INFRASTRUCTURE ANNEX

Strategic Environmental Assessment

Environmental Report

(ex art. 13 leg. decree 152/2006)

January 2016

Table of Contents

List of acronyms used

HC	High Capacity (railway)
AdSP	Port System Authority
AF	Functional Areas of Intervention
AI	Infrastructure Annex to the Economic and Finance Document (DEF) 2015
ANAS	National Autonomous Roads Company
HS	High Speed (railway)
CdP	Programme Contract
CF	Cohesion Fund
CEF	Connecting Europe Facility (Reg. (EU) N. 1316/2013)
CIS	Institutional Development Contracts
DEF	Economic and Finance Document
ERTMS	European Rail Traffic Management System
MATTM	Ministry for the Environment and the Protection of Land and Sea
MIT	Ministry of Infrastructures and Transport
PSNPL	National Strategic Plan for Portuality and Logistics
PON	National Operating Programme
RFI	Italian Railway Network (Ferrovie dello Stato Italiane Group)
RPA	Preliminary Environmental Report (or Scoping Report)

1 Introduction:

1.1 Summary illustration of the Environmental Report (ER)

As part of the SEA process, the Environmental Report (ER) is the key document that tells us about the execution of the environmental assessment procedure of the plan. The table of contents of this Environmental Report (RA) copies the structure proposed in the SEA Scoping Report, with some inversions and more in-depth studies, due to the particular nature of the procedure being carried out.

Chapter 2, for example, previously dedicated to methodological aspects, has been dedicated to describing **the SEA process** of the Infrastructure Annex, given also the wealth - in number and quality of content - of the contributions received during the Scoping phase. Therefore it has been drawn up, reporting in detail: the subjects involved and their level of participation by type of Body and the subject of the contribution provided, preliminary consultations with the Competent Authority (MATTM) and finally a precise examination of how and where most of the individual proposals contained in each contribution have been integrated into the herein ER.

Chapter 3 is dedicated, as foreseen, to **a summary illustration** of the Infrastructure Annex, placing it in the path that has changed the nature from mere fulfilment of the "goal" law 443/2001 and later amendments and integrations (that still characterises the second part of the document and the annexes where the information about the progress on implementation of the Strategic Infrastructures Programme is provided) to *General Framework for investments in transport*, in compliance with the indications on ex ante conditionalities (Cexa) of the Topic Objective 7 "Transport and Infrastructures" contained in the Partnership Agreement 2014-2020.

The methodological aspects have been more suitably transferred to the end of the AI illustration as they are more closely related to the particular appearance that it has taken on, in relation to a general regulatory and programme framework subjected to rather intense evolution dynamics. Therefore, **Chapter 4.** illustrates the **assessment model adopted,** first retracing the methodological references, in particular the studies and experiments previously funded by the MIT on the SEA of National Operating Programmes on mobility, and then describing the complexity factors that have emerged during the AI assessment, and relative management by identifying the "Functional Areas of Intervention". The other **basic methodological choices** from the assessment model adopted are then shown and explained, in particular:

- integration of the environmental and economic-social parts of the assessment, also with the verification value of ex ante conditionalities (art. 10 Reg. EU nr 1315/2013);
- the argument for the assessment, as a guarantee of transparency and a condition for evaluating the accumulated impacts;
- the environmental agenda for the AI's Functional Areas of Intervention, as a tool for the vertical integration of assessment (*tiering*).

Chapter 4 ends with a precise description of the assessment tools provided (assessment matrix and Assessment Dossiers) and the three operational steps required for the relative construction.

The rest of the contents exactly follow the outline proposed in the Scoping report.

C**hapter 5** contains a description of the **State of the environment** organised into six environmental macro-components.

C**hapter 6** contains a description, for each of the six environmental macro-components identified, of the most important contents - in terms of environmental goals - of sector and not international, EU or national planning, thus arriving at identification of the six Specific Environmental Objectives (OAS). These are formulations that summarise the directions for environmental protection (often already

declined in transport terms) adopted by the SEA to the point of integrating them into the *assessment reference objectives system,* to guarantee **verification of the AI's external consistency.**

Chapter 6 is accompanied by **Annex 1** "Regulatory and Programme Reference Framework", that lists all the documents examined in detail, with a brief description of the objectives and targets set by each one.

The final section illustrates the creation of the seven Economic-Social and Transport Policy Objectives (OES) identified – as an integral part of the above-mentioned assessment reference objectives system – starting with the General priorities" as set out in article 10 of the Regulations (EU) 1315/2013 on the Union guidelines for the development of the transEuropean transport network, adopted by the Commission as a reference for the fulfilment criteria for Cexa, regarding the AI characteristics as "General Framework for Investments in Transport".

Chapter 7 illustrates and comments on the **results of the Strategic Environmental Assessment carried out**, allowing a distinction to be made between the AI's overall performance (*General Assessment of Compatibility*) compared to the pursuit of each of the six OAS and seven OES identified as *Assessment reference objectives system*.

An environmental assessment of compatibility and an economic-social assessment of compatibility, referring to the AI performance compared with the set of six OAS and the seven OES adopted in the SEA, are also made available.

An *Assessment of Strategic Value* has also been drawn up in relation to the performance of each Functional Area of Intervention examined, thanks to which it has been possible to identify the environmental components probabilistically subjected to the most significant environmental impacts, in order to propose targeted accompanying measures for reducing - and above all preventing during the planning phase - each of them. The results of these assessments have been added to with graphs to support comments.

The above-stated assessments have also been integrated with a *focus* on the fulfilment of ex ante conditionalities that are part of the AI (limited to the ones set out in article 10). Reg. 1315/2013).

The drawing up of 27 **Assessment Dossiers** (one for each of the Functional Areas identified) completes the assessment, reported fully in **Annex 2**.

Chapter 8 contains the **Accompanying measures**, in the form of an "organic index of the indications for the Functional Areas environmental agendas", once again organized with reference to the six OAS. It systematically contains the possible accompanying measures to make the Functional Area in question operational in the progressive definition of the interventions, regardless of the presence of important negative impacts (a positive impact can always be improved), while the measures targeted at limiting the specific negative impacts identified in the Assessment Matrix as worthy of "particular control", i.e. *of measures that can make them acceptable, compared to the total benefits that can be obtained via the implementation of the Functional Area interventions,* are reported directly in Section 3 of the Assessment Dossiers.

Chapter 9, illustrates the AI **monitoring** system, with ample reference to the methods already explored by the MIT and MATTM as part of the Environmental Monitoring Plan in the PON SEA "Infrastructures and Networks" 2014-2020.

Lastly, **Annex 3,** contains the Incidence Study on Natura 2000 sites (**VINCA**).

1.2 Finding contents of Annex VI to the Leg. Decree 152/2006 in this Environmental Report

The detailed description of the information to include in the RA is shown in Attachment VI to the Leg. Decree 152/2006 (Environment Consolidated Text), identical to the corresponding Annex of the Directive 2001/42/CE on the SEA. The following prospectus illustrates correspondence between the

chapters of the Environmental Report and the contents of Annex VI, as interpreted in light of the assessment method adopted.

ENVIRONMENTAL REPORT CONTENTS	LEG. DECREE 152/2006, ANNEX VI "CONTENTS OF ENVIRONMENTAL REPORT".
Chapter 1 Introduction	
Chapter 2 The SEA process in the AI (including consultation results)	
Chapter 3 Illustration of Infrastructure Annex	a) illustration of contents, main plan or programme objectives and report with other pertinent plans or programmes;
Chapter 4 The adopted assessment model	h) summary of the reasons behind the choice of identified alternatives and a description of how the assessment was carried out, and any difficulties met (e.g. technical shortcomings or difficulties deriving from new problems or new techniques used to solve them) when collecting the information required;
Chapter 5 Current state of the environment	b) aspects relating to the current state of the environment and the probable evolution of the plan or the programme; c) environmental, cultural and landscape characteristics of the areas that could be significantly involved; d) any existing environmental problem, pertaining to the plan or programme, including in particular the ones relating to areas of particular environmental, cultural and landscape importance, such as the areas appointed as special protection areas for the conservation of wild birds and the ones classified as sites of EU importance for the protection of natural habitats and wild flora and fauna, and also territories with agricultural production of a particular nature and quality, as set out in article 21 of the legislative decree dated 18 May 2001, nr. 228;
Chapter 6 Environmental protection and transport policy objectives established at international, EU or national level and their integration in the AI	e) environmental protection objectives established at international, EU or member state level, relevant to the plan or programme and the way in which said objectives and any environmental considerations have been considered during its preparation;
Chapter 7 Possible significant effects of the AI	f) possible significant impacts on the environment, including aspects such as biodiversity, population, human health, flora and fauna, land, water, air, climatic factors, material goods, cultural heritage, including architecture and archaeology, the landscape and the interrelation between the above factors. All significant impacts must be considered, including secondary, cumulative, synergic, short, mid and long term, permanent and temporary, positive and negative ones;
Chapter 8 Accompanying measures: organic index of indications for the environmental agendas of the functional areas	g) measures foreseen to prevent, reduce and compensate any significant negative impacts of implementation of the plan or programme on the environment as fully as possible;
Chapter 9 Monitoring System	i) description of the measures provided for regarding the monitoring and control of significant environmental impacts deriving from implementation of the proposed plans or programme, in particular setting out the ways for collecting data and processing indicators required to assess the impacts, frequency of the production of reports showing the results of impacts and corrective measures to adopt;
Separate volume: - non-technical summary of the environmental report	j) non-technical summary of information as in letters above.

2 The SEA process in the Infrastructure Annex

2.1 Regulatory references for SEA and VINCA

The Strategic Environmental Assessment (SEA) is a support process for decisions, introduced into the European programme scenario by the Directive 2001/42/CE dated 27 June 2001 “European Parliament and European Council Directive regarding the assessment of the effects of certain plans and programmes on the environment (hereinafter referred to as the "SEA Directive").

It completes a long legislative season that has seen the European Union and the member states committed to the application of procedures, methodologies and techniques to integrate the preventive environmental evaluation into projects, programmes and plans started up with the Directive 85/337/EEC,[1] relating to the evaluation of the effects of certain environment projects (EIA), and continued with the Directive 92/43/EEC on Assessment of the Environmental Implications (VINCA), aimed at protecting sites involved in Natura 2000 Network (SCI and SPA).

The objective of the SEA directive is to guarantee a high level of environmental protection and to contribute to the integration of environmental observations into the plan or programme prior to its adoption.

The state legislation implementing the directive is the Legislative Decree 152/2006 "Environmental legislation" and later amendments and integrations. (or Consolidated Environment Act, hereinafter referred to as “Environmental Act”).

The implication assessment procedure, on the other hand, must provide documentation that helps to identify and assess the main effects that the Infrastructure Annex can have on the Natura 2000 sites involved by the plan or programme, bearing in mind the preservation objectives contained in them.

To coordinate and simplify procedures, the Environment Act (art.10, par.3) establishes that “*the SEA and the EIA include the assessment of implications procedures as set out in article 5 of decree number 357 from 1997; for this purpose, the environmental report, the preliminary environmental study or the environmental impact study contain the elements as set out in annex G of the same decree nr. 357 from 1997 and the assessment of the competent authority extends to the purpose of preserving the assessment of implications or must acknowledge the results of the assessment of implications. Public information modes provide specific evidence of procedural integration*.”

The Environmental Report will however, contain the prescribed implication study on the Natura 2000 sites, in the Annex.

As mentioned above, the EU legislative references on the Assessment of Environmental Implications (VINCA) are:

- Directive 92/43/EEC (Habitat) by the Council dated 21 May 1992, regarding conservation of the natural and semi-natural habitats and wild flora and fauna.
- Directive 2009/147/EEC of the European Parliament and Council dated 30 November 2009 regarding the conservation of wild birds.

With regard to the national legislative references, implementation of the Habitat Directive took place via Presidential Decree nr. 357/97, later amended and integrated by the Presidential Decree nr. 120/2003, while acknowledgement of the Birds Directive took place via Law nr. 157/1992, later integrated by Law nr. 221 dated 3 October 2002.

[1] Recently (25 April 2014) substituted by the new directive 2014/52/EU, that amends the directive 2011/92/EU, that in turn replaced the 85/337/EEC, as amended by the directives 97/11/EC, 2003/35/EC and 2009/31/EC.

based on article 6 of the new Presidential Decree 120/2003, paragraph 1, consideration must be taken, in planning and territorial programming, of the naturalistic and environmental value of the proposed Sites of Community Importance (pSCI), the Sites of Community Importance (SIC) and the Special Areas of Conservation (SAC). This is a general principle that tends to avoid territorial management tools being approved that are in conflict with the conservation needs of the habitats and species of interest.

In particular, assessment of the implications must contain the elements as set out in Annex G - still in force - of the same decree 357/1998.

2.2 Contributions provided by Subjects with Competence on the Environment (SCA) during the preliminary consultation phase.

The preliminary environmental report

The Environment Act lists the phases and activities in the SEA process in the following terms:

a) carrying out a subjectability check, limited to plans and programmes as set out in article 6, paragraphs 3 and 3-bis;
b) the preliminary phase for setting out and defining the contents of the environmental report;
c) drafting the environmental report;
d) conducting consultations;
e) assessment of the plan or programme, the environmental report and the results of consultations, with reasons given for the opinion provided;
f) the decision;
g) information about the decision;
h) monitoring.

The preliminary environmental report (RPA), also commonly called the *Scoping Report*) is the document around which phase b) of the SEA process hinges, if phase a) is superfluous, as the Infrastructure Annex to the DEF is certainly subjectable to SEA.

Article 13, paragraph 1 of the Environmental Act clearly identifies the aims of the Scoping Report, ordering that, on the basis of a preliminary report on the possible significant environmental impacts of implementing the plan or programme, the Proceeding Authority must enter into consultation with the Competent Authority, from the first moments of drawing up the plans and programmes, and other subjects competent in environmental matters, in order to define the extent and level of detailed information to include in the environmental report.

In particular, the Preliminary Environmental Report regarding the AI SEA process contained:

a) a description of the subject of the assessment (Infrastructure Annex to the Economic and Finance Document, in its progressive outline) and the reasons for which it was subjected to SEA (chapter 2).
b) A description of the integration modes between planning activity and environmental assessment activities (chapter 3);
c) indications about the possible significant environmental effects deriving from implementation of the plan or programme (chapter 5), processed according to a first short series of rapid analyses of the programme context and environmental-territorial context (chapter 4).
d) the criteria for setting out the environmental report (chapter 6), including the description of the assessment model adopted and information to be included in the environmental report.

e) a description of participation activities and modes (chapter 7)
f) indication of the subjects involved in the SEA process (chapter 8)
g) In Annex 1, a summary table of the legislative and programme reference framework examined in section 4.2, with an indication of the main contents and the reference environmental components
h) In Annex 2, a "Questionnaire for the preliminary consultation of Subjects with Competence on the Environment (SCA), aimed at aiding the exchange of information.

Subjects involved

The **proceeding Authority** for the SEA of the Infrastructure Annex (AI) is the Ministry of Infrastructures and Transport (MIT), Department for infrastructures, information and statistic systems -Headquarters for the Development of the Territory, Programming and International Projects.

The **Competent Authority** is the Ministry for the Environment and protection of the territory and sea (MATTM) - Headquarters for environmental assessments (the Minister), competent in the country (art.7, par. 1 Leg Decree 152/2006 and subsequent amendments and integrations), that uses technical-scientific support from the Technical Commission for Verification of Environmental Impact - EIA and SEA (art.8 Leg Decree 152/2006 and later amendments and integrations).

The Ministry for Cultural Heritage and Activities (MIBACT) - Headquarters for landscape, the arts, architecture and contemporary art, collaborates with preparatory activity, expresses its competent opinion and **expresses itself together (the Minister) with the competent authority** regarding the opinion with grounds of the SEA.

I **Subjects with competence on the Environment (SCA)** are the public administrations and public bodies that, for their specific competences or responsibilities regarding the environment, may be involved in the impacts on the environment due to implementation of the plan or programme in question (art.5, par. 1 letter s) of the Leg. Decree 152/2006 and subsequent amendments and integrations).

In the case of the AI SEA, there are about 200, falling into the following categories:

- Ministry for Cultural Heritage and Activities and of Tourism;
- Ministry for Health;
- Ministry for agricultural, food and forestry policies;
- Superintendencies for Architectural and Landscape Heritage and territorially competent Archaeological Superintendencies;
- Regions and Autonomous Provinces (headquarters in charge of SEA and VINCA, if not the same, and headquarters in charge of transport matters);
- ISPRA;
- Regional Agencies for Environmental Protection (ARPA);
- District Authority (formerly Basin);
- ANBI;
- National Parks Bodies;
- Protected Marine Areas management bodies;
- International Sanctuary for sea mammals, also known as the Sea Cetacean Sanctuary;
- Baia Underwater Park management body;
- Gaiola Underwater Park management body;
- Higher Institute of Health.

As part of the SEA procedure, the Ministry for Cultural Heritage and Activities, the Regions involved and other competent Administrations and Bodies on environmental matters can make observations, objections and suggestions regarding the plan or programme that the Ministry for the Environment receives and assesses as part of the SEA procedures in order to issue its SEA opinion with reasons (art.15 Leg Decree 152/2006 and subsequent amendments and integrations) in the timescales and using the methods indicated in the obligations for the competent authority.

Preliminary consultations with the Competent Authority for the SEA

A preliminary meeting was held on 30th July 2015 at MATTM, aimed at verifying the layout and timescale for the SEA procedure.

Several exponents from the MATTM SEA department and a representative from MIBACT took part in the meeting, in addition to representatives from MIT, MISE and relative advisors.

During the meeting, the contents of the Scoping Report were discussed (previously sent to attendees as a draft) and the desire was expressed, in the spirit of institutional sharing that characterises the SEA process, to attempt sharing with the HC in such an early phase of the process, i.e. even before the formal sending of the Scoping Report (which took place on 7 August 2015).

The timescale for the process was set - also in relation to the necessary time for government and institutional stages in general, required of the Infrastructure Annex to the DEF, and the need to set up cross-border consultations with other countries - finally agreeing with the MATTM about the shortening of the procedure from 90 days as standard to 45 days, pursuant to art. 13, par. 2 Environmental Acts.

Participation of the Subjects with Competence on the Environment

The Scoping Report was then completed and sent on 7th August 2015 – with a consultation start-up notification pursuant to art.13 par. I of the Leg. Decree 152/2006 and subsequent amendments and integrations. (prot. 0006304 MIT) - to the Competent Authority for the SCA.

Together with the Scoping Report, the information required by the Competent Authority for preparing notification to France, the Swiss Confederation, Austria and Slovenia for the request of expression of interest in taking part in the cross-border consultations (pursuant to article 32 of the Leg. Decree 152/2006 and subsequent amendments and integrations) were also sent as attachments. The format used is the one made available by UNECE pursuant to article 10 of the SEA Protocol to the Convention of Espoo on the environmental impact assessment in a cross-border context.

Only Austria and Slovenia showed interest in taking part in the SEA procedure.

On the contents plan, the Scoping Report is sent to the SCA so that they can provide any contribution of their own, in particular expressing their opinion about:

- verification of the programme context and the completeness and relevance of the plans and programmes identified;
- the environmental assessment process proposed and its contents;
- the modes for identifying the holders of interest and the carrying out of the participation process;
- the environmental assessment modes proposed;
- the environmental report contents;
- any other aspect considered to be of interest.

By the 45th day after sending the Scoping Report to the above subjects, 23 written and registered contributions were received, in addition to which another 9 contributions were received, but after the

deadline, which were however considered and stated in the herein environmental report, making a total of 32.

The following ***Fig. 1*** shows the percentage of participation, compared to the contacted SCA (19%), while ***Fig. 2***. shows he same data divided by type of SCA.

Fig 1 - % of of the SCA invited

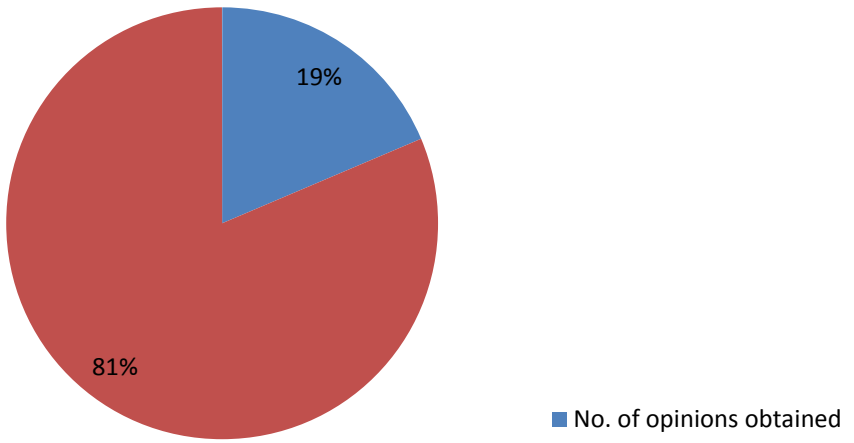
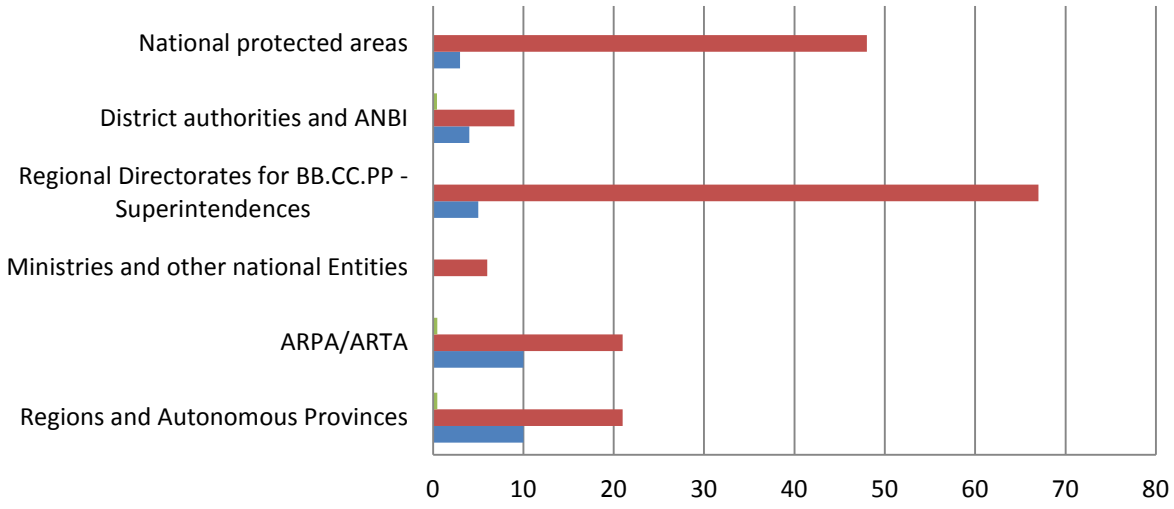


Fig. 2 - Percentage of SCA participation by type of body

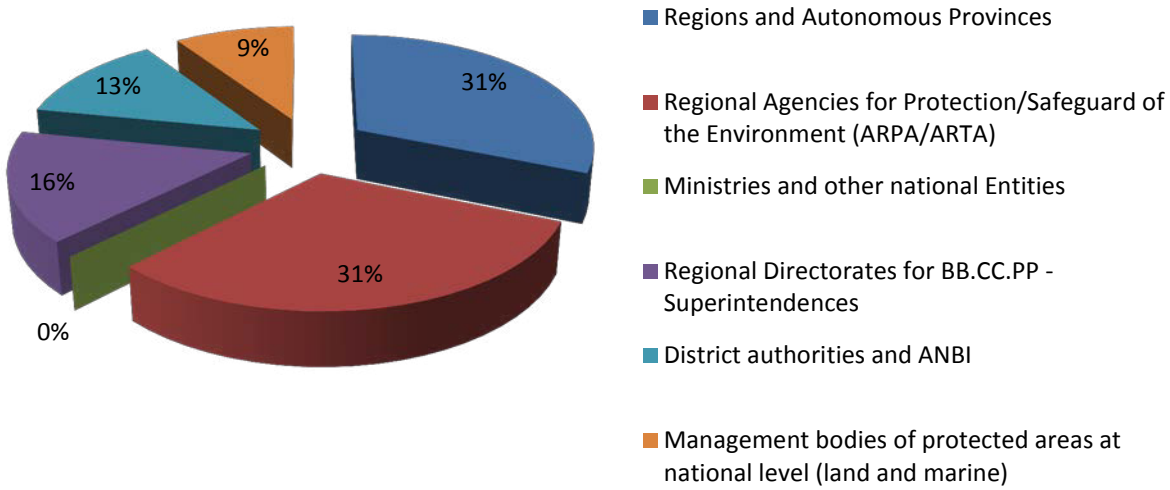


	Regions and Autonomous Provinces	ARPA/ARTA	Ministries and other national Entities	Regional Directorates for BB.CC.PP - Superintendences	District authorities and ANBI	National protected areas
% of participation	48%	48%	0%	7%	44%	6%
SCAs contacted	21	21	6	67	9	48
No. of opinions sent	10	10	0	5	4	3

As can be seen in ***Fig. 2,*** about half the 21 Regions (including the 2 Autonomous Provinces) and the Regional Environmental Agencies (ARPA) took part in the consultation, almost always providing the questionnaires filled out and separate additional information. The District Hydrographical Authorities showed a good level of participation (about 44%), while Superintendencies and management bodies for protected areas took part to a lesser extent, with 7% and 6% respectively of the respective totals of the contacted bodies.

If we move on to analyse the pool of contributions that were received (***Fig.3)***, about one third can be attributed to Regions and ARPA, while the remaining third is distributed amongst other SCA, except for the Ministries contacted, that did not reply.

Fig. 3 - Opinions obtained as a percentage of the total requests sent, by type of SCA



Bearing in mind the fact that the precise indications provided by the Subjects with Competence on the Environment were widely taken into consideration in the assessment and drawing up of the herein environmental report (hereinafter RA), reported later on in this section, below is an analysis of the composition of the contributions made in relation to the questions asked in the questionnaire attached to the RPA (***Fig.4***).

Table ***2.1*** shows the summary framework of the results from the questionnaires filled out by the Subjects with Competence on the Environment (SCA) that have sent contributions, divided according to the type of response to each question, or directly, filling out the questionnaire, or indirectly in the text of the written contribution, but referring precisely to the subjects of the questions.

This set of information can be commented from various points of view. First of all, the matters that have returned the most positive response can be considered, or - from a different point of view - the matters proposed in the RPA on which the SCA declared themselves not totally satisfied, therefore believing it useful to provide contributions.

As can be seen, the greatest participation (59% of the SCA) was seen in the reporting - for the purpose of the SEA procedure applied to the Infrastructure Annex - further databanks and/or information, in addition to the ones identified in the RPA. These are planning tools drawn up regionally or by the hydrographical district, most all considered in the RPA as categories of plans but without a well-known indication for each Region.

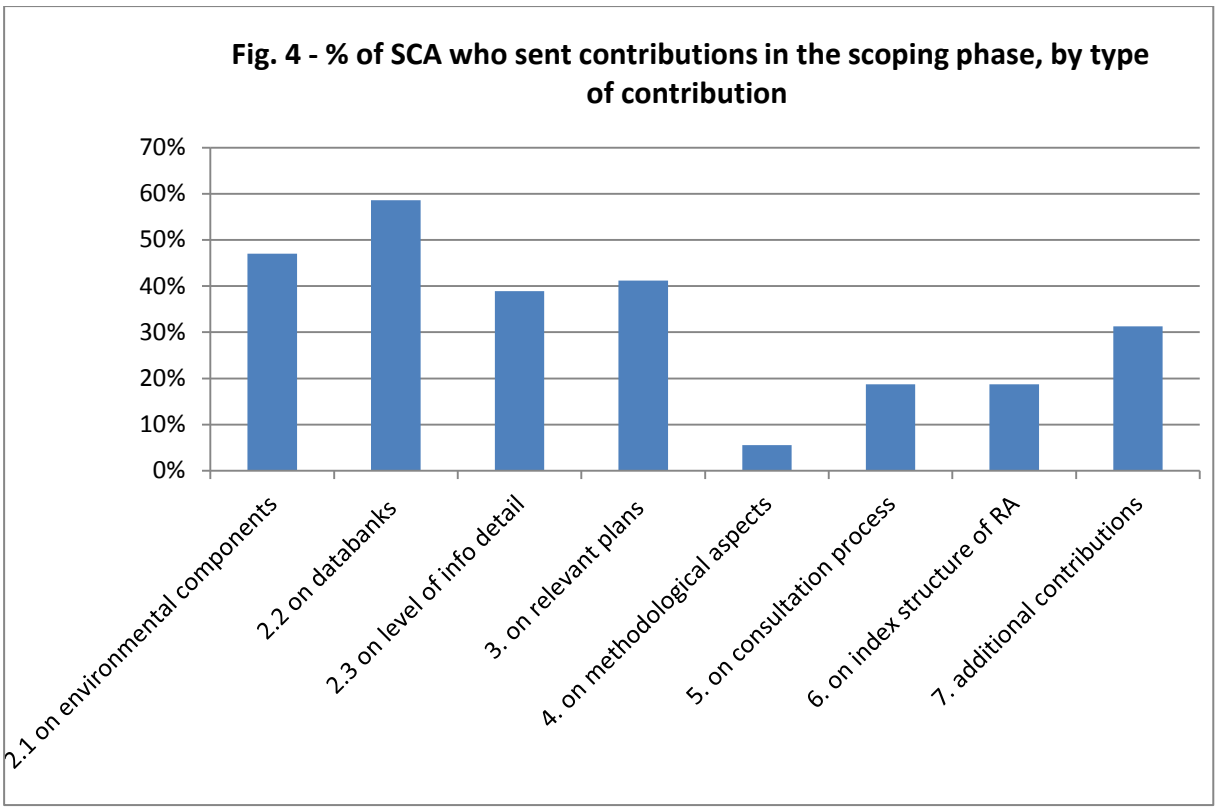
Below are indications about environmental components that are to be included in the assessment, as an addition to Table 5.1 of the herein Report (47% of SCA).

Table 2.1 - Systematic overview of results of questionnaires compiled by Subjects with Competence on Environment who sent contributions in the scoping phase of the SEA

Questions in the questionnaire atttached to Preliminary Environmental Report (RPA)	Regional departments for environment, agriculture and infrastructure										Regional agencies for protection/safeguard of the environment (ARPA/ARTA)										Archaeological Superintendences					District authorities and ANBI				Protected Area management bodies			total replies provided	of which satisfied **	%	of which dissatisfied **	%
	Abruzzo Region	Friuli Venezia Giulia Region	NURV of the Tuscany Region	Veneto Region	Marche Region	Sardinia Region on	*Autonomous Province of Trento*	*Valle D'Aosta Region**	Lombardy Region*	Piedmont Region*	ARPA Calabria	ARPA Lombardy	ARPA Campania	ARPA Tuscany	ARPA Friuli Venezia Giulia	ARTA Abruzzo:	*ARPA Veneto **	*ARPA Valle d'Aosta **	*ARPA Puglia on **	*ARPA Liguria **	Lombardy Superintend. for Archaeological Heritage	Archaeological Superintendence for Tuscany	Special Superintend. for Pompeii, Ercolano and Stabia	Umbria Archaeological Superintendence	Archaeological Superintend. for Basilicata	Tiber River Basin Authority	Serchio River Basin Authority	Adige River Basin Authority	Arno River Basin Authority	Consorzio AMP Plemmirio (Syracuse)	Tuscany Archipelago National Park	Gran Sasso. and Monti della Laga National Park Body*					
Questionnaire compilation	X	X	X			X				the regional opinion will be expressed in the subsequent phase of assessment	X	contributions integrated in opinion no. 25 Lombardy Region	X		X	X	X		X	X			X			X		X		X		X	18				
2. EXTENT OF INFORMATION FOR CONSTRUCTING THE ENVIRONMENTAL CONTEXT 2.1 . Do you think that all the environmental components and topics relevant to the Infrastructure Annex have been taken into consideration?	yes	**no**	yes		yes	**no**					yes		**no**		yes	yes	**no**		yes	**no**			yes			**no**		**no**		yes		**no**	17	0	**0%**	8	**47%**
2.2 For the purpose of the SEA procedure applied to the Infrastructure Annex, do you think it is useless reporting any further data bank availability and/or information in addition to what is found in section 4.3 and in Chapter 5???	yes	**no**	**no**	yes	**no**	**no**	**no**	**no**	**no**		**no**		yes	**no**	**no**	yes	yes		no	no	yes	yes	yes	yes	yes	yes	**no**	yes	**no**	**no**	**no**	**no**	29	0	**0%**	17	**59%**
2.3 Do you think that the extent and level of detail of the information to be included in the environmental report described in Chapter 5 is adequate?	yes	**no**	yes	yes	yes	yes					yes		yes		**no**	yes	**no**		**no**	**no**			**no**			**no**		yes		yes		yes	18	0	**0%**	7	**39%**
3. EXTENT OF INFORMATION FOR CONSTRUCTING THE PROGRAMMATIC CONTEXT Do you think that the list of plans and programmes pertaining to the Infrastructure Annex and listed to section 4.2 for which the consistency reports must be verified is thorough?	yes	**no**	yes	yes		yes					yes			**no**	**no**	yes	yes		**no**	**no**			**no**			**no**		yes		yes		yes	17	0	**0%**	7	**41%**
4. METHODOLOGY OF ASSESSMENT PROCESS Do you think that the methodology illustrated for the assessment of environmental effects of the Infrastructure Annex is clear and thorough? section 6.1)	yes	yes	yes	yes		yes					yes		yes	yes	**no**	yes	yes		yes	yes			yes			yes		yes		yes		yes	18	0	**0%**	1	**6%**
5. METHODOLOGY OF THE CONSULTATION AND PARTICIPATION PROCESS Do you think that the consultation and participation process illustrated in section 7 is adequate?	yes	yes	yes			yes					yes		yes		yes	yes	yes		**no**	**no**			**no**			yes		yes		yes		yes	16	0	**0%**	3	**19%**
6. PROPOSED STRUCTURE/INDEX OF ASSESSMENT REPORT Do you believe that the chapters and relative content as found in the index proposal in section 6.3 are suitably structured?	yes	**no**	yes			yes					yes		**no**		yes	**no**	yes		yes	yes			yes			yes		yes		yes		yes	16	0	**0%**	3	**19%**
7. ADDITIONAL OBSERVATIONS Do you think that it is superfluous to provide other useful contributions?	yes		yes			yes					yes		**no**	yes	yes	yes	yes		yes	**no**			**no**			**no**		**no**		yes		yes	16	0	**0%**	5	**31%**

* SCAs that sent contributions after the deadline but were still considered by the SEA

** Not all (only 6 out of 8) the Questionnarie questions were formulated in a way that the answer "no" indicated non-complete satisfaction expressed by the SCA, which therefore sent a contribution in this regard. To standardise the meaning of the answers, questions 2.2 and 7 were therefore modified, respectively, replacing the words "useful" with "useless" and "adequate" with "superfluous".



The following questions recorded a higher percentage of satisfaction, regarding:

- the adequacy of the size and level of detail of the information to be included in the RA (question nr. 2.3), with 61% of the SCA that stated they were satisfied (complementary to 39% that actually contributed);
- the completeness of the list, proposed in the RPA, of plans and programmes regarding the Infrastructure Annex and for which consistency reports (question nr. 3) must be verified, with a 59% percentage of satisfaction.

another degree of satisfaction, amounting to 81%, was shown in another two proposals in the RPA:

- the one regarding the consultation and participation process;
- the one regarding the organisation of the RA contents list into chapters, with relative contents.

Finally, the methodology shown in the RA for assessment of the environmental effects of the Infrastructure Annex was declared to be "clear and thorough" by 94% of the SCA, with only one request for clarification received (Friuli Venezia Giulia ARPA).

Integrations of contributions received in this Environmental Report

There are eight tables in this sub-section - one for each question on the questionnaire - that show how each contribution provided is considered in this RA, with reference to any section where it has been directly inserted or handled, however.

In drawing up these tables, the content of the contributions - whether sent via the questionnaire or not - were regrouped under the eight topics expressed in the questions, even if placed in the questionnaire in less relevant parts than the ones where they were included in the end; for example, all together in section 7 "further useful contributions", although being clearly pertinent to one or more of the previous specific questions. Thanks to the prior de-grouping and regrouping of topics, it has been possible to

examine contributions more organically, observing reciprocal contradictions and redundancies, with the aim of inserting the contents considered to be useful in the RA in an orderly and consistent manner.

Therefore, the number of answers to the questions on the questionnaire does not always correspond to the number of SCA that are found - in Table 2.1 - to have provided a contribution to this or that question. To justify the freedom with which the contents have been regrouped, the original versions are available on the MATTM website, for a direct consultation.[2]

Lastly, a large part of the detailed observations made by the SCA were found to be unusable in this SEA, due to the strictly strategic nature that the AI assumed.

However, as they were often observations that could be very useful, they have been included in Chapter 8, regarding the "Environmental Agenda" of interventions that the Functional Areas will use, in addition to the criteria for subsequent planning/projects/assessments.

Extent of information for constructing the environmental context

QUESTION 2.1: DO YOU THINK THAT ALL THE ENVIRONMENTAL COMPONENTS AND TOPICS RELEVANT TO THE INFRASTRUCTURE ANNEX HAVE BEEN TAKEN INTO CONSIDERATION?

SCA	CONTRIBUTION	PROPOSAL FOR INTEGRATION INTO THE SEA
ARPA Campania	Suggests completing the macro-components (MC) for environmental-territorial analyses/assessments with the following specific topics: • MC 2: subsurface, seismic risk, volcanic risk; • MC3: sea and coast environment; • MC4: contaminated sites; • MC 6: Industries at risk of incidents • MC6: Socio-economic aspects - highlight infrastructures and urban density in the context analysis for definition of programme actions	Integrations included in table 5.1 and sections 8.4 e 8.7, if not already addressed
ARPA Veneto	Suggests completing the macro-components (MC) for environmental-territorial analyses/assessments with the following specific topics: • MC3: **Exotic species** (as the infrastructures and transport system are the preferential introduction and expansion routes for allochthonous species) • MC4: **Contaminated sites** (as they are preferential places for the location of infrastructures, in order to associate the reduction in land consumption with reclamation of the area) • MC4: **Foundations soil and rock from excavations** (as it is hoped there will be a priority use of all inert materials from the excavations planned for the work, or for other ongoing work in the surrounding area, when creating the foundations of infrastructures, only resorting as a second choice to inert materials recovered in aggregate or conglomerate form) • MC4: **Waters** (as the infrastructures are possible sources of contamination of surface and underground water during the realisation phase and the usage stage. It must be pointed out that regarding the use of lake basins for first flush waters coming from road surfaces that can exploit plant purification and act as stepping stones on the ecological networks).	Integrations included in table 5.1 and sections 8.4 and 8.5

[2] http://www.va.minambiente.it/it-IT/Oggetti/Documentazione/1563/2539

ARPA Liguria	Suggests completing the macro-components (MC) for environmental-territorial analyses/assessments with the following specific topics: • MC4: **Food and agricultural assets** (as agricultural activity can undergo changes due to urbanisation processes and/or can suffer effects in areas that become temporary worksites; Manual 109/2014 ISPRA – page 40). • MC6: **Physical agents** (as they characterise the current and future state of the territory; ISPRA manual page 47)	Integrations included in table 5.1 and sections 8.5 and 8.7
Friuli Venezia Giulia Regional Administration	Suggests completing the macro-components (MC) for environmental-territorial analyses/assessments with the following specific topics: • MC6.**: short and long term employment repercussions** (this should appear in the environmental topics for which the description of the context should be given and the assessment developed, in relation to the "population" component and the summary environmental objective OAS 6, with special reference to the living and working conditions and also economic conditions). It is in fact believed that the choice of focusing on some strategic infrastructures rather than others should not exclude the consequences in terms of jobs that such infrastructures may contribute to generating in the areas they concern, both during realisation and during operation. Setting these assessments would also allow evaluation, during the monitoring state, of whether the strategic choices have generated a so-called “tunnel effect” or have contributed, also long-term, to the development of socio-economic fabric.	Topic addressed in paragraph 8.7
Sardinia Regional Administration	Suggests completing the macro-components (MC) for environmental-territorial analyses/assessments with the following specific topics: • MC6.: mobility and transport (in order to assess the effects that the plan will produce on the above-stated environmental topic, while being a plan that is the general framework for investments in transport that are of national interest)	Topic addressed in paragraph 8.7
Gran Sasso Monti della Laga National Park (PN)	Suggests completing the macro-components (MC) for environmental-territorial analyses/assessments with the following specific topics: • MC2.: seismic and fire risk • MC4.: protection and reduction of water pollution	Topics already considered in the RPA
	Also suggests: • MC1.: reducing greenhouse gases, re-establishing biodiversity islands (planting of indigenous trees and bushes in man-made areas too) • MC3.: integrating analyses with habitats and/or species that, although not identified in the European directive annexes, are even more important to conservation on a local level; paying special attention to water environments. • MC4: favouring abandoned sites to locate infrastructures; if this is not possible, providing indications for environmental recovery, regarding the permeability of land and re-vegetation of the site, also to reduce the risk of flooding.	Integrations included in sections 8.2, 8.4, 8.5.
Tiber Basin Authority (AdB)	Suggests completing the macro-components (MC) for environmental-territorial analyses/assessments with the following specific topics: • MC4: considering the water component not just as the element that characterises the hydro-geological set up of an area (OAS 2) but also as a natural resource to be protected and renewed, including it in OAS 4	Integrations included in table 5.1 and section 8.5

	under the heading “state of waters”	
AdB Adige	Suggests completing the macro-components (MC) for environmental-territorial analyses/assessments with the following specific topics: • MC6.: physical agents (ionising and non-ionising radiation)	Integrations partly entered in table 5.1 and section 8.7

QUESTION 2.2: FOR THE PURPOSE OF THE SEA PROCEDURE APPLIED TO THE INFRASTRUCTURE ANNEX, DO YOU THINK IT IS USEFUL REPORTING ANY FURTHER DATA BANK AVAILABILITY AND/OR INFORMATION IN ADDITION TO WHAT IS FOUND IN SECTION 4.3 AND IN CHAPTER 5 OF THE PRELIMINARY ENVIRONMENTAL REPORT?

SCA	CONTRIBUTION	PROPOSAL FOR INTEGRATION INTO THE SEA
Tuscany Regional Unified Assessment Centre (NURV)	• Printouts from the SISBON Information System (data bank of websites involved in the reclamation proceedings), shown on the Arpat website. • Regional legislation on waste management (Reg. Law 25/1998 and later amendments and integrations) (Articles 9. par.3 bis on the observance of maximum polluting concentrations; art.4 par.7, on recovery of materials in public specifications)	Useful but not usable information in this SEA
Friuli Venezia Giulia Regional Administration	• The link http://www.regione.fvg.it/rafvg/cms/RAFVG/ambiente-territorio/strumenti-per-conoscere/ contains information from the environmental and territorial data and services index and relative WEB GIS and related maps. The GIS Carta della Natura 50.000; • The link http://www.regione.fvg.it/rafvg/cms/RAFVG/ambiente-territorio/tutelaambiente-gestione-risorsenaturali/ FOGLIA203/FOGLIA1/ allows access to the conservation measures regulations and management plans; it also provides access to the information and data that the service has available, and management plans currently being drawn up, in particular official documents can be downloaded, such as site perimeters, standard formulas, environmental data - including the map of the EU habitats of interest presented in the latest available update. • This Service also has data banks on fauna and monitoring data of habitats and benthic communities in the SCI and marine areas of Friuli Venezia Giulia, available on request.	Useful but not usable information in this SEA
Marche Regional Administration	• MC3.: Natura 2000 network; use ISPRA data (Biodiversity section and Natura 2000 network) and, for the Marche area, the Rete Ecologica Marche (REM) data that can be found on the website www.ambiente.marche.it .	Useful but not usable information in this SEA
Sardinia Regional Administration	• Single Data Bank (BDU), available at the ministry and containing data on infrastructure work funded with national and EU resources (FSC, POR, etc.)	Useful but not usable information in this SEA
Friuli Venezia Giulia Regional Environmental Protection and Prevention Authority (ARPA)	• ISPRA 218/2015 report “The consumption of soil in Italy” ed. 2015 • ISPRA reports on the quality of urban environments	Integrations included in Chapter 8
Trento Autonomou	Provides data list that the Superintendency for cultural assets in the Province of Trent can supply	Reference in section 8.6

s Province		
Gran Sasso Monti della Laga National Park (PN)	• Seismic risk: http://www.protezionecivile.gov.it/JCMS/IT/RISCHIO_SISMICO.WP • Carta della Natura: http://www.geoportale.isprambiente.it/geoportale/catalog/main/home.page • Fire risk: http://www.pcn.minambiente/GN/	Integrations included in Chapter 8 "Environmental Agenda"

QUESTION 2.3: DO YOU THINK THAT THE EXTENT AND LEVEL OF DETAIL OF THE INFORMATION TO BE INCLUDED IN THE ENVIRONMENTAL REPORT DESCRIBED IN CHAPTER 5 OF THE RPA IS ADEQUATE?

SCA	CONTRIBUTION	PROPOSAL FOR POSSIBLE INTEGRATION INTO THE SEA
ARPA Tuscany and Tuscany Regional Unified Assessment Centre (NURV)	• MC6: In Section 4.3 of the Scoping Report, replace the general consideration of nitrogen oxides (NOx) with the specific one on nitrogen dioxide (NO2); • MC6: Consider the substances and parameters foreseen by the Leg. Decree 155/2010 and later amendments and integrations for the description of the context and monitoring of expected effects of the plan.	Integrations included in sections 5.7 and 8.7
	• MC3: Expand the field of assessments to the value elements involving the entire regional territory, characterizing the landscape, recognized by the Fact-gathering Framework of the Regional Landscape Plan (Landscape Territorial Plan - PIT, approved 2015) Among the approaches, refer in particular to the Regional Ecological Network (RET), the Map of Theoretical Absolute Intervisibility and the Map of Weighted Intervisibility of networks of landscape enjoyment, and the so-called "Transformation of the restrictions" ex articles 136 and 142 of the Landscape Code.	Useful but not usable information in this SEA (see sect. 4.2). These regional documents remain listed generally, for use in subsequent assessments (see sect. 6.1) A specific quote is contained, as an example of the wealth of content of the regional Territorial Landscape Plans - PTP, in section 8.6)
Friuli Venezia Giulia Regional Environmental Protection and Prevention Authority (ARPA)	• MC4: Pay special attention to the estimation methods for consumption of land by transport infrastructures: for example, the Corine Land Cover (updated 2012) with a minimum mappable unit of 25 ha for area elements and 100 metres for linear elements, does not "see" most roads. Also, the data regarding the surface area occupied by communication routes, referring to the period 1990-2001, should be updated.	Integrations included in section 8.5
ARPA Veneto	• MC2: land; additional knowledge-gathering processes should be included, if some interventions are located on a corridor, and also the erosion risk map and the inventory of landslides contained in the ISPRA annual environmental data report. • MC3: Biodiversity; it would be useful to state the main classes/species of vertebrate at risk of incident by crossing and propose guidelines/measures of mitigation for the reduction of the risk itself • MC4: The quality of land should also be assessed to favour the realisation of the infrastructure in environments with lower eco-site value. It would also be useful to introduce indicators that can express the intrinsic value of land (protective capacity, use capacity, water reserve, etc) And the indicator of organic carbon in the ground, for evaluating the impact of the infrastructure in terms of CO2 • MC4: The infrastructures are possible sources of contamination of surface and underground water during the realisation phase and the	Integrations included in sections 8.3, 8.4 and 8.5

	usage stage. Biological, chemical-physical and hydromorphological elements of surface and underground waters should be included in the additional indicators, in the event of location.	
ARPA Puglia:	• MC1.: Introduce a monitoring system for the of the travelling flow in port and airport areas (intended as the number of vehicles) in addition to goods and people indicated in the RPA • MC4.: Consumption of ground; an aerial indicator should be considered of the extent of the surface areas relevant to each infrastructure, in addition to the encumbrance of the infrastructure itself. • MC6: The % of population exposed to noise inside urban agglomerates is not found in the QC but is central to the Assessment.	Integrations included in sections 8.2, 8.5, 8.7
ARPA Liguria	• MC3.: For localisable infrastructures, it proposes to use a consideration of the areas of conservation interest for biodiversity in addition to the Ecoregional conservation approach (Natura 2000 network)	Integrations included in section 8.4
Marche Regional Administration	• MC2.: a suggestion is made - as for the other OAS, to explain environmental matters and relative indicators, with particular attention to hydrological collapse (landslides and floods) and to the rise of the sea level and how the AI forecasts are part of the context of existing and developing critical factors.	Integrations included in section 8.3
Trento Autonomous Province	• MC1.: do not limit handling to climate-changing gases but consider the ones most connected to the transport sector (nitrogen oxides; see Leg. Decree 13.08.2010, no. 155); • MC5: Report that the architectural and archaeological heritage and sites do not appear in the MIBACT Risk Map or in other national data banks. • MC1: Proposes moving the matter of air pollution in urban areas from MC 6 (handled as quality of urban areas and population health) to MC 1 (air quality) • MC5: Asks whether analyses on movable goods (archives, books, museum collections etc) will also be included in the RA, in addition to architectural and archaeological heritage.)	• Integrations included in section 8.7 • Integrations included in sec. 8.6 • Proposal not accepted: the choice made is clearly the one to attribute the aspects of climate-changing gas reduction to MC1 and to concentrate attention on reducing directly harmful polluting agents for human health in MC6, dedicated to the quality of urban areas. • The topic is not considered pertinent to the AI
Lombardy Regional Administration	• MC4: Pay particular attention to the consumption of agricultural land, also not to waste investments that it may have benefited from • MC6: It proposes the integration the assessments with an environmental statement/account of the AI aimed at reporting the environmental resource flow taken/issued overall by the system of works of strategic interest.	• Integrations included in section 8.5 • Topic addressed in paragraph 8.7
Tiber Basin Authority (AdB)	• MC2.: Integrate specific indicators for the water and geomorphological risk (e.g. Number of areas at risk interfering with infrastructures, number of authorising proceedings that require the AdB opinion, etc). • MC4.: Integrate specific indicators for the interference of work with the state of waters, e.g. The impact of new infrastructures on the status of	Integrations included in sections 8.3 and 8.5

	underground and surface waters; number of interferences with water bodies, status of water before and after interventions, etc.	
AdB Serchio	• MC2.: The RA should explain that, in order to set the later stages of the EIA correctly, the following aspects should be taken into consideration: 1)consistency of the work with the Basin planning tools must be checked, 2) interferences of new infrastructures with the geomorphological and water dangers P4 and P3 of the Hydrogeological Structure Plans (PAI) and relative limitations; 3) limitations to water drawing contained in the regulation 7 and with the protection and safeguarding of the areas included in the Protected Areas Register (tab. 5)	Integrations included in section 8.3

Extent of information for constructing the programme context

QUESTION 3: DO YOU THINK THAT THE LIST OF PLANS AND PROGRAMMES PERTAINING TO THE INFRASTRUCTURE ANNEX AND LISTED TO SECTION 4.2 FOR WHICH THE CONSISTENCY REPORTS MUST BE VERIFIED IS THOROUGH?

SCA	CONTRIBUTION	PROPOSAL FOR POSSIBLE INTEGRATION INTO THE SEA
ARPA Calabria	Reports further environmental information relating to: • water matrix (Classification of the Water Management Plan 2009 and qualitative-quantitative monitoring project for surface and underground water bodies in Calabria 2013); • Air matrix (Regional Plan for Safeguarding Air Quality, 2010); • Contamination of the ground and reclamation (Regional Reclamation Plan 2007, Abstract of High Risk Sites Plan 2012).	If not found in integrated RPA - in the regional plan categories - Chapter 8.
Arcipelago Toscano National Park (PN)	• Technical Implementation Regulations of Park Plan	
Tiber AdB and Serchio AdB	They state the need to considered the following plans, both approved and still being drawn up, for the purpose analysing programme consistency: • Water resources management plans referred to in Dir. 2000/60 /EC • Flood risk management plans referred to in 2007/60 EC • Abstract from hydrographical basin plans	
ARPA Tuscany and NURV Tuscany	• Regional Environmental and Energy Plan (PAER 2015), • Waters Protection Plan (PTA 2005) and DPGRT 46/R/2008, • Regional waste management and polluted sites reclamation (PRB 2014) • Regional Plan of extraction activities, recovery of excavation areas and reuse of recoverable residues (PRAER) to study the matter of excavation and building materials (OAS4).	
Friuli Venezia Giulia Regional Administration	*Conservation measures and management plans*. If the work involves regional territories, the consistency relations of the programme must be verified with the conservation measures • Of the continental bio-geographic area, approved by Regional administration council on 28 March 2013 no. 546 • Of the alpine bio-geographic area, approved by Regional administration council on 11 April 2013 726, • and in addition with the management plans currently approved (SCI and SPA IT3330006 Valle Cavanata and Banco Mula di Muggia, SCI IT3320028 Palude Selvote, SCI IT3320031 Paludi di Gonars management plan) and adopted management plans (SAC IT3320026 Risorgive dello Stella).	
Veneto Regional Administrati	• Bear in mind the contents of the Environment Min. Decree dated 29/11/2000 on acoustics limitations.	If not found in integrated RPA -

on and ARPA Valle d'Aosta		in the regional plan categories - Chapter 8.
ARPA FVG	Reports the presence of the following regional plans for the purpose of programme consistency analysis: • Waters Protection Plan (during approval phase) • Regional Plan for Transport infrastructures, mobility of goods and logistics (approved with Regional Prov. Decree 300/2011) • Regional Local Public Transport Plan	
Trento Autonomous Province	Some of the regional planning instruments proposed for verifying external consistency and to identify the environmental protection objectives are the following: • Waste management plans • Waters protection plans (found on APPA site)	
ARPA Puglia	Reports the presence of the following regional plans for the purpose of programme consistency analysis: • Agglomerates action plans ex leg. Decree 194/2005 • Action plans for national transport infrastructure management bodies ex leg. Decree 194/2005	
ARPA Liguria	• Rural Development Plan 2014-20 (to reduce impacts on agricultural-food heritage) • Regional Territorial Plan for quarry activities and Regional Plan for waste (the presence of quarries and dumps may affect location of work) • Waters Protection Plan, hydrographical district management plan (protecting water resource) • Flood Risk Management Plan (PGRA); dir. 2007/60 EC, leg decree 49/2010, leg decree 219/2010	
Lombardy Regional Administration	• EU Macro-regional Strategy for the Alpine Region (EUSALP) (launched 28-July 2015) • European Parliament Resolution on a sustainable future for transport (06.07.2010) with a view to the preparation of the 2011 White Paper	• Already present in Annex 1 • Superseded by the white paper
	• Commission Communication "EU Strategy for Biofuels" (COM (2006) 34) • Commission Green Paper "Towards a new Urban Mobility Culture" (COM (2007) 551 def.) • Commission Communication "The EU Agenda for cargo transport: increasing efficient, integration and sustainability in cargo transport in Europe" (COM (2007) 606 def.) • Communication from the Commission to the European Parliament, Council and Committee (…) "Together towards competitive, resource-efficient urban mobility" (COM (2013) 913 def.) • European Parliament and Council Directive 2009/33/EC on the promotion of clean, low-energy consumption vehicles in road transport • Communication from the Commission (COM/2006/231) "Thematic strategy for soil protection" • "Time table for a more efficient Europe in use of resources" (COM (2011) 271) • "Implementation of the Thematic Strategy for the protection of soil and ongoing activities" (COM (2012) 46 def.) • A decision regarding accounting regulations and action plans for emissions and absorption of greenhouse gases coming from soil-connected activities, changes in the use of soil and forestry (COM (2012) 93 def.) • Guidelines on best practice to limit, mitigate or compensate soil-sealing (SWD (2012) 101 def.)	Integrated in Annex 1 "Legislative and programme reference framework", if not present

25. Lombardy Regional Administration	• Rural Development Programme 2014-20 • Provincial quarry plans (Reg. Laws 14/1998) • Regional Waste Management Programme (PRGR) • Po Management Plan (PdG Po) • Flood Risk Management Plan (PGRA); • Waters Protection Plan (PTA) • Reg. Law 31/2008, for the protection of agricultural soil; • Reg. Law 31/2014, reduction in the consumption of soil and recovery of deteriorated soil.	If not found in integrated RPA - in the regional plan categories - Chapter 8.
	• Possible reports, as part of the information sources: SEA of the Regional Territorial Review, in particular Chapter 3.1 and Annex E "Characterization of territorial systems in Lombardy in terms of vulnerability and resilience" (on line)	Integrated, as regional plan categories, in Chapter 8.

Assessment process methodology

QUESTION 4: DO YOU THINK THAT THE METHODOLOGY ILLUSTRATED FOR THE ASSESSMENT OF ENVIRONMENTAL EFFECTS OF THE INFRASTRUCTURE ANNEX IS CLEAR AND THOROUGH? (SEC. 6.1 RPA)

SCA	CONTRIBUTION	PROPOSAL FOR POSSIBLE INTEGRATION INTO THE SEA
Veneto Regional Administration	• Check the consistency between the AI and the plans listed in Annex 1 (check with external consistency)	As better illustrated in section 4.2 of the RA, the external consistency check is implicit in the assessment matrix itself, as the *Specific Environmental Objectives for the assessment* are directly derive from reading international, EU and national environmental plans and programmes carried out in Chapter 6.
ARPA Tuscany	• It states that an internal consistency analysis between Plan objectives and action should be present, in addition to an external consistency checks.	The final version of the AI does not include a systematic list of "plan actions" that can be assessed to compare with other AI goals: the highest level of detail is that of Functional Areas of Intervention, from where the AI strategic lines and specific objectives derive directly. Therefore, the internal consistency analysis cannot be carried out in the SEA (see sect.4.2)
ARPA FVG	• It is not clear how the internal consistency check will be carried out.	

FURTHER METHODOLOGICAL REPORTS

SCA	CONTRIBUTION	PROPOSAL FOR POSSIBLE INTEGRATION INTO THE SEA
ARPA Liguria and Lombardy Regional Administration	• *Methodological references:* it recommends to also include the ISPRA Manual 109/2014 " Elements for updating the NT on Environmental Assessment) • *Monitoring. I*f possible, improving the estimation of the plan's life cycle, in order to provide a better basis for PMA planning (useful for ISPRA Manual 124/2015, already quoted in the RPA)	References integrated into Chapter 8 of the RA
	• *Monitoring.* It proposes diversified monitoring by state of approval/implementation of the work, applying the contents of article 18 of the Leg. Decree 152/2006 and together with EIA environmental monitoring of individual works.	Set up of the monitoring plan is consistent with this proposal (see Chapter 9)
Tuscany Regional Unified Assessment Centre	*Methodology.* • Proposes to enter the following information into the Assessment Dossiers: Compared to the functional area, specify if they are works/interventions to plan or already	The SEA AI does not contain this information with the necessary systematic nature of this type of study (see section 4.2)

(NURV)	planned and/or ongoing by region of reference. Consequently explain whether consistency with the regional planning and programming tools must be checked • To evaluate the environmental effects of programme choices/options that are not already being implemented, the environmental implications deriving from monitoring of current ones, concerning the type of intervention, must be considered.	
ARPA Tuscany and Tuscany Regional Unified Assessment Centre (NURV)	• *Monitoring.* Concerning the monitoring system, it suggests adding to each indicator with a technical description sheet, containing the relative calculation modes and data source, in addition to the relative resources, roles and responsibilities, and setting reference goal values or threshold values for each indicator, compared to which they must compare the monitoring results and consequently redirect the plan, if necessary.	The strictly strategic nature of the AI undergoing the SEA does not permit entering into this level of detail. However, chapter 9 contains the general indications, foreseeing the preparation of an operational PMA in later stages
Tiber Basin Authority (AdB)	• *Monitoring.* The Environmental Monitoring Plan must foresee environmental status indicators, that allow verification of whether the environmental objectives defined in the Environmental Report are achieved	
	• The proceeding authority must inform all the SCA consulted during the SEA of the successful publication of the Monitoring Report and the access and consultation modes for it.	Monitoring must follow the indications provided by article 188 of the Leg. Decree 152/06, including the one indicated, referred to in Chapter 9 of the RA
ARPA Campania	• *Monitoring.* It reports that it may be advisable to describe all the environmental/territorial components within them, not limited to the transport sector, also for the purpose of drawing up the environmental monitoring plan;	Environmental components on which the functional areas of intervention will have no foreseeable impact shouldn't be included.
Tuscany Regional Unified Assessment Centre (NURV)	• *VINCA.* Please remember that the Environmental incidence study must refer to the regional laws on biodiversities. (Reg. Law 30/2015, Regional Decree 644/2004, Regional Decree 1006/2014, 454/2008, Natura 2000 site management plans)	The strictly strategic nature of the AI undergoing the SEA does not allow this level of detail.
Veneto Regional Administration	• *Recalls attention to the field of applicability of the VINCA:* if, as for the AI, the document to be assessed is not equivalent to a plan for the structure (rules and maps), type and mode of implementation from which the measurable effects on the territory can be implemented, pursuant to article 5 of the Presidential Decree no. 357/97 the VINCA must be carried out as part of the authorisation/approval procedure for the projects that results from the programmes in question. • Provides detailed information about the Natura 2000 sites in the region and on specific assessment methods.	We agree fully with the contribution provided, although actually key to the setting out of the VINCA

Consultation and participation process method

QUESTION 5: DO YOU BELIEVE THAT THE CONSULTATION AND PARTICIPATION PROCESS ILLUSTRATED IN CHAPTER 7 OF THE RAP IS ADEQUATE?

SCA	CONTRIBUTION	PROPOSAL FOR POSSIBLE INTEGRATION INTO THE SEA
AdB Adige	• Proposes to integrate the "Economic and social and trade association parties" with the following subjects: Professional bodies (engineers, architects, agricultural and forestry experts etc); Consumer associations; other trade associations in the agricultural and crafts field (Confagricoltura, AIC, Associazione Italiana Agricoltura Biologica, Confederazione Produttori Agricoli, APA)	The proceeding authority acknowledges the proposal and reserves the relative decision
ARPA Puglia	• There is a lack of main management bodies of infrastructures and transport	
Lombardy Regional Administration	• Proposes integration of some regional SCA with the lists found in Chapter 4 of the RPA; in particular, it proposes to add the following to the words of Category "3. Environmental Associations": subjects for the promotion of sustainable mobility, mobility management and for the green economy in the transport, infrastructures and mobility sectors."	
	• It hopes that suitable comparisons will be guaranteed before final approval of the AI, also in relation to the degree of definition of the AI itself.	The strictly strategic nature of the AI did not allow the start up of dialogues other than the stages clearly set out in the SEA regulations (contributes during Scoping phase and comments after publication.
ARPA Liguria	• The participation modes to be activated are not described.	

Environmental Report structure/index proposal.

QUESTION NO. 6 DO YOU BELIEVE THAT THE CHAPTERS AND RELATIVE CONTENT AS FOUND IN THE INDEX PROPOSAL IN SECTION 6.3 ARE SUITABLY STRUCTURED?

SCA	CONTRIBUTION	PROPOSAL FOR POSSIBLE INTEGRATION INTO THE SEA
Tuscany Regional Unified Assessment Centre (NURV)	• Requests specification, as clarification, of the interrelations between the Multi-year Planning Document (DPP) and the Infrastructure Annex. The RP does not clarify this document and the Leg. Decree no. 228/2011 foresees that each Minister draws up a DPP that includes and makes consistent all the plans and programmes for public works under his competence	The matter is handled in the AI (version 13 November 2015) at page 6 and page 68.
ARTA Abruzzo:	• Hopes for inclusion of the analytical part of the AI (….) In the RA. These premises are important for understanding the nature of the goals set by the same Annex	The RA summarises the contents of the AI, including a summary of the SWOT analysis referring to the main shortcomings to overcome (see section 3.2)
Lombardy Regional Administration	• Integrating the reference legislation framework with the EIA procedure applied to the Strategic Infrastructures (ex leg. decree no.163/2006, chapter III, part IV, section II) and clarifying coordination and integration of the above procedures • Integrating section 2.2 of the RPA explaining the reference legislation of the AI (Law 441/2001 and connected implementation provisions) • It hopes for an overall intervention by the law-making body to re-order and reform the legislation coming from the Objective Law and related provisions (…) in order to ensure full	• Although connected, these subjects fall outside the subject of the herein SEA. • The subject is handled partly on pages 48 and 49 of the AI (version 13 Nov. 2015)

	participation of subjects and transparency/traceability of decision-making processes.	

Further comments

QUESTION 7: DO YOU THINK OTHER CONTRIBUTIONS ARE USEFUL IN ORDER TO CARRY OUT THE SEA?

SCA	CONTRIBUTION	PROPOSAL FOR POSSIBLE INTEGRATION INTO THE SEA
Veneto and Valle d'Aosta Regional Administrations	• Possible discrepancy between the number of SCI contained in tab. 4.4 on page 31 (1947) and the one stated on page 32 (2286)	The data has been corrected (see section 5.4 RA)
Consorzio Plemmirio (Siracusa)	• Reports the recent setting up of the Capo Murro di Porco Land Reserve - Penisola Maddalena, in the Siracusa area.	We would like to thank them for this information. If aiming for involvement in the Scoping Phase of the AI, even though the Reserve was set up prior to (17.07.2015) sending the RAP to the SCA, the Management Body would not have in any case been a part of the SCA consulted during the Scoping phase, as it is a regional reserve.

3 Illustration of the Infrastructure Annex

3.1 Nature of the Infrastructure Annex in the framework of a developing programme

Within the current regulatory framework, the action regarding investments on transport infrastructures and logistics of main national interest was mainly entrusted to two tools: the General Transport Plan (PGT) and the Strategic Infrastructures Programme (PIS).

The General Transport Plan was set up by law no. 245 dated 15 June 1984, with the purpose of *"ensuring a single direction towards transport policy and coordination and standardisation of carrying out the competences and implementation of state, regional and autonomous province (Bolzano and Trento) administration interventions*" (art. 1). The first PGT was approved by D.P.C.M. dated 10 April 1986, and updated by Pres. Decree dated 29 August 1991. The PGT currently in force, the General Transport and Logistics Plan (PGTL), was approved by the Council of Ministers on 2 March 2001 and adopted by Pres. Decree on 14 March 2001.

The Strategic Infrastructures Programme (PIS) is, however, a fulfilment of Law no. 443 dated 21 December 2001 (so-called Objective Law) that states that *"The Government, in observance of the regional constitutional attributions, identifies the public and private infrastructures and strategic production sites of main national interest to be carried out for the country's modernisation and development. Identification is via a programme set up by the Ministry for Infrastructures and Transport, in agreement with the competent ministries and regional or autonomous provincial administrations, after an opinion given by the CIPE and after agreement with the joint conference as set out in article 8 of the legislative decree no. 281 dated 28 August 1997, and are included in The Economic-financial planning document, with an indication of the relative allocations"* (art. 1).

In the last decade, the PIS – and its subsequent updates contained in the Infrastructure Annex - has seen some legislation amendments introduced that have strengthened connections between the size of EU and national transport policies and planning for each work included in the programme, such as the introduction of some priority criteria for their realisation [3].

These initiatives, while not part of an overall legislation revision process, have outlined a mature framework of reform goals based on the existence of one or main national plan for transport that can contain national strategy definition and mid-term planning to be subjected to periodical updating.

The definition phase of the new period of EU programming 2014-2020 that has reach a final stage with approval of the EU Regulation no. 1303/2013 dated 17 December 2013 , which establishes common provisions for the use of European Structural and Investment Funds (ESIF) was inserted in this evolution path of national legislation. One of the most significant regulatory innovations was the "ex ante conditionality" introduction, i.e. A set of minimum legislative, administrative and organisational conditions aimed at guaranteeing an effective, efficient use of the funds.

With regard to the transport sector, which for the new EU regulatory architecture belongs to the Thematic Objective 7 "Promoting sustainable transport systems and eliminating bottlenecks in the main network infrastructures", the main conditionality is the existence of one or more general plans or frameworks for transport investments, in compliance with the institutional set up of the

[3] In particular, the amendments introduced by the Leg. Decree no. 163/2006 (Public contracts code) with article 41 of Law 214/2011 are stated, which define the modes and planning criteria for strategic work in light of three criteria: a) consistency with integration with European and territorial networks; b) progress of procedures; c) possibility of main funding from private capital.

infrastructure and improves accessibility to the overall network and central TEN-T network. This general picture must also satisfy the legal requisites for strategic environmental assessment[4].

The need to fulfil this obligation, together with the path of legislative evolution referred to previously, has led - via partnership sharing between the Member State and the European Commission - to identifying the programming tool for national strategic lines for transport - in the Infrastructure Annex to the Economic and Finance Document, aimed at satisfying the ex ante conditionality in question.

This decision was approved as part of the Partnership Agreement 2014-2020 where the action plan aimed at achieving this objective, i.e. Approval of an update to the Infrastructure Annex compliant with the criteria established by the ex ante conditionality, is also specified, while nationally, the most important legislation in this aspect is the CIPE Resolution no. 26/2014 where it is established that the Infrastructure Annex is the national reference framework for the programming cycle 2014-2020.

This content, in fact, is shown in chapter II (the Strategic Lines) of the Infrastructure Annex 2015, in Part One ("General framework of the transport infrastructure programming") as specifically updated, compared to the version in April 2015, and approved by the Council of Ministers on 13 November 2015.

This part one of the Annex, therefore, retains the dual nature of:

- *General Framework for investments in transport*, in adjustment to the indications on Ex Ante Conditionality of the Thematic Objective 7 "Transport and Infrastructure" contained in the Partnership Agreement 2014-2020.
- *Premise for the subsequent programming carried out for a different reason*, as an explicit and circumstantial strategic frame within which the programmatic and operational content of transport investments must be fully developed

3.2 The contents of the Infrastructure Annex to the Economic and Finance Document 2015

The Infrastructure Annex to the Economic and Finance Document 2015, in the version approved by the Council of Ministers on 10 April 2015, has been used as a reference document for the *Scoping* phase for starting up the Strategic Environmental Assessment procedure.

As mentioned above, on 13 November 2015, on proposal from the Minister of Infrastructures and Transport, the Council of Ministers approved the adjustment to Part One of the Infrastructure Annex 2015 (General Framework for the transport infrastructures programming) according to the indications contained in the Ex Ante Conditionality to the Thematic Objective 7 "Transport and Infrastructures" contained in the Partnership 2014-2020.

Part One of the AI from November 2015 fully copies Part One of the AI from April 2015.

Compared to the previous annual editions, the Infrastructure Annex to the DEF 2015 is characterised by a radical revision to the structure and contents. Consistently with the reform path outlined in the section above, it proposes the following as an answer to three types of needs:

- adapt the national programme on strategic infrastructures to EU guidelines;
- Draw up a strategic tool that can offer guidelines for public administration planning, also in light of the balance restraints, and for the investment decisions of private investors;

[4] More specifically, the ex ante conditionalities regarding the OT 7 are divided into the conditionalities 7.1 "Transport", 7.2 "Railways" and 7.3 "Other modes of transport, including internal navigation and sea transport, ports, multimodal connections and airport infrastructures".

- Aid interlocution and negotiation with territorial autonomous parties, as part of the reform process of Chapter V of the Constitution, in the direction of greater rigour in sharing priority works and anticipation of the definition and overcoming of the implementation critical factors of the priority works.[5]

In Part One with the Chapter "General framework of the transport infrastructures programming" The Annex, unlike the others[6], introduces a chapter dedicated to the context analysis - split into an analysis of the demand for cargo and passenger transport, infrastructures, evolutionary framework of the legislation, and EU and national planning tools - that concludes with a diagnostic character developed through a SWOT analysis. The main shortcomings to be overcome are mainly identified in relation to:

- Railway transport networks that do not satisfy expectations compared to other EU countries, in particular passes and the southern regions, with the consequence of a lack of inclination towards the use of railways, especially for the transportation of goods;
- Many sections of the TEN-T road network still do not meet safety standards, including at crossings;
- Sea transport and intermodal sector, where the development challenges for the sector are affected by port hub management that is still inefficient and fragmented, lack of interconnections with the main transport networks and limited competition, with negative impacts on competitiveness;
- Congestion of large urban areas and low quality of regional public transport;
- Difficulty in activating private capital for the funding of infrastructures with potential economic return.

Faced with these weaknesses, Chapter Two "Strategic Lines" proposes national strategic guidelines, while aware of the limits caused by the lack of available resources, used to make choices on infrastructure investments for transport and logistics to be completed in the period 2015-2020, passing the further time limit of 2030 consistently with European objectives on transport policies.

The ***strategic lines*** identified aim to promote:

1. expansion of the railway mode and improvement of passenger services, in terms of quality and travel time, and transport of good in terms of length of modules, shape and axial weight, mainly concentrating nationally on the completion of the Central European network, starting with the passes and the South of Italy and connections with the TEN network of the main urban and productive hubs;
2. reduction of urban and metropolitan congestion through the strengthening of metropolitan networks, starting from the most populated areas, and the improvement of multimodal regional mobility for better and more reliable services;
3. improvement of port and interport competitiveness, aiming at optimisation of each port's vocation, through necessary infrastructural and procedural work and optimisation of national port system governance;
4. improvement of the road network, by completing the central road network, in particular the most congested routes; increase in connections to secondary and tertiary hubs for the TEN-T global network and raising of safety levels on the main roads;

[5] See AI, section II.1, page 61.

[6] An initial and more extended context analysis was contained in the Infrastructure Annex to the Update Notes for the Economic and Finance Document, as an Appendix, in September 2014, that did not interact with the strategic guidelines contained in the Annex text.

5. optimisation of air traffic in-line with the design of the "Single European Sky" and multimodal connection of major airports to urban centres;
6. attraction of private capital through adapted policies of administrative strengthening of the contracting stations, the dissemination of models of economic financial plans for private proponents, the greater explanation of the benefits deriving from the execution of work instrumental to the development of the productive districts and effective and synergic use of the different community (European fund for strategic investments – EFSI, ERDF) and national financing sources.

Implementation of these strategic guidelines is transferred to a series of implementing and financial instruments, as set out in the Annex, consistent with the already named CIPE Resolution no. 26/2014 that urged the increase in their strategic coordination, outlines a standard, representing the broadest reference programme frame. The tools are referred to and briefly illustrated in Part Two, section II.2 of the Annex, they are:

- The Strategic Infrastructures Programme (PIS);
- The ANAS 2015 Programme Contract Scheme, investments part
- The RFI Programme Contract, investments part;
- the National Strategic Plan for Portuality and Logistics
- The Airport Plan;
- The Connecting Europe Facility (CEF) mechanism and European Fund for Strategic Investments (EFSI)
- European Structural and Investment Funds, including the 2014-2020 Infrastructure and Network Operating Programme and the 2014-2020 Operating Programme PON METRO
- The Development and Cohesion Fund 2014-2020

In observance of Law 443/2001 and further amendments and integrations, information about the implementation status of the Strategic Infrastructures Programme [7], and some indications about the implementation status of the multimodal TEN-T corridors and the candidate projects for accessing CEF funding are provided in part two of the document and the annexes.

[7] With regard to the Strategic Infrastructure Plan (PIS) interventions, the Annex identifies a group of 25 priority works in the programme, selecting according to a consistency assessment, with integration with European and territorial networks, the progress and possibility of main funding through private capital.

4 The adopted assessment model

4.1 Main methodological references

Some of the several existing methodological reference documents drawn up to lead the SEA process and used were:

- The European Commission Guidelines for application of Directive 2001/42/EC: "Implementation of the Directive 2001/42/EC on the assessment of effects of certain plans and programmes on the environment" (European Community Official Publications Department, 2003);
- The recent (May 2015) ISPRA (Higher Institute for Environmental Protection and Research) Guidelines "Operational indications to support the assessment and drafting of SEA documents (ISPRA), Manuals and Guidelines 124/2015);
- Of the Manual "The Sea Manual. A Source book on Strategic Environmental Assessment of Transport Infrastructure, Plans And Programmes" (result of the BEACON (Building Environmental Assessment CONsensus) project, funded by the Directorate General Energy and Transport - TREN - of the European Commission, 2005);
- Of the manual "Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment", (European Union EU, 2013);
- of the European Commission study, DG Environment, "Strategic environmental Assessment of Transport Corridors: Lesson learned comparing the methods of five Member States", Final Report, January 2001.
- The study commissioned by the MIT "Intermediate Assessment of the National Operating Programme "Networks and Mobility" 2007-2013: A (more) strategic environmental assessment to support decisions on the current (and future) programming" June 2013;
- the study "Towards a more strategic SEA: thoughts from the in itinere assessment of the PON networks and mobility 2007-2013" – edited in May 2014 by the Ministry for Infrastructures and Transport, as **5th paper on PON Networks and Mobility** 2007-2013; a paper that includes the results from the previous MIT study in a broader theoretical and methodological framework.

In light of the pre-selected approach, in particular the choice of preferring a "constructive approach" to the SEA, the "Assessment of the Overall Efficiency of Environmental and Territorial Strategies" Model was used (VECSAT model), which has both its principles and its application modes described in the above-stated Fifth Paper on PON Networks and Mobility; a volume that also reports, as concrete examples to support illustration, the various applications that the model has already had, in the National Operational Programme and in other levels of planning and programming.

This is a model with the necessary flexibility for lending itself -with suitable adaptations - to assessing policies, plans and programmes at any level or in any thematic sector, as long as it is - or perhaps because it is - very circumstantial compared to the basic methodological choices that inform it; conceptual options, defined as antidote to some problems that emerged from the analysis of the early years of application of the SEA legislation, highlighted in the study named above, and that is suitable for addressing the particular problems raised by the Strategic Environmental Assessment of the AI, as set out in the section below.

In constructing the model, it was decided to use an especially intensive use of multicriteria analysis (MCA) method, as it is more inclined than others to support the policy decision in a multi-level, non-linear and procedural process, and where it is important to share responsibilities (and management) of the impacts, faced with a low level of certainty that the foreseen impacts will occur (as well as the occurrence of unforeseen ones).

To better understand the sense of the assessment architecture about to be described, we can refer to the basic methodological choices underlying the model, and how they allowed the AI's intrinsic complexity factors to be managed.

4.2 Complexity factors in the AI assessment and relative management by identifying the "Functional Areas of Intervention".

In order to contextualise the methodological choices made in light of the AI contents shown in Chapter 3, we must underline the complexity factors in the document to be assessed, that the SEA was compared with.

As above, the Infrastructure Annex to the Economic and Finance Document 2015 has a dual value:

- A new one: as a wide-ranging strategic framework for planning investments in the transport sector, useful for carrying out the ex ante conditionality (Part One of the AI);
- One more consistent with the Infrastructure Annex to the DEF, i.e. as an enabling tool for the funding of a certain number of infrastructure works that are part of the Strategic Infrastructures Plan (Part Two of the AI).

More specifically, the AI under assessment offers a framework of guidelines which may be classified as:

- Explicit indications, clearly identifying several major strategic lines on which to focus infrastructure investments, as well as several priority works under the Strategic Infrastructure Programme;
- Implicit indications, relating to the possibility of achieving a more detailed clarification of such lines through a virtuous interaction with the implementing tools of the sector.

Therefore the first problem for the assessors was to identify the subject of assessment as precisely as possible, while expecting the characteristic uncertainties of the SEA process, in which the plan/programme and the Environmental Report proceed in parallel.

The Scoping Report suffers from this uncertainty, as, in defining the "*extent and level of detail of information to be included in the environmental report*" it proposes different assessment indicators and criteria according to the level of definition that the AI should have reached (topics to be assessed on a global and/or local level).

The particular VECSAT model adopted has offered useful tools for facing this kind of difficulty too, as it assumes the prior organisation of plan/programme content to be assessed in a "*Tree of Choices*", to be reported in the Assessment matrix prepared for the SEA. The guidelines contained in the AI have therefore been analysed, selected and placed in an order of importance to provide a balanced picture of the transport policy, to which a homogeneous set of assessment criteria can be applied.

This picture became tangible in the "***Tree of Choices of the AI***", shown in the ***table 3.1*** below it is contained in the Assessment Matrix drawn up for the SEA in the same manner. This is split into three hierarchical levels:

1. Strategic lines
2. Specific objectives
3. Functional Areas of Intervention

In particular, the ***Strategic lines*** are the five listed as such in the AI (see sect. 3.2), and dedicated to the different modes of transport: railway, mobility systems in cities, port systems, road networks, airports.

Tab. 3.1 – The Tree of Choices in the AI

Strategic lines	Specific objectives	Functional Areas of Intervention (AF)
1. Expansion of the railways mode and improvement of passenger services, in terms of quality and travel time, and transport of good in terms of length of modules, shape and axial weight, mainly concentrating nationally on the completion of the Central European network, starting with the passes and the South of Italy and connections with the TEN network of the main urban and productive hubs.	1.A. Development of the mid-long-range passenger network. Actions for relaunching railway services compared to other door-to-door modes will focus on increasing network performance to make the mobility system more competitive, with a mix that favours "light" investments with a rapid return (technologies, increases in speed and removal of bottlenecks) alongside some "heavy" investments for network development	1.A.1. Interventions on singular points of the conventional network with solutions that are preferably technological or that provide for a limited use of the territory to permit the raising of speed
		1.A.2 Interventions to raise the performance of the network, continuing with development of the HS/HC network (with specific attention to the South through interventions identified by National Operating Programme 2014-2020 - Infrastructures and Networks), including the speeding up of aerial stretches and upgrading of the performance of the main traveller lines
		1.A.3 Interventions to strengthen railway connections with the main airports in line with the European strategy for the "Core" network to promote air-rail intermodality
	1.B Increase in quality of the cargo network making railways more attractive, planning a series of actions together with logistic operators to provide solutions for the main critical factors that the current cargo railway system suffers from.	1.B.1 For freight traffic, performance adjustment on the main European "Core Corridors" (train profiles and modules), in particular strengthening of the links between domestic terminals – with special attention to those of the South – and Alpine passes, and separation and optimisation of flows by type of service
		1.B.2. Strengthening and streamlining of interconnections between the railways and manufacturing districts, ports and freight terminals, aiming to reduce "last mile" costs and improvement and expansion of services in plants
	1.C. Increase in safety, quality and improving infrastructure efficiency, ensuring continuity in maintenance programmes	1.C.1 Safety interventions and adjustment to legal obligations (level crossings, safety in tunnels, hydrogeological risk, seismic checks, acoustic rebalancing)
		1.C.2 Interventions for infrastructure quality and efficiency (circulation, telecommunications, ERMTS technologies)
2. Reduction of urban and metropolitan congestion through the strengthening of metropolitan networks, starting from the most populated areas, and the improvement of multimodal regional mobility for better and more reliable services	2.A Development of the TPL network with new proposals for relaunching the sector, also for better intermodal integration between road and rail.	2.A.1 Functional interventions to improve regional railways services, with particular reference to large cities and commuter services
		2.A.2 Functional interventions to expand metropolitan networks

3. Improvement of port and interport competitiveness, aiming at optimisation of each port's vocation, through necessary infrastructural and procedural work and optimisation of national port system governance	3.A. Increase competitiveness of the Sea System, reducing times and costs of transit of goods and of time to carry out interventions on infrastructures in the ports, and improving port systems.	3.A.1. Measures for simplifying and speeding up procedures, controls and interventions on ports of national interest **(objective 1 PSNPL)** and for increasing efficiency of port services and operator competitiveness **(objective 2 of the PSNPL)**
	3.B. Improve services and infrastructures in the port sector and aid an increase in quality of transport and logistic services for manufacturing enterprises.	3.B.1. Measures to improve the transport services and increase accessibility to ports via sea and land **(objective 3 PSNPL)**
		3.B.2. Measures for increasing port infrastructures and their land connections **(objective 5 PSNPL)**
	3.C. Implement a vision of a Sea System as the driver for economic recovery, to also benefit the Italian industrial and productive system, promoting innovation too.	3.C.1. Measures to encourage the integration of logistic chains and manufacturing and logistic activities **(objective 4 PSNPL)**
		3.C.2. Measures to stimulate research, development and technological innovation in the Italian port system **(objective 6 PSNPL)**
	3.D. Pursue international and European guidelines for protection of the environment and reduction of greenhouse gases, accompanying the promotion of the logistics system and increasing use of the sea as a more sustainable communication and transport route than road transport, with protection of the port area environment from various sources of pollution, and minimisation of environmental impact of infrastructures on surrounding area and reduction of energy consumption linked to port activities.	3.D.1. Measures or increasing energy efficiency and environmental sustainability in ports (**objective 7 PSNPL)**
	3.E. Support the mission given to Italian ports via centralised, multi-year planning of financial resources for infrastructures, Sea System coordination, programming and promotion, and a new Governance model.	3.E.1. Measures for the financing of management and investments of Port Systems **(objective 8 PSNPL)**, for the coordination, planning and national promotion of the sea system **(objective 9 PSNPL**) and for adjustment of the Governance of ports to the mission of the Italian Port System **(objective 10 PSNPL)**
4. Improvement of the road network, by completing the central road network, in particular the most congested routes; increase in connections to secondary and tertiary hubs for the TEN-T global network and raising of safety levels on the main roads	4.A. Resolution of structural critical factors of the network, with particular reference to the age of the main works of art	4.A.1. Interventions for static safety of the main works of art by carrying out static and seismic stability studies on the infrastructures, particularly for some routes that are subject to deterioration of infrastructures too, and widespread interventions on the network
	4.B. Improvement of circulation and safety conditions on the road network	4.B.1. Interventions of adaptation and rationalisation of the road network with specific regard to stretches affected by heavy traffic or significant occurrence of accidents, or aimed at resolving critical issues related to urban congestion at urban hubs, including the completion of routes already affected by relevant interventions of adaptation and safety measures
		4.B.2. Interventions for implementing road Intelligent Transport Systems (ITS)

	4.C. Safety work to protect the road network from landslides and flood risks in order to avoid interruptions in service.	4.C.1. Improvement of stability of crumbling slopes or roads at risk of flooding, using stabilisation methods for crumbling areas and regulation of rainwater
	4.D. Reduction of isolation of important population layers with a view to synergy and integration of the various programming levels	4.D.1. Interventions for aiding accessibility to internal areas and the ones most penalised by the particular orography of the territory
5. Optimization of air traffic consistent with the outline of "single European sky" and a multimodal connection at main airports with city centres	5.A. Optimization of air traffic in line with single European sky	5.A.1. Interventions aimed at developing air traffic management systems (SESAR programme)
	5.B. Realization of the works required to improve of accessibility and intermodality	5.B.1. Interventions linking road and rail modes to three intercontinental gateways (Fiumicino, Malpensa and Venice)
		5.B.2. Interventions linking road and rail modes with the other strategic airports
		5.B.3. Optimisation of intermodal connections with the nearest airports for regions where there are no airport infrastructures
	5.C. Guarantee airports the capacity requested for economic development of the country	5.C.1. Interventions of adaptation and strengthening of existing airports that are ongoing and already planned
		5.C.2. Setting of restraints in the territory or functional delocalisation, if development of the scales is affected by physical, environmental or safety limits

For ***specific objectives***, this is a more precise explanation of the strategic lines, currently found in the annex; for example, "1.A. Development of the mid-long distance passenger network" for railways, or "3.A. Increase competitiveness of the Sea System, reducing times and costs of both transport of goods and the creation of infrastructure improvement work planned for ports, and also improving port services", in the case of port systems.

The ***Functional Areas of intervention*** are a grouped-together way of portraying the realms of intervention of the AI. These areas may have a functional, physical characterization (e.g. "1.A.3 Interventions to strengthen railway connections with the main airports in line with the European strategy for the *Core* network to promote air-rail intermodality"), or strictly immaterial ones (e.g. "3.A.1. Measures for simplifying and speeding up procedures, controls and interventions on ports of natural interest and for the increase in efficiency of port service and in operator competitiveness"): both are considered equally as they cooperate with equal rank to the achievement of objectives.

In particular, the Functional Areas have been identified as a meeting point for two paths proceeding in opposite directions:

- One *top down*, of ramifications of the AI Strategic Lines, as defined above;
- One *bottom up,* checking that all the interventions and works cited and referred to in various ways in the AI, are easily placeable in at least one specific Functional Area.

The Functional Areas of intervention (AF) are the level of greatest detail of AI contents that can be subjected to Strategic Environmental Assessment.

This is due to the different level of maturity of intervention programmes that support implementation of the AI strategic lines. Under this profile, the lack of homogeneity is shown in the joint presence in the Annex, of:

- works that, already underlay, or having already completed their planning, approval and environmental impact procedure, could not be assessed as options to be discussed, but in light of the environmental repercussions deriving from their realization, in particular their contribution to the composition of impacts combined with others;
- Programme choices for which the level of implementation detail has not yet matured.

Consequently, it was not possible to use the indicators provided in the Scoping Report, to the advantage of an assessment using reasoning of probability on expected results, basically linked to the type of Functional Area of intervention being considered; on the other hand, these reasons have been collected and discussed in detail in specific ***Assessment Dossiers***, foreseen in the assessment model applied.

Also, due to the lack of organic identification of all the interventions, it was not possible to draft the usual ***internal consistency analysis*** and the plan/programme goals to be assessed, other than indirectly by checking "coverage of the whole range of interventions mentioned, by the Functional Areas as identified, whatever the level of definition (this is the "*bottom-up*" referred to above).

Finally it can be seen how this section realises the "*difficulties in the assessment process*" similar to the ones described in letter h) of Annex VI to the Environmental Consolidated Act, which is therefore completed.

4.3 integration of the environmental and economic-social parts of the assessment, also with the verification value of ex ante conditionality (art. 10 Reg. EU nr 1315/2013)

The VECSAT model aims to place the environmental assessment in a structure that also includes the "social pillar" and the "economic pillar" alongside the "environmental pillar", as they are all essential, weight-bearing elements of sustainable development. In spite of the fact that as a principle, sustainable development provides for integration of these three dimensions, the SEA regulations and practice have been developed keeping them firmly apart.

On the other hand, by limiting the SEA to the sole assessment of the environmental repercussions, option zero (coinciding with the lack of interventions) will not have impacts higher than those of any plan or programme that must be subjected to SEA for given reasons. Above all, the possibility of comparing the extent of the environmental impacts (if negative) and the extent of the economic-social impacts (if positive) aids the decision-makers when considering acceptability, in terms of cost-benefit ratio, negative impacts that may survive prevention measures, mitigation or compensation made during the project and specifically stated in the SEA (see Chapter 8). In other terms, it may be the case that the most important environmental impacts, if caused by an extremely advantageous choice for economic-social impacts, is more acceptable of lesser environmental impacts caused by a choice that isn't motivated by social and economic advantages for society.

These two areas of evaluation must, of course, be proportionate, but also it must be possible to compare them separately, a reason for which the assessments in Chapter 7 are organised by the two sections of the Assessment Matrix (pursuit of environmental objectives and pursuit of Economic-Social Objectives).

The method adopted, when explaining the method chosen for the model, is therefore intended to contribute to an inversion of this trend, thanks:

- To the prior *reconstruction of a* ***system of environmental and economic-social reference goals for the evaluation,*** alongside it, to the environmental goals proposed with the SEA, the explanation of economic-social ones and other relevant transport policy objectives for the annex itself;

- To setting the assessment of the Infrastructure Annex effects on the territory in terms of assessing the rate to which the objectives as above were pursued by the functional areas of intervention in the AI, thus being able to reason in terms of "cumulative effects" or "internally compensated" effects.

The environmental and economic-social objectives for assessment therefore take the place of various indexes of the classic "environmental components" characteristic of the EIA, but also used in the SEA.

For this application of the model to the Infrastructure Annex, the reference Objectives System comes from the analysis and subsequent summary of the Reference Programme Framework for the AI, therefore including international and EU (regulations, directives, communications from the Commission, EU White or Green Papers, various protocols etc) and national documents (strategic national documents, specific sector regulations etc) of specific interest for the AI, i.e. pertaining to environmental policies and transport policies (including the relative economic-social effects); the latter - it is stated - are increasingly synergic, if not overlapping, with the former (see, for example: the White Paper on Transport, and the EU Regulation no. 1315/2013[8], on the EU guidelines for the TEN Networks.

Expecting a certain level of overlapping, which is an indicator of probably convergence, this set of policy options has been analysed in Chapter 6 below, giving rise to six ***Specific Environmental Objectives (OAS)***, and seven ***Economic-social and transport objectives (OES)***; the latter derive directly from art. 10 "General Priorities" in the stated Reg. no. 1315/2013, fully repeated in the satisfaction criteria of the ex ante conditionalities for Thematic Objective 7. *In particular, these "General Priorities" are the criteria for fulfilling conditionality 7.1, where they provide for the existence of one or more plans or general frameworks for investing in transport that meet the legal requirements for a strategic environmental assessment and define the contribution to the single European transport space in line with Article 10 of Regulation (EU) No. 1315/2013 of the European Parliament and of the European Council, including priorities for investments relating to:*

- *the main axes of the TEN-T core network and of the comprehensive network in which investments by the ERDF and Cohesion Fund are envisaged;*
- *and secondary connectivity..*[9]

By *secondary connectivity*, it means connections of any type in the territories on the TEN network hubs.[10]

The concept of secondary connectivity is also inter-related - for the purpose of fulfilling the conditionalities - to that of "regional and local public transport" as set out in the conditionality 7.1 itself.[11]

To guarantee a better verifiability of the actual consistency between the Infrastructure Annex strategies and the environmental protection objectives of the international, EU and national QdRP on the one part, and general ex ante conditionalities that the Infrastructure Annex must carry out on the other, OAS and OES were inserted directly into the columns of the assessment matrix, by means of the reference Objectives System for the assessment itself, i.e. shared objectives which if pursued can potentially undergo significant impacts - positive or negative - consequent to the implementation of the Infrastructure Annex.

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[8] Regulation (EU) no. 1315/2013 by the European Parliament and Council, dated 11 December 2013, on Union guidelines for the development of the transEuropean Transport Network and that abrogates decision no. 661/2010/UEN°1315/2013.

[9] See: European Commission, Guidance on Ex ante Conditionalities for the European Structural and Investment Funds. PART II, 13 February 2014, Chapter A.7-1 "Transport", assessment grille in table 5.

[10] See "FAQ on ex ante conditionalities relating to transport" http://ec.europa.eu/regional_policy/sources/docgener/informat/2014/6_faq_transport.pdf.

[11] See "FAQ on ex ante conditionalities relating to transport" (...) op. cit.

One of the reasons for the aggregation in such few elements is the intention to reduce the redundancies while forming the results of the assessments. This could alter the overall judgement on performances of the Functional Areas of intervention that will be supplied with the assessment model adopted, except for proceeding with complicated "weighting" of results.

It can be seen how the ***external consistency analysis*** foreseen by the SEA - normally carried out with the aid of several matrices to search for any inconsistencies, but where the results often don't have any direct consequence on the assessment – both implicit in the SEA itself, in the adopted model, as the matrix supporting the strategic environmental assessment uses consistency with objectives coming from the interpretation and summary of the reference Programme Framework as assessment criteria.

4.4 An argumentative approach to the assessment (explaining the figures) as a guarantee of transparency and a condition for assessing cumulated impacts.

Opting to keep the original spirit of the environmental assessment alive, aimed at increasing shared knowledge, the results of the assessment of the effects of each programme choice are shown in ***Assessment dossiers*** arranged in a way that favours the communication aspects and therefore providing explanations of results.

The ***argumentation approach*** is particularly useful when it is necessary to renounce processing indicators when expressing judgements about the pursuit of plan or programme objectives; it is even more useful when these indicators have been calculated, to comment on the value, escaping the dangers of a deterministic approach, not suited to situations with a high rate of uncertainty. The logic adopted in applying the model is more that of "rapid" analysis, meaning concentrating attention on the clearly perceivable and foreseeable problems based on the assessors' experience, and avoiding the systematic in-depth study of all aspects that are theoretically relatable to the programme.

Also, the argumentation approach to the assessment is directly related to the possibility of reasonably assessing the ***cumulated impacts*** of the plan/programme in question (requested in the SEA, but often difficult to implement), as it presumes the allocation of quantitative judgements that can be added to each other (i.e. positive and negative numbers).

Given the randomness of the allocation of this type of score, the condition of being fully explained is essential for validation of the assessment itself.

From this point of view, the VECSAT model offers the possibility of assessing, at last, with all due precautions, the cumulated impacts.

In fact, thanks to an overall reading of the values in the ***Assessment matrix*** of impacts, it is possible to keep the effect of each plan choice examined compared to the set of reference objectives for the assessment under control, and compare overall hypothetical performance in the plan/programme, with the intention of progressively reducing the value of cumulated impacts, reaching the best balance possible between the environmental, social and economic components, i.e. Pursuing the sustainability of the proposed transformations that the SEA basically aims at.

The particular Assessment matrix created for the AI has the aim of assessing the pursuit of the *reference environmental and economic-social objectives system* (OAS and OES) by the 27 Functional Areas of intervention identified (AF) and therefore contains the former in the columns and the latter in the lines, suitably referenced to the specific objectives and the strategic lines of the AI that originated them.

At the cross points between lines and columns, the assessor makes judgement of the AFs' capacity to pursue (or combat) each of the OAS/OES. Other scores from a complex ranking list extending in both directions from zero, correspond to the judgements, as shown clearly in section 4.6 below.

Allocation of these judgements is widely explained in section 2 of the assessment dossiers, specifically dedicated to providing written reason for the estimate - reported as a number in the assessment matrix - of the pursuit of each of the 13 reference objectives for assessment by the Functional Area in question (also for illustration of the content of the assessment dossier, see section 4.6).

4.5 Vertical integration between assessments (*tiering*): the environmental agenda for the Functional Areas of intervention of the AI

In the assessment dossiers provided for in the VECSAT model, the argumentation approach is used to circumstantially highlight advantages and disadvantages of the choice in question compared to the entire system of objectives.

Here, highlighting important environmental and territorial impacts (i.e. the "disadvantages" as above) also allows possible accompanying measures to be identified in a systematic way, to make operational at the same time as realising the choice that will presumably be responsible for it, or at least to report them as problems that may be addressed as part of the project and monitoring.

The assessment dossier foreseen by the VECSAT model contains a study of the conditions that will reduce the risks of impacts found to a minimum, or to make them acceptable, compared to the overall benefits that can be obtained by carrying out the intervention in question. This study produced a list of possible accompanying measures of various kinds: works of mitigation and compensation, but also project stratagems, regulatory and/or managerial *éco-aménagement* measures, or special phenomena that require monitoring, during implementation of the plan/programme, thus creating an organic integration of environmental monitoring of the implementation process, to be planned in the SEA Environmental Report.

In fact, regardless of the level of original environmental compatibility of the choices to be assessed, it is possible to have a small *guidebook*, the indications in which can be used in the subsequent outlining of foreseen actions.

On the other hand, if - as in the case of the AI - the assessment is of strategic plan/programme choices that are not yet univocally defined in the project, the dossier section dedicated to the accompanying measures also takes on the value of ***Environmental agenda*** of interventions that will implement the Functional Area of intervention, with the function of guiding internationalisation in the future project of the environmental considerations, becoming a part of the already vertical coordination between planning, designing and relative assessments commonly known as *tiering*.[12]

Section 3 of the Assessment Dossier is specifically dedicated to the environmental agenda, as it contains the planning criteria of interventions that will be used by the Functional Area on further plans/programmes with implementations functions for AI choices, according to the chain of subsequent planning and assessment calibrations specifically foreseen for implementation. In particular, these are:

- lists of environmental sub-topics under attention, as indications for an eco-compatible project, with relative indicators;
- Lists of measures related to mitigation/compensation used in similar cases, from which to eventually draw inspiration, and in any case useful for investigating environmental issues;

[12] For the concept of *tiering* please refer to an analysis carried out on the diffusion of environmental assessment practices compared to the tiering of transport planning in the German Federal State. See: Fischer, T.B., "Strategic environmental assessment and transport planning: towards a generic framework for evaluating practice and developing guidance", in *Impact Assessment and Project Appraisal*, volume 24, number 3, September 2006, Beech Tree Publishing, Guildford, Surrey, UK.

The proposals contained in the environmental agenda concentrate on the negative impacts found that are of a certain entity (scores -2, .3, and -4), leaving aside the not so significant ones (-1).

However, the significant impacts can also be reduced and the already positive ones can be improved. Therefore, to avoid making the assessment dossiers too heavy, section 3 refers directly to Chapter 8 for these aspects "Accompanying measures: a systematic index of indications for the Functional Areas' environmental agendas" in this RA, where they have been arranged by OAS and illustrated systematically, in order to correctly plan the subsequent planning/SEA of EIA/Project phases of the interventions that implement the functional areas of intervention.

4.6 The assessment tools and their construction

As mentioned above, the assessment method proposed requires the construction of two kinds of assessment tools:

- An ***assessment matrix***
- as many ***assessment dossiers*** as there are Functional Areas to be assessed (27, for the AI).

The construction and use of these tools is divided into the following three operational stages:

First phase:	Drafting of an assessment matrix
Second phase:	Filling out in parallel of the assessment matrix and the 27 assessment dossiers for the *Functional Areas of intervention*;
Third phase:	Reading and graphic representation of results

First phase: Drafting of an assessment matrix

Strategic composition of the *Tree of Choices* organises the options explicitly contained in the Infrastructures Annex into lines, according to ramification into:

1. Strategic lines
2. Specific objectives
3. Functional Areas of Intervention

for the definition and identification of the above, please refer to section 4.2 above.

The Environmental and Economic-Social Objectives System of reference for the assessment is contained in the assessment matrix' columns.

As already explained in section 4.3, it comes from the analysis and rationalisation of the environmental, economic, transport and social objectives taken from recognition of the Programme Reference Framework (QdRP) explained in Chapter 6, also interpreted in lights of the fact-finding framework of the environmental-territorial context as set out in Chapter 5 and the aims at the basis of the XII Infrastructure Annex to the DEF, in its current version, as shown in Chapter 3.

To aid handling (and assessing),these reference objectives for the assessment have two sections in the matrix - which must not be confused with the Specific objectives of the Tree of Choices:

- SPECIFIC ENVIRONMENTAL OBJECTIVES Section (OAS)
- ECONOMIC-SOCIAL OBJECTIVES Section (OES)

Please refer to Chap. 6 for an illustration of the creation of said objectives, and section 4.3 above for justification of this methodological choice. ***Fig. 4.2*** contains a diagram of the organisation of these objectives in the assessment matrix, that, is found in its fully filled out form in Chap. 7.

Table 4.2 - The reference Environmental and Economic-Social Objectives System for the assessment

TREE OF CHOICES FOR INFRASTRUCTURE ANNEX GENERAL OBJECTIVE ("requirements of AI"): Adapt national planning in the field of strategic infrastructure to EU guidelines and provide a strategic tool that can provide guidelines for financial programming of public administrations, in the light of budgetary constraints, and for the investment decisions of private investors			REFERENCE OBJECTIVES SYSTEM FOR THE ASSESSMENT																			
			SPECIFIC ENVIRONMENTAL OBJECTIVES (OAS)								ECONOMIC-SOCIAL OBJECTIVES (OES) General priorities for development of the Global Network referred to in Art. 10 of EU Reg. No. 1315/2013 of the European Parliament and European Council inherent to the EU guidelines for development of the TEN-T network, and adopted by the Commission as assessment criteria for meeting the conditionalities ex ante for Thematic Objective 7.									Overall Strategic Value score	Assessment of Strategic Value
			Increasing air quality and energy savings and reducing greenhouse gases **(includes OES 9)**	Increase resilience to climate change and other disasters, including reducing hydrogeological risk **(includes OES)**	Protect natural areas and biodiversity, including marine biodiversity	Reduce soil erosion, depletion of resources and waste production	Protect the landscape and cultural heritage, including geosites	Improve the living conditions and health of the population, including by increasing the quality of the urban environment **(includes OES 10)**	Environmental strategic value score	Environmental strategic value judgment	Ensure better accessibility and connectivity for all EU regions while taking into account the special circumstances of islands, isolated networks, and sparsely populated, peripheral and remote regions	Ensure an optimal level of integration of transport modes and interoperability among them	Provide missing links and remove bottlenecks, especially in cross-border sections	Promote the efficient and sustainable use of infrastructure and, where necessary, increase capacity	Improve or maintain the quality of infrastructure in terms of social conditions, of accessibility for all users, particularly older people, people with reduced mobility and disabled passengers, as well as the quality of services and continuity of traffic flows	Develop and install telematics applications and promote innovative technological development	Remove administrative and technical barriers, in particular to interoperability of the transEuropean transport and to competition	Economic-Social Strategic Value score	Economic-Social Strategic Value judgment		
Strategic lines	**Specific objectives**	**Functional Areas of Intervention (AF)**	**OAS 1**	**OAS 2**	**OAS 3**	**OAS 4**	**OAS 5**	**OAS 6**	**pSA**	**gSA**	**OES 1**	**OES 2**	**OES 3**	**OES 4**	**OES 5**	**OES 6**	**OES 7**	**pSE**	**gSE**	**pS**	**S**

Second phase: Filling out in parallel of the assessment matrix and the assessment dossiers

As mentioned in section 4.4, the *assessment dossier* is perceived as an aid to estimating the degree of pursuit of the Specific Environmental (OAS) and Economic-Social (OES) objectives in the AI by each of the Functional Areas of intervention in question; therefore there are as many Assessment Dossiers as there are Functional Areas identified in the AI.

These dossiers are shown in Annex 2 to the herein Environmental Report.

The Assessment Dossier is above all identified by a summary definition, and a full definition, almost always corresponding literally to the propositions contained in the AI. They have four sections, characterised by the following names and content (see Fig. 1).

1. DESCRIPTION:

It includes the following information:

- reference strategic line (level one of strategic choices);
- reference specific objective (level two of strategic choices);
- Description of Functional Area (always taken, as the previous ones, from examining the AI);
- "Realistic and mature" interventions listed as such in the AIR, in the section of the same name on page 90;
- Main subjects involved (e.g. Port authorities, RFI, ANAS, Autostrade spa, etc);
- Geographical realm involved (e.g. All Italian ports, TEN corridors, "with particular reference to the South of Italy", etc);
- Reference implementation and financial instruments (e.g. PIS, PON, RFI Programme Contract, etc);
- Overlapping with other Functional Areas.

2. PURSUIT OF REFERENCE OBJECTIVES SYSTEM FOR THE ASSESSMENT OF THE INFRASTRUCTURE ANNEX

This section contains the justifications of attributed judgements, in the assessment matrix, for the pursuit of each of the **reference assessment objectives** identified, by the Functional Area of intervention examined. This is a rather long, articulated sub-section divided in turn into two sub-sections:

- Pursuit of summary environmental objectives (OAS)
- Pursuit of the Economic-Social Objectives (OES)

Also, in this section, the summary information obtained by entering the scores into the assessment matrix is summed up, such as:

- Aggregated scores (With number and sign of interferences found), i.e.:
  - ENVIRONMENTAL strategic value SCORE (pSA)
  - ECONOMIC-SOCIAL strategic value SCORE (pSE)
  - OVERALL strategic value SCORE (pS)
- Quality judgements, i.e.:
  - ENVIRONMENTAL STRATEGIC VALUE JUDGEMENT (gSA)
  - ECONOMIC-SOCIAL strategic value JUDGEMENT (gSE)
  - STRATEGIC VALUE ASSESSMENT (S):

3. ACCOMPANYING MEASURES: ENVIRONMENTAL AGENDA OF INTERVENTIONS THAT WILL USE THE FUNCTIONAL AREA

If significant negative environmental impacts, or negative impacts that can be reduced thanks to a good location/planning, are possible, this section contains a suggestion of a list of ecocompatible planning criteria aimed at reducing the presumably expected impacts for each type of intervention relating to the Functional Area.

These criteria can be of various kinds: elements of attention to planning with relative indicators, planning criteria, impact mitigation measures, impact compensation measures, particular indicators to consider.

4. REFERENCE DOCUMENTS

This section contains the list of documents (publications, plans and programmes, internet sites, etc.) from where the information used to focus the content of the Functional Area and for the expression of judgements are taken.

Fig. 1 - Structure of the assessment dossier

FUNCTIONAL AREA ASSESSMENT DOSSIER	
Functional Area (summary definition)	Code +wording
Full definition	Code +wording
1. DESCRIPTION	
Strategic lines	Code +wording
Specific objectives	Code +wording
Description of the Functional Area	…….
"Realistic and mature" interventions listed as such in the AI (pages 90-91)	• ……
Main subjects involved	…….
Geographic realm involved	……
Reference implementation and financial instruments	……
2. PURSUIT OF REFERENCE OBJECTIVES SYSTEM FOR THE ASSESSMENT OF THE INFRASTRUCTURE ANNEX, BY THE FUNCTIONAL AREA OF INTERVENTION IDENTIFIED	
Pursuit of specific environmental objectives (OAS)	(Contains an argumentation of the allocation of performance points to each of the 6 OAS).

Pursuit of the Economic-Social Objectives (OES)	(Contains an argumentation of the allocation of performance points to each of the 7 OES).
Aggregated scores (With number and sign of interferences found)	ENVIRONMENTAL strategic value SCORE (pSA): : … positive interferences, … negative, for a total of… **points**; ECONOMIC-SOCIAL unit NATURE SCORE (pSE): : … positive interferences, … negative, for a total of… **points;** OVERALL strategic value SCORE (pS) **Points: ……**
Quality judgements	ENVIRONMENTAL strategic value JUDGEMENT (gSA): ECONOMIC-SOCIAL strategic value JUDGEMENT (gSE): strategic value ASSESSMENT (S):
3. ACCOMPANYING MEASURES: ENVIRONMENTAL AGENDA OF INTERVENTIONS THAT WILL USE THE FUNCTIONAL AREA OF INTERVENTION	
	….
4. REFERENCE DOCUMENTS	

In parallel to drafting the assessment dossier, the corresponding line of the Functional Area of intervention being assessed is filled out. The assessment matrix is configured as a support tool for assessment of the pursuit of the objectives deriving from the underlying international, EU and national Programme Reference Framework (QdRP) by the AI choices (shown in the lines), rationalised and summarised as reference objectives for the assessment (shown in the columns).

At the cross points between lines and columns, and based on considerations and argumentations contained in the dossier, the assessor expresses a summary judgement of the functional areas of intervention's capacity to pursue the economic-social and environmental objectives, using the following scale of values.

KEY 1: Judgement criteria of the capacity of the AF capacity to pursue the objective in question	
4	The AF can contribute decidedly to achieving the objective
3	The AF can contribute well to achieving the objective
2	The AF can contribute moderately to achieving the objective
1	The AF can contribute in a limited manner to achieving the objective
	The AF has no relevant interactions with the objective
0	No score, but deriving from algebraic compensations of negative and positive scores
-1	The AF may affect, although to a limited extent, the pursuit of the objective
-2	The AF requires
-3	The AF may considerably affect the pursuit of the objective
-4	The AF may inhibit the possibility of achieving the objective

Third phase: Reading and demonstrating results

Once all the assessment matrix has been filled out, different types of readings of the aggregated results will be available;

Reading the matrix by columns: Assessment of environmental and economic-social compatibility of the AI

The reading of the matrix by columns is the actual Strategic Environmental Assessment.

Indeed it provides an idea of how the strategies set forth in the AI, which constitute the total of its Functional Areas, follow the *System of reference objectives for the assessment.*.

In particular, the following can be distinguished:

- the score to pursue for each individual environmental objective (OAS) and socio-economic objective (OES), verifying first of whether the sum of the impacts is negative or positive.
- the score to pursue in each of the two sections in which the objectives of reference for the assessment are set forth, that is the Environmental strategic value score (pSA) and the Socio-Economic strategic value score (pSE);
- The overall score to pursue for the entire objectives of reference for the assessment (the latter only useful if there is a comparison of various types of performance).

Also, reading by columns allows checks on balance in the pursuit, by the AI, of the 13 different OAS/OES: some may be found to be pursued negatively, some positively; or it may be that the positive and negative effects cancel each other out. The pros and controls of the AI compared to the pursuit of each system objective remains highlighted, however, and this information can be used to identify, for example, any transport objectives that have been neglected compared to all the objectives considered, or the environmental components that could potentially be subjected to most stress.

Finally, it is possible to identify useful dimensions, although of lesser interest, e.g.: the number of AF interfering with the objective, and therefore the average interfering AF score.

To aid reading of the results, a judgement (***Assessment of compatibility***) was placed alongside each total score in the columns, taken from observing the distribution of the scores from the various OAS/OES, according to the diagram shown in Key 2 below.

KEY 2: Determination of the Assessment of Compatibility (judgement of pursuit of the OAS / OES by the AI)			
no.	Very negative: p <= -10	**B**	Good: 10 < p <= 30
LN	Slightly negative: -10 < p < = 0	**O**	Excellent: 30 < p < =50
S	Sufficient: 0 < p <=10	**E**	Excellent : p > 50

Reading the matrix by lines: Assessment of Strategic Value of Functional Area

Reading the rows of the Matrix make it possible to assess the overall performance of individual functional areas, also broken down into the two sections into which the reference objectives for the assessment are structured (OAS and OES).

In the case of the AI, this has made it possible to indicate which Functional Areas, by virtue of their potentially negative impacts recorded on one or more components of the environment, justify further consideration in the section of the Assessment Dossier dedicated to accompanying measures, or the Environmental Agenda of the AF.

The problem did not arise in relation to the Economic-Social Objectives and transport policy pursued by the AI, insofar as they were always positive; as was to be expected, because part of the missions of the AI was to define at national level the objectives of transport policy established at European Community level, from which the OES derive.

By virtue of these variations in behaviour regarding pursuance of OAS and OES, the attribution of judgements has used different scales, shown below (Legend 3 of the Matrix).

KEY 3: Determination of environmental and economic-social strategic value judgements in the AF		
Environmental strategic value score (pSA)	**Judgement**	**Economic-social strategic value score (pSE)**
pSA <= 0	**N =negative**	pSE <= 0
0 < pSA <= 6	**P = Positive**	0 < pSE <= 12
pSA > 6	**MP = Very Positive**	pSE > 12

Reading by lines allows you to appreciate the overall strategic value score (pS), given the algebraic total of the single performances of pursuit in objectives..

Unlike other scores of environmental and socio-economic strategic value, the corresponding judgement - called an "Assessment of Strategic Value" (S) - is not a simple discretisation of the scores into three bands, but follows the most detailed diagram shown in Key 4 below, obtained by making the three *ranges* of the Environmental Strategic Value judgement (gSA) standard, with the two *ranges* of the Economic-Social Strategic Value judgement (gSE) (negative interval, as mentioned above, is an empty result).

In this way, it was possible to adequately consider the presence of negative PSA, while being algebraically compensated by good pSE performances.

KEY 4: Diagram for determining the Assessment of Strategic Value (S)				
		Environmental strategic value Judgement (gSA)		
		Negative (N)	**Positive (P)**	**Very positive (MP)**
Economic-social strategic value judgement (gSE)	**Positive (P)**	**!** **Need for particular control of impacts**	**+** **Middle Sc**	**++** **High Sc**
	Very positive (MP)		**++** **High Sc**	**+++** **Very high Sc**

The various results deriving from reading the matrix by columns, lines or overall, were then placed into different forms, which can be seen in Chapter 7, dedicated to true assessments.

5 Current state of the environment

5.1 An examination organised according to six environmental macro-components

This chapter presents the summary of the environmental fact-finding framework supporting the SEA, as integrated thanks to the contributions provided during the Scoping phase, by subjects with competence on the environment (SCA). This analysis of the current state of the environment was carried out with the aim of identifying the specific elements actually used to assess the Infrastructure Annex, i.e. selecting the ones, among the many possible environmental and territorial analysis topics, on which it is possible to have an *especially significant incidence*.

According to Annex VI to leg. decree 152/2006 (letter f), assessment of the possible significant impacts on the environment by the plan/programme must be carried out while considering minimum the following aspects: *biodiversity, with particular attention to protected species and habitats by virtue of the directive 92/43/EEC and directive 2009/147/EC, population, human health, flora and fauna, soil, water, air, climatic factors, material goods, cultural, architectural and archaeological heritage, landscape and the interrelation between the above factors*.

In consideration of the recent confirmation of other topics of environmental attention that are of special interest for transport planning and bearing in mind contributions on the matters provided by the SCA during the Scoping phase, the list of aspects to be considered in the assessment has been added to by the following topics:

- energy consumption
- contribution to the change in global CO2 and greenhouse gas emissions
- prevention of natural disasters caused by climate changes using “climate adaptation” techniques in regional planning and project engineering
- protecting the 200 “priority areas” for Ecoregional Conservation
- sea and coastal environment
- dissemination of exotic species
- consumption of land and other natural resources
- contamination of surface water and groundwater
- consumption of agricultural-food assets
- waste produced, including earth and rocks from excavations;
- recovery of contaminated sites (priority use)
- conservation of geosites
- prevention of anthropic-originated incidents.
- physical agents: light and optical pollution)

Lastly, and again to increase the logical relations between the AI fact-finding framework (environmental-territorial context and programmatic context) to the max on one hand, and the criteria for carrying out the SEA on the other, the traditional environmental components included in the ones listed in Annex VI and the additional ones above - were grouped together into six ***environmental macro-components,*** that corresponds to the six *Specific Environmental Objectives (OAS)* for the assessment, mentioned in the description of the method adopted (see Chap. 4).

Integration of the various environmental components in order to form six macro-components was carried out based on the affirmation of their close relationship, also in light of the most recent EU and national programme framework of reference (see Chap. 6), especially if confirmed by the possibility of estimating impacts based on similar data, indicators and considerations (see Chap. 8).

Below, Table 5.1 shows the correspondences between the six macro-components and environmental components - both traditional and non - referred to above.

Tab. 5.1 - Correspondence between the six Macro-Components identified and traditional environmental components

Environmental/regional Macro-Components	Environmental Act, Annex VI, par. f)	Other components derived from the most recent programmatic documents
1. Air quality, energy saving and climate-altering gases	• air • climate factors	• energy consumption • contribution to the change in global CO2 and greenhouse gas emissions
2. Resistance to change and other hazards, hydrogeological risk	• land (prevention of geomorphological, seismic, volcanic risk, etc.) • water (prevention of hydraulic risk, coastal erosion)	• prevention of natural disasters caused by climate changes using "climate adaptation" techniques in regional planning and project engineering • Fire risk
3. Natural areas and biodiversity	• biodiversity, with particular attention to types and habitats protected by virtue of Directives 92/43/EEC and 2009/147/EC • flora and fauna	• protecting the 200 "priority areas" for Ecoregional Conservation • sea and coastal environment • dissemination of exotic species
4. Subsoil erosion, withdrawal of resources and waste production	• material goods	• consumption of land, water and other natural resources • contamination of surface water and groundwater • consumption of agricultural-food assets • waste produced, including earth and excavation materials • recovery of contaminated sites (priority use)
5. Landscape, cultural assets, geosites	• cultural assets, including architectural and archaeological • landscape	• conservation of geosites
6. Conditions and health of the population	• people (road accidents, man-made disasters) • human health (air quality, physical agents such as noise and vibrations)	• physical agents: light and optical pollution)

Drafting of the environmental-territorial context analyses organised by macro-components as set out in the six sections below mainly involved the data shown in the annual ISPRA environmental data report ed. 2014-2015 and the *on line*[13] version (hereinafter referred to as "ISPRA Annual Report"), that also offers an overview of the state of the national environment also with much *focus* concerning the matter of transport.

Secondly, the contributions made in such respect by Subjects with Competence on the Environment (SCA) consulted during the SEA Scoping Phase and accounted for in detail in the Environmental Report in section 1.3 were of substantial use.

[13] http://annuario.isprambiente.it/ada/indice

5.2 Macro-component 1. Air quality, energy saving and climate-altering gases

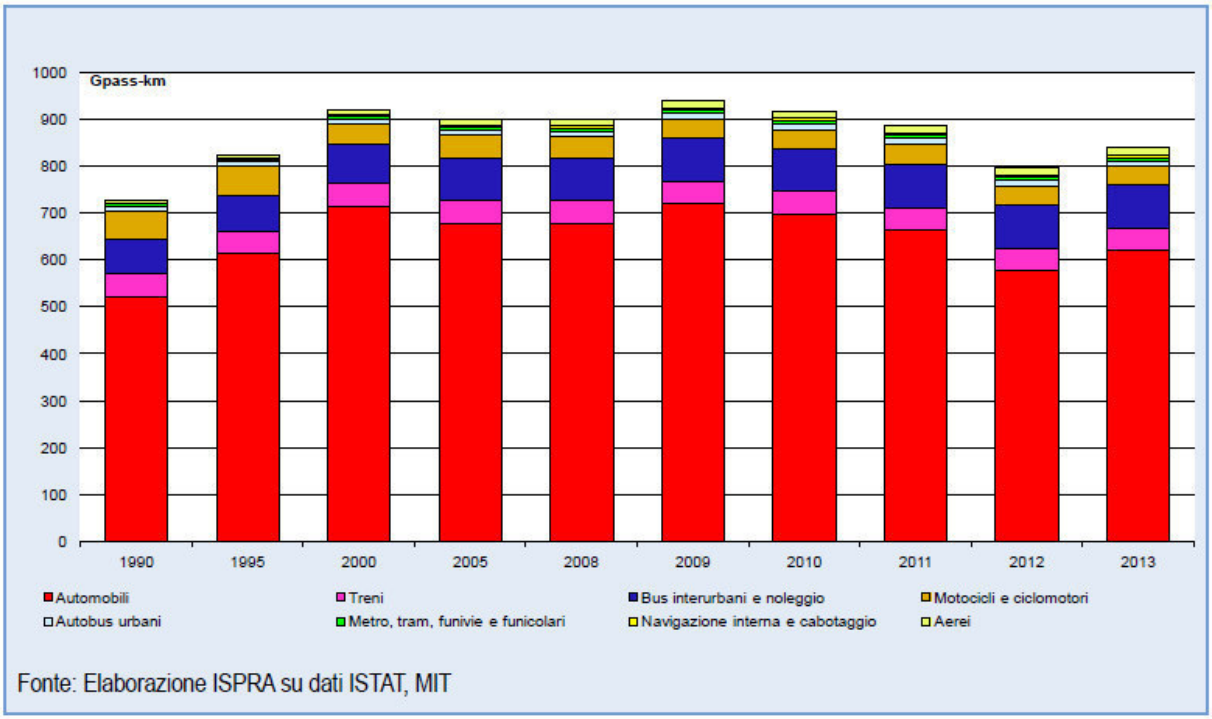
The matter of improving air quality, and in particular of reducing carbon dioxide emissions and other climate-changing gases through interventions on mobility is now a fixed point of all levels of transport policy, as can be seen in the summary European and national programmatic framework as in the target reading carried out in section 6.2 below. In particular, these intentions are explained by pursuing the objective of transferring increasing percentage of passengers and goods from road transport to less polluting transport modes, such as railways and "sea motorways".

With regard to national policies, it is pointed out that of the six main *Strategic Lines* adopted by the Infrastructure Annex, the first three are aimed at modal transfers as mentioned above.

In handling this fact-finding framework for air topics it was considered useful to highlight the starting situation compared to the intensity of passenger and goods transport by mode. The ISPRA Annual Report ("transport" section) offers a rich overview of these themes, organised by effective historical series in order to show the current trends.

The estimations of passenger number trends by mode of transport are very interesting, for the purpose of estimating the positive incidence expected on ***air quality*** by mode transfer from road to rail or other less polluting modes of transport. The ISPRA Annual report shows, in (***Fig. 1***), the recent sharp drop in the number of passengers/km transported (-13.2% between 2010 and 2012) followed by a slight recovery, (+5.3% between 2012 and 2013). These reductions are all concentrated on vehicles, with other modes of transport showing limited variations.

Fig. 1 - Total internal passenger traffic



Cars continue to be the most used transport mode, with vehicle use being 74.0% of the modal division of passengers/km, compared to 6.5% of rail transport and 12.2% of public and private buses (2013 data).

For goods transport overall, from 1990 to 2013, the amount transported fell by 18.9%. This reduction is much lower (about 6–7 %, respectively evaluated by ISPRA or by Eurostat) if goods transported by foreign carriers in Italy are included (so-called road "cabotage"). In particular, ***Fig. 2*** shows the largest reduction was between 2005 and 2013 (-24.2% overall), although there was a temporary inversion in

the trend in 2010. In reference to road transport only, overall intensity of transported goods (long and short haul, national and overseas) since 1990 increased until 2005, remained constant until 2010 and the dropped in 2013 until values were below 1990 ones.

Fig. 2 –Modal division of goods transport

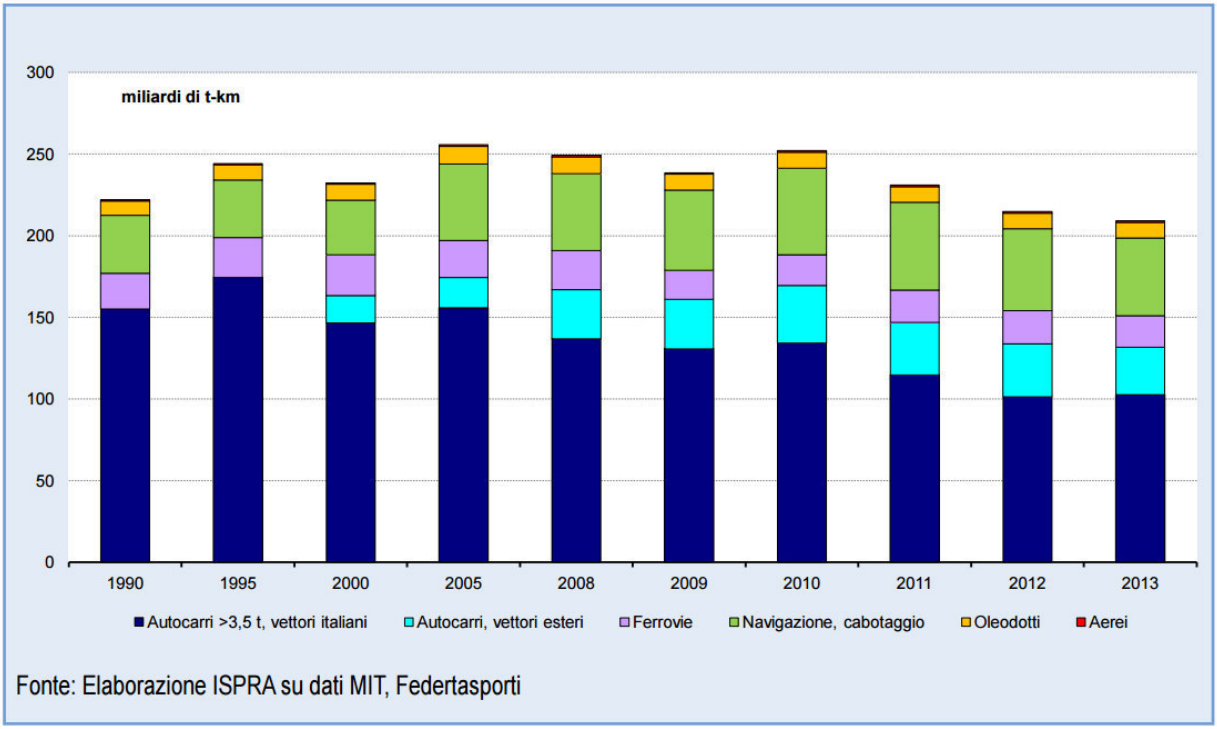
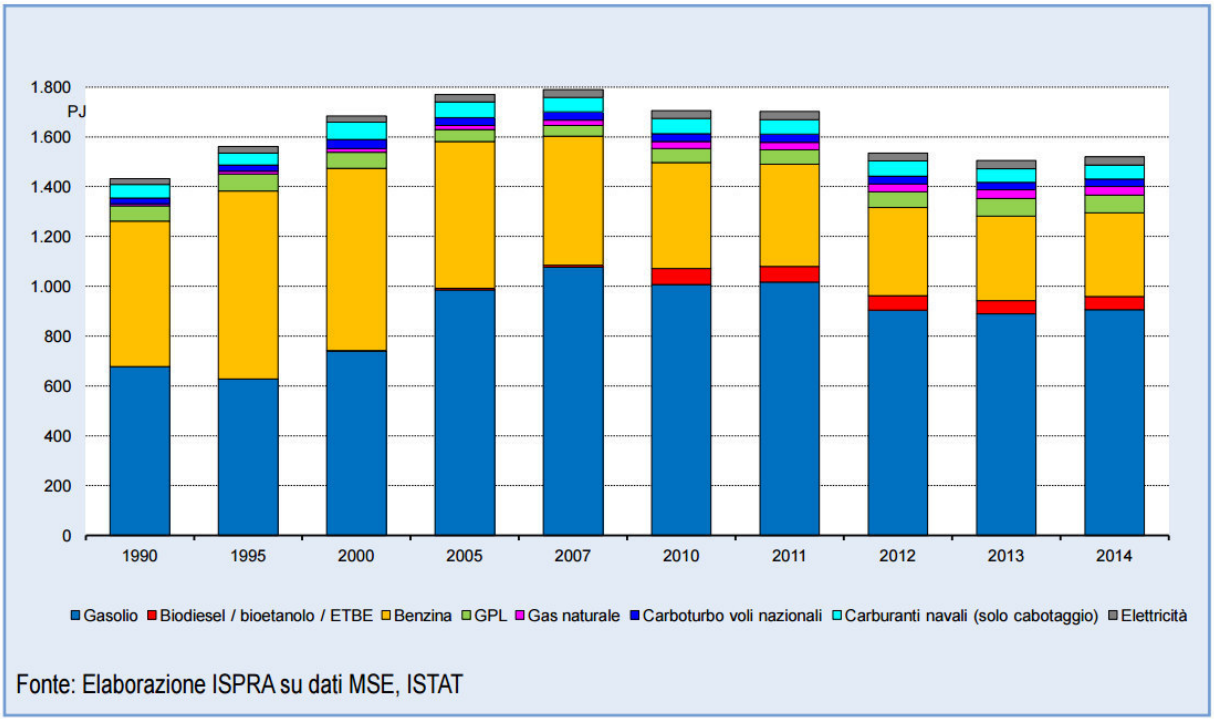


Fig. 3 - Final energy consumption in the transport sector



On analysing the transport mode situation, the ISPRA Annual report shows that in the period 1990-2013, goods transport by rail fell by 12% and accounted for 9% of the total in 2013, including foreign

carriers, while goods transported by sea and waterway, which accounted for 23% of the total, increased by 33%, with a big contribution from the increase in container traffic.

The percentage of goods transported by air also rose considerably (+62% in the period considered), although the relative share of the total was not consistent (0.47%).

As a consequence of the growth in transport volume and modal quota for road transport, total energy consumption in the period ***1990-2014*** in the transport sector increased – from 1990 to 2014 - by 6.0%. However, after reaching a peak in 2005 (+23.5% compared to 1990), these consumptions are now falling. This reduction is only low from 2008 to 2011, while it increased between 2011 and 2014 to -10.7% (***Fig.3***).

Insofar as ***greenhouse gas emissions*** are concerned, after the energy production and transformation industries, transports are the sector that is most responsible for emissions (25.5% in 2014 vs. ***Tab. 5.2***).

Tab. 5.2 -Greenhouse gas emissions in the transport sector by type of gas and percentage of transports on total (not including international bunkers)

	1990	1995	2000	2005	2010	2011	2012	2013	2014 (preliminary estimates)
	kt C02eq.								
Greenhouse gas emissions from transport	103,241	114,240	123,961	128,597	119,918	118,965	106,371	103,584	104,641
of which carbon dioxide	101,306	111,475	121,542	126,947	118,536	117,599	105,143	102,393	103,405
methane	980	1,091	838	507	313	294	261	236	262
nitrous oxide	955	1,674	1,581	1,143	1,069	1,072	967	956	975
Total greenhouse gas emissions	520,089	530,801	552,676	576,540	505,710	493,545	468,459	437,287	411,049
	%								
Share of total emissions	19.9	21.5	22.4	22.3	23.7	24.1	22.7	23.7	25.5
Source: ISPRA									
Note:									
Total emissions, without absorption due to the LULUCF sector (land use, land-use change and forestry) Historical set has been recalculated based on the updated IPCC Guidelines (IPCC 2006)									

As shown in tab. 5.2, carbon dioxide (CO2) is by far the single element that is most responsible (99%) for climate altering gas emissions in the transport sector, as the percentages of methane and nitrous oxide (N2O)[14] are very low. These are generally gases that are not harmful to human health, but extremely efficient in producing the "greenhouse gas effect" and therefore climate changes.

[14] Also called "laughing gas", it is not toxic when inhaled, though it can cause asphyxiation in excessive quantities. However, it is a powerful greenhouse gas: its climate heating potential is 310 times more impactful than carbon dioxide, per unit of mass over a period of 100 years.

See macro component 6 regarding components originating from vehicle pollution which are harmful to human health. "Population, human health, quality of the urban environment."

Within the transport sector, air transport is one of the most rapidly growing greenhouse gas sources, in particular air traffic on international routes, which is responsible for most of these emissions. The real impact of emissions from air transport on global warming is however higher than what has been recorded, due to the emission of a high level of aqueous vapours, which could result in the formation of vapour trails and cirri, with adverse effects on global warming.

Tab. 5.3 – CO2 Emissions by type of traffic and transport conditions

	1990	1995	2000	2005	2010	2011	2012	2013	2014
	%								
Type of traffic									
Passenger	64.2	64.7	64.8	62.3	62.9	62.6	61.9	62.7	62.6
Freight	34.3	33.5	34.3	36.8	35.6	36.3	36.8	36.9	36.9
Other (P.A.. nautical)	1.5	1.8	0.9	0.9	1.6	**1.0**	1.3	0.3	0.4
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Mode of transport									
Road transport	95.3	95.5	93.2	93.8	91.9	92.6	92.0	93.3	93.1
Other modes	4.7	4.5	6.8	6.2	8.1	7.4	8.0	6.7	6.9
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Source: Drafted by ISPRA based on MSE data									
Key:									
PA. Public Administration									
Note:									
Historical set has been recalculated									

Nevertheless, regarding CO2 emissions, road transport is the main culprit, with 93.1% of the total in 2014 ***Tab. 5.3***). In 2013, greenhouse gas emissions from the transport sector practically reverted to 1990 levels, while the provisional data for 2014 shows a slight increase (1%) compared to 2013. Finally, we note that 62.6% of the sector's carbon dioxide emissions originate from the passenger transport area, while the portion attributable to the road transport of merchandise is equal to 39.9%.

With regard to ***other atmospheric pollutants***, the annual report by ISPRA shows that the major source of emissions is the mobility of merchandise and passengers by road, which furthermore has increased, between 1990 and 2013, by 31.6%, in terms of overall distance travelled (vehicles per kilometre) for merchandise and passengers.

However, the annual report indicates that in recent years there has been a significant drop in atmospheric emissions produced from road transport, thanks to the technological improvements made to vehicles with an ensuing decrease in average emissions from new vehicles per kilometre travelled. For example, between 1990 and 2012:

- lead emissions practically disappeared, thanks to the removal of tetraethyl gasoline from the market in 2001.

- benzene emissions decreased by 93%; nitrogen oxide emissions (NOx) decreased by 50.5%
- emissions of particulate matter, PM2.5, decreased by 56%.
- Emissions of non-methane volatile organic compounds (NMVOC) have decreased by 79%.

Nevertheless, air quality in large urban areas and in certain macro areas of the country, such as the Po Valley, is not within the limits established by European regulations.

Finally, it should also be considered that hydrogen oxides and NMVOCs are the main pollutants as they contribute to the acid rain phenomenon and are the precursors of nitrogen dioxide and tropospheric ozone which can create ozone even in areas that are far from the sources. Sulphur oxide, particulate and nitrogen oxides emissions also contribute significantly to atmospheric emissions. In particular, sulphur oxide emissions, which have almost disappeared from road transport, are still significant insofar as sea transport is concerned.

5.3 Macro-component 2. Resistance to change and other hazards, hydrogeological risk

To improve environmental performance in terms of infrastructure and transport planning in general, the issues of ***resistance to climatic changes*** and other natural hazards are very dependent on ***reducing hydrogeological risk*** which is incumbent on infrastructures whether they are already existing or in the design stage, as well as they risks that they can cause due to their physical presence, such as for example the increased risk of flooding in populated areas.

In this sense, the construction of the green environmental knowledge base is mainly focused on mapping of the areas at risk, so as to eventually apply, in support of the assessment, overlay mapping techniques comparing any corridors identified by AI Strategic Lines with the situation in the territory in relation to various risk issues, mainly landslides and floods (see paragraph 5.3).

These types of phenomena have always garnered attention from time to time (for example: Florence in 1966, Genoa in 1970, Piedmont in 1994, Sarno in 1998, Soverato in 2000, Messina in 2009, Genoa and Cinque Terre in 2011), but recently there has been a progressive increase in catastrophic events caused by meteorological events of unexpected intensity, also due to the concurrent lack of protection in the territory and the territorial maintenance work required as a result of the abandonment of traditional agricultural activities and human settlement in territories that are more and more at risk hydro-geologically.[15]

A study conducted jointly by ANCE [Italian association of builders] and CRESME [Italian centre for construction research][16],based on data collected by the MATTM [Ministry for the Protection of Environment and for the protection of the Land and Sea] through the AVI [Damaged Italian Areas] project[17], shows how 15,000 events (serious and/or slight) took place between 1985 and 2001, including 13,500 landslides and 1,500 floods.

Some of these disasters had repercussions on the populations, claiming victims or damaging inhabited areas. Of the 15,000 events 120 (95 landslides in 25 floods) were directly responsible for approximately 970 deaths.

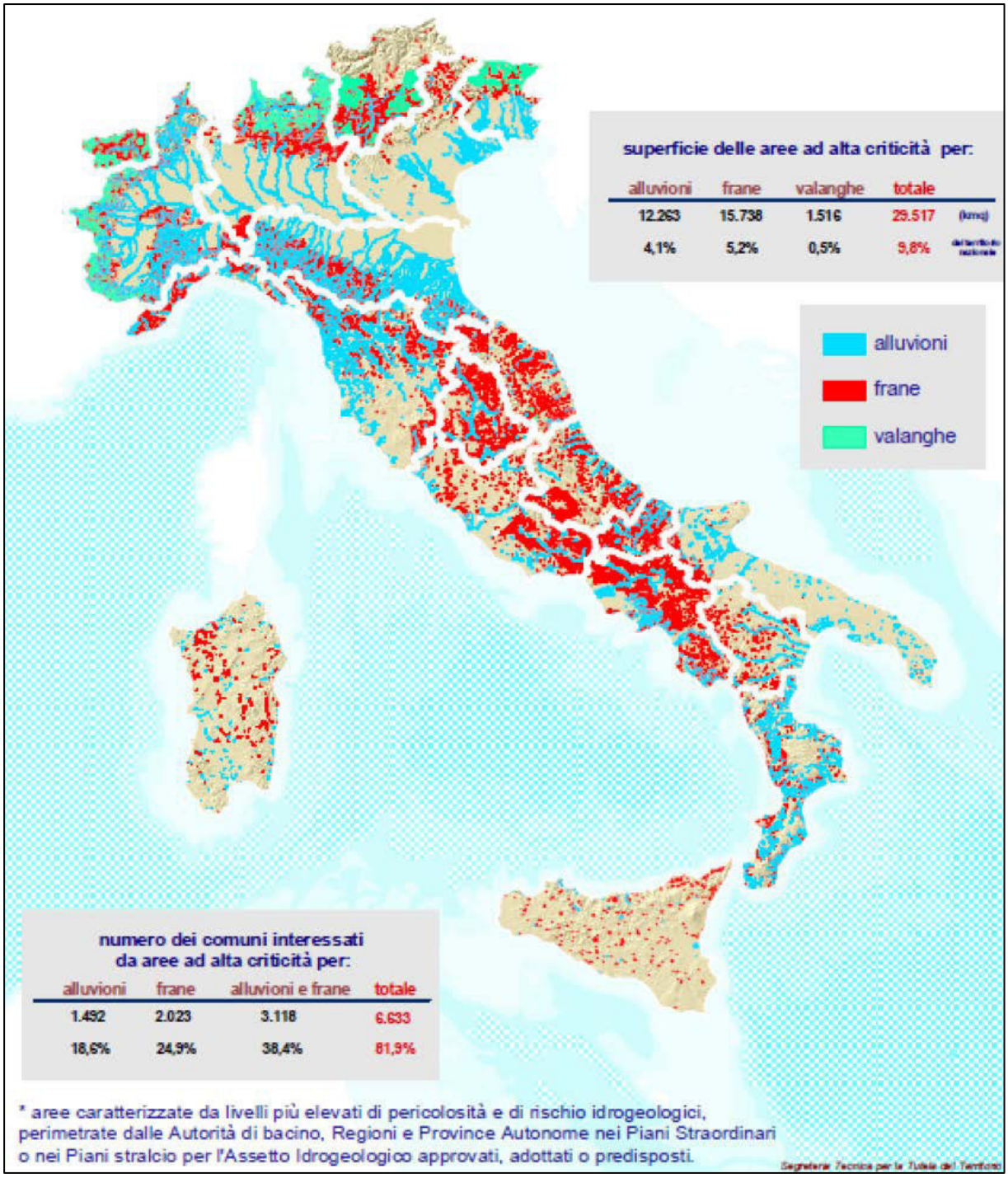
[15] For an overview of the most catastrophic landslides and floods that took place after the Second World War in Italy, see the SICI [Sistema Informativo sulle catastrofi idrogeologiche-hydrogeological disasters information system] website http://sici.irpi.cnr.it/storici_italia.htm.

[16] First Ance-Cresme Report– "The state of Italy 2012 - Seismic and Hydrogeological Risk".

[17] The Ministry of Coordination of Civil Protection commissioned GNDCI - [Gruppo Nazionale per la Difesa dalle Catastrofi Idrogeologiche - National Group for Protection against Hydro-geological Disasters] of the National Research Council (CNR) to carry out the special AVI project in order to obtain a census of the areas that have been affected by geological disasters (landslides) and hydrological disasters (floods).

In particular, the study above provides the following information concerning areas that are at ***a high level of hydrogeological danger*** (depicted in ***figure 4***):

*Fig. 4 – Map of the areas at a high hydrogeological risk **



Source: First ANCE-CRESME Report– "The state of Italy 2012 - Seismic and Hydrogeological Risk", based on MATTM data

- The areas that are at a high level of hydrogeological danger (risk of landslides and/or floods) cover approximately 10% of the surface area of Italy (29,500 km²) and concern 89% of the municipalities (6,631).
- 5.8 million persons (9.6% of the population) reside in areas which are at high hydrogeological risk; this corresponds to 2.4 million families.

- 58% of the surface areas of Italy that are at a high level of hydrogeological risk are subject to landslides (17,200 km²) and 42% to floods (12,300 km²).
- Considering both of the elements of risk, Emilia Romagna is a region with the highest exposure to risk, with 4,316 km² or 19.5% of its surface area. Campania (19.1% of areas at risk), Molise (18.8%) and Valle D'Aosta (17.1%) follow.
- In five regions - Valle d'Aosta, Umbria, Molise Calabria and Basilicata -all the municipalities have a portion of their territories affected by a high level of hydrogeological risk.
- At the provincial level, Naples is in first place with 576 thousand persons residing in high risk areas, Turin is in the second place (326 thousand persons) and Rome is in third place (216 thousand persons)

The study indicates that approximately 44% of the country (131 thousand square kilometres) and 36% of the municipalities (2,893) is at a ***high level of seismic risk***. 21.8 million people live in these areas (36% of the population), totalling 8.6 million families and there are approximately 5.5 million buildings, residential and non-residential. The seismic risk is higher around the Apennines and the South of Italy. Campania is in first place, with 5.3 million people living in 489 municipalities with a high seismic risk. Sicily follows with 4.7 million people in 356 high risk municipalities and in Calabria all the municipalities are at risk, totalling approximately 2 million people.[18]

Very interesting information is provided in the introduction to Guidelines issued by the Chamber of Deputies on 2 April 2014, which obligated the Government to implement a series of initiatives focused on mitigating the hydrogeological risk (these guidelines furthermore outlined the data of the aforementioned ANCE-CRESME study). *The overall cost of the damages caused in Italy by earthquakes, landslides and floods, from 1944 to 2012 totals Euro 242.5 billion, that is approximately 3.5 billion per year. 75% of the total, Euro 181 billion concerns earthquakes, while the remaining 25%, or Euro 61.5 billion is due to hydrogeological damages. From 2010 to date costs of Euro 20.5 billion (8% of the total) are estimated to have been incurred, taking into account that Euro 13.3 billion for the earthquake in Emilia Romagna"*

From the above, we can see how the issue of protecting the population residing in the areas which are at risk, the hydrogeological restoration of the territory and the safeguarding of the territorial wealth are questions of primary importance for our country, including in terms of saving financial resources. The contribution that the Infrastructure Annex can make to this line of action is necessarily connected to targeted maintenance interventions and assuring that existing infrastructures are compliant with standards, in adopting all the necessary measures when new constructions take place in the areas that are at hydrogeological risk. ISPRA's mapping based on data provided by Basin authorities[19] are particularly useful; these are provided below and refer to:

- Distribution of interference in urbanized areas and areas at geomorphological risk R3 and R4;
- Distribution of interference at thoroughfares and areas at geomorphological risk R3 and R4;
- Distribution of interference on railway lines and areas at geomorphological risk R3 and R4;
- Distribution of interference in urbanized areas and areas at water risk R3 and R4;
- Distribution of interference at thoroughfares and areas at water risk R3 and R4;
- Distribution of interference on railway lines and areas at water risk R3 and R4;

Figures ***5, 6 and 7*** show only three of the potential water risks as an example.

[18] For thematic maps see also the Civil Protection website: www.protezionecivile.gov.it

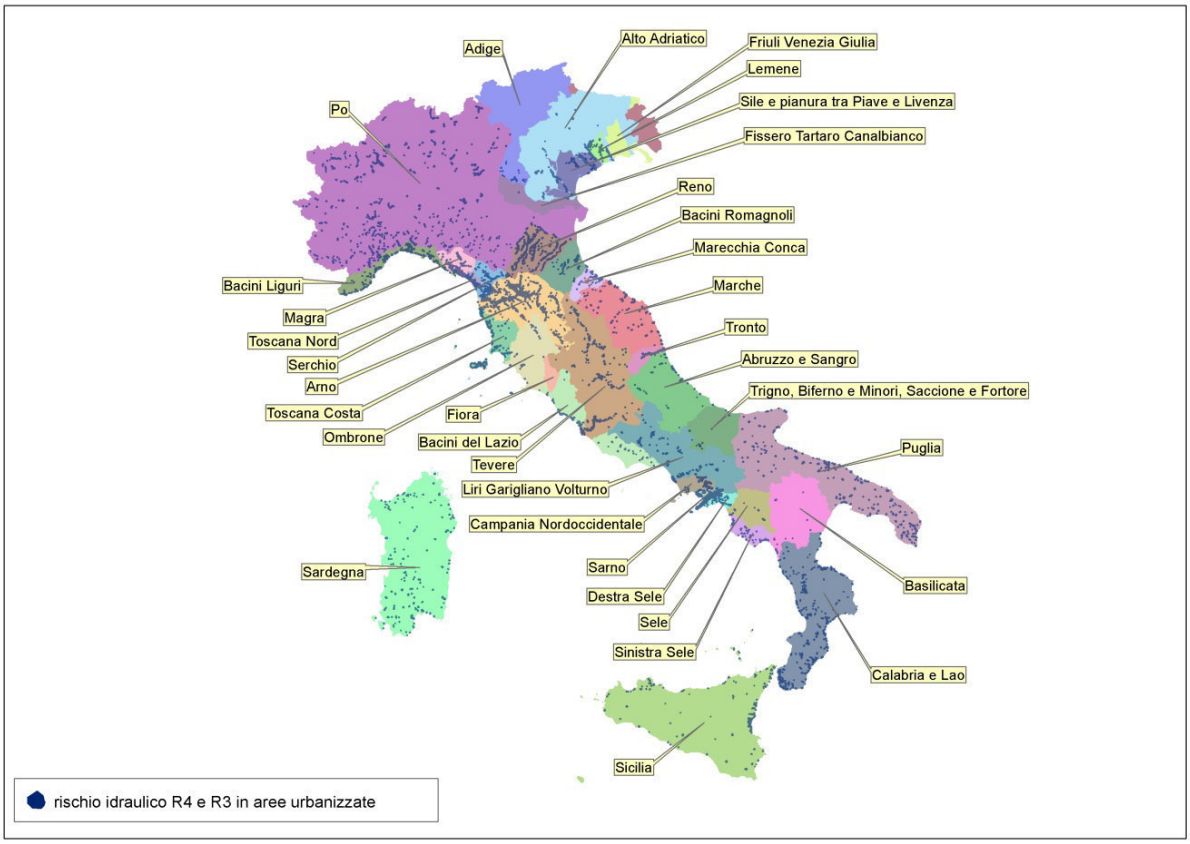
[19] http://annuario.isprambiente.it/ada/scheda/2199/9

Another area of interest regarding the issues discussed in this paragraph is that of ***coastal risk***, to be taken under consideration in assessing for construction projects, for example. Coastlines can in fact be affected by intense erosion and flooding phenomena, which the prospects of rising sea levels related to the climate changes, can cause to be intense.

To summarize this type of environmental factor, a "coastal risk index" was created as part of the European EUROSION project, the purpose of which is to estimate the risk connected to the occurrence of events, such as coastal erosion and/or marine flooding, which are damaging to the environment and/or in terms of human activities. This index, resulting from the product of the probability of the event (coastal sensitivity) multiplied by the impact on the environment and human activities (coastal vulnerability), was calculated on the community scale, including only coastal municipalities. [20]

The ISPRA Annual Report deduces that the area which is potentially at risk (RICE - Radium of Influence of Coastal Erosion), considering only municipalities which are coastal, occupies 954,379 m² or 3.17% of the entire national area, concerning a population of 5,276,535, or 9.12% of the national population; it furthermore estimates that 336,746 square kilometres (1.12% of the national area) and 2,133,041 persons (3.69% of the total population) are exposed to a medium - high and high risk.

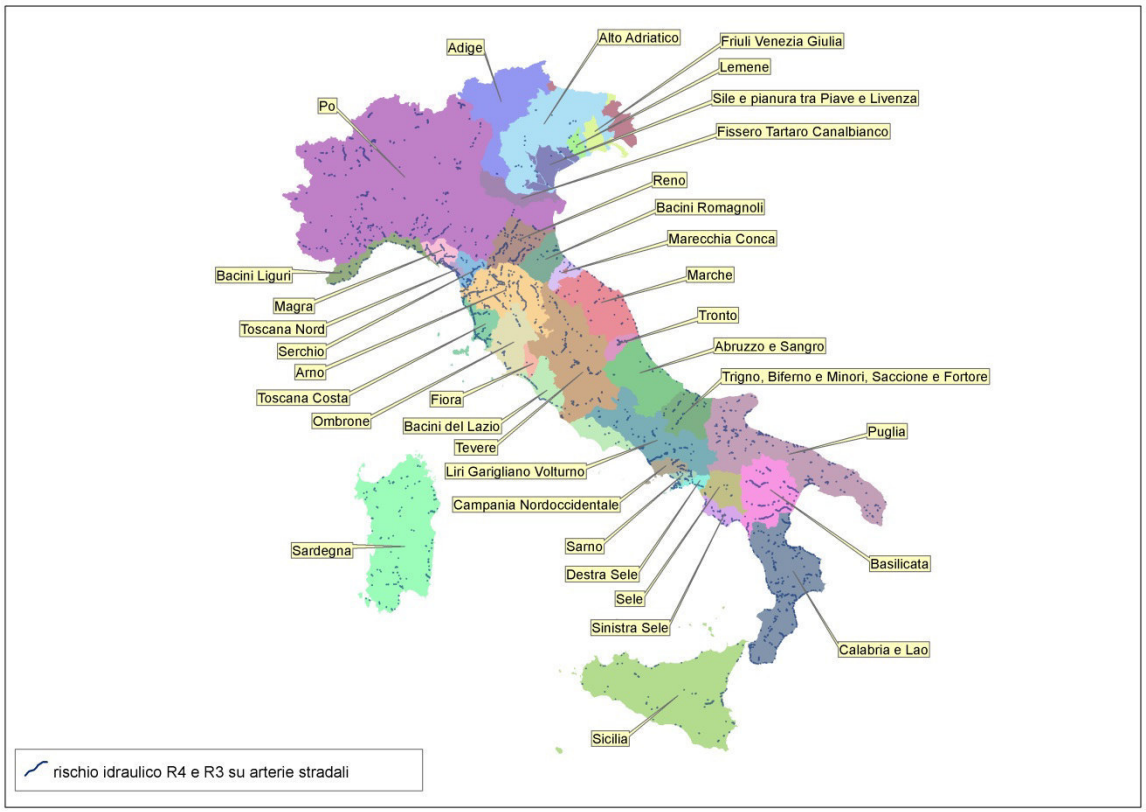
Fig. 5 - Distribution of interference in urbanized areas and areas at water risk R3 and R4;



source: ISPRA Yearbook of Environmental Data

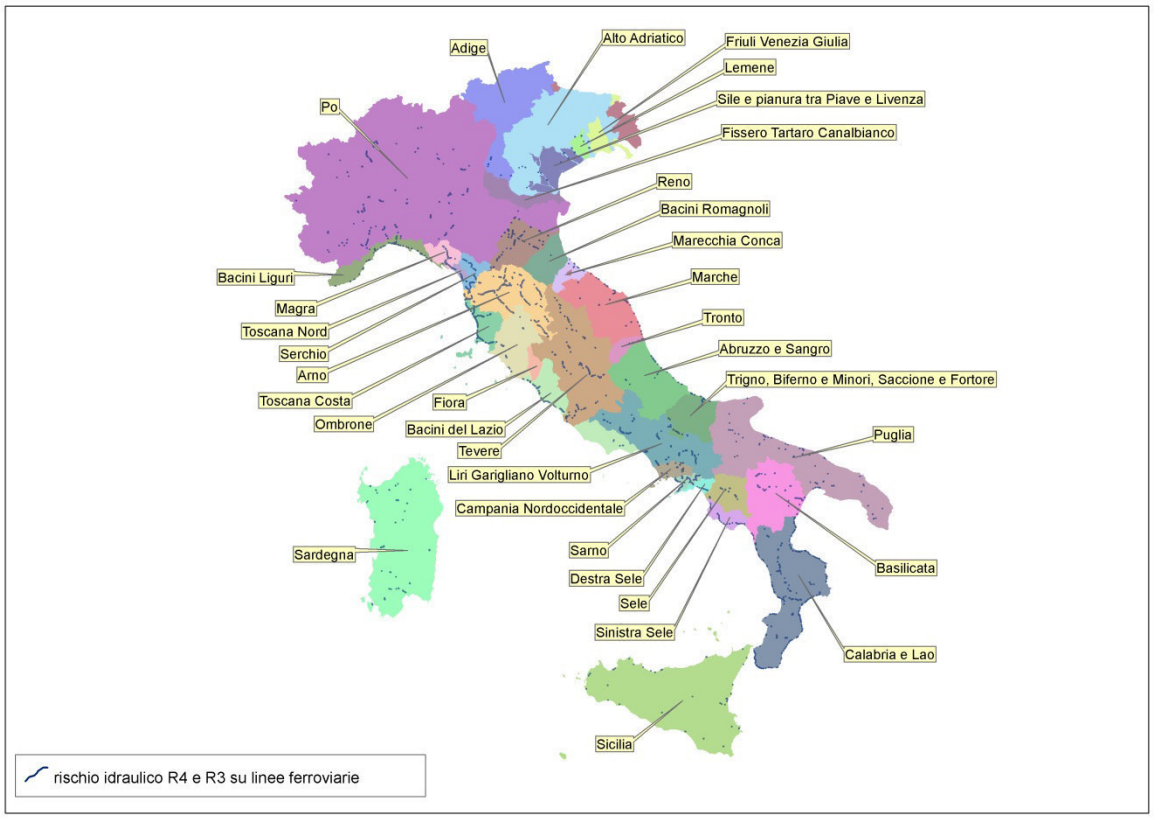
[20] http://annuario.isprambiente.it/ada/scheda/1210/5

Fig. 6 - Distribution of interference at thoroughfares and areas at water risk R3 and R4;



source: ISPRA Yearbook of Environmental Data

Fig. 7 - Distribution of interference on railway lines and areas at water risk R3 and R4;



source: ISPRA Yearbook of Environmental Data

In ***Fig. 8*** Shows the map of the coastal risk index, resulting from the index of the sensitivity multiplied by the index of vulnerability, normalized at 100 and subdivided into five classes.

It also measures the percentage of risk compared to the maximum value that can be obtained when all the pressure factors are present (sensitivity) as well as all the damage factors (vulnerability). The illustration shows an area of "medium - high" and "high" risk in the northern part of the Adriatic, between the northern coast of Emilia Romagna, Venice and the eastern portion of the Friuli Venezia Giulia coast. Other than the above, the "medium - high" risk situations are discontinuous, affected by the presence of urban settlements and human activity.

Other issues of interest regarding this environmental macro-component discussed in the ISPRA Annual Report, ***inherent in dangers of a natural origin*** are:

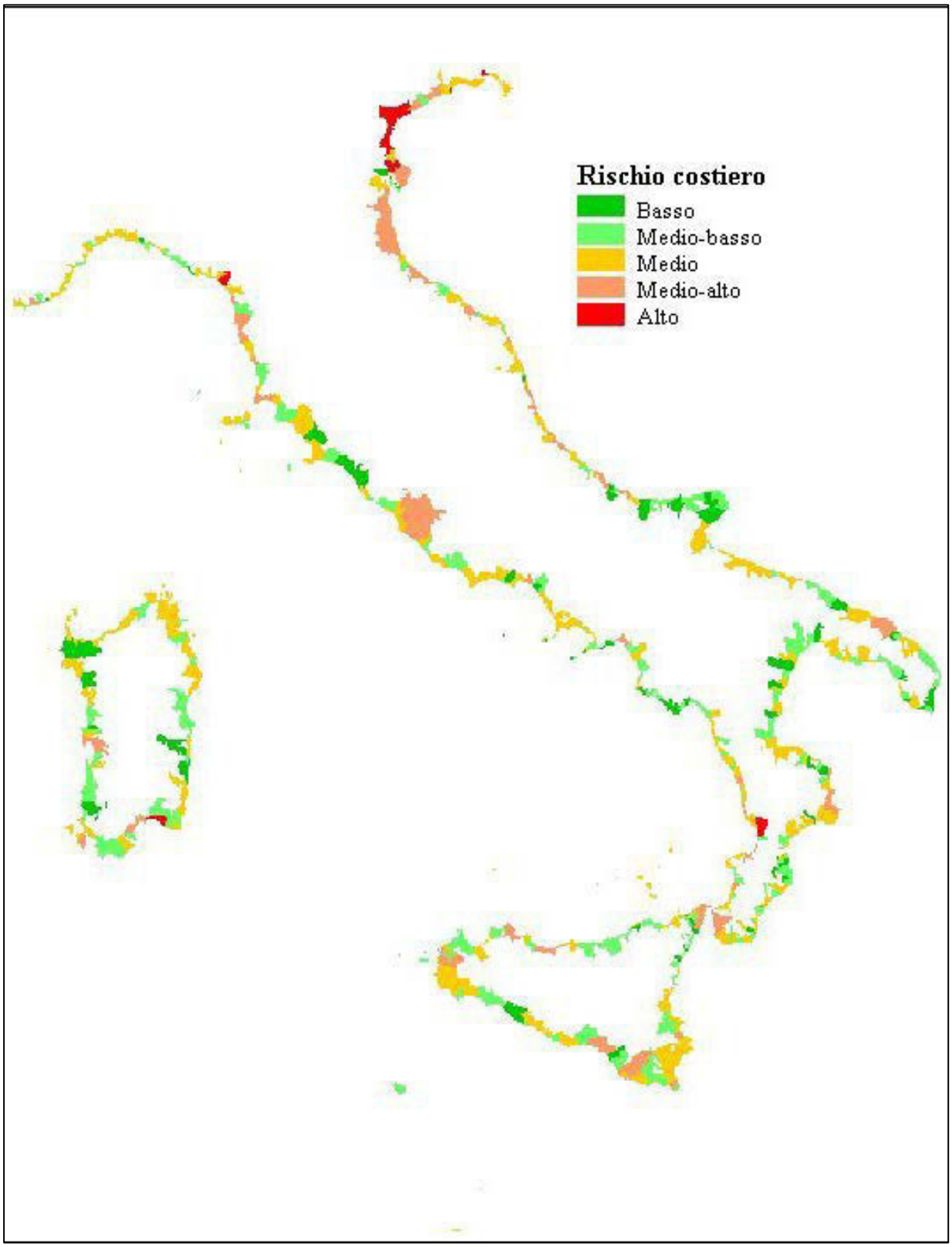
- Fire risk
- Coastal dynamics
- Municipalities affected by subsidence
- Man-made reservoirs
- Rain
- Drought
- Areas at risk of *sinkholes*

We provide below some information relative to this latter issue.

Sinkholes are created in the ground suddenly and in a catastrophic manner; they could be:

- of a natural origin, that is they are dependent on the particular hydrogeological context. Natural sinkholes connected mainly to karst phenomena concerning the breaking down of rocks and, to a lesser extent, erosion -liquefaction processes (piping sinkholes). This latter type of sinkhole is the most dangerous and sudden; it mainly occurs in lowland areas.
- It is caused directly by human actions, and particularly the collapse of artificial cavities that are present in the subsoil or dysfunctions in the services based in the subsoil. They are concentrated in areas in which urbanization has been massive and where excavation of the subsoil has taken place over centuries for various reasons.

Fig. 8 - Mapping of the coastal risk, by municipality



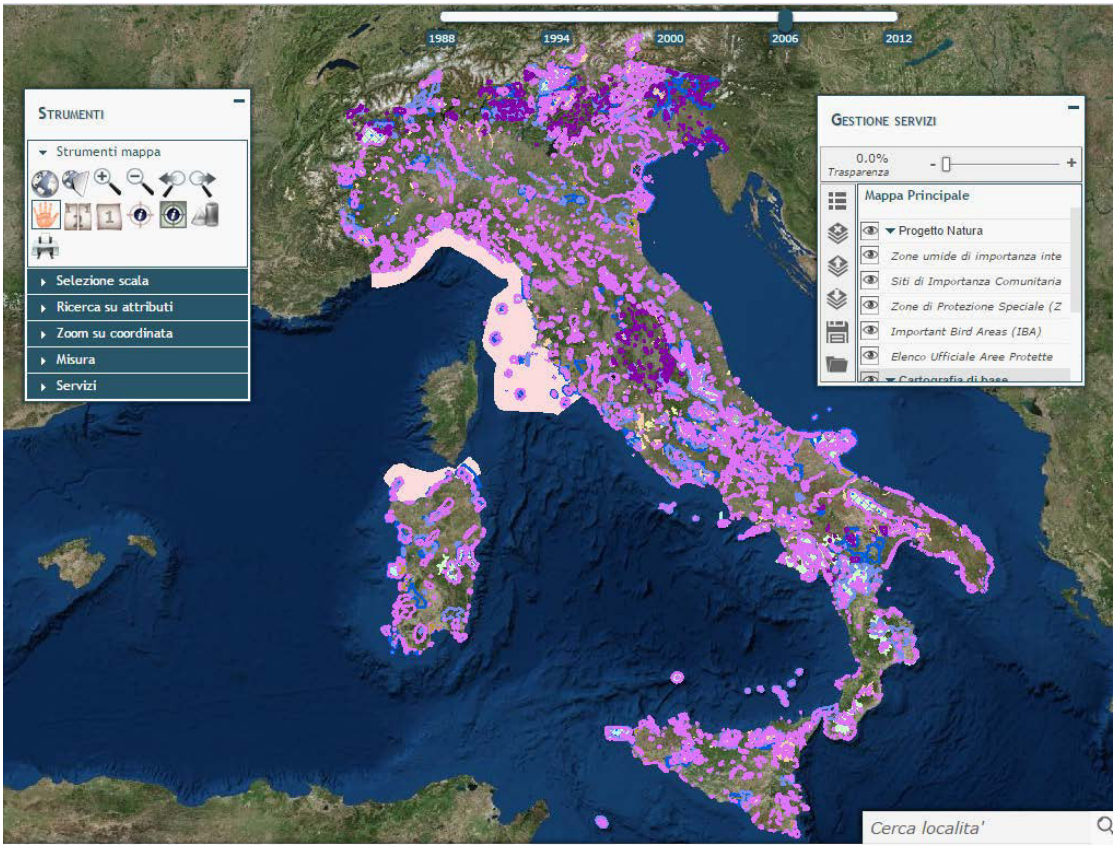
source: ISPRA Yearbook of Environmental Data

5.4 Macro-component 3. Biodiversity, including marine biodiversity

Currently, at the national level there are currently 871 protected areas with a total surface area of 3,163,590 hectares on land covering 10.5% of the national territory and 2,853,034 hectares at sea, based on a formal measure issued by the State and the Regions.[21] They comprise:

- 24 national Parks (which cover a total surface area of 1,465,681 hectares, or 4.8% of the country's territory);
- 134 natural regional or sub national Parks with a surface area of 1,739,960 hectares;
- 27 Natural Protected Marine Areas
- 147 Natural State Reserves
- 365 Natural Regional Reserves
- 171 Protected Regional Areas
- 3 other protected national areas: the Under Water Parks of Baia and Gaiola, in Campania and 1 international protected area «marine mammal sanctuary" in the Ligurian Sea.

Fig. 9 - National Geoportal: total protected Italian areas



http://www.pcn.minambiente.it/viewer/index.php?project=natura

Regarding the forms of protection that result from community regulations or international designations. In Italy there are also:

[21] Information from EUAP [Elenco ufficiale delle aree naturali protette - official listing of natural protected areas]. The update has been carried out by the MATTM. Currently, the 6th update is in effect which was approved by a resolution of the Italian State-Region Conference on 17 December 2009 and published in the Official Gazette no. 125 of 31.05.2010.

- 1947 Sites of Community Interest (SCI) with a total surface area (on land and in the sea) of 4,394,382 hectares (ISPRA figure, 2014 update);
- 367 Special Areas of Conservation (SACs) with a total surface area (land and sea) of 452,970 hectares (ISPRA figure, 2014 update);
- 610 Special Protection Area (SPAs) with a total surface area (land and sea) of 4,411,444 hectares which are overlapping and which fully overlap the protected areas (ISPRA figure, 2014 update);
- 8 Biosphere Reserves (UNESCO): Miramare, Circeo, Collemeluccio-Montedimezzo, Somma-Vesuvio and Miglio d'Oro, Cilento and Vallo di Diano, Valle del Ticino, Arcipelago Toscano and Selva Pisana);
- 51 Heritage Sites (UNESCO) of which four are designated as natural sites (Aeolian Islands, 2000 Monte San Giorgio, 2003, the Belluno Dolomites. 2009 and Mount Aetna, 2013);
- 51 Ramsar Sites (60.052 hectares);
- 63 Biogenetic Reserves.
- 6 especially protected areas of Mediterranean importance.

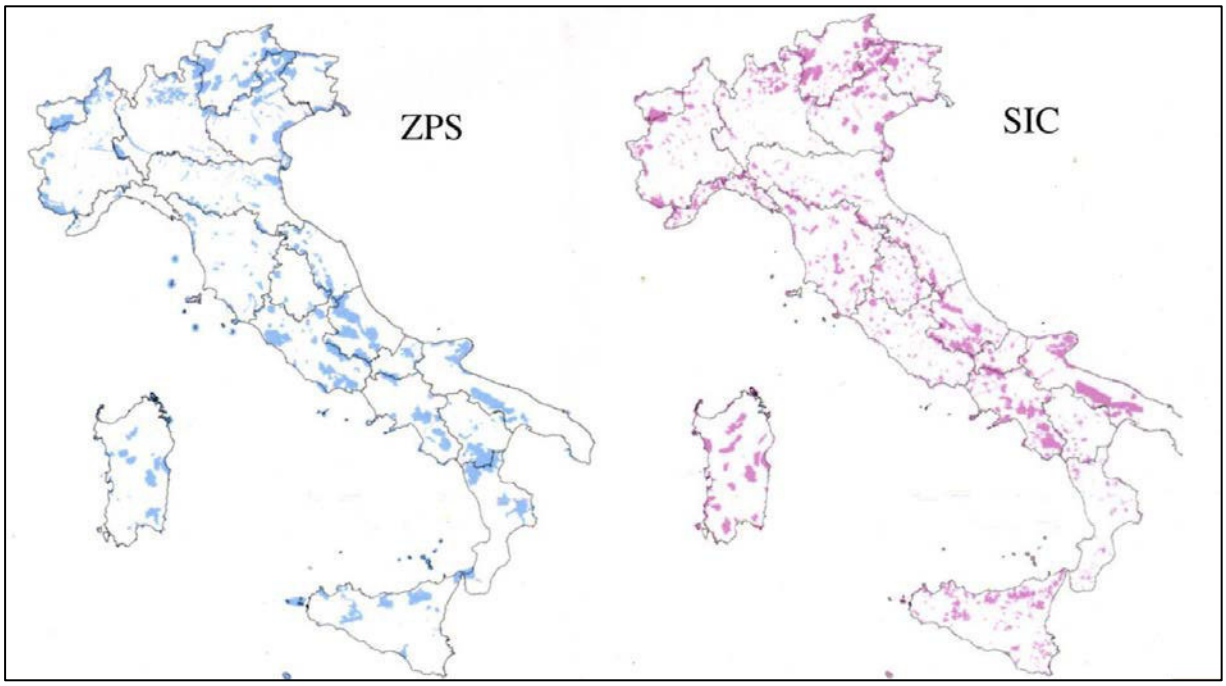
All these areas are georeferenced on the National Geoportal. The situation as a whole is shown in ***Fig. 9*** As can be observed, this is a very extended system.

Natura 2000 Network in particular consists of Sites of Community Interest (SCI) identified by the member states as established by the Habitat Directive, which are subsequently designated as Special Areas of Conservation (SACs) and also include Special Protection Areas (SPAs) established pursuant to the "Birds" Directive 2009/147/EC on the conservation of wild birds (***Fig. 10***).

Designation as a SCI therefore constitutes the first step before reaching SAC status. The other passages consist in preparing an environmental plan and an operating plan.

Here-below in (***Tab. 5.4,*** we show the situation analytically insofar as the presence of SCI and SACs which, not counting the overlapping, cover a total net surface area of 6,391,381 hectares of which 5,817,599 are on land while approximately 19.3% are on national territory.

Fig. 10 – SCI and SPAs on Italian territory



Tab. 5.4 - Number and surface area of the Sites of Community Importance (SCI) and the Special Areas of Conservation (SACs) by Region/Autonomous Province (updated October 2014)

Region/Autonomous Province	SCI	SCI surface area			Average SCI surface area	SAC	SAC surface area			Average SAC surface area
		land	sea	total			land	sea	total	
	no.	ha			ha	no.	ha			ha
Piedmont	126	284,449		284,449	2,258					
Valle d'Aosta*	1	37,036		37,036	37,036	27	34,607		34,607	1,282
Lombardy*	147	115,426		115,426	785	46	108,773		108,773	2,365
Trentino-Alto Adige*	52	260,637		260,637	5,012	123	43,609		43,609	355
Trento	12	110,705		110,705	9,225	123	43,609		43,609	355
Bolzano	40	149,932		149,932	3,748					
Veneto	104	369,477	3,805	373,282	3,589					
Friuli Venezia Giulia*	3		1,996	1,996	665	56	129,173	3,003	132,176	2,36
Liguria	126	138,067	9,133	147,2	1,168					
Emilia Romagna	139	236,793	3,557	240,35	1,729					
Tuscany	134	305,935	70,53	376,465	2,809					
Umbria*	2	18,349		18,349	9,175	95	102,981		102,981	1,084
Marche	76	104,684	900	105,584	1,389					
Lazio	182	122,759	22,846	145,605	800					
Abruzzo	54	252,593	3,41	256,003	4,741					
Molise	85	97,75		97,75	1,15					
Campania	109	338,678	25,072	363,75	3,337					
Apulia	78	393,455	74,795	468,25	6,003					
Basilicata*	35	34,414	5,894	40,308	1,152	20	30,824		30,824	1,541
Calabria	178	70,197	20,251	90,448	508					
Sicily	223	380,182	108,317	488,499	2,191					
Sardinia	93	366,427	116,568	482,995	5,193					
ITALY	**1,947**	**3,927,308**	**467,07**	**4,394,382**	**2,257**	**367**	**449,97**	**3,003**	**452,97**	**1,234**

Source: ISPRA Environmental Annual Report

It is also important to note another form of classification for biodiversity applicable at the national level, that is the domestic classification Ecoregional Conservation (ERC) which is the shared approach for protection of the biodiversity on the planet, developed by WWF International.

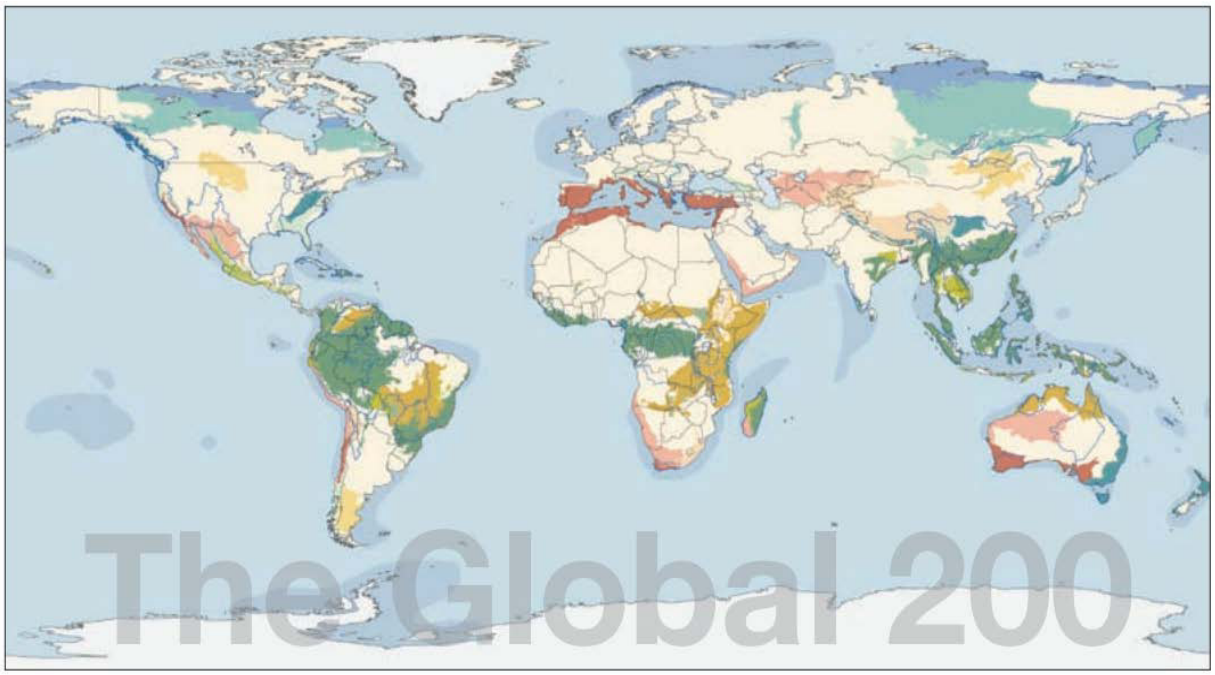
WWF defines an *ecoregion* as "large unit of land or water containing a geographically distinct assemblage of species, natural communities, and environmental conditions".

The surface of the earth has been divided by WWF scientists into 8 main *ecozones*, containing over 800 smaller ecoregions. Among these, 200 have been selected, and named *Global 200*: most of the biodiversity on the planet is located here (***Fig. 11***).

The core idea is that concentrating the commitment to protect these priority locations also protects the entire Earth ecosystem.

In summary, Ecoregional Conservation means to define global strategies for the conservation of biodiversity, starting by studying a mixture of indicators relative to the overall biological distinctiveness of an area and analysing the threats and the status of its protection, to identify priority areas and focal species within uniform biogeographic systems, on which to intervene through specific action plans.

Fig. 11 - The 200 Priority Ecoregions for Conservation of Biodiversity



Source: WWW The Conservation of Biodiversity in the Central Mediterranean Ecoregion Contributions to Biodiversity at the National Level (2006)

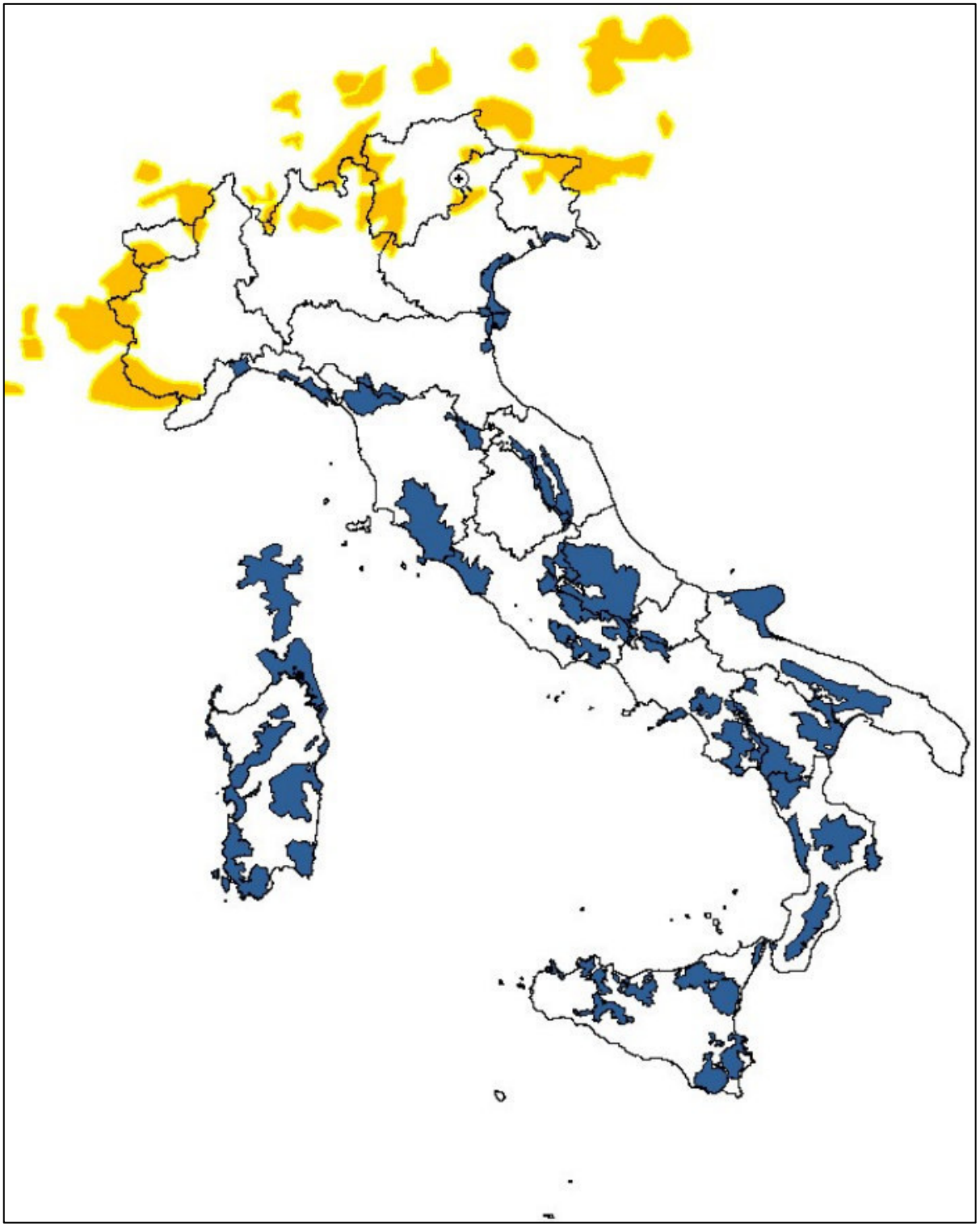
The ERC Process is in fact based on four main phases:

1. a Recognition phase characterized by the collection of available data and the development of already intrinsically related scientific content of a social - financial character.
2. development of the *Biodiversity Vision*, within the context of which the objectives and priorities for conservation of the Ecoregion are set at the following levels: priority areas, focal species and ecological processes (e.g. migration of avifauna). The Vision idea is associated with a lengthy time horizon (50 years), but the particular methodologies are selected based on this vision , including those favouring a chronological rather than typological approach.
   In fact, the priority areas are designated based on the perimeters of the units of landscape, with identification of the percentage of that unit taking place only at a later time and actually coinciding with the location of the resources to be protected. This selection explains the principle of the Biodiversity Vision itself, i.e. identification of future scenarios in which the area of the resource in question will be the same as the highest possible percentage of the landscape pertaining to it.
3. drafting of the Ecoregional Conservation Plan (ECP) and/or the Action Plans for individual Priority Actions. These are instruments which are very closely related to strategic planning.
4. assessment/monitoring of implementation For objectives regarding the conservation of biodiversity the indicators mainly point to the defragmentation of the ecological network, the increase of individuals belonging to the "focal species" and the actual coinciding of the perimeters of the Priority Areas with the vital areas of the species in question, based on the aforementioned principles of "resilience" thereof.[22]

[22] Summary from Arnofi, S. “Una metodologia per l’integrazione di PTCP e Processo ERC, utile per il superamento dell’ ‘approccio urbanistico’ alla conservazione della biodiversità” [A methodology for integration of PTCP and the ERC Process, applicable to superseding the "urbanistic approach" to biodiversity conservation]. In Istituto Nazionale di Urbanistica, Rapporto dal Territorio 2005 [National Urbanistic Institute, Territorial Report 2005] , Edizioni INU, Rome, 2006

The central position of Italy in the Mediterranean, between continental Europe and Africa, its proximity to the Balkans and the complex history of the two major islands, have made Italy a crossroads and overlapping point between species of vegetables and animals from differing origins.

Fig. 12 -the priority areas are the Alps Ecoregion and the central Mediterranean Ecoregion



The great divergence between altitudes and latitudes furthermore gives rise to a great diversity of climates, while the prior glacialisations contributed to creating islands of biodiversity throughout the entire peninsula.

Therefore Italy is actually part of two of the 200 ecoregions selected as priority regions: the Alps Ecoregion and the Central Mediterranean Ecoregion

For both, in-depth studies on the prospects for Ecoregional Conservation have been going on for years; in particular:

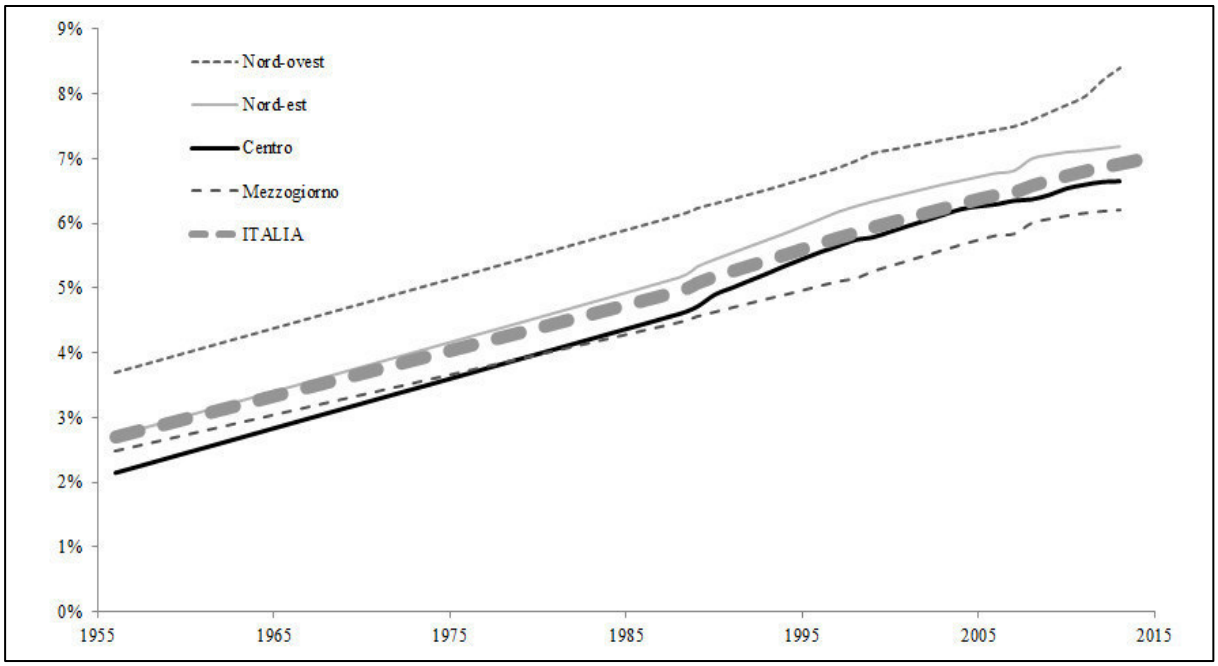
- for the Alps Ecoregion, the various trans-border countries are implementing a joint ecoregional conservation program named "Convention of the Alps";
- for the Central Mediterranean Ecoregion, a "Biodiversity Vision" has been compiled[23], to which significant contributions were made also by the National Strategy for Biodiversity.[24]

Fig. 12 below is the map of the priority areas covering both Ecoregions.

5.5 Macro-component 4. Subsoil erosion, withdrawal of resources and waste production

The data provided in the ISPRA Annual Report (regarding the geosphere) and in particular ***Fig. 13*** below, show the ongoing and worrying increase in ***eroded subsoil*** in Italy, due to the progressive occupation by homes, industrial, commercial and transport infrastructures, including in territories which are intrinsically predisposed to developing subsoil erosion and geomorphological-water imbalance phenomena.

Fig. 13 - Erosion of the soil in Italy in percentages



source: ISPRA Yearbook of Environmental Data

[23] WWF "La Conservazione della Biodiversità nell'Ecoregione Mediterraneo Centrale. Contributi al Piano Nazionale per la Biodiversità"[The Conservation of Biodiversity in the Central Mediterranean Ecoregion. Contributions to Biodiversity at the National Level]],(2006)

[24] See MATTM, Directorate for the Protection of Nature(DPN), "Ecoregioni: biodiversità e governo del territorio. La pianificazione d'area vasta come strumento di applicazione dell'approccio ecosistemico. Verso la Strategia Nazionale per la Biodiversità". [Ecoregions: biodiversity and territorial governance. The planning of vast areas as an instrument for application of the ecosytemic approach. Moving toward a national strategy for Biodiversity].

Generally, the percentage of eroded soil is higher in Northern Italy, while Southern Italy and the islands have slightly lower rates. The indicator nevertheless shows that the usage of artificial soil throughout all of Italy has increased continuously since WWII and consequently, removal of soil for other uses has been increasing as well.

When analysed on a *per capita* consumption basis, the situation is even more critical.

It has in fact increased constantly from 167 m^2 per inhabitant in the 1950s to 349 m^2 per inhabitant currently: the erosion of the soil is therefore not caused by a population increase. Furthermore, a significant portion of the increase has taken place from 1989 to date, when the basic framework of the infrastructures and production areas was for the most part already completed.

The further increase is therefore due to a large extent to the increase in the residential standards, the number of second homes and the large shopping centres.

Tab. 5.5 – Per capita *estimate of eroded subsoil in Italy*

Year	Land consumed (SQm/inh.)
year '50	167
1989	270
1996	301
1998	309
2006	334
2008	338
2013	349
Source: ISPRA	
Note: The values shown in the table have been recalculated based on the increase in sample points and the acquisition of new images. They are therefore more accurate than those previously published.	

Currently, 9.3% of the lowland areas (0-300 mt), 4.2% of the hilly areas, and 1.7% of the mountainous areas (altitude over 600 metres) are urbanized.

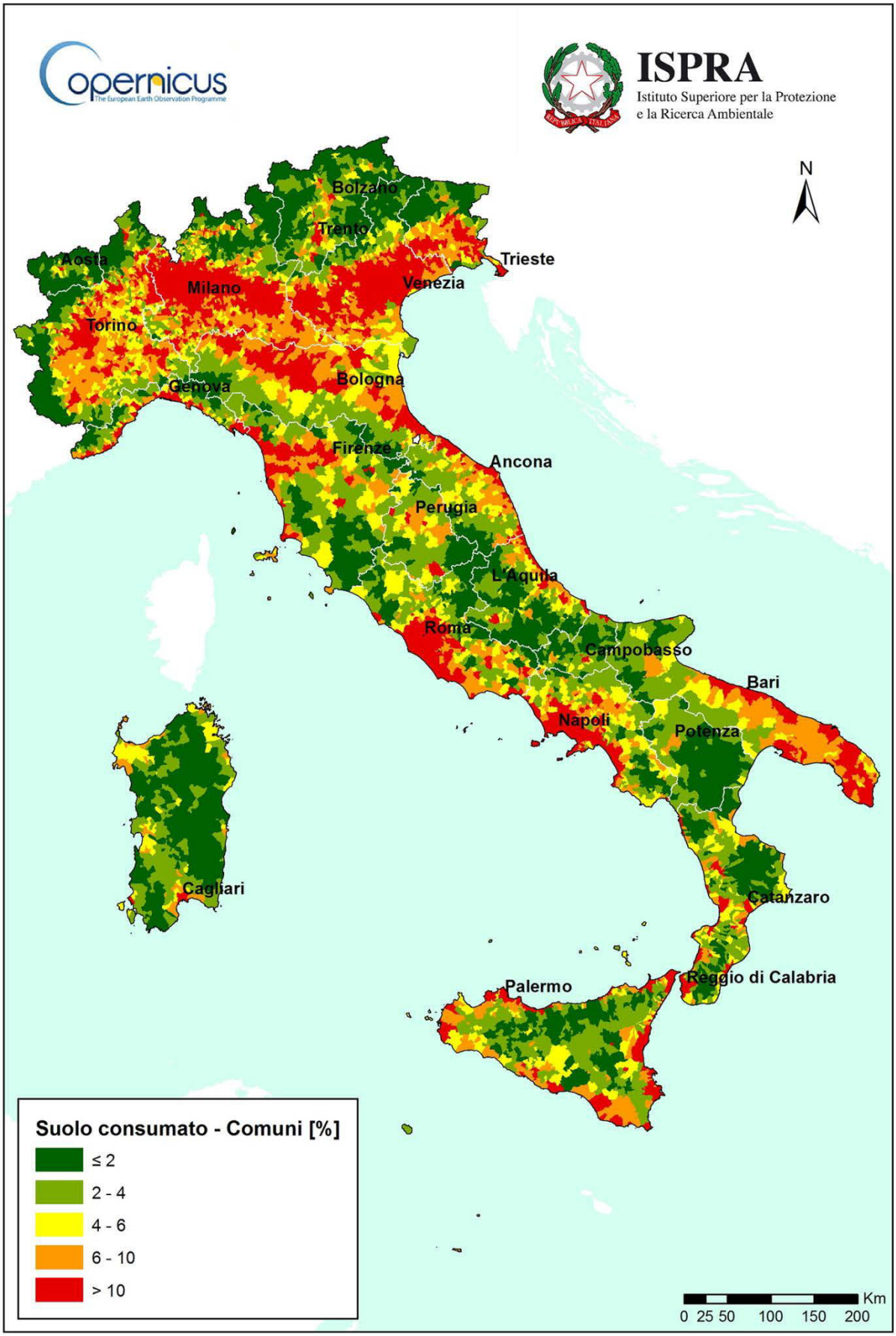
It is of particular interest to examine the percentage of soil sealing in Italy by municipality (2012 data) as shown in Fig. ***14***, which indicates that the higher values are found along the coastlines, in the lowlands and the foothill areas, such as in the Lombardy and Veneto regions.

Various municipalities in the provinces of Naples, Caserta. Milan and Turin exceed 50% and sometimes even 60% of erosion in the territory, mainly caused by the processes involved in expanding the respective provincial capitals within the corresponding territories so that they become metropolitan areas.

Delving deeper into the issue of ***soil erosion insofar as transport infrastructures***, useful information is provided by processing some data from the Ministry of Infrastructure and Transport (MIT) and the system for recording the uses of the soil *Corine Land Cover*(CLC),l which are contained in the ISPRA annual report.

The data used refers to the extension of the areas used for communication networks, based on the average widths of the routes shown in the highway code.

Fig. 14 -Percentage of soil sealing in Italy by municipality (2012)



The *Corine Land Cover* data for 2000 shows the national percentage of urbanized soil to be equal to 6.73%, or 20,266 km². Of these, approximately 29% (5,993 km) are occupied by highway and railway infrastructures (***Tab. 5.6***).

Tab. 5.6 -Extension of urbanized areas used for transport infrastructures and the Communications Network

	Communications, highway and railway network A	Urbanized areas and non-road infrastructures B	A+B	Values % compared to the total regional surface area
	ha * 100			%
Piedmont	488	1.096	1.585	6,24
Valle d'Aosta	26	47	73	2,24
Lombardy	417	2.491	2.908	12,19
Trentino Alto Adige	165	287	452	3,32
Veneto	358	1412	1.770	9,64
Friuli Venezia Giulia	121	529	650	8,24
Liguria	158	269	427	7,88
Emilia Romagna	431	1.038	1.469	6,64
Tuscany	413	937	1.350	5,87
Umbria	181	261	442	5,22
Marche	217	386	603	6,22
Lazio	398	995	1.393	8,09
Abruzzo	286	264	550	5,09
Molise	105	51	156	3,52
Campania	369	835	1.204	8,86
Apulia	422	855	1.277	6,59
Basilicata	192	145	338	3,38
Calabria	387	463	850	5,64
Sicily	511	1.248	1.759	6,84
Sardinia	348	663	1.011	4,2
ITALY	**5.993**	**14.272**	**20.266**	**6,73**

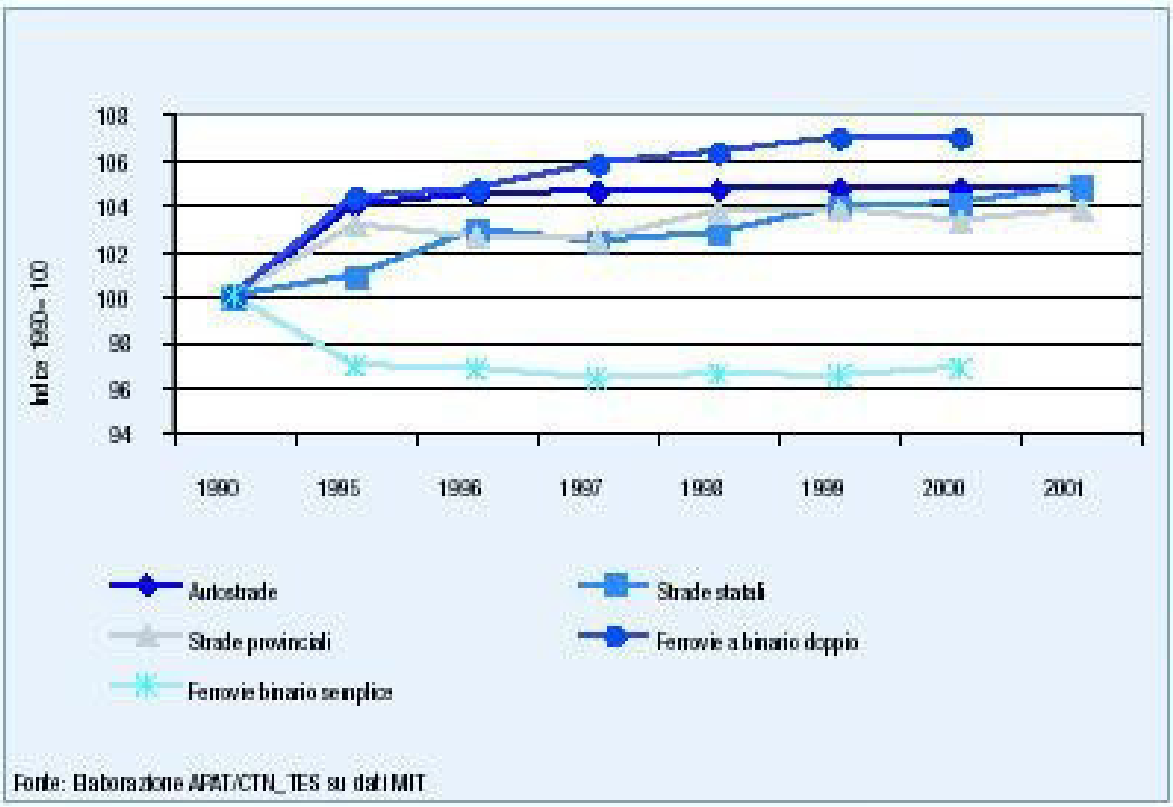
Source: Environmental Annual Report by ISPRA on data from ISTAT and MIT–2002 (roads and railways) and CLC 2000 (urbanized)

The ISPRA Annual Report observes how Sicily and the Piedmont, followed by Emilia Romagna and Apulia have the most service areas used for communications networks; conversely Lombardy, followed distantly by the Veneto, Sicily, Piedmont and Emilia Romagna, are under the highest pressure insofar as territorial urbanization. In absolute terms, Valle D'Aosta is the region with the lowest numbers insofar as urbanization, infrastructures and communication networks, with a percentage of built up or in any case soil-sealed territory of just 2.24%. Conversely, Lombardy and the Veneto region are characterized by high values, of 12.19% and 9.64% respectively.

Fig. 15 shows the surfaces occupied by the main communications networks for the period 1990-2001. As can be seen, the area occupied by double track railroads has increased, in terms of percentage as compared to 1990, more than the others (reaching approximately 107%). However, this is probably not just new soil erosion, but replacement of simple railway tracks with double railway tracks, as the concurrent and corresponding drop in the former during the same period indicates.

On the other hand, the surfaces used for highways increased rapidly up to 1995, at the same rate as the double track railways, to then stabilize at 105%. National roads have experienced the same level of growth to 2001, though this growth has not been linear.

Fig. 15 -Evolution of the surface area occupied by a transport networks in Italy



Source: ISPRA Environmental Annual Report

The issue of resource depletion can be examined using the overview provided by the ***Domestic Material Consumption*** (DMC) provided in the ISPRA Annual report (section on waste and materials flow).

It measures the apparent domestic consumption of material resources, estimated as equivalent to the quantity of materials which as at the end of the reference period (year) were transformed into waste (emissions into water, the air and the soil) or new stocks of the social - economic system (waste disposed of in controlled landfills; capital assets, such as buildings, infrastructures and machinery; durable consumer goods). The indicator is calculated as the result of the internal extraction of materials used - the quantity of biomass, non- energy producing minerals and fossil fuels that are extracted and sent for transformation - and the physical trade balance corresponding to the direct inputs of materials from abroad which the direct outputs of materials destined for export are subtracted from.

Domestic material consumption constitutes a part of a whole consisting of aggregated indicators based on the materials flow for the entire economy, which are useful for analysis of the social-economic metabolism and, in conjunction with the domestic budget, for the study of:

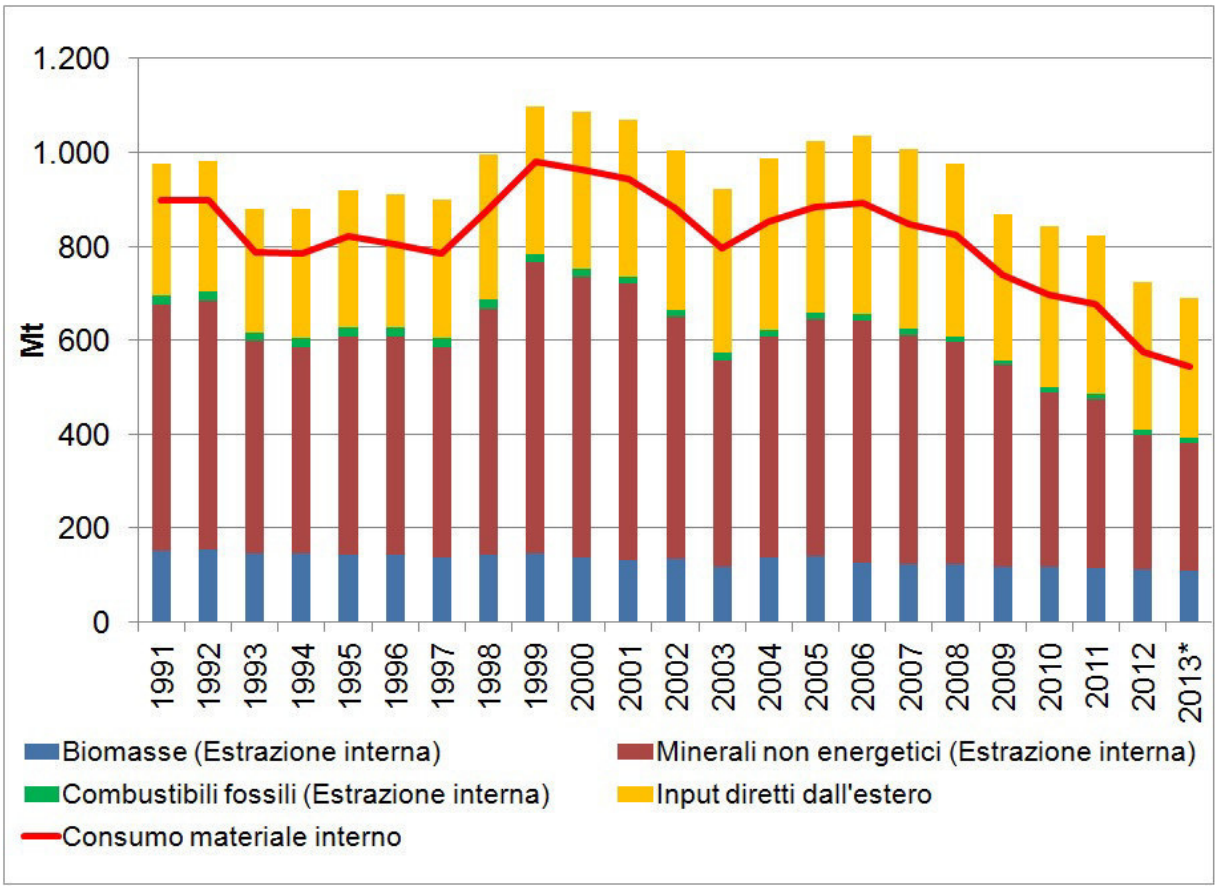
- production and sustainable consumption;
- de-coupling of environmental pressures and economic activity;
- resource productivity.

This approach transposes concepts and definitions used in the accounting for the national budget to the physical dimension of human activities (in particular those relative to the domestic anthropic system), providing an overall view of the phenomena that give rise to environmental pressures through knowledge of the quantities of the raw materials used in a specific social and economic system.

The ratio of gross national product and Domestic Material Consumption is currently used in Europe to monitor the productivity of resources as part of the system composed of sustainable development indicators.

In 2013, domestic material consumption in Italy was 542 million tonnes (provisional figure). The DMC shows an overall decrease of almost 40% from 1991 to 2013; during this period, there were two significant phases: the first, from 1991 to 2006 in which the indicator had a cyclical performance without showing a clear tendency; in the second, from 2006 to 2013 the indicator had returned to the initial levels and began to decrease on a constant basis (***Fig. 16***).

Fig. 16 - Domestic material consumption



Source: ISPRA Environmental Annual Report

With regard to the issue of ***waste***, in relation to the contents of the Infrastructure Annex and the transport policies in general, this can be examined in terms of ***reducing special hazardous waste originating from out of use vehicles*** that can somehow be connected to the transfer of passengers and merchandise through the highways and by rail or sea (motorways of the sea)

Any increase in the efficiency of these latter transport methods could indeed indirectly lead to less usage of public and private wheeled transport and therefore decrease the rate at which this type of waste is produced.

The ISPRA annual report (section on energy processes, transport subsection) shows how the domestic production of hazardous special waste from out of use vehicles in 2012 dropped by 30.4% compared to 2010 (1,671,153 tons) and 15.6% compared to 2011 (1,377,738 tons). It constitutes 12.4% of the total quantity of hazardous special waste produced in 2012, or 9.4 million tons.

In regard to the collection of used lead batteries, ***table 5.7*** below shows the very significant decrease between 2005 and 2009 (- 23.2%) and the further decrease between 2012 and 2013 (- 3.6%). The trend for the collection of used oils, which increased by 19.3% between the years 2000 and 2006, was

inverted between 2008 and 2012, while in 2013 there was a slight recovery. The regeneration of used lubricating oils has nevertheless allowed Italy to save almost Euro 3 billion in crude oil imports to date.

Tab. 5.7 -Collection of used lead batteries and oils in Italy

	2000	2005	2006	2007	2008
	t				
Used lead batteries	176,763	201,524	191,743	187,622	161,169
Used oil	187,751	219,931	224,000	219,413	203,621
	2009	**2010**	**2011**	**2012**	**2013**
	t				
Used lead batteries	154,661	155,706	147,744	191,804	184,962
Used oil	188,463	192,000	184,122	174,337	175,195
Source: Drafted by ISPRA based on data from COBAT (taken from 2000 to 2011), CDCNPA (from 2012-2013), COOU and MIT					
Key:					
[1] Includes oil used for cars, motorcycles, industrial and agricultural vehicles, naval vessels and industrial machinery.					

Other issues of interest regarding this environmental macro-component discussed in the ISPRA Annual Report, which are not examined here for the time being are:

- Coastal urbanization at 300 m from the coast
- Coasts artificialised with maritime and defence works
- Coastal defence works
- Destroyed sand which is dredged for filling
- Withdrawal of water for various uses

5.6 Macro-component 5. Landscape, cultural assets, geosites

The main reference regarding the ***protection of the landscape and the cultural assets is*** Legislative Decree 42, of 22 January 2004 " cultural assets and landscapes code" as amended, which attributes to the Ministry of Cultural Heritage and Activities and Tourism (MIBACT) the task of safeguarding, preserving and promoting the national cultural assets.

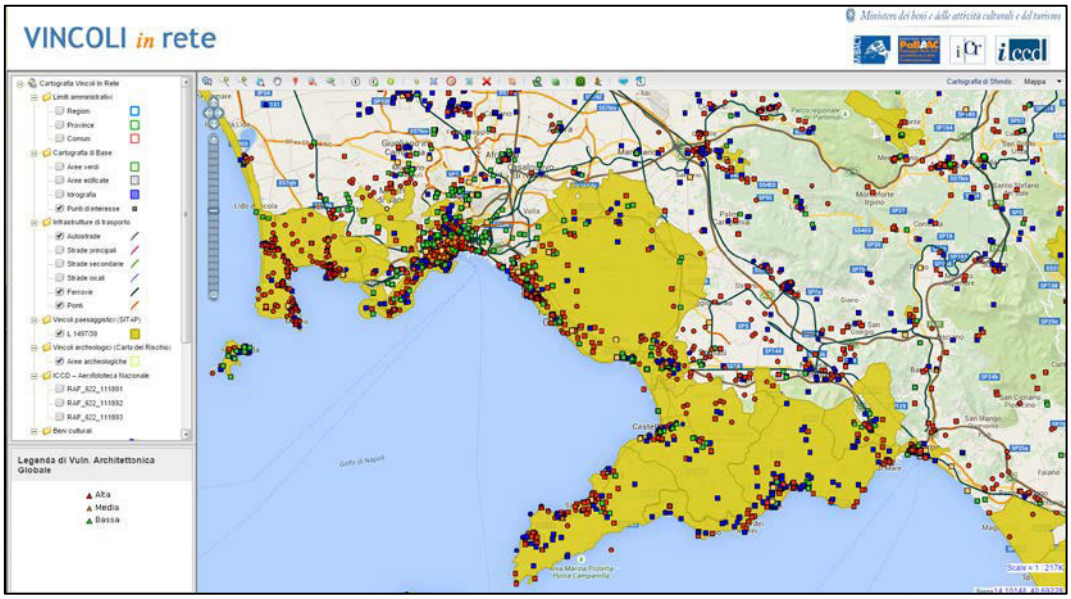
The list, illustration and delimitation of such assets can be viewed on the MIBACT website ("Vincoli in rete" - [network limitations]), with geo-referenced mapping, which makes it possible to estimate any physical interference using the Infrastructure Annex forecasts. The "vincoli in rete" project therefore provides access to information regarding architectural and archaeological cultural assets. It was created by the Higher Institute for Preservation and Restoration (Istituto Superiore per la Conservazione ed il Restauro) as part of a project for the development of services provided for internal and external

MIBACT users. The data necessary for implementing the project is currently available from Superintendencies, the Regional Directorates and, at the central level, within the following databases:

- Paper based information system regarding risk which contains all the restricting Decrees regarding immovable assets issued from 1909 to 2003 (laws 364/1909, 1089/1939, 490/1999) available at the Higher Institute for Conservation and Recovery
- Protected Assets Information System at the General Directorate for Landscapes, the Arts, Architecture and Contemporary Art;
- SITAP information system at the General Directorate for Landscapes, the Arts, Architecture and Contemporary Art;
- SIGEC Web information system at the Central Institute for Cataloguing and documentation.

Fig. 17 provides an example of the available interactive cartography themes.

Fig. 17 - MIBACT Digital interactive mapping (example)



http://vincoliinretegeo.beniculturali.it/vir/vir/vir.html

A further extremely significant reference, at the international level, is the ***"World Heritage List"*** published and continuously updated by UNESCO.

The list of heritage sites worldwide includes 1017 properties (of which 788 cultural assets, 197 natural, and 32 mixed) in 163 countries. Currently, Italy is the country with the highest number of sites (51) included in the World Heritage list: 47 cultural and 4 natural (***5.8***)

Tab. 5.8 Unesco World Heritage Sites in Italy

Year of Registration	SITE	TYPE
1979	Arte Rupestre della Val Camonica	Cultural
1980 (e 1990)	Centro storico di Roma, le proprietà extraterritoriali della Santa Sede nella città e San Paolo fuori le Mura *	Cultural
1980	La Chiesa e il convento Domenicano di Santa Maria delle Grazie e il 'Cenacolo' di Leonardo da Vinci	Cultural
1982	Centro storico di Firenze	Cultural
1987	Venezia e la sua Laguna	Cultural
1987	Piazza del Duomo a Pisa	Cultural

1990	Centro Storico di San Gimignano	Cultural
1993	1 Sassi e il Parco delle Chiese Rupestri di Matera	Cultural
1994	La città di Vicenza e le ville del Palladio in Veneto	Cultural
1995	Centro storico di Siena	Cultural
1995	Centro storico di Napoli	Cultural
1995	Crespi d'Adda	Cultural
1995	Ferrara, città del Rinascimento, e il Delta del Po	Cultural
1996	Castel del Monte	Cultural
1996	Trulli di Alberobello	Cultural
1996	Monumenti paleocristiani di Ravenna	cultural
1996	Centro storico di Pienza	cultural
1997	La Reggia di Caserta del XVIII con il Parco, l'acquedotto Vanvitelli e il Complesso di San Leucio	cultural
1997	Residenze Sabaude	cultural
1997	L'Orto botanico di Padova	cultural
1997	Portovenere, Cinque Terre e Isole (Palmaria, Tino e Tinetto)	cultural
1997	Modena: Cattedrale, Torre Civica e Piazza Grande	cultural
1997	Aree archeologiche di Pompei, Ercolano e Torre Annunziata	cultural
1997	Costiera Amalfitana	cultural
1997	Area Archeologica di Agrigento	cultural
1997	La Villa Romana del Casale di Piazza Armerina	cultural
1997	Villaggio Nuragico di Barumini	cultural
1998	Parco Nazionale del Cilento e Vallo di Diano, con i siti archeologici di Paestum, Velia e la Certosa di Padula	cultural
1998	Centro Storico di Urbino	cultural
1998	Zona Archeologica e Basilica Patriarcale di Aquileia	cultural
1999	Villa Adriana (Tivoli)	cultural
2000	Isole Eolie	natural
2000	Assisi, La Basilica di San Francesco e altri siti Francescani	cultural
2000	Città di Verona	cultural
2001	Villa d'Este (Tivoli)	cultural
2002	Le città tardo barocche della Val di Noto (sud-est della Sicilia)	cultural
2003	Sacri Monti del Piemonte e della Lombardia	cultural
2003	Monte San Giorgio *	natural
2004	Necropoli Etrusche di Cerveteri e Tarquinia	cultural
2004	Val d'Orcia	cultural
2005	Siracusa e le necropoli rupestri di Pantalica	cultural
2006	Genova, le Strade Nuove e il Sistema dei Palazzi dei Rolli	cultural
2008	Mantova e Sabbioneta	cultural
2008	La ferrovia retica nel paesaggio dell'Albula e del Bernina *	cultural
2009	Dolomiti	natural
2011	1 longobardi in Italia. Luoghi di potere	cultural
2011	Siti palafitticoli preistorici delle alpi *	cultural
2013	Ville medicee	cultural
2013	Monte Etna	natural
2014	Paesaggi vitivinicoli del Piemonte: Langhe-Roero e Monferrato	cultural
2015	Palermo arabo-normanna e le cattedrali di Cefalù e Monreale	cultural
***cross-border sites**		

http://www.unesco.it/cni/index.php/siti-italiani

For the purposes of this study, it is also interesting to consider the list of *tentative* sites proposed for inclusion in the World Heritage list, shown in ***table 5.9***.

Tab. 5.9 -list of Italian proposals for new UNESCO sites Latest revision: 28 November 2014

Sites:
Marittime-Mercantour(Maritime Alps) (15/04/2013)
Ivrea, industrial city of the 20th century (03/05/2012)
Parco Nazionale della Sila – Sila, gran bosco d'Italia (31/01/2012) [Sila National Park - Sila, the great forest of Italy]
Arab-Norman Palermo and the Cathedral Churches of Cefalù and Monreale (18/10/2010)
The Prosecco Hills of Conegliano and Valdobbiadene (05/10/2010)
Massif du Mont-Blanc (registration as a trans-border heritage with France and Switzerland) (30/01/2008)
Archipelago of La Maddalena and Islands of Bocche di Bonifacio (01/06/2006)
Bradyseism in the Flegrea Area (01/06/2006)
Cascata delle Marmore and Valnerina: Monastic sites and ancient hydrogeological reclamation works (01/06/2006)
Cattolica Monastery in Stilo and Basilian-Byzantine complexes (01/06/2006)
Citadel of Alessandria (01/06/2006)
Fortress Town of Palmanova (01/06/2006)
Hanbury botanical gardens (01/06/2006)
Historic Centre of Lucca (01/06/2006)
Historic Centre of Parma (01/06/2006)
Historic Centre of Pavia and Chartreuse (01/06/2006)
Island of Asinara (01/06/2006)
Karstic caves in prehistoric Apulia (01/06/2006)
Lake Maggiore and Lake D'Orta lakelands (01/06/2006)
Monte Sant' Angelo and the Via Sacra Langobardorum (01/06/2006)
Mothia Island and Lilibeo: The Phoenician-Punic Civilization in Italy (01/06/2006)
Orvieto (01/06/2006)
Pelagos: The Cetacean Sanctuary (01/06/2006)
Ponds in the Bay of Oristano and the Sinis Peninsula island of Mal di Ventre (01/06/2006)
Romanesque Cathedrals in Puglia (01/06/2006)
Salento and the "Barocco Leccese" (01/06/2006)
Scrovegni's Chapel (01/06/2006)
Sulcis Iglesiente (01/06/2006)
Taormina and Isola Bella (01/06/2006)
The Aniene valley and Villa Gregoriana in Tivoli (01/06/2006)
The city of Bergamo (01/06/2006)
The Lower Palaeolithic Palaeosurfaces at Isernia-La Pineta and Notarchirico (01/06/2006)
The Marble Basin of Carrara (01/06/2006)
The Murge of Altamura (01/06/2006)
The Porticoes of Bologna (01/06/2006)
The Transhumance: The Royal Shepherd's Track (01/06/2006)
Via Appia "Regina Viarum" (01/06/2006)

Villas of the Papal Nobility (01/06/2006)
Volterra: Historical City and Cultural Landscape (01/06/2006)

http://www.unesco.it/cni/index.php/siti-italiani

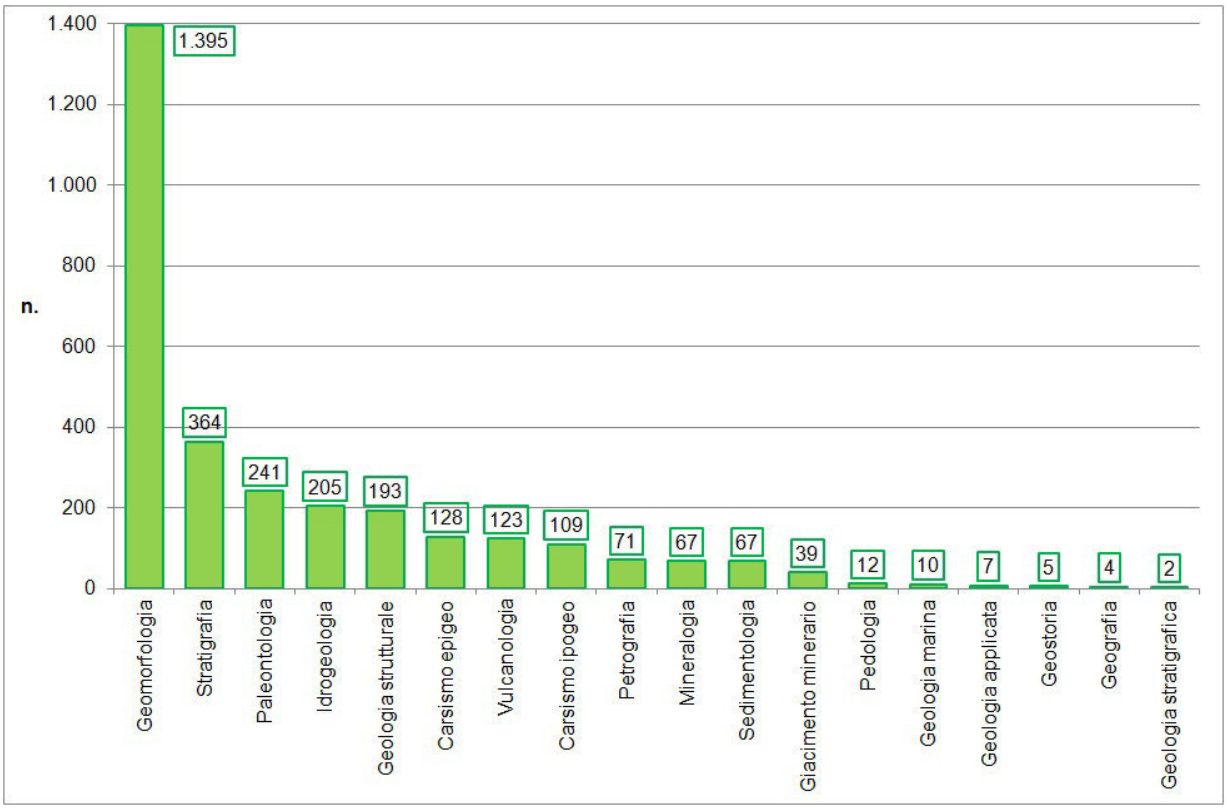
Geological interest sites, the preservation of which is significant on account of the reconstruction of the geological area in which they are located, should also be counted among cultural and landscape assets as a "geological-cultural heritage", including geosites.

The Cultural Assets and Landscape Code (Leg. Decree 42/2004 as amended) is fully applicable to the above, as it is identified as being among the assets to be protected and promoted due to the public interest they generate "*immoveable things having conspicuous features of natural beauty and geological singularity, the villas, gardens and parks, which are not protected pursuant to the provisions of the second part of this code, which are distinguished due to their uncommon beauty; the complex of immoveable things that constitute a characteristic whole of aesthetic and traditional value; the panoramic beauties viewed as a framework of units comprising a whole, and therefore also those panoramas or vistas from whence this beauty is enjoyed.*"

In particular, it should also be considered that this formulation is important because, in addition to the landscapes themselves, it also includes the areas from where they can be viewed and enjoyed among the areas to be protected. In fact, geosites are generally distinguished as "area geosites" and "panorama geosites", the latter referring to the panoramic view points and vistas from whence one can enjoy the particular geo-morphological configuration which is of interest.

The value of the cultural geological heritage is furthermore recognised: in the 1972 UNESCO Convention on the Protection of World Cultural and Natural Heritage (Paris) and the Framework Law on protected areas (Law 394/1991), and the European Landscape Convention, Florence 2000 (ratified by law 14/2006).

Fig. 18 - geosites by type



Source: ISPRA Environmental Annual Report

With regard to the geosites as considered above, the ISPRA Annual Report elaborates on some data regarding Italian geosites that have been identified, described and inventoried in ISPRA's Geosite data base. For example, the Annual Report provides a graphic representation of the geosites by type, and a chart containing the geosites by Region, indicating those that are already located in protected areas (see ***Fig. 18*** and ***Tab. 5.10***), respectively.

Tab. 5.10 - Number of geosites by region- geosites in protected areas

Region	GEOSITES			
	no.	in protected areas		
		SPA	SCI	AP
Piedmont	241	93	80	52
Valle d'Aosta*	50	21	17	10
Liguria	331	31	153	51
Lombardy	43	13	13	9
Trentino-Alto Adige*	179	75	99	84
Veneto	167	114	117	103
Friuli Venezia Giulia*	38	22	22	23
Emilia-Romagna	159	43	80	38
Tuscany	91	24	51	40
Umbria*	37	8	21	11
Marche	119	62	64	43
Lazio	686	282	131	140
Abruzzo	146	73	73	86
Molise	61	18	30	4
Campania	49	23	31	39
Apulia	39	18	20	15
Basilicata*	118	25	18	40
Calabria	40	13	13	18
Sicily	207	55	94	92
Sardinia	299	51	122	24
total	***3,100***	***1,064***	***1,249***	**921**
Source: ISPRA				
Key: SPA=Special Protection Areas; SCI=Sites of Community Importance; PA=Protected Areas				
Note: Since the aerials of SPAs, SCIs and Protected Areas can overlap, a geosite may fall in one or more types of protected area: accordingly, the number of geosites by type of protected area is not the total number of recorded geosites.				

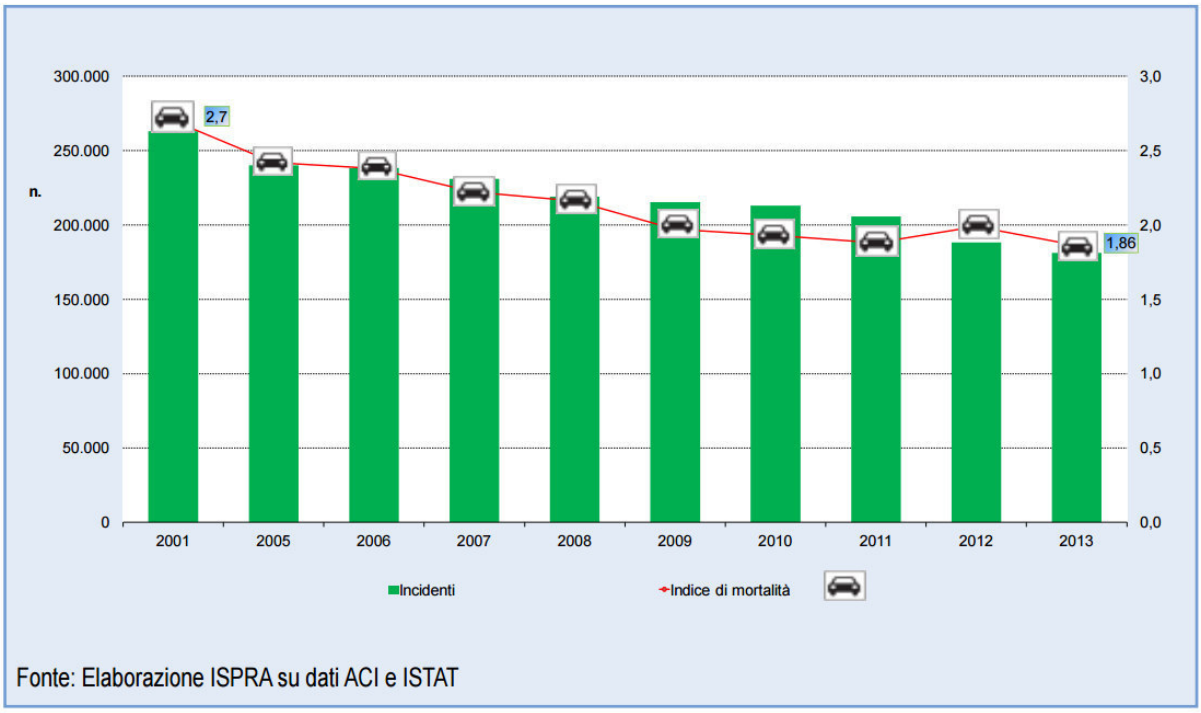
As a comment to this latter chart, ISPRA observes that a little more than 30% of the inventoried geosites is located inside protected areas and Natura 2000 network sites, where, due to the lack of a specific law for their protection, they are covered by the legal restrictions applicable to the area.

5.7 Macro-component 6. Population, human health, quality of the urban environment

This environmental macro-component, being the object of the valuation, focuses on the effects of transport infrastructures on the anthropic matrix, such as road safety, or environmental implications caused by an increase in the flow of traffic on the network in terms of atmospheric pollution or physical agents (acoustic pollution, vibrations, optical or light pollution), particularly in urban environments.

The ISPRA Annual Report shows how an improvement in ***road safety*** made possible a constant reduction in the number of deaths per road accident, the number of such accidents and the persons injured. Between 2001 and 2013, the highway accidents involving harm to persons did in fact decrease by 31.1%, from 263,100 to 181.227, with a 52.3% decrease in deaths (from 7,096 to 3,385) and the percentage of injured persons dropped by 31.0% (from 373,286 to 257,421) (***Fig 19***).

Fig. 19 - Highway accidents in Italy and mortality indices



From 2004-2012, there were 1,209 serious railway accidents, which resulted in 706 deaths and 626 injuries. In 2012, there were 123 accidents which resulted in 86 deaths and 64 injuries. For transportation by sea, there was an increase of 22.2% in the number of accidents (from 59 to 72), from 2011 to 2012. From 2012 to 2013, there was an increase in accidents related to air travel (from 36 to 48) and the number of deaths (from 7 to 8).

Regarding the health problems caused to the population residing in urban areas by ***atmospheric pollution*** from automobile traffic, we reiterate that while carbon dioxide (CO2) is not harmful to human health, other products of the incomplete combustion processes that take place in automobile and air-plane engines are. Among these: 90% of the carbon monoxide (CO) emissions, 100% of the lead

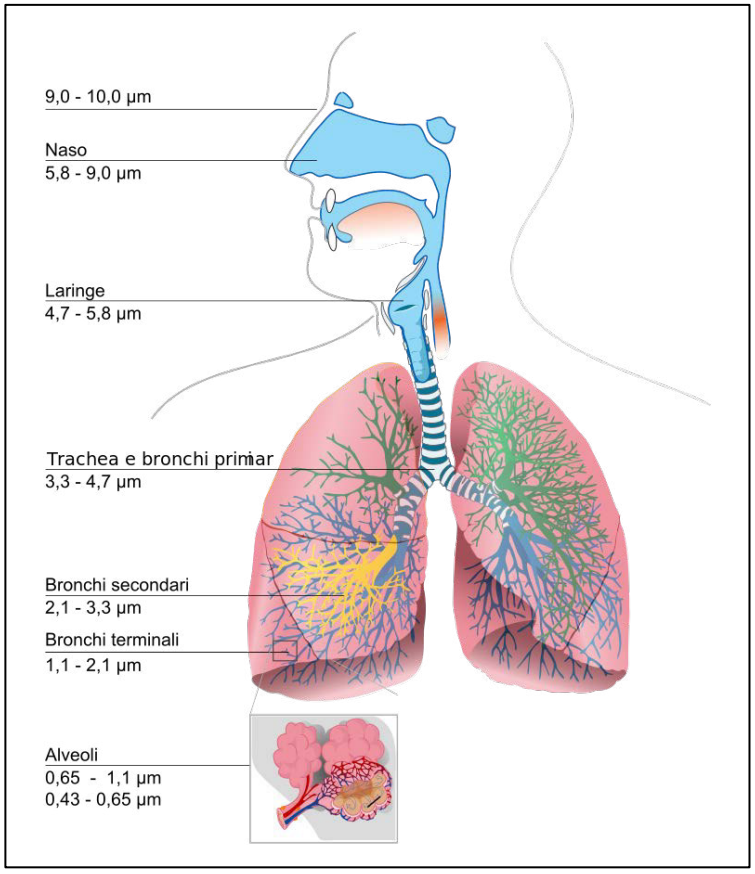
emissions (though the absolute value has now decreased greatly), 63% of the nitrogen oxides (NOx), of which approximately half are due to road transport.

Among the various nitrogen oxides, NO2 is the most significant insofar as human health is concerned; this gas is 4 times more dangerous than NO, though the latter is able to easily oxidise into NO2 once it is in the air. In summary, the acute effects of NO2 on the respiratory apparatus include exacerbation of chronic inflammatory diseases affecting the respiratory tracts, such as chronic bronchitis and asthma, and decreased pulmonary function. More recently, the possible damage that NO2 does to the cardio-vascular system has been defined, including its potential to induce ischemic cardiomyopathy, heart failure and cardiac arrhythmias. The long term effects include cellular and tissue related alterations of the lungs, and increased susceptibility to bacterial and viral pulmonary infections.

Nitrogen dioxide is therefore a widespread pollutant with adverse effects on human health which, together with carbon monoxide, contribute to creating the phenomena of photochemical smog (which is the precursor of secondary pollutants such as tropospheric ozone and secondary fine particulate matter), eutrophication and acid rain.

Dusts, or particulate matter ("PM") also cause a problem, which is tracked by a number that indicates the maximum diameter of the suspended particulate matter. For example, PM10 means all the particulate matter with a diameter less than 10 µm, so that PM2.5 is a sub-total of PM10, which in turn is a subtotal of the coarse particulate matter, etc. In particular (see ***fig. 20***):

Fig. 20 - Penetration of dusts into the respiratory apparatus.



- *coarse particulate matter* is an airborne particulate matter which is larger than 10 µm, unable to enter the respiratory tract through the larynx, except to a small degree.
- PM10 is a particulate matter formed of particles that are smaller than 10 µm (that is, they are smaller than one hundredth of a millimetre), which is a powder that can be inhaled and therefore it is able to penetrate into the upper respiratory tract (nose and larynx). Particles from approximately 5 and 2.5 µm are initially deposited on to the bronchioli.
- PM2.5 is a fine particulate with a diameter of less than 2.5 µm (one quarter of a hundredth of a millimetre), it is a thoracic powder which is therefore able to penetrate deeply into the lungs, especially when breathing through the mouth.

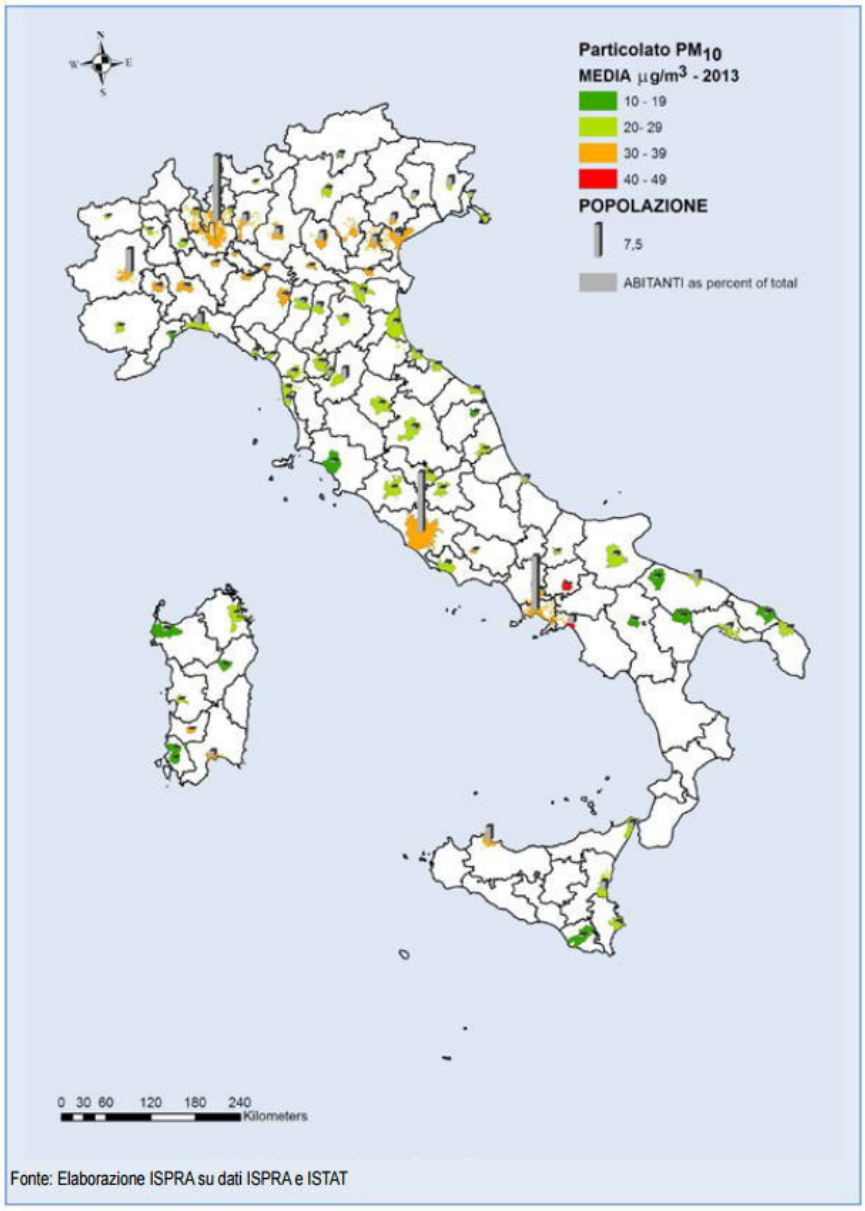
In addition to carbon monoxide (CO) carbon dioxide (NO2) and other nitrogen oxides (NOx), other noxious emissions must also be taken under consideration, as indicated in Legislative Decree 155/2010 "Implementation of Directive 2008/50/EC "on ambient air quality and cleaner air for Europe"; these are sulphur dioxide (SO2), benzene, lead, arsenic, cadmium, nickel, benzo(a)pyrene and ozone.

ISPRA provides indicators on the ambient air quality regarding these pollutants. Of particular interest are the indicators from the ***exposure of the population to outdoor atmospheric pollutants***, in particular PM_{10} and $PM_{2.5}$. The assessment of the trend from 2006 to 2013 in relation to the average annual concentration of PM_{10} which urban populations are exposed to is relatively positive (***Tab. 5.11***).

Tab. 5.11 - Number of municipalities/conurbations and percentage of the population exposed to PM_{10} per level of annual average concentration

Exposure to average annual concentration levels (c) (µg/m^3)	Municipalities/Agglomerates	Population exposed	
	no.		%
0<c≤20	17	1,058,438	4,4
20<c≤30	48	10,746.072	44.2
30<c≤40	20	12,002.604	49.4
40<c≤50	2	491,452	2.0
c>50	0	0	0.0
total	**87**	24,298.566	100.0
Source: Drafted by ISPRA based on ARPA/APPA and ISTAT data			

Fig. 21 – PM_{10}: average annual concentration and population residing in cities and conurbations (2013)



Tab. 5.12 - Number of municipalities/conurbations and percentage of the population exposed to $PM_{2.5}$ per level of annual average concentration

Exposure to average annual concentration levels (c) (µg/m^3)	Municipalities/Agglomerates	Population exposed	
	no.		%
0<c≤10	2	735,979	3.4
10<c≤25	51	14,042,717	65.4
25<c≤35	10	6,708,645	31.2
c>35	0	0	0,0
total	**63**	**21,487,341**	100,0
Source: Drafted by ISPRA based on ARPA/APPA and ISTAT data			

Fig. 22 – $PM_{2.5}$: average annual concentration and population residing in cities and conurbations (2013)

The assessment of the current status of the national average exposure indicator, which is moreover lower than the limits set by the law of 40 µg/m3 (except for Benevento and Salerno, see ***Fig. 21***), is nevertheless critical if compared to the threshold value for protection of health of 20 µg/m3 recommended by the World Health Organization, with 76 provincial figures exceeding this threshold.

Regarding the average annual concentration of $PM_{2.5}$ which urban populations are potentially exposed to, the assessment of the current state of the average national exposure is rather good (***Tab. 5.12***), since most of the stations (all less than 10) record data below the legal limits of 25 µg/m3. However, the situation does present some significant critical issues when assessed in relation to the threshold value for the protection of health of 10 µg/m3, recommended by the World Health Organization (61 of 63 stations).

The most critical situations, this time, are in the large cities of the Po Valley, particularly in the Veneto, Lombardy and Piedmont (***Fig. 22***). The ISPRA Annual report also features findings in urban areas which refer to other pollutants, such as carbon dioxide (NO_2) and ozone (O_3).

Regarding the ***exposure of the population to traffic noise***, we reiterate that with Legislative Decree 194/2005 Italy implemented Directive 2002/49/EC (*The Environmental Noise Directive* - END) relating to the assessment and management of environmental noise so as to avoid, prevent or reduce the harmful effects of noise.

Tab. 5.13 - Population exposed to noise emitted by means of transport, intermittent noise and means of transport (2014)

Sound levels dBA	Roads[a]	Railways[b]	Airports[c]
	Population exposed[d]		
L_{den} 50÷54	576,500	400	0
L_{den} 55÷59	1,638,400	403,300	122,500
L_{den} 60÷64	1,489,000	264,700	27,300
L_{den} 65÷69	1,291,600	207,100	16,000
L_{den} 70÷74	580,700	154,800	600
L_{den} ≥75	221,900	102,200	200
L_{night} 45÷49	432,500	100	0
L_{night} 50÷54	1,531,400	364,100	27,000
L_{night} 55÷59	1,458,500	247,300	7,200
L_{night} 60÷64	921,300	179,000	900
L_{night} 65÷69	292,800	128,000	100
L_{night} ≥75	86,300	76,500	0
Source: Drafted by ISPRA based on EIONET data			
Key:			

[a] *data on* major road routes *having reported acoustic mapping; the exposed population in agglomerations is not considered* [b] ***data on major railway routes having reported acoustic mapping; the exposed population in agglomerations is not considered*** [c] *data on major airports having reported acoustic mapping; the exposed population in agglomerations is not considered* [d] data rounded to the nearest hundred
NOTE
Major road routes*: road infrastructure on which more than 3,000,000 vehicles travel every year* Major railway routes*: railway infrastructure on which more than 30,000 trains travel every year* Major airport*: civilian or military airport open to civilian traffic through which there are more than 50,000 flights per year*

The END Directive had, among other things, set 30 June 2007 as the deadline for the preparation of noise maps for roads with more than 6,000,000 vehicle passages per year, railway infrastructures with more than 60,000 train passages per year per year and major airports with more than 50,000 movements per year. It set 30 June 2012 and thereafter, every 5 years, as the deadline for presentation of noise maps concerning road axes with more than 3,000,000 vehicle passages a year and railway axes with more than 30,000 train passages a year.

Tab. 5.13 contains the results of this noise mapping of the transport infrastructures, indicating the exposed population that resides outside conurbations, the noise produced by road traffic (which is the main source of noise, in absolute terms), railways and air transport. Aggregated at the national level, these values refer to the population exposed to noise induced by infrastructures, the operators of which have complied with the obligations ensuing from Directive 2002/49/EC.

Among other physical agents that are applicable to this environmental macro-component, which are further examined in Chp. 8, we note:

- vibrations
- light and optical pollution
- effects on the local socio-economic system.

6 Environmental protection and transport policy objectives established at international, EU or national levels and their integration in the AI

6.1 An external coherence analysis intrinsic to the impact assessment matrix

This part of the Environmental Report examines the following point of Annex VI: *e) environmental protection objectives established at international, EU or member state level, relevant to the plan or programme and the way in which said objectives and any environmental considerations have been considered during its preparation;*

As indicated in Chp. 4, which you are referred to for further information, the Valuation Model adopted is not limited to verifying the coherence of the Infrastructure Annex contents with the Programme Reference Framework (QdRP), *but also directly creates the System for the valuation reference objectives,* which are, in this case, the six Specific Environmental Objectives set forth in the columns of the Assessment Matrix (see Chp. 7).

The formulation of the Specific Environmental Objectives is based on an expeditious analysis of international, European and national policy, planning and programme documents which are listed and illustrated in Annex 1 to this Report, and refer to the six ***environmental macro-components*** identified in Chp. 5. With reference to the table in Annex 1 listing the documents that were examined, which also contains a summary of the main contents, we will describe below how they have been summarised into the six Specific Environmental Objectives (OAS) used as a reference for the assessment.

The purpose of this description is two-fold: on the one hand, to explicitly justify the application of the particular OAS identified in the valuation model and, on the other hand, not to lose sight of the richness of the themes, nuances and considerations contained in the QdRP by using this formulation of the environmental objective, while ensuring there is an outline able to act as a guideline for the assessments made in the ***Assessment Dossiers.***

The integration of various "classic" environmental components in forming a Specific Environmental Objective OAS was carried out on account of their close relationship with each other, especially when this can be corroborated by estimating the impacts on the basis of similar data, indicators and considerations, as further specified in Chapters 5 and 8.

The six Specific Environmental Objectives considered are:

OAS 1 Increasing air quality and energy savings and reducing climate altering gases;

OAS 2 Increasing the resilience to climate change and other calamities, including by reducing the hydro-geological risk;

OAS 3 Protecting natural areas and biodiversity, including marine biodiversity;

OAS 4 Reducing soil erosion, depletion of resources and waste production;

OAS 5 Protecting the landscape and cultural heritage;

OAS 6 Improving the living conditions and health of the population, including by increasing the quality of the urban environment.

6.2 OAS 1. Increasing air quality and energy savings and reducing climate altering gases;

The specific references to European policy in this area are:

- **A "Clean Air" for Europe programme**[25], based on the figures proposed by the 2005 thematic strategy on atmospheric pollution, with the objective of reaching "air quality levels that do not cause risk to or have significant negative impacts on human health and the environment". The targets set for 2020 are:
  - reduce the concentration of $PM_{2.5}$ by 75%;
  - reduce the concentration of ozone by 60% of what is technically feasible;
  - reduce the dangers to the natural environment due to acidification and eutrophication by 55% of what is technically possible.

  To achieve these objectives, it will be necessary to decrease, compared to the 2000 figures: SO2 emissions by 82%, NOx emissions by 60%, COV emissions by 51%, ammonium emissions by 27% and primary $PM_{2.5}$ emissions by 59%.
- The **7th Environment Action Programme**[26], which, in terms of air quality set as its objective "to turn the Union into a resource-efficient, green and competitive low-carbon economy," so that by 2020, air pollution and its impacts on ecosystems and biodiversity are further reduced with the long-term aim of not exceeding critical loads and levels;
- The **New EU Sustainable Development Strategy**[27], which pursues the general objective of intensifying the environmental measures for the protection of biodiversity, seas and oceans and other natural resources.
- the **national Environmental Action Strategy** which lists the aforementioned European Strategy for Sustainable Development[28], according to principles which, insofar as transportation is concerned, are aimed toward reducing waste, increasing the useful life of goods, developing local markets and promoting on-site manufacturing;
- The **national plan for decreasing the emission of gases responsible for global warming** (CIPE resolution update), with the objective of ensuring the country will comply with the annual binding objectives regarding emissions pursuant to decision no. 406/2009/EC of the European Parliament and Council of 23 April 2009 and the steps set for the Communication of the Commission COM (2011)112, which provides for reductions of 25% in 2020, 40% in 2030, 60% in 2040 and 80% in 2050, compared to 1990 levels.
- The **National Reform Programme 2014** which aims to:
  - redesign an organic environmental taxation that is able to preserve and guarantee environmental equilibrium and ensure that the Kyoto objective regarding the decrease of carbon emissions is reached;
  - reduce greenhouse gas emissions in line with the objectives of the Europe 2020 strategy;

[25] COM(2013) 918 final.

[26] Decision no. 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet'.

[27] The Communication "Mainstreaming sustainable development into EU policies : 2009 Review of the European Union Strategy for Sustainable Development".

[28] MATTM - "Environmental action strategy for sustainable development in Italy"- Approved by CIPE [Comitato interministeriale per la programmazione economica - Inter-ministerial committee for economic planning] on 2 August 2002 with Resolution no. 57

- increase the percentage of energy produced from renewable sources, in line with the objectives of the Europe 2020 strategy;
- increase energy efficiency in the end uses of energy.

The *target* of reducing the carbon emissions by 13% in 2020, compared to 2005 levels, is of particular interest in the case in question.

As indicated in par. 5.3, the issue of improving air quality and in particular the reduction of carbon monoxide and climate altering gases which are due to the mobility component through modal re-balancing is by now a constant objective of transport policies.

The following clearly exemplify this:

- the same **2013 Regulation for the development of the TEN**[29] networks, which hinges on pursuing the modal re-balancing objectives for highways, railways and sea transport, especially insofar as the transportation of merchandise is concerned, which provides, among the TEN network objectives (art. 4), that it demonstrate the "European added value"[30]by contributing to sustainable development objectives through:

  i) development of all transport modes in a manner consistent with ensuring transport that is sustainable and economically efficient in the long term;

  ii) contribution to the objectives of low greenhouse gas emissions, low-carbon and clean transport, fuel security, reduction of external costs and environmental protection;

  (iii) promotion of low-carbon transport with the aim of achieving by 2050 a significant reduction in CO_2 emissions, in line with the relevant Union CO_2 reduction targets;

- the ten goals of the **White Paper on Transport**[31], in particular objectives 3, 4 and 6 (***Tab. 6.1***);

Tab. 6.1 Ten Goals for a competitive and resource efficient transport system: benchmarks for achieving the 60% GHG emission reduction target

Developing and deploying new and sustainable fuels and propulsion systems
1)Halve the use of 'conventionally-fuelled' cars in urban transport by 2030; phase them out in cities by 2050; achieve essentially CO2-free city logistics in major urban centres by 2030.
2)Low-carbon sustainable fuels in aviation to reach 40% by 2050; also by 2050 reduce EU CO2 emissions from maritime bunker fuels by 40% (if feasible 50%).
Optimising the performance of multimodal logistic chains, including by making greater use of more energy-efficient modes.
3) 30% of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030 This percentage should reach more than 50% by 2050, facilitated by efficient and green freight corridors. To meet

[29] Regulation of the European Parliament and of the Council 1315/2013/EU "Development of a TransEuropean transport network"... (op.cit).

[30] Art, 3.d) the "European value added" is defined as the "the value of a project which, in addition to the potential value for the respective Member State alone, leads to a significant improvement of either transport connections or transport flows between the Member States which can be demonstrated by reference to improvements in efficiency, sustainability, competitiveness or cohesion, in line with the objectives set out in Article 4";

[31] White Paper "Roadmap to a Single European Transport Area — Towards a competitive and resource efficient transport system" Brussels, 8.3.2011 COM(2011) 144 final

this goal will also require appropriate infrastructure to be developed.
4) By 2050, complete a European high-speed rail network. Triple the length of the existing high-speed rail network by 2030 and maintain a dense railway network in all Member States. By 2050 the majority of medium-distance passenger transport should go by rail.
5) A fully functional and EU-wide multimodal TEN-T 'core network' by 2030, with a high quality and capacity network by 2050 and a corresponding set of information services.
6) By 2050, connect all core network airports to the rail network, preferably high-speed; ensure that all core seaports are sufficiently connected to the rail freight and, where possible, inland waterway system.
Increasing the efficiency of transport and of infrastructure use with information systems and market-based incentives
7) Deployment of the modernised air traffic management infrastructure (SESAR [12]) in Europe by 2020 and completion of the European Common Aviation Area. Deployment of equivalent land and waterborne transport management systems (ERTMS, ITS, SSN and LRIT, RIS). Deployment of the European Global Navigation Satellite System (Galileo).
8) By 2020, establish the framework for a European multimodal transport information, management and payment system.
9) By 2050, move close to zero fatalities in road transport. In line with this goal, the EU aims at halving road casualties by 2020. Make sure that the EU is a world leader in safety and security of transport in all modes of transport.
10) Move towards full application of "user pays" and "polluter pays" principles and private sector engagement to eliminate distortions, including harmful subsidies, generate revenues and ensure financing for future transport investments.

Source: Roadmap to a Single European Transport Area

6.3 OAS 2 Increase resilience to climate change and other disasters, including reducing hydrogeological risk

European environmental policies have recently focused on the issue of climate change, in particular those policies which aim to increase general awareness of the issue using the institutional power of the SEA (Strategic Environmental Assessment) and the terms and conditions for the funding of national mobility networks.

Indeed, a **Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment**[32]was recently published while the aforementioned **2013 Regulation for development of the TEN-T network** explicitly provides that:

- under art. 5 "Resource-efficient network", that the TransEuropean transport network shall be planned, developed and operated in a resource-efficient way, through: (...)the assessment of strategic environmental impacts, with the establishment of appropriate plans and programmes and of impacts on mitigation of the effects of climate change; (...) g) adequate consideration of the vulnerability of transport infrastructure with regard to a changing climate as well as natural or man-made disasters, with a view to addressing those challenges;
- under art. 35 "Resilience of infrastructure to climate change and environmental disasters" that "During infrastructure planning, Member States shall give due consideration to improving resilience to climate change and to environmental disasters."

[32] EU, "Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment", 2013

In particular, European policies on climate change are developed along two main lines:

- the first, which is of a more traditional nature, aims to reduce climate altering gases (discussed on the preceding paragraph);
- the second, complementary to the first, which realistically assesses that the situation is by now partially compromised, and therefore focuses on the adaptation of the anthropic environment to climate changes, in an attempt to reduce the impact of the ever-increasing phenomena in terms of victims, material damages and biodiversity.

This close interrelation which effectively exists between adaptation to climate changes and the protection of biodiversity furthermore constitutes the basis of the two issues in the above-mentioned Guidelines.

Given the mainly hydro-geological nature of the specific impacts addressed in the next paragraph which are attributable to transport infrastructures or which have an impact on the latter, the issue of climate change has been correlated with the issue of hydraulic, geomorphological and seismic defence of the ground and the protection of the water resources from depletion, so as to avoid systematic redundancies.

With regard to this latter environmental component, the main reference documents are:

- the "**Thematic strategy for soil protection**"[33], the main objective of which is to prevent further erosion of the soil and to maintain the functions when:
  - soil is used and its functions are exploited, action has to be taken on soil use and management patterns;
  - soil acts as a sink/receptor of the effects of human activities or environmental phenomena; in this case action has to be taken at source;
  - restoring degraded soils to a level of functionality consistent at least with current and intended use, thus also considering the cost implications of the restoration of soil.
- **Directive 2007/60/EC** of the European Parliament and the European Council of 23 October 2007 on the assessment and management of flood risks, the objectives of which are to:
  - create a uniform reference framework at the European level to reduce and manage the risks that floods pose to human health, the environment, cultural heritage, economic activity and infrastructures;
  - establish, at the district or management unit level, maps identifying at-risk areas and flood risk maps;
  - establish flood risk management plans at the district or management unit level.

  Among the aims of the Directive we reiterate:

  - By 2011: - preliminary assessment of flood risk;
  - By 2013: - mapping of danger and flood risk;
  - By 2015: - establishment and implementation of flood risk management plans.
- The aforementioned **Seventh Environmental Action Programme**, the objectives of which, in terms of soil protection and natural risks are:
  - to protect, conserve and enhance the Union's natural capital;
  - to turn the Union into a resource-efficient, green, and competitive low-carbon economy.

[33] Communication of the Commission (COM/2006/231)

As can be readily observed, these are broad objectives which are also applicable insofar as increasing the resilience of the environment to climate change, and in relation to which any responsibilities incumbent upon transport infrastructures are those which correspond to the above-mentioned factors.

The following additional documents were also taken under consideration:

- the Communication "**EU Strategy on adaptation to climate change**";[34] which aims to minimise risks from climate change, protect the health and well-being and property of the population and preserve the natural heritage, maintain or improve the adaptation capacity of natural, social and economic systems and take advantage of any opportunities that could arise from the adaptation actions". The following objectives are added concerning the transport sector:
  - focusing on optimising the existing networks as opposed to constructing new and large projects and carrying out a weighted assessment of the efficiency standards of those structures as compared to their functionality;
  - constructing new infrastructures a*ccording to climate proof criteria*, so as to adapt to future changes.
- The document "**Europa 2020**";
- **White Paper "Adapting to climate change: towards a European Framework for action**"[35];
- The **Report published by the European Environmental Agency - "Urban adaptation to climate change in Europe"[36]**, which is the major reference for action against climate change in an urban environment. It identifies specific urban effects and challenges, proposing a multi-level governance approach. The report identifies the major potential effects of climate change on European cities, characterising them in terms of vulnerability or capacity to adapt to change in relation to factors such as geographic position, urban dimensions and structure, health and governance systems. It furthermore proposes a series of adaptation responses according to the different spatial and territorial scales considered; finally, it identifies the challenges and opportunities for multi-level governance within the *European* policy area;

Coastlines can also be affected by intense erosion and flooding phenomena, which the prospects of rising sea levels related to the climatic changes can cause to be intense.

The issue of coastal defence is in fact on the agenda of International Organisations. In particular, in 2001 the European Parliament requested the European Commission to draft policies for coastal defence, through the stipulation of a "Service contract concerning coastal erosion – evaluation of the needs for action". This **project, named EUROSION[37]**, was commissioned by a consortium led by the National Institute for Coastal and Marine Management of the Netherlands Ministry of Transport, Public Works and Water Management. It was concluded in 2004.

The "coastal risk index", which is explained in par. 5.3., was developed on this basis.

6.4 OAS 3 Protecting natural areas and biodiversity, including marine biodiversity;

The specific references to European policies regarding biodiversity are:

[34] COM(2013) 216 def..

[35] (COM(2009) 147 fin..

[36] EEA Report no. 2/2012.

[37] ENV.B.3/SER/2001/0030.

- The **New EU Sustainable Development Strategy**[38], which pursues the objective of intensifying the environmental measures for the protection of biodiversity, seas and oceans and other natural resources;

- The **EU 2020 Biodiversity Strategy,**[39] which aims *to halt the loss of biodiversity and ecosystem services in the EU by 2020,* and in particular to: preserve and restore the natural environment, preserve and value the ecosystems and their services, and step up its contribution to averting global diversity loss. It first of all provides for full implementation of the Habitat[40] and Birds[41] Directive so that by 2020: the state of the preservation is doubled for habitats and improved by 50 % for the species included in the habitat directive; the state of preservation has been maintained or improved by 50% in the species which were assessed in the Birds directive.

This latter Strategy was then stated in the **National Biodiversity Strategy (SNB)**[42], which is the instrument for integrating the biodiversity requirements into national sector policies, recognising and reinforcing conservation and sustainable use for its intrinsic value and as an essential element for human well-being, thereby also fully meeting the 2011-2020 biodiversity challenge.

To realise the vision for conservation of biodiversity, the national Strategy has been built around three main, complementary themes and the corresponding targets for 2020:

1. *biodiversity and ecosystem services:* within 2020, to guarantee the conservation of biodiversity, which is the variety of living organisms, their genetic variability and the ecological complexes they form a part of, and to ensure the protection and restoration of the ecosystem services so as to guarantee their key role insofar as life on Earth and human well-being.
2. *biodiversity and climatic changes:* substantially reduce the impact of climate change on biodiversity within the national territory, establishing the appropriate measures for adaptation to the amendments made and mitigation of their effects, increasing the resilience of natural and semi-natural ecosystems;
3. *biodiversity and economic policies*: integrate the preservation of biodiversity into economic and sector policies, including as an opportunity for the creation of new jobs and social development, reinforcing comprehension of the benefits of the ecosystem services that derive from it and awareness of the cost of their loss.

Of particular interest, for the present purposes, are the specific objectives identified in the national biodiversity strategy which refer to the "Infrastructures and transports" sector:

1. make optimising existing networks a priority over constructing new large-scale projects;
2. carry out a weighted assessment of the infrastructure efficiency standards as compared to their functionality and the ecosystem values/services in the territory in which the interventions take place, containing and limiting environmental fragmentation;

[38] The Communication "Mainstreaming sustainable development into EU policies: 2009 Review of the European Union Strategy for Sustainable Development".

[39] EU Biodiversity Strategy 2020 – Our life insurance, our natural capital COM (2011) 244.

[40] Directive 92/43/EC (Habitat) by the Council on the conservation of the natural habitat and of wild flora and fauna.

[41] Directive 2009/147/EC on the conservation of wild birds.

[42] MATTM, 2010.

3. avoid any further urban and city-corridor *sprawl*, applying quality criteria and quantity limits to urbanised areas that take into account the range, distribution and functionality of the natural resource systems;
4. limit consumption of non-anthropised soil, preferring recovery and/or expansion of existing infrastructure, where available;
5. integrate mobility policies, infrastructures and transports into territorial planning, for synchronised weighting of the effects of environmental components and biodiversity;
6. protect natural areas and habitats;
7. verify that application is effective:
   i. of the SEA [Strategic Environmental Assessment] for integration of the environmental issues in the formulation of sustainable plans and programmes, particularly insofar as the management of mobility and transports, thereby making it possible to define a sustainability guideline for sector plans based on explicit qualitative and quantitative indicators and objectives (limiting soil erosion, depletion of natural resources and emissions);
   ii. of the EIA [Environmental Impact Assessment] in order to assess the potential effects of construction of a project, whether linear or punctual, on the habitat and the species of animals and vegetables present in a vast area;
   iii. the VINCA (assessment of environmental implications) in order to identify and assess the possible effects that a project can generate on habitats and species of community interest and on Natura 2000.
8. identify solutions for mitigation of the impact from the realisation and operation of the infrastructures;
9. identify measures for environmental compensation where residual impacts that cannot be mitigated are generated;
10. apply the procedure indicated in the landscape report contained in D.P.C.M. [Prime Ministerial Decree] of 12/12/2005 for identification of the best solutions for integration of the infrastructures into the landscape and natural environment;
11. mitigate acoustic, light, atmospheric pollution through application of appropriate mitigation solutions that provide for green areas and the maintenance/creation of ecological corridors and natural habitats.

One last note refers to the opportunity of including the "marine areas" theme in the Summary Objective again, as it is configured as a sub-articulation of the broader Biodiversity theme.

Regarding the marine environment in particular, we mention the following:

- Directive 2008/56/EC, which aims to protect and preserve the marine environment, prevent its degradation or, where possible, restore marine ecosystems in zones in which they have been damaged; in particular by reducing the inputs into the marine environment, in order to progressively eliminate pollution, ensure that there are no significant impacts or risks to marine biodiversity, marine ecosystems, human health and legitimate uses of the sea.
- The **Integrated Management Protocol for coastal zones**. The mission of Integrated management of coastal zones is:
  - to facilitate, through rational planning of the activities, the sustainable development of coastal zones, ensuring that the environment and the landscapes are taken under consideration so that they are in harmony with the economic, social and cultural development;

- to preserve the coastal zones for present and future generations;
- to ensure sustainable usage of natural resources, particularly insofar as the usage of water;
- to ensure conservation of the integrity of the coastal ecosystems, landscapes and the geomorphology;
- to prevent and/or reduce the effects of natural risks and in particular climate change, which can be caused by natural or human activities;
- to ensure coherence between public and private initiatives and all the decisions of the public authorities, at the national, regional and local levels in relation to the use of coastal zones."

6.5 OAS 4 Reducing soil erosion, depletion of resources and waste production;

The issue of saving natural resources, including reducing those which are withdrawn, transformed and disposed of as solid waste, is decidedly present throughout all the environmental policies examined.

It is indeed central to the aforementioned **New EU Sustainable Development Strategy** and also to the **National Environmental Action Strategy**.

The latter, in particular, dedicates chapter 6 to the issue of withdrawing resources and reducing waste, underlying above all how in developed countries production activities and consumption are characterized by inefficient and unsustainable use of resources withdrawn from the environment (water, air, minerals, fuels, territory and others) and the equally unsustainable production of waste and the waste water into which they are disposed.

The National Strategy therefore proposes to significantly increase the degree of efficiency with which natural resources are used in the entire life cycle of the products, from the extraction phase to the manufacturing, consumption and disposal/recovery phases, so as to benefit final consumers and the efficiency of enterprises.

In fact, wasting resources has negative effects on human health and the economy, due to:

- the loss of value due to environmental degradation;
- reclamation requirements;
- decreased availability of renewable and non-renewable resources;
- increased needs for protection of the health of the population.

It is furthermore indicated how, on the social scale, the inefficient use of resources violates the principle of fairness, as well as the right of developing countries and future generations to access resources.

Among the additional documents taken under consideration, we note:

- The Communication "**A resource-efficient Europe – Flagship initiative under the Europe 2020 Strategy** ", of which we underline, for the present purposes, the objectives "Present a vision for a low-carbon, resource-efficient, secure and competitive transport system by 2050 that removes all obstacles to the internal market for transport, promotes clean technologies and modernises transport networks; " and "Define medium and long-term objectives and means for achieving them with the main aim to decouple economic growth from resource use and its environmental impact".

6.6 OAS 5 Protecting the landscape and cultural heritage;

The main reference regarding the protection of the landscape and cultural heritage is Legislative Decree 42 of 22 January 2004 "Cultural assets and landscapes code" as amended, which attributes to the Ministry of Cultural Heritage and Activities and Tourism (MIBACT) the task of safeguarding, preserving and promoting the national cultural assets.

See paragraph 8.6 for an illustration of the instruments that it makes available.

A further extremely significant reference, at the international level, is the "World Heritage List" published and continuously updated by UNESCO.

6.7 OAS 6 Improving the living conditions and health of the population, including by increasing the quality of the urban environment.

This theme is central to the renewed attention of European environmental policies, as proven by the explicit introduction of the new EIA Directive, of the terminology "population and human health" heading the list of factors in respect of which the EIA shall "identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect effects of a project" on the following factors" (art. 3):

Among the specific European policy documents we reiterate the Communication" **European Environment and Health Strategy**"[43], the objective of which is the understanding of the cause-and-effect relationships between the environment and health and to make available the information needed to develop an integrated Community policy. Other objectives of the strategy are to identify and reduce any new health threats caused by environmental factors and to strengthen the Union's capacity for policy-making in this area. The plan is to implement the strategy incrementally in successive cycles. The strategy will pave the way for a Community information system for assessing the overall impact of the environment on human health and the cause-and-effect links and for developing an integrated policy on the environment and health.

The dimensions involved in the well-being of the population and its health are multiple and transversal to many areas, as is natural. Consider, for example:

- The dimensions of the *environmental conditions*: air, and noise pollution, climate change, water and soil contamination, chemical substances, ionising and non ionising radiations, etc.
- the dimensions of the living and working c*onditions:* availability of services, residential conditions, indoor pollution, access to green spaces, etc.
- The dimensions of *economic conditions*: employment quality, access to services, access to health structures, etc..
- Dimensions of *lifestyle*: usage of public transport, walking and cycling, etc..

In light of these considerations, the nature of the Infrastructure Annex to assess, and the intention to avoid redundancy in the assessment, it was considered appropriate not to separate the sector theme of urban environmental quality and noise from the population and health theme.

Regarding of the reduction of noise, one of the main reference documents is **Directive 2002/49/EC of 25 June 2002** relating to the assessment and management of environmental noise (as updated by regulation (EC) no. 1137/2008) which provides for adoption by member states of action plans, based on acoustic mapping results, the purpose of which is to reduce environmental noise where necessary and, in particular, when the exposure levels have the potential of harming human health, and to preserve

[43] COM(2003) 338 def.

the acoustic quality of the environment when it is good. The purpose is of "avoiding, preventing or reducing on a prioritised basis the harmful effects of exposure to environmental noise."

Of particular interest for the issue of transports, is the directive according to which member states provide that, no later than 18 July 2008, the competent authorities' shall set up plans for managing in the territories the problems of noise and the relative effects, including, if necessary, containment of noise, for:

a) the main road axes on which more than six million vehicles pass per year, the major railway axes on which over 60 000 trains pass per year and the major airports;

b) conurbations of over 250 000 inhabitants. These plans are also aimed at avoiding increases of noise in silent areas.

Furthermore, "By 30 June 2012 at the latest, and thereafter every five years, strategic noise maps showing the situation during the preceding year must be made and, where relevant, approved for those agglomerations, roads and railways located within their territories."

The directive was implemented, at the national level, by **Legislative Decree no. 194 of 19 August 2005** "Implementation of directive 2002/49/EC relative to the assessment and management of environmental noise", which integrates, in certain areas, the previous law of 26 October 1995, no. 447 "Framework law on acoustic pollution" as amended.

In particular, the Decree of 2005, in order to avoid, prevent or reduce the harmful effects of exposure to environmental noise, including discomfort, defines the skills and procedures for:

- elaboration of the acoustic mapping and the strategic acoustic maps;
- elaboration and adoption of action plans, the purpose of which is to avoid and reduce environmental noise where necessary, in particular when the exposure levels can be harmful to human health, and to avoid increases in the noise present in quiet areas;
- ensure information and participation of the public with regard to environmental noise and the relative effects.

6.8 OES: the ex ante conditions for the AI such as the Economic-Social Objectives and the reference transport objectives for the assessment

In line with the requirement of integrating into the SEA the "environmental pillar" with the "economic pillar" and the "social pillar" included among the basic methodologies underlying the model in paragraph 4.3, the reference system of objectives for assessment includes environmental and economic-social objectives for the transport sector. Furthermore, in support of this choice, it should be considered how, in the case of mobility infrastructures, the former cannot easily be separated from the latter, as shown, for example, by the ten objectives of the White Paper on Transport under paragraph 6.2 above.

The Economic- Social Objectives (OES) used in reference to the assessment, such as the OAS, derive from the analysis of the environmental, economic, transport and social objectives deduced from recognition of the Programme Reference Framework (QdRP) for the AI, interpreted this time in light of the ends constituting the basis of the Infrastructure Annex to DEF 2015. We refer, in regard to the latter, to the requirements underlying the AI itself, in particular:

- adapting the national planning regarding strategic infrastructures to the community guidelines;
- developing a strategic instrument able to offer guidelines for the planning of Public Administrations, also in light of the financial restrictions applicable to the investment decisions of private investors;

The main document of reference for the QdRP for the Socio - Economic Objectives consists of the regulation (EU) no. 1315/2013[44], pursuant to which the ex ante conditions which the AI fulfils have been formulated.

In particular, we provide the entire text of art. 4:

> ***Article 4 "Objectives of the transEuropean transport network"***
>
> *The transEuropean transport network shall strengthen the social, economic and territorial cohesion of the Union and contribute to the creation of a single European transport area which is efficient and sustainable, increases the benefits for its users and supports inclusive growth. It shall demonstrate European added value by contributing to the objectives laid down in the following four categories:*
>
> *a) cohesion through:*
>
> *i) accessibility and connectivity of all regions of the Union, including remote, outermost, insular, peripheral and mountainous regions, as well as sparsely populated areas;*
> *ii) reduction of infrastructure quality gaps between Member States;*
> *iii) for both passenger and freight traffic, interconnection between transport infrastructure for, on the one hand, long-distance traffic and, on the other, regional and local traffic;*
> *iv) a transport infrastructure that reflects the specific situations in different parts of the Union and provides for a balanced coverage of all European regions;*
>
> *b) efficiency through:*
>
> *i) the removal of bottlenecks and the bridging of missing links, both within the transport infrastructures and at connecting points between these, within Member States' territories and between them;*
> *ii) the interconnection and interoperability of national transport networks;*
> *iii) optimal integration and interconnection of all transport modes;*
> *iv) the promotion of economically efficient, high-quality transport contributing to further economic growth and competitiveness;*
> *v) efficient use of new and existing infrastructure;*
> *vi) cost-efficient application of innovative technological and operational concepts;*
>
> *c) sustainability through::*
>
> *i) development of all transport modes in a manner consistent with ensuring transport that is sustainable and economically efficient in the long term;*
> *ii) contribution to the objectives of low greenhouse gas emissions, low-carbon and clean transport, fuel security, reduction of external costs and environmental protection;*
> *iii) promotion of low-carbon transport with the aim of achieving by 2050 a significant reduction in CO2 emissions, in line with the relevant Union CO2 reduction targets;*
>
> *d) increasing the benefits for its users through:*
>
> *i) meeting the mobility and transport needs of its users within the Union and in relations with third countries;*
> *ii) ensuring safe, secure and high-quality standards, for both passenger and freight transport;*
> *iii) supporting mobility even in the event of natural or man-made disasters, and ensuring accessibility to emergency and rescue services;*
> *iv) the establishment of infrastructure requirements, in particular in the field of interoperability, safety and security, which will ensure quality, efficiency and sustainability of transport services;*
> *v) accessibility for elderly people, persons of reduced mobility and disabled passengers.*

[44] Regulation (EU) no. 1315/2013 of the European Parliament and Council of 11 December 2013, on the on Union guidelines for the development of the transEuropean transport network ... (op.cit).

In summarising these objectives, in order to add them to the Economic-social Objectives (OES) of reference for assessment, it was particularly important to refer directly to **art. 10** "**General Priorities"** of the aforementioned **Regulation no. 1315/2013** on the Union guidelines for the TransEuropean Networks (TEN-T)as these were subsequently used by the EU as valuation criteria for fulfilment of the ex ante conditionalities for Thematic Objective 7 ("Promoting sustainable transport and removing bottlenecks in key network infrastructures")[45] The following text is provided:

> *Article 10 - General Priorities*
>
> *1. In the development of the global network, general priority is given to the measures necessary for:*
>
> *a) ensuring enhanced accessibility and connectivity for all regions of the Union while taking into consideration the specific case of islands, isolated networks and sparsely populated, remote and outermost regions;*
> *b) ensuring optimal integration of the transport modes and interoperability within transport modes;*
> *c) bridging missing links and removing bottlenecks, particularly in cross-border sections;*
> *d) promoting the efficient and sustainable use of the infrastructure and, where necessary, increasing capacity;*
> *e) improving or maintaining the quality of infrastructure in terms of safety, security, efficiency, climate and, where appropriate, disaster resilience, environmental performance, social conditions, accessibility for all users, including elderly people, persons with reduced mobility and disabled passengers, and the quality of services and continuity of traffic flows;*
> *f) implementing and deploying telematic applications and promoting innovative technological development.*
>
> *2. In order to complement the measures set out in paragraph 1, particular consideration shall be given to measures that are necessary for:*
>
> *a) ensuring fuel security through increased energy efficiency, and promoting the use of alternative and, in particular, low or zero carbon energy sources and propulsion systems;*
> *b) mitigating exposure of urban areas to negative effects of transiting rail and road transport;*
> *c) removing administrative and technical barriers, in particular to the interoperability of the transEuropean transport network and to competition.*

Observe that part of the main and complementary measures (three which are underlined) are of an essentially environmental nature, and were therefore already included among the Summary Environmental Objectives (respectively OAS 2, OAS 1 and OAS 6).

The remainder consists of the guidelines considered to be the most relevant in relation to the reference Economic-Social Objectives for the assessment, i.e.:

OES 1 Ensure better accessibility and connectivity for all EU regions while taking into account the special circumstances of islands, isolated networks, and sparsely populated, peripheral and remote regions;

OES 2 Ensuring optimal integration of the transport modes and interoperability within transport modes;

OES 3 Provide missing links and remove bottlenecks, especially in cross-border sections

OES 4 promoting the efficient and sustainable use of the infrastructure and, where necessary, increase capacity ;

[45] European Commission, Guidance on Ex ante Conditionalities for the European Structural and Investment Funds. PART II, 13 February 2014.

OES 5 Improve or maintain the quality of infrastructure in terms of social conditions, accessibility for all users, particularly older people, people with reduced mobility and disabled passengers, as well as the quality of services and continuity of traffic flows

OES 6 Develop and install telematics applications and promote innovative technological development;

OES 7 Remove administrative and technical barriers, in particular to interoperability of the transEuropean transport and to competition.

As can be observed, these criteria are mixed, with the social objectives (connecting the isolated regions, ensuring accessibility for all, etc.) prevailing over economic-transport objectives (interoperability, completion of missing connections, elimination of bottlenecks, etc.) and vice-versa.

In general, it is expeditious to observe how the ex ante conditionality measures for transport - to the extent that they effectively contribute to satisfying the public finance savings requirements in line with the budget limitations and the efficiency of public and private investments expressed in the AI - belong by rights to the socio-economic development objectives group.

Finally, for the purpose of facilitating the consistency check of the AI with the criteria under Art. 10 of EU Regulation No. 1315/2913 for the Commission's partners, the three latter OESs which were redundant with respect to the OASs, specifying the correspondences, including with notes in the Assessment Matrix are also coded:

[{1}OES 8 {2}Improve or maintain the quality of infrastructure in terms of safety, protection, efficiency, resilience to climatic conditions and, where appropriate, to disaster, of environmental performance (coincides with OAS 2)

OES 9 Ensure the safety of fuels through greater energy efficiency and promote the use of renewable energy and alternative propulsion systems and in particular low or zero carbon emissions (included in OAS 1)

OES 10 Mitigate the exposure of urban areas to the harmful effects of rail and road transport transit (included in OAS 6).

7 Possible significant effects of the AI

7.1 Assessment of the effects of the AI on the pursuit of environmental objectives (Assessment of Environmental Compatibility)

The actual Strategic Environmental Assessment of the AI is found in the columns of the Assessment Matrix (par. 7.5).

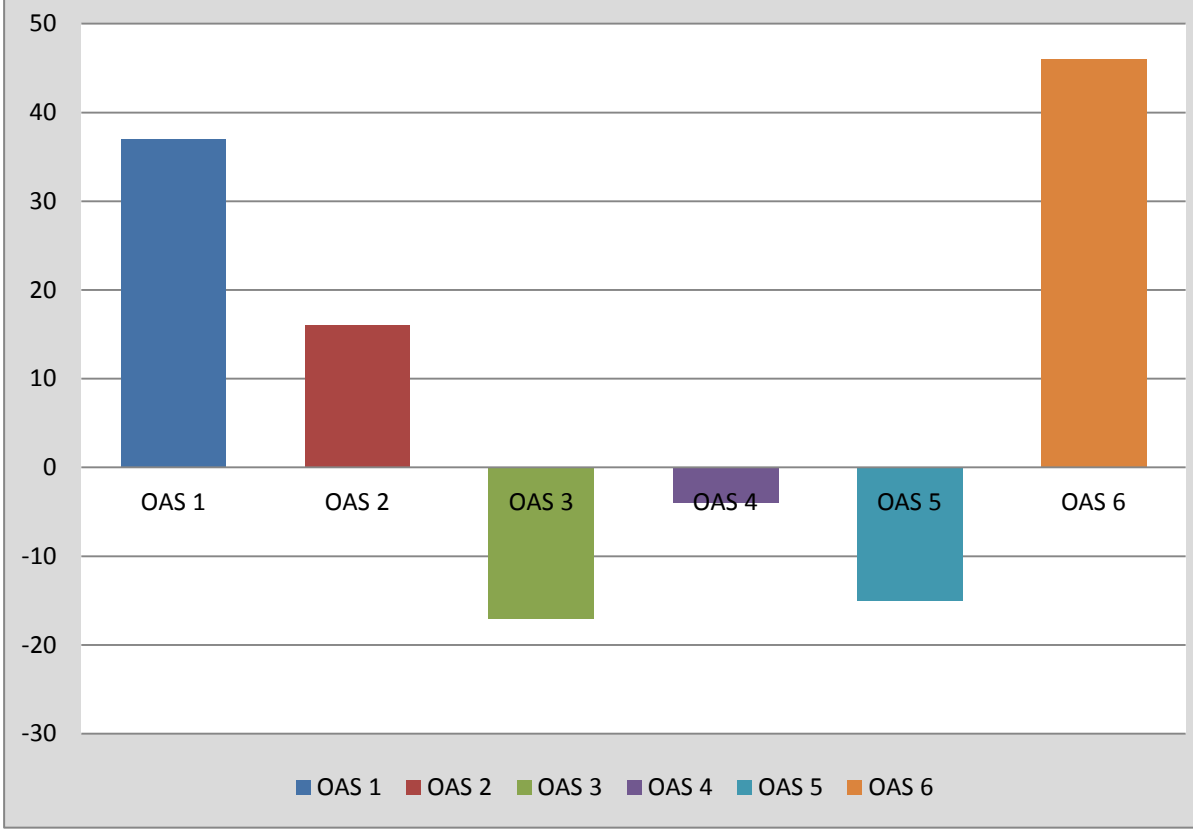
Indeed it provides an idea of how the strategies set forth in the AI, which constitute the total of its Functional Areas, follow the System of reference objectives for the assessment. In particular, the following can be distinguished:

- the score to pursue in each of the two sections in which the objectives of reference for the valuation are set forth, that is the Assessment of Environmental and Socio-Economic compatibility;
- the score to pursue for each individual environmental objective (OAS) and socio-economic objective (OES), verifying first of whether the sum of the impacts is negative or positive.

The Matrix results columns in the section on ***Assessment of Environmental Compatibility***, indicate first of all how the balance between the positive and negative environmental results expected from implementation of the 27 functional areas of the AI are, as a whole, positive (63 points).

However, this positive assessment is the result of pursuing the six Specific Environmental Objectives (OAS), which also lacks uniformity ***(see Fig. 1)***, as three of these objectives give very positive results, while three give results ranging from slightly to very negative results.

Fig. 1 - Environmental performances expected by the implementation of the Functional Areas of the AI



In particular, among the first, in the following order:

- OAS 6 "Improving the living conditions and health of the population, including by increasing the quality of the urban environment" has been "optimally" pursued (46 points).
- OAS 1 "Increasing air quality and energy savings and reducing climate altering gases" has been "optimally" pursued (37 points).
- OAS 2 "Increase resilience to climate change and other disasters, including reducing hydrogeological risk" has been pursued "well" (16 points).

In the second group:

- OAS 4 "Reducing soil erosion, depletion of resources and waste production" has had a slightly negative performance (score - 4), while
- two Specific Environmental Objectives - OAS 3 "Protecting natural areas and biodiversity, including marine biodiversity" and OAS 5 "Protecting the landscape and cultural heritage" have had Very negative impacts, with scores of- 17 and - 15 points respectively.

To understand the meaning of these indications, it is useful to examine the graph provided in ***Fig. 7.2.*** while we mention one more time that these are assessments resulting from probability calculations connected to the nature of the functional areas (AF) and they are presented in the Assessment Dossiers. As a result, the estimates that have been made can be subject to amendment and there could even be an inversion of their signs, in relation to the attention focused in the localization/designing stage of the works that have not yet begun, on eco-compatible designing criteria such as those set forth in Section 3 of the Assessment Dossier (environmental agenda) compiled for each of the 27 Functional Areas of Intervention (see Attachment 2 and Chp. 8).

Fig. 7.2 presents in graph form the composition of the environmental impacts assumed for each Functional Area whether on the negative or the positive side. We reiterate that identification of the impacts corresponds, -in the assessment model used -*to the estimate of the degree to which each of the Specific Environmental Objectives were pursued.*

In the paragraphs below, comments will be made regarding the most significant contributions of the individual AFs insofar as determination of the positive and negative impacts, in relation to the pursuit of each of the six Specific Environmental Objectives. We note that in order to facilitate immediate reading of the graph, the first figure of the codes attributed to the functional areas corresponds to the various means of transport comprising the first level Strategic Lines, and in particular:

1. railways;
2. intermodality of urban passengers (regional railways and metros);
3. port systems;
4. road transport;
5. airports and airport connections.

Pursuit of OES 1: "Increasing air quality and energy savings and reducing climate altering gases"

As indicated above, OAS 1 has achieved an overall score of "optimal", with an algebraic sum of positive and negative points attributed to the services expected from the 27 AFs examined of 37 points. Almost all the AFs have interacted **positively** with the OAS, with high scores (4 points) and medium high scores (3 points) across all the transport components. In particular, the best performances were in:

- the **urban intermodality area,** where it is considered quite probable that actions referring to the AFs which the Strategic Line of the AI is articulated in -2.A.1 "Functional interventions to improve the quality of regional railway services, particularly insofar as large metropolitan areas and commuter services" and 2.A.2 "Functional interventions for reinforcement of metropolitan networks" (both with scores of 4 points) - had significant positive effects on

achieving the objectives of OAS 1, especially insofar as the metropolitan areas afflicted with excessive automobile traffic.

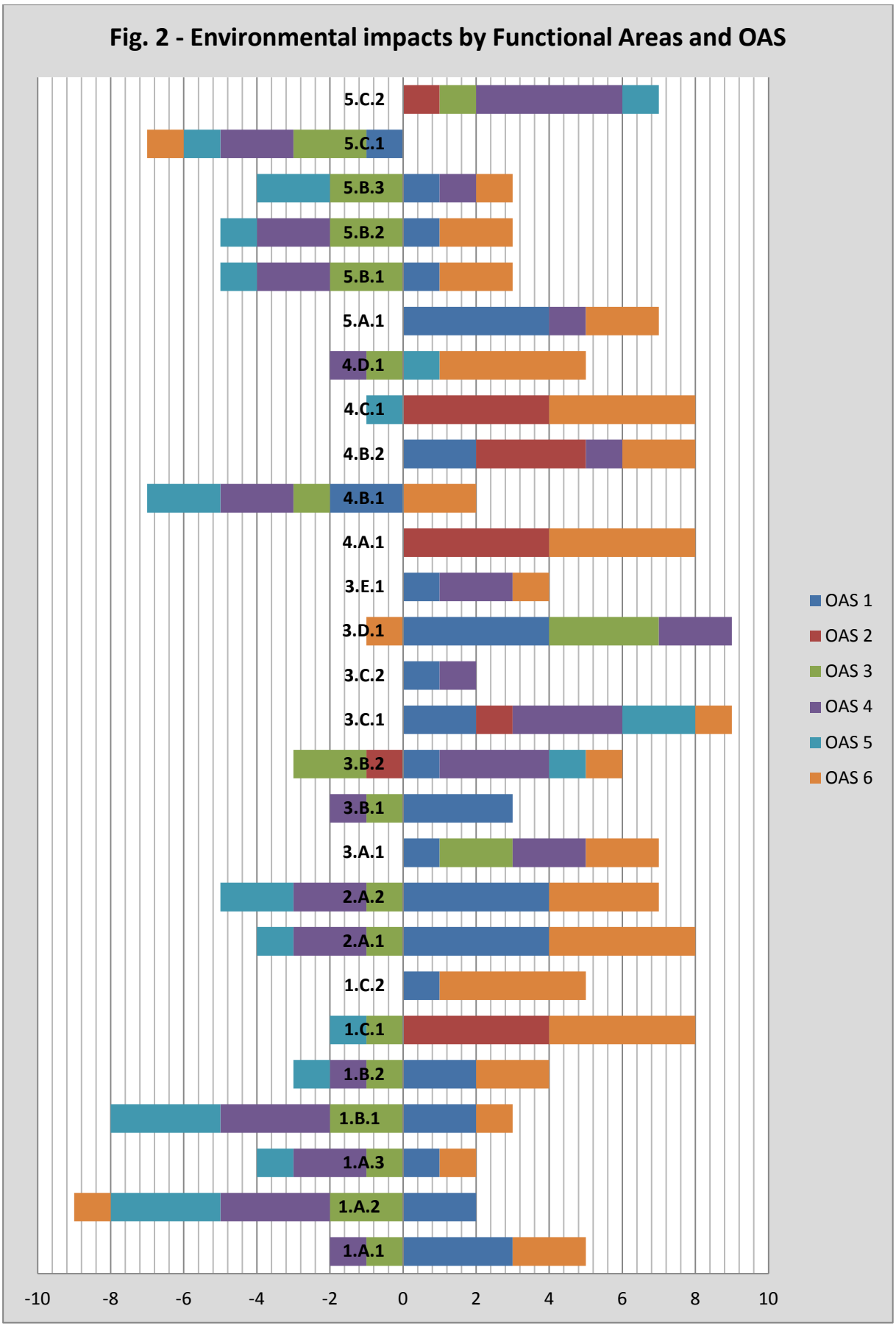
Indeed, in general, the expected increase in territorial coverage and the quality of the service offered will render local public transport by rail more competitive compared to private mobility by automobile, thereby reducing the emission of atmospheric pollutants deriving from traffic and the consumption of combustible fuels for traction.

- regarding **the usage of ports**,
  - AF 3.D.1. (4 points),coincides with the objective 7 of the National Strategic Plan for Portal and Logistics Services (PSNPL), which explicitly provides for "Efficiency measures for energy and environmental sustainability imports";
  - the "Measures for improvement of transport services and increasing accessibility of ports via sea and land" (AF 3.B.1' 3 points), since the strengthening of the railway services for freight is expected to result in a reduction of the carbon monoxide emissions and other pollutants originating from automobile transportation: due to use of railways for access to the portal areas themselves as well as the incentives that a good railway connection provides for development of the "motorways of the sea" over ordinary means.
- Given the very high levels of climate altering gas emissions that characterize **air transport**, very significant advantages are expected from implementation of the air traffic management systems (SESAR programme), under AF 5.A.1. (4 points)as they are expected to have the ability to reduce the environmental impacts from air transport in terms of climate altering emissions (CO2, NOx and CH4) by 10%; in particular they are expected to be able to reduce emissions of CO2 by approximately 50 million tons per year. This is expected to take place simply by simplifying and streamlining flight trajectories which are often longer than necessary due to the need to follow a specific corridor and to wait for slots to become available prior to landing.
- Regarding **rail mobility**, good results are expected from speeding up the lines on the conventional networks (AF 1.A.1, 3 points) since improving the competitiveness of rail transport can result in a certain proportion of the medium to long haul movements which are more energy consuming and create more emissions than rail, such as automobiles and airplanes, preferring rail transport. The entity of the impact is uncertain and depends on the actual consistency of the demand for transport on the routes affected by the intervention, but it can be assessed positively by virtue of the widespread character of the interventions under the AF.

Regarding **road transport**, which is generally discouraged by the AI which promotes means of transport that impact the climate and air quality less, the best expectations (score 2) are from the development of Intelligent Transport Systems (ITS) on roads (AF 4.B.2.), as they allow for more efficient management of the traffic flows on the roads, consequently reducing the travel time and therefore also the consumption of fossil fuels for traction, climate altering gas emissions and other pollutants that originate from automobile traffic.

Negative impacts of a certain significance (-2 points) were recorded only by this latter means, in particular the interventions for adaptation and rationalization of the road network (AF 4.B.1), due to the inevitable increase in climate altering emissions due to the additional traffic generated from the improvement in the transport offered. It stands to reason however, that the negative impacts on the air quality and the energy consumption will be offset, in the long term. by the continuous improvement in the car fleet (see par. 5.2).

Fig. 2 - Environmental impacts by Functional Areas and OAS



Finally, we reiterate that this Objective **also pursues one of the "General Priorities" of the aforementioned Reg. (EU) no. 1315/2013** Art.10, specifically under par. 2 a) **"ensuring fuel security through increased energy efficiency, and promoting the use of alternative and, in particular, low or zero carbon energy sources and propulsion systems".** [46] virtually "OES 9" (see par. 6.8) which was not inserted in the OES section precisely because it was already set forth in OAS 1 and would have been redundant.

Pursuit of OAS 2 "Increasing the resilience to climate change and other calamities, including by reducing hydro-geological risk"

OAS 2 is perceived by the AI as having been pursued "well" (16 points), for **very positive impacts** (4 points) expected by the AI particularly in relation to the following AFs which refer to the **rail and road infrastructures**:

- AF 1.C.1 “Interventions for safety and adaptation to legal requirements (safety of level crossings, safety in tunnels, hydrogeological risk. seismic checks, acoustic checks, noise abatement)", which have the capacity of generating very positive effects to the extent that they reduce the vulnerability of the existing constructions to seismic phenomena and in terms of hydrogeological risk. Additionally to the intrinsic reasons, the securing of railway infrastructures is important in terms of civil protection (but always in some way connected to the resilience of the system), to ensure the functionality of the strategic connections through which to route assistance in the event of a calamity;
- AF 4.A.1. "Interventions for the static securing of major art works including through the realisation of studies and verification of the static and seismic stability of infrastructures especially with regard to certain itineraries which have suffered deterioration including at the infrastructure level, as well as through interventions along the network", since the securing of road infrastructures can significantly increase their resilience to exceptional events (flooding, landslides, etc.) due to climate changes, and also seismic events.
- AF 4.C.1. "Improvement of the stability of landslide slopes or roads at water risk, through stabilisation of grounds subject to landslides and regulation of rainwater", the formulation of which is considered to be sufficiently explicit.

Convergence on this type of intervention indeed seems to give substance to the slogan "The most important Major work is Maintenance", which counts for three fourths of the positive score the AI gave to OAS 2.

A good performance (3 points) is expected from AF 4.B.2 as well. (Interventions for implementation of ITS for roads) mentioned previously, since ITS applications are also designed to provide information in real time regarding atmospheric conditions and to support emergency management systems, thereby decreasing the vulnerability of the road system in the case of exceptional events, especially when caused by the weather.

No significant negative impact was recorded, this also being due to the fact that it was assumed a priori that the issues of geomorphological, water and seismic risk management, together with their correlated issues in terms of adaptation to climate change, will be correctly set in compliance with current regulations in the planning/design phase of the individual interventions. A single slightly negative impact was on the other hand attributed to AF 3.B.2 (-1 point), which refers to the

[46] It is in turn connected to Article 4 "Objectives of the transEuropean transport network", c) (contribute *to) a sustainability,* through: i) the development of all transport modes in a manner consistent with ensuring transport that is sustainable and economically efficient in the long term; ii)contribution to the objectives of low greenhouse gas emissions, low-carbon and clean transport, fuel security, reduction of external costs and environmental protection; iii) promotion of low-carbon transport with the aim of achieving by 2050 a significant reduction in CO2 emissions, in line with the relevant Union CO2 reduction targets;

strengthening of the port infrastructures, as it was considered that the works at sea (new jetties, dredging, etc.) deserve particular attention in regard to the hydrogeological risk, in this case due to the possible impacts on the dynamics of the currents and the erosion/nourishment of the coast.

Finally, we reiterate that this Objective **also pursues one of the "General Priorities" of the aforementioned Reg. (EU) no. 1315/2013** Art. 10, and particular only the first part of the priority under par. 1 e): "improve or maintain the quality of the infrastructure in terms of safety, protection, efficiency, resilience to climatic conditions and, where appropriate, to disasters, and in terms of environmental performance"[47] virtually "OES 8" (see par. 6.8) which was not inserted in the OES section precisely because it was already set forth in OAS 2 and would have been redundant.

Pursuit of OAS 3 "Protecting natural areas and biodiversity, including marine biodiversity"

OAS 3 is considered **by AI to have been pursued in a "negative" manner** (-17 points), due to a series of seven moderately negative (-2) and 6 slightly negative (-1) points attributed, as a precautionary measure, mainly to **linear railway and road infrastructures**.

This type of work may result in negative impacts of a varying level, depending on the characteristics of the individual interventions: of lesser importance were the interventions involving adaptation of existing infrastructures, including track doubling, but for which the effect of the interruption of the ecological continuity due to the linear character of the infrastructure is emphasised; the impact in terms of removal of natural areas and interference with habitats or protected species were of a more significant level and could originate from significant deviations from the original routes or new lines which involve natural areas. In these terms, the less significant impacts are generally connected to routes that are developed along viaducts or in tunnels.

To control such foreseeable impacts, the AF Environmental Agency recommends that measures be taken for protecting ecological connectivity, particularly maintaining/reclaiming the natural habitats which are adjacent to the infrastructures in question, acting on the relevant zones, any slopes and draining channels, assessing the realisation of "passageways for fauna" so as to ensure that the ecological corridors are maintained (see RA par. 8.4).

Good performance (3 points) is expected from the aforementioned AF 3.D.1, containing measures for energy efficiency and environmental sustainability of ports, as the actions listed in Objective 7 of the PSNPL, which the AF derives from, include realisation of interventions for the recovery and protection of the seabed and activation of the monitoring programmes of any protected sites near the ports. There are furthermore actions the purpose of which is to ensure compliance with increasingly reduced and compatible emission levels for vessels, engines and fuels, consequently resulting in less pollution of the marine environment.

Pursuit of OAS 4 "Reducing soil erosion, depletion of resources and waste production"

OAS 3 is viewed by **the AI in a "slightly negative" light** (-4 points), with many, including significant, impacts (including of an opposite nature) offsetting each other in the assessment.

The **most positive impact** (4 points)was in the **air transport sector**, only insofar as Functional Area 5.C.2 "Setting of restrictions in the territory or functional delocalization, in the event that development of the stopovers is affected by physical, environmental or safety limitations", as the interventions in question aim, in the final analysis, to leverage the existing infrastructures as much as possible, though keeping an option to expand the airport area over the long term. In this matter, the need to create new airports, perhaps in the same metro area, in order to address any increasing demand which remains unfulfilled,

[47] Connected in turn with Article 4 "Objectives of the transEuropean transport network" d)*(increase) benefits for its users,* by: (…) ii) reduction of infrastructure quality gaps between Member States, for both passenger and freight traffic, i; iii) supporting mobility even in the event of natural or man-made disasters, and ensuring accessibility to emergency and rescue services (…).

can be avoided and this would obviously lead to savings in terms of the land and other resources that would be required for the new construction (see also OES 7).

Other positive impacts, though of lesser significance (3 points), were also assigned for the two AFs in relation to the port system: AF 3.B.2. "Measures for improving the infrastructure of ports and their land connections (objective 5 of the PSNPL) and AF 3.C.1. Measures for stimulating the logistics chains and the manufacturing and logistics operations (objective 4 of the PSNPL).

Indeed, both focus on restoring existing port infrastructures by improving their quality features and minimise the use of land: the first, in particular, also provides for recovery of the military easements and military land which has been abandoned or disposed of or which is under-used, increasing of the dry port areas, while the second aims to stimulate re-usage of disposed of industrial areas and available areas within the port grounds on which to install manufacturing operations, thereby implementing the "vision of the Sea System as a driver of economic recovery, concurrently benefitting the Italian industrial and productive system" as per specific Objective C.1.

The **major negative impacts** (-3 points), on the other hand, were registered in relation to the two correlated objectives regarding the **railway infrastructures**, as they are part of the new route:

- 1.A.2 Interventions to raise the performance of the network, continuing with development of the HS/HC network (with specific attention to the South through interventions identified by National Operating Programme 2014-2020 - Infrastructures and Networks), including the speeding up of aerial stretches and upgrading of the performance of the main traveller lines
- 1.B.1 For freight traffic, performance adjustment on the main European "Core Corridors" (train profiles and modules), in particular strengthening of the links between domestic terminals – with special attention to those of the South – and Alpine passes, and separation and optimisation of flows by type of service

Certain interventions of the Strategic Infrastructure Program which have already been identified as being of priority refer to these AFs, in particular: HS/HC Milan-Venice line (Brescia-Verona, Treviglio-Brescia, Verona-Padua), all interventions on the Naples-Bari lines, also provided by the Infrastructure and Networks PON 2014/20 and included in the Naples-Bari-Lecce/Taranto CIS Institutional Development Contract, the new HC Terzo Valico dei Giovi and the new basic Brennero tunnel.

Some new projects that are part of the AF are at a very advanced level of implementation: they are already underway or work on them is expected to begin in the very near term, partly due to inclusion of the list of works under the "Unblock Italy" Legislative Decree 133/2014-L.164/2014 (certain construction lots relative to the Naples-Bari and Verona-Padua lines).

Dismissing the contradiction which was already covered under par. 4.2, which is that there are Functional Areas subject to SEA which also include projects that are not optional as they have already been approved and/or are underway and, at least in terms of "cumulative prior impacts, are counted together with the work still to be initiated", we note the negative effects of the new railway lines in terms of the soil erosion and consumption of raw materials (generally for the construction of infrastructure works), which vary depending on the characteristics of the individual interventions.

The erosion of the soil, in particular, can be considered as negligible in terms of the adaptation to existing infrastructures (including track doubling) and substantial if the interventions provide for significant deviations from the original blueprints or new railway lines, not including the cases involving already artificialised areas (e.g. interventions on the Milan-Venice HS/HC lines). In the case of routes through passes, the potential impact on waste produce assumes importance, in particular insofar as issues connected to the handling of rocks and excavation grounds. Other significant interference, in terms of OAS, can take place on the regime applicable to groundwaters.

Impacts of a lesser entity (2 points) characterise another six AFs. These are connected to the strengthening of smaller extensions such as the railway and road connections with airports (AF 1.A.3,

5.B.1, 5.B.2, 5.C.1), increasing accessibility to urban railways (AF 1.A.1 and 1.A.2),and the completion of certain road sections (AF 4.B.1).

The pursuit of OAS 5 "Protecting the landscape and cultural heritage"

Except for the already mentioned AF 5.C.1, which refers to free territories located near airports, the **impacts on OAS 5 continue to be negative,** with an Assessment of Compatibility of -15 points.

Once again, these are negative scores attributed as a precautionary measure, especially with regard to line works that cover the major **railway and road infrastructures** but also, to a lesser extent, the connections of the same type with ports and airports.

The potential negative effects mainly refer to the impact of various structures on the landscapes that comprise the rail or road infrastructure. As in the case for OAS 2, the impact can be considered to be negligible insofar as adaptation of existing infrastructures, but it can be significant for interventions that require the construction of works such as viaducts or railway embankments which are particularly extended and substantial; tracks that are constructed in tunnels generally create less impact.

Thus, the Environmental Agenda of the AF recommends that great care be taken to include landscaping in the new infrastructures, giving priority to the use of environmentally sound engineering techniques and materials that can be visually integrated into the landscape and, where possible, providing for mitigation of the visual impact by planting native trees or shrubs (see RA par. 8.6).

For urban sections, particular attention is paid to the potential interference with archaeological assets when significant excavation works are required for construction of underground metro networks (AF 2.A.2) and the impact on the urban landscape created by the worksites set up for the new urban lines being constructed for the Local Transport Network (AF 2.A.1 and AF 2.A.2), which are often present for long periods of time.

The pursuit of OAS 6 "Improving the living conditions and health of the population, including by increasing the quality of the urban environment"

As can be observed in Fig. 2, the excellent Assessment of Environmental Compatibility achieved by OAS 6 is the result of the very few negative impacts (which are nevertheless negligible and have been given 1 point) and the high number of positive effects (21 over 24), even those which were on the average rather high (the average score per AF interfering event for the OAS is 1.9, when the OAS average is 0.6).

A good proportion of the positive score (16 points) is due to the three AFs the objective of which was to improve the safety of streets and railways as described in OAS 2 (1.C.2,, 4.A.1 and 4.C.1)), with the addition of AF 1.C.2, "Interventions for quality and improvement of the infrastructure (technologies for circulation, telecommunications, ERMTS)". These elements are all central to the pursuit of the following specific AI objectives:

- 1.C Increase of the safety, quality and efficiency of the railway infrastructure, ensuring the continuity of the maintenance programmes;
- 4.A. Resolution of the critical areas inherent in the structure of the network, particularly insofar as the age of the main works of art;
- 4.C. Securing of the road network from landslides and water risk in order to avoid service interruptions;

The positive impact attributed above (OAS 2) for "environmental health", i.e. resilience to catastrophic events of various types and origins, is therefore re-attributed here on account of the obvious implications on the health of the population that uses it, which is less exposed to the risk of natural disasters that could involve the infrastructures and also on account of the isolation that a catastrophic event on the line would cause, affecting widespread areas. A very steep decrease in highway and rail

accidents is also expected (thought should be given to the well-known "danger of falling rocks" sign), the latter thanks to new technologies set forth in AF 1.C.2, expressly focused on improving the safety of the various components of the railway infrastructure.

The other two **major positive impacts** , which contribute a total of 8 points to the overall assessment of the OAS, once again refer to the population, but with greater focus on quality of life and the ability to live a safe life. These are two AFs specifically dedicated to lessening the inconvenience of those who reside in smaller centres and sometimes even inland areas, who are required to travel often for educational purposes or work. These are the following AFs:

- 2.A.1. geared towards improving the quality of regional railway services, particularly with regard to large metropolitan areas and commuter services;
- 4.D.1 Interventions that encourage accessibility to internal areas and those which are the most affected by the territory's particular orology;

which are self explanatory. Likewise, tourists and excursionists can all benefit from the improved accessibility to the major transport hubs, therefore positive impacts are also expected for the local social-economic system, an area which is also explored in OAS 6.

A series of lesser positive impacts, but which are quite widespread throughout the AI, were also attributed to the improvement of the air quality in urban areas (and therefore, this affects the health and wellbeing of the population), which is expected as a result of the reduced car traffic, itself the result of the prodigious programme of urban and extra-urban railway lines and connections.

Finally, we reiterate that this Objective **also pursues one of the "General Priorities" of the aforementioned Reg. (EU) no. 1315/2013** Art. 10, specifically the one under par. 2 b). (particular attention is focused on a) "mitigating exposure of urban areas to negative effects of transiting rail and road transport"[48],virtually "OES 10" (see par. 6.8) which was not inserted in the OES section precisely because it was already set forth in OAS 6 and would have been redundant.

7.2 Assessment of the effects of the AI on the pursuit of economic-social and transport objectives (economic-social Assessment of Compatibility)

The columns in the second section of the results of the Assessment Matrix show how the impacts expected from the implementation of the 27 functional areas of the AI on the system comprising of the seven reference Economic-Social and transport Objectives for the (OES) assessment is **always positive,** generating a total score of 327 ***(Fig. 3)***

In particular, one of the above:

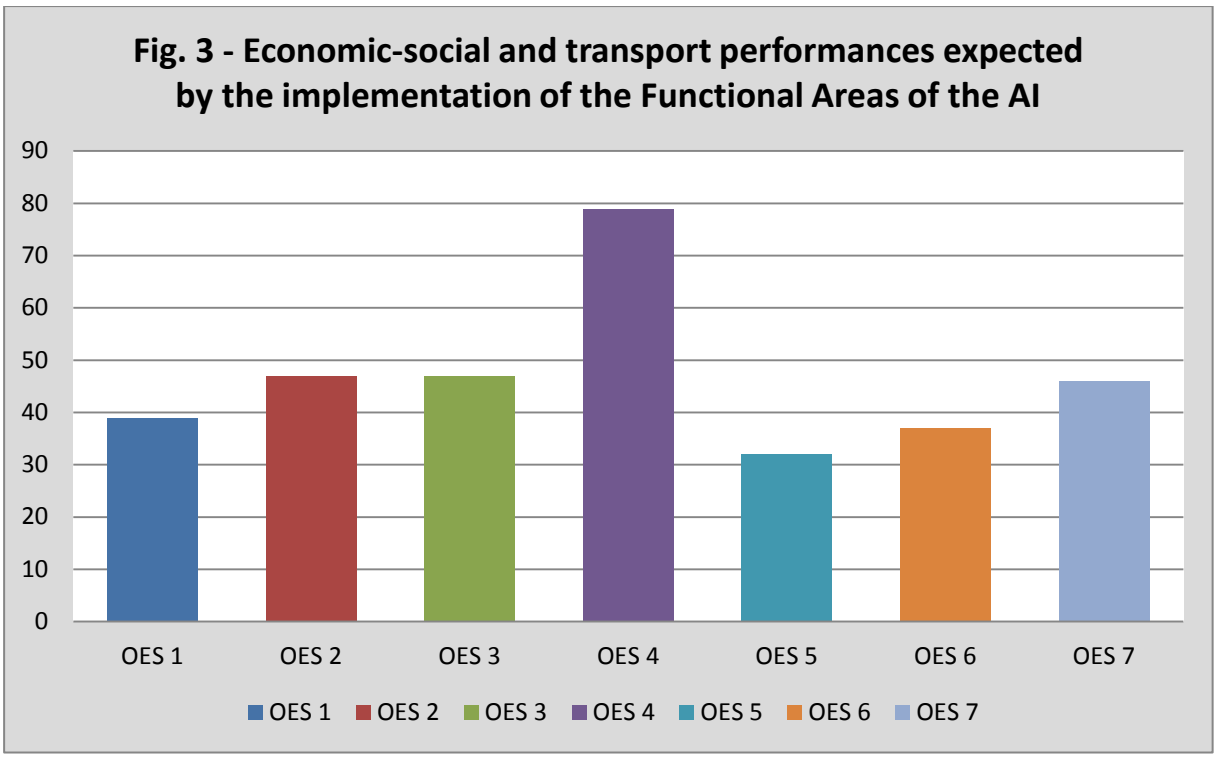
OES 4 promoting the efficient and sustainable use of the infrastructure and, where necessary, increase capacity;

is pursued by the AI in an "excellent" manner (i.e. with a score of above 50), reaching 79 points, while the remaining six are pursued in an "optimal" manner (score between 30 and 50). In the following order:

OES 2 Ensuring optimal integration of the transport modes and interoperability within transport modes (47 points)

OES 3 Provide missing links and remove bottlenecks, especially in cross-border sections (47 points)

[48] This is in turn connected to Article 4 "Objectives of the transEuropean transport network", c)*sustainability through,* (...)already mentioned in OAS 1.



OES 7 Remove administrative and technical barriers, in particular to interoperability of the trans-European transport and to competition (46 points)

OES 1 Ensure better accessibility and connectivity for all EU regions while taking into account the special circumstances of islands, isolated networks, and sparsely populated, peripheral and remote regions (39 points)

OES 6 Develop and install telematics applications and promote innovative technological development (37 points)

OES 5 Improve or maintain the quality of infrastructure in terms of social conditions, accessibility for all users, particularly older people, people with reduced mobility and disabled passengers, as well as the quality of services and continuity of traffic flows (32 points)

Reiterating that the OES coincide with the ***General Priorities for the development of the global network*** pursuant to art, 10 of EU Reg. 1315/2013 of the European Parliament and of the Council on Union guidelines for the development of the trans-European transport network, and that they have been assumed by the Commission as valuation criteria for fulfilment of a part of the ex ante conditionalities for the Telematics Objective 7.1 (see par. 4.3), the performances of the AI in relation to each of the seven OES are shown below, with the assistance of the following ***Fig. 4.*** The ***Corridor Studies***, which were conducted by the European Commission on each of the Core TEN-T Corridors (December 2014) are a particularly important reference for carrying out this evaluation[49]

[49] See *Final reports e compliance maps* relative to the Four Corridors that refer to Italy: "Baltic-Adriatic Core Network Corridor Study"; "Mediterranean Core Network Corridor Study"; Rhine-Alpine Core Network Corridor Study"; "Scandinavian-Mediterranean Core Network Corridor Study".

The pursuit of OES 1: Ensure better accessibility and connectivity for all EU regions while taking into account the special circumstances of islands, isolated networks, and sparsely populated, peripheral and remote regions

This objective consolidates the European social-economic cohesion objectives of Reg. (EU) no. 1315/2013, [50]and is, compared to the scale of values adopted in the matrix- **pursued in an "optimal"** " manner with 39 points.
On the average, this is pursued moderately (with an average value in line with the average of the entire section of OES), but by more than one half by the Functional Areas (16 of 27), with peaks of excellence (score of 4) in the following cases:

- AF 3.B.1. "Measures for improving the transport services and increasing the **accessibility to ports** via sea and via land" (deriving from objective 3 of the PSNPL), as they aim to supersede the limits on the transportation of freight by creating the conditions for an increase in the use of rail transport and the promotion of the latter's competitivity, especially for medium-long distance traffic. Indeed, there is provision for the freight railway corridors to be extended so that they reach the *international* gateways in ports;
- 4.D.1 Interventions that encourage **road accessibility** to inland areas and those which are the most affected by the territory's particular orology.

- AF 5.B.3. "Optimisation of the intermodal connections with the closest airports for regions lacking airport infrastructures", as the strengthening and optimisation of the networks and transport services between **airports** and the areas currently lacking airport infrastructures will also allow the Italian regions that are more distant from strategically important networks to use air transport and to benefit from the opportunities that it offers, particularly in terms of economic and social development.

Pursuit of OES 2: Ensuring optimal integration of the transport modes and interoperability within transport modes;

This OES, together with OES 3, OES 4, OES 6 and OES 7, reflects the transport efficiency *objectives set forth* in the aforementioned Reg. (EU) no. 1315/2013,[51] and is-insofar as the value scale adopted in the Assessment of Compatibility Matrix **pursued by the AI in an "optimal"** manner, with 47 points from 20 interferences, all of which were positive,
This is pursued by almost all the AFs, with peaks of excellence (score 4) in the following cases:

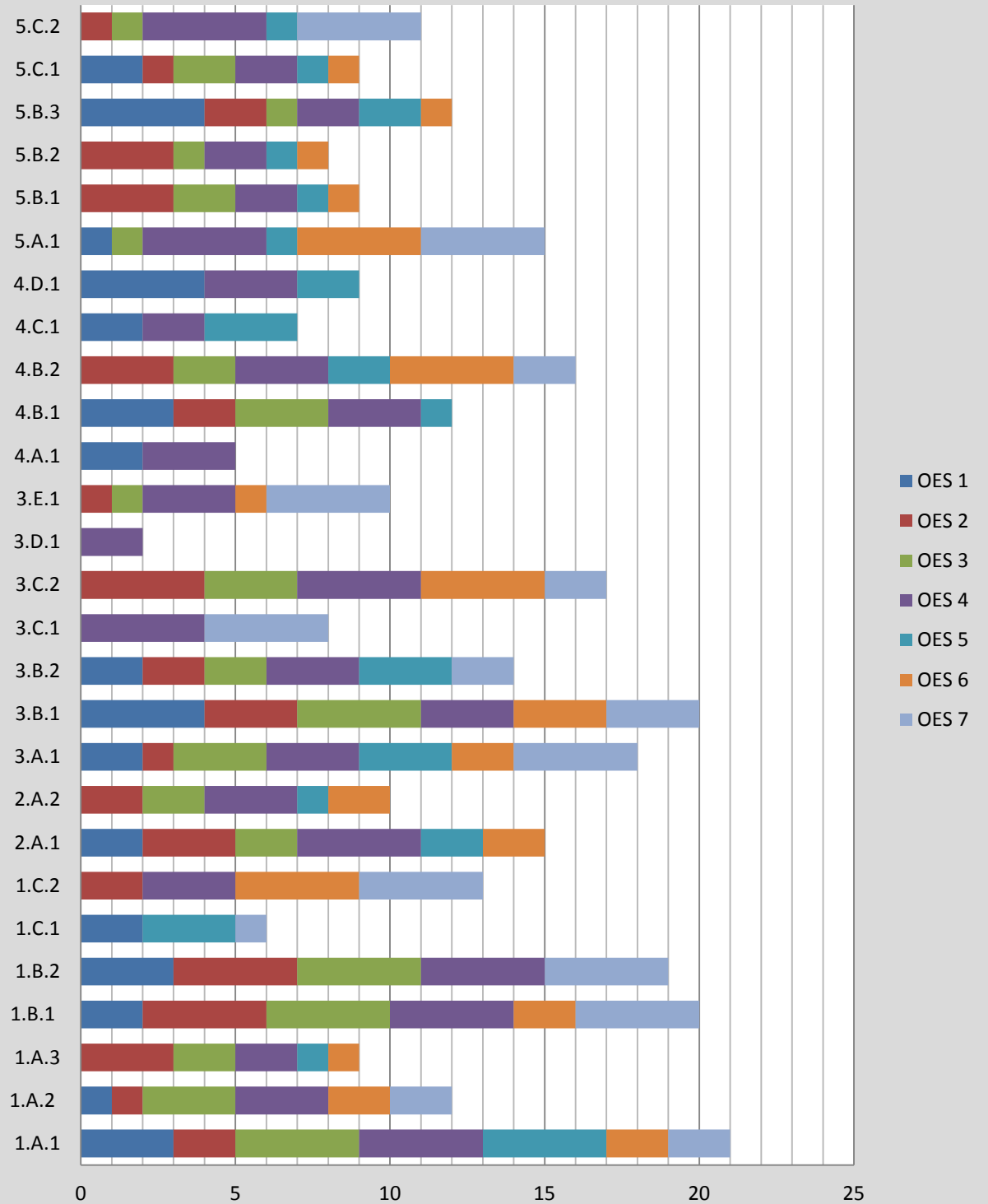
- of the two AFs containing the specific AI objective "1.B Increase in the quality of the freight network, rendering rail transport more attractive and planning, in conjunction with the logistics operators, a series of actions aimed at providing solutions to the main critical issues currently afflicting the railway freight system", to the extent that the ADF interventions are able to satisfy the various types of traffic (rolling motorways, *high cubes*, swap bodies and semi-trailers), generated/attracted by the main logistics hubs: ports, intermodal centres and alpine passes, or where their direct purpose is to address any insufficient intermodal accessibility of the m[manufacturing districts, ports and interports.
- AF 3.C.2. "Measures for stimulating research, development and technological innovation in Italian ports (PSNPL objective 6)", as one of their purposes is to develop a cooperative modular architecture that allows for the integration of information and services relative to road transport and intermodality (PLN-UIRNet), freight transport by rail (PIL/PIC- FS Italiane), transport via the motorways of the sea (PMS - Comunità Portuali) and the management of the hubs (PLN,PCS, PIL) and air transport (DG-Air. Transport), with the aim of creating a network of integrated services according to the principles of co-modality and intermodality,

[50] See Article 4 "Objectives of the TransEuropean transport network", letter a).

[51] See Article 4 "Objectives of the TransEuropean transport network", letter b).

and to coordinate intervention measures by monitoring and assessing the effects on transports, the environment, safety and the efficiency of the logistics system.

Fig. 4 - Economic-social and transport impact by Functional areas and OES



Six other significant positive impacts (score 3) on OES 2 are expected from updating of AFs:

- 1.A.3, 5.B.1 and 5.B.2, insofar as specifically aimed at multimodal integration, through the interconnection of railway lines, airports and infrastructure for road transport.
- 2.A.1. "Functional interventions to improve the quality of regional rail services, with particular reference to large metropolitan areas and services for commuters" insofar as this involves actions specifically aimed at the integration of existing multimodal transport systems in terms of both physical interconnections (through completion of the network of rail links) and "intangibles" (e.g. through the creation of integrated ticketing, scheduled for the metropolitan railway service (SFM) of Bologna).
- 3.B.1. "Measures to improve transport services and increase the accessibility of ports via sea and via land (objective 3 PSNPL)" to the extent that the main actions are designed to simplify access to port services for promoting optimal use of the capacity of logistics hubs. It is also planned to improve fluvial-maritime transport links by creating corridors for the customs clearance of goods.
- 4.B.2. Interventions for the implementation of Intelligent Transport Systems (ITS) for roads, insofar as the implementation of such systems in the road transport sector can also facilitate route planning at the intermodal level, especially with regard to the transport of goods.

Pursuance of OES 3: Provide missing links and remove bottlenecks, especially in cross-border sections

The Assessment of compatibility of AI with respect to this OES was **"excellent",** with 47 points resulting from 20 interferences, all positive.

Peaks of excellence (score 4), in the pursuance of OES 3 are attributable to 4 functional areas inherent to **rail and port mode**:

- 1.A.1 "Interventions on singular points of the conventional network with solutions that are preferably technological or that provide for a limited use of the territory to permit the raising of speed", given that the speeding up of lines is pursued in large part by intervening on station routes through the implementation of technological and infrastructural interventions to improve traffic in the hubs with particular reference to stations that house crossings;
- 1.B.1 "Performance adaptation for freight traffic on the main European corridors "Core Corridors" (train outlines and modules), in particular strengthening of the links between domestic terminals – with special attention to those of the South – and Alpine passes, and separation and optimisation of flows by type of service", to the extent that they call for technological and infrastructural interventions on railway hubs expressly destined to separate and optimise flows by limiting interferences that cause delays and inefficiencies in circulation;
- 1.B.2. "Strengthening and streamlining of interconnections between the railways and manufacturing districts, ports and freight terminals, aiming to reduce "last mile" costs and improvement and expansion of services in plants", to the extent that, among other interventions, it is planned to create rail links where they are missing or inoperative between ports and freight terminals of the *Core* network, currently only partially connected through other modes of transport.
- 3.B.1. "Measures to improve transport services and increase the accessibility of ports via sea and via land" (objective 3 PSNPL), to the extent that the main actions included in AF aim at promoting sea links with access to domestic terminals that are strategic for traffic to and from Mediterranean and Black Sea ports, through the development and financing of integrated supply chain projects.

Other positive interferences (3 points), relate to the **rail, port and road** modes, respectively, with the AFs:

1.A.2 inherent to interventions for development of the HS/HC network, the speeding up of the antenna sections and the upgrading of the main traveller corridors, insofar as this involves the implementation of technological interventions to improve traffic in the hubs and interventions that affect the cross-border sections of TEN-T corridors. Some of the interventions related to AF are included in the list of projects identified preliminarily in Annex I - Part I of Regulation No. 1316/2013 establishing the "Mechanism for Connecting Europe" (CEF), or in any case have been identified as solutions for critical problems in the aforementioned "Corridor Studies".

3.A.1 "Measures for the simplification and acceleration of procedures, controls and interventions on the ports of national interest (objective 1 PSNPL) and for improving the efficiency of port services and increasing the competitiveness of operators (objective 2 PSNPL)", insofar as they aim to accelerate implementation of major works of infrastructural upgrading in ports, without which the operation of the rest of the equipment offered would be compromised (for example, dredging the seabed to accommodate new generation cargo ships with greater draft).

3.C.2. "Measures to stimulate research, development and technological innovation in the Italian port system (objective 6 PSNPL)", for the reasons already expressed about OES 2.

Pursuance of OES 4: Promote the efficient and sustainable use of infrastructure and, where necessary, increase capacity

The OES is pursued by 26 out of 27 functional areas, and very often with scores above 2. The Assessment of compatibility of the AI with respect to this OES was, **in fact, "excellent"**, with 79 points from 26 interferences, all positive (average score for interference equal to 3, compared with an average of 2.5 for OES).

Therefore this Economic-Social Objective roughly provides the figure of the entire AI, and of its intentions to improve in particular the infrastructure for existing mobility, interconnecting it and increasing its capacity only where deemed necessary to ensure the functionality of the entire network transport.

It is, however, an intention which, as seen in the previous section, also has positive effects on the proper pursuance of environmental objectives, such as OAS 2 "Increasing resilience to climate change and other disasters, including reducing hydrogeological risk", both in turn in line with various documents addressing environmental policies such as, for example, the National Strategy for Adaptation to Climate Change" (see. para. 6.3), according to which the minimisation of risks, induced by these changes in the transport sector, can also be reached "by favouring the optimisation of existing networks with respect to the implementation of new and major works and performing a weighted assessment of the standards of efficiency with respect to their functionality".

In particular, with respect to this objective, the following recorded the highest performance:

- three functional areas (1.A.1, 1.B.1 and 1.B.2) belonging to the Strategic Line of the AI for **rail transport,** namely those aimed at:
  - maximum efficiency of existing infrastructure through the so-called "speedups", understood as interventions on singular points of the conventional network with solutions that are preferably technological or that provide for a limited use of the territory to permit the raising of speed (AF 1.A.1);
  - increasing the quality of the goods network by making the rail mode more attractive (AF 1.B.1)
  - and strengthening and streamlining of interconnections between the railways and manufacturing districts, ports and freight terminals, aiming to reduce "last mile" costs and improvement and expansion of services in plants (AF 1.B.2);

- both AFs in which Strategic Line 2 of the AI, on **intermodality in urban areas**, specifically concerning the "reducing of urban and metropolitan congestion through the strengthening of metropolitan networks, starting from the most populated areas, and the improvement of multimodal regional mobility for better and more reliable services";
- most of the actions provided for in the **Strategic National Ports and Logistics Plan (PSNPL)**, taken on board en bloc in the AI as a reference for the interventions on the port system, and in particular those related to the implementation of a vision of the Sea System as an engine for economic recovery, benefiting also the Italian industrial and production system, and also promoting innovation (Specific Objective 3.C of the AI);
- two Functional Areas related to **airports:** one concerning the optimisation of the air traffic in line with the Single European Sky project (SESAR, Specific Objective 5.A) and one designed to take full advantage of the capacity of existing airports through the imposition of planning restrictions or functional delocalisation, where airport development is conditioned by physical, environmental or safety limitations (AF 5.C.2).

Good performances (score 3) are also shown by three AFs related to the resolution of the structural problems of the network, with particular reference to the age of the main structures (AF 4.A.1) and the improvement of safety and traffic on the road network (4.B. 1 and 4.B.2).

Pursuance of OES 5: Improve or maintain the quality of infrastructure in terms of social conditions, of accessibility for all users, particularly older people, people with reduced mobility and disabled passengers, as well as the quality of services and continuity of traffic flows

This objective condenses the more properly social objectives in terms of *greater benefits for all users*, referred to in the aforementioned Reg. (EU) No. 1315/2013.[52] The Assessment of compatibility of the AI with respect to this OES was **"excellent",** with 32 points resulting from 17 interferences, all positive.

There was **only one point of excellence** (score 4), in its pursuance, in relation to AF 1.A.1 "Interventions on singular points of the conventional network with solutions that are preferably technological or that provide for a limited use of the territory to permit the raising of speed" **(rail mode**) because of the expected improvements in terms of quality of service and accessibility. Control and traffic management devices, installation of which is expected under implementation of the AF, are indeed functional for rendering train traffic more efficient and punctual, limiting interferences between flows. The adoption of technological solutions then makes it possible to raise speed on traveller lines of the conventional network, without requiring the abolition of stations, thus without limiting the opportunities for access to rail transport by citizens on a territorial basis.

The three AFs which have recorded a significant pursuance (score 3) of this OES belong to all modes of transport, except for air transport. In particular:

- for **rail and road modes**, in relation to the AF concerning the related safety measures (AFs 1.C.1 and 4.C.1), and to AF 4.B.1. "Interventions of adaptation and rationalisation of the road network with specific regard to stretches affected by heavy traffic or significant occurrence of accidents" with reference to the possibility of ensuring greater continuity of traffic flows for both people and goods;
- for the **port system**, AF 3.A.1 - "Measures for the simplification and acceleration of procedures, controls and interventions for ports of national interest (objective 1 PSNPL) and for improving the efficiency of port services and increasing the competitiveness of operators (objective 2 PSNPL)", as regards the simplification of authorisation procedures for the use of port infrastructure; advantageous in general, and particularly for the tourism sector –

[52] Cf. Article 4 "Objectives of the TransEuropean transport network", letter d).

especially cruise tourism – through improvements in ground services and connections with other modes of transport (rail/air).

Pursuance of OES 6: Develop and install telematics applications and promote innovative technological development

The Assessment of compatibility of AI with respect to this OES was **"excellent",** with 37 points resulting from 17 interferences, all positive. As expected, the four AFs pursuing the objective excellently (4 points concern **implementation of innovative technologies** in each of the four modes of transport. It is worth further describing their respective characteristics, at least minimally, to appreciate the general positive effects on the *network*:

- for **rail transport**, AF 1.C.2 is aimed at the diffusion of technological equipment and telematics applications for the efficiency and safety of rail traffic. It includes actions for the dissemination of technological equipment and telematics applications that improve the efficiency and safety of rail traffic, with particular reference to **ERTMS/ETCS** (European Rail Traffic Management System) systems. ERTMS is a system of management, control and protection of railway traffic with equipment both on land and on board, designed in order to make the traffic and safety systems of various European Railways interoperable, replacing systems that are incompatible. In the aforementioned Regulation on European Union guidelines for the development of the TransEuropean transport network (EU/1316/2013), full implementation of the ERTMS is expressly stated as an objective to be achieved by 2030 for all corridors of the central TEN-T network. The fitting out is required for all new railway lines or those subject to modernisation; there is also a European plan for implementation of the ERTMS (Decision 2009/561/EC) which identifies the sections to be equipped by 2015 and 2020.
- for **port systems**, AF 3.C.2 specifically pursues research and technological innovation and, in particular, diffusion of **Intelligent Transport Systems** for the management of port operations. It derives from Strategic Objective No. 6 of the PSNPL, which lays down a series of measures designed essentially to speed up procedures (e-ports, intelligent systems such as Port Community Systems, etc.), ensure the digital logistics chain in the interests of safety and speeding up, as well as promoting research and advanced training programmes nationwide. Actions for the digitisation of the logistics chain are united by the goal of improving integration and interoperability among the multiple information processing systems existing today. The following activities are planned:
    1. Digitisation of the logistics chain;
    2. Promotion of structured research collaboration among the Port System Authorities (AdSPs), universities and research centres;
    3. Promotion and financing of advanced training programmes at national level;
    4. Legislative measures to strengthen dissemination of the National Logistics Platform (NLP).
- In an EU context of absolute prevalence (and constant growth) of road transport, where the use of technological systems plays an increasingly fundamental role in the creation of an integrated, safe, efficient and sustainable transport system for people and goods, AF 4.B.2 includes the development and implementation of intelligent transport systems **(Intelligent Transport Systems - ITS) for road transport** adequately coordinated with already existing systems at national and European level and suitably interfaced with other transport modes. In fact, an ITS based on the interaction between IT and Telecommunications enables transformation of transport systems into an integrated system, where traffic flows are distributed equally among the various modes, for greater efficiency and safety. Interventions related to the AF mainly concern the design and development of ITS technologies and services for the management and monitoring of traffic and infrastructure, passenger

information, *road pricing*, and the management of road freight and road safety; for example, sensors, cameras, variable message panels, real-time information on traffic and weather conditions, emergency management and road safety systems, automatic toll payment and tracking of dangerous goods.

- Functional Area 5.A.1. "Interventions aimed at the development of **air traffic management systems**" includes 3 multinational SESAR projects (2014-EU-TM-0136-M, 2014-EU-TM-0387-M and 2014-EU-TM-0121-M) funded through the Connecting Europe Facility (CEF), with ENAC (Italian Civil Aviation Authority) as partner and contains a number of initiatives concerning arrivals, navigation, management and exchange of information among operators, airport automation, etc. The SESAR programme is well represented within the National Networks and Infrastructure 2014-2020 Operating Programme (PON), as part of Priority Axis I - "Encourage the creation of a single European multimodal transport space with investments in TEN-T": in this regard, the actions that PON intends to support are focused on the design, development and installation of new plants and systems related to the development and improvement of technologies connected mainly with ATM systems. Projects related to the SESAR programme are also included among the interventions planned within the Regulations and Studies related to Corridors of the TEN-T network. The SESAR programme started its activities in 2005 and is currently in the phase of "deployment" (2014-2025), which covers large-scale installation of the new systems and widespread implementation of related functions.

Pursuance of OES 7: Remove administrative and technical barriers, in particular to interoperability of the trans-European transport and to competition

The Assessment of compatibility of the AI with respect to this OES was **"excellent",** with 46 points resulting from only 15 positive interferences, but with very high average scores (3.1 compared with an average of 2.5 for OES).

The AFs pursuing the objective excellently (4 points) are in fact seven, distributed among all modes of transport. They concern:

- for **rail mode**, all interventions in pursuance of specific objective 1.B "Increasing in quality of the goods network making rail mode more appealing by planning, in coordination with logistics operators, a series of actions to provide a solution to the main problems currently affecting the goods rail system", namely those aimed respectively at: performance adjustment of Italian and cross-border sections of the main freight corridors to the standards of interoperability defined in the Regulations on European Union guidelines for development of the TransEuropean transport network (1.B.1) and the completion of missing or inefficient links along major freight corridors, adjusting them to the standards of interoperability defined in the aforementioned Regulations (1.B.2).
- the AFs regarding the **technological innovation** treated in the previous OES 6, with the exception of the road ITS (that is, 1.C.2 , 3.A.1 and 5.A.1)
- AF 3.E.1. "Measures for the financing of management and investments of **Port Systems** (objective 8 PSNPL), for the coordination, planning and national promotion of the sea system (objective 9 PSNPL) and for adjustment of the Governance of ports to the mission of the Italian Port System (objective 10 PSNPL)", insofar as the main objective of "New Governance" is precisely that of increasing the competitiveness of the entire Italian manufacturing sector and, in particular, that in southern Italy, through reorganisation of the entire port system. In principle, this refers to measures aimed at improving the competitiveness of the port and inter-port system by proposing a new model of Governance based on recognition of the need to overcome the single-port dimension of port governance bodies in favour of multi-port governance structures. Among the instruments necessary for achieving the objectives of the

Plan, the New Governance model proposes streamlining, reorganisation and consolidation of the existing Port Authority. In particular, among the intervention strategies, the PSNPL defines the establishment of Port System Authorities (AdSPs), with connecting functions in respect of all public administrations with responsibility for activities to be carried out in the port context.

A series of reorganisation activities is further envisaged that involve both the MIT and each Port System Authority, as well as the creation of a monitoring and planning system for port, logistics and maritime transport system, which also calls for the institutionalisation of a special logistics and port partnership Forum and the review and harmonisation of the rules on port scheduling and the scoping of AdSPs, along with framework standard setting for port development plans and Three-Year Operating Programmes for ports.

In particular, with reference to objective 8 of the PSNPL – "certainty and programmability of financial resources" –the creation of a balanced allocation of resources generated in ports is planned through centralised and long-term planning of financial resources for infrastructures. This will be possible through systematising existing sources (e.g. ERDF, Development and Cohesion Fund, Junker Plan, etc.), in order to identify the most correct source to be attributed to each category of investment as a result of the degree of its maturity, its specific objectives, cost-benefit analysis conducted and expectations regarding timing of implementation.

- For **air mode**, AF 5.C.2 "Imposition of territorial restrictions or functional delocalisation, where port development is conditioned by physical, environmental or safety limitations", already treated as a valuable contribution to pursuance of OAS4 "Reduce land use, the withdrawal of resources and the waste produced" (insofar as, in the final analysis, it concerns targeted interventions to enhance to the maximum already existing infrastructures, avoiding recourse to the creation of new airports – perhaps in the same metropolitan area – to respond to an eventual growth in unmet demand), has very interesting implications also for pursuance of this OAS.

  In fact, it is an example of the benefits that removal of technical and administrative constraints – or rather the removal of technical barriers through administrative constraints – can have for the competitiveness of airports.

  The "stabilising" effect of this kind of intervention on the competitiveness of airports, especially those at international level, induced by safeguarding the possibility of scheduling future expansions to keep up with demand, should be considered. Faced with a measure that is essentially of an urban planning-administrative nature, thus also of relatively rapid implementation, positive effects may occur immediately after its application in terms of attractiveness to airlines in the growth phase, which might feel reassured by this possibility of expansion when choosing between alternative locations. After all, on closer inspection, it is nothing more than fielding the "classic" function of urban planning, which saw the light as a means for ensure the rational growth of settlements and a framework of certainty for private operators.

  Furthermore, the application of constraints seems to be an alternative to the albeit expected "functional delocalisation", i.e. the need to move out of airport grounds, and presumably not in the immediate vicinity, service functions that are not essential to the operations of air traffic, precisely to make room for the latter in cases of extreme need for expansion. In this sense, the constraint avoids partial delocalisations, thereby reducing transfer costs and waste of not only economic resources in terms of new infrastructure and new construction; all this against overwhelmingly positive effects on the functionality of airport activities of the airport, viewed as a whole, due to the physical proximity that would be retained.

7.3 Balance of the significant effects of the AI on the system of reference objectives for the assessment (analysis of overall strategic value)

As mentioned in para. 4.6, reading the rows of the Matrix make it possible to assess the overall performance of individual functional areas, also broken down into the two sections into which the reference objectives for the assessment are structured (OAS and OES).

In the case of the AI, this has made it possible to indicate which Functional Areas, by virtue of their potentially negative impacts recorded on one or more components of the environment, justify further consideration in the section of the Assessment Dossier dedicated to accompanying measures, or the Environmental Agenda of the AF. The problem did not arise in relation to the Economic-Social Objectives and transport policy pursued by the AI, insofar as they were always positive; as was to be expected, because part of the missions of AI was to define at national level the objectives of transport policy established at European Community level, from which the OES derive.

In this sense, this section of the Assessment Matrix constitutes a sort of analysis of external coherence of the AI, as well as a possibility of verifying ex-ante conditionalities, although limited to the part of the TO. 7.1 relative to the characteristics of the AI as a "general framework for investment in transport in conformity with the institutional framework of Member States that support infrastructure development and improve access to the global network and the central TEN-T network and that meets the legal requirements for a strategic environmental assessment".

By virtue of these variations in behaviour regarding pursuance of OAS and OES, the attribution of judgments has used different scales, for which please refer to Legends 3 and 4 of the Matrix, and to para. 4.6 which illustrates it.

Finally, an overview of the assessment matrix and the subsequent ***Fig. 5*** permits identification of those functional areas of intervention which, due to a **negative score on environmental strategic value,** and independently of the amount of accumulated positive impacts, are reported in the final column dedicated to the Assessment of Strategic Value (S), **requiring a particular control of impacts (**symbol: **"!")**, eventually using, at future stages of implementation of the AF, specific design indications for the individual detected impacts exceeding -1 contained Environmental Agenda of Assessment Dossiers, and – more widely – in Chapter 8 of this ER.

In particular, it concerns all AFs in which "heavy interventions for the development of the network" may occur, to use a definition of the AI itself (see Specific Objective 1.A of the Tree of Choices of the AI), and thus the AFs:

Rail mode

1.A.2 Interventions to raise the performance of the network, continuing with development of the HS/HC network (with specific attention to the South through interventions identified by National Operating Programme (PON) for Infrastructures and Networks 2014-2020), including the speeding up of aerial stretches and upgrading of the performance of the main traveller lines

1.A.3 Interventions to strengthen railway connections with the main airports in line with the European strategy for the "Core" network to promote air-rail intermodality

1.B.1 For freight traffic, performance adjustment on the main European corridors "Core Corridors" (train outlines and modules), in particular strengthening of the links between domestic terminals – with special attention to those of the South – and Alpine passes, and separation and optimisation of flows by type of service

Road mode

4.B.1 Interventions of adaptation and rationalisation of the road network with specific regard to stretches affected by heavy traffic or significant occurrence of accidents, or aimed at resolving

critical issues related to urban congestion at urban hubs, including the completion of routes already affected by relevant interventions of adaptation and safety measures

Air mode

5.B.1 Interventions linking road and rail modes to three intercontinental gateways (Fiumicino, Malpensa and Venice)

5.B.2 Interventions linking road and rail modes with the other strategic airports

5.B.3 Optimisation of intermodal connections with the nearest airports for regions where there are no airport infrastructures

5.C.1 Interventions of adaptation and strengthening of existing airports that are ongoing and already planned

As for the rest of the AFs, by definition all with both positive strategic environmental and economic-social assessments, there are three distinct classes, based on the consistency or otherwise of the "Positive" or "Very Positive" judgments in the two judgments of Environmental Strategic Value (gSa) and Economic-Social Strategic Value (gSe). In particular:

- 4 AFs resulted "average" in overall strategic value (symbol: +), insofar as both with “Positive” gSa and gSe;
- 12 AFs resulted "high" in overall strategic value (symbol: ++), insofar as one with “positive” and one with “very positive” gSa and gSe;
- 3 AFs resulted "very high" in overall strategic value (symbol: +++), insofar as both with “very positive” gSa and gSe;

As is easy to imagine, in this latter case, the three AFs reserved for technological innovation in the management of infrastructure and carriers (road, port and airport sectors), at parity of effectiveness with the other AFs, have only positive environmental impacts for obvious reasons.

7.4 Compliance with ex ante conditionalities (Art. 10. Reg. 1315/2013)

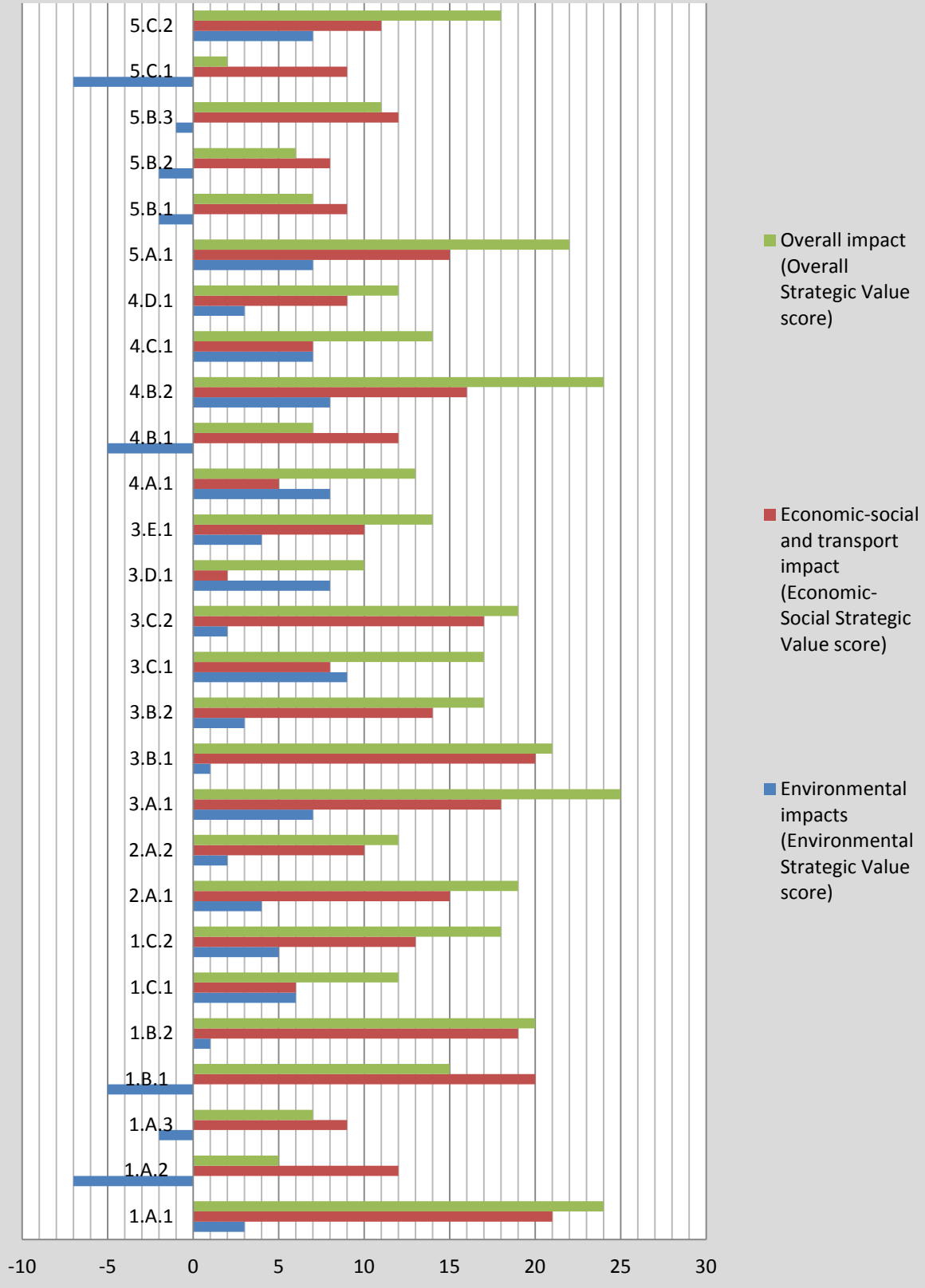
As specified in paras. 4.3 and 6.8, the seven Economic-Social and Transport Objectives (OES) whose pursuance was subject to assessment in para. 7.2, derive directly from Art. 10 "General Priorities" of the aforementioned Reg. No. 1315/2013, then transposed in full among the criteria of satisfaction of ex ante conditionalities for Thematic Objective 7.
In particular, these "General Priorities" are the criteria for fulfilling conditionality 7.1, where they provide for *the existence of one or more plans or general frameworks for investing in transport that meet the legal requirements for a strategic environmental assessment and define the contribution to the single European transport space in line with Article 10 of Regulation (EU) No. 1315/2013 of the European Parliament and of the European Council, including priorities for investments relating to:*

- *the main axes of the TEN-T core network and of the comprehensive network in which investments by the ERDF and Cohesion Fund are envisaged;*
- *and secondary connectivity.*

Parts of the General Priorities were essentially of an environmental nature, and were therefore already included among the objectives Summary Environmental Objectives (respectively OAS 2, OAS 1 and OAS 6).

However, for the purpose of facilitating the consistency check of the AI with the criteria under Art. 10 of EU Regulation No. 1315/2913 for the Commission's partners, the three latter OES which were redundant with respect to the OAS, specifying the correspondences, including with notes in the Assessment Matrix. In the specific case:

Fig. 5 - Overall impacts expected by the implementation of the AI, by Functional Areas and strategic components



OES 8 Improve or maintain the quality of infrastructure in terms of safety, protection, efficiency, resilience to climatic conditions and, where appropriate, to disaster, of environmental performance (coincides with OAS 2)

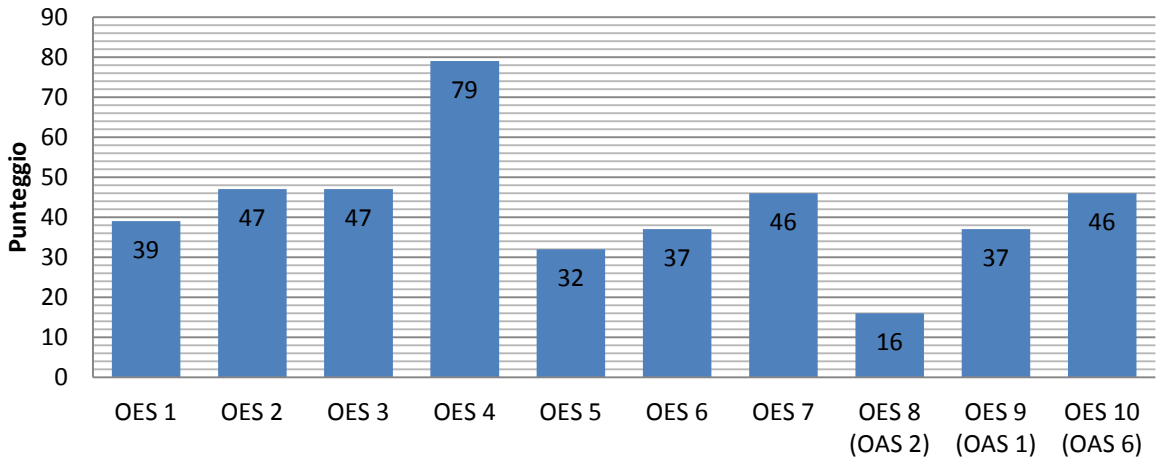
OES 9 Ensure the safety of fuels through greater energy efficiency and promote the use of renewable energy and alternative propulsion systems and in particular low or zero carbon emissions (included in OAS 1)

OES 10 Mitigate the exposure of urban areas to the harmful effects of rail and road transport transit (included in OAS 6).

This section presents a selection of previous assessments specifically targeted at verifying the fulfilment by the AI of the Body of Criteria established by the Commission.

Referring for more details to previous paragraphs 7.1 and 7.2, for the verification sought refer to the simple graphic in ***Fig. 6*** below, which summarises the full congruence of the AI with the compliance criteria.

Fig. 6 - Fulfilment of ex ante conditionalities the fulfilment of ex ante conditionalities (General Priorities)



OES	Par. and lett.	General Priorities under Art. 10 of Reg. (EU) No. 1315/2013
	Co.1	*1. In the development of the global network, general priority is given to the measures necessary for*
OES 1	lett.a)	Ensure better accessibility and connectivity for all EU regions while taking into account the special circumstances of islands, isolated networks, and sparsely populated, peripheral and remote regions
OES 2	lett. b)	Ensure an optimal level of integration of transport modes and interoperability among them
OES 3	lett. c)	Provide missing links and remove bottlenecks, especially in cross-border sections
OES 4	lett. d)	Promote the efficient and sustainable use of infrastructure and, where necessary, increase capacity
OES 8 (OAS 2)	lett. e) (first part)	Improve or maintain the quality of infrastructure in terms of safety, protection, efficiency, resilience to climatic conditions and, where appropriate, to disaster, of environmental performance (coincides with OAS 2)
OES 5	lett. e) (second part)	Improve or maintain the quality of infrastructure in terms of social conditions, of accessibility for all users, particularly older people, people with reduced mobility and disabled passengers, as well as the quality of services and continuity of traffic flows
OES 6	lett. f)	Develop and install telematics applications and promote innovative technological development
	Co.2	*2. In order to complement the measures set out in paragraph 1, particular consideration shall be given to measures that are necessary for:*
OES 9 (OAS 1)	lett. a)	Ensure the safety of fuels through greater energy efficiency and promote the use of renewable energy and alternative propulsion systems and in particular low or zero carbon emissions (included in OAS 1)
OES 10 (OAS 6)	lett. b)	Mitigate the exposure of urban areas to the harmful effects of rail and road transport in transit (included in OAS 6).
OES 7	lett. c)	Remove administrative and technical barriers, in particular to interoperability of the trans-European transport and to competition

7.5 Assessment Matrix

LEGEND 1: Criteria for judging the intervention capaciity of the AF to pursue the objective in question	
4	The AF can contribute significantly to achieving the objective
3	The AF can contribute in large measure to achieving the objective
2	The AF can contribute moderately to achieving the objective
1	The AF can make a limited contribution to pursuance of the objective
	The AF has no relevant interactions with the objective
0	Non-scoring, but arising from algebraic compensation of negative and positive scores
-1	The AF can be in contrast, albeit in a limited way, with pursuance of the objective
-2	The AF requires special attention in order not to contrast with pursuance of the objective
-3	The AF can contrast significantly counteract with pursuance of the objective
-4	The AF may impede the possibility of achieving the objective

LEGEND 4: Schema for determining overall strategic balance (Sc)

		Environmental Strategic Value judgment (gSA)		
		Negative (N)	Positive (P)	Very positive (MP)
Economic-Social Value judgment (gSE)	Positive (P)	! Need for special monitoring of impacts	+ Average Sc	++ High Sc
	Very positive (MP)		++ High Sc	+++ Very high Sc

LEGEND 2: Determination of the compatibility balance (judgment of pursuance of the OAS/OES by the AI)			
N	Very negative: p <= -10	**B**	Good: 10 < p <= 30
LN	Slightly negative: -10 < p < = 0	**O**	Optimum: 30 < p < =50
S	Sufficient: 10 < p <= 30	**E**	Excellent : p > 50

LEGEND 3: Determination of the Guest of the Environmental Strategic Value and Economic-Social Strategic Value judgments of AFs		
Environmental strategic value score (pSA)	Judgment	Economic-social strategic value score (pSE)
pSA <= 0	N = negative	pSE <= 0
0 < pSA <= 6	P = Positive	0 < pSE <= 12
pSA > 6	MP = Very Positive	pSE > 12

ASSESSMENT MATRIX

TREE OF CHOICES FOR INFRASTRUCTURE ANNEX

GENERAL OBJECTIVE ("requirements of AI"):
Adapt national planning in the field of strategic infrastructure to EU guidelines and provide a strategic tool that can provide guidelines for financial programming of public administrations, in the light of budgetary constraints, and for the investment decisions of private investors

			REFERENCE OBJECTIVES SYSTEM FOR THE ASSESSMENT																					
			SPECIFIC ENVIRONMENTAL OBJECTIVES (OAS)								ECONOMIC-SOCIAL OBJECTIVES (OES) General priorities in development of the Global Network under Art. 10 EU Reg. No.1315/2013 concerning EU guidelines for development of the TEN-T network, the fulfillment of which constitutes ex ante conditionality for the AI (limited to part OT 7.1)										Overall Strategic Value score	Strategic Value balance
			Increase air quality, energy savings and the reduction of greenhouse gases **(includes OES 9)***	Increase resilience to climate change and other disasters, including reducing hydrogeological risk **(includes OES 8)***	Protect natural areas and biodiversity, including marine biodiversity	Reduce soil erosion, depletion of resources and waste production	Protect the landscape and cultural heritage, including geosites	Improve the living conditions and health of the population, including by increasing the quality of the urban environment **(includes OES 10)***	Environmental strategic value score	Environmental strategic value judgment	Ensure better accessibility and connectivity for all EU regions while taking into account the special circumstances of islands, isolated networks, and sparsely populated, peripheral and remote regions	Ensure an optimal level of integration of transport modes and interoperability among them	Provide missing links and remove bottlenecks, especially in cross-border sections	Promote the efficient and sustainable use of infrastructure and, where necessary, increase capacity	Improve or maintain the quality of infrastructure in terms of social conditions, of accessibility for all users, particularly older people, people with reduced mobility and disabled passengers, as well as the quality of services and continuity of traffic flows	Develop and install telematics applications and promote innovative technological development	Remove administrative and technical barriers, in particular to interoperability of the transEuropean transport and to competition.	Environmental Strategic Value score	Economic-Social Strategic Value judgment		
Strategic lines	**Specific objectives**	**Functional Areas of Intervention (AF)**	**OAS 1**	**OAS 2**	**OAS 3**	**OAS 4**	**OAS 5**	**OAS 6**	**pSA**	**gSA**	**OES 1**	**OES 2**	**OES 3**	**OES 4**	**OES 5**	**OES 6**	**OES 7**	**pSE**	**gSE**	**pS**	**S**
1. Expansion of the railways mode and improvement of passenger services in terms of quality and travel time, and transport of good in terms of length of modules, shape and axial weight, nationally Mainly concentrating on the completion of the Central European network, starting with the passes and the South of Italy and connections with the TEN network of the main urban and productive hubs.	1.A. **Development of medium-long range** passenger network. Actions for relaunching railway services compared to other door-to-door modes will focus on increasing network performance to make the mobility system more competitive, with a mix that favours "light" investments with a rapid return (technologies, increases in speed and removal of bottlenecks) alongside some "heavy" investments for network development	1.A.1. Interventions on singular points of the conventional network with solutions that are preferably technological or that provide for a limited use of the territory to permit the raising of speed	3	_	-1	-1	0	2	3	P	3	2	4	4	4	2	2	21	MP	24	++
		1.A.2 Interventions to raise the performance of the network, continuing with development of the HS/HC network (with specific attention to the South through interventions identified by National Operating Programme 2014-2020 - Infrastructures and Networks), including the speeding up of aerial stretches and upgrading of the performance of the main traveller lines	2	_	-2	-3	-3	-1	-7	N	1	1	3	3	_	2	2	12	P	5	!
		1.A.3 Interventions to strengthen railway connections with the main airports in line with the European strategy for the "Core" network to promote air-rail intermodality	1	_	-1	-2	-1	1	-2	N	_	3	2	2	1	1	_	9	P	7	!
	1.B **Increase in the quality of the freight network** making the rail mode more attractive, planning, in coordination with logistics operators, a series of actions to provide a solution to the main problems currently affecting the freight rail system.	1.B.1 For freight traffic, performance adjustment on the main European "Core Corridors" (train profiles and modules), in particular strengthening of the links between domestic terminals – with special attention to those of the South – and Alpine passes, and separation and optimisation of flows by type of service	2	_	-2	-3	-3	1	-5	N	2	4	4	4	_	2	4	20	MP	15	!
		1.B.2. Strengthening and streamlining of interconnections between the railways and manufacturing districts, ports and freight terminals, aiming to reduce "last mile" costs and improvement and expansion of services in plants	2	_	-1	-1	-1	2	1	P	3	4	4	4	_	_	4	19	MP	20	++
	1.C. **Increase in safety, quality and improving** infrastructure efficiency, ensuring	1.C.1 Safety interventions and adjustment to legal obligations (level crossings, safety in tunnels, hydrogeological risk, seismic checks, acoustic rebalancing)	_	4	-1	_	-1	4	6	P	2	_	_	_	3	_	1	6	P	12	+

Strategic lines	Specific objectives	Functional Areas of Intervention (AF)	OAS 1	OAS 2	OAS 3	OAS 4	OAS 5	OAS 6	pSA	gSA	OES 1	OES 2	OES 3	OES 4	OES 5	OES 6	OES 7	pSE	gSE	pS	S
	continuity in maintenance programmes	1.C.2 Interventions for infrastructure quality and efficiency (circulation, telecommunications, ERMTS technologies)	1	_	_	_	_	4	5	P	_	2	_	3	_	4	4	13	MP	18	++
2. Reduction of urban and metropolitan congestion through the strengthening of metropolitan networks, starting from the most populated areas, and the improvement of multimodal regional mobility for better and more reliable services	2.A Development of the TPL network with new proposals for relaunching the sector, also for better intermodal integration between rail and road	2.A.1 Functional interventions to improve regional railways services, with particular reference to large cities and commuter services	3	_	-1	-2	-1	4	3	P	2	3	2	4	2	2	_	15	MP	18	++
		2.A.2 Functional interventions to expand metropolitan networks	4	_	-1	-2	-2	3	2	P	_	2	2	3	1	2	_	10	P	12	+
3. Improvement of port and interport competitiveness, aiming at optimisation of each port's vocation, through necessary infrastructural and procedural work and optimisation of national port system governance	3.A. Increase competitiveness of the Sea System, reducing times and costs of transit of goods and of time to carry out interventions on infrastructures in the ports, and improving port systems	3.A.1. Measures for simplifying and speeding up procedures, controls and interventions on ports of national interest **(objective 1 of PSNPL)** and for increasing efficiency of port services and operator competitiveness **(objective 2 of PSNPL)**	1	_	2	2	_	2	7	MP	2	1	3	3	3	2	4	18	MP	25	+++
	3.B. Improve services and infrastructures in the port sector and aid an increase in quality of transport and logistic services for manufacturing enterprises	3.B.1. Measures to improve the transport services and increase accessibility to ports via sea and land **(objective 3 of PSNPL)**	3	_	-1	-1	_	_	1	P	4	3	4	3	_	3	3	20	MP	21	++
		3.B.2. Measures for increasing port infrastructures and their land connections **(objective 5 of PSNPL)**	1	-1	-2	3	1	1	3	P	2	2	2	3	3	_	2	14	MP	17	++
	3.C. Implement a vision of a Sea System as the driver for economic recovery, to also benefit the Italian industrial and productive system, aòso promoting innovation	3.C.1. Measures to encourage the integration of logistic chains and manufacturing and logistic activities **(objective 4 of PSNPL)**	2	1	_	3	2	1	9	MP	_	_	_	4	_	_	4	8	P	17	++
		3.C.2. Misure per incentivare la ricerca, lo sviluppo e la innovazione tecnologica nella portualità italiana **(objective 6 of PSNPL)**	1	_	_	1	_	_	2	P	_	4	3	4	_	4	2	17	MP	19	++
	3.D. Pursue international and European guidelines for protection of the environment and reduction of greenhouse gases, accompanying the promotion of the logistics system and increasing use of the sea as a more sustainable communication and transport route than road transport, with protection of the port area environment from various sources of pollution, and minimisation of environmental impact of infrastructures on surrounding area and reduction of energy consumption linked to port activities.	3.D.1. Measures for improving the energy efficiency and environmental sustainability of ports (**objective 7 of PSNPL)**	4	_	3	2	_	-1	8	MP	_	_	_	2	_	_	_	2	P	10	++
	3.E. Support the mission given to Italian ports via centralised, multi-year planning of financial resources for infrastructures, Sea System coordination, programming and promotion, and a new Governance model.	3.E.1. Measures for the financing of management and investments of Port Systems **(objective 8 of PSNPL)**, for the coordination, planning and national promotion of the sea system **(objective 9 of PSNPL**) and for adjustment of the Governance of ports to the mission of the Italian Port System **(objective 10 of PSNPL)**	1	_	_	2	_	1	4	P	_	1	1	3	_	1	4	10	P	14	+

Strategic lines	Specific objectives	Functional Areas of Intervention (AF)	OAS 1	OAS 2	OAS 3	OAS 4	OAS 5	OAS 6	pSA	gSA	OES 1	OES 2	OES 3	OES 4	OES 5	OES 6	OES 7	pSE	gSE	pS	S
4. Improvement of the road network, by completing the central road network, in particular the most congested routes; increase in connections to secondary and tertiary hubs for the TEN-T global network and raising of safety levels on the main roads	4.A. Resolution of structural critical factors of the network, with particular reference to the age of the main works of art	4.A.1. Interventions for static safety of the main works of art by carrying out static and seismic stability studies on the infrastructures, particularly for some routes that are also subject to deterioration of infrastructures, and widespread interventions on the network	_	4	_	_	_	4	8	MP	2	_	_	3	_	_	_	5	P	13	++
	4.B. Improvement of circulation and safety conditions on the road network	4.B.1 Interventions of adaptation and rationalisation of the road network with specific regard to stretches affected by heavy traffic or significant occurrence of accidents, or aimed at resolving critical issues related to urban congestion at urban hubs, including the completion of routes already affected by relevant interventions of adaptation and safety measures	-2	_	-1	-2	-2	2	-5	N	3	2	3	3	1	_	_	12	P	7	!
		4.B.2. Interventions for implementing road Intelligent Transport Systems (ITS)	2	3	_	1	_	2	8	MP	_	3	2	3	2	4	2	16	MP	24	+++
	4.C. Safety work to protect the road network from landslides and flood risks in order to avoid interruptions in service	4.C.1. Improvement of stability of crumbling slopes or roads at risk of flooding, using stabilisation methods for crumbling areas and regulation of rainwater	_	4	_	_	-1	4	7	MP	2	_	_	2	3	_	_	7	P	14	++
	4.D. Reduction of isolation of important population layers with a view to synergy and integration of the various programming levels	4:d.1. Interventions for aiding accessibility to internal areas and the ones most penalised by the particular orography of the territory	0	_	-1	-1	1	4	3	P	**4**	_	_	**3**	**2**	_	_	9	P	12	+
5. Optimisation of air traffic consistent with the outline of "single European sky" and a multimodal connection of main airports with city centres	5.A. Optimisation of air traffic in line with single European sky	5.A.1. Interventions aimed at developing air traffic management systems (SESAR programme)	4	_	_	1	_	2	7	MP	1	_	1	4	1	4	4	15	MP	22	+++
	5.B. Implementation of works required to improve accessibility and intermodality	5.B.1. Interventions linking road and rail modes to three intercontinental gateways (Fiumicino, Malpensa and Venice)	1	_	-2	-2	-1	2	-2	N	_	3	2	2	1	1	_	9	P	7	!
		5.B.2. Interventions linking road and rail modes with the other strategic airports	1	_	-2	-2	-1	2	-2	N	_	3	1	2	1	1	_	8	P	6	!
		5.b.3. Optimisation of intermodal connections with the nearest airports for regions where there are no airport infrastructures	1	_	-2	1	-2	1	-1	N	4	2	1	2	2	1	_	12	P	11	!
	5.C. Guarantee airports the capacity required for economic development of the country	5.C.1. Interventions of adaptation and strengthening of existing airports and those already planned	-1	_	-2	-2	-1	-1	-7	N	2	1	2	2	1	1	_	9	P	2	!
		5.C.2. Setting of restraints in the territory or functional delocalisation, if development of the airports is affected by physical, environmental or safety limits	_	1	1	4	1	_	7	MP	_	1	1	4	1	_	4	11	P	18	++
Total score given to pursuance of the objective			**37**	**16**	**-17**	**-4**	**-15**	**46**	**63**		**39**	**47**	**47**	**79**	**32**	**37**	**46**	**327**		**390**	
Compatibility balance (C)			**O**	**B**	**N**	**LN**	**N**	**O**			**O**	**O**	**O**	**E**	**O**	**O**	**O**				
No. of Functional Areas interfering with the Objective			*23*	*8*	*19*	*23*	*18*	*24*	***115***		*16*	*20*	*20*	*26*	*17*	*17*	*15*	***131***		***246***	
Average score for interfering AFs			*1,6*	*2,0*	*-0,9*	*-0,2*	*-0,8*	*1,9*	***0,5***		*2,4*	*2,4*	*2,4*	*3,0*	*1,9*	*2,2*	*3,1*	***2,5***		***1,6***	

8 Accompanying measures: organic repertoire of indications for the environmental agendas of Functional Areas

8.1 A repertoire to support compilation of the Assessment Dossiers

This part of the Environmental Report concerns the following point of Annex VI: *g) Measures planned to prevent, reduce and as fully as possible offset any significant adverse effects of implementing the plan or programme.*

The purpose of this SEA fulfilment is to ensure that the Environmental Report addresses the ways in which the significant adverse effects of the plan are to be reduced (point 5.27 EU Guidelines)[53].

In this regard, it is worth recalling that the assessment model adopted was designed specifically providing for this "constructive" assessment function.

The systematic search in the Matrix for the potential impacts of the AF compared with respect the whole system of reference objectives makes it possible, in fact, to identify with a certain orderliness also possible accompanying measures to be made operational in the progressive definition of interventions pertaining to the Functional Area in question.

As such, the indications offered by the matrix are then developed in Section 3 of the Assessment Dossier, which therefore contains in-depth information on the conditions that permit reducing likely impacts to a minimum, or making them acceptable, compared with the overall benefits obtainable through the choice of plan in question. It is in this sense that this in-depth information constitutes a sort of ***environmental agenda of interventions that will implement the Functional Area of intervention,*** containing various kinds of indications, such as:

- environmental themes or plans of attention and localising criteria, by way of indications for an environmentally friendly design from the outset, when technical decisions are still to be taken and the range of possibilities is wider and their viability less expensive;
- measures related to mitigation/compensation used in similar cases, from which to eventually draw inspiration, and in any case useful for investigating environmental issues;
- indicators for future assessments;
- contributions concerning the three previous points provided by Subjects with Competence on the Environment (SCAs) consulted during the scoping phase.

It is useful to premise the presentation with a reference to the definitions of the main accompanying measures, indicated in ISPRA manuals.[54]

The **localising criteria** derive from the need to safeguard the landscape-environmental system on the basis of its factors of sensitivity factors, and direct improvement of the project by acting on the design phase of the work itself. In this phase, among the possible alternatives, the best position of the work of transformation in relation to the existing work is indicated.

Mitigation measures are aimed at minimising or even cancelling the negative impact of a plan or project during or after its completion. Mitigation measures cover different categories of intervention: mitigation works, i.e. those directly connected to impacts (e.g. noise barriers); works of project "optimisation" (e.g. reduction of energy consumption or its improved integration with the landscape).

Compensation measures are interventions not strictly closely related to the work, which are realised by way of environmental "compensation" for residual impacts that cannot be mitigated (e.g. the

[53] Office of Official Publications of the European Communities. Implementation of Directive 2001/42/EC ... (op. cit.).

[54] Cf. Manual No.126/2015: “Ambiente, Paesaggio e Infrastrutture”(Environment, Landscape and Infrastructure), Volume IV;

creation of wetlands or wooded areas in affected areas of the ecological network or reclamation and revegetation of degraded sites not related to the work in question). These also serve to redevelop previous degradation of the landscape-environmental system. Compensation measures not only reduce residual impacts attributable to the project, but provide for substitution of an environmental resource that has been depleted by a resource considered of at least equal importance.

ISPRA manuals also emphasise that mitigation and compensation are an integral part of the project and are designed simultaneously with it, and that the interventions themselves, although designed to minimise the effects of a project primarily on a component and/or environmental factor, should be effective against more components and/or factors and, above all, have a significance at the system and not only the component level. It is hoped, therefore, that a real **environmental balance** will be drawn up, indicating and quantifying the actual extent of the effects of the changes on the landscape-environmental system to then be able to indicate really targeted compensation.

Obviously, the treatments that follow are intended to provide useful guidance for the subsequent phases, including references to sector manuals, without pretending to exhaust the topics on the table.

In the final analysis, it is reaffirmed that the environmental agenda of the Functional Area of intervention serves to guide internalisation of the environmental considerations of the case in future projects to be implemented, being set in the logic of vertical coordination between planning and design (and related assessments) generally referred to as "*tiering*".

This chapter therefore organically develops accompanying measures aimed at improving the environmental performance of infrastructures for mobility, always aggregated according to the six Specific Environmental Objectives (cf. table in section 5.1), to support drafting of the Assessment Dossier evaluation in which such measures, if appropriate, are referred to selectively, adapting them from time to time to the specific Functional Area in question.

Of course, given the proximity of strategic environmental assessment activities and identification of accompanying measures for negative assessments, the information contained in this chapter has also been used as a reference for the environmental assessments reported in the dossier and summarised in Chap. 7.

In this premise, it is also useful to refer to presence of increasingly numerous ***plans and programmes developed at regional level, sub-regional level or for wide areas*****,** which provide the main framework for shaping the measures proposed.

They were listed by categories in the Scoping Report, among the reference documents for the assessment, distinguishing those that pursue primarily socio-economic and transport objectives from those that pursue primarily environmental objectives, subject to assessing the level of definition that the Infrastructure Annex would have taken before embarking on depth of detail, region by region.

Subsequently, the purely strategic nature that the Annex has finally taken on has made this type of depth at the assessment level superfluous in this SEA. Nevertheless, these kinds of documents, including those reported by several Subjects with Competence on the Environment (SCAs) during the Scoping phase of the SEA (cf. section 2.2), are however mentioned below, by way of important references for the subsequent phases of definition/assessment of programming in the field of transport:

Mainly socio-economic and transport objectives

- Regional Transport Plans
- Plans for Regional Mobility
- Port Regulatory Plans
- Airport Development Plans
- Regional Operating Programmes 2014-2020

etc.

Mainly environmental objectives

Regional Territorial and Landscape Plans

Provisional Plans for Basin Area

Water Management Plans

Water resources management plans referred to in Dir. 2000/60 /EC

Flood risk management plans referred to in 2007/60 EC

Regional Reclamation Plans

Provisional plan for high-risk sites

Waste management plans

Regional plans for mining activities and recovery of excavated areas

Rural Development Plan 2014-20

Management plans for protected areas and Natura 2000 Sites, continental biogeographical area, Alpine biogeographical area, etc.

Management plans for UNESCO sites

Air quality improvement plans

Regional energy plans

Noise pollution control plans

SEA related to all plans listed above.

8.2 OAS 1 Increase air quality, energy conservation and reduction of greenhouse gases

The premise of the linking under way between transport and environmental policies related to this OAS, mentioned in section 6.2, is the lower level of polluting emissions that rail, sea and river transport is believed to have compared with road transport, although some specifically conducted studies have shown that this occurs only in some special conditions[55].

In setting future assessments of projects that give shape to Functional Areas of intervention, one could thus also think at the level of overall network or "global level impacts", considering the overall changes in pollutant emissions induced by the modal shift away from the more polluting modes to the less polluting modes that the plan or project will presuppose.

With reference to the targeted analysis of the environmental-territorial context conducted in section 5.2, the themes/indicators relevant for assessment of these aspects are:

- estimates of trend in number of passengers and goods transported by mode of transport;
- indicators of total energy consumption in the transport sector;
- greenhouse gas emissions by type of gas (ISPRA Yearbook);
- CO2 emissions by mode of transport;
- emissions of other air pollutants by mode of transport;

[55] Cf.: Westin Jonas, Kågeson Per, “Can high speed rail offset its embedded emissions?” Transportation Research Part D (2012), 2011, journal homepage: www.elsevier.com/ locate/ trd. The article analyses the implications for climate change of investments in high-speed railway lines, given the uncertainties about the future demand for transport, technology and energy production. According to the results of the study, in order to offset annual emissions due to the construction of new high-speed lines, annual traffic of at least 10 million one-way trips is required and on condition that most of this traffic subtracted from other modes of transport comes from air transport. In addition, the project cannot foresee the extensive use of tunnels.

all can be found in the ISPRA Environmental Annual Report.

On the other hand, with reference to the Catalogue of ISPRA Indicators, the indicators considered relevant for parameterisation of impacts are:

ID	Strategic topics	Objective of overall sustainability	Environmental issue	Indicator	Unit of measurement
51	Sustainable transport	Ensure that our transport systems meet the economic, social and environmental needs of society while minimising their undesirable impacts on the economy, society and the environment	Transport demand and modal distribution	Transport demand (freight and passengers) by mode of transport	passengers-km tonnes-km
53			Sustainable energy consumption in transport	Final energy consumption in the transport sector	ktep
54			Atmospheric emissions from transport	Total greenhouse gas emissions and by sectors	Mt/year

Taking advantage of the specific contribution made by ARPA Puglia, in the case of port and airport areas, it is proposed to complement that list with an indicator that renders the flow of goods and people in terms of transiting vehicles (understood as the number of vehicles).

Of course, although resorting to parametric values, it will be necessary to obtain project data related at least to:

- estimates of changes in passengers/goods transported following implementation of the intervention,
- the share of these believed to have been presumably subtracted from more polluting modes of transport.

This will make it possible to reach the figure of emissions "saved", from which the emissions expected from completion of the work itself should still be subtracted (cf. previous note).

Reasoning instead at the local level, further elements could be taken into account, elements such as the use of alternative energy sources (e.g. in the case of port management) or measures of compensation for the production of greenhouse gases, such as reconstitution of biodiversity islands through the planting of native trees and shrubs also in populated areas.[56]

Other mitigation measures in relation to this OAS are not being proposed, insofar as the AI aims in substance (3 strategic lines out of six) at the modal transfer of goods and passengers towards less polluting modes, as shown by the excellent environmental Assessment of Compatibility of pursuance of OAS 1, to be seen in the Assessment Matrix.

The environmental plans to be consulted include: Air quality improvement plans, regional energy plans, and related SEA.

8.3 OAS 2 Increase resilience to climate change and other disasters, including reducing hydrogeological risk

The main extreme climatic phenomena to contain which adaptation strategies can be put in place aimed at increasing ***resilience to climate change*** in the environment concerned are:

- heat waves (including impacts on human health, crop damage, forest fires);

[56] Cf. Contribution of PN Gran Sasso and Monti della Laga during the scoping phase.

- drought (including a decrease in water availability and in the quality of that available);
- risk of flooding and exceptional rainfall;
- extreme storms and strong winds, including damage to infrastructure, buildings, crops and forests, and communication systems);
- landslides;
- rise in sea level, coastal erosion, water retraction and saline intrusion;
- waves of frost.

In the specific field of transport planning, and with reference to the issues listed above, the following *factors* can actually be considered as having an impact:

1. **heat waves**: risk of forest fires that disrupt the operation of transport infrastructure;
2. **drought**: increase in water consumption, in areas at risk of drought, due to the establishment and operation of the plan's works; exposure of groundwater to saline intrusion due to the implementation of port works; works involving excessive exposure to pollution of waterways in relation to the decrease in their volume during drought;
3. **river flooding:** localisation of infrastructure in an area at risk of flooding, or with a network of drainage that is insufficient for ensuring the disposal of exceptional rains, or that may cause a risk to sensitive receptors (critical infrastructure) due to its very hindering presence;
4. **strong wind:** localisation of infrastructure (such as bridges) in an area characterized by phenomena of peaks in the intensity of wind, which might compromise the exercise, stability and/or safety of the people using it;
5. **landslides:** localisation of infrastructure in a geomorphologically unstable area;
6. **rise in sea level, coastal erosion, water retraction and saline intrusion**: localisation of infrastructure in an area sensitive to phenomena of a rise in sea level, or subject to coastal erosion, or itself the cause of changes in the dynamics of current that expose new stretches of coastline to erosion;
7. **waves of cold and frost**: exposure of infrastructure to risks posed by exceptionally long periods of cold or waves of frost that could damage it; infrastructure management that takes into account the possible inconveniences/risks for users in these situations.

With regard to specific measures for ***adaptation to climate change,*** some "Action proposals" for the transport and infrastructure sector are provided below, taken from the National Strategy for Adaptation to Climate Change[57] (Annex 3), which are useful in the planning/design phase for works related to different Functional Areas of Intervention:

NON-STRUCTURAL OR "SOFT" TYPE ACTIONS

- Measures to protect the territory, diffusion of awareness of risks (*risk awareness*), possibility of compulsory insurance, introduction of compensation mechanisms;
- Risk mapping;
- Integration of adaptation into planning instruments such as the urban mobility plan (PUM) and the urban traffic plan (PUT) at municipal level, and further sector plans at higher levels.

ACTIONS BASED ON ECOSYSTEMIC OR "GREEN" APPROACH

Green infrastructures

- Maintenance of natural areas (agricultural areas, wetlands, lakes) where the flooding of rivers and flooding due to heavy rains can be allowed;

[57] MATTM, National Strategy for Adaptation to Climate Change, 2014.

- Maintenance of green corridors and belts.

Public transport infrastructures

- Protection of underground train stations from flooding;
- Integration between green infrastructures and slow mobility.

ACTIONS OF AN INFRASTRUCTURAL AND TECHNOLOGICAL OR "GREY" TYPE

Road transport infrastructures

- Identification of road network points at risk of flooding and optimal management of the sewerage system for water drainage;
- Replacing of road surface with drainable asphalt and at the same time resistant to high temperatures;
- Raising the ground level of a road in the event of a rise in sea level;
- Checking road maintenance on a more regular basis;
- Ensuring the availability of a data collection and communication network.

Railway transport infrastructures

- Stabilisation interventions of railway ground level and modification of the techniques of construction of tracks, with the use of structures that do not succumb to temperature changes;
- Assigning appropriate priority to maintenance of railways, and to the verification and adjustment of free spans of railway bridges over rivers under changed hydrological regime.

Port infrastructures

- Raising roads and warehouses at risk of flooding, increase the height of walls surrounding warehouses, reorganise the space of the port in such a way as to avoid locating warehouses in vulnerable areas, regularly dredge the bottom of port areas.

Airport infrastructures

- Ensuring drainage of airport runways following events of rain, hail or snow in order to ensure operability.

Other important elements for future assessments related to climate change are provided by the aforementioned manual on "Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment" (EU, 2013), which should be referred to for further information.

The factors being assessed with regard to this kind of impact on the theme of resilience to climate change, as well as hydro-geological, seismic, volcanic, etc. risk are almost all assessable necessarily according to the scale of the project, and thus at a level of detail inherent to the EIA. Therefore, the factors listed above remain valid as a field for procurement of recommendations for the future designs of new infrastructure in accordance with the *climate proof* criteria above. Moreover, it should be noted that the new EIA Directive 2014/52 EU, and in particular Annex IV, specifically requests that the EIA report should include analysis of the impact of the project on the climate but also of the project's vulnerability to climate change.

If, however, in future designs/assessments it were possible to identify and localise interventions, the cognitive discussion illustrated in the analysis of the environmental-territorial context referred to in section 5.3, and related to different types of ***hydrogeological risk*** are considered particularly useful for the assessment:

- ISPRA cartographic processing at national level of data from the Basin Authority about the distribution of interferences between urbanised areas/road arteries/railway lines and areas at R4 and R3 geomorphological risk/areas at R4 and R3 hydrogeological risk (each source of interference is analysed for each type of risk);
- the ''coastal risk index" developed within the aforementioned European EUROSION project with the purpose of estimating the risk related to the occurrence of events such as coastal erosion and/or sea floods, which are harmful for the environment and/or human activities.
- other themes of interest analysed in the ISPRA Yearbook, including dangers of natural origin, such as coastal dynamics, municipalities affected by subsidence, artificial reservoirs, precipitations, hydrological drought, areas subject to *sinkholes*.

But the most effective instrument by far for predicting possible impacts is superimposition, with the techniques of *overlay mapping* of the layout/area of the infrastructure in question on the many thematic maps of ***different types of risk*** that are available, such as (non-exhaustive list):

- hazard and hydraulic/geomorphological risk maps. In particular, the conformity of the work with the planning instruments of the Basin must be checked, as well the interferences of new infrastructures with the geomorphological and P4 and P3 hydraulic hazards of the Hydrogeological Structure Plans (PAI), and conformity with related limitations;
- hazard and seismic risk maps[58];
- maps relating to fire risk[59];
- maps of hazard and risk of volcanism;
- map of risk of erosion and landslide inventory[60].

Among the indicators to support the assessment, those specific for the hydraulic and geomorphological risk that affects the work (and the alternatives in question) should be considered, such as, for example, the number and extent of the areas at risk interfering with the infrastructures, the number of authorisation procedures requiring the opinion of the District Basin Authorities[61], and the average number of sea storms per year. The latter figure, in particular, is given in the ISPRA catalogue and is of particular interest – as well as for studies on climate change, maritime transport, activities related to fishing and the study of coastal erosion, for the design and sizing of maritime works, as well as for controlling the spread of pollutants in the sea.

In this regard, it should also be borne in mind that Directive 2007/60/EC on the "assessment and management of flood risks", implemented by Legislative Decree No. 49 of 23 February 2010, charges District Basin Authorities with the preparation of ***Flood Risk Management Plans***, for the areas under their responsibility, while the Regions, in coordination with each other and with the National Department of Civil Protection, are charged with the part related to the warning system for hydraulic risk for the purpose of civil protection.

In this case, the plans referred to in Legislative Decree 49/2010 (to be completed and published by 22 June 2015) should include measures for managing flood risk in areas where there may be a potential risk deemed significant, highlighting in particular the reduction of potential adverse consequences for human health, land, property, the environment, cultural heritage and economic and social activities, through the implementation of non-structural priority interventions and measures to reduce the danger.

[58] www.protezionecivile.gov.it

[59] www.pcn.minambiente/GN/

[60] geoportale.isprambiente.it

[61] Indicators suggested by AdB Tevere during the scoping phase.

However, with respect to works of landslide and flood risk mitigation that can affect transport infrastructures, refer in particular to the following ISPRA Manuals:

- "Implementation of Directive 2000/60/EC. Analysis and assessment of hydromorphological aspects", version 1.1, Rome, August 2011;
- "Atlas of slope layout works", 2001;
- "Atlas of slope layout works", second edition, No. 10/2002;
- "Guidelines for the assessment of hydrogeological instability and its mitigation through measures and interventions in agriculture and forestry", No. 85/2013.

Environmental plans include: Regional territorial and landscape plans, Provisional plans for catchment area, Water management plans, Water resources management plans under Directive 2000/60/EC, Flood risk management plans under 2007/60 EC, and related SEA.

8.4 OAS 3 Protect natural areas and biodiversity, including marine biodiversity

In general terms, the impacts of transport infrastructure on natural systems fall into three basic types:

- loss of habitat
- direct impact on animal populations
- fragmentation of environmental continuity

The ***loss of habitat***, particularly on the valley floor and in the hydrographic grid, but also in marine areas next to port works, can be derived directly from the effects of the layout of the work and site activities, or indirectly through the alteration of soils and the water regime, in particular if the work causes repercussions on surface groundwater, riverbeds, or on sea currents. In this sense, it can be understood how, upstream of the assessment of impacts, correct *functional diagnostics* should be carried out to identify the specific ecological dynamics on which the survival of the habitat of species at risk considered depends, and alteration of which may therefore depend on interventions that are also very far from the perimeter of any SCI or SPA, or protected area in general.

Another perhaps still neglected cause of loss of habitat is induced by the need to supply sizeable volumes of inert materials for the construction of artefacts, through mining activities that are not always localised in areas already compromised in terms of landscape and environment.

The ***direct impacts on animal populations*** destined to remain in the phase of operation of the finished infrastructure typically depend on factors of disturbance produced in terms of noise, lighting, vibration, air pollution and risk of accidents through the crossing of carriageways or railway tracks (the latter having an effect, of course, on the safety of travellers)[62].

Another decisive factor for the endangerment of ecological balances is that tied to the ***spread of exotic species***, given that infrastructures and the transport system generally are preferential pathways of introduction and expansion of non-native species.[63]

[62] In each Italian province an estimated 15,000 animals are run over every year. The general trend is towards an increase in the light of expansion of the road network and the increase in traffic volumes. Other accidents, often fatal to birds, are caused by accidental collisions against taut cables, wires and transparent surfaces such as glass or Plexiglas soundproof panels. Furthermore, small terrestrial species (small mammals, amphibians, invertebrates) remain trapped and die in wells, ducts, pipes and canals with steep banks. The species numerically most affected by road deaths are: hedgehogs, toads and owls. Cf. ISPRA Manual No.76.1/2011 "Fragmentation of the territory by linear infrastructures. Guidelines and best practices for the prevention and mitigation of impacts".

[63] Cf. contribution of ARPA Veneto during the scoping phase.

The ***fragmentation of environmental continuity*** is a very serious type of impact, to the point that conservation biology experts agree in blaming it for negative effects on biodiversity comparable – in the medium to long term – to the direct destruction of natural environments or the persecution of individual species. As is known, in fact, for some species habitat fragmentation can represent reduction of the related *distribution area* below the minimum vital dimension, namely that able to guarantee sufficient genetic variability to be able to defend the species itself from environmental stresses.

For this reason, for decades now, discussion has been more in terms of *conservation of ecological networks* of connection among protected areas than in terms of conservation of protected areas in themselves, since in any case, as "islands", this would not be sufficient for the purpose. This aspiration echoes in the very denomination of "Natura 2000 Network", used to indicate the set of Sites of Community Interest (SCI) and Special Protection Areas (SPAs) in Europe.

As mentioned above, the theme of reducing the impact of an infrastructure on biodiversity requires in-depth studies of the functional diagnostics of individual threatened species/habitats, which are outside the scope of relevance of the SEA of the AI, given the exclusively strategic nature that it has taken on. In the framework of subsequent assessments, at the level of the SEA, EIA and VINCA, it would be desirable to put in place complementary readings that are able to re-establish at least indicatively the effect of the sum of the fragmentations and losses of habitat expected from implementation of the plan. The complementary readings mentioned comprise:

1. a traditional **physical reading**, aimed at carrying out a census of the intersections between transport infrastructures and natural protected areas, including the Natura 2000 network[64] or even censuses on a regional basis of habitats and/or species which, although not identified by the annexes to European directives, have local conservation importance that is often greater[65];
2. a **functional reading**, aimed at highlighting the impacts of the works on environmental continuity, in terms of "additional fragmentation". It is thus a reading with functional connotations, which express the impacts on ecological processes supported by environmental continuity. As a reference for this type of analysis and by way of example, the following types of instruments can be used: the maps from Regional Landscape Plans, which usually also show the design of the Regional Ecological Network; the results of PLANECO national research, aimed precisely at identifying and proposing measures for the protection and restoration of ecological connections between areas of high naturalness, or the indicator of the ISPRA Yearbook which describes the distribution of Ecological Value for the Italian territory, providing a regional representation based on a subdivision into classes (although currently only for 12 regions, cf. section 5.4).
3. a **strategic reading**, which relates the map of infrastructures with the map of the priority areas already identified using the methodology of Ecoregional Conservation (ERC).

With reference to *physical reading*, the national geoportal offers, if necessary, in-depth detail useful for carrying out – using the technique of *overlay mapping* – a physical reading of any interferences of the choices of the Infrastructure Annex on the system of protected areas described so far.

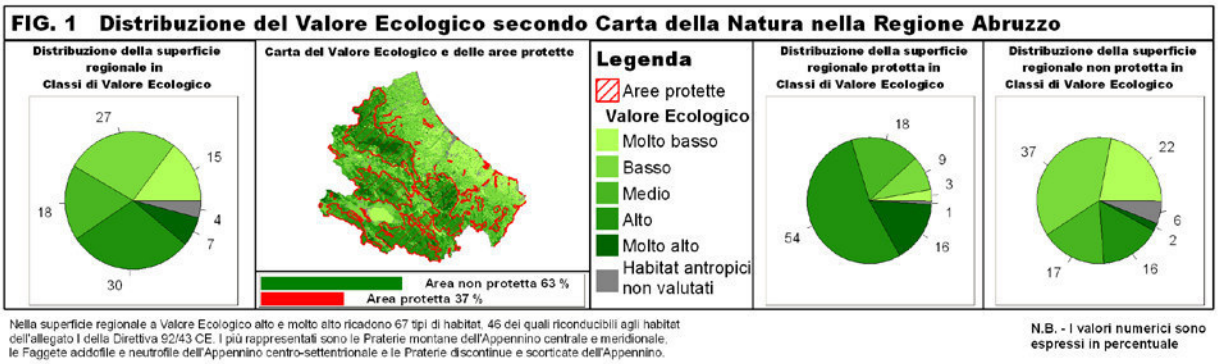
As regards *functional reading*, which aims to highlight the impact of works on environmental continuity (i.e. outside the protected areas) in terms of "additional fragmentation", it is certainly useful to analyse the situation of biodiversity using other cognitive frameworks, such as those offered by the indicator of the ISPRA Yearbook which describes the **distribution of Ecological Value for the Italian territory**,

[64] See, among others: Carta della Natura (www.geoportale.isprambiente.it) and Progetto Natura (www.pcn.minambiente.it).

[65] This latter theme of attention comes from the integration in the ER of the contribution from the Gran Sasso and Monti della Laga National Park Authority.

providing a regional representation based on a subdivision into classes (although currently only for 12 regions). Each class is assigned the percentage of regional territory falling into it, with information on the habitats present within the classes with greatest Ecological Value. The indicator also provides a comparison between the distribution of the Ecological Value and that of protected areas (***Fig. 1***).

Fig. 1 - Distribution of Ecological Value according to the Carta della Natura of the Abruzzo Region



source: ISPRA Yearbook of Environmental Data

The indicator permits considerations to be made about spatial distribution of the Ecological Value on a regional scale: for classes with high and very high Ecological Value, it shows how many and which are the most common types of habitats falling within them and allows a comparison between these areas and those under protection, providing useful information for the identification of additional areas to be protected or in general for the purposes of territorial at national and regional level.

For *strategic reading*, reference can be made to the setting of *Ecoregional Conservation,* (ERC), intended as a shared approach to protect the planet's biodiversity, developed within the framework of WWF International. In this perspective, moreover, much progress has been made, to the point of coming up with large-scale and long-term action models capable of relating the establishment and management of individual protected areas with the planning and management of a system of natural areas, as well as with socio-economic development and large area programmes. Reference is made in particular to *Ecoregional Conservation* (ERC) or Global 200, proposed by WWF International to encompass 238 *priority*[66] *Eco-regions* identified throughout the entire planet.

Some applications of this methodology have already covered the two global eco-regions that concern Italy (the Alps and the Mediterranean). The result of the application of the ERC methodology is identification of *priority areas*, understood as areas where values of biodiversity that are unique and indispensable for the entire eco-region are represented.

Priority areas, new evolutionary and ecological phenomena, conservation objectives and focal species (indicators of the effectiveness of conservation actions) are the pillars on which the Biodiversity Vision – seen as the desirable medium-term scenario (at least 50 years) for the conservation of biodiversity – rests.

Of course, the prerequisite for this operation is being able to have information on the exact location of the infrastructures, and of their variants. In this case, the following indicators of the Catalogue of ISPRA indicators are useful, but only as supplementary data for cartographic data in support of the assessments under the first "physical reading".

[66] An eco-region is defined as a territorial, land or sea unit, which contains a relatively large and homogeneous set of unique ecosystems that share a significant number of species, ecological dynamics and environmental conditions, and that, therefore, can be managed as a single conservation unit.

ID	Strategic topics	Objective of overall sustainability	Environmental issue	Indicator	Unit of measurement
35	Conservation and management of natural resources	Improve the management and avoid overexploitation of renewable natural resources (biodiversity) – SSS*	Loss of biodiversity	Natura 2000 Network state of conservation of habitats and protected species	state of conservation
74			Loss of biodiversity	Distribution of ecological value according to the Carta della Natura	ecological value (classes)
57	Sustainable transport	Ensure that our transportation systems meet the economic, social and environmental requirements of society by decreasing their undesirable impacts on the economy, society and the environment – SSS*	Territorial fragmentation	*fragmentation (mesh size) source EEA Report No 2/2011 - Landscape fragmentation in Europe* proxy: Density of transport infrastructure (network km/sq km)**	Sq. km km/sq. km

* SSS stands for " New EU Sustainable Development Strategy"

** The indicator can also refer to the environmental issue "loss of biodiversity" especially if its calculation considers, in addition to transport infrastructures, other territorial elements such as, for example, residential areas.

However, with respect to possible environmentally friendly planning measures/mitigation measures, it is worth listing the priorities for intervention indicated by the National Strategy for Biodiversity regarding the "transport work area":

a) rehabilitation of natural habitats at the margins of linear and point infrastructures;

b) integration of infrastructures within the ecological network;

c) landscape/naturalistic restoration of urban/peri-urban areas affected by degradation at the margins of the road/rail infrastructures, elimination of solutions of continuity between urban spaces and infrastructure grounds;

d) promotion of forms of sustainable mobility in urban areas;

e) increase of green surfaces in urban areas, including acting as a filter for pollutants;

f) adoption of techniques of naturalisation and bioengineering in the environmental insertion of infrastructures.

Of particular relevance in the development of the priorities listed above are the guidelines contained in ISPRA Manual No.76.1 / 2011 "Territorial fragmentation by linear infrastructures. Guidelines and best practices for the prevention and mitigation of impacts", which is summarised below.

The general criteria to be applied to the design of linear infrastructures in order to conserve biodiversity, the natural and cultural environment, landscape, and opportunities for outdoor recreation can be summarised as follows:

1. The planner has the main responsibility for considering environmental issues. Concern for natural assets should be assessed on the same level as technical and financial aspects.
2. Planning should be based on a good knowledge of nature and ecosystems. Inventories of protected areas are not sufficient, and it is up to experts to scientifically assess the consequences of different alternatives. Cooperation with specialists from the beginning of the process is a prerequisite for a good environmental outcome.
3. There is need for analysis and assessment of the entire area affected by the infrastructure, insofar as the works condition the natural and cultural environment, landscape and recreational opportunities over a much wider area than that covered by the project. It is therefore necessary to assess the implications for sufficiently lengthy stretches and over larger areas than those that are directly covered by infrastructural works.

4. It is necessary to avoid disturbing and passing through significant environments. Division and fragmentation lead to the loss of functions for the natural and cultural environment. Remaining areas must maintain a form and surface that makes them still ecologically functional.
5. The migration routes of animals must be protected, as well as opportunities for fish to swim freely and connections to be made in areas of open countryside. Ecological connections that have evolved over a long period of time and which are perfectly adapted to local conditions and landscape cannot be fully restored if damaged.
6. The layout of linear infrastructure has to be adapted to the natural and cultural environment, landscape and outdoor recreational opportunities. Choose layout, standards, materials and details which safeguard the assets of the surrounding environment.
7. Use mitigation measures if adverse impacts are inevitable. Plans that do not take into account environmental requirements must be reviewed.

For the purpose of making an ***"optimum" choice of location alternatives*** (of layout), an impact assessment should be conducted prior the start of the design phase, applied to alternative intervention (of localisation and project), adopting multi-criteria or multi-objective type methods of comparative analysis. It is therefore necessary to identify and define the indicators that concern the ecosystem and, based on characteristics of environmental quality, establish weights of importance for each indicator[67].

In general, with respect to the different layout alternatives, the following questions should be considered:

- fragmentation should be avoided, particularly in priority interest areas for biodiversity conservation, and in those not yet subject to fragmentation;
- functionality must be maintained of wildlife corridors, used for travel, transfer and migration: particular consideration should be given to rivers, streams and other waterways, riparian forests, hedges and rows of trees;
- elevations (hills, mountains, valleys) can provide opportunities for reducing the barrier effect of infrastructure;
- new communication routes must be placed preferentially in infrastructural corridors, that is to say in those areas already subject to urbanisation and industrialisation, in order to avoid fragmentation of environments that have not been greatly disturbed;
- landscape continuity of elements such as river valleys, slopes and ridges must be preserved.

In fact, the optimal choice aims to identify not just one possibility, but a range of alternatives:

- **choice compatible with mitigation,** i.e. where there is compatibility between not particularly high ecological quality and the presence of not very serious and sufficiently mitigable environmental impacts; cases in which attention should be paid to impact assessment and the design of mitigation and monitoring measures;
- **choice compatible without problems and perhaps advantageous.** Case in which the ecosystem and landscape are of poor quality and are perhaps already compromised by existing anthropic-infrastructural fabric and various forms of degradation. In such a case, implementation of a new infrastructure is usually compatible, albeit with the necessary mitigations and after assessment of the load capacity of the host territory. In such cases, it is almost always the effects on health or the socio-economic system rather than on nature that prevail.

[67] On this issue, see Battisti, C., "La selezione di indicatori a livello di specie nella pianificazione/progettazione di infrastrutture lineari" (The selection of indicators at the level of species in the planning/design of linear infrastructures) in "Materiali di approfondimento" (Research materials) - ISPRA Report 87/2008

However, it should be borne in mind that in densely populated areas the few remaining environments that have not been compromised represent ecological corridors or vital to wildlife. It is therefore necessary to identify and characterise them with precision, proceeding to adopt measures for their maintenance or, if possible, improvement.

In many of these cases, implementation of work and related investment may even give rise to opportunities for improving the environment, arranging interventions for the above-mentioned improvement and for environmental and social compensation (e.g. creation of new ecological corridors, wetlands, microhabitats or reclaimed areas).

With specific regard to the ***possible contribution of infrastructures to the conservation of the ecological network***, the aforementioned ISPRA Manual No. 76.1/2011 provides the following directions:

- an ecological corridor can be established there is vegetation along the side of the road layout that has been integrated in the past (e.g. rows of Tuscan cypress trees or plane trees along the Po), or along slopes and adjacent strips; these corridors, although in many cases of moderate absolute ecological value, often represent the only discontinuity with artificial constructions and the only natural support in areas that are heavily populated or subject to intensive agriculture;
- drainage canals, often adjacent to the road layouts, can also be positive ecological elements, even such as to create biotopes of a certain value (e.g. in the case of stagnation); an interesting opportunity is represented by the collection tanks for rain water which, if designed taking into account environmental integration, can effectively assume a biotopic role (ecosystems filter);
- in some cases, areas of sediment can help to increased permeability of the infrastructural system, especially if designed taking into account landscape and environment integration (there are examples in Northern Europe, in Switzerland and France in particular);
- road edges and slopes, if of a suitable type and integrated within certain natural settings, can establish ecotones with specificity or give rise to new habitats, species of both animals (e.g. reptiles in embankments) and plants (e.g. many herbaceous and ruderal floral species); this takes place (alternatively or in combination) with the introduction of soil conditions different from those present in the territory, with specific microclimatic situations and with the artificial reduction of biological competition; if these strips are subject to naturalistic engineering interventions (if well designed in terms of the choice of vegetation), processes of natural vegetalisation may be accelerated;
- strips of land adjacent to certain types of roads or railways are state-owned or in any case public property, as well as existing as buffer zones; this facilitates the establishment of side corridors free from structures or from improper or makes it easier to implement (at political-administrative level) intended use for environmental purposes;
- recomposition of fragmentation determined by road infrastructures is made possible thanks to the "passages for wildlife," which, if well designed, can enable the maintenance of ecological corridors, while representing points of constraint of their axes and therefore a factor of rigidity of the network's dynamics.

It should be recalled that, for the protection of fauna, in addition to wildlife underpasses, other systems with the main aim of reducing mortality from collision may be used. Here, besides protection nets, we are also referring, for example, to optical dissuaders and other devices capable of alerting larger size fauna.

The environmental plans to be consulted include: Regional Territorial and Landscape Plans, management plans for protected areas and Natura 2000 Sites, continental biogeographical area and Alpine biogeographical area, Port Regulatory Plans and related SEAs.

8.5 OAS 4 Reduce subsoil erosion, withdrawal of resources and waste production

The specific impact of transport infrastructures with respect to pursuance of OAS 4 is mainly related to the implementation of new works.

In fact, they induce above all ***consumption of new soil***, unless they are localised – in this case point works – in areas already compromised, and rehabilitated for the purpose (in this case, this refers to positive impacts).

In general, the quality of soils potentially involved should be assessed in advance, in order to promote implementation of the infrastructure in areas of lowest possible eco-systemic value. It would also be useful to introduce indicators that can express the intrinsic value of land (protective capacity, use capacity, water reserve, etc) and the indicator of organic carbon of the soil, designed also to assess the impact of the infrastructure in terms of CO2.

In particular, it is important to assess the subtraction of soil referring to ***food farming heritage,*** given that agricultural activity may undergo changes in view of processes of urbanisation and/or may be affected in areas temporarily being used as construction sites[68].

Finally, it should be borne in mind that the indicator of soil consumption of soil should include the extension of the surfaces attributable to each infrastructure, in addition to dimensions of the infrastructure itself[69].

Large quantities of ***raw materials***, such as groundwater, aggregates, cement, iron, etc., are usually needed for construction, many of which necessarily come from quarrying and mining, which never fail to produce other environmental impacts, particularly on the landscape or on local roads, which are then overloaded with heavy goods traffic involved in these activities.

In relation to the conservation of water resources, it should also be considered that the infrastructures are possible sources of ***contamination of surface and groundwater*** during both the construction and operating phases. Therefore monitoring of water status (ISPRA indicators) during the construction and operating phases of the work is therefore of particular importance.[70]

Another important issue – especially in transport infrastructures that require tunnelling – is ***disposal of debris***, which is difficult to relocate adequately in such large quantities, and with the possibility that it is contains pollutants (e.g. asbestos, or toxic substances from the dredging of industrial ports) which are difficult and expensive to dispose of.

Typically associated with the operation of infrastructures, especially those of roads, is ***consumption from oil fields*** which, by their nature, are non-renewable resources.

Similar to the effects of OAS 1, the above mentioned impacts lend themselves to being assessed in parametric form, attributing a certain coefficient of soil consumption, consumption of raw materials, or production of waste per sq km or infrastructure realized, including the construction site phase. Particularly useful for this purpose are the indicators of the ISPRA Environmental Yearbook, better illustrated in section 5.3, related to:

- dynamics of soil consumption by distribution;
- dynamics by soil consumed per capita in Italy;
- percentage of soil sealing in Italy by municipality (2012 data)
- consumption of soil for transport infrastructures;

[68] Cf. ISPRA Manual 109/2014, p. 40.

[69] Cf. contributions from ARPA Veneto, ARPA Liguria, ARPA Puglia and Lombardy Region during scoping phase.

[70] Cf. Contributions from ARPA Veneto, PN Gran Sasso and Monti della Laga, and AdB Tevere during scoping phases.

- extension of urbanised areas used for transport infrastructures and the communications network by region;
- trend over the period 1990-2001 of the surface area occupied by main roads;
- domestic material consumption (DMC);
- hazardous special waste from end-of-life vehicles.

Regarding the calculation of soil use for infrastructure, it must be borne in mind that the Corine Land Cover (updated 2012), having a minimum mappable unit of 25 ha for areal elements and 100 metres for linear elements, does not identify most roads as such.[71]

.Of course it is necessary to know at least the development of infrastructure and its altitude position in the event that viaducts and tunnels have to be considered. However, should it be possible to assess precisely localised works and their alternatives, those in the following selection from the ISPRA catalogue can be considered indicators.

ID	Strategic theme of the SSS*	Objective of overall sustainability	Environmental issue	Indicator	Unit of measurement
7	Conservation and management of natural resources	Improve the efficient use of resources to reduce the overall use of non-renewable natural resources and the related environmental impacts from the exploitation of raw materials, thereby using renewable natural resources at a rate consistent with their capacity for regeneration – SSS	Depletion of raw materials	Mining of first class minerals (mines) and second class minerals (quarries)	No. of mining activities and/ or no. of sites
			Depletion of non-renewable energy resources	Extraction sites for energy resources (hydrocarbons, geothermal resources)	No. of mining activities and/ or no. of sites
8		Improve the management and avoid overexploitation of renewable natural resources (water) – SSS	Sustainable use of water resources	Withdrawals of surface water and groundwater by type of use**	Mm3/year
			Marine pollution	quality biological elements (phytoplankton, macroalgae, benthic macroinvertebrates and angiosperms) supported by chemical, physical and hydromorphological elements - under Leg. Decree152/06 and Min. Decree 260/10	quality classes
31		Rational use of soil to limit occupation and soil sealing – COM (2006) 231	Soil saving	Soil use	classes of soil use
45	Sustainable consumption and production	Avoid generation of waste and increase efficiency in the exploitation of natural resources, thinking in terms of life cycle and promoting reuse and recycling – SSS*	Special waste production	Special waste production	tonnes/year

[71] Cf. contribution from ARPA Friuli Venezia Giulia during scoping phase.

* SSS stands for “New EU Sustainable Development Strategy”

** The proposed indicator ‘Withdrawals of surface water and groundwater by type of use’ is not popolable evenly for the whole country at least at the regional level (ISTAT has the data on withdrawals of water for drinking purposes at regional level). In the future, the ‘Percentage withdrawals of surface water and groundwater compared with those available’ ("Water exploitation index" - EEA) is proposed as the most representative in relation to the related objective of sustainability. The portal of the ISPRA Geological Survey has the '' National Archive of Subsoil Surveys (Law 464/84)”, in which information is available on the distribution by region of wells and the type of use of groundwater pumped from wells. Such information may contribute partially to monitoring the use of water resources.

It is worth consulting ISPRA Report 218/2015 "Il consume di suolo in Italia” (Land Consumption in Italy), ed. 2015.

In terms of the ***prevention of these impacts during the design and execution*** of works as a result of the strategic decisions of the AI, the Subjects with Competence on the Environment (SCAs) consulted during Scoping provided the following useful indications in relation to the following topics connected to the saving of natural resources/reducing of waste for disposal (cf. section 2.2):

Contaminated sites:
they should be considered as preferential sites for the localisation of infrastructure, in order to associate the reduction of soil consumption with reclamation of the area itself; if this is not possible, give indications for environmental restoration, with permeability of the soil and revegetation of the site inherent, also in terms of flood risk mitigation; ;

Foundations/earth and rocks from excavation:
it is desirable that, in the construction of foundations of infrastructures, priority use be made of all inert materials resulting from the excavations required for the work, or for other projects being planned in the surrounding areas, resorting to inert materials recovered in the form of aggregates or conglomerates only as a second option;

Conservation of the quality of surface and groundwater
during both construction and operating phases. In this regard, note the utility of lagooning basins for rainwater from road areas that can take advantage of phytopurification and act as *stepping stones* for ecological networks (cf. also OAS 3).

As for the specific ***effects on hydrogeology***, it should be borne in mind that the construction of a linear infrastructure alters the morphology of the territory, due to excavations, movement of earth, tunnels, opening of quarries from which to procure construction materials and landfills in which to deposit waste materials, etc . These activities produce deep changes and interferences in the quality and quantity of surface and groundwater, as well as erosion, compaction and soil sealing, changes in the transport of solids and of hydrological regimes, leaching of minerals and increase the risk of landslides, with direct degradation and destruction of wetland habitats.

In the particular case of road infrastructures, vehicles normally release gases and dust produced by the combustion of fuel, while the anti-snow salts are deposited on surrounding vegetation or are absorbed by roots. Run-off from asphalt and the conveyance of substances into waterways and groundwater can transfer damage at great distances and for a long time. The accumulation of lead and cadmium in the soil and plants is much greater on roads with high traffic volumes. Significant pollution problems also occur during the construction site phase, caused by the means and products used and the handling, storage and disposal of materials.[72]

The environmental plans to be consulted include: Regional Territorial and Landscape Plans, Water Management Plans, Water Resources Management plans referred to in Dir. 2000/60/EC, Regional

[72] Cf. ISPRA Manual No.76.1/2011 "Fragmentation of the territory by linear infrastructures. Guidelines and best practices for the prevention and mitigation of impacts".

Reclamation Plans, Transitional Plan for high-risk sites, Waste Management Plans, Regional Plans for mining activities, rehabilitation of excavated areas, geological mapping of territory.

8.6 OAS 5 Protect landscape and cultural heritage

As for impacts on biodiversity, the possibility of assessing the impact of infrastructures on landscape and cultural heritage has the minimum requirement of knowing the exact localisation of interventions and their alternatives. The main reference for assessing this kind of impact on landscape and cultural heritage is undoubtedly the ***regional Landscape Plan*** provided for by Art. 143 of Legislative Decree No. 42 of 22 January 2004, "Cultural Assets and Landscape Code" as subsequently amended.

For each area, landscape plans in fact define specific requirements and forecasts, in particular for:

a) conservation of the constituent elements and morphologies of the landscape under protection, taking account of architectural types, techniques and construction materials, as well as needs of restoring landscape values;

b) redevelopment of compromised or degraded areas;

c) safeguarding of landscape features of other territorial areas, while at the same time ensuring the least use of land;

d) identification of lines of urban development and construction, based on their compatibility with the different recognised and protected landscape values, with special attention to the safeguarding of rural landscapes and sites on the World Heritage List of UNESCO. [73]

The contents of the PPR should include at least:

- recognition of the territory covered by the planning through analysis of its landscape features, impressed by nature, history and their interrelationships;
- recognition of the buildings and areas declared to be of significant public interest in accordance with Article 136, their boundaries and scale representation suitable for the identification and determination of specific conditions of use;
- recognition of the areas protected by law (Art. 142, para.1, which includes entire categories such as sea or lake coasts, rivers with their related areas, mountains, protected areas, etc.), their boundaries and scale representation suitable for the identification and determination of specific conditions of use designed to ensure the conservation of the distinctive characteristics of these areas and, consistent with these, their enhancement;
- eventual identification of additional properties or areas of considerable public interest, their boundaries and scale representation suitable for the identification and determination of specific conditions of use;
- identification of any additional contexts to be subjected to specific safeguard and use measures;
- analysis of the dynamics of transformation of the territory in order to identify risk factors and vulnerabilities in the landscape, as well as comparison with other acts of programming, planning and soil conservation;
- identification of restoration and redevelopment interventions in severely compromised or degraded areas and other enhancement initiatives compatible with the requirements of protection;

[73] In addition, the UNESCO website provides information and maps for each site, as well as a list of the sites proposed for the World Heritage Site (cf. section 5.5).

- identification of measures necessary for the proper inclusion, in the landscape context, of interventions to transform the territory, in order to achieve sustainable development of the affected areas; Identification of the various areas and their quality objectives.

Each individual region, then, enriches these basic themes with different approaches.

By way of example, refer to the reports offered during the SEA scoping phase by ARPA Toscana precisely concerning the need to "broaden the scope of the assessments to the value elements concerning the entire region that describe the landscape recognised by the Cognitive Framework of the Regional Landscape Plan (PIT Landscape, approved in 2015). Among the approaches, refer in particular to the Regional Ecological Network (RET), the Map of Theoretical Absolute Intervisibility and the Map of Weighted Intervisibility of networks of landscape enjoyment, and the so-called "dressing of constraints" under Articles 136 and 142 of the Landscape Code.

This kind of mapping therefore includes both individual assets, whose landscape and perceptual context could vary greatly depending on interventions for mobility (not necessarily in a negative way) and very extensive landscapes (an example is that of the five municipalities that are part of the UNESCO site of Val d'Orcia), the protection of which can easily come into conflict with the construction of new infrastructure.

In general, it can be said that the system of mobility can have a significant impact on the system of cultural and landscape heritage in two ways:

- it can generate **negative impacts**, where the construction of new infrastructure interferes directly with the objectives of protection and enhancement of assets;
- it can generate **positive impacts,** where, on the contrary, interventions on the mobility system (both existing and new) are intended to improve access by public transport to assets that are already very popular, or to encourage the inclusion in tourist routes of assets not sufficiently valued, taking care of the landscaping insertion of works in every case at the maximum level.

In this case, the maps of the Regional Landscape Plans produced under Leg. Decree 42/2004 and/or SITAP databases or "network constraints" (cf. section 5.2) contain the information necessary to verify the type of interference of the work with the landscape and cultural heritage values contained therein, including archaeological heritage.

Another interesting source of information consists of the Risk Map prepared by MIBACT, in which, at municipal level, the vulnerability of assets subjected to environmental risks (e.g. seismic) and anthropogenic risks (e.g. excess of frequentation, theft, etc.) were estimated. However, as reported by the Province of Trento during the scoping phase, assets and sites of an archaeological and architectural nature in the province do not appear in the MIBACT Risk Map or in other national databases. Thus reference to the maps of the provincial PTPs remains valid for these. For its part, the ISPRA Catalogue provides the following indicators.

ID	Strategic theme from SSS*	Objective of overall sustainability	Environmental issue	Indicator	Unit of measurement
71	Cultural resources and landscape	Protection and preservation of cultural heritage - SNAA Protection, management and planning of landscapes – CEP. Protection and enhancement of cultural heritage Leg. Decree 42/2004	Protection and enhancement of landscape heritage	Protected landscape areas	cartography
72			Protection and management of cultural heritage	Assets declared of cultural interest and bound by measure	
73				Bound archaeological areas	catalogue
* SSS stands for New EU Sustainable Development Strategy					

As to the techniques of ***landscaping of infrastructural works,*** in particular linear works, among the many available publications the following guidelines ISPRA are mentioned by way of reference:

- Manual No.126/2015: "Ambiente, Paesaggio e Infrastrutture"(Environment, Landscape and Infrastructure), Volume IV;
- Manual No. 65.3/2010 "Analisi e progettazione botanica per gli interventi di mitigazione degli impatti delle infrastrutture lineari" (Botanic analysis and design for interventions to mitigate the impact of linear infrastructures);
- Manual No. 65.4 / 2010 "Mitigazioni a verde con tecniche di rivegetazione e ingegneria naturalistica nel settore delle strade" (Green mitigation with revegetation techniques and bioengineering in the roads sector);
- Manual No. 65.5/2010 "L'inserimento paesaggistico delle infrastrutture stradali: strumenti metodologici e buone pratiche di progetto" (Landscaping of road infrastructures: methodological tools and project best practices).

These guidelines were produced explicitly to provide a reference tool in the definition of criteria that are as effective as possible for maintaining and/or constructing new environmental balances, which are able to support new landscapes of quality within which *the works of transformation, and specifically those related to infrastructure, present themselves as potential opportunities for redevelopment of the environmental landscape system and not as inevitable causes of degradation to be minimised*.[74]

in fact, among the main objectives pursued by ISPRA Manuals through *analysis of impacts conducted in parallel with the design of a work*, the possibility emerges of avoiding or minimising negative impacts, emphasizing instead the positive impacts. To this end, a continuous interaction is required between the impact analysts and designers of the work, bearing in mind that it is better to prevent (localise, insert and offset) than to mitigate a posteriori. The "good project" is based, *in primis*, on the best possible localisation of the infrastructure, thus on landscaping criteria, which will also take account of the types of works (one thing is a raised road, another is one at ground level or on a viaduct), from which will emerge the ***compensation mitigation works***.

Compensation interventions may include, for example:

- environmental restoration and the formation of neo-ecosystems;
- urban renewal with the creation of green areas, park areas, re-naturalisation of river banks; formation of wetlands;
- phytopurification plants to improve the quality of different waters;
- restoration of degraded areas in general; overpasses/underpasses for existing roads;
- facilities and activities for environmental education.

The works mentioned above are integral parts of the project and are designed alongside it, while use of the technique with least impact for the same technical, functional and naturalistic result should be planned for identification of the best techniques.

For more details on the design techniques of landscaping, see the aforementioned ISPRA manuals, which the preceding discussion has summarised.

As for ***geosites***, the ISPRA Geosites geodatabase is freely accessible on the ISPRA website and provides access to information on every single geological site through text and/or cartographic research. The specifications for the census of the geological heritage adopted by ISPRA, like those used by many Italian regions, generally define the type of interest that characterises the individual site. In addition to

[74] Cf. Manual No.126/2015: "Ambiente, Paesaggio e Infrastrutture"(Environment, Landscape and Infrastructure), Volume IV;

fundamental scientific interest, these include other types of correlated interest, such as: cultural, educational, excursionary, historical, landscape, etc.

In general terms, in addition to loss or reduction of the asset itself, the interaction between geological heritage and infrastructure often leads to a loss or a reduction of one or more of the values associated with it. Construction of a road or rail layout, for example, can determine the complete or partial loss of a site or its fragmentation. The accessibility or visibility of a determined asset may also be prevented or limited.

In some cases, there may be pollution from the roadway or the site or a delicate sedimentological or karst cycle may be compromised. In these last cases the interference is not necessarily caused by the direct superimposition of the infrastructure on the asset, but it could be harmed or damaged by the infrastructure even if it is placed, for example, upstream. In planning an infrastructure, it is therefore important to consider all these possible interferences and provide mitigation in the cases in which it is not possible "to move" the work.

On the contrary, in some cases building an infrastructure can represent an opportunity to discover new elements of geo-environmental interest. Many discoveries and especially outcroppings, structural elements, karst cavities or palaeontological remains would never have come to the light without the work connected to building infrastructure.

In these cases, the local administrations (municipal, provincial, regional) need to coordinate with the work site project managers to establish the best ways to preserve and/or evaluate the property. In the event of unavoidable interference with already well-known assets of geologic interest before beginning work, or in the event of interference with items identified during the work performance phase, provision must be made for assessing the item. Examples are more and more frequent of areas, above all in northern Europe and the United States, that in the course of valuing elements of geodiversity have created opportunities for local development as well as spreading culture.[75]

For the work design phase and the choice of alternatives for safeguarding and assessing the geosites, please refer directly to ISPRA Handbook No. 65.1/2010 "Interactions between linear infrastructure and geologic heritage," just cited above.

The environmental plans to be consulted include: Regional Territorial and Landscape plans, UNESCO site management plans, geomorphological cartography of the territory.

8.7 6 OAS Improve the conditions of the population and its relative health, also increasing the quality of the urban atmosphere.

Also in the field of transportation infrastructure, the Specific Environmental Objective (OAS) is strongly cross-cutting and is already partially applied by nearly every other OAS considered, regarding the quality of the atmosphere and its safety (air quality OAS 1, risks of climatic phenomena in vulnerable areas under the OAS 2 hydrogeological profile, etc).

The choice made in this work is to include within this objective all topics typically connected to the impact of transport infrastructure on the population and human health that are not already subject to other OASs, or that have not been considered with specific reference to the number of people exposed; that is:

- Exposure to atmospheric pollution (dust, tropospheric ozone, nitrogen dioxide, etc)
- Physical agents: exposure to sound pollution, vibrations, and light pollution;
- Effects on Roadways

[75] See ISPRA Handbook No. 65.1/2010 "Interactions between linear infrastructure and geologic heritage."

- Impacts - both positive and negative- on the quality of the life of people at the local level, (local socio-economic impacts), therefore with the exclusion of positive impacts for people who will benefit at the European or national level, since these are already considered within the OES of the reference System of Objectives for the assessment.

As already noted above (OAS 1), health problems caused to the population residing in urban areas by air pollution and related to mobility depend substantially on harmful products originating from incomplete combustion in the ***engines of motor vehicles and airplanes***, responsible for: 90% of total carbon monoxide (CO) emissions, lethal even if under the critical threshold for particular categories of at-risk populations (people with heart problems, the elderly, convalescents, children, etc); 100% of lead (although in absolute value now greatly reduced), 63% of nitrogen oxides (NOx), of which approximately half are due to roadway transportation.

On an informative basis and to support the directives for planning work executed under the strategic policies of the Infrastructure Annex, we report below the list of ISPRA indicators used for writing analyses within the environmental-territorial context, pursuant to par. 5.7 and, following it, the list of the ISPRA Catalogue indicators for the aspects considered.

- exposure of the population to outdoor atmospheric pollutants, in particular to PM_{10} and $PM_{2.5}$ dust, nitrous oxides (NO and NO2) and ozone (O3);
- population exposed to traffic noise, by noise intervals and type (2014);
- 2001-2013 trends of roadway accidents in Italy and the mortality rates;
- Accidents by type of transportation.

ID	Strategic theme from SSS*	Objective of overall sustainability	Environmental issue	Indicator	Unit of measurement
58	Public health	To reach air quality levels that do not involve a significant negative impact to human health - PAA, COM (2005) 446 **, DM 60/2003	Exposure to atmospheric pollution (dust, tropospheric ozone)	Exposure to atmospheric pollution (PM10)	% population exposed by classes of PM10 concentration (g/m3)
60			Exposure to sound pollution	% population living in each acoustic zone	%
62		To ensure that our transportation systems meet the economic, social and environmental requirements of society by decreasing their undesirable impacts on the economy, society and the environment - SSS*	Effects on Roadways	No. road accidents	No.
63				No. deaths from roadway accidents	

* SSS stands for New EU Sustainable Development Strategy ** PAA stands for 6th Environmental Action Plan

It is suggested however to consider the substances and the parameters covered under Leg.Dec. 155/2010 and following for the description of the context and monitoring of the expected effects from the implementation of the Functional Area.

In case of designation of the Functional Work Area within a program of localized nature, it is recommended to frame the problem within the instruments designed for the urban scale, such as Urban Mobility Plans. In such a context, it will be possible to explore the local strategic aspects more deeply, and therefore to reach more correct solutions in terms of general transportation and the environment.

In the work planning phase- at the EIA scale - the range of the impact mitigation /compensation criteria is greatest. Below is a partial, though not exhaustive, summary of directives for future planning/assessments.

Exposure to fuel exhaust from automotive traffic

The ISPRA Handbook 109/2014 [76] recommends, in the event of highway infrastructure, to closely study the effects impacting air quality, reporting the pertinent information (in summary):

- regarding the selection and use of the dispersion, transformation and deposit models of atmospheric pollutants, justified based on provisions set forth in regulations in effect;
- on disseminated weather and pollutant emissions data and other data captured by the dispersion, transformation and deposit models of pollutants in the atmosphere, indicating possible critical situations (e.g. complex orography, calm winds, physical-chemical transformations, deposit/accumulation/mobilization of pollutants etc);
- for every worksite (execution phase): traffic flows (number of vehicles, tracts involved, etc) generated along the highway routes and used as input for models (vehicle flows, average traffic, emission factors, etc.);
- regarding studying traffic, indicating the consistency between what is reported in the description of the design aspects and in the environmental analyses;
- regarding the traffic flows used as input for the model of atmospheric dispersion (vehicle flows, average traffic, etc);
- regarding the factors of emission and the methodology of estimating pollutant emissions and greenhouse gases used;
- regarding the estimation and assessment of effects on the soil of characteristic pollution from vehicular traffic, with particular reference to the main sensitive recipients (soil, water, livestock farms, residential areas, etc.) present in proximity to the hypothetical work footprint, taking advantage of the support of preliminary surveys nearby;
- on the estimation of the effect in the case of a specific crossing of the planned linear infrastructure in tunnels, by means of appropriate simulation models;
- regarding the specificity of the type of work: estimation of the impacts of the possible production of unpleasant smells; estimation of impact of any dangerous aerosol production; assessment of **the risk of important incidents** with spillage of dangerous substances;
- on the compatibility of the work designed with plans for protection and restoration of air quality;
- on impact mitigation measures detailed according to the criticality indicated.

Specifically regarding the ***impact imputable to physical agents,*** they are broken down into: noise, vibrations, light and optical pollution; considering the remaining physical agents (ionizing and non-ionizing radiation, such as electric and magnetic fields and non-ionizing electromagnetic fields) not particularly significant for building the transportation infrastructure, as long as, during the EIA of the plans, any meaningful production of radiation, ionizing and not, will also be promptly verified, regarding the railway lines in cases when they are supplied by alternating current systems.

Physical agents: acoustic impacts

Regarding the impact on the acoustic climate, it is observed that transport infrastructures are surely among the main sources of noise. Roads, railroads and airports generate significant sound emissions,

[76] ISPRA, "Elements for updating technical regulations in environmental assessments," doc no.109, 2014.

requiring in the planning phase the introduction of suitable measures for safeguarding and mitigation. The work execution phase also has potential negative impacts on the components, to be managed through focused planning and/or mitigation measures to be provided in the EIA phase.

In case the provisional estimates demonstrate that regulatory limits will be exceeded, because of the interventions being planned, appropriate arrangements/devices and mitigation interventions, with an indication of the type, location and size and sound characteristics, need to be identified. The results of the impact estimates, in the worksite[77] and operations phases, with and without mitigation, are reported in the form of noise maps, as well as precise levels on the recipients identified.

Actions for mitigation of acoustic impact are subdivided generally as:

- reduction of the noise at the source;
- reduction of the noise near the recipient.

Regarding the first aspect, we can distinguish sources of railway and vehicle traffic noises.

Regarding **the reduction at the source of the railway noise,** it is assumed that, although the rail transportation system has the lowest environmental impact in terms of atmospheric emissions, one of the greatest limits to its development and strengthening is still the high level of noise produced during its operation. The main mechanisms for the generation of railway noise can be identified as the train system (engine, ventilation and cooling systems and aerodynamic noise) and wheel-track interaction. For an effective action of reduction at the source, as required by national regulations, the main mitigation measures concern rolling stock (use of brake shoes in composite material; replacement of the brake disks; use of wheel vibration dampers; reprofiling the wheels; use of wheels with low acoustic emissions) and the track (acoustic grinding; embedded brakes; track vibration dampers; tracks on flexible platforms for bridges; support maintenance; gear maintenance; reduction of noises on curves)[78].

Regarding the **reduction at the source of noise from street traffic**, actions usually consist of anti-noise barriers (of which location, total longitudinal extension, type, and height are indicated in a table, usually divided by Municipality, and also often in planimetry and graphic representations) and the use of sound-absorbing asphalt.

When it is not technically (railway or street centre too close to the recipient, aesthetic compatibility with the surroundings) or economically (the number of citizens is low compared with the costs) possible to adopt mitigation measures at the source or on the route of propagation of the noise, that is, when such actions do not result in the attainment of legal limits, action is taken directly on the recipient by increasing the sound-isolating power of the individual exposed façades, with regard to both the masonry and fixtures. In particular, **actions near the recipient**, as also specified by UNI regulation 11296:2009[79], can regard the different elements that constitute the façade system and among these: the façade screens, doors and windows and fixtures.

The main actions that can be undertaken at the source are:

- increase in the acoustic performance of the opaque components (external coat);
- ventilated windows;

[77] On this topic, an appropriate ISPRA Study is available, "Guidelines for monitoring of noise deriving from large worksites." Doc. 101/2013, to be consulted as applicable.

[78] ISPRA, "Guidelines for provision and verification of the efficacy of plans for acoustic reorganization of linear transportation infrastructure." doc n.23, 2012

[79] UNI 11296:2009 "Acoustics - Guidelines for the planning, selection, installation and testing of the mitigation systems for recipients of the noise originating from transport infrastructure," provides an important reference for the execution and testing of noise abatement systems for ground transportation.

- non-ventilated windows;

Physical Agents: vibrations[80]

The analyses of the effects of enacting the plan regard the execution and operation phases and possibly that of decommissioning.

The assessment of estimated effects of vibrations on individual recipients can be conducted through appropriate predictive models (analytical, numerical and/or empirical), possibly calibrated through measurements *in situ*, that involve the characterization by type of source and the land through which the induced vibratory phenomenon is induced.

The calculation model must be described by reporting the dissipation algorithm that describes the propagation of the vibration waves from the source to the recipient, the detail of the input data pertinent to the parameters characterizing the source and means of propagation, and comparisons with measurements *in situ*. For transport infrastructure, the estimate of the vibration levels during the operations phase must refer to the traffic system under normal circumstances, also considering all the accessory sources forming part of the plan. For the other work/systems/activities, the estimate must refer to all sources of vibrations in the operating conditions of the system, considering the conditions of simultaneous operations; e.g., the conditions of maximum vibration emission levels.

The estimation of vibrational levels in the execution phase must refer to the most critical phases by type of work and the presence of recipients, and must consider all sources/machinery/systems provided for the worksite. The assessment of vibrational levels on the individual recipient also includes disturbing effects associated with noise inside buildings produced by vibrations involving the structures of the building. When the estimates demonstrate potential critical situations, in terms of disturbance and/or damage to the buildings, there must be appropriate mitigation devices /actions, with an indication of the type, location, and size characteristics and damping of the vibrations.

The results of the assessments, during the work and operations phases, are returned as precise levels on all recipients identified and in the form maps of vibrational levels.

Physical Agents: light and optical pollution[81]

Light radiation brings light pollution problems, understood as any alteration of the levels of natural lighting and in particular every form of radiation of artificial light that is dispersed outside the areas to which its function is dedicated, and in particular beyond the level of the horizon (or towards the sky), and optical pollution (or intrusive light), understood as any form of artificial irradiation directed toward surfaces and/or things for which it is not functionally intended or for which no lighting is required.

The study of the topic concerns the impact produced by light sources, functionally connected to the work planned, in all phases of the life of the work (execution, operation and eventual divestment).

The study of **light pollution** must evaluate the compatibility of the technical design specifications provided in sector regulations, pertinent to the design, execution and management of lighting plants. The light source must meet requirements regarding type, electrical power absorbed and photometric characteristics understood as light flow, light efficiency, photometric curve, colour temperature, index of chromatic yield etc.

The criteria of planning, execution and management of the systems must respond to the required lighting specifications, especially regarding the geometric parameters that characterize the positioning of the lighting in the space, and the orientation and the regulation of the light flow. The study of light pollution must moreover estimate the compatibility of the project execution location with respect to areas/zones requiring special protection, such as, for example, the areas circumscribed to astronomical

[80] ISPRA Manual 109/2014 (…) op.cit.

[81] ISPRA Manual 109/2014 (…) op.cit.

observatories, identified according to the category of observatory, protected natural areas and areas of high environmental/social/cultural value, however characterized by the competent national, regional and/or local authorities.

The pertinent analyses of **optical pollution** must instead consider all potential recipients impacted by the operation, with particular regard to safeguarding human health and possible effects on land and marine animals and birds, as well as plant species. The assessments of the effects can be carried out through calculation models, of which the algorithm and the input data used must be described. Finally, assessments of criticality in terms of possible damage/alteration/disturbance to the individual recipients must involve the identification of appropriate mitigation devices/equipment/actions. The results of the assessments, with and without mitigation actions, must be returned in the form of maps and/or precise levels on the individual recipients.

Effects on Roadways

In newly-built road infrastructures, highway accidents can be reduced to a minimum by certainly respecting, first and foremost, the security standards provided by the technical regulations.

Regarding existing roads, it is possible, also with the aid of the data in the possession of the highway patrol, to reconstruct the map of the places where a significant number of accidents take place, and consequently act with focused solutions, which may be limited to signage or, in the cases of structural criticality of the road and crossings, correcting them with technical solutions.

Effects on the local socio-economic system

Some SCAs have suggested, in the SEA Scoping phase, integrating the considerations on potential environmental impacts on the population with those more specifically linked to the local socio-economic system. In particular:

1. the ARPA Campania suggests indicating, in the analyses of context, infrastructural equipment and residential loads for the definition of programmatic actions;
2. the Sardinia Region suggests completing the Macro-components (MC) for the environmental-territorial analyses/assessments with a topic specifically dedicated to mobility and transport, “also intended to estimate the effects that the plan will produce on the aforementioned environmental topics, it being a plan that constitutes the general picture for investments of national interest in the area of transportation.”
3. the Friuli Venezia Giulia Region suggests inserting, among the environmental topics regarding which to develop the assessment, regarding the "population” component and the OAS 6 summarized environmental objective, the specific topic of short- and long-term drops in employment, thinking “that the choice to aim at some strategic infrastructures rather than others would not neglect the impact in terms of jobs that such infrastructures can contribute to generating on the territories they cross, either in the execution phase or the operations phase. To set up such assessments, moreover, would allow, in the monitoring phase, to estimate if the strategic choices have generated a so-called “tunnel effect” or have contributed, also in the long term, to the development of the socio-economic fabric.”
4. The Lombardy Region proposes to integrate the assessments with an environmental budget/accounting intended to keep track of the flows of environmental resources captured/issued by the system of work of strategic interest.

The proposals made are first framed in the context of the nature of the Infrastructure Annex subject to assessment.

As amply specified in this Environmental Report and in the Infrastructure Annex, the AI under assessment has assumed, over its course, the appearance of a strategic plan, useful as a “general picture for investments in the area of transportation.” By their nature, therefore, the contents of the AI

are concentrated on defining at the strategic level, on the Italian territory, the directives of a wider design, traced on a European scale (TEN-T networks), with particular attention to strengthening relationships between the European Union and the countries of Eastern Europe and countries on the other side of the Mediterranean.

For this reason, the Economic-Social Objectives (OES) considered in the proposed evaluation Model, among the many assumed from the analysis of environmental, economic, transportation and social objectives in the recognition phase of the Programme Reference Framework (QdRP) for the AI, were selected in the light of the purposes forming the basis of the Infrastructures Annex to DEF 2015 (see Cap.3). This refers, for this last purpose, to the "requirements" subject of the AI, in particular to those of "*adapting the national programming of strategic infrastructure to the community and to have a strategic instrument in a position to offer guidelines for the programming of the public Administrations, also in the light of budgetary constraints, and for the investment decisions of the private investor"* (see par. 3.2).

In the light of the above, it appeared particularly meaningful, in outlining this general objective, to refer directly to the guidelines supplied by the EU in terms of criteria of assessment for the satisfaction of the former conditions for Thematic Objective 7, and in particular Art. 10 "General Priorities" of Regulation No.1315/2013 on the guidelines of the European Union for TEN networks.

In view of the broad scale of reference within the environment of which these objectives were formulated, it may certainly happen that, on the local scale, undesired effects may arise, such as the "tunnel effect" feared in the contribution of the Veneto Region, and that these considerations are not sufficient to justify modifications in the general designs of the TEN T networks, regarding paths to follow to pursue collective interests at a higher level (national and municipal, as already indicated)...

On the other hand, the worries expressed by Institutional and Technical Entities (SCA) operating at a regional and Vast Area level appear to be well-founded, to the extent that, at an equal level of pursuit of the OES of the AI, the choice of details may also produce very different effects on the "population component" understood in its more extensive meaning, until also including the socio-economic well-being of the people, and therefore their stay in the territory.

All this can be framed in the wider debate on the dialectic between national and local interests, which so engages civil society when it relates to transportation infrastructure, but, in more general terms, when it is a matter of the location of any kind of installation of national interest.

From such a perspective, it appears decisive to provide for elements in order to ensure that the plans and designs of the work will implement the Functional Areas Work being effectively convenient at least for the wider community to which they are assigned (national and municipal), that is, effectively pursue the strategic Lines traced by the AI as outlines of such interests "also in the light of budgetary constraints," as evidenced in the AI, regarding the "triple order of requirements" that this point has satisfied (see Ai, p. 61, cited also in par. 3.2).

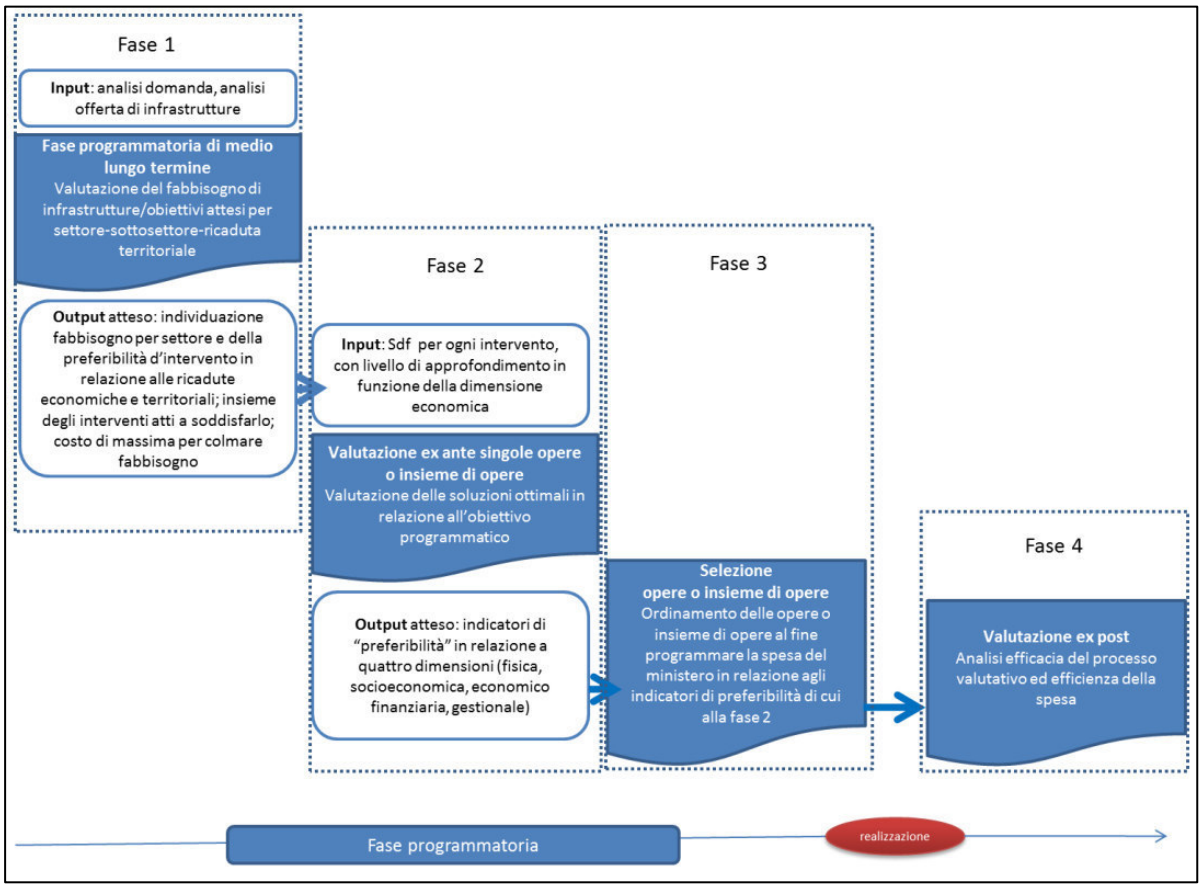
The possibility of such verification is closely correlated to the completeness of the documentation of the plan/design under the profile of expense and financial plans, cost-benefit analyses that also internalize the expected environmental and social costs (environmental accounting), the opinions of the EIA and a realistic schedule, also regarding the timing for issuing the various permits required. This constitutes the supposition of the idea that careful assessment of the social benefits of the plan - whatever is the territorial scale - along with its effective feasibility in "physiological" times, constitute a vital point of reference in order to estimate social sustainability, also of any negative impacts.

In such a sense, a positive indication is already contained in the AI, where[82], in the strategies for pursuit of Strategic Line 6[83] - it identifies the Multi-year Planning Document (DPP) provided in Leg. Dec.

[82] See AI, from p. 68 "L'evoluzione degli strumenti di pianificazione e programmazione - Il DPP" (the development of planning and programming tools - the MPD)

No.288/2011 as a document that "*based on the strategic lines defined by this Annex, will represent - beginning in the three years 2017 - 2019 - the unitary instrument of choice, operating programming, performance, monitoring of all activities under the competence of the MIT*", drafted based on the appropriate Guidelines[84] that "*provide a methodology in order to guide the selection of actions that correspond to the expressed requirements, coherent with the objectives and strategic lines of national planning therein, and to characterize the priorities of action based on the criteria of costs and meeting said objectives.*" The Guidelines of the Ministry of Infrastructures and Transportation are currently in the phase of being written, based on the "Vademecum for the application of the Model of Guidelines for provision of the DPP"[85], from which the following schematic is drawn, that traces all the evaluation steps provided by Leg. Dec. n.288/2011 (arts. 3, 4, 5 and 6)

Fig. 2- The DPP assessment process



[83] 6. "attraction of private capital through adapted policies of administrative strengthening of the contracting stations, the dissemination of models of economic financial plans for private proponents, the greater explanation of the benefits deriving from the execution of work instrumental to the development of the productive districts and effective and synergic use of the different community (European fund for strategic investments – EFSI, ERDF) and national financing sources."

[84] In order to draft the DPP, Art.8 of Leg. Dec. No.288/2011, establishes that every Ministry must provide the "Standardized guidelines for the assessment of the investments" to which it is subject, to take pertinent action, to the CIPE. With D.P.C.M. August 3, 2012.

[85] In April 2014, the Prime Minister's Office, Department for programming and coordination of community policies and the Department for development and economic cohesion - Unit of assessment of public investments, with the collaboration of the Project Technical Finance Unit and the Unit for the assessment and verification of DIPE investments, published *the Vademecum for the application of the Model Guidelines for provision of the Multi-year Planning Document, available on www.dps.gov.it.*

As can be observed, there are suppositions to be verified, in the programming of the next infrastructural work on transportation, at least the condition for pursuing advanced strategic interests effectively.

Regarding the internalization of the environmental costs in the economic analyses, also widely practised in other Countries in drafting the evaluation document for European investments - the Leg. Dec. does not indicate it, limiting itself to addressing environmental topics, inserting among the contents of the analyses a generic description involving "localization, the environmental, landscape, and urban-territorial problems regarding execution of any work."

On the other hand, formulations of "classic" economic assessment also include the "Underlying principles of funds for appraising analysis of the cost-benefit relationship under the socioeconomic profile and European added value" pursuant to art. 51 of the aforementioned Reg. (EU) No. 1315/2013, on the guidelines of the Union for development of the transEuropean transport network, stating "Based on the objectives detailed in article 4, the Commission publishes the founding principles that apply for appraising the analysis of the cost-benefit relationship under the socioeconomic profile and European added value with regard to plans of common interest for which financing is requested from the Union."

However, in both cases, the guidelines still remain to be written, and within the drafting phase the possibility cannot be excluded of introducing ***internalization of external environmental costs*** foreseen by the White Book on transportation:

- among its "ten objectives for a competitive and efficient transportation system in terms of resources" (see par. 6.2, Tab. 6.1), in particular, the tenth objective states "To proceed towards the full application of the 'the user pays' and 'the polluter pays' principles, ensuring that the private sector makes a commitment to eliminate aberrations - including harmful subsidies -, generate income, and guarantee financing for future investments in the transportation sector."
- in art. 68, where the Commission invites the European Parliament and the Council to approve of the "Table of progress towards a single European transportation space - For a policy of competitive and sustainable transportation" and the list of initiatives attached to it, among which, in point 39, is "to proceed to full and obligatory internalization of external costs (including, beyond the obligatory recovery of lending costs, also the costs pertaining to noise and atmospheric pollution and congestion) in road and railway transportation. Internalize the costs of noise and atmospheric pollution in the ports and airports and atmospheric pollution in the sea, and examine the statutory application of internalization fees on navigable routes within the European Union. Create market measures in order to further reduce greenhouse gas emissions."

To justify this political line, it is worth citing Art. 59 of the same White Book, which states: "Internalization of external costs, elimination of fiscal distortions and unjustified subsidies and aberrations and promotion of free competition are among the necessary efforts to align market choices with sustainability requirements (and account for the economic cost of "non-sustainability")... This is necessary to create fair conditions for modes that in are direct competition with each other."

Stimulated by the contributions offered by the SCA indicated above, and with the hope that these directives may be fully implemented in the short term, and that therefore next steps may be taken in future, to assess work already verified under the profiles of collective convenience on a large scale, is considered useful, within the limits of the current task, to face the issue of the economic-social impacts caused from the update of the AI at the local level, proposing within the Environmental Agenda for the Functional Areas of Intervention for balancing and reducing to a minimum the impacts on the local socio-economic system, when indicated, in terms, for example, of:

- prolonged disturbance in the work phase: consequences on the local economy and current mobility and health levels;
- permanent impact of work performed: consequences on the local economy and on current mobility and health levels;
- short- and long-term drops in employment
- estimated environmental costs and benefits in economic terms (environmental accounting).

Among the environmental plans to be consulted, for OAS 6: Plans for recovery of air quality, regional energy plans, elimination of noise pollution, Regional Transportation Plans, Regional Mobility Plans and pertinent SEA.

9 Monitoring System

9.1 Objectives and peculiarities of environmental monitoring of Infrastructure Annex

This Chapter addresses the point of Annex VI: *i) description of the measures provided with respect to the monitoring and control of significant environmental impacts from the execution of the proposed plans or program, defining, in particular, the data collection modes and drafting of the necessary indicators for assessment of the impacts, the regularity of the production of a report illustrating the results of the assessment of the impacts and the corrective measures to be adopted.*

Further indications on the topic are contained in Art. 18 of Legislative Decree 152/06 implementing the requirements contained in Art. 10 of European directive on Strategic Environmental Assessment (SEA) 2001/42/EC, providing the following directives:

1. The monitoring ensures supervision of significant impacts on the atmosphere deriving from execution of approved plans and programs and the verified attainment of pre-established sustainability objectives, to promptly identify unexpected negative impacts and adopt appropriate corrective measures. The monitoring is carried out by the originating authority in collaboration with the competent authority, also taking advantage of the environmental agencies system and the Advanced Institute for Environmental Protection and Research-ISPRA.
2. The plan or program identifies responsibilities and the existence of resources necessary for performing and managing the monitoring.
3. The websites of the competent authority, the originating authority and the interested Agencies offer appropriate information on ways of developing the monitoring, its results, and any corrective measures.
4. The information collected through the monitoring is considered in the event of eventual modifications to the plan or program and always included as background data for later planning or programming.

Below are the first responses to these requirements with the often-repeated warning regarding the particular nature of the Infrastructures Annex, which simultaneously summarizes a picture of initiatives established or in the process of establishment and is a tool for proposing strategic forecasts to help define actions still not fully delineated under identification and planning. In some cases, such strategic lines are drawn in specific Objectives and Functional Areas of Intervention characterized by substantially intangible actions that affect components along indirect lines with outcomes that are difficult to measure.

Furthermore, the analysis performed here indicated the presence of Strategic lines, Objectives and Functional Areas of Intervention that pursue, explicitly or implicitly, objectives of environmental nature (e.g., occasionally, modal re-balancing is evoked in favour of rail transportation); thus, the topic of environmental monitoring is often translated into measuring expected benefits rather than negative "impacts."

It appears quite evident that environmental monitoring of the AI (Infrastructure Annex) actions, being at the apex of *the transportation programming and planning tiering process* , cannot avoid becoming a terminal for the chain of monitoring actions associated with other plans for enactment or specific actions more closely and directly connected with the AI.

In other words, the monitoring associated with the Infrastructure Annex must be nothing more than the collector of outcomes of other correlated, if not subordinate, monitoring, according a "*bottom-up*" logic basing the process on measurement or estimation of environmental effects of performing specific actions.

Such a process must be facilitated by full application of Arts. 22 and 28 Leg. Dec. 152/06 in environmental monitoring of work subject to Environmental Impact Assessments.

It is thus considered important to point out the community directive on the SEA 2001/42/EC and Leg. Dec. 152/06, which in several parts reiterate the need to avoid duplication of procedures and to share information.

Obviously, the number of variables involved, the complexity of necessary coordination between entities of various natures (those performing the actions, the institutions, the appointed monitoring system, etc.) and the means of aggregating the information make the process quite difficult.

Moreover, in any activity of monitoring effects associated with a determined action disturbing a state that is not a static fact, it becomes difficult to define cause and effect relationships, obviously falling back on attributing "merit" or "detriment" to a determined effect. This is a well-known problem of direct observability of effects of an action as the difference between a "factual" situation (what happens after the action is taken) and a "counterfactual" situation (what would have happened if the action had not been implemented).

These indications of criticality encountered in all the monitoring processes lead to suggesting a dynamic vision of Monitoring Plans for which the main lines can be defined here, postponing to a later phase the provision of a detailed program that must provide for progressive adjustment and implementation with the contribution of various entities involved.

9.2 Correlated monitoring plans

As pointed out previously, it is thought that environmental monitoring of AI execution mainly coincides with an action of collection and concentration of data from other monitoring, beginning from that connected with the single action the or subordinate or correlated plans and programs equipped with their own monitoring systems.

Certainly, the Environmental Monitoring Plan belongs to this category provided within the SEA of PON Infrastructures and Networks 2014-2020.

With reference to the Environmental Report drafted within the more in-depth SEA procedure of PON, below are reported the main contents of PMA to define the elements also useful for formulation of PMA regarding the Infrastructure Annex.

The PMA of PON Infrastructures and Networks 2014-2020 moves from the analysis of experience in the previous program, identifying the following criticalities:

- lack of integration between monitoring environmental aspects and the physical, procedural and financial monitoring of Programme;
- difficulty of ensuring active and stable involvement of entities holding the data and environmental information;
- Beneficiaries' insufficient proactivity and timeliness in transmitting useful documentation for environmental monitoring of financed actions;
- insufficient availability and homogeneity of necessary data for populating the indications for environmental monitoring;
- lack of synergy between EIA processes, to which many of plans admitted for financing are subject, and the SEA Programme process.

Moreover, other problems of more technical nature have been identified pertinent to the number of existing variables and their correlations, the impossibility to assess correctly (and promptly) the

elements of scenarios regarding external dynamics that are not directly controllable, and poor coordination of timing of the monitoring and manifestation of environmental effects.

Favouring this analysis, the PMA has provided for construction of a "network of actors" in a position to guarantee proper development of all activities provided within the monitoring, involving, as a priority:

- Ministry of the Environment (National Environmental Authority);
- Department for Development and Economic Cohesion (DPS - Ministry for Economic Development);
- Ministry of Cultural Assets, Activities and Tourism (MIBACT);
- Higher institute for Environmental Protection and Research (ISPRA);
- Regional Agencies for Environmental Protection (ARPA);
- Competent offices of Regional Objective Convergence;
- Basin Authority;
- Beneficiaries of actions.

These entities form the main nucleus of a "Permanent panel for environmental Programme monitoring," tasked with guaranteeing the effectiveness of monitoring process, facilitating the information flow and integrating the monitoring of PON "Infrastructures and networks" with the monitoring of Regional Operations Programmes.

Regarding the functional aspects, it is very relevant, after a careful activity of coordination with the Ministry of Environment and the ISPRA, to define a set of indicators of "context," "process" and "contribution." Given this previous coordination activity, it is thought appropriate to transfer its outcomes also to the formation of PMA of AI.

Finally, the PMA of PON "Infrastructure and networks" recalls the experience of monitoring the past programming period regarding the system of managing environmental monitoring through creation of a specific environmental section on the SIPOREM website (Informational System for control and monitoring of expenses of PON networks and mobility) with the aid, also, of a WebGIS system that allows data bank management and space analysis of some indicators.

9.3 General Structure and Indications

The task of finding the effects of execution of IA is entrusted to the environmental monitoring. In principle, with respect for provision of art. 18 of Leg. Dec. 152/06, the verification of extent of such effects, once compared with those expected and predicted in the assessment phase, must reorient the plan choices.

Evidently, this principle is difficult to apply given the remarkable quantitative questions that often characterize environmental assessments conducted on plans and programmatic documents of the type being examined, in which the subjects of assessment are accompanied by actions with impacts (positive or negative) that may be assumed in general terms based on analogies, similar cases and logical deductions but certainly not measurable in the strict sense of term.

It is also clearly useful to have a constantly updated picture of main indicators in a position to document the extent of environmental effects of the action allowing a comparison with the signs and trends foreseen in the assessment phase of various levels of aggregation (single action or collection of actions belonging to the same functional area).

Evidently, within the monitoring, it is implicit that one of its important segments is dedicated to assessing the execution compared with the expectations and predictions. Obviously, this type of activity is included in the control procedures that the MIT, in coordination with other institutions,

normally also uses, along with accounting mechanisms for public investments and European contributions.

Returning to the logic already used in the PMA of PON Infrastructures and networks, a summary of this data, referring above all to the material advance of the actions, can be performed using "process indicators."

Concentrating the attention instead on the topic of environment, the monitoring can be articulated as:

- monitoring context with the aid of state indicators;
- specific monitoring of the actions with the aid of contribution indicators.

In fact, the context monitoring coincides with the activity carried out by various entities, specifically MATTM, ISPRA, and ARPA, of various regions in addition to the University and other research entities for defining the state of environment at various levels, primarily through periodically published Reports on the State of the Environment.

Although broad, the analysis of current state of atmosphere on which the strategy provided by the Infrastructure Annex is developed was proposed in this Environmental Report.

Unfortunately, as already indicated, having this picture does not automatically imply the possibility of being able to use future data updates as a tool to verify the effect of enactment of strategic lines provided by the Infrastructure Annex.

It is evident that the evolutions of indicators of Reports on the State of the Environment are the result of all policies that act on the territory as well as in locally-connected situations and, last but not least, also of outside factors completely independent from any policies.

For example, as demonstrated from the most recent environmental reports, the economic crisis affecting the Country significantly affected the amount of greenhouse gas emissions.[86]

Also considering this substantial independence (or rather, dependency that is not recognizable and quantifiable) between the AI and the evolution of environmental data, it is considered that the ordinary action of data collection must try to undertake a search for possible correlations.

As pointed out, it is considered possible to operate according to a bottom-up logic through a cooperation activity involving various individuals and in particular those responsible for the performance and management of individual actions directly or indirectly attributable to the Functional Areas of Intervention identified within the SEA (ANAS, Regions, RFI, Port Authorities, etc.). These entities, in fact, must make available the outcomes of pertinent activities of monitoring individual actions mainly regarding the monitoring plans obligatory for all work included in the field of application of EIA.

Unfortunately, prior experiences (beginning from those regarding monitoring of PON Infrastructures and Networks of the last programme) indicate great difficulty of operation of this line, due to the low performance of obligations caused by the difficulty of exchange and supply of data.

That suggests a strategy to optimize the process that moves on two fronts:

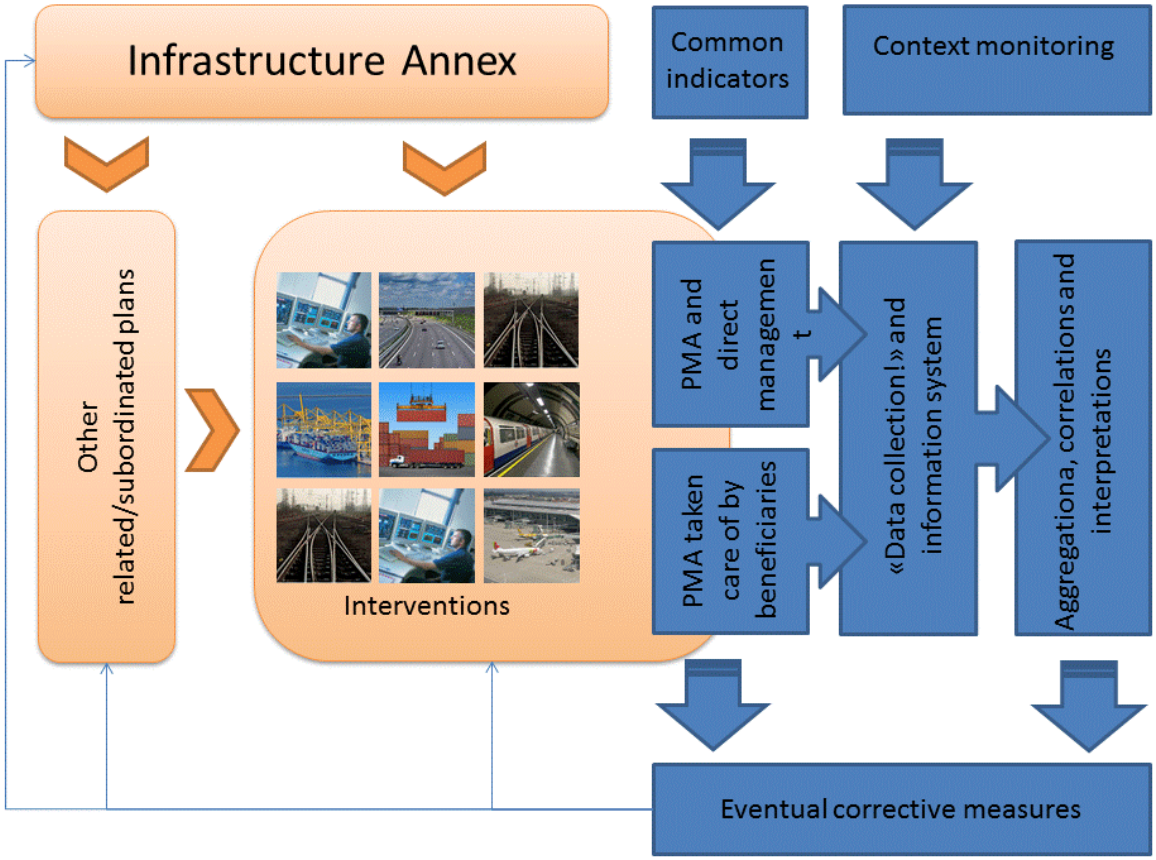
- governance of production process and data exchange that implies, for example, the presence of prescriptions in the EIA provisions by the Competent Authorities that impose "open data" approaches in the plans for monitoring or imposing environmental monitoring activity also for actions not subject to EIA (in this case, it could, for example, be operated by applying conditionality to financing);

[86] See ISPRA "National greenhouse gas emissions - determining factors and comparison with the European Countries," ISPRA report 220/2015

- creation of forms of subsidiarity foreseeing the hypothesis of direct management of environmental monitoring by central institutions.

Regarding this last point, it is considered appropriate to explore the possibility of associating with the Infrastructure Annex the development of a pilot plan identifying a sample of the actions articulated by type for which to implement an Environmental Monitoring Plan for direct MIT management. Such a pilot initiative could supply a model of reference and a meaningful database able to replace the lack of information in the case of poor line operation, which must be activated under the action of those responsible for performance of the actions (ANAS, RFI, Port Authorities, etc.).

Fig. 1 - Outline of PMA of Attached Infrastructures



Some difficulty will be probably found for immaterial actions (for example, regulatory initiatives or improvement of managerial models) or technological infrastructuring (strengthening networks, hardware, software, etc.) the environmental effects of which are connected with the qualitative and quantitative variations of infrastructure exercise (increased capacity of railway networks as a result of improvement of control systems and traffic management).

After this data collection beginning from individual or group actions, it will be possible to execute the necessary aggregations and to also verify any contribution to condition changes in the cases in which it is possible to assess the nature of cause/effect relationships that exclude the presence of other actions.

As required by art. 18 of Leg. Dec. 152/06, this interpretative activity may generate mitigating and/or corrective action required at various levels:

- at the level of individual action regarding any excesses above legal standards or local effects being greater than foreseen or judged intolerable;
- at the planning level (at various levels) regarding the recording of cumulative effects on specific environmental components of global nature (eg., the total CO2 emissions not being in line with expectations).

Regarding the indicators, to avoid dispersion and the difficulty of dialogue among the various entities involved, it is considered possible to refer to the indicators provided within the PON Monitoring of infrastructures and networks. These have been identified after a long process of sharing with the Ministry of Environment and ISPRA ratified in May 2014.

Such sharing is intended, as a priority, for identification and selection of indicators according to the following characteristics:

- effective availability of necessary data for population;
- representivity regarding environmental matrices analysed or the type of the action monitored;
- scalability (the significance and populability of indicator to the various scales);
- significance in the time intervals regarding the Programme schedules.

In the following tables, these indicators are reported with the understanding that during in-depth study for the formation of an operating PMA, a need may be identified for introducing others. In particular, it is probable that, extending the meaning of environment also to the socio-economic context, other indicators may be considered to define the effect of performance and exercise of various projects on the territory and the population (necessary indicators may be economic and occupational growth, social acceptance and social-health indicators, etc.).

Process indicators	Units of measure
Total length of constructed or renovated railway lines	Km
Railway network connecting with the ports	Km
Railway network connecting with airports	Km
Railway network connecting interports	Km
Surfaces subject to action (plazas, logistical areas, and roadway shoulders)	sq.m.
Length of additional approaches	m
SESAR systems installed	No.
Technological systems and equipment (TSE) installed	No.
Execution of information systems applications	No.
Km of road monitored with TSE	Km

Status indicators	
Air quality	Emissions of pollutants by transport mode (total and by sector): C6H6, PM10, PM2,5, SOX, NOX, NMVOC
	Excess emissions from power centres for the following pollutants: NO2, PM10, O3, C6H6
	Levels of concentration in ambient air of pollutants compared with limit values
Noise	Sound emissions exceeding limits for controlled sources
Soil and natural	Use of soil (surface by soil use class CLC 2006)

risks	Waterproofed surface
	Hydrogeological risk (surface by risk class)
Natural areas and Biodiversity	Surface of protected natural land areas (National Parks, Regional Parks, Natural Preserves, other Protected Areas), marine (Protected Natural Marine Areas and Natural Marine Preserves) and Nature 2000 sites
	Type of Habitat (according to the European Corine Biotope classification system)
	Classification of Ecological Values of habitats
	Classification of Ecological Sensitivity of habitats
	Classification of Anthropic Pressure on the habitats
	Classification of Environmental Fragility of habitats
Marine and coastal environment	Quality of marine-coastal waters: quality state of biological elements (phytoplankton, macroalgae, macroinvertebrates and angiosperms) and chemical-physical and hydromorphological elements (former Leg. Dec. 152/06 and DM 260/10)
	Extent of coastline designated for swimming
Landscape and cultural assets	Areas subject to landscape restrictions (according to arts. 136 and 157 Leg. Dec. No. 42/2004) and already protected according to laws No. 77/1922 and No. 1497/1939
	Landscape assets according to Article 142 c. 1 of Code (as originally introduced by Law No. 431/1985)
Energy and climate change	Final fossil fuel consumption by transport mode
	Greenhouse gas emissions: CO2
Population and Health	Number of road incidents

Impact indicators		
Air quality	Emissions of pollutants by transport mode (total and by sector): C6H6, PM10, PM2,5, SOX, NOX, NMVOC	Change in emissions of polluting substances, by transport mode, involving performance of the action
	Excess emissions from power centres for the following pollutants: NO2, PM10, O3, C6H6	Change in number of excess emissions (NO2, PM10, O3, C6H6) found in the power centres involved in performance of the action
	Levels of concentration in ambient air of pollutants compared with limit values	Change in levels of concentration in ambient air of pollutant compared with value limits
Noise	Sound emissions exceeding limits for controlled sources	Percentage of sound-emission exceeding events to which the action contributes.
Soil and natural risks	Use of soil (surface by soil use class CLC 2006)	Surface of single soil use classes (CLC 2006) involving performance of the action
	Waterproofed surface	Change in waterproofed surface connected to performance of the action
	Hydrogeological risk (surface by risk class)	Change in extension or the infrastructured surface (Km or sq. Km) in areas at hydrological risk with reference to the different risk class, following performance of the action
Natural areas and biodiversity	Surface of protected natural land areas (National Parks, Regional Parks, Natural Preserves, other Protected Areas), marine (Protected Natural Marine Areas and Natural Marine Preserves) and Nature 2000 sites	Change in surface protected by the ANP recorded as a result of performance of the action
	Type of Habitat (according to the European Corine Biotope classification system)	Habitats affected by performance of the action

	Classification of Ecological Values of habitats	Change in the Ecological Value of habitats affected by performance of the action
	Classification of Ecological Sensitivity of habitats	Change in Ecological Sensitivity of habitats affected by performance of the action
	Classification of Anthropic Pressure on the habitats	Change in Anthropic Pressure on the habitats affected by performance of the action
	Classification of Environmental Fragility of habitats	Change in Environmental Fragility of habitats affected by performance of the action
Marine and coastal environment	Quality of marine-coastal waters: quality state of biological elements (phytoplankton, macroalgae, macroinvertebrates and angiosperms) and chemical-physical and hydromorphological elements (former Leg. Dec. 152/06 and DM 260/10)	Change in quality of marine coastal waters affected by performance of the action
	Extent of coastline designated for swimming	Change in coastline designated for swimming as a result of performance of the action
Landscape and cultural heritage	Areas subject to landscape restrictions (according to arts. 136 and 157 Leg. Dec. No. 42/2004) and already protected according to laws No. 77/1922 and No. 1497/1939	Change in surface protected according to Leg. Dec. 42/04 arts. 136 and 157, as a result of performance of the action
	Landscape assets according to Article 142 c. 1 of Code (as originally introduced by Law No. 431/1985)	Change in surface of landscaped and archaeological assets protected according to article 142 c. 1 of Code, as a result of performance of the action
Energy and climate changes	Final fossil fuel consumption by transport mode	Change in final fossil fuel consumption affected by performance of the action
	Greenhouse gas emissions	Change in gas greenhouse emissions affected by performance of the action
Population and health	Number of road incidents	Change in the number of road incidents as a result of functionality of the action.

Obviously in the phase of executive planning of PMA, the indicator measurement modes of indicators will be specified, with the understanding that there will be various means of assessment of effects.

In particular it is expected to operate through:

- direct approaches based on observations and measurements that could, for example, be conducted with the aid of specific instruments of measure (for example, power centres indicating pollutants) or through periodic reports of some information with official entities (number of incidents on a specific road) or queries of existing data banks;
- indirect approaches or through estimates based on other data or proxy; this is the case, for example, of assessments and balance sheets on changes in the emissions of climate altering pollutants related to transport performance (passengers/km/ton CO2 eq).

Finally, it must be possible to perform vertical and horizontal aggregations respecting the strategic nature of AI and using for this purpose either aggregations by Functional Areas of Intervention or aggregations by environmental objectives.

9.4 Operations and managerial aspects of PMA

Given the great variety and complexity of relationships and intersections among interlocutors, objectives and usefulness of monitoring action, it appears obvious that governing the process

assumes a determinant importance and that its definition must be put into effect within a detailed plan to which to refer in a later phase when it is also possible to collect the outcomes of the SEA process. Certainly, the possibility will be verified to recover and eventually integrate the experience developed within the PON Infrastructures and networks, in particular regarding the establishment of an inter-sector coordination structure that involves the institutions mainly identified on the model of "permanent Panel for environmental monitoring" cited above that would encourage dialogue with information holders, especially:

- ISPRA, regional ARPA and other institutions designated to the production and collection of data on the state of the environment;
- managers/actors of individual actions (ANAS, RFI, etc.) called to create detailed monitoring activity for such actions, preferably based on common guidelines.

For operations management of monitoring activity, a need may be envisaged of creating a specific technical task force to:

- provide the procedure for information flows;
- to produce common guidelines, beginning from those already available from public sources,[87] for all suppliers of information and especially for the actors in the interventions that, also having specific PMAs, could better interface with the aforementioned monitoring;
- absorb the information from the monitoring performed on the individual work projects by acting entities and within possible enactment of an initiative of direct management of monitoring of some significant work;
- absorb the information on status conditions from monitoring performed by the delegated institutions;
- manage the eventual pilot plan for direct monitoring of some projects;
- verify, through periodic monitoring, proper execution of activities;
- guarantee compliance with the schedule of activities and possible modernizations;
- issue period reports;
- provide for the adjustments and integrations necessary;
- identify any corrective actions to the monitoring activities, also with reference to any critical situations arising;

Obviously, this activity must be supported by creation of an Information System of the Monitoring Plan that considers guaranteeing as a minimum:

- monitoring and assessment of data;
- filing and updating data;
- aggregations, contrasting and comparisons of data;
- geo-referencing and spatial analysis of data.

The information developed within the SIPOREM portal dedicated to monitoring the PON Infrastructures and Networks of previous programming can be considered an interesting reference for the formulation of such a system.

This information will be summarized and collected in periodic monitoring reports that will contain:

[87] See "Guidelines for the provision of Environmental Monitoring Project (PMA) of work subject to EIA procedures (Leg. Dec. 152/2006 and following, Leg. Dec. 163/2006 and following)," ISPRA, MATTM, MIBAC, 2014

- verification of state of progress of work subject to the IA;
- adequately quantified monitoring indicators based on the progress of performance of the actions;
- the summary of monitoring results for aggregable items (total emission balance as a sum of individual monitoring or sum of waterproofed surfaces);
- any indications for reorientation of initiatives foreseen, in terms of eventual corrections to activities and instruments put into effect.

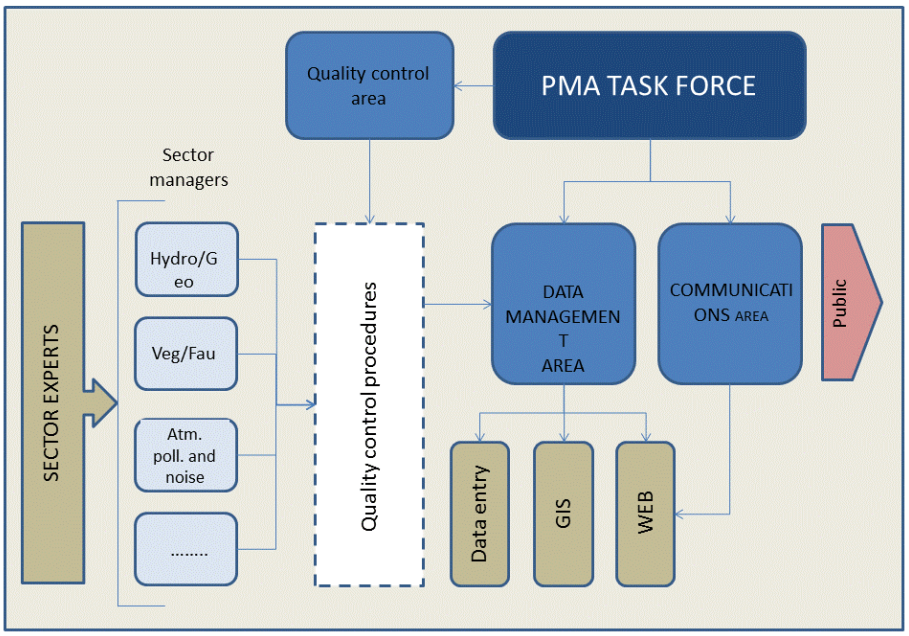
The regularity of relationships would be harmonized with other opportunities for reporting performance of work in the AI, attempting, however to cover all typical monitoring phases; e.g., before performance of the actions, during the execution and in the full operations phase.

As already pointed out in integration of "system" information, the structure assigned for monitoring will be able to promote and to carry out ad hoc surveys, aimed at the acquisition (e.g. based on collection of samples) of information considered useful for the assessment of effects of that supported by the AI. In this case, the *task force* must gain additional competences to respond to the technological scientific requirements and those also necessary for the execution of measures in the field in the various disciplines and for the management of monitoring equipment and devices as well as of data transmission networks.

Purely as an example, ***Fig. 2*** illustrates the main elements of a structure of this type. In the organizational assumption formulated, there is evident attention also to the topic of liaison, beyond that among the various institutional stakeholders, also with the public and interested parties (citizens directly affected by performance of the action) and the public in general.

This need for ample involvement is ruled by the “Aarhus Convention” on access to environmental information enacted in Italy in 2001. This involves primarily the performance already described for the creation of a data filing system with the aid of GIS instruments in a logic of interoperability with the systems adopted by the Ministry of Environment and therefore with homogeneous geo-referencing standards. Meanwhile, it is essential for this system to have an external interface for easy consultation. The creation of a website may be assumed (or enrichment of existing sites) according to more up to date innovative logic of the Public Administration regarding “open data”.

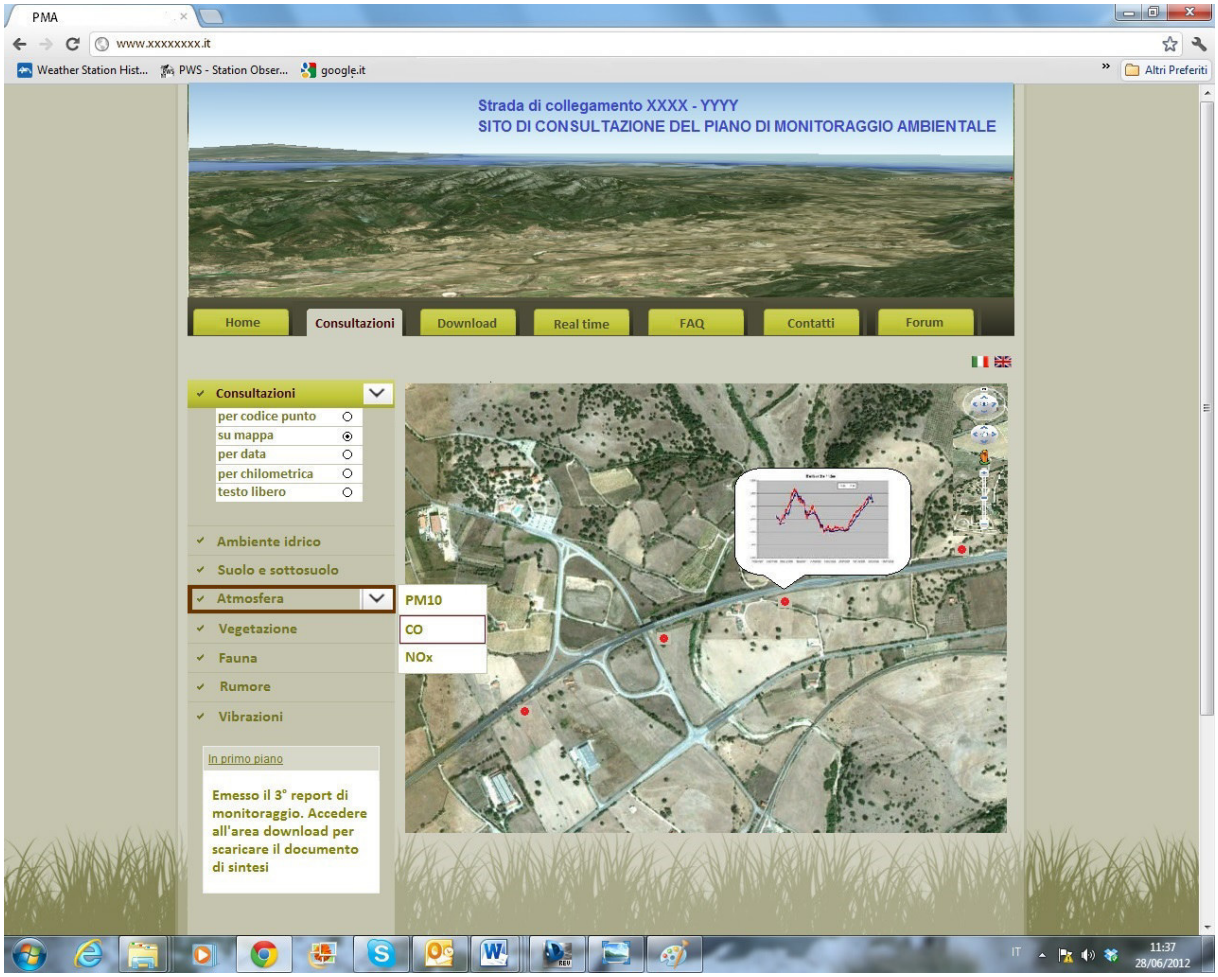
Fig. 2 - Organizational hypothesis of monitoring structure (Our source)



Below, in ***Fig. 3.*** is an image regarding a single work project serving as an example of how a website of this type could be introduced.

During detailed PMA planning, the most appropriate functionalities can be verified with which to equip a system of this sort, with reference also to the level of interactivity with the public, allowing, for example, sending warnings.

Fig. 3 - Simulation of screen of a site dedicated to consultation of data on monitoring an action (Our source)



ANNEX 1: REGULATORY AND PROGRAMMATIC REFERENCES

ANNEX 2: ASSESSMENT DOSSIERS OF FUNCTIONAL AREAS

ANNEX 3: ASSESSMENT OF INCIDENCE OF INFRASTRUCTURE ANNEX ON THE NATURE 2000 SITE