Project cofinancé parle Fonds Européen de Développement Régional

Project co-financed by the European Regional Development Fund

APICE

Common Transnational Strategy to curb emissions:

APICE for the Mediterranean

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ACKNOWLEDGMENTS: For the composition of the present report, Regione del Veneto and the author would like to express acknowledgments to all APICE partners for their collaboration and kind response to any required data.

ISBN 978-88-89405-27-7

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1. The Common Transnational Strategy

1.1. What is about?

The Common Transnational Strategy (CTS) represents the general and shared result of the APICE project, whose title explicitly mentions, as its general aim, “Common Mediterranean strategy and local practical Actions for the mitigation of Port, Industries and Cities Emissions”.

The aim of CTS is to develop and to provide policy makers with independent tools to arbitrate conflicts between environmental targets and economic sectorial objectives with respect to coastal and marine activities of 5 Port-Cities. On one hand, CTS is meant to support policy makers and local communities to develop their own strategies to mitigate air pollution in coastal areas. On the other, CTS is oriented to support the ongoing discussion at European level with respect to New Directives implementation on Air quality and on ICZM, integrated with the Marine Strategy Framework Directive.

The CTS represents the merging point of the scientific findings (air-monitoring campaigns and model scenarios) with environmental, economic and urbanization trends in vulnerable Mediterranean areas and the platform for shared initiatives. It aims at constituting a road map to develop a common Mediterranean path to curb emissions that is further articulated in local adaptation plans, according to a principle of environmental, economic and social sustainability.

The Common Transnational Strategy has moved from the comparison of regional scenarios and to draft a transnational strategy shared by all partners and local key-stakeholders related to strategies/techniques to get grip on the EU environmental and maritime directives, evaluate options for future territorial legislations (i.e. integrate existing urban master-plans and port investments plans) and possible eco-financing incentives (i.e. blue-flags incentive, Clean Ship Project) to merge environmental and socio-economic needs of port-cities policies and pursue the EU requirements for coasts and sea sustainable management.

Stakeholders, targets and goals, measures and actions, communication issues are strictly linked and intertwined, since they together constitute the “ingredients” to design and implement a local plan towards air pollution mitigation. Stakeholders play an active role in the definition of the contents of the plans, as well as in their implementation, so in the achievement of the targets of the APICE project.

1.2. The approach is *the strategy*

1.2.1. The aim of the CTS

The Common Transnational Strategy (CTS) has been developed taking into consideration the general mandate of the APICE project.

The Common Transnational Strategy has been structured aiming at *simultaneously* supporting the sustainable development of port activities, being respectful of the environment and human health. The CTS assumes a win-win approach, that refers to

conditions where proposed actions generate benefits for targeted communities while simultaneously advancing the objectives of third party entities or other development agendas (also referred to as ‘‘co-benefits’’) (Simon et al., 2012).

In the APICE project, the CTS aims at improving air quality for local communities in Port Cities and Coastal Areas while supporting economic activities taking place in the same areas through innovative solutions. The APICE partnership has defined the general objectives of the win-win strategy, and aims at underlining critical trade-offs that might emerge for each case study area.

The general mandate of the CTS answers to the general targets as follows:

1. to pursue EU requirements for coasts and seas sustainable management, as required by the Maritime Strategy Framework Directive (2008/56/EC) and recommended by the Integrated Coastal Zone Management (2002)
2. to define a common Mediterranean strategy for the mitigation of Port, Industries and Cities Emissions, which can be used to upgrade the Protocol of Pollution (under the framework of Barcelona Convention, 2006)
3. to achieve International and European emissions reduction targets – to find rapid answers, where legal innovation and changes are slow, anticipating paths of innovative development.

1.2.2. The role of the stakeholders

Transnational Strategy is the result of bottom-up process which has taken place in the 5 Port-Cities of the APICE Project: Barcelona, Genova, Marseilles, Thessaloniki and Venice. The contents arise from the comparison of the discussions of APICE Partners with local stakeholders in each Port City.

Decision makers and main Port actors were involved to address air quality and to find out paths for pollution mitigation with innovative solutions.

The case of Port Cities exemplar in terms of the framework of stakeholders, because of the variety of actors because of different reasons: (i) for their nature, from Public bodies (decision makers, but also Port Authorities and Harbour Masters), to Private bodies, companies and operators; (ii) the level at which they operate (for example, local municipalities and Ship Companies operating at International level); (iii) the dynamics that they influenced and they get influenced, as for maritime transport dynamics, which are international and on a global scale.

The APICE project acquires such complexity putting in relevance, within its transnational strategy, the necessity to consider the discussion and negotiation with the stakeholders as a key aspect to achieve its targets.

1.2.3. CTS, the planning cycle (methodology)

As general strategy, the APICE methodology has acted to implement the capacity to evaluate hypotheses and directions of change (through scientific analysis) as criteria

for policy making, converted from retroactive regulations, which have characterized air quality management with regulations on concentrations, to proactive planning and negotiation – quoting Hopkins et al. (2011) – through the elaboration of the Common Transnational Strategy and the Local Adaptation Plans.

The methodology is thought to last longer than the project itself, that is to say, to constitute a procedure that can be acquired and implemented to support a durable dialogue between bodies in charge of air quality monitoring and modeling (as Environmental Agencies, for example) with the network of multiple stakeholders involved in decision making process.

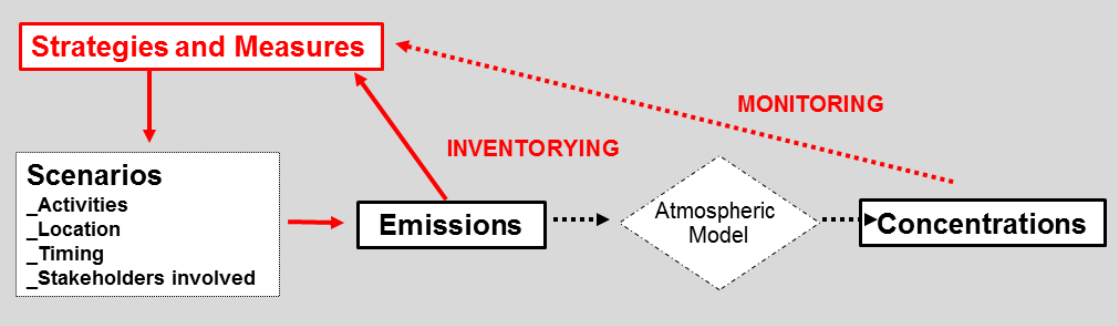

Figure 1: the APICE planning cycle.

The approach of the planning cycle, as general framework to identify actions and measures to curb emissions, is synthesized in fig. 1. To close the cycle, the actions of inventorying emissions is seen as the way to construct the scenarios, but also as the crucial action to verify and to monitor the effectiveness of the actions put in place with the strategies, through the updating of the emissions inventory on a regular base. It constitutes a first level control to monitor the actions implementation, as well as the occasion to revise the strategies and to upgrade them under several perspectives, as technological improvements or innovation, updating of socio-economic trends or changes in planning orientation, along with the passing of time.

At the same time, the act of monitoring is related to the update of the source apportionment deriving from the model analysis, but it is also related to the monitoring of the air quality as an important response about the effectiveness of the measures for pollution mitigation put in place with the Local Adaptation Plans.

2. Toward a common Mediterranean strategy

2.1. Shared measures for air pollution mitigation

The Common Transnational Strategy arises from the assessment of actions for air pollution mitigation in each Port City (Barcelona, Genova, Marseilles, Thessaloniki and Venice), which has been built taking into consideration the main sectors of emissions (according to 7 categories), which were as well considered in the emissions inventories, as follows:

- Measures cat. 1: Ship emissions;
- Measures cat. 2: Diesel Powered equipment;
- Measures cat. 3: Cargo handling equipment;
- Measures cat. 4: Rail emissions;
- Measures cat. 5: Road emissions and diesel road vehicles;
- Measures cat. 6: Solid Bulks;
- Measures cat. 7: Inventorying, Monitoring and Communicating.

Each measure has been articulated in actions, of different type and nature. Cluster of stakeholders were associated to each action, according to their involvement, roles and competences, to evaluate the actions.

The assessment was conducted at local level by each APICE Port City working group, taking into consideration the local differences between the 5 Port Cities:

- their geographic, climate, topographic conditions;
- emissions (inventorying and monitoring) as resulted by the APICE analyses;
- the economic situation, trends and scenarios of each Port Cities;
- the stakeholders involved;
- political agendas;
- capacity to involve key actors;
- State of the art in term of Air Quality Planning and Management;
- National, Regional and local legislation and planning framework.

These aspects deserve a special mention, as they are the specific aspect defining the territorialization of the Common Transnational Strategy according to the 5 Port Cities, articulated then in the Local Adaptations Plans. The assessment of the most feasible and effective actions in each Port City has been influenced by local conditions as defined in the list above. On the other hand, actions that were assessed as the most effective in the 5 Port Cities has been assumed to be part of the Common Transnational Strategy. The comparability has been possible because of the common methodology adopted by the Partnership in the assessment phase, as in the all other phases.

To evaluate the feasibility of actions in each Port City, 10 criteria were adopted by the Partnership. The criteria, that take into consideration environmental, social and eco-

nomic aspects at once, in line with the general approach of the APICE project, have been weighted from the Partnership through a Delphi Method:

1. Cost-effectiveness (weight: 9,28);
2. Implementability (weight: 9,00);
3. Emissions reduction potential (weight: 8,67);
4. Technical feasibility (weight: 8,39);
5. Costs (weight: 8,22);
6. Enforceability (weight: 8,17);
7. Co-benefits (weight: 8,00);
8. Potential funding opportunities (weight: 8,00);
9. Measurable results (weight: 7,22);
10. Timeframe (weight: 5,50).

Measures and actions contained in the CTS have been shared by the APICE Partnership as the ones that might be implemented in different ways and according to different schedule, by all partners.

Table 1: actions shared by the Partnership as part of the Common Transnational Strategy

Measures	Actions
Measure 1: Ship Emissions	Action 1.1: On-shore Power Supply (OPS) Action 1.2: Change fuel while manoeuvring Action 1.3: Alternative fuel (LNG)
Measure 2: Diesel powered equipment and Cargo handling equipment	Action 2.1: Accelerated fleet turnover Action 2.2: Idle reduction programs Action 2.3: Alternative fuels
Measure 3: Road Traffic	Action 3.1: Improvement of road system (to avoid congestion) Action 3.2: Environmental excellence certification for trucks Action 3.3: Mode switching - Alternative fuels (CNG, LNG, hybrid) Action 3.4: Idle reduction programs
Measure 4: Rail Traffic	Action 4.1: Increase rail ratio through economic incentives Action 4.2: Improvement of rail system (access, avoid congestion) Action 4.3: Track electrification
Measure 5: Inventorying, Monitoring, Coordinating, Communicating	Action 5.1: Monitoring and control (protocol or agreement between stakeholders, etc) Action 5.2: Port Air Quality Steering/Working Committee Action 5.3: Data Sharing: Inventorying Emissions and Monitoring concentrations as the base for planning Action 5.4: Communication strategy

Each APICE working group has developed the assessment of the actions, selected from a general list composed by Veneto Region, from the analysis of plans and actions available in literature and from most advanced experiences developed by Port Cities in different parts of the World.

In each Port City the assessment was based on the discussion with local stakeholder as well as on the field analysis developed by each APICE team. With respect to the criterion on “emissions reduction potential”, the evaluation was developed according to the information deriving from the APICE modelling, where available.

The most suitable actions supported by the APICE project are listed in table 1.

As part of the Common Transnational Strategy, the actions are discussed through a comparative analysis of their potential and effectiveness as deduced by the analyses conducted by each APICE working group in each port city, according to contextual situation, to put in evidence strengths and weaknesses as well as common benefits and uncertainties discussed by the partners.

With respect to ships emissions (Measure 1), the actions that can be implemented to curb emissions deriving from the sector of maritime transport, related to the vectors of maritime traffic as ships and vessels of different types, were three: (i) On-shore Power Supply (OPS); (ii) Alternative fuel (LNG); (iii) Change fuel while manoeuvring.

OPS has a great impacts at local scale in reducing potential impacts on highly urbanized areas next to the Port areas, to witness the local relevance of the emissions reduction, that might justify strong initial investments, as for the proximity to population. The emissions potential reduction with respect to the overall emissions inventory has been evidenced in the 5 Port City to be less relevant, with low impacts on the general contribution on air pollution from maritime sector.

Despite a significant reduction in emissions, there are still a number of issues with respect to implementation, logistics and safety. The scenario is characterized by contextual uncertainties, still really high, that should be faced by a work in network at International and local level, and by economic and Institutional actors, together with Ship Industry. In the case of APICE project, only some Port Cities have taken into consideration the option of LNG (Barcelona, Marseilles, Venice), and only Barcelona has developed a proper strategy to implement the use of LNG in its Port, defining 4 steps that might be acquired by the Partnership as guidelines/recommendations, since they constitute significant barriers to be faced by each Port.

With respect to the action of changing sulphur content fuel while manoeuvring, new limits in sulphur content will enter into force by 2020, as imposed by IMO and EU Directive under revision. As part of the CTS, APICE partners reflect on barriers and possible issues that can slow down the achievement of the limits, as well as to consider to open the discussion with Port Authorities, Ship Companies and ship operators towards year 2020. Besides the fuel availability in 2020 (revision in 2018 to update the schedule) that is widely discussed as main issue from Shipowners, and Fuel Markets Operators, it is necessary to anticipate possible economic and environmental impacts, as well as in terms of total contribution of ships emissions, and to discuss on the implementability at local, Regional and International level.

With respect to the Measures 2, oriented on Diesel powered equipment and Cargo handling equipment, norms, limits and standards act on single engines to mitigate emissions at source. In any case, as witnessed by the analysis of the APICE project in each Port City, the contribution in terms of emissions of Goods movement Equipment sector depends on different logistics situations in different Ports. From the point of view of the enforceability of actions and measures for the equipment, it depends on the ca-

pacity of local actors to develop programs to sustain EU standards requirements, which are mainly based on voluntary agreements or incentives through specific programs devoted to a panel of different actions. The gap between enforceability and implementability can be bridged according to the capacity to negotiate and to dialogue with local operators to coordinate actions that might orient freight movement towards paths of innovation in technology and optimization in the operability.

Road traffic (Measure 3) has been identified to have a great impact in terms of emissions in all 5 Port-cities of the APICE project. With respect to the emissions related to road traffic, APICE project has analyzed the topic dividing it according to two main issues: (i) Emissions produced by road traffic in general (Marseilles LAP); (ii) Emissions related to traffic induced by Port activities (Barcelona and Venice LAPs), related to heavy duty vehicles and road freight, and to passengers traffic. CTS proposes couple those two approaches to arrive to a complete framework that integrates the effects of the Port activities with the territory in which they are inserted, as well as to coordinate actions on the others segments of transports that give place to the emissions deriving from road traffic, as private transports, public transport, etc. With respect to enforceability and effectiveness of actions, EU standards act on single engines, while cumulative effects are far from being investigated, as APICE did, considering that the total amount of traffic constitutes a source of risk for the 5 Port cities. Moreover, actions taken at local level are influenced by decisions at National level, where Member States, through National policies oriented towards financial incentives can support fleet renewal, with great effects on emissions at local scale.

Measure 4 related to rail traffic is strictly connected to the previous one, the road traffic, because of the analysis and of the actions that should be assumed to curb emissions. In the APICE project, emissions related to rail traffic have been articulated taking into consideration different aspects of the issue as follows: (i) emissions that can be subtracted from road freight sector switching transport mode to rail freight, considering its management and its ratio with respect to road freight induced by the Port activities; (ii) emissions deriving from rail transport inside the case study areas, that might be operated through diesel engines. All APICE partners agree that the major action to impact in the reduction of emissions deriving from road transport, without diminishing the traffic flows, is to increase the rail ratio in each Port-city. As discussed for the measures referring to road traffic, decisions on rail freight ratio depend on a series of contextual and transitional aspects that have to count on multi-level governance, where National Policies and local plans coherently work towards a common target. Besides, the National Policies on rail freight answer to the European Policy, to orient the implementation of rail infrastructures and transport ratio, with strong impacts at local level, where Ports and local Authorities can operate for their part. APICE Local Adaptation Plans' actions to implement local infrastructure and modal split have also positive effects in terms of reducing emissions at source, deriving from rail diesel engines of the last mile, and predisposing the network for modal switch.

The set of actions referring to the measure of "Inventorying, Monitoring, Coordinating, Communicating" (Measure 5) has gained specific attention and interest related to the APICE general approach. All APICE partners, within Local Adaptation Plans, have mentioned the actions as follows, as indispensable to establish a solid and effective strategy to manage emissions reduction strategy. Stakeholders participation is crucial not only in finding innovative solutions between Enforceability and Implementability,

as stated as a key point of the Common Transnational Strategy. Differently form the other measures, these actions don't act directly in mitigating emissions at source, but aim at structuring a shared and organized system to acquire and to update information related to emissions, through the control (better on a regular base in time) of emissions at sources. The actions aims at structuring the relationship of multiple stakeholders involved in each Port City, and the Main Actors (Port Authorities, Local Administrations, Economic Actors), that needs to collaborate by bringing their knowledge and according to their competences towards common target of mitigating and reducing air pollution.

2.2. Local Adaptation Plans[1]

The Local Adaptation Plans (LAPs) have been drafted in each project area and they represent the roadmap at the same time to elaborate and to scale down the Common Transnational Strategy at local level.

While designing the targets of APICE project, in each area the LAP aims at achieving specific targets at follows:

- In the area of Barcelona, the LAP aims at constituting a guidance for reduction of 12 % for both NOx and PM10 emissions from the port, and thus supporting and complementing efforts by national and regional authorities;
- In Genova, the APICE project is expected to develop a model for air quality focused on harbour emissions, as this tool was missing in this area before APICE. This tool is fundamental for the Strategic Environmental Assessment of the new Port Master Plan. The APICE model was also applied to a selection of actions contained in the new Port Master Plan, with the aim of continuing with the overall assessment of the whole plan;
- In Marseilles, the application of APICE inputs & scenarios is meant to support a new project of setting electric power ground supply terminal within the strategic Plan of the Port Authority and to include of APICE deliverables in atmospheric, urban and health protection plan of PACA region;
- In Thessaloniki, the LAP will contribute in establishing a roadmap for the improvement of the efficiency of the Region of Central Macedonia in urban development planning for Thessaloniki city and implementing environmental policies in order to improve the citizens' quality of life;
- For Venice, the target is to constitute a planning guidance to drive port-district expansion (and its connection with the northeast transport poles) in the frame of the Regional Masterplan & coastal plans, as well as to support the promotion of agreements to mitigate emissions of docked-vessels in front of Venice.

As geographical scope, the areas investigated take into consideration morphological and geographical aspects which are specific of each Port City, as follows:

[1] Local Adaptation Plans of the five APICE port cities are available at http://www.apice-project.eu/.

- In Barcelona, area declared Special Protection Zone in the Air Quality Plan (40 municipalities);
- In Genoa, Coastline and its back of Genova Province;
- In Marseilles, the Bouche-du Rhône land as a part of the PACA Region;
- In Thessaloniki, the Region of Central Macedonia;
- In Venice, City of Venice and Venice Lagoon, with respect to Veneto Region.

The Local adaptation plans are organized in a coherent way to be comparable between partners, even if local differences are put in evidence, as they characterize the specific context in which the Common Transnational Strategy has been elaborated and downscaled.

With respect to the contents, a first part is devoted to:

- The Stakeholders involved and the process of participation;
- The process of measures assessment;
- Method to define emissions reduction targets (the way you use to define emissions reduction targets, as top down or bottom up; reference to limits, etc);
- Emissions sources: main findings, main problems, uncertainties;

A second part of the LAP discusses on measures analysis and implementation, taking into consideration the general ranking of the measures (the general ranking of the measures, the logic of your ranking, the actions implemented).

Then the analysis of each measure has been carried out, considering the state of the art, the description of the measure and actions in which it is divided (if any). The measures are analyzed according to the criteria considered for the evaluation, and then discussed about benefits and advantages, disadvantages, barriers, uncertainties, implementation and effect of the measure.

The last part is devoted to the discussion of the mainstreaming of local adaptation plan for each Port City, concerning the main outcomes and actions to be implemented from APICE. The LAP Mainstreaming within local decision making processes has some specific objectives according to each local situation:

1) to integrate existing programming
2) to strengthen territorial governance in port-cities
3) to promote voluntary agreements among administrations, ports, ship-owners & transport entrepreneurship.

Specifically, the Mainstreaming of APICE's scenarios and designed measures should be referred to:

- in Barcelona, integration of APICE Plan within the Catalan plan to improve air quality, and within Port Authority strategy and management;
- For the Genoa new Port Master Plan, which foresees the reorganization of terminals location and new infrastructures;
- Regional-Urban platform 08-10 for environmental control of Marseille involving the Marseille Port Authority due to strong investments in West and East ports;
- Growing Thessaloniki strategic plan of Port Authority and urban plan for the city of Thessaloniki;

- new Veneto Masterplan and Port of Venice Op. Plan 08-13 which plans hard investments.

Based on this general framework, each Port City working group has articulated the LAP according to peculiarities and specific topics emerged from the discussion with the stakeholders involved.

3. Perspectives and emerging issues

3.1. The need for networking

The APICE Common Transnational Strategy puts in evidence some important issues that all APICE Port Cities share, and that can be extended to the Port Cities of the Mediterranean area.

First important issue is the question of the territorialization of the European and International regulation and the relation with local and contextual situation that characterized the hyper-diverse territorial conditions of each Port City, as demonstrated by the APICE project. The need to network coastal realities that share similar problems emerges as a key conclusion from the APICE project because of three important considerations that have been debated along with the Common Transnational Strategy implementation.

First of all, the five Port Cities share a similar legislative context, considering MARPOL Convention and EU Directives of different sectors that have been acknowledged in the 4 Member States (France, Greece, Italy and Spain) as for example:

1. EU Directives on Air Quality
2. International legislation on ships (MARPOL, Annex VI)
3. EU recommendation on ICZM and Framework Directive on Marine Strategy
4. Trans-European Transport Networks TEN-T
5. EU Standards per vehicles categories (Directive 2001/116/EC)

As this legal framework strongly influence the field of action that can be developed by each Port City, the APICE project put in evidence the need to create a network of clusters of local stakeholders at Port City level (Local governments, Port Authorities, etc) to interact with EU and International Bodies to get them feedbacks on effectiveness of policies in local contexts, as well as to orient the selections of new topics that might be taken into consideration to revise and update EU Policies. An important aspect that emerges from APICE is the need to coordinate policies from different sectors around environmental management of Port Cities' activities.

Secondly, while elaborating the assessment of actions of air pollution mitigation, the demanding issue of interacting with global economic actors emerges in each Port City. Ship owners and ship companies orient their preferences according factors which include local aspects, but which are strongly influenced by global aspects at international scale. The problem of the weight and position of local actors while negotiating emerges to suggest that the act of to creating a network of local stakeholders towards common goals to interact in the negotiation with Global Economic Actors might result in a most effective position to achieve environmental friendly targets

without creating market distortions and losing in attractiveness. Moreover, several aspects discussed within the Common Transnational Strategy that influence achievements of good air quality standards at local level might depend on global factors, as issues on fuel price/markets and refinery Industry, issues related to technology and innovation, or the definition of international traffic routes. Local stakeholders might acquire a position in the international debate by networking, and so to acquire a critical mass, and more on environmental targets that should be shared within the European Union.

Thirdly, the effectiveness in achieving environmental objectives as defined by European policies is strongly affected by the each Port City local conditions, as (i) geographic, climate, topographic; (ii) procedures of emissions inventorying and monitoring in place; (iii) political agendas and capacity to involve key actors; (iv) National, Regional and local legislation and planning framework and Air quality management. There is a need to reflect on the territorialization of targets and standards on local conditions that might not be sufficient to achieve locally good environmental standards. The need of networking between Port Cities is relevant to share best practices and procedure, as well as to reflect on possible development deriving from paths of innovation that might arise because of local capacity to create clusters around common targets.

As emerging point, it is relevant to mention the importance of networking of port cities and their stakeholders towards common goals on topics which will have common impacts on Port-Cities, and which local communities alone might not be able to face. Special attention has to be devoted to the Mediterranean Sea and the different geographical areas in which it is divided, as West Mediterranean, the Adriatic and Ionian Sea, as the negotiation of Environmental requirements might affect competitiveness and attractiveness of the Mediterranean Ports on global markets.

3.2. APICE and the discussion on an Emission Control Area (ECA) in the Mediterranean Sea

On this topic, a wider discussion should be launched with respect to the proposal for a Emission Control Area (ECA) in the Mediterranean by the European Union together with the stakeholders at all scales, from local stakeholders to global economic actors as ship owners and ship companies. The discussion should be based on an extensive cost-benefit analysis to put in relevance positive and negative externalities to the Mediterranean environment, as well to the costs that private companies might assume.

Some Emissions Control Areas, in which emissions of certain air pollutants from ships are subject to more stringent controls than the limits that apply globally, are currently in force in Baltic Sea and in the North Sea, and from August 1, 2012, in US and Canada Waters, where Amendments to MARPOL Annex VI (Prevention of air pollution from ships) have formally established a North American Emission Control Area (ECA) (tab. 2).

According to Aagesen (2011) of the Lloyd's Register, approximately 80–90% of merchant vessels will enter an ECA during their lifetimes and more ECAs are expected – particularly in the Mediterranean and the Far East – in the future.

Table 2: Adoption, entry into force & date of taking effect of Special Areas under MARPOL Annex VI "Prevention of air pollution by ships" (Emission Control Areas); source: IMO (www.imo.org).

Special area	Adopted	Date of entry into force	In effect from
Baltic Sea (SOx)	26 Sept 1997	19 May 2005	19 May 2006
North Sea (SOx	22 Jul 2005	22 Nov 2006	22 Nov 2007
North American (SOx, and NOx and PM)	26 Mar 2010	01 Aug 2011	01 Aug 2012
United States Caribbean Sea ECA (SOx, NOx and PM)	26 Jul 2011	01 Jan 2013	01 Jan 2014

The preparation for the application of a Emission Control Area can be consider as a framework to address air pollution mitigation by all Member States who ratified MARPOL 78/73.

Section 3 of Appendix III to MARPOL Annex VI[2] sets out the following eight criteria for designation of an ECA:

1. a clear delineation of the proposed area of application, along with a reference chart on which the area is marked;
2. the type or types of emission(s) that is or are being proposed for control (i.e. NOX or SOX and particulate matter or all three types of emissions);
3. a description of the human populations and environmental areas at risk from the impacts of ship emissions;
4. an assessment that emissions from ships operating in the proposed area of application are contributing to ambient concentrations of air pollution or to adverse environmental impacts. Such assessment shall include a description of the impacts of the relevant emissions on human health and the environment, such as adverse impacts to terrestrial and aquatic ecosystems, areas of natural productivity, critical habitats, water quality, human health, and areas of cultural and scientific significance, if applicable. The sources of relevant data including methodologies used shall be identified;
5. relevant information pertaining to the meteorological conditions in the proposed area of application to the human populations and environmental areas at risk, in particular prevailing wind patterns, or to topographical, geological, oceanographic, morphological, or other conditions that contribute to ambient concentrations of air pollution or adverse environmental impacts;
6. the nature of the ship traffic in the proposed Emission Control Area, including the patterns and density of such traffic;
7. a description of the control measures taken by the proposing Party or Parties addressing land-based sources of NOX, SOX and particulate matter emissions affecting the human populations and environmental areas at risk that are in place and operating concurrent with the consideration of measures to be adopted in relation to provisions of regulations 13 and 14 of Annex VI;
8. the relative costs of reducing emissions from ships when compared with land-based controls, and the economic impacts on shipping engaged in international trade.

[2] regulations 13 and 14 and Appendix III of MARPOL Annex VI.

APICE methodology and rationale, in its entire process from monitoring, inventorying, modelling, scenario analysis and planning, can be adopted to assess the marine SOx emissions in the designated area and their impact on the environment and human health, as required by the SECA application. APICE project considers all these three components within its procedure of implementation. It might be extended to other areas and port cities as part of the required studies to apply for an ECA as its studies are based on (i) the meteorological conditions in localized critical areas; (ii) expected shipping traffic patterns and socio-economic trends. APICE takes also into consideration the description of the land based SOx controls in place when the SECA is expected to come into force, evaluated according to the Local adaptation Plans. About enforcement, APICE considers to implement and to strengthen controls on ships accessing to the five Ports within its Common Transnational Strategy, in line with the guidelines for the implementation of the ECA.

With respect to marine and coastal ecosystems, there are in place several indications with respect to environmental values of the Mediterranean. In 1976 the Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention)[3] was adopted with a specific focus on marine pollution control, including several other objectives as follows: a) to ensure sustainable management of natural marine and coastal resources; b) to integrate the environment in social and economic development; c) to protect the marine environment and coastal zones through prevention and reduction of pollution, and as far as possible, elimination of pollution, whether land or sea-based; d) to protect the natural and cultural heritage; e) to strengthen solidarity among Mediterranean coastal States; f) to contribute to improvement of the quality of life. An ECA in the Mediterranean could be a tool to achieve the targets of the Barcelona Convention as above.

However, several uncertainties should be overcome.

To successfully apply to the ECA designation procedure, it would be necessary to demonstrate that a SECA is the most effective means of reducing emissions in the areas under analysis. The APICE project has defined, for the areas concerned by the project, the contribution of each sector to emissions through source apportionment. The evaluation of the cost-effectiveness between the effort of different sectors in reducing emissions according to their contribution to air pollution is an uncertain point that might emerge. In fact, in the case of APICE five Port Cities, inland road transport constitutes a great source of pollution. As in assessing a SECA, the IMO principally takes account of the relative costs of reducing marine SOx emissions as compared with land based controls and the economic impact on international shipping affected by the proposed SECA, this point would need to be strengthen by further analysis.

As reported by Meech (2008) within the SAFEMED Project, the extent of the SECA will raise shipping costs resulting in higher freight rates, which will have a negative impact in the economies of the States bordering a SECA.

Further studies on the economic impacts in the Mediterranean Sea of the entry into force of the SECA should be put in place. The European Cruise Council (Ashdown, 2012) developed a study on the costs deriving from the implementation of a ECA in the Mediterranean for the year 2015 with respect to cruise traffic, an important sector

[3] See http://www.unepmap.org/.

for the Mediterranean. Considering the additional fuel cost of 0.1% Sulphur content fuel as MGO in 2015 in the range of €155-310 per ton, with an average of approximately €230 per ton, which corresponds to around 80% of increase, the cost of ECA on Cruise traffic might be of 50 $ per passenger per week with 25% of fuel price increase, on average of 200 $ per passenger per week, which might strongly affect Cruise traffic.

Table 3: Gross weight of seaborne goods handled in EU's ports (in million tons), source: Eurostat, 2011.

Country	2005	2006	2007	2008	2009	Change 2009/2008
Cypro	7.3	7.6	7.5	7.9	6.8	-14.7%
Spain	231.7	243.2	250.5	249.7	223.6	-10.5%
France	102.8	107.2	102.0	102.9	91.4	-11.2%
Greece	151.3	159.4	164.3	152.5	135.5	-11.2%
Italy	508.9	520.2	537.3	526.2	472.5	-10.2%
Malta	5.3	5.5	5.3	5.5	5.5	0.1%
Slovenia	12.6	15.5	15.9	16.6	13.4	-19.3%
EU Mediterranenan ports	1019.9	1058.6	1082.7	1061.2	948.5	-10.6%
Bulgaria	24.8	27.5	24.9	26.6	21.9	-17.6%
Romania	47.7	46.7	48.9	50.5	36.1	-28.5%
EU Black Sea ports	72.5	74.2	73.8	77.0	58.0	-24.7%
EU-27	718.7	3835.9	3937.5	3918.6	3433.0	-12.4%

** Mediterranean ports only.*

Quantitative analyses on freight traffic in the Mediterranean with respect to the entry into force of a ECA are not available (as multi-criteria analyses, cost-benefits analysis). While Cruise Sector might profit from the entry into force of the ECA, for the commercial pay-back deriving from Cruises eco-labelling, maritime freight transport might be affected by a severe increase in costs on transport, and might decide to change strategies or routes. Meech (2008) reports as well that the introduction of a SECA in the Mediterranean could have a detrimental impact on ports on the Moroccan, French and Spanish Mediterranean coasts as their alternative ports on their Atlantic coasts might present lower freight costs as shipper will not be required to switch to lower sulphur, higher priced fuels.

There is a need for a wide discussion at international European and Non-European level, as to position the Mediterranean Sea in the context of Global maritime routes. And beside all, only a shared political will by Member States might orient the decision to implement an Emission Control Area, also because a “clear delineation of the proposed area of application, along with a reference chart on which the area is marked” will be decisive in assessing the feasibility of the ECA. Currently, between the 25 States that face the Mediterranean Sea, only seven have ratified Annex VI (namely: Croatia, Cyprus, France, Greece, Italy, Slovenia and Spain). The definition of the SECA area might include the Mediterranean as a whole or just part of it. Several problems might be detected for both options, as detected by Meech (2008) in the

exploratory analysis for the implementation of a SECA in the Mediterranean that might result also in a lack of compliance. The current political instability of the Northern African States complicates the required debate that need to be launched if reflecting on policies on the entire Mediterranean basin, to discuss on issues regarding "the practicality of enforcement, scientific justification of benefits to the environment, support from adjoining nations to the SECA and the costs of regulating the marine sector as compared to the costs of SOx emission abatement inland" (Meech, 2008, p. 48).

The results from the APICE project might be useful to enter inside the discussion on the opportunity to launch and support the predisposition of a ECA for the Mediterranean, considering that more original research and further discussion with the stakeholders is needed. The APICE methodology, as well as the structured process of stakeholders' participation can constitute a solid base to introduce the phase of stakeholders' consultation as required by the ECA application procedure.

3.3. A way ahead

Besides the specific question on the Emission control Area, as a tool to mitigate air pollution from maritime transport, it is necessary to understand how to promote sustainable transport in the context of climate change.

The White paper "Roadmap to a single European transport area" (COM(2011) 144 final) aims at developing new transport multimodal routes with less impact on CO2 emission to achieve the environmental policy goals in the transport sector. The necessity of "greening" maritime transport & port activities should pass through strategies to cut the emissions and protecting the environmental status of marine water (adaptation strategies).

Research and innovation are essential for a faster and cheaper transition to a more efficient and sustainable European transport system based synergies with sustainability objectives on (i) vehicles' efficiency, (ii) cleaner energy use (iii) more secure operations.

In this respect, IMO is currently working on the, Energy Efficiency Design Index (EEDI), which works through the reduction of propulsion power (Speed reduction, Lower resistance, as with Hull form and Reduced friction, Propulsion efficiency, changing Propulsion concept and Propulsor efficiency, Propulsion machinery efficiency, Fuels with less carbon, as LNG), of auxiliary power (Reduce hotel load, Aux machinery efficiency, Fuels with less carbon) and clean energy and recovery, and increasing capacity (Higher speed with same power, Larger ship; Larger payload).

However, there is a need to continue in investigating on the relationship between inland and maritime activities as in a unique territorial space, intertwining orientations deriving from the ICZM protocols and from the Marine Strategy Framework Directive.

The approach of APICE towards "Common Mediterranean strategy and local practical Actions for the mitigation of Port, Industries and Cities Emissions" has taken into consideration some key aspects in developing its strategy, which constitute the main stepping stones to achieve robust environmental governance:

- Identification of the key-pressures – emissions;
- Implementation of the «right mix» of measures;

- Effort and commitment of stakeholders;
- Interface with legal frameworks (at national, regional and local level);
- Relation with meteorological and environmental context and specificities.

As stated by the Mediterranean Sea Policy, composed by the Communication “Towards an Integrated Maritime Policy for better governance in the Mediterranean” COM(2009) 466 final, the “Barcelona Convention” and the ICZM protocol Cooperation is a key factor for the Mediterranean.

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