inventory contains a list of all (potentially) hazardous materials on board. The list has to be developed during the building of the ship and is one of the items that has to be reviewed by a class society, in order to get a statement of compliance. Without this certificate, a ship's papers will not be considered complete.

Developing a complete list of hazardous materials involves the whole supply chain. Whereas some companies in the supply chain for a yacht will be familiar with the need for material specifications, a lot of the suppliers will not know exact material compositions of their products. This will be especially the case with suppliers of complex systems like the heating, ventilation and air conditioning system. The unfamiliarity with the Inventory-approach of products and systems can cause the drafting of an Inventory to be complex.

Because of the potential complexity of I.H.M-development, several institutes have developed Inventory services for shipyards.

For SYBAss members, it is important to have an administrative burden that is as low as possible. It would be beneficial therefore to work with institutes that are able to help implement an inventory system as well as perform certification of the inventories that are drafted.

To find out whether it is possible to obtain all services from one partner, activities on the Recycling Convention of a selection of classification societies were investigated. The results of this limited survey have been summarized in Table 1, on the next page.

Organization	I.H.M.-related Auditing / Certificate	Inventory Services
Lloyds Register of Shipping	Issue of an independently verified Inventory of Hazardous Materials (auditing)	LR cannot prepare the inventory for the yard by itself but can only guide, assist and approve the I.H.M.: – "I.H.M. for new builds is compiled by the shipyard"
Germanischer Lloyd	I.H.M. certificate for new and existing ships	Offer process management for drafting of I.H.M.
Det Norske Veritas – DNV	Issuance of the I.H.M. as an independent third party report	Offering inventory services (drafting of list)
Registro Italiane Navale – RINA	Issues 'Green Passport Plus', a document covering most or all aspects of Recycling Convention	Assist in drafting of I.H.M.
American Bureau of Shipping – ABS	Provide 'Green Passport', compliant with I.H.M.	Ship yards can participate in 'Green Passport Program' and receive complete inventory guidance
Class NK (Nippon Kaiji Kyokai), Japan	Statement of Compliance (Class NK is a classification society).	Software 'Prime Ship Inventory' for I.H.M.-development for new ships. Assistance with existing ships. Starts with Material Declarations and Suppliers Declarations of Conformity submitted by the shipyard's suppliers.

Table 1 – I.H.M.-activities of (SYBAss-member related) class societies and certification institutes

Note 1: combined services on inventories, auditing and certification may be offered by other companies than those listed in this table. Contact your preferred class society to inquire about I.H.M.-services

Note 2: DNV provides many additional services, such as presentation of the necessary documents to the authorized organisation such as a class society for the approval and issuance of the required documents of compliance. DNV also offers training of ship operators in preparing elements of the inventory themselves. Furthermore, DNV mentions the assisting in drafting of I.H.M. 's for existing ships

4.3 OTHER COMPANIES OFFERING INVENTORY SERVICES

If the preferred Class Society does not offer the required (amount of) inventory services, assistance in the drafting of I.H.M.'s is also offered by other companies than class societies. Some of these are:

Organization	Main country of activity	Inventory Services
Metizoft a.s.	Norway	Specialized in I.H.M, turn-key solutions for I.H.M.
Wilhelmsen	World-wide	Complete inventory services, existing as well as new ships
Lucion Marine	United Kingdom	Complete inventory services, specialized in existing ships. accredited by Lloyds Register to supply Green Passports (inventory of hazardous materials) to vessels.
Environmental Protection Engineering (EPE	Greece	Specialized in drafting I.H.M. for existing ships (information collection, sampling, visual inspection)

Table 2 – I.H.M.-activities of some independent consultants

After completion of the I.H.M., the Flag State can be approached for certification (statement of compliance).

4.4 SET-UP OF INFORMATION STREAM

As shown in tables 1 and 2, more and more companies offer shipyards assistance in the drafting of I.H.M.'s. It is not clear whether this service includes the development of the working methods necessary to generate the stream of I.H.M.-information (e.g. Material Declarations and Suppliers Declarations of Conformity) from suppliers to shipyard.

The process leading to a statement of compliance of the I.H.M. consists of three major steps

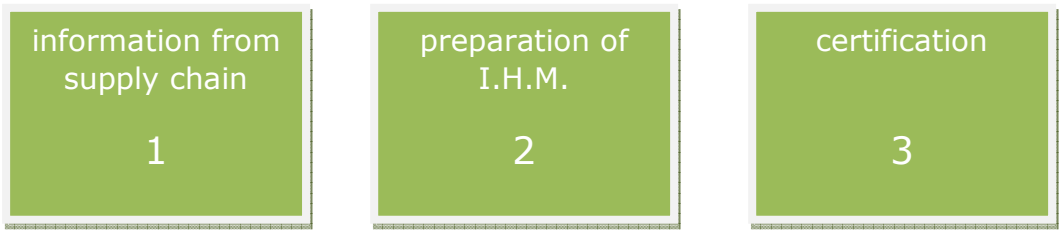

Figure 2 – steps to a compliant inventory of hazardous materials

The information considered in Step 1 consists of all details required for the drafting of the I.H.M. All suppliers involved in the building of a ship will need to specify material details. Depending on the complexity of the part, equipment or system supplied, these material details will be less or more difficult to obtain. In some cases, only a tier-3 supplier will be in possession of the required chemical information.

Setting up the flow of information will take a certain amount of time. After the first round of information requests from the shipyard to tier-1 suppliers, a second round of information requests from Tier-1 suppliers to Tier-2 suppliers will develop. This may even continue to further levels. Total amount of time required to obtain the last details required for completion of the I.H.M is difficult to estimate.

Because of the issues mentioned, the whole information management of step 1 (requests of Material Declarations and of Suppliers Declarations of Conformity, request of possible other necessary information) is something that will require careful consideration of SYBAss-members. Depending on the overlap in Tier 1- and Tier 2-suppliers of different SYBAss-members, standardizing the information flow will be more or less fruitful. Collectively developing such an information system related to I.H.M.-management could influence the current level playing field among SYBAss-members, as some may already be further in this process compared to others.

The hazardous materials-related rules are not the only factor increasing the number of papers on a yacht. The amount of documents related to, for instance, commercial class and crew is growing too. When the Ship Recycling Convention would become effective, the administrative burden of the Inventory of Hazardous Materials might be the trigger for standardisation. A big step in integrating information flows in the supply chain suppliers – shipyard – owner can be taken. Integrated and more transparent ship information will not only enhance inventory activities, but will also improve the handling of warranty issues, vessel systems operation. Money will be saved by the reduction in repeated data handling (e.g. manual data entry in both the design phase and in the composition of manuals).

5 EXISTING SYSTEMS AND BEST PRACTICES FOR REGISTERING AND/OR BANNING SUBSTANCES IN THE CAR INDUSTRY

Introduction

The shipbuilding industry is not the first to face stricter legislation regarding recycling and the environment. Many industries have dealt -successfully or not- with similar legislation in the past and it is therefore a sensible step to look at the lessons learned from another sector. One such industry is the car industry. Influenced by increasingly strict environmental legislation, automobile manufacturer operations have been severely impacted. The need to comply in order to continue selling cars has led the industry to develop and adopt a range of innovative measures, the most important of which will be discussed in this part of the project report.

5.1 LEGISLATIVE FACTORS

5.1.1 Legislation around the world

In the United States of America, legislation on hazardous materials is in force under the name of the *Toxic Substances Control Act*. Canada has legislation that is very similar to the European REACH Directive, as does Australia (REACH: Registration, Evaluation, Authorization and restriction of CHemicals). All aforementioned countries are at the moment in the process of negotiations with the European Chemicals Agency (ECHA) to join the REACH initiative in some way or another. China has also updated their legislation with their *Measures on Environmental Management of New Chemical Substances*, otherwise known as Order 7. This legislation will enter into force on 15 October 2010.

In the USA and Canada, there are as of yet no specific laws on End of Life-Vehicle- (ELV) management, however scrap yards are obliged to comply with provincial/state environment law or federal environmental law. South Korea adopted the *Act for Resource Recycling of Electrical & Electronic Products and Automobiles* in 2008, and countries such as Turkey and Japan also have specific ELV legislation. Turkish legislation is modeled after EU example, whereas Japan's specifically designed ELV legislation entered into force in 2005.

5.1.2 European Directives

Europe has *by far* the strictest legislative policies regarding registration and prohibition of chemicals and ELV management. In order to form a clear image of the legislative forces in and around the European car industry, a number of related European Directives will be discussed. The European industry is generally considered as the most heavily regulated car industry in the world, hence they are leading in this field.

ELV – (End of Life Vehicle 2000/53/EC)

ELV legislation is specifically aimed at the automotive industry. It was written to reduce the effect on the environment of the car recycling business. Even before the implementation of the ELV Direc-

tive this was a thriving and profitable business, because of the amount of metals and usable second hand parts in scrap cars. Millions of vehicles were discarded each year and a large percentage of the residual materials ended up in places not meant for waste storage. Chemicals used in the thousands of car parts assembled in a vehicle leached into the ground water and had an adverse effect on the environment and population. The Directive covers two distinct stages: scrapping of existing vehicles and the restriction of substances that can be used to build new vehicles. Annex 2 of this legislation handles specific hazardous substances that are either prohibited or can only be used in restricted applications. The latter is usually the case when no good alternative is available.

RRR – (Reusability, Recycling and Recoverability 2005/64/EC)
The purpose of the RRR Directive is to make sure that cars sold on the European market are "reusable and/or recyclable to a minimum of 85 % by mass and are reusable and/or recoverable to a minimum of 95 % by mass"[6]. The obligations of this objective are covered in the whole vehicle type-approval process. Type-approvals are handled by parties that are certified by the European Commission (EC) and are binding for the whole European market; they concern the vehicle in its entirety, not just recycling-related aspects. Without a type-approval, it is impossible to sell a vehicle on the European market.

REACH – (Registration, Evaluation, Authorisation and Restriction of Chemicals EC 1907/2006)
REACH as it was implemented by the EC, is actually an amendment of several earlier Directives. Some of its aims are as follows:

- To provide a high level of protection of human health and the environment
- To make manufacturers and importers responsible for managing risks associated with chemicals
- To allow the free movement of substances on the EU market

REACH is binding for all products entering the European market, not only cars, but because of their complexity, the implementation of REACH for the car industry was especially challenging. The underlying philosophy of REACH is to *register* instead of *ban*.

5.1.3 Legislative challenges for the car industry

For the car industry, the challenges put forward by implementation of this legislation were twofold:

- General laws on hazardous substances meant Original Equipment Manufacturers (OEM's) had to report, label, register (REACH!) or even phase out usage of those materials
- Specifically, the RRR Directive meant OEM's needed to prove their vehicles could be recycled; in doing this, they needed to have a detailed material overview of their products
- Finally, the ELV Directive states that OEMs are responsible for the end-of-life phase of their products; this includes providing information on dismantling and recycling of their products

To provide material overviews and pinpoint the 'location' of hazardous materials in products, detailed product information has to be available. Because of the complexity of products in the automotive sector, this information will (almost) never come from one manufacturer but is a collection

[6] *Directive 2005/64/EC of the European Parliament and of the Council of 26 October 2005, EUR-Lex*

data from suppliers of subassemblies brought together by the OEM. In the end, the OEM has the responsibility that nowhere in his product (i.e. nowhere in his supply chain) banned substances are present. The OEM also has the responsibility under REACH to register all other chemical substances.

5.2 BEST PRACTICES: IMDS & IDIS

To meet the challenges described in the previous section a number of OEMs took initiatives to come up with solutions. These are described in this section.

5.2.1 IMDS

IMDS, short for the International Material Data System, was developed in the late 90's to meet the challenge posed by the aforementioned legislation to register and identify chemical substances in products. Developed by 8 OEM's[7] and built, maintained and hosted by HP-owned company EDS, it has grown to become the industry standard for what it aims to do: being a common system to be used throughout the automotive supply chain for managing the environmental aspects of automotive products (both entire vehicles and parts). Since, many companies have joined the initial 8 OEM's: 70.000 companies are connected in some way or another to IMDS and more than 150.000 users contribute to the system on a regular basis.
IMDS is web-based and there is no need for special hardware or software, only a standard, internet-connected computer. The system is free-to-use for the entire supply chain, however there are extra services that can be purchased for customers with special wishes, such as automatic or large scale data entry. Also, heavy users can pay a fee for additional functions to communicate with the system outside of the browser. Most ERP or PDM systems can be connected in some way to IMDS, for example by XML.

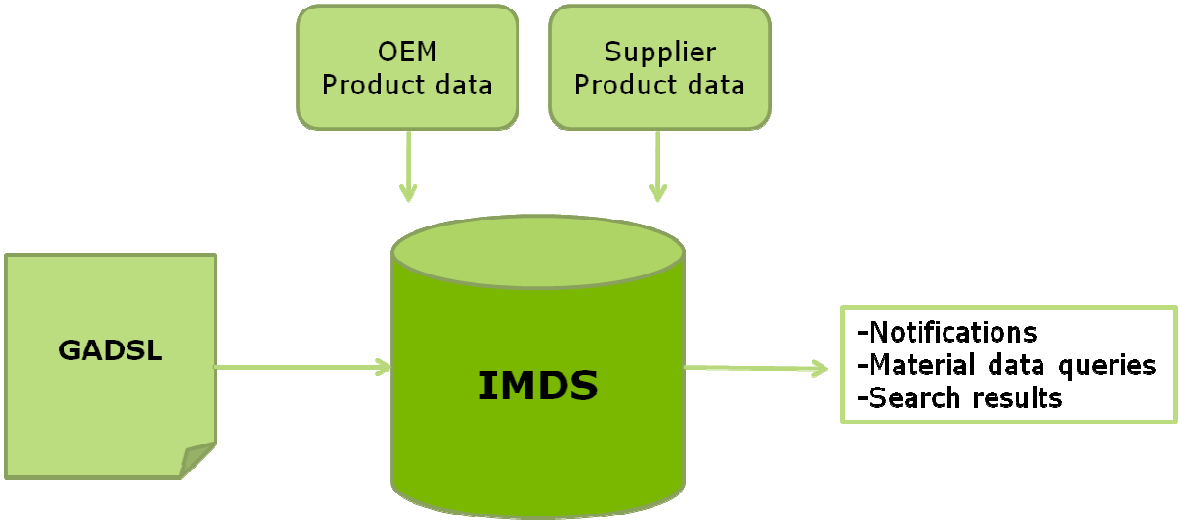

Figure 3 – high-level system overview

[7] *Audi, BMW, DaimlerChrysler, Ford, Opel, Porsche, VW and Volvo*

5.2.1.1 System inputs

From figure 3 it can be concluded that the system uses both *default* inputs and *user* inputs to function:

1. Default inputs – lists of declarable and prohibited substances based on existing legislation
2. User inputs – material data sheets for components, subcomponents, etc, entered by suppliers and OEM's

5.2.1.1.1 Default inputs

The IMDS uses a list of declarable and prohibited substances that were taken from existing legislation in the EU, the Americas, Japan, UK and other international legislative or directive bodies. The Global Automotive Declarable Substance List, or GADSL[8], was devised in 2005 and based upon the earlier ILRS, an intermediate list. It contains all OEM data on declarable substances and is therefore the only list that needs to be used. The list contains the following data:

- Substance – *chemical name of substance listed*
- CAS No. – *number given by the American Chemical Society to uniquely describe a certain chemical*
- Classification – *formal classification of the chemical substance*
  - D – *Declarable*
  - P – *Prohibited*
- Reason code – *code included to display the reason to include chemical in GADSL*
  - LR – *Legally Regulated*
  - FA – *For Assessment*
  - FI – *For Information*
- Application – *special conditions (for example exemptions) for certain applications*
- Source – *regulation or document that stipulates legal requirement*
- Generic examples
- Threshold – *maximum amount of substance that can be present in product/part/material without the need to declare (0,1% unless stated otherwise)*

gadsl
global automotive declarable substance list

	Substance	CAS-No.	Classification	Reason code	Application	Source (Legal requirements regulations)	Generic examples	Threshold (0,1% if not stated otherwise)
28	**Cadmium and its compounds, all members**		P	LR	All applications except those listed below.	EU-D 2000/53/EEC EU-R 1272/2008/EEC EU-D 76/769/EEC	Surface protection of metals, stabilizers in polymers, pigments, in paints and plastics, electronics	0,01%, Any intentionally added content must be reported.
28.1			D	LR	Valid exemptions according to current ELV Annex II	EU-D 2008/689		
29	**Chlorinated hydrocarbons, selected**		D, except	FA		EU-R 1272/2008/EEC	Leather, paints, rubbers, adhesives	
	1,1,1 Trichloroethane	71-55-6	P	LR		EU-D 94/60		
	Tetrachloromethane (Tetrachlorocarbon)	56-23-5	P	LR		Montreal Protocol		
30	**Chlorinated or Brominated Dioxins or Furans, all members**		P	LR		ChemVerbotsV	Impurities in products	Content above 10 ppb

Figure 4 – Selection from GADSL

[8] *https://www.mdsystem.com/magnoliaPublic/en/public/list/GADSL.html (visited on 28 July 2010)*

5.2.1.1.2 User inputs

Users within IMDS can be OEM's as well as Tier-1 suppliers or others in the supply chain. Each sub-component, component and material in the supply chain needs to be entered in the system, together these comprise the final product.
Three types of Material Datasheets (MDS's) can be entered, using a parent/child tree structure[9]:

- Component – *can have components, semi-components and materials as children in the data tree*
- Semi-components – *can have semi-components and materials as children*
- Materials – *can have other materials and basic substances as children*

In this way, a product tree is built up, consisting of different 'nodes', i.e. the types displayed above. Each entry starts with the materials, which are made up of substances. Materials can either be entered by the user, received from a supplier through the send/propose functionality or selected from the material list in IMDS. Users are encouraged to use existing MDS's for materials instead of creating their own to ensure correctness.
A component is used when the product is physically used in whole on an assembly and the weight remains constant (no trimming or drilling out). A semi-component should be used if the product is used by weight or length or will have the weight decreased before going into an assembly. For Semi-Components, the addition of dimensional data (weight per volume, weight per area, weight per length) is possible.
After the choice of the type of datasheet, information in four categories can be entered:

- Ingredients
  - *These are other components, semi-components or materials, depending on the type of datasheet*
  - *Weights and quantities are added to each entry in the product tree*
  - *Weights of child nodes can be entered in percentages of the total weight of the product tree. The total weight should always amount to 100%*[10]
  - *Application codes can be added to materials when attaching them to a component tree. Certain materials are banned from use, barring a number of exceptions. These applications can be indicated using application codes. In this way, IMDS will not automatically flag the material as prohibited, since it is used in an application that is exempt from current regulations*
- Recyclate Information - *no longer used in this format*
- Supplier Data - *contact information for the MDS*
- Recipient Data - *recipient is selected when a user wants to send a MDS to an IMDS user company*

5.2.1.2 System outputs

The outputs the system can supply are aimed at reaching several goals. First of all, the data in the system should be complete and correct. Therefore, the system allows for a user to check an MDS and ascertain it is complete and filled in correctly. Any user can create an MDS report of all MDS's sent and/or received by any user in the supply chain. Users receiving MDS's can accept or reject

[9] *https://www.mdsystem.com/html/data/training_en_7.1.pdf (page 21 and further)*
[10] *Note that this is distinctly different from a Material Safety Data Sheet (MSDS), where only hazardous substances are mentioned and totals rarely add up to a 100%. Therefore MSDS are seen as unsuitable to correctly fill IMDS data*

these sheets, causing them to either be added to the overall tree, or be rejected and returned to the supplier (including a valid reason of course). Finally, an MDS can be put on a follow-up list – a sort of waiting list. A follow-up date is assigned and all users in the relevant supply chain will be notified the specific MSD is "Due for Processing" at the date entered.
Another functionality to create useful output is the search function within IMDS. Here, users can search for components, semi-components, materials, substances or entire MDS's using certain search criteria. It is also possible to analyze data in IMDS, using the Analysis tool. MDS's can be analyzed from multiple perspectives such as materials, classifications or basic substances. Another useful output from the analysis tool is the certificate of expenditure. This is a "where is it used?" analysis, that brings up any information on where certain substances are used, for example those listed in GADSL or prohibited under REACH legislation.

5.2.2 IDIS

The legislative challenges mentioned in the previous chapter also included the responsibility of OEMs for the end-of-life phase of their products; as stated this includes providing information on dismantling and recycling of their products. This obligation is covered by IDIS, or the International Dismantling Information System. The system is developed and managed by the IDIS2 consortium, made up of car manufacturers from Europe, Japan, Malaysia, Korea and the USA.
IDIS contains information on the safe dismantling and treatment of end-of-life vehicles, such as the location and means to disarm pyrotechnic devices (see below).

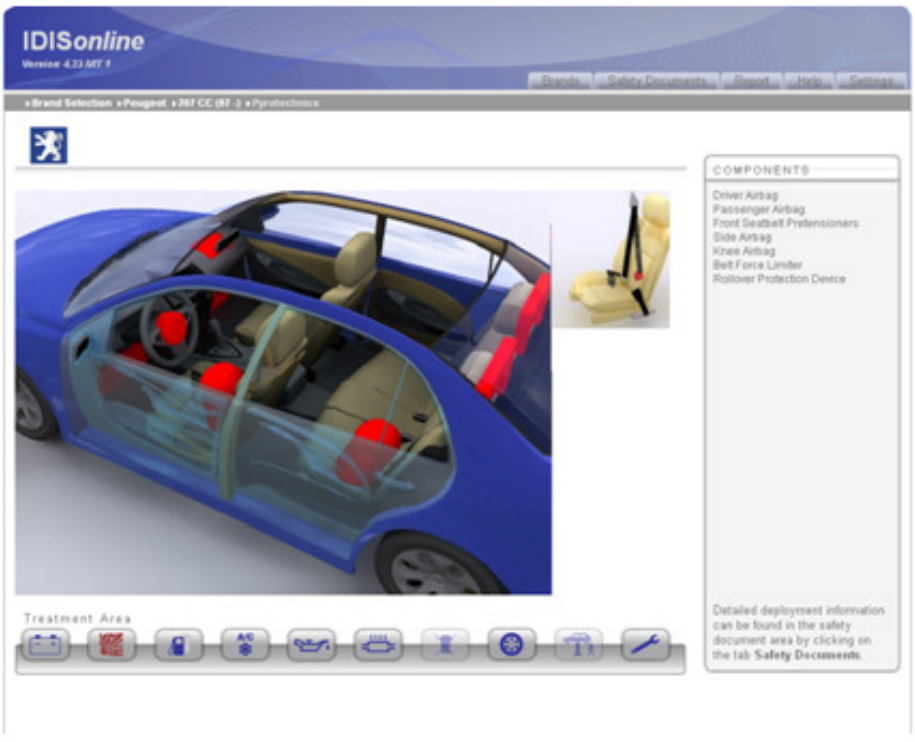

Figure 5 – Pyrotechnic devices in a vehicle *Source: IDIS2*

IDIS also provides advice on recyclable parts and components, using easy schematics (see below).

Source: IDIS2

5.3 COMPLIANCE WITHIN THE SUPPLY CHAIN

The previous chapter has shown that IMDS and IDIS are powerful tools to administrate and analyze the supply chain and indicate possible issue areas, as well as provide information on practical recycling methods. However, the OEM is the end-user in the chain and therefore responsible for the final product (the vehicle). They have to comply with legislation such as mentioned in chapter 3 and section 5.1 and have to make sure to manage this obligation as diligently as possible. To dictate compliance within the supply chain, obligations of suppliers to an OEM are contractually fixed at the beginning (or during) the cooperation on a certain project. The obligations are updated when new legislation comes into force. The detailed legal technicalities are beyond the scope of this project, but some general remarks will be made about the way OEM's make agreements on restriction of substances in suppliers' products.

A mid-range and luxury car brand in Europe produces lists containing chemicals in a number of categories:

- White list chemicals – *chemicals may be used but 'better' alternatives are available in the list*
- Grey list chemicals – *chemicals may be used but are kept under close surveillance and active research is done to find less hazardous alternatives (the restriction refers to chemicals in concentrations exceeding 0,1%[11])*
- Red list chemicals – *chemicals may not be put in use (certain exceptions are possible)*

[11] *Note 0,1% is the threshold mentioned in GADSL for most declarable substances*

The lists are referred to in the requirements drafted for suppliers and contractors to the OEM. The requirements are signed for and mentioned in contractual documents, hence delegating the responsibility, or at least the liability, to the supplier/contractor. In legal disputes, for example in the case of non-compliance, the OEM can always refer to the supplier and possibly sue for damages incurred in infringement procedures of respective legislation. OEM's might also oblige suppliers to periodical audits to verify compliance with certain requirements. This is all a contractual matter between OEM and supplier. Suffice to say, these contracts are merely a legal 'safe guard' and real compliance will only be reached through thorough cooperation in the chain. IMDS is a very useful tool that can help OEM's stay in control and work constructively together with their suppliers.

ATTACHMENT I: RECYCLING CONVENTION EXTRACT APPLYING TO RELEVANT DESIGN & CONSTRUCTION PHASE

Part A – Design, construction, operation and maintenance of ships

Regulation 4 – Controls of ships' Hazardous Materials

In accordance with the requirements specified in Appendix 1 to this Convention each Party:

1. shall prohibit and/or restrict the installation or use of Hazardous Materials listed in Appendix 1 on ships entitled to fly its flag or operating under its authority; and
2. shall prohibit and/or restrict the installation or use of such materials on ships, whilst in its ports, shipyards, ship repair yards, or offshore terminals, and shall take effective measures to ensure that such ships comply with those requirements.

*Regulation 5 – Inventory of Hazardous Materials**

1. Each new ship shall have onboard an Inventory of Hazardous Materials. The Inventory shall be verified either by the Administration or by any person or organization authorized by it taking into account guidelines developed by the Organization. The Inventory of Hazardous Materials shall be specific to each ship and shall at least:

1. identify as Part I, Hazardous Materials listed in Appendices 1 and 2 to this Convention and contained in ship's structure and equipment, their location and approximate quantities; and
2. clarify that the ship complies with regulation 4.

2. Existing ships shall comply as far as practicable with section 1 not later than 5 years after the entry into force of this Convention, or before going for recycling if this is earlier, taking into account the guidelines developed by the Organization and the Organization's Harmonized System of Survey and Certification. The Hazardous Materials listed in Appendix 1, at least, shall be identified when the Inventory is developed. For existing ships a plan shall be prepared describing the visual/sampling check by which the Inventory of Hazardous Materials is developed, taking into account the guidelines developed by the Organization.

3. Part I of the Inventory of Hazardous Materials shall be properly maintained and updated throughout the operational life of the ship, reflecting new installations containing Hazardous Materials listed in Appendix 2 and relevant changes in ship structure and equipment, taking into account the guidelines developed by the Organization.

Part B – Preparation for Ship Recycling

(this part concerns among others the Ship Recycling Plan, relevant only for ships destined to be recycled)

Part C – Surveys and certification

Regulation 10 – Surveys

Ships to which this Convention applies shall be subject to the surveys specified below:

1. an initial survey before the ship is put in service, or before the International Certificate on Inventory of Hazardous Materials is issued. This survey shall verify that Part I of the Inventory required by regulation 5 is in accordance with the requirements of this Convention;

Regulation 11 – Issuance and endorsement of certificates

An International Certificate on Inventory of Hazardous Materials shall be issued either by the Administration or by any person or organization authorized by it after successful completion of an initial or renewal survey conducted in accordance with regulation 10, to any ships to which regulation 10 applies, except for existing ships for which both an initial survey and a final survey are conducted at the same time, taking into account the guidelines developed by the Organization.

Note

Above quote of Convention text is of March 2011. Convention may have been amended since. For details of the actual text, please refer to website I.M.O..