Guide on good environmental practices and ecodesign for recreational nautical sector

2012
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Think different and reality will change

2012
0. Summary
This document includes an interesting study and reflection on the impact that man creates on the environment with nautical boats throughout its lifecycle and how we act in a responsible and active way to reduce or avoid them.

Recreational boating is a relatively recent phenomenon that originates at the end of World War II and has been consolidated in our Western society to achieve important economic areas and social settings. Today recreational boating is a strategic sector for our society that wishes to maintain its progress in a natural environment increasingly fragile and vulnerable.

The point is that we have approximately 6.3 million nautical boats in the EuroMediterranean area that are used by 35 million users a year (ICOMIA 2010). With this huge volume of activity floating our seas, we do almost nothing to reduce the environmental impact of their manufacture, use or destruction. Should we go on doing and behaving the same way as we’ve done so far? The response to this question in the present situation is that nautical business is unsustainable this way.

Good environmental practices in the nautical industry are essential to improve our production processes and reduce their impact on the use of natural resources, natural environment and energy. We also serve to integrate key concepts needed to face the future in a more sustainable way. Ecodesign, ecoproducts, clean production and recycling, among other things, lead us to a more efficient and responsible for nautical boats and their optimal management end as waste.

This document also highlights the complexity of the sector to achieve significant environmental improvement and plausible. It is therefore essential that each of the stakeholders, users, manufacturers, government and recycling companies, among others, are consistent and responsible with their actions and act decisively and synergy in the same direction.

It is the key time and a little change is emerging in the nautical industry in Europe. This change is catalyzed largely by the financial crisis, and define new opportunities for a greener future and responsible. This new development paradigm nautical and so must, must converge towards innovation, energy efficiency and rationality in the efficient use of raw materials and natural resources.

Our great strength is the clear conviction of practicing active environmental conservation and the most valuable asset of the nautical sector, the Sea.
Objectives and usefulness of the guide

In our endeavor to be helpful and get the best results for environmental improvement and competitiveness of the European nautical industry, we will apply all our knowledge and experience in this guide to good environmental practices and Ecodesign.

The aim of the guide is to give good ideas and recommendations to all actors in the lifecycle and agents for the nautical sector with its management capacity, leaderboat and commitment to improve, from its position of personal or collective responsibility, the environment nautical and help generate a more sustainable nautical industry.

The good practice guide is a straightforward document easy to understand that integrates the knowledge and experience of many years of a team of experts in the nautical world and the nautical environment and now thanks to the project Boatcycle acquires more relevance, commitment and visibility. The guide is divided into 6 levels of action for each of the major players and significant nautical industry: manufacturers, users, marinas, public authorities and institutions of nautical management services and waste managers.
1. Brief history on design and boat building
1.1 Introduction

The nautical and man have long coexisted, as well as the history of the oldest civilizations that stood out for being more educated, technological and powerful than the rest (Ref. Oxford Encyclopedia of Nautical History-2007). It is known that Egyptians used the more traditional fishing boats, transport and commerce for their noble enjoy long journeys for the wonderful Nile upstream from major cities like Cairo or Alexandria to Aswan and Lake Nasser. The ancient tradition says that sailing down the Nile from Thebes to Karnak sunsets and sunrises are the most beautiful in the world and then you can connect with the soul of the gods in the afterlife (JK Nielsen Ribanedeira, 2010).

In ancient Sumer, between the river Tigris and Euphrates, in the cities of Babylon, Uruk and Larsa river navigation was in its time, pleasant and important activity for the wealthy classes that transformed commercial boats in pleasure boats, incorporating the latest browser technologies imported from Indochina through the Persian Gulf, the Arabian Sea, the Malabar coast and the Gulf of Bengal.

Early boatbuilders of the history of navigation were the Egyptians around 2900 years BC that sailing on the Nile gained experience to leave afterwards to the open sea. Its construction was purified technology, since the selection and treatment of timber until its handling and assembly. This enabled the construction of boats with sturdy wooden frame that could transport, cargo, passengers and accommodate rowers. These boats had a single mast that supported a rectangular sail, and large paddles located as used as a rudder, keel and lacked around the boat was placed a network of fibers or ropes, which acted as a hull reinforcement.
The inhabitants of ancient Phoenicia, in the eastern Mediterranean coast, thanks to its technology and greed in navigation were very good traders and knew how to build merchant boats capable of carrying considerable warboats and more effective than any of those produced by his contemporaries, the Egyptians and the Aegean. The boatping talent of this people developed on par with his trade, fishing and to a lesser extent warrior. The Phoenician boats were made of resistant wood such as cedar, pine, oak and cypress. They have very large boats, which also took advantage of the wind through rectangular sails. The essential construction components of this boat are wood, rope of linen, cotton and other natural fibers for sails.

Then the fundamental direction of the boats was just suffered changes and technological developments that allowed these basic principles to improve in functionality and security. Some major developments in Asia were already in the ninth century AD, and were not adopted in the West, inconceivably, until recently the nineteenth century. An example of this is found in Chinese junks, which had a hollow bulkheads or divisions and tight, allowing the seal to keep the boat in case of a waterway, preventing its collapse. This feature was already observed by Marco Polo in 1298 and described in his travel books. The Vikings, who around 700 A.D. initiated departures from Scandinavian waters, excellent onboard boats
and paddles square sail called longboats, to conduct regular raids explorations and conquest of the islands of the Atlantic reaching Western Europe and even the coast of North America (Oxford Encyclopedia of Nautical History-2009).

It was only after millennia before all the mainland, and more recently the island, remain fully identified, most of them through sea routes. It happened over time spans and intimately connected with the rhythm of technological progress, especially since the fifteenth century, a golden age in which inaugurated the great explorations and discoveries of new lands.

The seventeenth century would witness the height of the sea of candles, with all types of boats proliferate on all the seas, military fleets composed of frigates, corvettes, sloops, cutters, xebecs... allowed to hold the supremacy of one country in the oceans away from their home ports. In the commercial, almost identical copies of the warboats, but smaller, and even armed to deal with the incursions of pirates sailed the seas under the command of powerful companies, such as the famous “Indian companies”.

The last sailing boats that operated regularly were the clippers and the long post. The clippers were the most beautiful and elegant boats that were ever built, true formula I in the sea, which would be gained deserved fame in racing tea from the ports of China to Britain and the United States until 1870, when they were replaced by steam-powered boats. Until that time the steamer had not been able to overcome the speed and performance of the clippers, but finally they would rob its leaderboat position by terminating the heyday of sailing, but leaving an indelible memory of that great stage.

From 1845, with the implementation of the helix, for the first time in millennia the speed and security prevailed over any other concept, becoming a priority issue of nautical engineering and boatbuilding. From here follow an unstoppable process, would specialize quickly all the functions of boats according to their mission, resulting in the most diverse range of boats from the largest freighters, tugs and tankers to smaller boats such as sailboats recreational, yachts and motorboats. Since then ply oceans, inland seas, large lakes and navigable rivers, supported by GPS technology in an innovative deployment of technical resources, whose short period of evolution and progress is unknown at any other time or stage in the history of navigation.
1. brief history on design and boat building

1.2 Recreational boating, growth and limits

In this context mention the recreational boating leads us to propose a phenomenon closely linked to the social reality of their environment. The oldest historical information we have about the use for recreational purposes of a boat back to the Egypt of the Twelfth Dynasty, but the modern concept of using sport of sailing in a stable does not appear until the mid-nineteenth century mainly in England and United States, from where it spread very rapidly through all the richest and most advanced in Europe (Ref. Oxford Encyclopedia of Nautical History-2006, Fundación Mar - Comune di Pisa - Blu Project 2006 - Ecosind - Interreg III C).

It is precisely the concept of social welfare which is the basis for the development of nautical sports. Fishermen and traders were the first users of the boat to walk or relax in the holidays. Surely, the boat used in the first place was the same he went fishing or transport goods over time and increased economic availability of more free time and would end up ordering a particular boat for their own pleasure.

These boats were built along the lines of hooves faster and manageable, because these are the two characteristics that always tend to follow the concept of pleasure boat, but their interpretation differs greatly by age.

Fundamentally customs, fishing and riding are activities that historically have required fast boats and easy to use and therefore are practical boats, fishing and customs which generally have laid the foundations of technical development pleasure boats in all countries. This is clearly reflected in the history of yachting and American English and, to a lesser extent, being often mere repetition of canons of English or American, in France, Norway, Sweden and Italy are historically powers development of recreational boating.

The second half of the nineteenth century in Europe is marked by tremendous economic growth due to the exploitation of new inventions, electricity, steam, railway, and a new organization of
society in general which is ultimately the bourgeoisie the establishment that stands out from all and definitely takes the reins of political and economic governance. Since the mid-50’s of last century begins to look at all ports and harbors of Europe and America in their extensive coastlines and flourishing recreational nautical activities.

Recreational boating is established worldwide as a cultural activity consolidated from the 70’s through the use of new building materials derived from petroleum, mainly polyester resins, which along with new manufacturing techniques have facilitated the production of lighter boats, resilient and competitive in all markets where the economic development model has appeared accidental.

In the 50s of last century the nautical industry experience in Europe and the United States first manifested growth with the manufacture of sailboats and yachts in wood and iron with excellent designs and achieve maximum functionality with natural materials.

On the contrary, from the 70 nautical culture experience exponential growth, thanks to mass production and cheaper synthetic materials and competitive, a fact reflected in the huge number of nautical boats that exist today in countries EU reaching over 6 million (ICOMIA) and about 13 million in USA (NMMA).

Make this enormous number of vessels is part of a major environmental problem throughout its life cycle and this has caught them by surprise. From design and manufacture of a recreational vessel, through its long life cycle and subsequent disuse has important ecological and CO2 emissions which require necessarily apply new concepts based on marine eco-design innovation and new cleaner and greener technologies.

Photo 5. Currently recreational boating is part of the landscape of our coasts and is the engine of activity in coastal development in wealthy countries. Natural Advice, SL
1. brief history on design and boat building
2. Environmental impacts caused by nautical activity
Main environmental impacts bound to the production and use of standard production boats:

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<tr>
<th>PHASE</th>
<th>PROCESS</th>
<th>ENVIRONMENTAL IMPACT</th>
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</thead>
<tbody>
<tr>
<td>Design</td>
<td>1. It integrates the concept of product lifecycle and associated envir-</td>
<td>1. The product comes to market to target and, regardless of the impacts throughout</td>
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<td></td>
<td>onmental costs.</td>
<td>its life and not when the product dies and must be recovered.</td>
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<td></td>
<td>2. Not integrate concepts of Eco design and efficiency throughout the</td>
<td>2. The product is designed nautically associated with high consumption of non-</td>
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<td></td>
<td>lifecycle.</td>
<td>renewable resources, a high level of CO₂ eq. and high water footprint.</td>
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<td></td>
<td>3. It integrates the concept of using renewable natural resources.</td>
<td>3. The contaminated product during its lifetime.</td>
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<td></td>
<td>1. Low energy efficiency in the production process.</td>
<td>1. Processes associated with high emissions of CO₂ equivalent and water footprint.</td>
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<td></td>
<td>mental costs.</td>
<td>3. Dependence on petroleum products.</td>
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<td>3. Use of chemicals hazardous to the environment and health.</td>
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<td></td>
<td>1. Sales campaigns to target market.</td>
<td>1. The objective is to sell regardless of the impact can be generated in the</td>
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<td></td>
<td>2. There are established links with the end user.</td>
<td>environment.</td>
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<td></td>
<td>3. The distribution is a large scale.</td>
<td>2. The sales agent dilutes the relationship between manufacturer and user so not fulfilling good ecological and efficient use of the product and return to the source for recycling.</td>
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<td>3. Distribution systems associated with long-haul high CO₂ emissions.</td>
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<td>1. Short-use cycles and high environmental impact.</td>
<td>1. Generation of hazardous waste and special.</td>
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<td></td>
<td>2. Land use, indirect impacts of the necessary service infrastructure</td>
<td>2. Generation of pollutants and noise pollution.</td>
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<td>(ports, ramps …), and management of waste generated, and so on.</td>
<td>3. Environmental impact frequency of sensitive natural areas.</td>
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<td></td>
<td>3. Environmentally expensive maintenance equipment.</td>
<td>4. Impacts on biodiversity.</td>
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<td>4. Low level of environmental responsibility of the user knowing.</td>
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<td></td>
<td>1. No efficient management of waste.</td>
<td>1. Abandonment of boats in ports and coastal areas.</td>
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<td>2. There is no actual record of the boats into disuse.</td>
<td>2. Sinking and side effects.</td>
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<td>3. Lack of specific legislation.</td>
<td>3. Unmanaged hazardous waste.</td>
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<td></td>
<td>4. There is a lack of procedure to be followed by the user.</td>
<td>4. Administrative problems and risks of accidents in ports.</td>
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2. environmental impacts caused by nautical activity

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<tr>
<th>PHASE</th>
<th>PROCESS</th>
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</thead>
<tbody>
<tr>
<td>Scrapping</td>
<td>1. Abandonment of boats in ports and coastal areas.</td>
<td>1. It takes a very efficient recycling of materials that increase their value.</td>
</tr>
<tr>
<td></td>
<td>2. Sinking and side effects.</td>
<td>2. Obsolete obsolete fleet increasing.</td>
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<td></td>
<td>3. Unmanaged hazardous waste.</td>
<td>3. The crushed or compacted composite hulls are stored in the dump waste with some contaminants.</td>
</tr>
<tr>
<td></td>
<td>4. Administrative problems and risks of accidents in ports.</td>
<td></td>
</tr>
<tr>
<td>Waste Management</td>
<td>1. Waste management is done manually and the value of materials is low.</td>
<td>1. No commercial interest since recycling cost are no paid by anybody so boats are not recycled but being abandoned or sunken.</td>
</tr>
<tr>
<td></td>
<td>2. The 20% is recoverable materials at low price.</td>
<td>2. The few boats that are scrapped are decontaminated, removed the engine and the rest is stored in the dump.</td>
</tr>
<tr>
<td></td>
<td>3. The remaining 80% fiberglass resins. Composites nowadays that have no market value and go to dump.</td>
<td>3. The environmental impact is high if we think of the whole lifecycle for composite and the amount of CO₂ eq.</td>
</tr>
</tbody>
</table>

The sailing world by necessity and tradition has worked intensively on the basis of efficiency, safety, durability and functionality. Thus, the spread of recreational boating and sport in society has required manufacturers to the production, marketing and distribution of cheaper boats available to all the parameters involved in integrating. On the other hand the rules on recreational boating and sport has become more demanding, as the rules on waste management, nautical protected areas, environmental impact and also in the management of marinas.

At this point now converge in the nautical industry and therefore in the nautical environment, the main stage of all products and services sector, a change in circumstances that peer necessary and integral to the concept and development of sailing. These circumstances are on the one hand the need to be more efficient and greener to tackle the shortage and rising prices of natural resources and climate change and the need to develop other more sustainable ways to be responsible with the planet’s health and the quality of life of future generations.

![Graphic 1: Emissions of greenhouse gases of a sailboat (CO₂ equivalent)](image)

Graphic 1: This chart explain in % CO₂ eq. the different impacts through the Cycle of Life of standard sailboat. Leitat Technological Centre. 2012.
In this respect, it is necessary and urgent to work on all the productive and social sectors to achieve the necessary balance between the rational and equitable growth of society, productivity and the environment. Specifically in the nautical industry, now more than ever necessary to implement a paradigm shift in the production of products and nautical services which take into account environmental impacts and sustainability of the processes. Never better, now is the time to implement the concept of Eco design to be responsible, excellent and durable with the medium that gives us life and our reason for being: the sea.
2. environmental impacts caused by nautical activity
3. Heading towards sustainable production and ecological
3.1 Introduction

In the progressive development of the project we have achieved a terse Boatcycle diagnosis to analyze, understand and characterize the European nautical industry from a study in reference areas of the Mediterranean sailing with strong Western influences on the rest of the continent and internationally.

Also the need for recycling through nautical boats centers or adapt existing infrastructure to carry out the management of waste in areas nautical criticism. However, the most significant and necessary, is the need to design and build boats more environmentally friendly and sustainable at both the hull and structure and propulsion systems.

On the other hand, the project also allowed us to study how to get a correct disposal (see guide to good management practices is obsolete boats, www.life-boatcycle.com) nautical boats into disuse and understand to what extent is important a good design of the boat to the end of its useful life, make a scrap effective, quick, efficient. The ideal is to reduce the amount of materials used, minimize environmental impacts to ensure that the end of the life of the boat, the percentage of existing products for optimum recovery and improvement in new manufacturing production cycles of new boats is high.

During the study of lifecycle analysis of nautical boats used, we have seen associated environmental impacts throughout the cycle and, above all, that is generated on the environment when they complete their lifecycle. The project has also been useful Boatcycle to hypothesize future scenarios in order to achieve ideal in terms of administrative management and control of boats during life and above all waste nautical generated when the boats have stopped function.

To address all the challenges in the nautical sector is essential that the collective firm confronts the challenge of designing products and nautical services correctly, efficient, ecologically sustainable and also that government supports and encourages them through such measures as regulations, standards and fair taxes, with the aim of strengthening innovation in the new nautical industry we need in the future.

The apparent unsustainability of the current model of consumerism to the limited capacity to which we referred to the planet (The Limits to Growth. 1972. Dana Meadows et.al.), forcing us to reduce the environmental impact of products so using criteria of compatibility and consistency with current limits, with more respectful environment and therefore more social benefit. Thus, the evolution towards more sustainable society is linked to products with low environmental impact: the nautical ecoproducts.
3.2 Re-thinking the marine industry

A shift towards more sustainable society is a complex task. The balance on the evolution of the 12 major environmental problems in Europe presented by the European Environment Agency in late 2010, shows an improvement in environmental policies, but a modest reduction in environmental impacts, taking that there is still significant pressure on the environment and the sea. An indicator of this impact, it is the ecological footprint, which exceeds the biocapacity equivalent in all European countries without exception and that for example in the Netherlands, equivalent to 17 times its total area.

Specifically, the environmental impact of nautical products in the Euro-Mediterranean due to the unsustainable exploitation of natural resources and energy, the generation of pollutants and waste products regarding to the capacity of sea to assimilate due to load limits, coastal and nautical environment in the coast where the activity is generated. These environmental impacts can be either direct if they are associated with the process of production and use of boats, such as emissions, waste generation, the overuse of natural resources and renewable energy on attendance in sensitive natural areas, etc. Indirect impacts are bound to the difficulty of waste disposal at the end of its useful life, as that is the case of boats and nautical boats into disuse.
4. Nautical product lifecycle
4.1 Introduction

The lifecycle of a product is usually complex when you consider that integrates all steps from extraction, processing, purchase and transportation of raw materials, product design, production, marketing, transportation, long phase use and eventual recycling or disposal.

These impacts generally medium to long term and generate a depletion and increased prices for natural resources and deficiencies and impacts on human health and the environment. It is also very important to take into account when designing a product that scales reach assess impacts associated with products, as these can affect a geographical local, regional, continental 0 overall and in the case of direct or indirect emissions of CO₂ and other greenhouse gas emissions. Likewise, the steady increase in the production of products and services in rich industrialized countries to meet a growing and unsustainable consumption causes, over time, a string of serious side effects of significant and increasing. In fact Western countries with an aging population (one in 3 western are between 26 and 49 years) and less than 18% of the world’s population consume in our production activity and 80% of the planet’s resources. Now that’s really unsustainable and especially now that there are countries like China, India and Brazil with important technological capacity further submitted scarce natural resources of the blue planet and will affect their already very violated and delicate ecology.

4.2 Reduce the environmental impacts on nautical and coastal environment

The world population is concentrated in coastal areas of the world and the trend is growing. Currently, 68% of the population lives within 50 km of the coast and coastal seas and their coastal areas receive the greatest number of impacts and pressures resulting from human activity. Faced with this situation of environmental stress in the world and in particular coastal areas, there is opposed an increase in environmental awareness and a willingness on the part of thousands of citizens to address environmental degradation. There is a slow but steady increase actions to improve environmental protection in developed countries and collecting a great need for legal instruments to ensure transparency on the environment. Also forged by generation through spontaneous social NGOs and foundations active systems in direct improvements of the natural environment as well as participatory management, restoration and conservation, example is the project of the Red Silmar (www.silmar.org).

Today, public institutions and businesses are more sensitive to environmental degradation and the
impacts of productivity that affect society. So the rules and consistency of progress are beginning to emerge in the environmental improvement of the various stages of manufacturing a product with the intention of participating in a representative way all stakeholders in the product lifecycle, designers, industrial, employers, consumers and politicians.

From a more global perspective and context of the new century, it is found that the level of integration and respect for the environment by the production sector is a function of the inter-relationships between aspects of technological, economic, social, market, ecological and political. Possible future scenarios are under the different options available, clearly integrating sustainable development model based on responsible business excellence criteria that integrates ecological, economic and equitable green and displays that will last for logic and balance of the parties, even the more liberal and unsustainable dominated by the concept of growth above all, regardless of the limits and system interactions with the parties. As presented to the experts, sustainable development can be represented by a simplified formula: \( DS = i.e^3 \), \( i \) is the integration and the inter \( e^3 \) represents ecology, economy and equity.

4.3 Eco products in the Euro Mediterranean environment

In the early nineties, new approaches appear in Europe in the field of product design with environmental criteria. Later these have been materializing thanks to environmental awareness by consumers and the development of a more stringent environmental legal framework, both the EU and at national and regional scale (there are over 200 standards and directives, among which relations with the European economy and environmental assessments and EMAS).

Result of administrative actions for the implementation of development policies on reducing CO2 emissions, the production sector has adopted structural changes in industrial production (recycling and using cleaner fuels, among other actions), and has obtained significant advances and encouraging, although far from desirable, say for example the current gap to meeting emission reductions under the Kyoto Protocol.

Processes are clearly displayed towards more sustainable actions companies incorporated by defining new and innovative development ideas. This is reflected in its strategy to work for the welfare of consumers, the reduction of raw materials in the production of goods and services, savings and overall energy efficiency in processes or minimization, elimination, reduction, recycling and
reuse waste. The aim of these environmental improvements in products incorporate new values is compatible with current limits, add value to the company to be more efficient and environmentally friendly, generating more profit and social return.

4.4 Development of nautical products more environmentally friendly

Actually we could characterize most products on the nautical market and services generated by the sector, such as items of consumption or use insulated with respect to environmental and ecological environment where they are used and developed. This is because it does not take into account the environmental impacts generated throughout their lifecycle and not internalize the environmental costs associated with the product or service.

Today, there are an important group of nautical products with so-called ecological greenwash. Include all those which have incorporated some minor environmental improvements with a goal to get a good green image and capture leads.

These so-called eco products, which, in its stage of design or redesign, have joined efforts to minimize the environmental impact that is generated in its lifecycle is really short but very significant for the good example they have on the nautical industry. An example of this is led by major multinational brands inboard engines and outboard engines such as Honda, Yamaha, Johnson and Volvo-Penta and others. The first three have complied with the rules of the powerful American agency control of environmental pollution (Environment Agency Pollution-EPA) where Honda leads the nautical engine manufacturing low CO₂ emissions and noise. There is an interesting year after year to assess competition between brands, which one gets the distinctive ecological and efficient engine. In the case of the European brand Volvo’s business strategy has to be one of the most sustainable and ecological world in the production of hybrid nautical engines and lower CO₂ emissions and decibels.

Getting to know that most environmental impacts that cause nautical products during the stages of production, marketing, use and disposal come from a void or poor incorporation of prevention in the phases of design and redesign of products, nautical products currently ecosystems is still at a very early stage.

Increasing the number of nautical products more environmentally friendly and sustainable in the market depend on the evolution and timing of demand for a society that wants to be more sustainable and the necessary cooperation and interaction
among the main nautical: public administration, industry and their representative associations and consumer obviously more responsible and consistent. In this sense and to be more consistent with the process of change towards sustainability and efficiency alternatives in the nautical industry to dispense with the purchase of the product by the selective use of the service or product sharing rent boat type boat.

5. Eco Culture for the construction of the nautical industry
5.1 Introduction

The need for a paradigm shift in social and productive development, access to information and global environmental situation is driving a new industrial culture acceptance limit applies to uncontrolled exploitation of resources. This is the end of a period when the company was an entity carrying out an activity to meet the needs of consumers, without worrying about the environmental impact.

Increasingly, market, product and quality depend on the set of actions developed by the company to bring its consumer. In this sense, the design of a boat echo assumes that the project remains on a single, specific isolated function within a department of the company, but now the product inherently has become the centerpiece of the action business that goes beyond the market and integrates the environment and the concept of society.

This new approach allows a change in business strategy, which, from a conceptual perspective, it means moving from a linear view individual products to a vision of cycle (from cradle to grave) with eco products.

In this context, the set of professionals in the design of an echo can be operated individually product but it is necessary to engage all collectively in the process. Interdisciplinarity, complementarity become the cornerstones on which the new design project of an eco product are structured.

The designer has a major challenge to get a good eco product and focuses on its ability to develop, with creativity, ecological requirements and implement integration work and fit a set of views and knowledge aimed at developing a sustainable product and environmentally friendly.

The nautical industry has historically been faced with the need to design and build functional, efficient and durable. Now, in addition, the challenge for the designer is to create nautical considering organic products to be incorporated the dimension of service for a particular user's cultural typology and integrate the environmental dimension in terms of environmental improvement. The need to create complicity with the responsible consumer before the product is an added value that pays off with a more ecological and responsible for the entire product lifecycle.

Design a green boat is not just thinking about how to select greener raw materials, or as is necessary to select the components to make them easier to assemble to reduce time, labor costs and energy consumption, but also as parts and elements will be more easily removed, recovered and recycled at the end of the life of the boat. We need to promote complementarity between the processes of
5. eco culture for the construction of the nautical industry

production, use and consumption, while, to think about the qualities of materials and products should be recycled and recovered.

Our reflection must focus on these and many other aspects should be incorporated into product design nautical ecological but there is a concept that above all it is necessary to understand and is as follows: the project of designing a spaceboats must be an ecological innovative technology to create value and differentiation in the market and in turn an environmental assessment tool. The design of an eco boat is, therefore, a discipline that involves project after project in key product lifecycle.

5.2 Users and eco boating

In the European and world markets there is a growing demand for products and services that respect the environment. Now companies and large corporations are viewed and valued by consumers and the public, not for its intrinsic value of the product and its quality and service, but also as concerned and involved with the consumer, society and environment. Companies and large corporations know that they are vulnerable to social criticism and that it can weaken your brand against competitive market. The company today is present in our lives as constantly emits information to stand out from the competition, that affects the consumer environment throughout the product lifecycle. The company’s goal is not only to address a market segment, but to take a clear position to make it possible to create a junction point between the consumer and meeting their usual environment and ecology that define the concept of quality of life.

Environmental requirements and regulations have triggered a review of models of production, market policies and the logics of consumption of products and services. The reality that characterizes the market today can not be subjected only to the economic, technological and quantitative, as it has acquired a strong cultural dimension and communicative. This is most evident in the market for eco product that responsibility towards
the environment and consumers together with brand consistency, requires the company appear as an entity that sociocultural values.

Now, the challenge for the new company is in its ability to create products with a meaning, a meaning and a utility-related sensitivity to the consumer and the environment. In this sense, many multinational companies are based its business strategy in this direction. The company Land Rover is known as vehicle brand historically linked to African safaris, now runs its business strategy towards sustainability in the design and manufacture of its products. Land Rover is basing its production and marketing policy in the values of respect for the environment, taking into account the system - a product that directly or indirectly affect the environment. In the future it seems that many nautical companies, now they do some, from the historic Zodiac with Jacques Ives Cousteau projects, through companies like Yamaha and Honda-Nautical -Nautical, the latter already has similar policies and strategies to integrate their development within the framework of sustainability in the field of nautical conservation and the environment in general.

The following actions related to environmental improvement a nautical company is implementing in its design and production centers in Europe and Asia.

<table>
<thead>
<tr>
<th>PHASE</th>
<th>ACTIONS IN ENVIRONMENTAL AMELIORATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>1. Integration of lifecycle.</td>
</tr>
<tr>
<td></td>
<td>2. Systems and processes low CO₂ emissions.</td>
</tr>
<tr>
<td></td>
<td>4. Use of recycled and recyclable materials.</td>
</tr>
<tr>
<td></td>
<td>5. Concept of suproducts recovery.</td>
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<tr>
<td></td>
<td>7. Low maintenance.</td>
</tr>
<tr>
<td>Production</td>
<td>1. Efficient use of natural resources.</td>
</tr>
<tr>
<td></td>
<td>2. Use of greener products.</td>
</tr>
<tr>
<td></td>
<td>3. Energy efficient production systems.</td>
</tr>
<tr>
<td></td>
<td>4. Automated production systems and fast.</td>
</tr>
<tr>
<td></td>
<td>5. Minimizing emissions.</td>
</tr>
<tr>
<td></td>
<td>6. Waste minimization in the production process.</td>
</tr>
<tr>
<td>Distribution</td>
<td>1. Packaging ecological and recyclable.</td>
</tr>
<tr>
<td></td>
<td>2. Require providers to environmental minimum requirements (ISO 14001).</td>
</tr>
<tr>
<td></td>
<td>3. Design of energy-efficient stores.</td>
</tr>
</tbody>
</table>
|             | 4. Management of administrative processes to a minimum paper waste, trans-
|             | port and low water footprint.                                            |
|             | 5. Efficient product distribution by rail or boat.                        |
|             | 2. Quality CSR internally and externally.                                |
|             | 3. Direct interaction with end users for responsible use of nautical products. |
|             | 4. Awareness raising and communication knowledge and conservation of the sea. |
5. eco culture for the construction of the nautical industry

<table>
<thead>
<tr>
<th>PHASE</th>
<th>ACTIONS IN ENVIRONMENTAL AMELIORATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumerism</td>
<td>1. Editing of manuals of good practice for responsible use of marine products.</td>
</tr>
<tr>
<td></td>
<td>2. Permanent information on the web on questions and issues of responsible and efficient use.</td>
</tr>
<tr>
<td>Recycling</td>
<td>1. Information to Own and manage the waste in case of disuse or accident.</td>
</tr>
<tr>
<td></td>
<td>1. System for easy removal and decontamination.</td>
</tr>
</tbody>
</table>

The company must integrate and coordinate with the design of new product eco cultural values and new market demands into shape, social cohesion and environmental compatibility through the production cycle, from design to destruction.

Companies and designers can influence consumers to lead a lifestyle designed, if fashion is a magnificent example of this, but in a less frivolous case of sailing, it is essential to offer better solutions than the preceding and while facilitating responsible products to consumers so they can take lifestyle friendly environment and help to shape and consolidate a healthy and sustainable society.
6. Towards eco sustainable design boats
To reduce the environmental impact of products there are different stages of action. These range from isolated strategies for tackling emissions in the manufacturing process of a product, to more comprehensive and integrated activities such as ecodesign, which seeks to achieve system integration - product, environmental, social and economic. Now we analyze each of the stages that make up the pyramid of strategies for improving the environmental aspects associated with nautical product with clear examples of real activity.

**Figure 2.** Corporate strategies to reduce impacts associated with products, from treatment to the eco sustainable design. Ecodisseny i Ecoproductes. Rieradevall J. i Vives J. Ed. Rubés, 1999.

**i. Treatment**

This would be the most basic level of the business strategy implemented to reduce impacts of products. It is based on the incorporation of environmental techniques for the treatment of emissions in production processes. Examples of treatment in nautical companies is the installation of purification or recycling systems for treating nautical waste, filters to reduce emissions of gases, particles or paint, waste treatment plant solids. They also include the use of external facilities such as incinerators, dumps and treatment plants of special products.

**ii. Recycling and reuse**

This second-level preventive action also focuses on production processes of firms internally or externally and act on their waste products. This gives meaning and function to the stock-products created in different regions of Europe and in Catalonia are driven by the chambers of commerce to promote the incorporation in the productive cycles of certain companies, waste and other companies suproductos to be used as basic materials for the manufacture of a component.

In this case nautical-level requirements in quality, durability and safety required in navigation makes it very difficult for a company to use a by-product or residue to make a boat. Even so there are interesting initiatives in this line that we expose briefly.

- The use of residual glass fibers and resin to make certain parts of RVF in recreational boats either polyethylene or PVC pieces that have been obtained from high quality plastics
recovered.

• In the manufacture of counterweights used sailboats lead recycling or demolition of old houses.

**iii. Clean production**

The aim is to prevent environmental impacts in the production stages. It is of interest definition on clean production according to the United Nations Program for Environment (UNEP). “Cleaner Production is the continuous application of an environmental prevention strategy processes in order to reduce risks to humans and the environment”.

Cleaner Production is based on:

1. Use the best available technologies.

2. Use less harmful materials.

3. Improving the management of production processes with environmental criteria

Use the best available technology can reduce environmental impacts in the vicinity of industrial activity and the risks to the health and safety conditions at work. Cleaner production is an early stage towards eco design, because it sets its improvements in stage of product lifecycle.

For certain industrial products, this is the most important stage of its lifecycle, but it is for most consumer products.

The implementation of regulations such as ISO 14001, EMAS, certification of quality management systems ISO 9001, ISO 14064, PAS 2050 standard and energy audits is really helping to design teams to incorporate environmental improvements in products in the production stage and throughout the product lifecycle.

The effects of actions in the field of cleaner production reported in most companies a quick return on investments due to a decrease in treatment costs and consumption of natural resources and energy.

In the nautical industry company that manufactures Volvo-Penta diesel and gasoline engines for boats and recreational boats of great length, this making a difference with their competitors for their commitment to environmental protection. This fact is reflected in all his actions by our obligation to its customers, end users, employees and community. As a company have a strategy to do everything possible to reduce the environmental impact of its products, both during manufacture and during its lifetime. Contribute to this through proactive environmental programs including the entire company, from development and manufacturing of products, to sales, maintenance and af-
fter sales. Pay particular attention to aspects such as energy efficiency and emissions, the environmental impact of materials at source, the emission of noise, environmental impact throughout the product lifecycle and facilitate the management of waste at the end of its useful life.

iv. Eco design

At this level of industrial activity experienced a significant change and why it happens to observe the actions of environmental improvement in the industrial sector, focusing only on reducing impacts associated with the production process, a vision of the entire cycle product, ranging from the materials used in the process to disposal to reduce resource consumption and reduce global emissions.

There are different ways to define ecodesign: the integration of environmental aspects into product design phase. Reducing the environmental burden associated with the product cycle. Incorporate actions to prevent and minimize environmental impacts associated with the product at the stage of design or redesign. Product environmental improvement in the initial stage of design since its function, the selection of materials more environmentally friendly, the application of alternative processes, the improvement in the distribution, during use and the study of the minimization of impacts at the end of its useful life.

Designing products to meet the real needs of consumers using the right quantity of materials and energy obtaining maximum performance and further reducing its environmental impact. The economic design aims to improve the products in many ways and which are:

- A reduction of component, material and quantity.
- The vast majority of the components are easily identified and recycled.
- The products and components are easy to clean, repair and reuse.
- A substitution of toxic materials associated with the product.
- Acceptance and reuse of all or part of the product in the final stage of their lifecycle by the company.
6. towards eco sustainable design boats

An interesting example is found in the molten salt batteries Zebra Company, which have a lifespan of over 20 years and once disused the company takes care of it for reuse and recycling. This battery has been used in the project Ecoinnomar Sea Foundation to promote a quiet and free navigation of CO₂.

![Photo 7. Molten salt battery high performance navigation Silent electric and CO₂-free.]

v. Eco-efficient design

This stage is reached when further aspect of reducing environmental impacts and achieve the company integrates economic improvement objectives. The concept of eco-efficient design integrates environmental and economic aspects in the design stage with the strategy of creating a higher value to the product. The eco eco-efficient design aims to reduce the costs associated with products and services with reduced environmental impacts and the minimum use of resources at all stages of their lifecycle.

In short is the ability to manufacture products that meet seamlessly in quality, performance and in reducing costs and environmental impacts associated with the entire product lifecycle by reducing emissions and conserving material and energy resources.

Examples of eco-efficient Eco design we have them in the manufacture of polyethylene back-moulded nautical boats. These boats are unattractive, but very expensive economically and ecologically and that can be made from plastic products are 100% recyclable, resilient and color are incorporated into the dough.

![Photo 8. Highly resistant boat polyethylene 100% recyclable.]

vi. Eco Sustainable Design

Highest level achieved in the manufacture of sustainable products.

The design should include the reduction of environmental impacts, a substantial economic improvement and social aspects. Definitions of eco
sustainable design put it this way: the integration in the design of a product of the ecological, economic and equity. Another definition related to the concept of sustainable development would be “the product that meets current needs without compromising resources for future generations.” Also, the echo is defined as integrating sustainable design into product design environmental improvements throughout its lifecycle in a manner consistent with improved economic balance of the product, responsible consumption and sustainable development.

![Photo 9](image)

List of environmental, economic and social future associated with the use of bioresins to manufacture biocomposites.

<table>
<thead>
<tr>
<th>Environmental</th>
<th>Economic</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Improved management of forests and biodiversity.</td>
<td>1. Improving the local economy.</td>
<td>1. Improved integrity and social cohesion.</td>
</tr>
<tr>
<td>2. Reducing forest degradation lower risk of fire.</td>
<td>2. Sustainable forest exploitation.</td>
<td>2. Generation of work.</td>
</tr>
<tr>
<td>3. Fixation and reduction of CO₂ emissions.</td>
<td>3. Enhancement of the primary sector.</td>
<td>3. It promotes sustainable development and enduring.</td>
</tr>
<tr>
<td>4. Renewable raw materials.</td>
<td>4. It attracts investment.</td>
<td>4. Helps to reduce dependence on oil and not associated conflicts.</td>
</tr>
</tbody>
</table>

Photo 9. Surfboard made of bioresins and biofibres.
6. towards eco sustainable design boats
BOATCYCLE PROJECT - Good environmental practices and eco-design for nautical sector
7. Essential conditions for the development of eco boating
7.1 Introduction

Eco design actions that are taken in the firms may lead to important positive economic, competitive, environmental, social and legislative results that increase and magnify over time. But in the short to medium term, the economic benefits that are derived from the improvements the key factors driving increasingly many companies are launched fully on this strategy. Eventually the company that built into their development strategies integrates the concept of ecology, in turn, excellence, efficiency, quality and high competitiveness and innovation, all rising stock markets to meet increasingly demanding and competitive.

There are also other important factors that contribute greatly to introduce environmental improvements in business and Eco design in the manufacture of its products. These factors are associated with the business environment and are as follows:

- The public administration that incorporates in its procurement policy to purchase green or responsible for products and services.
- The new legal framework or environment that is increasingly demanding and responsible with their natural resources and environment.
- The need to adapt to the demands of customers or suppliers who provide quality control systems throughout the product chain and lifecycle.
- Responding to new consumer demands with their attitude to be responsible and consistent with the environment, directs its actions towards purchasing greener products and sustainable throughout its lifecycle.
- Finally, the shareholders of the company plays a leading role against the activity of your company and can force a significant change in strategy towards the design and production of products and services more environmentally friendly and sustainable.

7.2 Other key factors
7. essential conditions for the development of eco boats

a. Technological framework

It stands to reason that any process of change in the way of manufacture and produce, not only should be associated with a desire to do better, but must also be technically feasible. In this regard over the past 20 years the evolution of software, hardware and internet developments have dramatically improved the possibilities of information technology and the thinking of society. The saying “If you think your reality changes differently” is accurate and we define a horizon of creativity and infinite possibilities of improving the thinking and design things to achieve a more healthy, environmentally friendly and sustainable.

Without going any further, to integrate a set of industrial components available on the market to transform a pleasure boat powered by a diesel engine, on the other low-emission electric motor and a very competitive price, is largely due to the changing technology and the ease of transmitting that knowledge exists across the network.

The nautical world needs necessarily be converted to sustainable through the world of ecology, eco design and eco products. As already mentioned, the sector has experienced, thanks to computers and new technologies, an evolutionary process of continuous improvement of manufacturing processes and design, reaching excellence in aspects of product functionality and quality. But then has not incorporated, so far, concepts of sustainability in an integrated way in the design plans and one of the main reasons is that it did not need.

Today the economic adjustments, the competitiveness of Asian markets and the environment dazzle a new horizon for the nautical industry that focuses on the design and manufacture of more environmentally friendly boats, low maintenance, high efficiency and energy functional (Report on Marine and Nautical Sector- http://www.lucintel.com & Strategic Report by Brunswick Corporation (BC - Anual report 2011).

Economic development initiatives in the company, is being favored by the creation and development of instruments specific work in this field,
as the MET matrix (Rieradevall J. et al. UAB - Icta) showing the environmental impacts (consumption of materials, energy consumption and toxic emissions) associated with each stage of product life-cycle. Also, the evaluation systems design change or lifecycle analysis (LCA) are ideal instruments for work within the framework of this strategy.

Life cycle is a term created by environmental experts have to quantify the environmental impact of a material or product from which is extracted from nature until you return to the environment as waste or recoverable by-product. In brief we can say that is a systemic process which consume natural resources and emit waste. LCA is a technique to fix the environmental aspects and potential impacts associated with a product and includes an inventory of relevant inputs and outputs of the system while assessing the potential environmental impacts associated with these inputs and outputs. At the end are interpreted the results of the inventory and impact phases in relation to the objectives of the study according to the UNE-EN ISO 14040:2006 and EN ISO 14044:2006. The ultimate goal of LCA is to achieve a reduction in consumption of materials, energy and emissions to the environment, applying the improvement ideas that arise in the evaluation and interpretation of the analysis.

The life cycle analysis is divided into four main stages:

- Defining objectives and scope.
- Inventory analysis.
- Impact assessment.
- Interpretation.

There is also analysis of simplified lifecycle (ACVS), application of LCA methodology to arrive at a rough estimate, which are known in advance the essential aspects, covering the entire lifecycle but superficially followed by an assessment of impacts synthetic and reliable results. Tools are very useful and powerful software to simplify the arduous task of making a study of lifecycle analysis, these are some of them: ProMES; ACL manager and EcoScan.

In the study of a stroke we can determine the need to incorporate so-called clean technologies in the production phases, allowing better address the challenges facing the limits that must be performed on natural resources and energy. The selection of material of less environmental impact are also determined by analysis of the lifecycle.

Currently, other technologies exist to improve the products they are designed to facilitate the reduction or elimination of toxic materials, use of recycled materials or incorporate new energy efficient technologies in production. Also avai-
7. essential conditions for the development of eco boats

lable in auto CAD tools allow manufacturers the components or materials of the final product easier to sort and reuse (easy separation of the different material components). An example of this in the nautical industry are numbered barcode or specific nomenclature of all the plastic components of a semi-rigid boat or air that are produced in series.

b. Regulatory framework

During the past 25 years the EU and its actions leading to innovation and sustainable development have adopted environmental policies through the creation of a new legal framework and financial support to the productive sectors that adopt such policies. In this sense it has enhanced the cooperation between the public and private sectors through pilot projects in the technological environment in the R & D programs of the European Union. It has led to companies that respect the environment by purchasing green: government contracts set primarily with companies that employ advanced environmental policy (ISO 14000, EMAS, etc.). In public tenders integrate environmental specifications and promote direct payments, tax exemptions or other mechanisms that favor greener procurement of services or the purchase of eco products. Another factor adjustment in environmental issues is the homogenization of environmental legislation in the States of the European Union. The clearest example is the EU directives, which favor the approval of a market with the same environmental criteria and avoid unfair competition among states to minimize the application of its policies of environmental protection. In the past 20 years they’ve published more than 200 directives (Packaging Law, Waste Management Law, EMAS, European eco label, etc., The Multifunctionality of Green Infrastructure - March 2012 - European Commission).

Also, the specific software development environment aimed at increasing environmental prevention as the Sixth Environment Action Programme of the European Union from 2007 to 2013. The purpose of these programs is to address the challenges we’re facing today in the environment where the focus is strictly to be overcome and replaced by a legislative strategy. This approach should use different instruments and measures to influence the decisions of businesses, consumers, policy makers and citizens.

A key element of European legislation on Recreational Boats Directive 94/25/EC is to classify boats and establishes safety requirements for design and construction, and environmental requirements in relation to greenhouse gas emissions and engine noise (limits introduced by Directive 2003/44/EC) in order to contribute to environmental protection and health and welfare of citizens. The Directive 94/25/CE defines recreational boats as boats of any kind, regardless of their pro-
pulsion from 2.5 to 24 m. in length. The Directive also includes exemptions from the application of these requirements, design and construction requirements. This Directive, which combines the promotion of competitiveness with environmental protection and citizen, was introduced gradually and is fully in force since December 31, 2006. The directive also requires manufacturers of boats and motors to keep a technical file with all relevant data, and to officially declare the compliance of your product with a Declaration of Conformity and CE marking which integrates as well as to inform user safety and maintenance through use of the manufacturer and use the user manual.

Another action focuses on the promotion of waste minimization programs and introduction of improved technologies compatible with the environment enterprises. Examples are the programs of the Ministry of Industry in the field of promoting eco efficiency of production processes. The European Union, aiming to increase its competitiveness, has chosen to encourage the development of products with less impact and this has created a set of strategies and legislation that affect pro-

<table>
<thead>
<tr>
<th>COMPARATIVE TABLE ON THE PROCEDURE FOR HANDLING A DISUSED VEHICLE AND A DISUSED BOAT</th>
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<tbody>
<tr>
<td>NORMATIVE OF REFERENCE</td>
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<tr>
<td>AFFECTED</td>
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<tr>
<td>OPERATIVA</td>
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<tr>
<td>CERTIFICATE OF DESTRUCTION</td>
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</table>
duct design. In 2005 established a policy regarding the products that use energy and puts limits on their consumption. In 2009 a new policy increases with these requirements to products they are using energy or in connection with it. Thus, for example television should reduce energy consumption in stand-by of a watt to 0.5 watts. The Spanish government policy in particular the Royal Decree (187/2011) published in the BOE in March will not allow any vendor to incorporate the CE mark to products which do not comply. In short, the European Union is definitely is pushing us to do eco design.

Finally, the empowerment of national and European eco-labels as an element of standardization of the market of “green” and environmental information to consumers on eco products.

The overall policy framework has influenced all European production sectors directly or indirectly in the automotive sector is clearly demonstrated. But we can say that the nautical industry has been somewhat on the sidelines for now and save some more innovative projects, business initiatives that fall decisively in the context of making products more sustainable and ecological environment.

Photo 10. Wooden yacht designed on ecological concepts. Designers: Simone Madella and Lorenzo Berselli.
c. Economic framework

In the economic context the most significant factor for the development of products compatible with the environment has been changing view of the industry and their employers, has grown from the opposite attitude and away from the industry to be an integral factor. Other factors such as better training in environmental issues, transversally, acquire all the business professionals (workers, technicians and managers), together with the new information technologies, software, the emergence of new markets looking for greener products and sustainable reduction in costs associated with the introduction of technological improvements available, have favored this change.

The economics that help incorporate environmental improvements in products include:

- Lower costs associated with the application of clean technologies, hardware and software, as well as the best available technologies compatible with the environment.

- Reduction of fixed operating costs of companies to incorporate emissions minimization programs, reducing the consumption of raw materials and energy savings.

- Indirect improvements in the safety of domestic and foreign companies. This reduces the number of accidents and facilitates environmental improvement of environmental conditions of workers.

- Improved corporate image (improved quality, safety and environment) and value of differentiating their products on the market eco goods and services (functionality, durability, easy maintenance and so on).

- Increased market for green products in Western countries.

All these factors are stimulating industrial competitiveness with the corresponding process, innovation and investment. It is observed in the European market a shift towards consumption of more environmentally friendly, thanks to a change in consumer values, which is embodied with increasing participation in recycling programs in all European regions. It would be quite desirable to head up the European nautical industry for their experience, maturity and innovation in the design and construction of boats, a significant change in the nautical industry production to ecology and sustainability.

A relevant example in Europe is the action of the FIN (French Nautical Industries Federation) that promotes several actions aimed at introducing environmental concerns throughout the boat lifecycle, in particular through its Bateau Bleu Pro-
7. essential conditions for the development of eco boats

gram. In early 2009 they created an Association for Responsible Ecological Sailing (APER) whose mission is to organize the launch of a French network of centers for the dismantling and recycling of yachts that have reached the end of its useful life.

Finally, the development of a market for eco products in the global nautical depends on the fact that trade agreements regulate or control that environmental and social aspects are included as primary foundations for their industrial policies and market.
8. Good practice and ecodesign for the nautical industry
During the past 30 years the Euro-Mediterranean nautical industry has grown and has established a very significant and coming to have a strategic value to economic and social level very remarkable in many coastal areas of European and Mediterranean countries. This growth has not only been in business volume, which has grown on average by 5.5% annually through 2007, but now represents a significant business community, professional, cultural, sports and tourism unavoidable for our environment promenade.

To get an idea of the importance of the European nautical industry in terms of output, jobs and revenue and other data of interest is shown in the following table:

<table>
<thead>
<tr>
<th>Nautical sector on data - Half of the decade of the 10</th>
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<tbody>
<tr>
<td>Italy</td>
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<tr>
<td>Nautical industry workers</td>
</tr>
<tr>
<td>People per boat</td>
</tr>
<tr>
<td>Boatyard workers</td>
</tr>
<tr>
<td>Turnover in million euros</td>
</tr>
<tr>
<td>Production - units</td>
</tr>
<tr>
<td>Coastline</td>
</tr>
<tr>
<td>Lakes Area in km²</td>
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</table>

Data from Fundación Mar, ECOTEC and EU. 2010.
All this volume of boating activity in the Euro-Mediterranean environment obviously generates a whole range of significant environmental impacts on coastal and nautical environment that should be quantified to determine its scope and size. From this information responsibly and love to see businesses and government users could act accordingly and work more sustainable and environmentally friendly to minimize environmental impacts and risks to all involved on the quality of the nautical environment, resources natural climate change in general.

Realistically, we can say that we have much to do and need to act now, with all instruments and actions that could improve the situation. In this respect, demonstration projects and initiatives as BOATCYCLE aims at helping to reduce the environmental impact caused by the nautical industry on the environment. Under the project we worked, among other things, to study and assess the lifecycle analysis of the most representative nautical boats present on our shores. From the information we’ve obtained, the mission has been to evaluate the critical points in the lifecycle of nautical boats where the environmental impact is the most important. It is observed that the responsible management of the boat at the end of its life and, as the life-cycle studies have shown, is a key to significantly reducing the environmental impact of boating along their entire life. The following drawing is meant in a significant but not equivalent way, those environmental impacts associated with different life stages of a sailboat.

Posing innovative tools and systems to the nautical industry in order to improve natural resource management, use of organic and sustainable materials as well as waste management is fundamental to be kinder and consistent with the medium that gives us life, the sea and its environment. This process should be done by changing our way of thinking. If you want to change things, you need to think differently, so we can change reality for the better. Re-thinking the design and manufacture of a product or nautical service, the way of use, maintenance and preservation, up to what and how to do better at the end of its useful life.
Table 1. Contribution of life stages for all impact categories from sailboat, Leitat Technological Centre.
8. good practice and ecodesign for the nautical industry
9. Application of good practices in the nautical sector
BOATCYCLE PROJECT - Good environmental practices and eco-design for nautical sector

9.1. Nautical users

Nautical users are by far the major agents of change towards more sustainable and environmentally friendly boating with the environment in general and the nautical environment. Studies on habits carried out by consulting firms for big brands show that 70% of Europe’s population but chose to purchase a product or service that is friendly to the environment if they maintain the price and quality rather another non-organic. Of this group 60% green consumers also would agree to report the cost of the product in conservation of the environment and biodiversity (United Nations Economic Commission for Europe (UNECE) Statistical data base - 2010).

Consumer power responsible to the environment is powerful and is closely related to product quality, innovation and excellence that the consumer wishes the mark which is attracted. Similarly, the ecological nautical consumption and responsible services to the nautical environment are best assessed as the sensitivity of the company that makes the activity sustainable or less harmful to the environment is also reflected in the quality of service.

a. Good practices for a buyer

Before you buy a product or service yacht should know:

1. If the company has an environmental quality certificate recognized and valid.

2. If the brand is known for its environmental sensitivity and whether this is reflected in the product or service you wish to purchase to be as environmentally friendly and sustainable with the environment throughout its lifecycle.

3. Calculate the time of use you will realize the boat and if consumption and environmental costs of maintenance are sound and sustainable. Requires the seller to guarantee maintenance costs and consumption.

4. Ask yourself about the idea of boatsharing before buying a boat. Environmentally it is much cheaper and infinitely more economical for your pocket.

5. Acquire safe nautical collection and integrate the professional management of your boat at the end of its useful life.

6. Learn about the legal and professional activity of nautical waste managers and their location.

7. Use, if possible, nautical ports and infrastructure with environmental quality certifications recognized and have the necessary facilities for waste management.
9. Application of good practices in the nautical sector

8. Check that all management of your boat either mooring or dry storage in winter is as environmentally friendly and sustainable manner.

9. Learn well and acts accordingly is your responsibility to the environment.

b. Good practices for sailors

1. Be respectful to the nautical environment and always sail with maximum efficiency and safety.

2. Manage your waste on board and in port lagoons Toss them in the proper containers.

3. Check for leaks of fuel and bilge water are managed properly for the port based on current standards and under the MARPOL.

4. If you visit natural areas of high ecological value your presence and attitude are important in maintaining environmental quality.

5. Anchors in areas that are accustomed to it and if you need to anchor on the seabed intended to be the minimum possible impact on sandy bottoms and never on habitats or protected species.

6. Hire maintenance and mooring services that are respectful to the environment.

7. Make a navigation-friendly and sustainable to nautical environment through the efficient use of natural resources, energy conservation and fuel.

8. Make a good general maintenance of your boat so it will be more efficient, pollute less and the risk of accidents will be reduced.

9.2 Manufacturing companies

As we have seen in much of the document, the productive sector of the nautical industry is at a crucial time for a change of direction if they want to secure their future. All scenarios and factors of influence in this sector have changed and so they have to adapt to it or die in the attempt.

The environmental quality of our coasts and nautical waters does not improve, climate change is a clear indicator that we are not doing things as we should. The latest reports from the European Union (EEA Annual report 2009 and Environmental statement 2010) environmental issues concluded that the quality of our ecosystem does not improve. The dependence on fossil fuels aggravate the environmental situation in the world and stressed that the global economy, in turn, is increasing the price of raw materials, increasingly scarce. This economic model suffers from exhaustion within a European welfare society costly to maintain and blatantly aging.
It is rhetorical to say that the solution to the crisis passes through innovation, ecology and diversification of international markets. However, environmental legislation is becoming more demanding and will soon be determined in a transverse and most direct way to manufacture the products and the impact they have throughout their lifecycle. Moreover, and as seen above, the consumer is now more responsible with what you buy and its attitude to environmental factor in the products is increasingly important. Against all of these circumstances we propose the following good practices.

**a. Good practice for manufacturers**

**i. Design Phase**

1. Any new idea or project proposal must be analyzed and nautical raised taking into account the environmental, social and ecological arising throughout its lifecycle.

2. The manufacturer has the responsibility and the need to propose the creation of new products and services that integrate from the beginning the concept of Ecodesign.

3. Promote creativity, innovation and efficiency in the context of eco design and ecoproducts in forums, symposiums and fairs nautical.

4. The basic criteria are:
   
   1. Low production costs, implementation and energy consumption during use.
   
   2. Reduction of environmental impact throughout the product lifecycle.
   
   3. Highly accessible by people and communities of the Third World and developing countries.

   **ii. Sustainability and consistency in the production process**

   1. Incorporate new strategies and corporate policies from the base of optimal treatment and recycling, incorporating gradually and resolutely new steps up to the level of sustainable eco design. Certified to ISO 14006 is an excellent challenge.

   2. Prioritize the use of raw materials with low environmental impact, raw materials with eco-labeling (EU Ecolabel, DGQA, Nordic Swan etc).

   3. Establish manufacturing systems minimizing the cost of natural resources and energy.

   4. Build or manufacture products under the criteria of consumption with energy-efficient, low maintenance over the life, besides facilitating
9. application of good practices in the nautical sector

the decomposition of the boat, and optimal recovery at the end of its useful life.

5. Select suppliers that develop an active policy towards cleaner production or eco-efficiency. In addition, to monitor sustainability throughout the lifecycle, it would be desirable to ask the supplier of environmentally responsible products or services related to manufacture.

iii. Transparency and CSR

1. Display the future the need to manage efficiently and eco boat at the end of its useful life and actions by establishing partnerships with public and private agents to prevent.

2. Be consistent in implementing the Directives on waste and emissions throughout the lifecycle of boats.

3. Promotion and creation of consortia and waste management organizations specializing in the nautical industry, in addition to the efficient and professional, give more value to products and improve recycling in the sector.

4. To promote Eco design and eco-products in the sector through companies nautical nautical associations, federations and universities and R & D through bilateral agreements and financing systems incorporating such “project finance”.

5. Provide product knowledge or nautical service by the owner or temporary user in order to improve its usefulness, efficiency and environmental risks and prevent accidents.

9.3 Nautical ports and other facilities

The nautical ports facilities are places where boats are moored for different purposes, namely parking, maintenance or get repaired. These facilities are diverse and range from mooring buoys and fields of floating marinas to different sizes and shapes, dry marinas and garages converted into boats stores. The long and complex life of a nautical boat, can reach an average of more than 15 years, constantly interacting with these facilities generate environmental impacts and diffuse large amount of waste to be managed. It is thus crucial and essential to establish systems of good environmental practices. This is the case of the Clean Marinas initiative under SUDOE project (2001-2005) between France, Spain and Portugal, from which other initiatives were launched more modest and localized, but very important through the implementation of EMAS and ISO 14001.

a. Good practice for other ports and sailing facilities

1. Develop and implement a system of port management and non-permanent sailing facilities to ensure minimal environmental impact on
the nautical environment.

2. Implementation of Environmental Management Systems according to the European regulation EMAS or ISO 14001 International Standard.

3. Manage efficiently the waste nautical by specific facilities and develop services to meet user requirements involving environmental risk and especially in the filling of fuel tanks or other maintenance operations.

4. In areas where no permanent mooring buoys and other fields of mooring systems, it is important that the installation of anchor is designed to avoid environmental impacts on the seabed or ecosystems that are in their area of influence.

5. To promote cooperation, participatory management and training among the different agents in ports and / or nautical facility.

6. To disseminate information to users on the management model adopted and suggest direct cooperation and participatory environmental management.

7. Permanent sensitization and training for agents capable of decision in the nautical and port.

8. Raise awareness among users on the proper use of the boat and the necessary respect for the nautical environment and to encourage action for the active conservation of the nautical environment.

9. Promotion of infrastructure and equipment for the reduction and prevention of nautical pollution and port.

10. Agree with the nautical industry in general and public administrations a transverse view of the nautical environment and ecosystem and the sailing world, with the goal of being more sustainable and active conservation action in the sea.

11. Establish contingency plans for prevention and intervention in case of abandonment of boats and / or in case of accidents or risk prediction.

12. Establish management agreements with centers and authorized specialist waste treatment and accept the efficient management of boats sit idle and waste.

9.4. Nautical service companies

In the context of nautical utilities include an important group within the sector from nautical workshops, boat transport companies, travel agencies, retailers, importers, insurance, nau-
tical and diving schools, boat designers and accessories stores between other. Analyze each of these subsectors nautical and provide good environmental practices is complex and difficult, but there are general approaches to environmental context level, not less important than are common and can provide good ideas and best practices. It is very important that this diverse group that supplies the nautical industry multitude of services can understand that its activity also has negative impacts on the nautical environment.

a. Best practices for nautical services sector

1. When designing or making a trade or service for the nautical industry will be necessary to consider, from an environmental perspective, the weaknesses and threats that may affect the environment and security. It should work to establish corrective measures or systematic improvements in all processes and services to ensure maximum safety and minimum environmental risk.

2. To form, acquire knowledge and train company personnel on the basis of the environment and environmental management systems and quality in order to understand the importance of working to implement actions of Ecodesign, eco products and ecosystem services, besides being more competitive in the market.

3. Companies working in the maintenance of boats and must manage hazardous special waste and must acquire proper training and permits that allow them legally to the effective realization and quality of that activity outside the workshop.

4. Being certified to ISO 14001 or EMAS regulation is an excellent action and commitment to the environment.

5. Tourism enterprises that generate general boating activities by the sea and the coast must calculate the environmental impact on the development of the tourism experience and assess the capacity of the environment and foster an attitude of respect and active conservation participants.

6. Establish management agreements with centers and authorized specialist waste treatment and accept the efficient management of boats sit idle and waste.

9.5 Public entities

Public officials are key elements in directing the policy / strategy given in the case of the nautical industry and, pun intended, should come to fruition. As discussed earlier in this paper, both the European Directives have the mission to promote cohesion and equitable legislation of member sta-
tes, such as the transposition of these directives in existing laws or new crib that is generated in each of European countries, as well as new policy initiatives in environmental and waste management, we can say that they have arrived late and the great evil in the entire nautical industry. While the management of waste nautical in marinas and nautical workshops is carried out, usually very optimal, the great sin of sailing still resides on the impact generated during manufacture for life and when the boat enters into disuse. Against this is important to note that good environmental practices must also come from public administration, apart from legislation and monitor compliance with laws, you can also through tax systems efficiently regulate the various sectors social and productive. Let us give some useful suggestions for improving good practice in public administrations across Europe who have expertise in waste management issues, environment and navigation.

a. Good practices for public administration

1. The great disparity of skills that the public takes on the nautical sports, recreational, and the complex situation of EEZ boundaries in Europe and in particular the Mediterranean coast determines the need for order and judgment to environmental regulations, best practices in coastal boatping, liability for accidents and waste management.

2. It is necessary to adapt existing regulations on waste management to the reality of integrating nautical industry boats that reach the end of its useful life.

3. Establish a national census of active and dynamic nautical boats from which to effectively monitor the status of the boats, their location and activity. This census should be integrated into a European network of censuses that are updated periodically. This is an essential management tool and useful for management and planning needs.

4. Promote the adaptation of infrastructures for the management of boats in disuse or creating specialized recycling centers of nautical boats in the most deprived areas and establish regulation systems which are proper and just to activate the activity of recycling as a process with a good commercial feedback in order to avoid boats abandonment and boost recycling business in so doing.

5. Promote R & D initiatives within a framework of sustainability for the nautical industry by promoting the production sector level tax, fiscal and public aid. So, buying green products or services and more sustainable should be desgravada of taxes, which are more competitive in the market, and also be leading in public contracts to purchase equipment and nautical services.
9.6 Waste managers and boats sailing out of use

Managers obsolete nautical boats themselves are not, rather they are authorized waste management in general engaged in managing specific boats obsolete. The nautical workshops are considered legal in most European countries, within the category of repair and there is a special category that allows them to manage sailing boats out of use beyond using the same systems and management processes I would perform for a car, motorcycle or tractor.

As already discussed the situation is serious because sooner or later the boat nautical 6 million we have in the Euro Mediterranean area, sooner or later, finished their useful life and will become a hazardous waste to be managed properly. Faced with this situation what are the recommendations and best practices that we propose to waste managers and boats sailing out of use to consolidate his career in the nautical industry and also perform their jobs better.

a. Good practices for waste managers

1. In spite of not currently having specific regulations and administrative support to invigorate the market for management of boats not in use, is an activity that in the medium and long term, it will be necessary. It is therefore advisable, within the law, further progress in these activities and improve professional level of knowledge, training and employee training, acquisition of specialized machinery, quality service.

2. Promote from the recycling industry, coastal and nautical tradition synergy with the consortia and associations of recyclers to join forces to establish plans and profitable business strategies in this area of high strategic value and potential in the euro area Mediterranean.

3. Establish standardized work systems and protocols that allow for management of disused warehouse in the area of collection, pre-treatment, transportation to the facility, deposition zone decommissioning, decontamination, dismantling, sorting of recoverable waste, waste management non-recoverable and disposal, etc. Certification to an ISO or EMAS environmental quality is an excellent process to get good results.

4. It is necessary to make an internal document destruction of the boat which shall be signed by the owner and subsequently should be sent to the captaincy nautical origin. After the destruction document must be filed due to internal control of boats destroyed and that, in future, could be transferred to the general record of boats destroyed managed by the government.
10. Conclusions
This compendium of best practice essentially seeks to bring the reader closer to a vision of the nautical sector, innovative and open participation. This is achieved from a simple and pedagogical assessment which represents the vision of a lifecycle analysis and, from there, you value it generates impacts on the environment and the sea. For the competitiveness of firms in markets increasingly demanding, it is important to develop the ability to forecast trends in society and markets. It is also conclusive and should be looked at trends in “green” or environmental consumers and this has become a necessity for companies to introduce changes to their products and services to meet those demands. So follow good environmental practices from the first sketches of the design of the boat or nautical product, will depend largely on the goodwill of other environmental processes.

Concepts such as Ecodesign, eco-friendly product and integrate innovative ideas that make it possible to move towards a more eco obviously nautical world. The study of the paper also concludes that the complexity of the sector is important and that to achieve significant environmental improvement and plausible it is essential that each of the parts of the industry and users, manufacturers, management and recycling companies, among others, are consistent and responsible with their actions and act decisively in the same direction. We can also finalize that, today, we are

at an early stage of a change in the sector, determined by the crisis, conclusively define their future that is almost forced to converge towards innovation, energy efficiency, sustainability in the use of raw materials and respect for environmental conservation.

Finally, will the public in concert with the nautical industry that will define a coherent and effective policy that can interpret the reality of sailing. It is therefore necessary to establish lines of action faster and smarter to get a qualitative leap and improve the ecological functionality and competitiveness of the European nautical industry of the future.
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