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REVIEW OF POTENTIAL DIFFERENTIATION MECHANISMS TO ADDRESS POLLUTION FROM LAND-BASED INDUSTRIAL SOURCES IN THE MAP COUNTRIES

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Glossary

Acronym	Definition
BAT	Best Available Technique
BATNEEC	Best Available Technique Not Entailing Excessive Costs
BB	**Baseline Budget**: Country total amount of releases for each pollutant targeted on SAP, with reference to the year 2003.
BSR	Burden Sharing Rules
DA	Differentiated Approach
EF	**Emission Factor**: The estimated average emission rate of a given pollutant for a given source, relative to units of activity
ELV	**Emission Limit Value**: is the maximum allowable release of a substance from an industrial operation to air, water or land. It may be a concentration limit and/or a maximum load for a given period in the discharge stream. ELV can be derived from BAT or EQS.
EQS	**Environmental Quality Standards**: value, generally defined by regulation, which specifies the maximum permissible concentration of a potentially hazardous chemical in an environmental sample, generally of air or water.
IPPC	Integrated Pollution Prevention and Control.
LBS	Land Based Sources Protocol
MEA	Multilateral Environmental Agreements
PNEC	**Predicted no-effect concentration**: An ecotoxicological measure for multiple species systems. It can be defined as the concentration below which a specified percentage of species in an ecosystem are expected to be protected.
SAP	Strategic Action Programme to Address Pollution from Land-based Sources

1. Introduction

1.1 Background

The Contracting Parties to the Barcelona Convention in their 14th meeting in Portoroz (2005) requested the secretariat to assess the feasibility of the implementation of burden sharing principles to address land-based sources of pollution in the region. The MEDPOL prepared a preliminary assessment which was presented to the national MEDPOL coordinators and national experts meeting in Durrës, Albania, last 1-3 June of 2006. As an outcome of the meeting, it was concluded to continue working to elaborate a differentiated approach with a view to its application and, to this end, to establish a Working Group to discuss technical and policy issues, as indicated in the Terms of Reference (ToR) contained in the Annex of the meeting report [27].

The main task of the Working Group will be to propose how to apply the differentiated approach and to explore their implications. Accordingly, the following subjects are expected to be addressed: the nature of measures, information requirements, and how to use the information to establish the relative position of the parties with respect to their contributions for the pollution load and their capacity to abate.

1.2 Objectives and scope

This main goal of this document is to provide to the Working Group relevant background information on the potential mechanisms for a differentiated approach. In particular, the document deals with the following subjects:

- Nature of measures: identification of different types of measures to address pollution from land based sources, and potential mechanisms to combine measures.
- Mechanisms for differentiation: review of potential mechanisms for a differentiated implementation of measures, previous experiences, and potential implications.
- Information requirements: identification of the main information requirements and data availability to enable the implementation of the different measures and differentiation mechanisms.

This report focuses on industrial land based sources of pollutants.

2. Nature of measures to address pollution

As stated in the Terms of Reference (ToR) of the Working Group on Differentiated Approach [27], one of the main subjects to be discussed previously to the potential differentiation mechanisms, is the nature of measures that can be proposed to address pollution from industrial land based sources. Accordingly, in this section a description of the main identified measures is included, as well as some criteria which could be used to combine and further develop the specific measures to be adopted.

2.1 Identification of measures

Many different measures can be adopted to address pollution from land-based industrial sources, but in general terms, two differentiated nature of measures can be identified, depending whether the focus is devoted to the reduction of the total load of pollutants entering the environment (*e.g. kg of pollutant per year*), or whether actions are focused to ensure that discharges do not exceed the capacity of the environment to absorb pollution,

which could lead to dangerous levels for the environment and the human health. All measures are in fact related by the common goal of protecting the environment and the human health, but their adoption has different legal and technical implications. Taking this into consideration, and as a classification or list of the nature of measures has not been identified, for the purposes of the Working Group measures have been differentiated as shown in Table 1.

"*Targeting load reductions*" (A) includes those measures where a specific target is set to reduce the load of pollution (usually in %). Within this category, two types of measures can be differentiated: reduction of the total load against baseline emissions (A.1), or reduction of a % of the release intensity (A.2). The first type of measures is the one currently adopted in the SAP, and has also been proposed in other multilateral environmental agreements, normally dealing with global and trans-boundary air pollution, like the Kyoto Protocol to reduce total loads of greenhouse gas emissions. Regarding measure A.2, reducing the release intensity, it has been used in voluntary agreements involving specific industrial sectors, or as an indicator to observe the effect of environmental policies, but not so often as a target itself, probably because of the difficulty to define an 'optimum' level of release intensity. However, this latter approach is taking a growing interest because of the underlying concept of 'convergence' (for example, in industrial standards among countries).

"*Ensuring Environmental Quality Objectives*" (B) includes also two differentiated measures: enforcement of Emission Limit Values (ELV) (B.1), and achievement of Environmental Quality Standards (EQS) (B.2). Both measures are related with preventing levels which may pose a risk to the environment and human health, but B.1 (ELV) is focused on the source of releases, and B.2 (EQS) focuses on the state of the environment. B.1 would imply to determine at regional level reference ELV for specific pollutants in a range of sectors, and transpose them into national legal frameworks (this is the common procedure in the European Union), whereas B.2 implies to determine EQS for specific pollutants in different media in the Mediterranean Region, and ensure that measured levels are close to these EQS. The difference is that EQS can be achieved by a combination of actions, like enforcing ELV to all facilities, but also targeting load reductions in specific highly industrialised areas, where compliance of ELVs may not be enough to ensure the achievement of EQS in the local environment.

Table 1 Some measures that can be proposed to address pollution from land-based sources.

	Nature of measure	**Possible measures**	**Short description**
A	TARGETING LOAD REDUCTIONS	**A.1** Reduction target (%) against baseline total emissions	A target is proposed to reduce total loads for a given substance, e.g. *50% reduction of Hg loads* (in Kg/yr) in the Mediterranean region (as currently stated in the SAP). The target is proposed against a baseline year, e.g. *national emissions of Hg in 2003*, and to be achieved by a given period of time (e.g. *by year 2015*)

	Nature of measure	Possible measures	Short description
		A.2 Reduction target (%) against release intensity (convergence)	In this case, the reduction target is relative to an 'optimum' emission level or release intensity. This can be determined on a sector basis according to the adoption of Best Available Techniques (BAT), e.g., *50% reduction of Hg emissions above the BAT emission factor in the cement industry*.
B	ENSURING ENVIRONMENTAL QUALITY OBJECTIVES	**B.1** Enforcement of Emission Limit Values (ELV)	To set Emission Limit Values (ELV) (*e.g. maximum allowable emissions (g of Hg/m^3 wastewater)*, for specific industrial operations), to be enforced at national level. The same ELV would be expected to be applied to all industrial operations in the Mediterranean Region.
		B.2 Achievementof Environmental Quality Standards (EQS)	To ensure that levels of pollutants in the ecosystem are close to Environmental Quality Standards (EQS). EQS are those values which determine the maximum allowable concentration of a potentially hazardous chemical in an environmental sample (water, sediment, biota), e.g. *'X' ng of Hg / gr (dw) of sediment*. Previously, EQS need to be determined for the Mediterranean Region.

Previously to further describe the above measures, it must be pointed out that other measures have been identified, but they have not been included in the review presented in this report for several reasons:

(a) Phase-out of some chemicals: to forbid the production and use of some substances or chemicals that are considered to pose a high risk to the environmental or human health. This would be equivalent to a load reduction (A) where the target is 100% reduction of releases. This measure has not been considered because it is expected to be rather defined at a broader international level (e.g. the Stockholm Convention). The scope of action at the Mediterranean Region could be to propose to international conventions for the inclusion of certain chemicals that are of specific environmental concern in the region.

(b) Reducing risk to human health and the environment: to reduce human exposure to high levels of contaminants and reduce risk on ecosystem. To identify those areas posing a

major risk and hence with a major priority for action, scientific based risk assessment are required, which are currently hardly available. Furthermore, this measure is conceptually close to those included in "ensuring environmental quality objectives" (B).

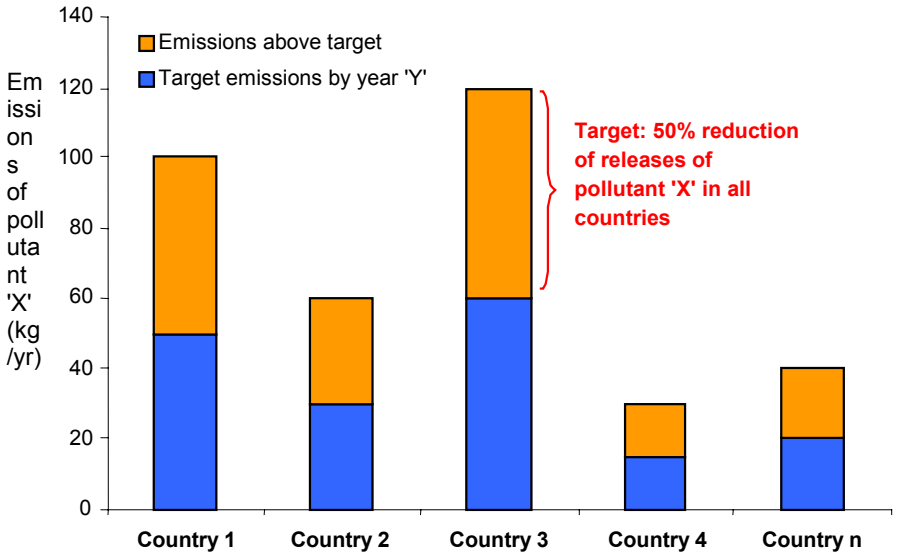
(c) Intervention on hot spots: to focus actions on those areas identified as hot spots. This measure is in fact complementary to all the previous ones, as it basically defines the geographic scope of action where to implement the different types of measures: load reduction, enforcement of ELV, achievement of EQS, reducing risk, etc. Only clean-up activities (land remediation, removal of stockpiles of chemicals, dredging, etc.) could be considered of a different nature, but the focus of this report is on measures to address releases of pollutants from current industrial operations.

Some further description of selected measures is presented below, including some graphical examples to facilitate understanding and comparison between them.

A.1 Reduction target (%) against baseline total emissions

As indicated before, this measure implies the reduction of the total load of a pollutant entering the environment, and is commonly formulated as *reduction of 'x' % of total loads (kg/yr) of pollutant 'X' by the year 'Y', against baseline emissions in year 'Y_0'*. Assuming a *flat rate approach* to the target load reduction, that is, all countries contributing equally to the overall target, this measure could be graphically represented as shown in Figure 1.

Figure 1 Graphical example of Measure A.1.: reduction target (%) against baseline total **emissions.**



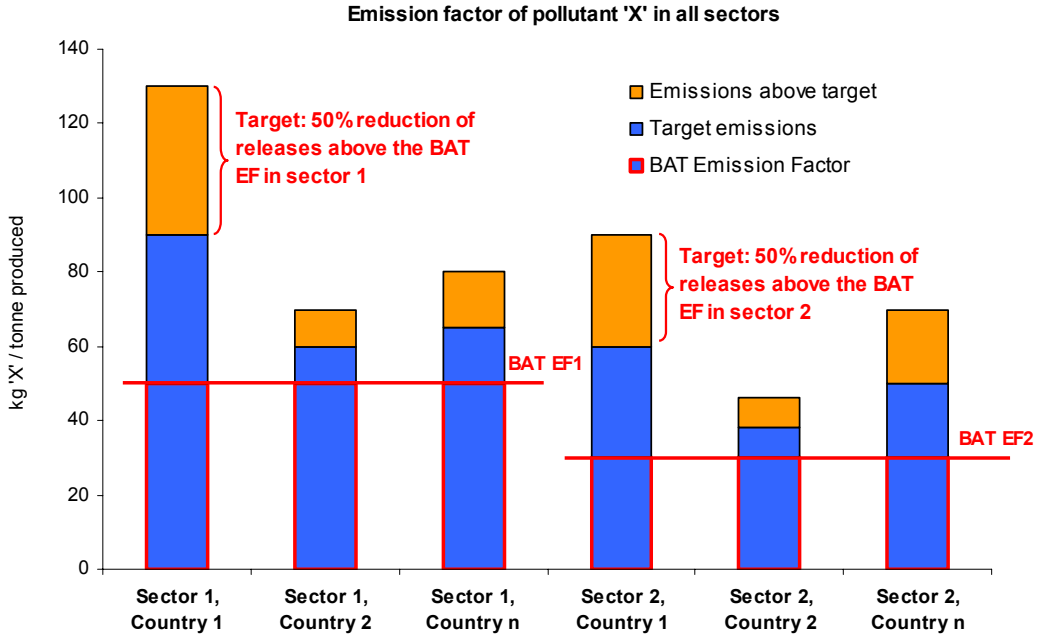
The example represented above shows how all countries would reduce 50% of their total current emissions. As indicated in another chapter below ('Information requirements'), this requires establishing a baseline inventory of emissions and a monitoring system to track progress against the target.

A.2 Reduction target (%) against release intensity

In this case, the reduction target is relative to an 'optimum' emission level or release intensity. The release intensity can be derived from total loads in relation to socio-economic indicators. Commonly used indicators are population or economic activity (e.g. GDP), as these information is usually available for all countries. However, when reducing emissions from industrial sources, it is reasonable to determine 'optimum' release intensity on a sector

basis, by estimating the expected emission factors[1] resulting from the adoption of the Best Available Techniques (BAT). Assuming that it is not feasible for all industries to adopt BATs, the target could be to reduce a % of releases above the BAT derived emission factor (BAT EF). In this case, the measure could be formulated as *'x' % reduction of emissions of pollutant 'X' above the BAT emission factor in sector 'Y'.* A graphical example of this measure is shown in Figure 2, where the effect of 'convergence' on final target emission factors can be observed.

Figure 2 Graphical example of Measure A.2.: reduction target (%) against release intensity (optimum Emission Factor (EF) adopting Best Available Techniques (BAT)).



As it can be observed in the example above, the BAT emissions factors will probably be different between industrial sectors (BAT EF1 and BAT EF2), and the relative position of each country against the target will depend on the level of adoption of new technologies in the different industrial sectors, which will also determine the effort required to achieve the target.

It must be noted that this measure would probably reduce the total load of pollutants entering the environment, but not necessarily, as the target focuses on reducing the release intensity, which depends on industrial production. This means that in those cases where significant increases in industrial activity take place, total loads could increase regardless the reduction of the release intensity.

B.1 Enforcement of Emission Limit Values (ELV)

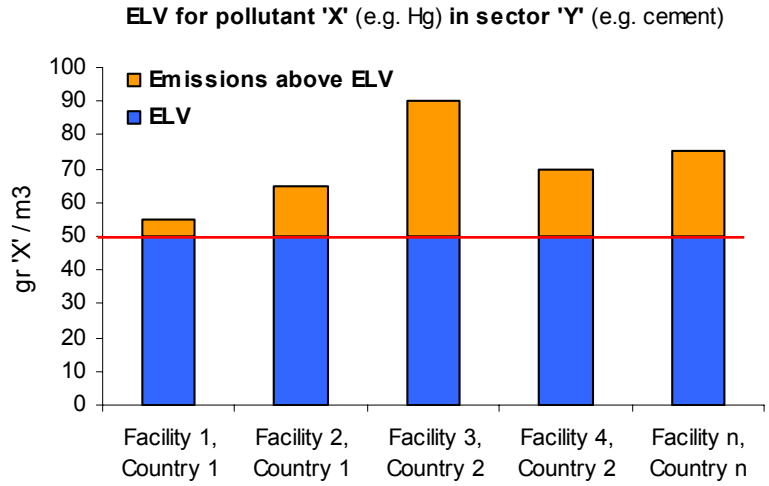
Emission Limit Values (ELV), also known as emission standards, refers to maximum allowable release of a substance from an industrial operation to air, water or land. Usually it is formulated as a concentration limit (e.g. 'x' *gr of Hg/m^3 of wastewater or air emitted*). ELV can be derived taking into consideration BAT or BATNEEC (Best Available Technique Not

[1] **Emission Factor**: The estimated average emission rate of a given pollutant for a given source, relative to units of activity.

Entailing Excessive Costs) and/or the Environmental Quality Standards (EQS) to be achieved in the receiving environment. Other factors like characteristics of the discharge (e.g. direct to or to sewage system) the de-pollution or treatment systems (e.g. primary or secondary wastewater treatment plants) need also to be considered to determine ELV in each case.

The measure would consist in setting and recommending reference ELV for the different substances and industrial sectors in the Mediterranean region, which would be transposed to national legislations and enforced at national level. In fact, this measure is already in practice in most countries, but an harmonization effort would be required. In this sense, the same ELV would be expected to be applied to all industrial operations in the Mediterranean Region. A graphical example is presented in Figure 3.

Figure 3 Graphical example of Measure B.1.: enforcement of Emission Limit Values (ELV).

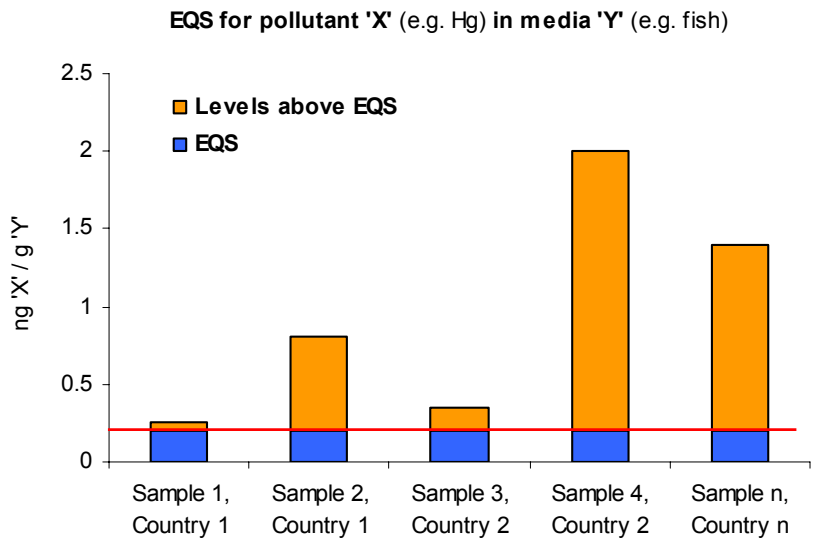


As shown in the example above, the emissions to be reduced are those above ELV, and the scope of action is the facility level or discharge point. As in the previous case (A.2.), total loads of pollutants at national or regional level may increase regardless the compliance of ELV, as loads will depend on the trends in the development of industrial activity. However, ELV are expected to avoid local damage to the environment provided they are derived taking into consideration the capacity of the receiving media to absorb pollution.

B.2 Achievement of Environmental Quality Standards (EQS)

EQS are those values which specify the maximum allowable concentration of a potentially hazardous chemical in an environmental sample (water, sediment, biota), e.g. *'x' ng of pollutant 'X' / gr (dw) of sediment*. The measure would be to ensure that levels of pollutants in the ecosystem are close to Environmental Quality Standards (EQS) in the overall Mediterranean region. As shown in the graphical example (Figure 4), those samples with measured levels above EQS would be above the target, so actions should be undertaken in the pollution sources leading to observed high levels of pollution. As indicated before, these actions can be in fact the enforcement of more stringent ELV, specific load reductions in polluted areas, promotion of the adoption of BAT, etc. In this sense, the target is focused directly on the quality of the environment, but countries might have the flexibility to undertake the set of measures more convenient in each case.

Figure 4 Graphical example of Measure B.2: achievement of Environmental Quality Standards (EQS).



One of the main drawbacks of this measure, as described later on, is that values for EQS are hardly available for the marine environment and have not been developed for the Mediterranean region.

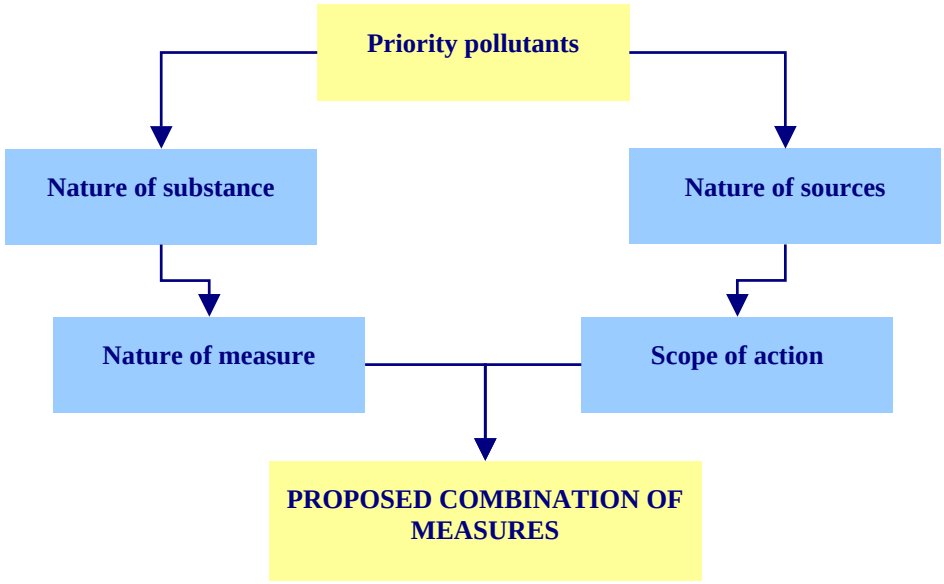
2.2 Flexibility criteria to combine measures

As already suggested in the ToR of the Working Group, measures can be combined, simultaneously implemented, and/or further developed to propose the most adequate measures in each case, thus enabling a more flexible approach.

The starting point to combine measures could be to analyse the nature of substances and the nature of sources of the SAP priority list of pollutants. As illustrated in figure 5 the nature of substances (persistence, toxicity, etc.) can be used to approach the most adequate nature of measure, whereas the nature of sources of pollutants (regional, clustered in sub-regions or sectors, etc.) can suggest the optimum scope of action where to implement each measure.

The different measures can be then combined with the scope of action to finally derive a set of measures that can be proposed for each pollutant or group of pollutants. The steps shown in figure 5 are described below in more detail.

Figure 5 A procedure to determine possible combination of measures.



(a) Nature of substances: this criterion can help to prioritize and choose the most adequate measure for each pollutant. For example, as shown in Table 2, persistent and toxic compounds could be approached through reduction in total loads, especially air emissions with trans-boundary effects in the region. However, other substances not so toxic or persistent can equally be of concern because of its effects at the local environment, like BOD or nutrients dealing to eutrophication. In this case ensuring environmental quality objectives (for example, through the enforcement of ELV) could be a good approach.

Table 2 Nature of substance as a criterion to orientate nature of measure – some examples.

Nature of substance	Nature of measure	Examples
Persistent and Toxic	Reduction of total loads	Organohalogen, heavy metals, dioxins
Local effects	Emission Limit Values	BOD, Nutrients, TSS
Hazardous wastes	Intervention on hot spots	Stockpiles of pesticides

(b) Nature of sources: the characteristics of the sources of pollution can also orientate the nature of measure, but especially the scope of action. If a pollutant is released widespread over the Mediterranean Region and by several industrial sectors, all countries should undertake actions to abate emissions (see examples in Table 3). In other cases some pollutants will be mostly released in a certain area of the region, or by a few countries, in both cases just involving a limited group of countries. Pollutants can also be released widespread over the region, but clustered in a few sectors or even a single sector. Sources may be very concentrated, as for the case of hot spots, where

action will be needed at the local scale. Finally, releases of concern can also be those which are located close to priority areas, such as protected areas, where actions will be focused at local level, but at the same time in all protected areas threatened by pollution in the region.

Table 3 Nature of sources as a criterion to orientate the scope of action – some examples.

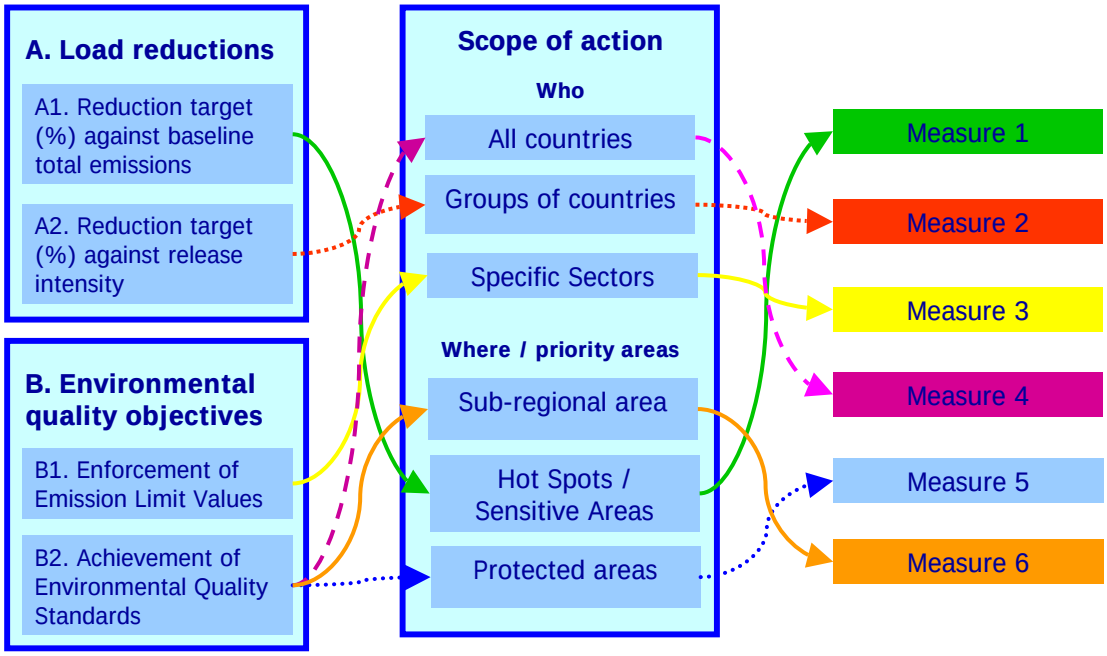
Nature of sources	**Scope of action**	**Examples**
Widespread over the Med region	All countries	BOD, nutrients, dioxins, mineral oils
Clustered in a group of countries or sub-region	Group of countries	Chemicals-NW Med? ; Pesticides-SE Med?
Clustered in a sector	Sectors	N,P-Agro-faming?; PAH-oil sector?; Zn-Metal?
Hot spots	Local	Oil terminals, petrochemical sites
Close to protected areas	Local	To be identified by geographical analysis

To analyse the nature of sources and relate it with the scope of action, accurate data on the amount of pollutants released and the geographic distribution of sources is required. The assessment of the state of the environment itself is another very important criterion to be taken into account when defining the scope of action, as measured levels of pollutants in different media, its trends and its geographical distribution, can provide information on the priority to act and the potential sources.

(c) Combination of measures: those measures identified as the most appropriate for each priority pollutant, can be further defined when combined with the scope of action. Many combinations are possible, as represented in figure 7.

- Total load reductions (A.1) could be targeted in the overall region, in a certain sector, or even just in hot spots (*Measure 1*).
- Reduction of the release intensity could be targeted at sector level or by a group of countries (*Measure 2*).
- Emission Limit Values could be enforced by all countries but only in specific sectors (*Measure 3*)
- Achievement of Environmental Quality Standards could be targeted with a major priority at regional level (*Measure 4*), in a certain area (*Measure 5*), or basically in protected areas (*Measure 6*).

Figure 6 Some possible combinations of the nature of the measure and the scope of action.



Other combinations are possible, even between them (*e.g. reduction of total loads in hot spots close to protected areas*). It is also worthy to note that measures are not mutually exclusive, but they can be simultaneous. For example, ELV can be enforced in all countries, and at the same time load reductions for certain pollutants can be targeted in some areas or in the overall region. In fact, the SAP already envisages a combination of measures for each of the targeted substances.

The process of selection of measures is very relevant for the purposes of the Working Group, due to the fact that besides legal, technical or economical implications, the proposed measures will determine the potential mechanisms available for differentiation. In some cases, differentiation will be hardly possible. In the next section, these mechanisms are reviewed for each of the basic measures identified in this chapter (A1-A2-B1-B2).

3. Implementation of measures: mechanisms for differentiation

As stated in its Terms of Reference, the main task of Working Group on Differentiation is "to propose how to apply the differentiated approach and to explore their implications". In order to facilitate discussions on this topic, the section below includes a review of potential mechanisms for differentiation (linked to the different measures identified in the previous section), as well as an initial review of the international background and common practices in multilateral environmental agreements. This review relies heavily on the available literature, but some assessment of the potential adoption within the framework of the Barcelona Convention and its potential implications is also provided.

3.1 Conceptual framework and background

3.1.1 The principle of common but differentiated responsibilities

First of all, some definitions, implications and manifestations of the principle of common but differentiated responsibilities are described below[2]:

a) Definition of the principle

The principle of 'common but differentiated responsibility' evolved from the notion of the 'common heritage of mankind' and is a manifestation of general principles of equity in international law. The principle includes two fundamental elements. The first concerns the common responsibility of States for the protection of the environment, or parts of it, at the national, regional and global levels. The second concerns the need to take into account the different circumstances, particularly each State's contribution to the evolution of a particular problem and its ability to prevent, reduce and control the threat.

Thus, the principle recognises historical differences in the contributions of developed and developing States to global environmental problems, and differences in their respective economic and technical capacity to tackle these problems. The *Rio Declaration* states (principle 7): "In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities". Similar language exists in the *Framework Convention on Climate Change*; parties should act to protect the climate system "on the basis of equality and in accordance with their common but differentiated responsibilities and respective capabilities."

b) Implications of the principle

In practical terms, the principle has at least two consequences. First, it entitles, or may require, all concerned States to participate in international response measures aimed at addressing environmental problems. Second, it leads to environmental targets or standards that impose differing obligations on States.

Common responsibility describes the shared obligations of two or more States towards the protection of a particular environmental resource. Common responsibility is likely to apply where the resource is shared, under the control of no state, or under the sovereign control of a state, but subject to a common legal interest (such as biodiversity).

Differentiated responsibility of States for the protection of the environment is widely accepted in treaty and other State practices (see section c) below). It translates into differentiated environmental targets or standards set on the basis of a range of factors, including special needs and circumstances, future economic development of countries, and historic contributions to the creation of an environmental problem. The *Stockholm Declaration* emphasised the need to consider "the applicability of standards which are valid for the most advanced countries but which may be inappropriate and of unwarranted social cost for the developing countries." In the *Rio Declaration*, states agreed that "environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply".

Differential responsibility therefore aims to promote substantive equality between States within a regime, rather than mere formal equality. The aim is to ensure that developing countries can come into compliance with particular legal rules over time – thereby strengthening the regime in the long term. Practically speaking however, differential responsibility does result in different legal obligations. The techniques available in differentiated responsibility include 'grace periods' or delayed implementation and less stringent commitments.

[2] as summarized by the Centre for International Sustainable Development Law (CISDL) [4]:

A particularly important aspect of the principle is international assistance, including financial aid and technology transfer. In many treaties it is acknowledged that developed countries have played the greatest role in creating most global environmental problems, and have superior ability to address them, thus they are expected to take the lead on environmental problems. In addition to moving toward sustainable development on their own, developed countries are expected to provide financial, technological, and other assistance to help developing countries fulfil their sustainable development responsibilities.

The principle therefore provides for asymmetrical rights and obligations regarding environmental targets and standards, and aims to induce broad State acceptance of treaty obligations, while avoiding the type of problems typically associated with a lowest common denominator approach. The principle also reflects the core elements of equity, placing more responsibility on wealthier countries and those more responsible for causing specific global problems. The principle also presents a conceptual framework for compromise and co-operation in effectively meeting environmental challenges.

c) Manifestations of the principle in multilateral treaties and declarations

Instances of **common responsibility** appear as early as 1949, where tuna and other fish were described as being "of common concern" to the parties by reason of their continued use by those parties. Other examples such as waterfowl are described as "an international resource," natural and cultural heritage as "part of the world heritage of mankind as a whole," the conservation of wild animals as being "for the good of mankind" and resources of the seabed and ocean floor and subsoil as "the common heritage of mankind."

Recent state practice supports the emergence of the concept of "common concern" as reflected in the *Climate Change Convention*, which acknowledges that "change in the Earth's climate and its adverse effects are a common concern of humankind," and the *Biodiversity Convention* which affirms that "biological diversity is a common concern of humankind." While each of these formulations differ, and must be understood and applied in the context of the circumstances in which they were adopted, the attributions of "commonality" share common consequences. Although state practice is inconclusive as to the precise legal nature of each formulation, certain legal responsibilities are attributable to all States with respect to these environmental media and natural resources under treaty or customary law. While the extent and legal nature of that responsibility will differ for each resource and instrument, the responsibility of each state to prevent harm, in particular through the adoption of environmental standards and international environmental obligations, can also differ.

Differentiated Responsibility appears in a number of treaties. The *1972 London Convention* requires measures to be adopted by parties "according to their scientific, technical and economic capabilities." The special needs of developing countries are expressly recognised at article 11(3) of the 1976 *Barcelona Convention* and in the preamble to the *UN Convention on the Law of the Sea*, where account is to be taken of their "circumstances and particular requirements," of their "specific needs and special circumstances," or of their "special conditions" and "the fact that economic and social development and eradication of poverty are the first and overriding priorities of the developing country parties." Other treaties identify the need to take account of States' "capabilities," "economic capacity," the "need for economic development," or the "means at their disposal and their capabilities."

The principle of differentiated responsibility has also been applied to treaties and other legal instruments for developed countries. Examples include the 1988 EC *Large Combustion Directive*, which sets different levels of emission reductions for each member state, the 1991 *VOC Protocol*, which allows parties to specify one of three different ways to achieve reduction, and the 1992 *Maastricht Treaty* which provides that: "Without prejudice to the

principle that the polluter should pay, if a measure [...] involves costs deemed disproportionate for the public authorities of a member state, the Council shall, in the act adopting that measure, lay down appropriate provisions in the form of temporary derogations and/or financial support from the Cohesion Fund."

Differentiation within developing countries is specified, for example, in the *Climate Change Convention* which recognises the "special needs and special circumstances of developing country parties, especially those that are particularly vulnerable to the adverse effects of climate change." Similarly, the *Desertification Convention* requires that "Parties […] give priority to affected African country parties, in the light of the particular situation prevailing in that region, while not neglecting affected developing country parties in other regions."

Under the 1987 *Montreal Protocol* the special situation of developing countries entitles them, provided they meet certain conditions, to delay their compliance with control measures. Under the *Climate Change Convention*, the principle of common but differentiated responsibilities requires specific commitments only for developed country parties at this time, and allows for differentiation in reporting requirements.

International funding as a means to implement differentiated responsibility has a long history, beginning with the UNEP Environmental Fund and the World Heritage Fund in the 1970's. A key example of implementation in this context is funding to ozone reductions projects through the Multilateral Fund for the Montreal Protocol. Financing mechanisms, partly implemented by the Global Environmental Facility, are established under the *Climate Change, Biodiversity and Desertification Conventions*. These mechanisms provide financial grants for implementing environmental projects and environmentally sound technology.

3.1.2 Burden sharing: common rules and previous experiences

When the focus is on how the efforts to protect the environment are distributed among countries, the 'common but differentiated responsibilities' can turn into the concept of burden sharing. According to Torvanger & Ringius (2000), burden sharing refers generally to "*the way in which a group of countries benefiting from a collective good agrees to share the costs of providing the collective good*". [20]

- Burden sharing within the Barcelona Convention

The concept of burden sharing is of key relevance in the context of the Barcelona convention and the Mediterranean Action Plan (MAP), as within the Strategic Action Programme (SAP) to address pollution from land-based activities, fixed overall target reductions are proposed. That is, a proposal to all Contracting Parties to contribute to the overall reduction of releases, against a baseline, and within specific timetables and for specific pollutants. For example, a target of 50% reduction over a period of 10 years in the inputs the Mediterranean of BOD, nutrients and suspended solids from industrial installations is proposed. It is equivalent to the type of measure A.1 described in the previous section. Accordingly, if the share or contribution to the overall reduction target is going to be differentiated, some burden sharing rules need to be developed and agreed.

- 'Flat' rate versus differentiated approach

As stated by Kontogianni et al (2006) [12], evidence from the performance record of multilateral environmental agreements, fosters the idea that uniform (or 'flat') rates of abatement are neither a fair, nor an equitable basis for international cooperation and national self-commitments. In fact, besides fairness debate, it has also been widely observed that the flat rate approach is neither cost-effective (see Hoel M (1992) [10], Gren IM (2001) [9], or Brandt US (2003) [2]). In order to illustrate the problems argued with the flat rate approach, a

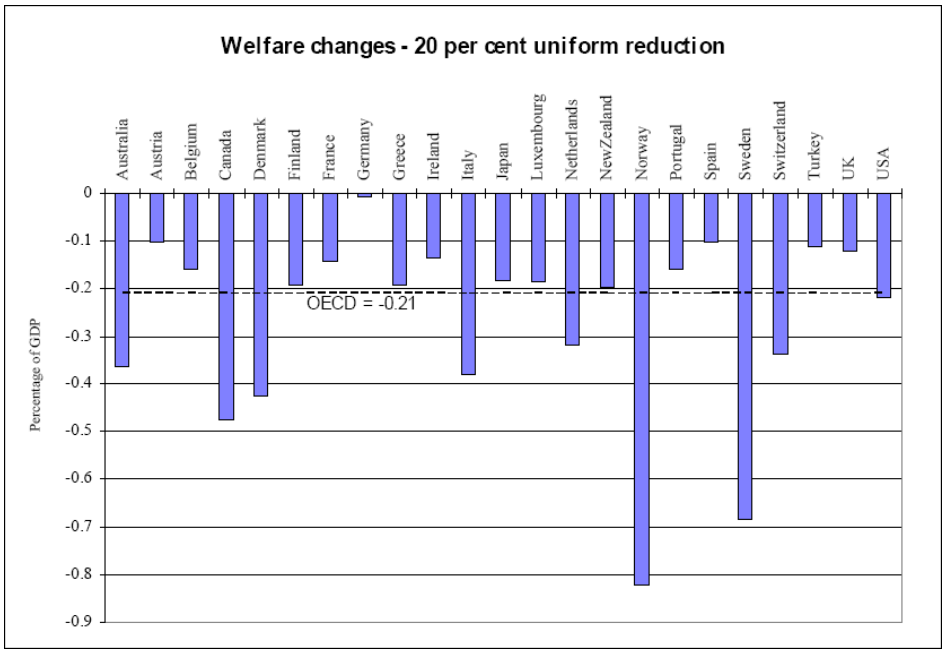
figure is reproduced from Torvanger et al (1996) [18] (see Figure 7), showing a calculation of the costs to some OECD countires under a flat rate agreement of 20% reduction of CO2 emissions relative to 1993 levels.

- The Kyoto Protocol experience

The Kyoto Protocol negotiations motivated a lot of work on the issue of burden sharing, and some of this experience will be briefly presented here for the purposes of this document. In this sense, the outcomes of the Ad Hoc Group on the Berlin Mandate (AGBM) are very illustrative on how countries positioned themselves during negotiations according to their national circumstances.

The AGBM process was initiated by the Berlin Mandate at the first Conference of the Parties (CoP1) to the UNFCCC in the spring of 1995, and ended up in the Kyoto Protocol in December 1997.

Figure 7 Welfare effects of a uniform 20 per cent reduction in CO2 emissions.



Source: Torvanger et al (1996)

At the AGBM, two general approaches existed to the question of whether there should be differentiation among Annex I Parties in the Protocol [28]. Some Parties were in favour of the 'flat rate reduction' objective, because of the difficulty they perceived in negotiating a differentiated regime. Other Parties advocated for a differentiated approach, a better mechanism to respond to differing national circumstances, particularly with regard to costs of abatement an levels of economic development and growth. They also defended differentiation as a more equitable and efficient, and argued that it would enhance the cost-effectiveness of the overall emission reduction effort.

During this process, about seventeen specified proposals for burden sharing were suggested by governments in the Kyoto Protocol negotiations, as recorded by the review performed by ECN/CICERO [7]. These proposals are collected also by Yanagi (2001) [29], and are shown in Table 4.

These proposals can be summarised, according to the AGBM [28], in three categories of possible indicators for differentiation: national emissions, national circumstances, and costs of action (see Table 5).

Table 4 Proposals of countries on the differentiation of reduction targets within Kyoto negotiations.

Country	Proposals of indices or principles for differentiation
Spain, France (EU)	Emission per capita Emission intensity of GDP
Japan	Emission efficiency Emission intensity of GDP
New Zealand	Cost-effectiveness Sink
Iceland	A "formula" considering each country's circumstance $Y_i = A[x(B_i/B) + y(C_i/C) + z(D_i/D) + w(E/E_i)]$ Y_i: reduction of emission of greenhouse gases (CO_2 equivalents) by party i (%) B_i: carbon intensity of party i C_i: GDP per capita of party i D_i: emission per capita of party i E_i: shares of renewable energy of party i out of total energy demand of the Annex I parties B, C, D, E: average of each indicator A: a scale factor to ensure that aimed for reduction in emission is achieved x, y, z, w: weights (total is 1)
Iran	Economic growth (GDP) Historical share of greenhouse gas emissions Dependence on fossil fuels Access to sources of renewable energy Defense budget; population growth Special circumstances Share in international trade
Norway	Differentiated targets considering cost-effectiveness, and emission intensity $Y_i = A[x(B_i/B) + y(C_i/C) + z(D_i/D)]$ Y_i: reduction of emission of greenhouse gases (CO_2 equivalents) by party i (%) B_i: carbon intensity of party i C_i: GDP per capita of party i D_i: emission per capita of party i B, C, D, E: average of each indicator A: a scale factor to ensure that aimed for reduction in emission is achieved x, y, z, w: weights (total is 1)
Poland	GDP per capita Emission per capita Emission intensity of GDP
Russia	Substantial decrease of emissions

Table 5 Possible indicators for differentiation discussed under the UNFCCC negotiations.

	Group of indicators	**Possible indicators**
A	National emissions	(a) Emissions per Party (b) Emissions per capita (c) Emissions per unit of GDP
B	National circumstances	(d) Physical characteristics (land area, sinks…) (e) Demographic characteristics (population density, growth, distribution…) (f) Energy profile (g) Socio-economic characteristics (energy intensity, dependence on fossil fuels…)
C	Costs of action	(h) Marginal costs of emission abatement (i) Net national economic costs

Source: UNFCCC [28]

- From principles to operational rules

The analysis of the Kyoto Protocol negotiations have produced relevant outcomes on how to shift from equity principles to operational rules in order to apply the burden sharing approach (the burden sharing rules). One of the key references in this sense is the *Final report of the joint CICERO-ECN project on the global differentiation of emission mitigation targets among countries* [7], where a comprehensive review of principles, differentiation mechanisms and their implications is provided. In the context of the Mediterranean, a key reference is the work performed by Kontogianni et al (2006) on the *application of the principles of fairness for burden sharing in the Mediterranean* [12]. This latter work explores the possibility of transferring and/or adapting existing knowledge regarding burden sharing in the Kyoto Protocol negotiations, to the issue of Mediterranean marine pollution. To this end, some burden sharing rules are discussed and tested for the case of BOD discharges.

For the purposes of this document, a theoretical context, mostly provided by Kontogianni et al (2006), for linking fairness principles to burden sharing rules is summarized below, as a previous step to test ourselves some rules in the following section.

First of all, two broad categories of fairness can be distinguished: **equality** and **equity**.

The notion of equality implies equal obligations to all states involved in negotiations. For instance, all parties should cut emissions by an equal amount (absolute equality) or percentage (relative equality). Equality in this sense is reflected in the principle of national ***sovereignty*** which according to international law entails that all states should have equal rights and duties. Such a concept of fairness might be reflected in a rule that allows all countries to discharge some pollutant in proportion to acquired rights (or past discharges) [12].

To the extent that equality treats individuals as the unit of account it is captured by the ***egalitarian*** principle according to which all people have an equal right to pollute or to be protected from pollution. This could be reflected in a rule that allows discharges in proportion to a country's population [12].

The concept of equality is naturally evoked in situations where negotiating parties are symmetric or similar in important dimensions. However, applying the equality principle in a strongly differentiated world is 'unfair' in the sense that demanding equal burdens from unequal parties conflicts with the notion of fair division. When it is generally recognized that the parties involved in a negotiation are substantially different, the norm of equity or fairness replaces equality in environmental negotiations [12].

Several dimensions of equity can be taken into account depending on whether the focus is on the cause of pollution or the consequences of pollution prevention, and whether the object to be distributed are the costs or benefits resulting from protection [7]. Some of the derived equity principles are shown in table 7.

Table 6 Some fairness principles and related burden sharing rules.

Principle / concept	Interpretation	Example of implied burden sharing rule
Sovereignty	All nations have an equal right to pollute or to be protected from pollution; current level of emissions constitutes a status quo right	Allow or reduce emissions proportionally across all countries to maintain relative emission levels between them
Egalitarian	Every individual has an equal right to pollute or to be protected from pollution	Allow or reduce emissions in proportion to population
Responsibility	The economic burden is proportional to emissions (eventually including historical emissions) (i.e. polluter pays)	Share abatement costs across countries in proportion to emission levels
Capacity	The greater the ability to pay the greater the economic burden	Stringency of reductions proportional to GDP per capita
Need	Development needs of countries and populations implies 'minimum' levels of emissions	Allow or reduce emissions according to development indicators (GDP per capita, emissions per capita, population growth,…)
Opportunity	Nations with high intensity levels of emissions (e.g. discharges per capita or per GDP) will present a major potential for cost-effective mitigation of pollution	Reductions proportional to availability of cheap reduction potential (e.g. discharges per GDP)

Source: Adapted from Ringius et al (2000) [16], Kontogianni et al (2006) [12], and Michaelowa et al (2003) [14]

When the focus is on the cause of the problem, then '***responsibility***' or 'guilt' is a logical equity principle to be applied, which is also a straightforward application of the Polluters Pay Principle (PPP), and is invoked widely in international environmental negotiations [12]. However, the extent of 'guilt' is a controversial subject, as it can be based on past (cumulative) emissions, on current emissions, on future emissions, or a combination of these. Furthermore past emissions are often difficult to quantify, and are also problematic because of retroactive liability.

When the costs of abatement of emissions are to be distributed and the focus is on the consequences for actors, then '***capacity***' is the logical equity principle to be applied. Capacity can also be viewed as an 'ability to pay' principle. Wealthy countries are expected to contribute relatively more than less economically developed countries. The conventional criterion for determining capacity would be wealth measured in terms of GDP per capita.

There are numerous variants of the principle of '***need***', which is intended to take into account the different level of development of countries ('development need'). Accordingly, it can be linked to a range of indicators such as population growth, per capita GDP, per capita discharges, etc. In the context of contributions to pollution cleanup this would entail using some indicator of welfare like per capita income and have countries with the highest per capita income undertake most (or proportionately more) of the burden [12] . It has also been translated in terms of providing to all human beings the 'pollution permits' needed to secure

basic human needs [7]. Emissions needed to secure a decent standard of living could be permitted while emissions from the production or consumption of 'luxury' goods should be subject to restrictive measures if total emissions exceed a certain threshold [7].

Finally, another principle which can be taken into account for burden sharing is the "***opportunity***" or potential to mitigate emissions in a cost-effective form. Those countries with high intensity levels of emissions (e.g. discharges per capita or per GDP) will present a major potential for cost-effective mitigation of pollution.

As a conclusion, for the implementation of burden sharing rules, a first distinction is needed between equality and equity. Equal obligation has a firm normative basis if all parties involved are equal in all relevant aspects. If this is not the case, equity comes into play. A range of key principles exists to distribute obligations equitably.

Additionally, it must be said that if the range of variance is so great that equity rules still lead to unfair burdens upon the poorest parties, **exemption** of obligations (at least temporary) is another option to be considered. Nevertheless, exemption need to be based on a certain principle that needs to be agreed, as well as a threshold need to be defined.

- Operational requirements for burden sharing rules

Adopting one or more of the above principle and burden sharing rules (BSR) in multilateral environmental agreements is certainly a controversial issue and a political high level decision. In order to facilitate decision-making some operational requirements can be taken into account, as those proposed by Torvanger and Ringius (2000) [20], which are presented in Table 7.

Table 7 Operational requirements for burden-sharing rules.

	Operational Requirement
A	Universal applicability
B	Easy to make operational
C	Simplicity
D	Allows for future requirements
E	Allows for country-specific requirements

A. The first operational requirement is that a BSR should be universally applicable. Rules that can be applied to all, or almost all countries, are clearly more attractive than rules that are only partially applicable because the latter raise thorny questions about supplementary rules, exemptions, or both. In those situations it would be necessary to distinguish between those actors that should be bound by a rule and those who should not.

B. The degree to which individual BSRs can be made operational is another important issue to consider when assessing their policy feasibility. In some cases it will be possible to identify empirical indicators and quantitative data that can be coupled to individual BSRs in a straightforward manner. It is likely that these rules would be widely supported. Reliable and comparable data will

be important. Indicators and statistics that are internationally approved might be more readily accepted than those that are not approved internationally.

C. It should be expected that BSRs that are relatively simple to make operational would be superior to those that are more complex. The more categories, depth and breadth of the data needed, the more complexity will be perceived. Even an otherwise promising BSR − e.g. one that combines several key principles of fairness, including weighting systems, etc. − might receive insufficient support because of its lack of simplicity.

D. It would seem self-evident that a possibility for adjusting and refining the operationalisation of burden sharing rules would be advantageous. Because of the lack of enough data on sources and distribution of emissions, or levels and impacts of pollutants in the marine environment, it is advisable to allow for future refining of the burden sharing rules. Another issue is concerned with flexibility. A BSR that allows for flexibility seems relatively more attractive, for example if national circumstances change unexpectedly at some point in the future.

E. A final issue concerns inclusion of country-specific circumstances. These might include criteria like structure of the national economy, distribution industrial activity between Mediterranean and non-Mediterranean basins, coastal population density, population growth, etc.

3.1.3 Sector-based convergence approaches to burden sharing

Also within the framework of the Kyoto Protocol, some approaches to differentiation of the greenhouse gas emission reduction burden among countries have been based on a sector basis. One of the main references is the ***Tryptich approach***, which was employed to share the European Union Kyoto target to abate GHG emissions among Member States [20].

The main motivation for the approach was to develop a method that would take into account the differences in emission-producing activities across the member states. The approach not only determines the distribution of commitments but also the aggregate level of emissions from the member states. In the first step the three sectors electricity generation, internationally oriented energy-intensive industries, and domestic sectors were identified. The total consumption (and production) of electricity in the EU was set to be limited to a growth rate of 1% per year. Some extra allowance was given the cohesion countries. CO_2 emissions were then distributed taking into account minimum percentages for renewable energies and combined heat and power (CHP), limitation of oil and coal use, use of nuclear power according to national preferences, and the remainder to be supplied using natural gas. The energy-intensive part of the industrial sector was allowed to increase production at a constant rate across all countries. The same energy efficient improvement rate was also applied across the member states for this sector. Emissions from the domestic sectors were distributed on a per capita base. The main rule was that emissions per capita should converge to the same level across all countries at a certain point in the future (e.g. 2030). The emission levels were only corrected for variations in natural climate across the countries.

However, the Triptych approach was originally intended as a burden sharing application for a group of economically relatively homogeneous countries. In this sense, Jansen et al (2001) developed the *Multi-sector Convergence Approach* (MSA) [11], similar to the Triptych approach but intended to address the issue of country/region emission assignments at a global level and over a longer-term time frame. The major distinguishing characteristics of the MSC approach are that (i) it is based on the distinction of different sectors within the

national economy, (ii) the MSC base model prescribes that the amount of per capita emission assignments will ultimately converge to the same level for all countries, (iii) additional allowances may be conceded to countries facing specific circumstances that warrant higher emission needs than countries with more favourable specific emission mitigating circumstances, all other factors being the same. A sectoral bottom-up approach is opted for in defining standards for per capita emission needs, as well as the consideration of sector emission standards.

The sector-based convergence approach can be of relevance for the differentiation of the contribution to the abatement of discharges in the Mediterranean region if the focus is on the convergence of release intensity indicators or emission factors, as it will be shown later.

3.2 Review of potential mechanisms for differentiation

A review of the potential mechanisms *"…to identify the relative positions of the Parties with respect to their contributions to the pollution load and their capacity to abate those contribution"* (ToR of the Working Group), is presented below. The underlying burden sharing rules and differentiation mechanisms suggested above are now illustrated in case studies linked to the different nature of measures, in order to show the main differences between them and the potential implications when used in the Mediterranean region.

3.2.1 Load reduction: the burden sharing

Different burden sharing rules (BSR), based on different principles, can be applied to determine the relative position of countries against an overall load reduction target. Following the same procedure to test BSR proposed by Kontogianni et al (2006) [12], in this section some examples are included to observe how results can vary according to the principle considered for differentiation. It must be noted that this exercise is oriented to test a **Measure A.1** type, that is, how to differentiate the effort to abate total loads by a fixed target, as stated for example in the SAP: 50% reduction of BOD discharges over a period of 10 years.

As this document is focused on the methodological aspects of burden sharing, and because available data on loads (National Baseline Budgets) is not currently available and comparable for all countries, all data used below to test BSR is no real country data but fictitious case studies, for the sake of illustrating results.

In order to be representative of the Mediterranean region situation, data has been introduced in order to 'create' a case study where significant differences can be appreciated among countries. In this sense, as shown in table first group of countries (1 to 5) would be representing more industrialized countries, with higher levels of GDP per capita, while the rest of countries (5 to 10) would be characterized by lower values of wealth indicators. However, release intensity indicators, such as discharges per capita or discharges per GDP, would vary according to different national circumstances.

Table 8 Data used for testing burden sharing rules in a fictitious group of countries.

	Pollution	Population	Economy and industry			Indicators for national circumstances		
	Total loads	Total	National GDP	Industrial added value		GDP per capita	Discharges per capita	Discharges per GDP
	(kg 'X'/yr)	(1000 inhab.)	(million $)	(% of GDP)	(M$ GDPInd)	($/inhab.)	(kg/inhab.)	(kg/$GDPind.)
Country 1	850,000,000	45,000	900,000	28%	250,200	20,000	18,889	3,397
Country 2	600,000,000	30,000	700,000	28%	196,700	23,333	20,000	3,050
Country 3	750,000,000	15,000	290,000	29%	82,940	19,333	50,000	9,043
Country 4	140,000,000	1,800	30,000	34%	10,200	16,667	77,778	13,725
Country 5	80,000,000	8,000	85,000	30%	25,160	10,625	10,000	3,180
Country 6	132,000,000	60,000	150,000	25%	36,750	2,500	2,200	3,592
Country 7	115,000,000	20,000	80,000	24%	19,040	4,000	5,750	6,040
Country 8	22,000,000	7,000	10,000	22%	2,190	1,429	3,143	10,046
Country 9	30,000,000	2,500	4,000	23%	920	1,600	12,000	32,609
Country 10	11,500,000	800	2,000	25%	500	2,500	14,375	23,000

In order to test applications of BSR on Measure A.1, all specific formulas are based on the basic structure:

$$D_i^T = D_i^0 - a_i(D^0 - D^T)$$

Where discharge D for country i in period T, D_i^T, is equal to current discharge, D_i^0, minus a fraction, a_i, of the total required reduction in discharge from the sum of countries, $(D^0 - D^T)$ (50% in our case). The distribution rules set the values for a_i, subject to the condition that $\sum ai = 1$. Approximately the same rules tested by Kontogianni et al (2006) [12] are presented below, just including some variations in indicators and multicriteria rules.

Rule 1: sovereignty

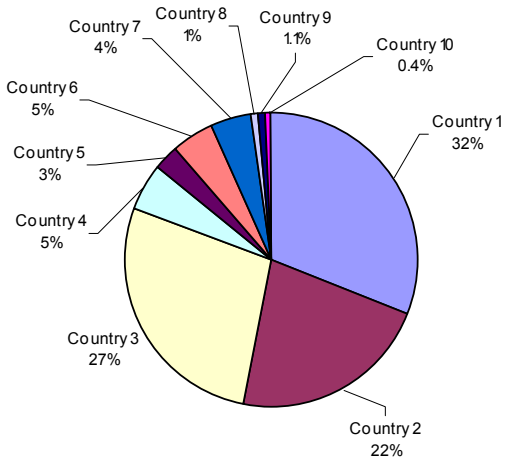
When burdens are allocated according to acquired rights (principle of sovereignty), each country will be discharging at the final year (Di^T) the same percentage of pollutant that it was discharging in the base year (Di^0) according to the formula:

$$Di^T = Di^0 - (Di^0/D^0)(D^0 - D^T)$$

where D^0 stands for total discharges in the base year and D^T for total discharges in the final year [12]. In this example the target is a reduction of 50% of total emissions (D^T), equivalent to 1.36 million tonnes / yr in the overall region (see data in figure 8). The effort to reduce this amount of discharges will be distributed according to the value of a_i. Since the rule respects the relative discharge levels among the countries, all countries will have to reduce discharges by the same percentage (50%). The outcome thus of applying the sovereignty rule is equivalent to that of the uniform (flat rate) rule. Results are shown in figure 8, including values for a_i (which are represented in the pie-chart on the right), and final discharges expected in the final year for each country (D_i^T). A first group of countries (1 to 3) appear to dominate total discharges and consequently should have to lead the major total reductions, regardless any other national circumstance.

Figure 8 Example of burden sharing of a reduction target adopting the sovereignty rule.

	Rule 1: Sovereignty		
	$Di^T=Di^0-(Di^0/D^0)(D^0-D^T)$		
	D: Total discharges (kg/yr)		
	Di^0	a_i (see graphic)	Di^T
Country 1	850,000,000	0.31130	425,000,000
Country 2	600,000,000	0.21974	300,000,000
Country 3	750,000,000	0.27467	375,000,000
Country 4	140,000,000	0.05127	70,000,000
Country 5	80,000,000	0.02930	40,000,000
Country 6	132,000,000	0.04834	66,000,000
Country 7	115,000,000	0.04212	57,500,000
Country 8	22,000,000	0.00806	11,000,000
Country 9	30,000,000	0.01099	15,000,000
Country 10	11,500,000	0.00421	5,750,000
D^0	2,730,500,000	1.00000	1,365,250,000
D^T (50% red.)	1,365,250,000		



Rule 2: egalitarian

When burdens are allocated to the egalitarian rule:

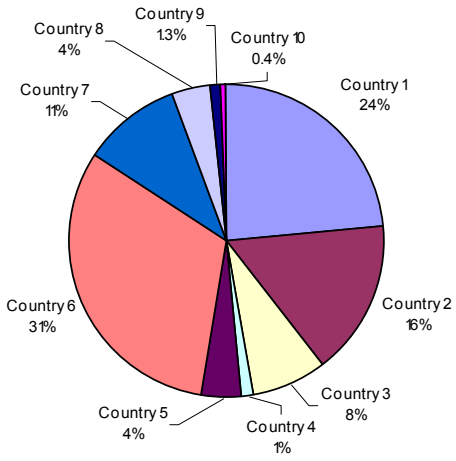
$$Di^T=Di^0-(Pi^0/P^0)(D^0-D^T)$$

where *P* stands for total population of the countries and P_i for population of country *i* countries are allowed to discharge in proportion (and only in proportion) to their share in total population of the region [12]. Other indicators could be use for the Mediterranean region, as coastal population or coastal density of population, but data should be available for all countries.

This could be a good rule to observe the expected contribution to discharges (more population, more discharges) in a situation where countries equally pollutes per capita, but if the share of population (a_i) is used to estimate the effort of each country to abate a fixed percentage of current discharges ($D^T_{(50\% \text{ red}}$), then it does no longer act as an equity rule. For example, results obtained for this case study (see figure 9), show how Country 6, because of its high population, obtains a negative final discharge target (which means that should abate 100% of its emissions an contribute to the abatement in other countries), whereas paradoxically its emission levels are much lower than other countries.

Figure 9 Example of burden sharing of a reduction target adopting the egalitarian rule.

	Rule 2: Egalitarian		
	$Di^T=Di^0-(Pi^0/P^0)(D^0-D^T)$		
	P: Total population (inhabitants)		
	Pi^0	a_i (see graphic)	Di^T
Country 1	45,000	0.23672	526,821,410
Country 2	30,000	0.15781	384,547,607
Country 3	15,000	0.07891	642,273,803
Country 4	1,800	0.00947	127,072,856
Country 5	8,000	0.04208	22,546,028
Country 6	60,000	0.31562	-298,904,787
Country 7	20,000	0.10521	-28,634,929
Country 8	7,000	0.03682	-28,272,225
Country 9	2,500	0.01315	12,045,634
Country 10	800	0.00421	5,754,603
P^0	190,100	1.00000	838,428,590



Rule 3: Responsibility

When burdens are allocated according to each party's responsibility, countries will participate in the overall reduction target in relation to their discharges in the base year. As indicated before, responsibility can be measured differently in terms of total or aggregate current discharges, per capita current discharges, or if data is available, cumulative emissions. Discharges under the aggregate responsibility rule will be uniformly reduced at the rate of the overall reduction target (50%), and thus results will be equivalent in fact to sovereignty rule (Figure 10). Results for aggregate responsibility will be used later when multi-criteria rules are applied. Regarding discharges per capita, this criterion is used below for testing the rule of 'need', so results are neither shown here.

Rule 4: capacity (ability to pay)

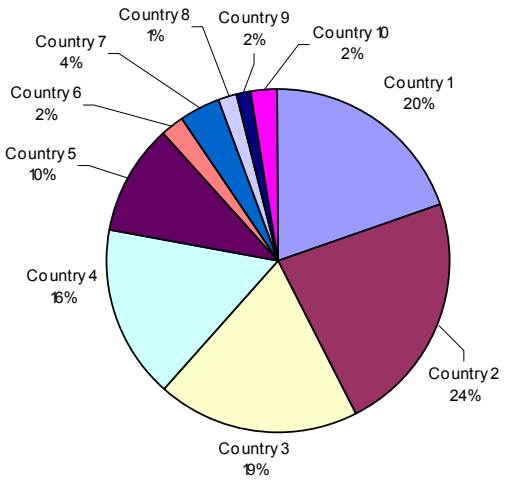
When burdens are allocated according to each party's ability to pay, final country emissions will be calculated as follows:

$$Di^T=Di^0-(GDPi/\sum GDPi)(D^0-D^T)$$

where GDPi stands for GDP per capita of country *i*. According to this rule, countries will participate in the overall reduction target (50%) in relation to their relative wealth [12]. Results are shown in figure 16. In this case, it can be observed how countries with relatively high GPD per capita, like Country 4 and 5, result in negative allowances, which means that under this rule these countries would not only be obliged to abate 100% of their own discharges but also to contribute to the abatement of a surplus of 83 and 62 million of tonnes, respectively. This suggests that GPD per capita can not be considered as a criterion alone, but as an indicator to adjust results when using another rule that takes into account current country discharges.

Figure 10 Example of burden sharing of a reduction target adopting the capacity rule.

	Rule 4: Capacity		
	$Di^T=Di^0-(GDPi/\sum GDPi)(D^0-D^T)$		
	GDPi: GDP per capita		
	GDPi	a_i (see graphic)	Di^T
Country 1	20,000	0.19610	582,269,549
Country 2	23,333	0.22879	287,647,807
Country 3	19,333	0.18957	491,193,897
Country 4	16,667	0.16342	-83,108,709
Country 5	10,625	0.10418	-62,231,802
Country 6	2,500	0.02451	98,533,694
Country 7	4,000	0.03922	61,453,910
Country 8	1,429	0.01401	2,876,396
Country 9	1,600	0.01569	8,581,564
Country 10	2,500	0.02451	-21,966,306
∑GDPi	101,987	1.00	1,365,250,000



Rule 5: Need

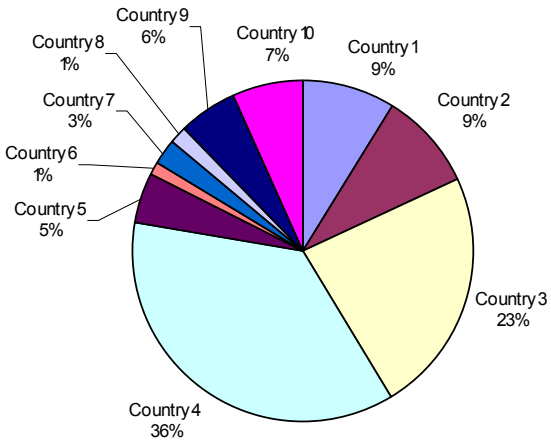
Based on the principle of (development) 'need', a burden-sharing rule can be linked to a number of indicators such as population growth, GDP per capita (or Purchasing Power Parity, PPP), per capita discharges, etc. The version considered here, as observed in other multilateral environmental agreements, is one that bases need on the discharges per capita (note that this criterion could also be used as for the responsibility rule):

$$Di^T=Di^0-(di^0/\sum di)(D^0-D^T)$$

where d_i stands for discharges per capita of country *i.* The contribution to the overall reduction target among countries (a_i) is shown in Figure 17. When this factor is applied to the total amount of discharges to be reduced (D^T, 1.3million tonnes), it comes out again that final allowed discharges for some countries are negative, that is, they would have to abate 100% of their emissions and contribute to the reduction of a surplus in other countries. This is the case for example in Country 4, with a high discharge per capita rate, but with total current discharges being much lower than other countries, as it is a small country.

Figure 11 Example of burden sharing of a reduction target adopting the 'need' rule.

	Rule 5: Need		
	$Di^T=Di^0-(di^0/\sum di)(D^0-D^T)$		
	d: Discharge per capita (kg/inhab)		
	di0	a_i (see graphic)	Di^T
Country 1	18,889	0.08821	729,570,771
Country 2	20,000	0.09340	472,486,699
Country 3	50,000	0.23350	431,216,747
Country 4	77,778	0.36322	-355,885,060
Country 5	10,000	0.04670	16,243,349
Country 6	2,200	0.01027	117,973,537
Country 7	5,750	0.02685	78,339,926
Country 8	3,143	0.01468	1,962,196
Country 9	12,000	0.05604	-46,507,981
Country 10	14,375	0.06713	-80,150,185
∑di	214,135	1.00000	1,365,250,000



Rule 6: opportunities

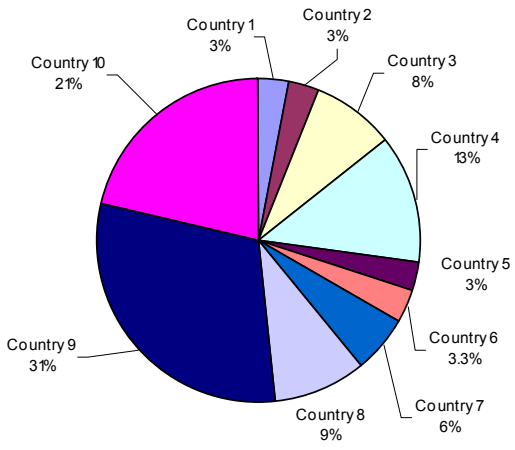
Sharing the burden on the base of opportunities is one more rule that may translate into a wide range of specific formulas. The one used here is based on discharges per GDP:

$$Di^T=Di^0-(di^0/\sum di)(D^0-D^T)$$

where d_i stands for discharges per industrial added value to GDP (as we are addressing discharges from industrial sources) of country *i*. The rule treats high discharges per GDP as an indicator for inefficient use of resources and accordingly as a proxy for wide margins of cost-effective reductions [12]. In this sense, the contribution to the overall reduction target would be dominated in this case from Countries 9 and 10, with high release intensity indicators. The drawback again is that comparing to their current emissions, these countries would have to abate 100% of their emissions and still contribute to reductions in other countries. It must also be noted that in the Mediterranean region, a potential problem with this indicator is to compare discharges to the Mediterranean catchment's area, with the overall national industrial activity, especially in those countries where the Mediterranean region is only a part of the overall national territory. It should be checked whether disaggregated statistics are available in all countries to get GDP figures for Mediterranean regions.

Figure 12 Example of burden sharing of a reduction target adopting the 'opportunity' rule.

	Rule 6: Opportunity		
	DiT=Di0-[(di/∑di)(D0-DT)]		
	d: discharge per GDP (kg/M$ GDP industrial)		
	di	a_i (see graphic)	Di^T
Country 1	3,397	0.03155	806,927,257
Country 2	3,050	0.02833	561,326,115
Country 3	9,043	0.08398	635,351,563
Country 4	13,725	0.12746	-34,019,842
Country 5	3,180	0.02953	39,686,523
Country 6	3,592	0.03336	86,460,580
Country 7	6,040	0.05609	38,422,391
Country 8	10,046	0.09329	-105,364,816
Country 9	32,609	0.30283	-383,432,234
Country 10	23,000	0.21359	-280,107,536
∑di	107,682	1.00000	1,365,250,000



It seems to be clear from the above examples, that a single criterion can not be used when sharing the burden to reduce pollution in a group of countries with very different national circumstances. It also appears that aggregate responsibility should always be taken into account when calculating the contribution to the overall target (as in our case, to test Measure A.1), otherwise unfeasible and non-sense results will always be obtained. In this sense, two more rules are considered below, using a multi-criteria approach, to combine into one single rule several principles and criteria. Assuming that responsibility and capacity are common criteria taken into account, these have been combined together with the development need in one case (rule 7) and opportunity for cost-effective reductions in another case (rule 8).

Rule 7: need, responsibility and capacity

The selected indicators to test this rule are total discharges (aggregate responsibility), discharges per capita (need) and per capita GDP (ability to pay). The combination of indicators can also be weighted according to the formula:

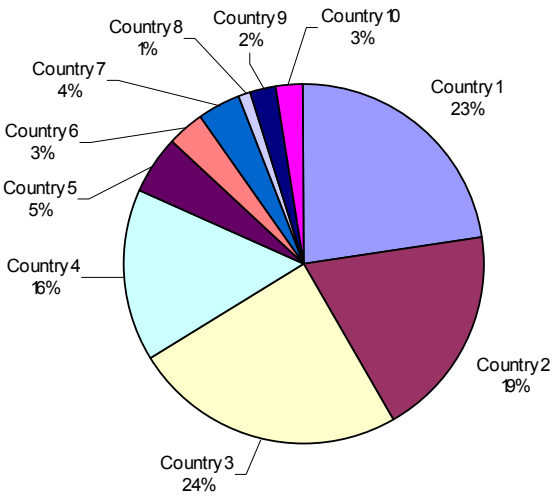
$$Di^T=Di^0-[x(di/\sum di)+y(Di/\sum Di)+z(GDPi/\sum GDPi)](D^0-D^T)$$

where *x*, *y* , and *z* are the weighting factors for indicator of need, responsibility and capacity, respectively. For expository purposes, the following weights have been chosen (see Table 9): *x = 0.25, y = 0.5 and z = 0.25*. However, a sensitive analysis of the rule using different weights suggests no major changes in final results. This could be due to the dominance of some figures when countries show significant differences among them (for example, in total discharges). In any case, comparing to other rules, this rule seems to distribute the contribution to the reduction target basically between major emitters (countries 1 to 4), but in a lower percentage as in rule 1 (sovereignty or aggregate responsibility). However, these countries would in fact benefit comparing to the flat rate approach (rule 1), as final allowed discharges are larger than those obtained in rule 1.

Table 9 Example of burden sharing of a reduction target adopting a multi-criteria rule (need, responsibility, capacity).

	Rule 7: Need, Responsibility, and Capacity							
	Principle			Weighting factor				
	Need	Responsibility	Capacity	x	y	z		
	a_i (kg/inhab.)	a_i (kg/yr)	a_i (GDP p.c)	0.25	0.50	0.25	a_i (see graphic)	Di^T
Country 1	0.088	0.311	0.196	0.022	0.156	0.049	0.227	540,460,080
Country 2	0.093	0.220	0.229	0.023	0.110	0.057	0.190	340,033,627
Country 3	0.233	0.275	0.190	0.058	0.137	0.047	0.243	418,102,661
Country 4	0.363	0.051	0.163	0.091	0.026	0.041	0.157	-74,748,442
Country 5	0.047	0.029	0.104	0.012	0.015	0.026	0.052	8,502,887
Country 6	0.010	0.048	0.025	0.003	0.024	0.006	0.033	87,126,808
Country 7	0.027	0.042	0.039	0.007	0.021	0.010	0.038	63,698,459
Country 8	0.015	0.008	0.014	0.004	0.004	0.004	0.011	6,709,648
Country 9	0.056	0.011	0.016	0.014	0.005	0.004	0.023	-1,981,604
Country 10	0.067	0.004	0.025	0.017	0.002	0.006	0.025	-22,654,123
	1.000	1.000	1.000			1.000	1.000	1,365,250,000

Figure 13 Example of burden sharing of a reduction target adopting a multi-criteria rule (need, responsibility, capacity).



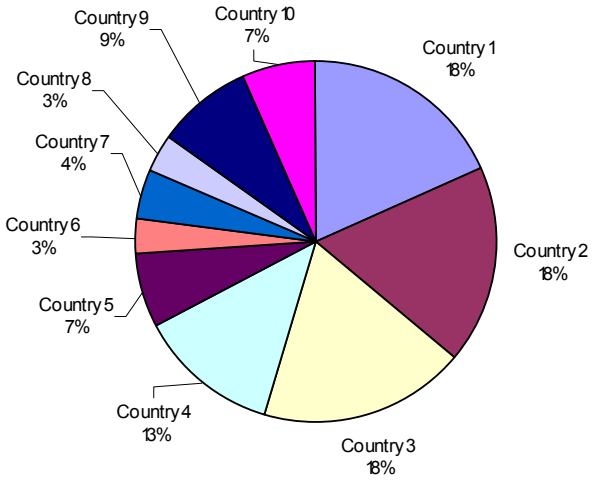
Rule 8: opportunity, responsibility and capacity

Another multi-criteria burden sharing rule can be obtained by combining (aggregate) responsibility and capacity (GDP per capita) with the opportunity principle, in terms of release intensity (discharges per GDP industrial), with the aim of taking into consideration cost-effective reductions. This rule can be formulated as above, using weighting factors for the different indicators. As shown in results (see Table 10 and Figure 14), no major differences are obtained comparing to the previous multi-criteria rule, except for an increase in the distribution of the expected contribution to the overall reduction target. Countries 1 to 3 should still address more than 50% of reductions, but other countries like 9 or 10, with high release intensity values, would also be expected to contribute to reductions at a higher rate than with the previous rule. The problem again is that these latter countries should abate 100% of their emissions and contribute to emissions in other countries.

Table 10 Example of burden sharing of a reduction target adopting a multi-criteria rule (opportunity, responsibility, capacity).

	Rule 8: Opportunity, Responsibility, and Capacity							
	Principle			Weighting factor				
	Opportunity	Responsibility	Capacity	x	y	z		
	a_i (kg/GDP ind)	a_i (kg/yr)	a_i (GDP p.c)	0.25	0.50	0.25	a_i (see graphic)	Di^T
Country 1	0.032	0.311	0.196	0.078	0.098	0.008	0.184	599,116,589
Country 2	0.028	0.220	0.229	0.055	0.114	0.007	0.176	359,155,432
Country 3	0.084	0.275	0.190	0.069	0.095	0.021	0.184	498,184,839
Country 4	0.127	0.051	0.163	0.013	0.082	0.032	0.126	-32,559,315
Country 5	0.030	0.029	0.104	0.007	0.052	0.007	0.067	-11,194,270
Country 6	0.033	0.048	0.025	0.012	0.012	0.008	0.033	87,381,992
Country 7	0.056	0.042	0.039	0.011	0.020	0.014	0.044	54,707,553
Country 8	0.093	0.008	0.014	0.002	0.007	0.023	0.032	-22,153,006
Country 9	0.303	0.011	0.016	0.003	0.008	0.076	0.086	-87,817,277
Country 10	0.214	0.004	0.025	0.001	0.012	0.053	0.067	-79,572,537
	1.000	1.000	1.000			1.000	1.000	1,365,250,000.0

Figure 14 Example of burden sharing of a reduction target adopting a multi-criteria rule (opportunity, responsibility, capacity).



- Preliminary lessons learnt

In spite of the fact that no real data have been used above (only fictitious countries with those differentiated profiles expected in the Mediterranean region), methodologically speaking some preliminary findings could be advanced for the case of applying a differentiated approach to an overall reduction target (Measure A.1):

- Several rules representing different principles for burden sharing can be used and combined to identify the fairest distribution of the effort to reduce pollution. In principle, the more criteria are considered, the more national circumstances are reflected in the final distribution of the expected contribution. However, at the same time, the more complexity is added to the methodology, and the more data is needed.

- Possibilities for identifying and combining different criteria and indicators are certainly diverse, but a limited group of criteria is in fact expected to be used in practice. These are basically related to wealth indicators (capacity, need) and release intensity indicators (responsibility, opportunity). The availability of data and its homogeneity can also be a constraint to the use of certain indicators.

- From the testing exercise of rules presented above, it can be observed how in many cases some countries not only would have to abate 100% of their emissions, but would even have to contribute to reductions in other countries. In practice, this makes no sense; especially in those cases where some countries with small total discharges have to contribute to reductions in other large (and richest) emitters (this can happen when the release intensity is used as a criterion for burden sharing). This situation has to do with the fact that in this case the equity principles are not being applied to obtain 'quotas' or calculate a fair distribution of 'needed' emissions among countries, but they are applied to obtain 'quotas' or shares for reductions in current total loads (baseline). As countries currently contribute in a very different way to total discharges, but the target is calculated as a fixed 50% reduction of baseline overall discharges in the region, small emitters will face in most cases 'unfair' contributions to the overall reduction target, unless the aggregate responsibility is predominantly taken into account. However, it is also true that release intensity needs to be taken into consideration, because it would be unfeasible to propose 50% reductions to a country where its industry and pollution preventions systems are already operating close to standards derived from Best Available Techniques.

- This situation described above is a complex one which will need to be carefully discussed under the Working Group, looking whenever possible for flexible mechanisms to the differentiation approach and if required, for a flexible interpretation of SAP targets. A possibility to facilitate discussions on this issue is to use the indicators identified before to elaborate action-oriented groupings of countries. Some examples are shown below.

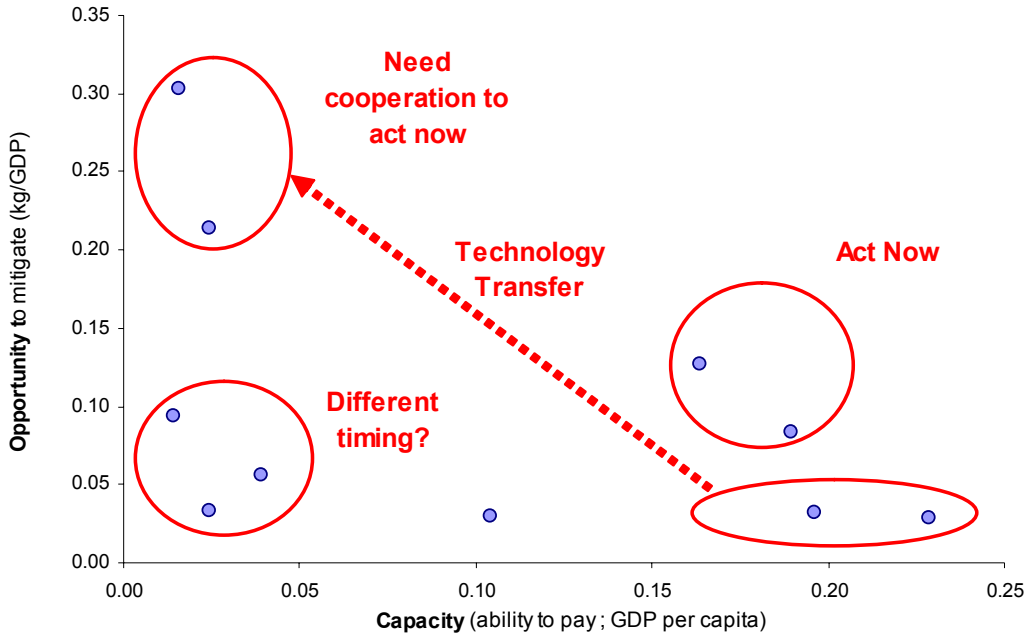
- Action-oriented grouping as a flexibility mechanism for differentiation

From a regional cooperative perspective, the potential expected actions to be undertaken by countries to reduce pollution could be identified by observing their relative position against wealth and opportunity indicators. Results obtained in the previous exercise have been used to place countries in a diagram that includes their capacity or ability to pay (GDP per capita) and their opportunity to abate discharges (kg / GDP industrial).

The distribution in the diagram (see Figure 15) can be used to identify and group those countries with relatively high release intensities and at the same time high values for wealth indicators, suggesting that these countries would be in a good position to '*act now*' to reduce

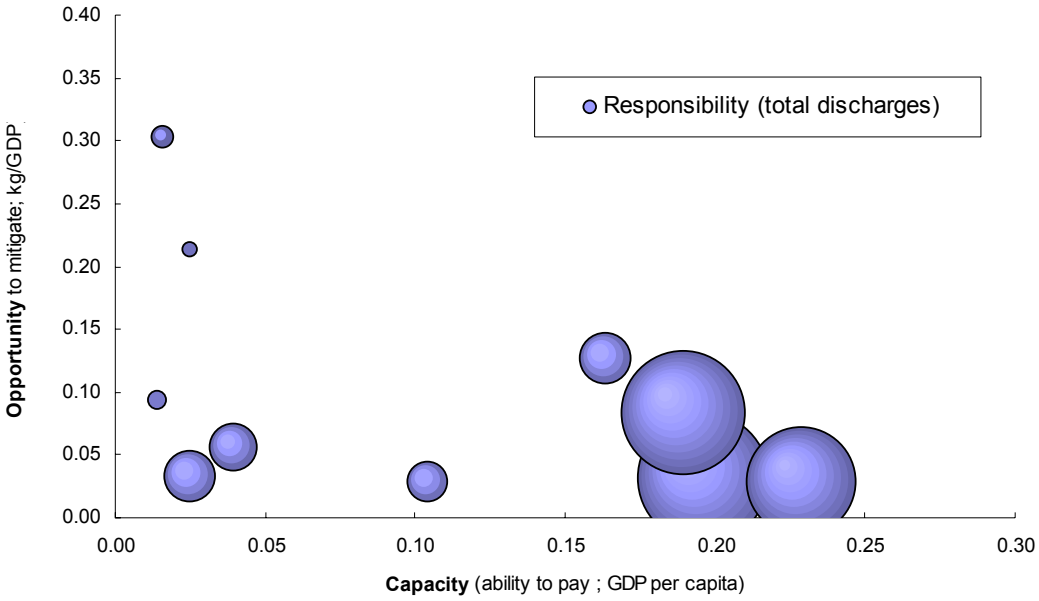
discharges. Countries with a higher capacity and with low release intensities could focus their action on a technology transfer to countries with low capacity and high levels of discharges per GDP industrial (cost-effective reductions in '*need cooperation to act now*' countries). Finally, countries with low values of GDP per capita and release intensity could have an temporary exemption ('*different timing*') to contribute to overall reduction targets, as probably they need to develop their economies and consequently will increase their current emissions. Nevertheless, these countries should also need some cooperation to develop their industrial sector with low-emitting technologies.

Figure 15 Action-oriented grouping of countries.



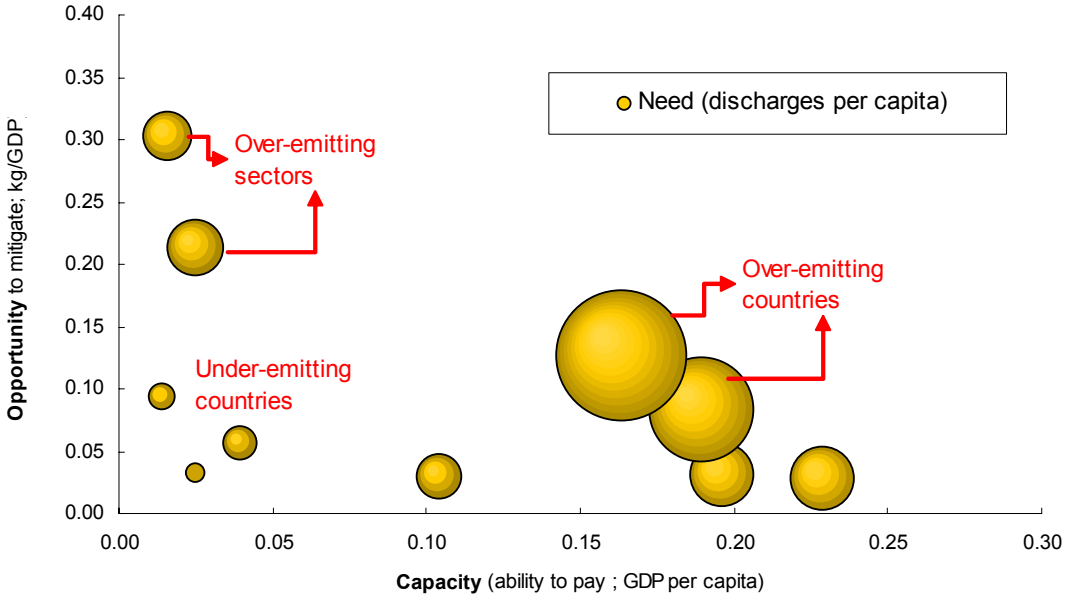
It must be noted that in the diagram above total loads are not taken into consideration, which can also be introduced as a third variable, as shown in figure 16 (size of bubbles). This multi-criteria approach can serve to better identify priorities for actions, although grouping can be now more complicated. For example, data from our case study would indicate that focusing actions on countries with low economic capacity and high release intensities would have a limited effect on the overall emissions, as these are concentrated in a limited group of countries with already low release intensities. Results could be different by using real data, but as a general trend, technology transfer and financial cooperation would still be expected from some countries.

Figure 16 Action-oriented grouping of countries (considering aggregated responsibility).



Finally, another example is shown (Figure 17) by using as a third variable discharges per capita, to represent the principle of need ('needed emissions'). In this case, those countries with higher discharges per capita (over-emitting countries) can be identified as well as their position against capacity and opportunity. However, as basically discharges from industrial sources are being considered, this indicator should be carefully analysed, as results could be conditioned by the level of industrialization of that countries and their sector profile.

Figure 17 Action-oriented grouping of countries (considering 'needed' emissions).



3.2.2 Reductions of release intensity indicators: a convergence approach

Measure A.2 addresses reduction of pollution loads by targeting the reduction of release intensity indicators against an 'optimum' or desirable relative level of emissions. Release intensity can be either defined in terms of discharges in relation to population (e.g. kg of pollutant 'X' per inhabitant, or coastal inhabitant), or in terms of discharges per unit of economic activity (e.g. discharges per GDP industrial), as we have seen before. Considering that the scope of this work basically addresses discharges from industrial sources, it is reasonable to focus on this second option. Additionally, determining 'optimum' release intensity relative to population for industrial discharges among countries with different industrial profiles would be complex and conceptually misleading.

So, focusing on industrial release intensity indicators, as indicated before, it is also reasonable to determine 'optimum' release intensity on a sector basis, by estimating the expected emission factors if the Best Available Techniques (BAT) are adopted. Release intensity relative to macro-indicators like GDP are easier to obtain but would not represent properly the different national industrial profiles. Furthermore, actions will eventually be needed to be implemented and monitored on a sector basis.

Under this scenario, and assuming that it is not feasible for all industries to adopt BATs (at least in the short/medium-term), the target has been suggested before as a % reduction of releases above the BAT derived emission factor (BAT EF) (see Figure 2).

Now potential mechanisms for differentiation are apparently more limited than previously in the case of burden sharing of a fixed overall reduction target (Measure A.1). The differentiated expected contribution to reduction of discharges will need to be based on the current emission factors of sectors in the different countries, comparing to the 'optimum' or BAT emission factor, thus leading to a process of convergence of emission factors among countries. Accordingly, this approach would focus on the 'opportunity' principle of sectors to abate emissions, but in some way also in the relative 'responsibility' of sectors. However, as suggested by Jansen et al (2001) [11] when proposing its multi-sector approach to globally abate GHG emissions, other indicators should be taken into account in order to ensure an 'equitable' distribution of the effort to mitigate emissions, such as per capita GDP (ability to pay), as not all countries are equally able to introduce low-emitting techniques.

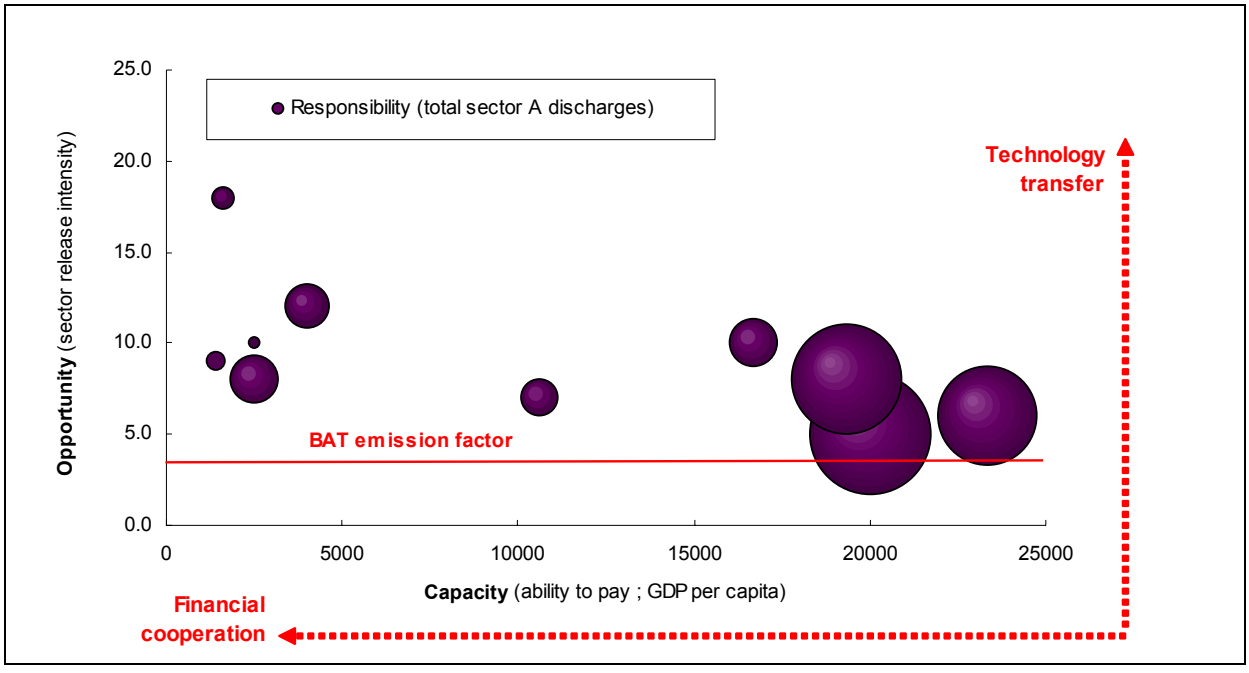
Firstly assuming an homogeneous reduction (e.g. 50% reduction) of current emissions factors or release intensities above the BAT emission factors, a case study is presented below (see table 15) to illustrate a differentiation approach process based on sector convergence of release intensities (A.2 type-measure). Total discharges of pollutant 'X' in a certain industrial sector ('Sector A'), for the same group of fictitious countries used above are showed in the second column of table 15. When compared to actual total sector activity (e.g. manufactured tonnes, third column), actual average sector emission factors can be obtained for each country (fourth column). These factors are expected to be reduced 50% comparing to the BAT EF, assumed to be 4 kg of pollutant 'X' / tonne produced. For example, Country 1 would have to reduce its EF from 5 kg/t to 4.5 kg/t, and Country 3 from 8 kg/t to 6 kg/t. As a result, considering total sector production, discharges to be reduced and final expected discharges can be calculated (columns 7 and 8, respectively).

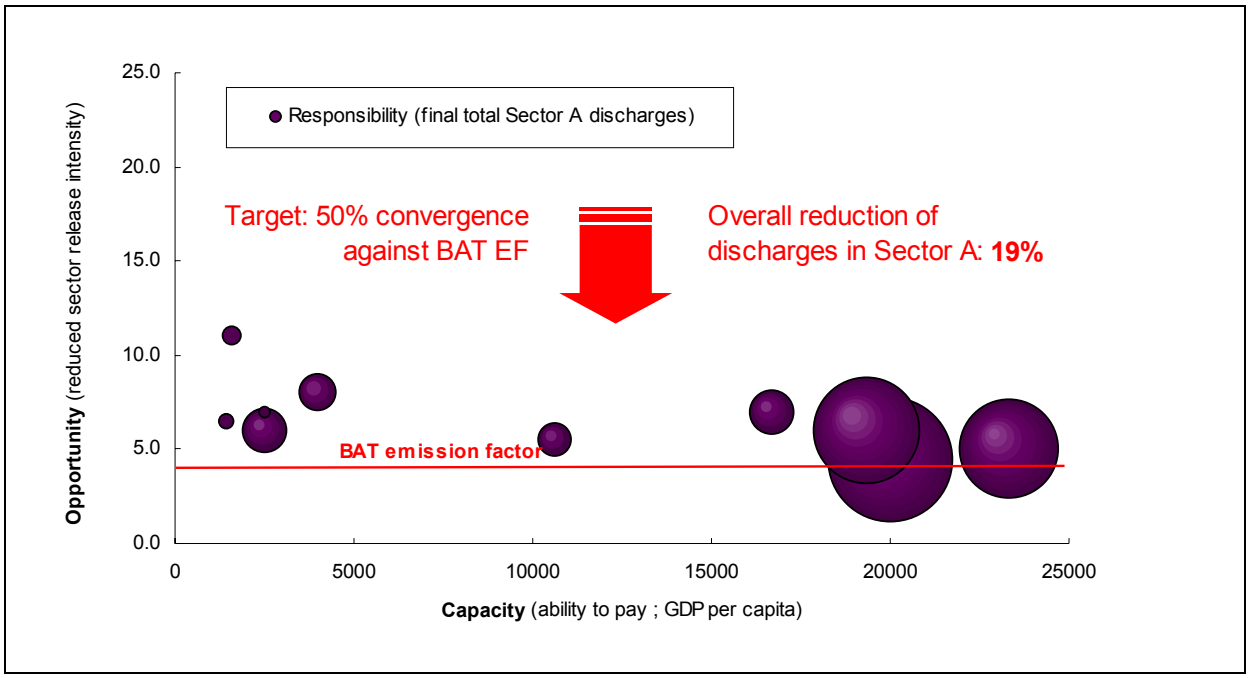
Table 11 Case study: targeting the convergence against BAT sector release intensity.

Sector A	Baseline total discharges of pollutant 'X' in Sector A (kg/yr)	Total sector production (manufactured tonnes / yr))	Average sector emission factor (kg / tonnes produced)	Sector BAT emission factor (kg / tonnes produced)	Target reduction of releases above BAT EF	Discharges to be reduced in Sector A (kg/yr)	Final expected discharges in Sector A (kg/yr)	% total reduction
Country 1	8,500,000	1,700,000	5.0	4.0	50%	850,000	7,650,000	10%
Country 2	6,000,000	1,000,000	6.0	4.0	50%	1,000,000	5,000,000	17%
Country 3	7,500,000	937,500	8.0	4.0	50%	1,875,000	5,625,000	25%
Country 4	1,400,000	140,000	10.0	4.0	50%	420,000	980,000	30%
Country 5	800,000	114,286	7.0	4.0	50%	171,429	628,571	21%
Country 6	1,320,000	165,000	8.0	4.0	50%	330,000	990,000	25%
Country 7	1,150,000	95,833	12.0	4.0	50%	383,333	766,667	33%
Country 8	220,000	24,444	9.0	4.0	50%	61,111	158,889	28%
Country 9	300,000	16,667	18.0	4.0	50%	116,667	183,333	39%
Country 10	115,000	11,500	10.0	4.0	50%	34,500	80,500	30%
Total	27,305,000	2,936,022				5,242,040	22,062,960	**19%**

It must be noted that depending on the size of the sector in each country, and its actual emission factors, a 50% reduction of release intensities can be above or below an overall reduction of 50% of regional discharges. In the example above, a 19% overall reduction is achieved in Sector A, as major emitting countries are in this case closer to the BAT EF, and hence relative reductions (see column 9) are lower than other countries. These results are illustrated in Figure 18, where the relative position of countries against the BAT EF is represented, as well as their ability to pay (GDP per capita) and responsibility (total sector A discharges). The upper diagram shows the current situation, and the diagram below shows the resulting situation after reducing 50% the country emissions factors above the BAT EF. As it can be observed, countries tend to convergence against the BAT EF, reducing their total discharges (size of bubbles) by **19%** (provided total industrial activity keeps constant). However, large emitters already close to BAT EF (place on the right of diagrams), will reduce their total discharge proportionally less than other countries. As suggested before, a cooperative approach to this situation would consist in facilitating technology transfer from 'cleaner' countries to the rest of countries (illustrated by the bottom-up arrow) and financial cooperation from countries with a major economic capacity (right-to-left arrow).

Figure 18 Targeting the convergence against BAT sector release intensity.





Another complementary possibility is to differentiate or adjust the contribution to reduction of emissions factors according to responsibility (total sector discharges) and ability to pay (GDP per capita) criteria. Many formulas could be derived to address this approach. As an example, an 'adjusting' mechanism is shown below, which consists in increasing the 50% target according to total sector discharges (responsibility) and GDP per capita (ability to pay). The final adjusted (increased) targets according to this rule are shown in the last column of Table 12. The combination criteria can be weighted depending whether the focus is on capacity or responsibility (the same weight is applied in the example). However, a sensitive analysis indicates that final results would not vary significantly. When final adjusted targets are applied to current emission factors in the different countries, an overall reduction of 23% is now obtained, as shown in Table 13. This means that total loads will still be dominated by large emitters close to BAT emission factors. It must also be noted that if a 100% convergence against the BAT EF is targeted, that is, the maximum technically potential reduction, the overall reduction achieved would be up to 38%. This suggests that, for this case study, a 50% overall reduction is not feasible, unless industrial activity decreases.

Table 12 Adjusting convergence targets according to responsibility and capacity criteria.

	Capacity	Responsibility	Capacity	Responsibility	Weighting factors		Increasing factor to the 50% target	Final adjusted target
	(GDP p.c.)	(sector A discharges)	%	%	0.50	0.50		
Country 1	20,000	8,500,000	0.196	0.311	0.098	0.156	25%	63%
Country 2	23,333	6,000,000	0.229	0.220	0.114	0.110	22%	61%
Country 3	19,333	7,500,000	0.190	0.275	0.095	0.137	23%	62%
Country 4	16,667	1,400,000	0.163	0.051	0.082	0.026	11%	55%
Country 5	10,625	800,000	0.104	0.029	0.052	0.015	7%	53%
Country 6	2,500	1,320,000	0.025	0.048	0.012	0.024	4%	52%
Country 7	4,000	1,150,000	0.039	0.042	0.020	0.021	4%	52%
Country 8	1,429	220,000	0.014	0.008	0.007	0.004	1%	51%
Country 9	1,600	300,000	0.016	0.011	0.008	0.005	1%	51%
Country 10	2,500	115,000	0.025	0.004	0.012	0.002	1%	51%
	101,987	27,305,000	1	1		1	100%	100%

Table 13 Case study: targeting the convergence against BAT sector release intensity (adjusted targets)

Sector A	Baseline total discharges of pollutant 'X' in Sector A (kg/yr)	Total sector production (manufactured tonnes / yr))	Average sector emission factor (kg / tonnes produced)	Sector BAT emission factor (kg / tonnes produced)	Target reduction of releases above BAT EF	Discharges to be reduced in Sector A (kg/yr)	Final expected discharges in Sector A (kg/yr)	% total reduction
Country 1	8,500,000	1,700,000	5.0	4.0	63%	1,065,646	7,434,354	13%
Country 2	6,000,000	1,000,000	6.0	4.0	61%	1,224,264	4,775,736	20%
Country 3	7,500,000	937,500	8.0	4.0	62%	2,310,227	5,189,773	31%
Country 4	1,400,000	140,000	10.0	4.0	55%	465,085	934,915	33%
Country 5	800,000	114,286	7.0	4.0	53%	182,870	617,130	23%
Country 6	1,320,000	165,000	8.0	4.0	52%	342,021	977,979	26%
Country 7	1,150,000	95,833	12.0	4.0	52%	398,923	751,077	35%
Country 8	220,000	24,444	9.0	4.0	51%	61,785	158,215	28%
Country 9	300,000	16,667	18.0	4.0	51%	118,223	181,777	39%
Country 10	115,000	11,500	10.0	4.0	51%	34,995	80,005	30%
Total	27,305,000	2,936,022				6,204,039	21,100,961	**23%**

3.2.3 Quality of the environment: risk-based oriented action

As previously described, "*Ensuring Environmental Quality Objectives*" (B) can include two differentiated measures: enforcement of Emission Limit Values (ELV) (B.1), and achievement of Environmental Quality Standards (EQS) (B.2). Both measures are related with preventing levels which may pose a risk to the environment and human health, but B.1 (ELV) is focused on the source of releases, and B.2 (EQS) focuses on the state of the environment. This distinction will influence potential mechanisms for differentiation, as described below:

- <u>Emission Limit Values: should they be differentiated?</u>

In principle, the same Emission Limit Values should be enforced to all industrial operations in the Mediterranean region, otherwise companies in the different countries would be facing different legal and competitivity frameworks. However, some criteria could be used for a differentiated definition and enforcement of ELV:

(a) Capacity of the local environment to absorb discharges.

(b) Ability of the national industry to adopt stricter ELV: gradual convergence of ELV during a period of time.

Regarding the first criterion, it is very difficult to determine whether the environment in an area has a major capacity to absorb emissions than in another area, and whether the final impact will be more or less important. However, in principle those highly concentrated discharges will probably have a major impact on the environment, and hence the stringency of ELV should be higher. In fact, this should be assessed on a local scale by each country, ensuring the enforcement of some basic reference values of ELV, and having the possibility to increase them provided a major risk to the local environment is detected. At a regional level, an overall assessment of country's potential impact on the coastal environment can be very roughly estimated by relating total discharges with some geographic indicators, like coastal Mediterranean area or length of coastline (including islands). An illustrative example is shown in Table 14.

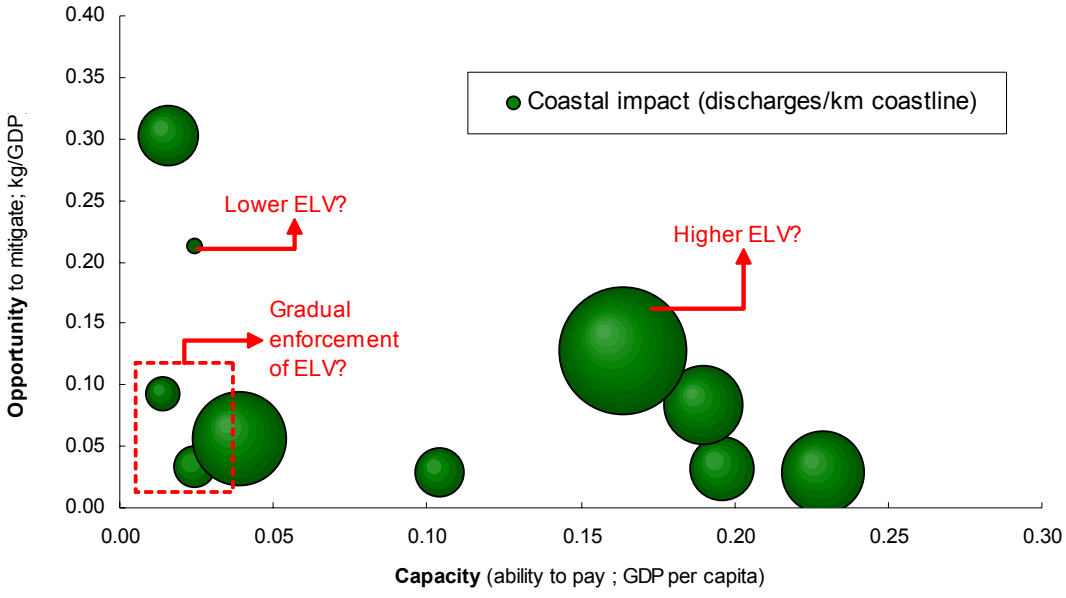
Table 14 Indicators for potential impact on coastal environment.

	Pollution	Geography		Indicators for potential coastal impact	
	Total loads	Coastal area	Coastline	Loads / area	Loads / coastline
	(kg 'X'/yr)	(Km2)	(Km)	kg / km2	kg / km
Country 1	850,000,000	150,000	7,000	5,667	121,429
Country 2	600,000,000	80,000	3,000	7,500	200,000
Country 3	750,000,000	50,000	4,000	15,000	187,500
Country 4	140,000,000	8,000	300	17,500	466,667
Country 5	80,000,000	10,000	1,200	8,000	66,667
Country 6	132,000,000	110,000	2,550	1,200	51,765
Country 7	115,000,000	35,000	450	3,286	255,556
Country 8	22,000,000	40,000	600	550	36,667
Country 9	30,000,000	4,000	300	7,500	100,000
Country 10	11,500,000	5,000	1,200	2,300	9,583

Results are also represented in the same type of diagram as used before (see Figure 25), in order to identify those countries with a major potential for coastal impact (e.g. discharges per km of coastline), as well as their relative position against the capacity and opportunity criteria. Whereas countries showing a high potential coastal impact should consider the possibility to increase ELV in certain areas (or improve pollution prevention systems as far as possible), countries with very low potential coastal impact could claim for less stringent ELV.

Furthermore, regarding the second potential mechanism for differentiation (gradual convergence), those countries with relatively low release intensity indicators (opportunity) and low ability to pay, could claim for a gradual adoption of stricter values of ELV during a certain period of time.

Figure 19 Combining potential impact on the coastal environment and ability to pay as a potential differentiation mechanism for the enforcement of ELV.



- Environmental Quality Standards: indicators for a differentiated priority for actions

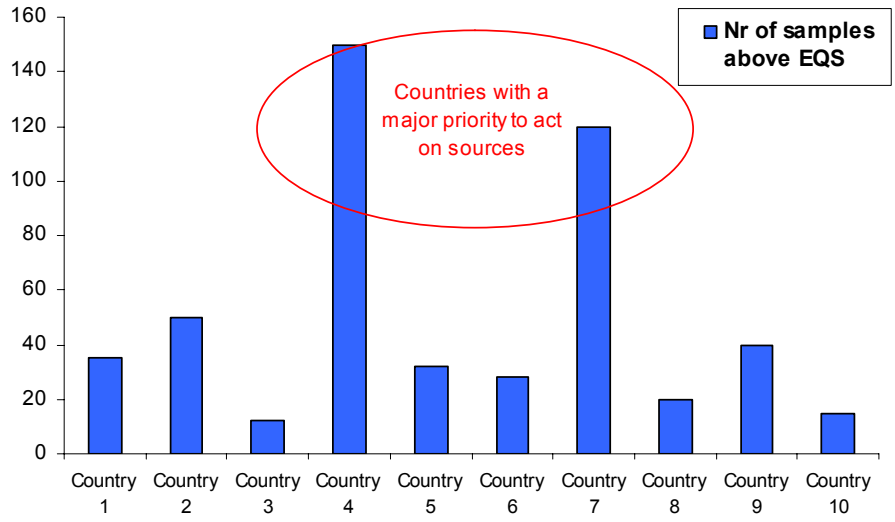
When the focus is on the achievement of Environmental Quality Standards (maximum allowable concentration of a pollutant in an environmental sample), no differentiation on the target should be expected among countries; that is, EQS should be achieved in the overall the region. A risk-based action oriented differentiation should rather be approached, in terms of identifying those areas with major measured levels of pollutants above EQS, in order to evaluate priority actions on the specific sources of pollutants leading to those high levels. As indicated before, these actions can be in fact the enforcement of more stringent ELV, specific load reductions in polluted areas, promotion of the adoption of BAT, etc. In this sense, the target is focused directly on the quality of the environment, but countries might have the flexibility to undertake the set of measures more convenient in each case.

The identification of priority areas according to measured levels above EQS can be done through the assessment of outcomes of regional and national monitoring programmes. This allow for an identification of the number of samples above EQS (see Figure 20, their distribution, as well as the trend over a period of time. Priority areas can also be determined according to the proximity of samples with high levels of pollutants to protected areas.

Once areas with a major priority for action are identified, national circumstances can also be taken into account in order to provide cooperation on monitoring programmes or assistance to undertake actions to reduce discharges.

The discussion on which indicators are the most appropriate to assess the quality of the environment is out of the scope of this document. Here these indicators are generally referred as EQS, but these could be defined in terms of Environmental Assessment Criteria (EAC), Predicted No-Effect Concentration (PNEC), biomarkers, etc. This is an on-going discussion in the marine area which needs to be specifically tackled by groups of experts.

Figure 20 Graphical example on identification of priority areas according to number of samples with measured levels of pollutants above EQS.



3.2.4 Summary of differentiation mechanisms and flexibility criteria

A summary of the potential differentiation mechanisms for the implementation of the different type of measures to address pollution from industrial land based sources, which have been

described above, is presented in Table 15. As it can be observed, different mechanisms can be applied depending on the nature of measure.

As a general distinction, 'targeting load reductions' (A) allow for more mechanisms of differentiation than 'ensuring environmental quality objectives' (B). Furthermore, depending on where is the focus for differentiation (whether responsibility, capacity, opportunity, etc.), indicators to be used will also vary, and also the rules to combine them. However, most of principles and burden sharing rules are developed on the basis of wealth and release intensity indicators.

It must be noted that differentiation mechanisms have been preliminary identified in this document on the basis of common practices or approaches in other multilateral environmental agreements. The MEDPOL Working Group on differentiation might probably identify other possibilities and requirements for further refinement of mechanisms in order to adapt to the framework of the Barcelona Convention.

Table 15 Nature of measures and related criteria for differentiation

	Nature of measure	**Possible criteria for a differentiated approach (DA)**
A	- **A.1** Reduction target (%) against baseline total emissions	- Responsibility (historic/total discharges/per capita) - Capacity (ability to pay) - Need (discharges per capita, population growth…) - Opportunity to mitigate (release intensity) - Other…
	- **A.2** Reduction target (%) against release intensity (convergence)	- Opportunity to mitigate (actual release intensity vs. BAT EF) - Adjusted by: Capacity, Responsibility…

B	- **B.1** Enforcement of Emission Limit Values (ELV)	- DA only partially applicable:
		  - Potential coastal impact / potential to absorb emissions
		  - Capacity (gradual adoption of ELV)

	- **B.2** Achievement of Environmental Quality Standards (EQS)	- DA not on the target but on the identification of different priority areas according to:
		  - Measured levels in media (water, sediments, biota) above EQS (nr of samples, distribution, trends,)
		  - Measured levels in protected areas

Considering the complexity and controversy of the issue under discussion, it is also very important to highlight those criteria or mechanisms that can allow for a flexible approach to differentiation. To some extent, they have already been identified in the examples above, and can be taken into consideration for any nature of measure:

- **Combination of principles** (multi-criteria analysis): a straightforward rule using a single criterion for differentiation, and acceptable for all (unequal) countries, is highly

unlikely to be identified. As an alternative, multi-criteria approaches that include indicators linked to different principles (responsibility, opportunity, capacity, etc.) might provide an outcome where different national circumstances are properly addressed.

- **Grouping** of countries according to different criteria (responsibility, opportunity, capacity…) can be used as a mechanism to identify those countries with similar national circumstances, and common expected actions to address pollution for each group of countries can be identified (mitigate now their own emissions, technology transfer, temporary exemptions or gradual convergence, etc.).

- **Technology transfer**: countries which have already adopted cleaner production industrial systems could complement their own abatement effort by transferring technology and providing technical assistance to other countries with high values for release intensity indicators, with the overall aim of a convergence among industrial sectors in the Mediterranean region against environmental standards. The 'opportunity' principle is underlying this flexibility mechanism.

- **Financial cooperation**: countries with a major economic capacity, especially large emitters, could provide financial aid to other Mediterranean countries to undertake cost-effective projects to abate emissions. Something similar to Clean Development Mechanisms (CDM) adopted in the Kyoto Protocol could be explored to be adapted under the Barcelona Convention. However, any mechanism allowing for a (limited) offset of discharges in certain countries should take into account the capacity of the environment to absorb pollution (marine pollution can not be approached as greenhouse gases). In this case, a combination of the 'responsibility' and 'capacity' principles are underlying this flexibility mechanism.

- **Temporary exemptions** or gradual adoption of targets could be 'granted' to those countries showing low release intensity indicators and a low capacity (ability to pay) status. For example, in the case of adoption of stricter Emission Limit Values or convergence against 'optimum' emission factors. Now the 'need' principle is underlying this flexibility criterion.

- **Priority areas**: the identification of national territories or specific areas showing a major risk for the coastal and marine environment (e.g. hot spots, or areas of environmental concern) can be used to 'differentiate' a first set of priority actions to address pollution in those areas.

- **Periodic review of the system**: any eventually approved differentiated approach could be adopted with the condition to be reviewed periodically. This could allow for a testing of the evolution of indicators, which might vary the relative position of countries against the expected relative contributions to the reduction of pollution. Also deeper knowledge on the state of the Mediterranean environment and the impact of pollutants, could suggest changes in the approach to prevention of discharges.

- **Nature of the target**: the target itself to reduce pollution can be approached in a dynamic form (independent of baseline[3]), instead of a fixed target (as currently is approached now). A dynamic target could facilitate the implementation of the differentiated approach, as targets would be closer related to national circumstances. Again, consideration of the state of the environment should be combined to allow or not for dynamic targets.

[3] Or placing the baseline in the future expected emissions according to certain development scenarios.

Additionally, it can be reminded that the nature of substance and nature of sources, as described in Section 0, can also be taken into consideration to elaborate on most appropriate measures to be taken (e.g. load reductions only for certain substances and in certain countries).

Finally, the technical and information requirements for the different options could act as some kind of 'feasibility' criteria, which could influence the nature of measure to be adopted and the related differentiation mechanisms. A brief review of this issue is addressed in the next section.

4. Information requirements

4.1 Required information for load reduction measures

For a differentiated implementation of load reduction measures (A.1 and A.2) two general categories of information is needed: emission data and socio-economic data.

4.1.1 Emission data – total loads

Required data:

In order to determine baseline emissions of pollutants entering the Mediterranean environment, actual wastewater discharges and air emissions (kg/yr) for the targeted substances are required. Loads to be accounted are should be those produced after the application of pollution prevention systems (air filters, wastewater treatment plants). The geographic coverage have to be harmonized (for example the Mediterranean catchment areas in each country). Detailed information on sources is also desirable in order to determine to proper scope of action to abate emissions. In this sense, the industrial sectors and subsectors discharging emissions and its geographic location would be needed for all countries. Finally, periodical monitoring of emissions will be required in order to track achieved reductions.

Availability of data:

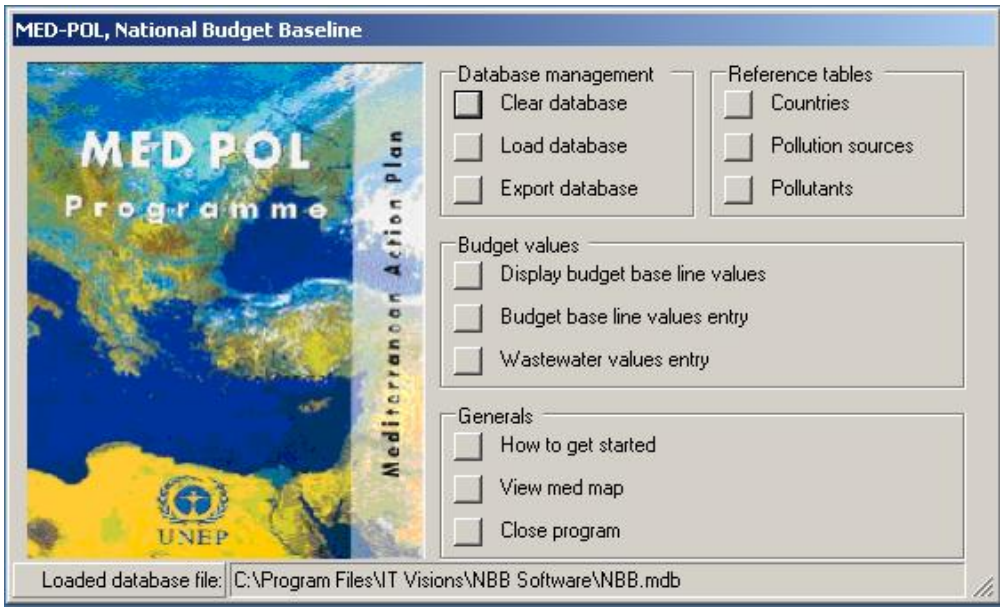
The key reference is the National Baseline Budget [25], which includes emission data to air and water for SAP priority pollutants in all MAP countries. The baseline year is 2003, and the database compiled by MEDPOL can be organized by substance, sector, subsector, country and administrative region (see Figure 21). So, this database has a major potentiality to be used as a baseline on current national and regional loads of pollutants, and to analyse the specific sources of pollutants by sector and administrative regions. Currently the database is being updated and refined with revised data from some countries. However, to be used as a baseline, it has to be ensured that all countries have followed the NBB guidelines [25] to elaborate their inventories, the same substances are considered, and the same approach to delimit the geographic scope has been used.

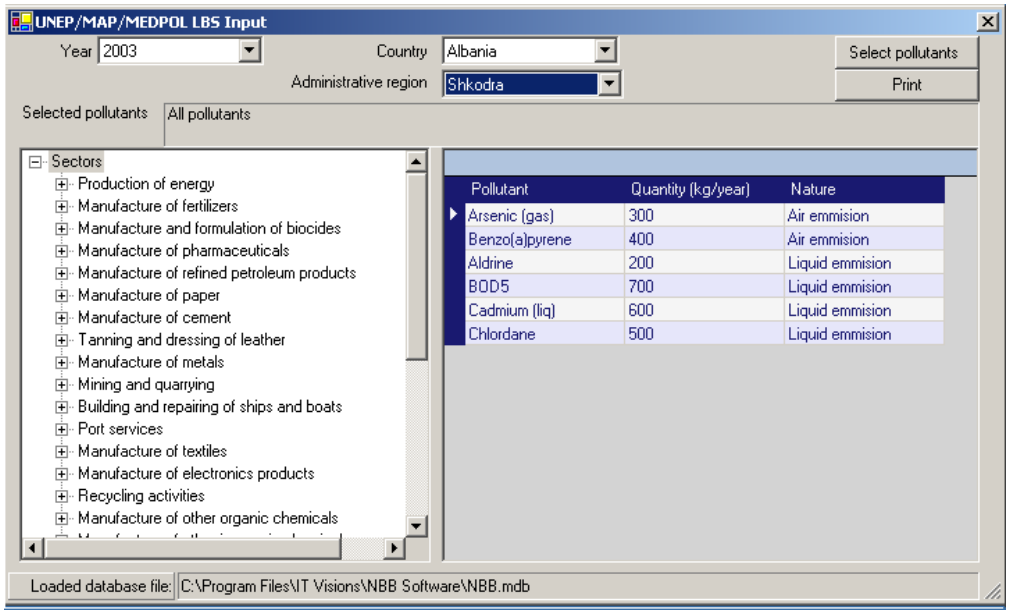
Countries may have also their own national inventories, or participate in other regional initiatives, like the European Pollutant Emission Register (EPER), which is similar to the NBB, but do not include the same substances.

For complementary purposes, for some substances or specific sectors, information could also be obtained from the MAP Technical Reports Series, from the European Environmental Agency (EEA), the Blue Plan or the MEDSTAT initiative (See below).

Comprehensive regional assessment (both from sources, pathways and levels in the environment) are also available for Persistent and Toxic Substances (PTS) (UNEP/GEF, 2002).

Figure 21 Some views of the National Baseline Budget database.





4.1.2 Emission data – release intensity

Required data:

To approach the reduction of release intensity, actual emission factors need to be obtained on a sub-sector basis, for all countries. A sector basis may be too broad for most of sectors, as the *reference measure of activity* (in economic units, tonnes of production or use of raw materials) may vary among sub-sectors. Even achieving this level of detail, rough estimations will be needed to derive average emission factors (for example in the chemical

sector, which shows a high variability of processes in comparison to other sectors, as for example the cement industry).

Besides actual emission factors, it is also needed to determine 'optimum' emissions factors provided Best Available Techniques are adopted, that is, the BAT emission factors.

Availability of data:

Currently, information on actual emission factors is hardly available, neither at regional or national level. A specific review would be needed to comprehensively check the availability of this kind of information, which is out of the scope of this document. In any case, probably the most convenient way to proceed would be to use the National Baseline Budget to determine actual emissions factors, by uploading also the required data on industrial activity in the different sub-sectors in each country. On the other side, this can imply a huge amount of work, and priority sectors should be identified to gradually obtain information.

Regarding BAT emission factors, some data could be obtained by a review of regional or national sector studies. At European level, a good source of information is the European Integrated Pollution Prevention and Control Bureau (EIPPCB), which elaborates the Reference Documents on Best Available Techniques (BREFs) for a range of sectors (more than 30 sectors have already been addressed), including actual (average) and BAT emission factors.

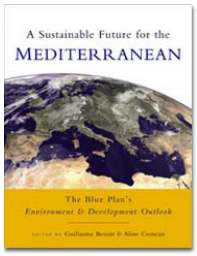
4.1.3 Socio-economic data

Required data:

For a differentiated implementation of both A.1 and A.2 measures, socio-economic data is required to take into consideration the diversity of national circumstances. This information will be basically related with population, macro-economic indicators, and industrial activity. The main difficulties can be derived from the need to elaborate specific indicators for the national Mediterranean areas.

Availability of data:

If generic macro-indicators are used for the above criteria (total population, GDP, industrial share, etc.), these data will be available for all countries in any statistical compendium (World Bank, OCDE, Eurostat…). Focusing on the Mediterranean areas (Mediterranean coastal population, economic and industrial activity, etc.), will require of more specific indicators, which can be available from the Blue Plan indicators. For example the statistical compendium available in the following report: *A Sustainable Future for the Mediterranean. The Blue Plan's Environment and Development Outlook* (Blue Plan, 2005):



Additional specific data for Mediterranean regions will have to be elaborated using disaggregated data likely available from national statistical bureaus.

Finally, it must be mentioned the MEDSTAT initiative, which can lead to an increase in the availability and comparability of statistical data in the overall Mediterranean region:

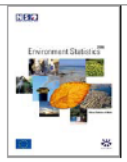
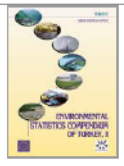
MEDSTAT II

The Member States of the European Union and the Mediterranean partners stepped up their statistical relationships through the MEDSTAT regional statistical cooperation project, which is financed by the MEDA programme. MEDSTAT I ran from 1996 to 2003 and MEDSTAT II was initiated in 2006 and will run for three years.

The objective of the project is to bring statistical methodology into line with European and international standards and to improve data consistency in the Mediterranean partner countries, as well as comparability with statistical data from the EU countries. The MEDSTAT project is also intended to improve the quality of the services that the national statistics offices and other partner organisations involved in the production of statistics provide to users.

MEDSTAT II builds on the qualitative work already accomplished by organising training sessions and providing technical resources for the information systems of national statistics offices and other statistics producers in the Mediterranean countries. Close attention is being given to data consistency, harmonisation and dissemination in 9 statistical sectors: trade in goods and services, transportation, migration, tourism, the environment (see Figure 22), national accounts, social statistics, energy and agriculture.

Figure 22 National Publications Produced as Part of MEDSTAT – Environment.

	*Environment Statistics 2006*, Statistical Service of Cyprus, Nicosia, 2006. ISBN 9963-34-423-2		*Compendium statistique national 2006*, Administration Centrale de la Statistique, en collaboration avec le Ministère de l'Environnement, Beyrouth, 2006
	*Compendium national sur les statistiques de l'environnement*, Office national des Statistiques, Alger, 2006. ISBN 9961-792-01-7		*Environment Statistics 2006*, National Statistics Office of Malta, Valleta, 2006. ISBN-13 :978-99909-73-40-2(2006).
	*Environment Data Compendium Israel, Jerusalem*, Central Bureau of Statistics, 2006. ISBN 965-90423-7-X		*Statistiques Environnementales au Maroc*, Direction de la Statistique, Rabat, 2006.
	*National Compendium on Environment Statistics Jordan*, Department of Statistics, Amman, 2006		*Statistiques de l'environnement de la Tunisie, compendium 2005*, Institut national de la Statistique, Tunis, 2006.
			*Environment Statistics compendium of Turkey II*, Turkish Statistical Institute, Ankara, 2006.

4.2 Required information for quality of ecosystem measures

4.2.1 Enforcement of Emission Limit Values

Required data:

The setting of common enforceable Emission Limit Values (ELV) in all Mediterranean countries requires a previous agreement on reference values for ELV for the different substances and industrial sectors. Furthermore, if conditional ELV are going to be adopted in relation to the potential local impacts on the environment, common criteria need also to be agreed.

Availability of data:

Emission Limit Values are already adopted in most countries for a wide range of pollutants and sectors. In this sense, the major gap of information is a comprehensive comparative review of ELV being applied in the different countries, and an assessment of the need to further develop reference ELV, which can be a long-time process (see Macia V (2005) [13]). The main references to this regard identified at regional level are the following:

- EC (2004) *Applicability of Convergence Road-Map for the NIS for the Mediterranean region* – Final Report. ERM/DG Environment, European Commission.

  It includes a comprehensive review of non-EU Mediterranean national environmental legal frameworks, as well as a comparability assessment with EU legal framework and convergence mechanisms.

- Macià, Victor (2005) Regional Assessment on the National and Regional regulations for releases of pollutants from industrial installations. MED POL Agreement No. 4-04074. February 2005.

  This report specifically addresses the review of current ELV being applied in EU and non-EU Mediterranean countries, although several gaps of information are pointed out.

4.2.2 Achievement of Environmental Quality Standards

Required data:

This measure would imply the setting of a common set of indicators on the quality of the environment, to be monitored over time in all countries. As suggested previously, the set of indicators to be used is out of the scope of this document, as specific discussion on this topic is already on-going by expert groups. Indicators will be needed for all targeted pollutants, but the specific indicators can focus on different media (water, sediment, biota), and can be of different nature (measured concentrations, bio-markers,). Once the most convenient indicators are agreed, the reference values or quality standard for each indicators need to be determined, for example, Environmental Assessment Criteria (EAC), Predicted no-effect concentration (PNEC), etc. Monitored values would be compared against quality standards to observe the level of achievement of these standards, its trend, and its geographic distribution.

Availability of data:

Many indicators on the quality of the environment have already been monitored since many years in the Mediterranean by regional programmes (MEDPOL), national programmes (e.g. RNO in France, or SIDIMAR in Italy), or by specific research works. Some information of the main reference, the MEDPOL programme, is presented below. The MAP Technical report series are also a source of information, as well as regional assessments for specific substances (like for PTS (UNEP/GEF, 2002)). Many information can also be obtained from the scientific literature and outcomes of specific projects.

The MEDPOL programme

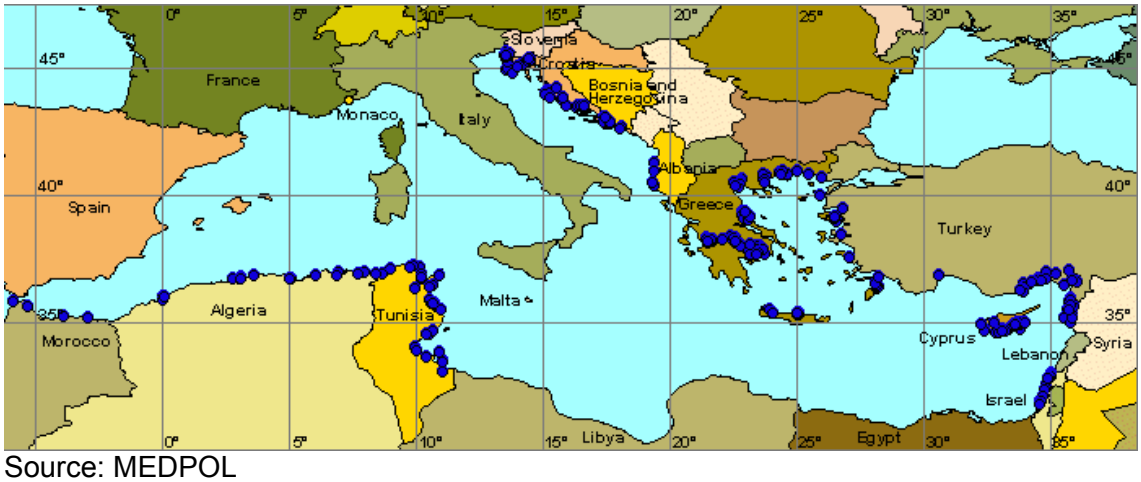
MED POL Phase III monitoring programmes are designed to cover basically two different types of marine sites; hot spots and coastal/reference areas. Samples are collected from different environmental media. The mandatory monitoring matrices for MEDPOL programme are biota and sediment for hazardous substances. The programme also covers the collection of data on land based inputs from point and diffuse sources. The ongoing monitoring activities provide data on different parameter groups. For hazardous substances, trace metals (Total Hg, Cd, etc.) and organic contaminants (halogenated hydrocarbons, poly aromatic haydrocarbons etc.) are included. Total mercury and cadmium are the only ones which are mandatory, however, most of the national programmes contain more than those as recommended. In Table 16 statistics on the availability of data in the MEDPOL III database are presented, and the monitoring sites are presented in Figure 23.

Table 16 Yearly statistics of MED POL Phase III database.

Year	Number of Stations	Number of Samples	Number of Parameters	Number Of Values
1996	21	137	13	873
1997	21	146	16	1090
1998	24	83	7	393
1999	206	1327	108	7930
2000	162	1182	117	7982
2001	307	2006	87	17310
2002	178	1358	70	7507
2003	156	1272	83	7176
2004	58	696	77	4159
Total	445*	8207	97*	54420

* Only unique stations and parameter are counted

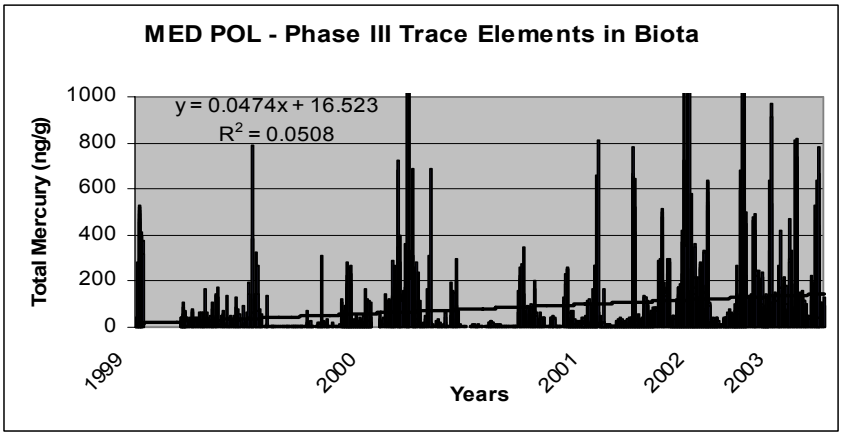
Figure 23 MED POL Phase III Monitoring sites

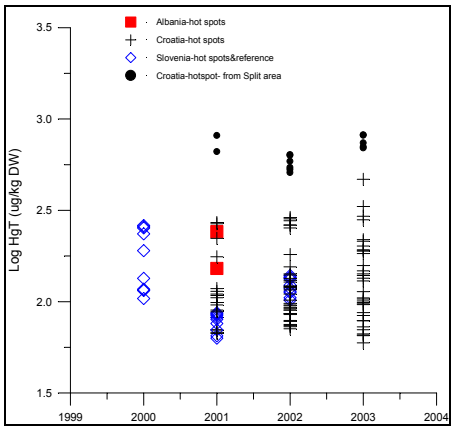


Source: MEDPOL

MEDPOL monitoring data can be used to observe trends for specific pollutants in the overall region or in specific areas (see Figure 24).

Figure 24 MED POL Phase III – monitoring of Hg in the region (left) and in specific areas (Adriatic, right)





Source: MEDPOL

Assessment on the availability of indicators and coverage of data are also produced by MEDPOL. For example, in

Table 22 MED POL assessment of availability of indicators an assessment is presented on the availability of data related with indicators for chemical pollution. As indicated, many gaps already exist among countries, which should be taken into consideration if the focus will eventually be concentrated in the achievement of environmental quality standards.

Finally, it must be highlighted that a key gap of information are the reference values for environmental quality standards in the Mediterranean. In the short term, some references can be used from other marine areas (e.g. the OSPAR convention [15]), but EQS should gradually be derived specifically for the Mediterranean region and for SAP targeted pollutants.

Table 22 MED POL assessment of availability of indicators

Country	*Indicator*								
	Heavy metals			**Organochlorines**			**Petroleum hydrocarbons**		
	Effluent	Sediment	Biota	Effluent	Sediment	Biota	Effluent	Sediment	Biota
Algeria	3^-	3^-	3^-	3^-	3^-	3^-	3^-	3^-	3^-
Bosnia Herzegovina	$1^❖$	0	0	0	0	0	0	0	0
Croatia	$1^❖$	3	3	$1^❖$	3	3	0	0	0
Cyprus❖	2	0	3	0	0	3	0	0	0
Egypt	0	1	1	0	0	0	0	0	0
France	3^-	0	2^-	0	0	0	3^-	0	0
Greece	3^-	3^+	3^+	2	2	3	2	2	0
Israel	$2^❖$	$2^❖$	3	1	0	3	1	0	0
Italy❖	?	3	3	?	3	3	?	3	3
Lebanon	1	1	1	0	0	0	0	0	0
Malta	3^-	$2^{-❖}$	3^-	3^-	0	1	0	$1^❖$	0
Morocco	3^-	3^-	3^-	0	0	3^-	0	0	0
Slovenia	0	0	3	0	0	0	0	3	3
Spain	2	0	3^+	2	0	3^+	0	0	0
Syria	1	1	1	0	1	1	0	1	1
Tunisia	0	3^-	3^-	0	0	0	0	3^-	3^-
Turkey	$3^{-❖}$								

0: Data Non Existing and /or Non Available
1: Scarce and/or limited temporal and spatial coverage
2= Indicator partially developed (limited temporal and /or spatial scale, and minimal trends)
3^-= Indicator almost fully developed (neither temporal scale nor trends presented in the national report, but apparently exist
3 = Indicator fully developed (data series exist according to national report and sometimes actually presented in the report)
3^+ = Indicator fully developed and used for EQS assessment
❖ = Data series exist according to national report but not actually presented in the MPI report/ Data from other sources i.e MPI fact sheets, literature, national reports

Information on priority areas

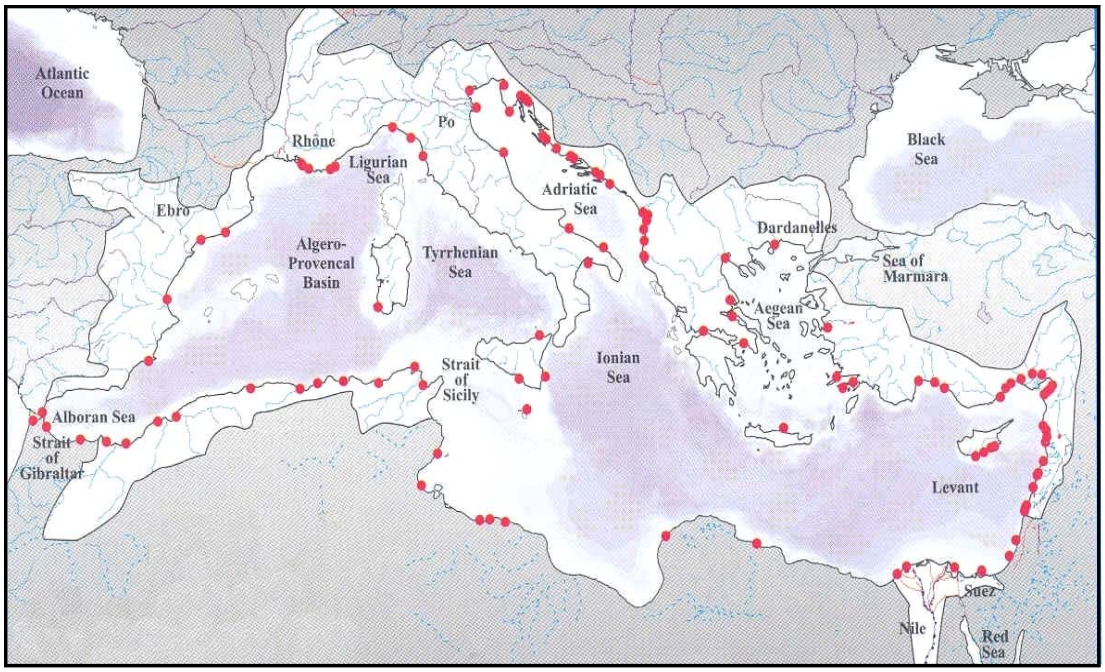
All measures identified in this report can be further defined by focusing actions on priority areas. These priority areas can be defined in terms high concentration of discharges (hot spots), or in terms of special areas to be protected (areas of environmental concern). A brief indication on available information on priority areas in the Mediterranean region is presented below.

Hot spots

As a key reference, MAP Technical report Nr 124 (UNEP/MAP, 1999) [23] includes an identification of hot spots and sensitive areas in the Mediterranean countries, which have been further reviewed by MEDPOL (see the distribution of hot spots in Figure 25). National Diagnostic Analysis (NDA) and National Action Plans (NAP) are also a good source of information on the location and characteristics of hot spots. In some cases, hot spots have been identified on the basis of geographic data included in emission inventories. This is the

case for Spain, where the EPER register have been used to identify the main concentrations of sources of emissions to air and water[4].

Figure 25 Industrial and domestic hot spots.



Source: MEDPOL

Areas of environmental concern

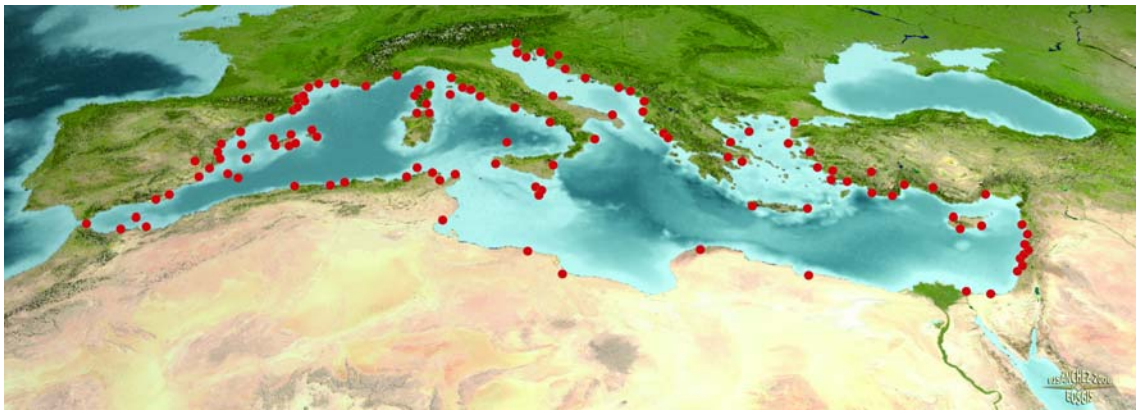
Information on the Mediterranean environment is well available from a diversity of sources. Within the MAP framework, it must be referred here the information collected by the RAC/SPA to facilitate the implementation of the Protocol on Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol, that came into force in December 1999).

Within this framework, in 2003, 52 Marine Protected Areas (MPAs) were inventoried, especially in the western Mediterranean. Besides this, the Protocol has a special arrangement, the SPAMI List, based on a regional idea: promoting management and cooperation for conservation by setting up Specially Protected Areas of Mediterranean Importance. The SPAMIs, legally binding on all Parties, have priority as regards scientific and technical research and as regards mutual assistance (seventeen sites have been put so far on the SPAMI List).

To enrich the information on biodiversity in the Mediterranean, RAC/SPA elaborated the following inventorying tool: the Standard Data Form (SDF) based on a reference list of habitats type (marine & coastal) and species for selecting site of conservation interest. RAC/SPA helps map such sites, using the SDF. The SDF, though originally based on the European Natura 2000 and Emeraude networks, have been adpted to the Mediterranean. A map with the location of SPA is shown in Figure 26..

[4] Results are included in the Spanish National Action Plan.

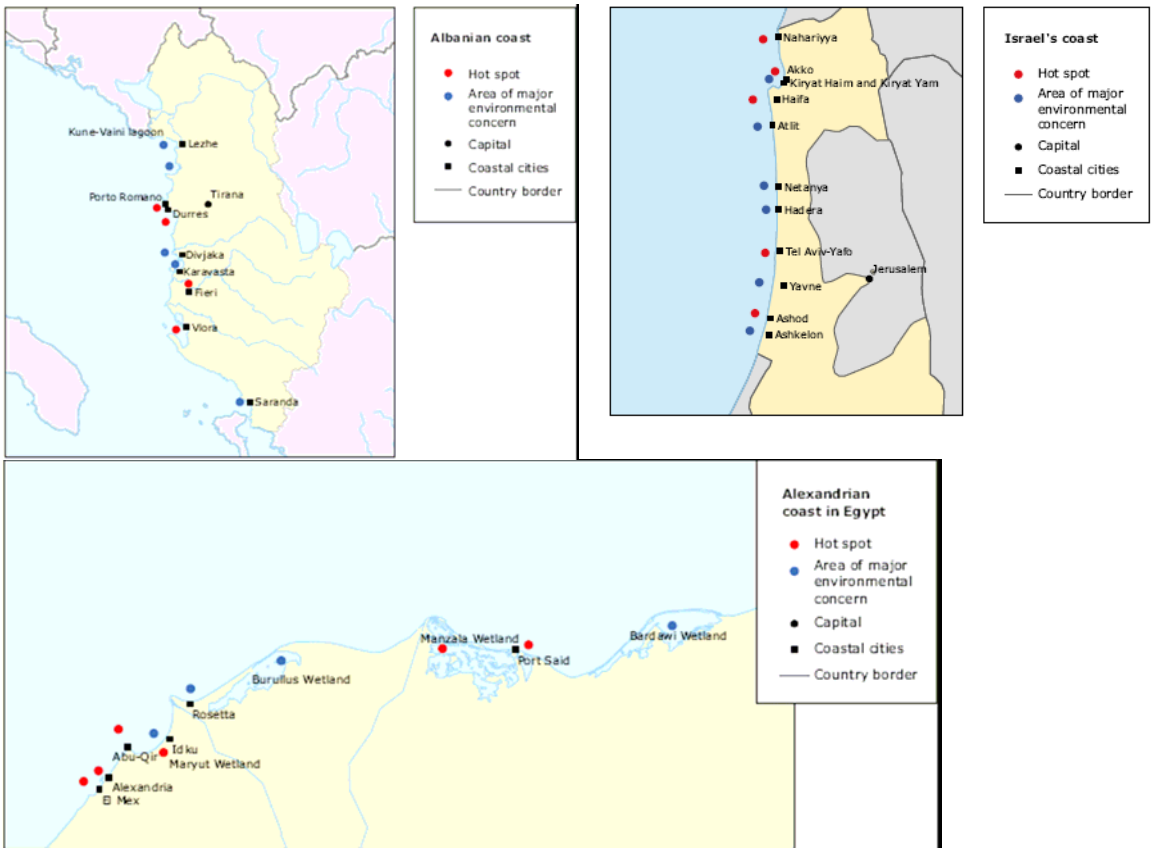
Figure 26 Areas of major environmental concern (SPA)



Source: SPA/RAC

The SPA/RAC is using the SDF, along with the compiling of information from other projects, to elaborate a georeferenced database on marine and coastal biodiversity. This Geographical Information System (MedGIS) can be very useful to perform a geographic assessment of the proximity of hot spots to areas of environmental concern, in order to identify priority areas to act on sources. An example of this kind of analysis, on an illustrative basis, is shown in Figure 27.

Figure 27 Areas of major environmental concern (SPA) and hot spots.



Source: UNEP/MAP – EEA [8]

Synthesis and time perspective

The main information requirements indicated above for the implementation of the differentiated approach through different natures of measures are summarized in Table 17. An estimation of the time framework (short to long term) to make data available is also indicated, although this will depend on a variety of factors (e.g. resources available to collect, elaborate and assess data). Data gaps are a common issue for all options, and in all cases significant technical difficulties must be faced to undertake measures (besides potential economic or legal implications). However, as a general trend, reduction of loads against baseline emissions (A.1) appears to be as the measure with a major potentiality to be undertaken in the short-medium term (exclusively on the basis of availability of data). On the opposite, the achievement of Environmental Quality Standards looks as the option with a longer time perspective, because of the long process required to established reference values for EQS.

Table 17 Summary of required information and availability of data for implementation of the differentiated approach.

	Nature of measure	**Major technical / information requirements**	**Expected time framework for availability of data**
A	- **A.1** Reduction target (%) against baseline total emissions	- Emission data (kg/yr) for all targeted substances, homogenously collected from all countries - Socio-economic data - Monitoring of real emissions to track reductions	- Emissions: short/medium term, depending on process of validation of NBB. - Socioeconomic data: short term (depending on the indicator)
	- **A.2** Reduction target (%) against release intensity (convergence)	- Determination of actual Emission Factors and BAT EF per substances / per (sub)/sector - Monitoring of real emissions	- Short/Medium-term, to determine actual EF in priority sectors. - Medium-term, to elaborate a first set of BAT EF for priority sectors
B	- **B.1** Enforcement of Emission Limit Values (ELV)	- Setting of reference values for enforceable ELV at regional level	- Short-term, for review of current ELV in all countries - Medium/long-term for deriving new ELV

	Nature of measure	Major technical / information requirements	Expected time framework for availability of data
	- **B.2** Achievement of Environmental Quality Standards (EQS)	- Determination of EQS per substance / per media - Monitoring	- Short-term, for compilation of available EQS. - Medium/long-term: to elaborate EQS for the Mediterranean - Short/long-term; for monitoring data (depending on country)

Short-term: 1-2 years
Medium-term: 2-3 years
Long-term: > 3 years

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