



**Department of Political Science**

**Master in International Relations - European Studies**

**Chair in Policy of EU Structural Funds**

**The Role of Cohesion Policy in addressing Carbon Footprint Assessment  
Strategies, Approaches and Instruments in a Multi-level Perspective**

**Supervisor  
Raffaella Nanetti**

**Candidate  
Anna Rita Ceddia**

**ID Number  
629502**

**Co-Supervisor  
Alessandro Lanza**

**Academic Year: 2018-2019**

## Table of Contents

<b>Acknowledgement</b>	3
<b>List of Abbreviations</b>	4
<b>List of Figures</b>	6
<b>List of Tables</b>	8
INTRODUCTION	9
Research questions, workings hypotheses, objectives and methodology	
CHAPTER I	12
<b>The European Union’s international and domestic institutional context. Global emission trends and Environmental Governance: causes, effects and framework of action</b>	
1.1 Preamble	13
1.2 Background and trends	14
1.3 Institutional approach and the environmental dimension of institutional theory	29
1.4 The international community and Multilateral Environmental Agreements	31
1.5 Observations	41
CHAPTER 2	43
<b>Evolution of contents and funding of the European Environmental Policy Focus and inclusion of emission concerns in the EU Cohesion Policy: Adjusting goals and objectives for emission reduction in the enlarging Europe</b>	
2.1 The EU domestic context	45
2.2 The EU normative and policy framework for emission reduction	48
2.3 Analysis of EU Emissions	60
2.4 The European Funds as a solution for Implementation Gap Reduction	66
2.5 Final remarks	84
CHAPTER 3	87
<b>The 2007-2013 cycle and the formulation of Carbon Footprint Assessment</b>	
3.1 The EIA and SEA Directives role in addressing environmental concerns	88
3.2 Relationship among the Environmental Assessment and Cohesion Funds	95
3.3 The 2007-2013 cycle	99
3.4 Towards a common carbon footprint approach	103
3.5 Evidences	120
CONCLUSION	123
<b>Annex: Interview with ENEA expert</b>	127
<b>Bibliography</b>	135
<b>Summary</b>	157



## Acknowledgement

I riconoscimenti dovrebbero trasmettere la gioia di uno studente alle prese con la tesi, perché di solito si scrivono alla fine, quando le frizioni derivanti dalla stanchezza e dallo studio sono ormai lontane, e si guarda a se stessi come la persona che era destinata ad arrivare alla fine di un percorso. Al contrario, io sono stata riconoscente alle persone care nel momento in cui la certezza della fine non era una condizione assodata e non c'era molta gioia, se non quella che ora considero derivare dalla loro presenza nella mia vita.

Ringrazio dunque la relatrice Raffaella Nanetti, soprattutto per la serenità con la quale mi ha seguito durante la preparazione della tesi.

Ringrazio Roberto del Ciello, la cui collaborazione ha donato slancio al lavoro di ricerca.

Un doveroso grazie a Sara e Paola, per aver rincorso il tempo insieme.

A Flavio, Pasquale, Martina, e Flaminia: raggi di sole in una città di specchi.

A Eufemia e Roberto, che hanno portato dolcemente in me quella leggerezza necessaria per guardare al futuro con concretezza per il presente.

A Claudia, che ha conosciuto i sospiri del mio animo.

A zia Maria, al cui cuore sempre mi rivolgo per rinvigorire la passione per il lavoro e l'entusiasmo per la vita.

A mia madre e mio padre perché mi hanno dato l'occasione di continuare gli studi, e a mio fratello, a cui dedico i miei sforzi. Perché possano capire che questa fatica che mi anima rappresenta una nuova opportunità di felicità.

## List of Abbreviations

**BRICS** Brazil, Russia, India, China and South Africa

**BAS** Business as Usual

**CDM** Clean Development Mechanism

**CEEC** Central and Eastern European County

**CF** Cohesion Fund

**COP** Conference of the Parties

**CP** Cohesion Policy

**DG** Directorate-Generals

**GDP** Gross Domestic Product

**GHG** Green House Gas

**GISS** Goddard Institute for Space Studies

**EAP** Environmental Action Programme

**EBRD** European Bank For Reconstruction And Development

**ECJ** European Court of Justice

**EEA** European Environmental Agency

**EEC** European Economic Community

**EFTA** European Free Trade Association

**EG** Environmental Policy

**EIA** Environmental Impact Assessment

**EIB** European Investment Bank

**EKC** Environmental Kuznet Curve

**ENEA** Italian National Agency for New Technology, Energy and Sustainable Economic Development

**EP** Environmental Policy

**ERDF** European Regional and Development Funds

**ETS** Emission Trading System

**EU** European Union

**EU 15** the number of Member Countries in the European Union prior to the accession of ten candidate countries on May 2004

**FAO** Food and Agriculture Organization

**IO** Input-Output

**IPCC** Intergovernmental Panel on Climate Change

**ISPA** Instrument of Pre-Accession

**JI** Joint Implementation

**MPF** Multiannual Financial Framework

**MS** Member State

**NPAA** National Programme for Adoption of the Acquis Communautaire

**NUTS** Nomenclature of Territorial Units for Statistics

**OECD** Organisation for Economic Co-operation and Development

**OP** Operational Programme

**PHARE** Poland and Hungary: Assistance for Restructuring their Economies

**ROP** Regional Operational Programme

**SAPARD** Special Accession Programme for Agriculture and Rural Development

**SDS** Sustainable Development Strategy

**SEA** Single European Act

**SEA** Strategic Environmental Assessment

**TUE** Treaty of European Union

**TFUE** Treaty on the Functioning of the European Union

**UN** United Nations

**UNGA** United Nations General Assembly

**UNEP** United Nation Environmental

Programme

**UNESCO** United Nations Educational Scientific And Cultural Organization

**UNFCCC** United Nations Framework Convention on Climate Change

**US** United States

**WB** World Bank

**WHO** World Health Organization

## List of Figures

**Figure 1.1:** Total CO<sub>2</sub> emissions from 1751 to 2014

**Figure 1.2:** Global emission by world region

**Figure 1.3 a:** Anomaly in surface temperature in the period from 1885 to 1894

**Figure 1.3 b:** Anomaly in surface temperature in the period from 2005 to 2014

**Figure 1.4:** Carbon Dioxide emissions by sectors expressed in percentage of total fuel combustion by Regional Area (1990 -2014)

**Figure 1.5:** Regional Map on Migration, Environment and Climate Change

**Figure 2.1:** Evolution in policy stringency for environmental action in EU OECD countries

**Figure 2.2:** Non-compliance of accession groups compared to the founding Members

**Figure 2.3a:** EU average of GHG emission from 1990 – to 2016

**Figure 2.3b:** Trends of CO<sub>2</sub> emission divided by consumption and production

**Figure 2.4:** Share (of total emission) by sector EU average in 1990

**Figure 2.5.a:** CO<sub>2</sub> Emission per Unit of GDP EU 15 (KGCO<sub>2</sub>/2010USD)

**Figure 2.5.b:** CO<sub>2</sub> Emission per Unit of GDP of CEECs (KGCO<sub>2</sub>/2010USD)

**Figure 2.6:** Aggregate Funding 1989-1993 by theme

**Figure 2.7:** EU pre-accession fund allocation by environment sector 1995-2000

**Figure 2.8:** EU pre-accession fund allocation for environment sector by country 1995-2000

**Figure: 2.9:** Comparison of allocations (EUR million) by sector across the three financing periods (all Member States aggregated)

**Figure: 2.10:** Direct and indirect environmental investments (% of total ERDF and Cohesion Fund allocations) compared

**Figure 3.1:** Ranking of national transposition measures from 2004

**Figure 3.2:** Configurations of the EIA and the SEA

**Figure 3.3:** Comparison of the 2002 and 2009 concentration of organizations that carry out EIA and SEA by MS

**Figure 3.4:** Total Expenditure and Revenue by MS for the 2007-2013 cycle

**Figure 3.5:** Test Regions in the 2007-2013 Programme Cycle

**Figure 3.6:** Emissions Scenario of the Original and Integrated OP of Emilia- Romagna Region by sectors

**Figure 3.7:** Emissions Scenario trends of the Original and Integrated OP of Emilia- Romagna Region

**Figure 3.8:** Emissions Scenario of the Original and Integrated OP of Puglia Region by sectors

**Figure 3.9:** Emissions Scenario of the Original and Integrated OP of Puglia Region

**Figure 3.10:** comparison among SEA without (up side of the image) and with (down side of the picture)  
Co2 impact

## List of Tables

**Table 1a:** Major 15 countries for emission by indicators (total amount of CO2 emissions, CO2 emissions per capita, and CO2 emissions per unit of GDP) in 1990

**Table 1b:** Major 15 countries for emission by indicators ( total amount of CO2 emissions, CO2 emissions per capita, and CO2 emissions per unit of GDP) in 2000.

**Table 1c:** Major 15 countries for emission by indicators (total amount of CO2 emissions, CO2 emissions per capita, and CO2 emissions per unit of GDP) in 2010.

**Table 1d:** Major 15 countries for emission by indicators (total amount of CO2 emissions, CO2 emissions per capita, and CO2 emissions per unit of GDP) in 2015.

**Table 1.2:** Institutional principles developed in the twentieth century

**Table 1.3:** Main categories of partner typology

**Table 2.1:** Six Challenges of Environmental Politics and Policy

**Table 2.2:** Comparison Multiannual Financial Frameworks from 1988-92 to 2014-2020

**Table 2.3:** Comparison of Cohesion Policy allocations with other sources of financing for direct environmental investments, in 2000-06 and 2007-2013 financing period, yearly average

**Table 3.1:** Focus on Environmental Assessment integration by MS

**Table 3.2:** List of the principal fields of intervention and principal SICs

**Table 3.3:** Original Financial Allocation of ROP Emilia- Romagna

**Table 3.4:** Original Financial Allocation of ROP Puglia

# INTRODUCTION

## Research Question

The present work follows in the stream of investigations that belong to the body of literature on the European Union. Among the various issues that might be addressed in this field, the main factor that determines the research context of this thesis is the relationship between European Union (EU) Cohesion Policy and the environmental aspect. The evolution of climate-related mutations and their connection with the socio-economic objectives promoted by the EU are dynamic and relevant today, but they are also of difficult articulation. This thesis aims to address and answer the following two questions:

- Which is the role of the EU Cohesion Policy in addressing de-carbonization of the EU territorial system?

and consequently:

- According to which criteria is it possible to determine whether or not the Cohesion Policy effectively contributes to the reduction of the carbon footprint?

## Working Hypotheses

In order to respond to the above stated research questions, the thesis selectively draws from hypotheses investigated at different levels of analysis by a number of studies, and it re-formulates and adopts the following working hypotheses:

- a) Institutions matter in the environmental issues debate; despite criticisms the institutional theory provides a conceptual framework according to which environmental concerns can be faced thanks to the presence of institutions.
- b) The Eastern Enlargement of 2004-2007 is an intervening variable within the institutional context of the EU and it has influenced the process of environmental concerns inclusion.
- c) The Environmental Policy (EP) of the EU is an on-going process and is influenced by EU-external (i.e. exogenous shock; response to Foreign States actions) and internal factors (i.e. sectorial interests promoted by EU Member States (MS); legislative and administrative thresholds).
- d) The Structural Funds are tools that promote development and the consolidation of specific objectives of the EU – even though not homogeneously across the EU Member States (MS) – through a multi-level approach pursuing the inclusion of social groups and citizens, and this can be extended also to

environmental concerns.

- e) The financial resources provided by the EU support achievements that otherwise would be more difficult to obtain by only relying on national budgets ; they differ in terms of both formal and substantial aspects from funding provided by other types of institutions.

## **Objectives**

The objectives of this study have been set as follows, to:

- Understand the global and regional trends of GHGs and particularly CO<sub>2</sub> emissions;
- Define which type of agency the European Union is in addressing environmental and climate-related negotiations;
- Identify the internal factors that cooperate in outlining the EU environmental and climate policy;
- Verify the extent of the contribution of the Cohesion Policy in addressing and achieving carbon emission reduction;
- Assess whether there is a strong connection between the Cohesion Policy and the effective implementation of the environmental and climate agenda in relation to the investments made under the Cohesion Financial Scheme.

## **Methodology**

For what concerns the methodology adopted by this thesis, it is inclusive of the following methods: pertinent scholarly literature review, content analysis of documents, and the single case study approach.

More specifically, information on which the analytical work of this thesis is based upon is drawn from: academic literature such as handbooks and research papers; datasets such as of the World Bank, Eurostat, European Environmental Agency, OECD, FAO, NASA Goddard Institute for Space Studies; Institutional online portals such as European Commission, European Court of Justice, European Court of Auditors, EU Member States, European Parliament; legal acts, law cases, materials related to *ex ante* and *ex post* funding programme evaluations, and journal articles.

Furthermore, part of the research has been based on primary source information, collected during the interview with expert of environmental account consultant.

The structure of the thesis is in seven sections: introduction, three chapters, conclusion, annex and bibliography. The introduction provides methodological information and addresses the research questions.

The first chapter contains the literature review on the phenomenon of carbon emission at the global level and contextualizes the action of the EU in the environmental and climate –related international relations background.

The second chapter provides information on the domestic context of the EU in which actions are influenced by multi-level dynamics in which competences and roles are often shared, sometimes contended, other times avoided. Once it has determined the institutional type of structure, the chapter moves to the discourse of carbon emission analysis in relation to economic structure, at the EU level and the national level. The accession in 2004-2007 of the 10 new MS posed new objectives because of the challenges that this Eastern and Greatest Enlargement, and these objectives have contributed to the articulation of the EU's EP elements. The last part of the second chapter introduces the CP as a framework able to operationalize EP elements which otherwise tend to be formulated just as theoretical principles of EP. Hence, the implementation gap is partially addressed by the normative and legislative framework of the CP approach.

In the third chapter, the relation among the legal provision such as the SEA Directive and the CP framework is analysed. The observations around this link lead to the mutual evolution that they faced during the 2007-2013 programme cycle, in which the assessment of carbon footprint has been fully addressed and tested.

In the conclusion, the main findings of the thesis are reported to as to consider the possible evolution of the practice analysed in the previous chapter and point out the limits to be faced in the future.

## CHAPTER 1

### **The European Union's international institutional context**

#### **Global emission trends and Environmental Governance: causes, effects and framework of action.**

*“The saddest aspect of life right now  
is that science gathers knowledge faster  
than society gathers wisdom.”*

*Isaac Asimov*

The aim of this chapter is to discuss the main elements of the Environmental Governance (EG) structure, which is partaken by the European Union (EU) and how such institutions are facing the challenges of environmental transformation. To present a comprehensive picture, an introduction including the state of the art of the alteration of the environment is first provided, as a preliminary condition or the discussion of the EG principles and dynamics. Because of the complexity of the topic, there is no presumption for this work to deal with all the current literature that investigates such a transversal topic, but to underline its principal aspects. Precisely because of the transversal nature of environmental changes that exercise their effects on territorial communities with remarkable magnitude, the following sections contain a part dedicated to the emergence of environmental changes, their causes and general implications. The discussion concerning the EG - and consequently also the dimension that regards policy formulation and implementation - focuses on the specific case of the GHG emissions raise, paying more attention to the rise of carbon dioxide, since the global market economy is considerably a carbon-based economy. Therefore, the discussion below is to:

- a. Highlight the reasons why the alteration of the ecosystem and the environmental changes are of particular concern, especially for the social sciences;
- b. Report on the main trends regarding environmental changes, considering particularly the emissions of GHGs. The specific part on carbon dioxide is explored the most due to the fact that the CO<sub>2</sub>

emission level has been historically linked to the economic development of countries and consequently represents a controversial indicator in measuring both economic and environmental changes;

- c. Focus on the core principles and frame of action to face environmental changes. In this part, elements of the institutional theory framework are highlighted and linked to the environment issue in order to provide the basis for the analysis presented in the following chapters, Analysis of the international context is provided taking into account factors such as:
  - 1) the juridical background and the legal implementation to face the environmental issue;
  - 2) the action implemented and the tools in place to contain the rise of GHG and CO<sub>2</sub> emissions.
  - 3) the role of states, international organizations and other subjects of international law – such as regional organization and therefore the EU;
- d. Conclude that in the transition from an intensive carbon-base economy to a more sustainable system, the institutional approach is still valid to address decreasing emission levels, that have such a deep negative impact on society.

## 1.1 Preamble

Wondering what the natural and non-human factors mean to humans does not set the discussion of this relation just in ethical or emotional dialectic<sup>1</sup>: to understand nature and the natural world commonly recognized as the environment<sup>2</sup> -, in modern society means also<sup>3</sup> to recognize in which type of world humans are living in and which types of goals societies can achieve and how, on the basis of new emerging constrains due to environmental and climate changes.

Empirical evidence has shown how societies meet considerable difficulties in finding this new balance and, thus, in the achievement of a more sustainable equilibrium. The words of Isaac Asimov are emblematic in presenting this critical situation, as the words of other thinkers who have shown concern about economies and social structures' capacity to change their behaviours both in conducting business and in lifestyle<sup>4</sup>. There are several reasons that explain the main difficulties encountered. Leaving aside the material aspects involved (e.g. the economic advantages and disadvantages deriving from the alteration of market conditions and the variation of commodity prices) that surely play a role in determining the formulation of new strategies, one of the major difficulties in defining the action necessary to shift to a new way of living within

---

<sup>1</sup> Essentially referring to Jamieson, D. and Bonnie Nadzam. 2015. *Love in the Anthropocene*. New York: OR Books LLC.

<sup>2</sup> OED Online. July 2018. Oxford University Press. Retrieved from: <http://www.oed.com/view/Entry/63089?redirectedFrom=environment> (accessed November 29, 2018).

<sup>3</sup> Main references for this point are: Diamond, J. (2013). *Guns, Germs And Steel*. Random House.

Diamond, J. (2005). *Collapse: How societies choose to fail or succeed*. Penguin.

Chakrabarty, D. (2015). The Anthropocene and the convergence of histories. In *The Anthropocene and the Global Environmental Crisis* (pp. 56-68). Routledge.

<sup>4</sup> Jamieson, D. (2014). *Reason in a dark time: why the struggle against climate change failed--and what it means for our future*. Oxford University Press.

the constraints of a changing environment has its roots in actions separated in space and time, not coordinated at the global level but eventually cumulative; so that they have destructive impacts on territorial communities .

While on the one hand there is some assurance from the scientific instruments available nowadays which permit to formulate a more complete and detailed picture of the environmental challenges and ensure a reliable system of information, on the other there is a consistent part of work that still has to rely on the planning, coordination, and implementation of policies that at different levels have to respond to those changes. Social sciences provide an inquiry into and data on environmental issues from a perspective that includes social dynamics directly affected or that are subjected to them. Social sciences support policy processes in institutions, identify incongruity and address clarifications in order to refine the practical aspects of a policy<sup>5</sup>. Thus, the role of the social sciences is essential in addressing environmental issues since the human condition – in both its individual and communitarian dimensions - is linked to the context of resources and carbon-constrained planet<sup>6</sup>, as this work discusses .

## 1.2 Background and trends

A first way to address the environmental issues is to present the measurements that have quantified the impact of anthropogenic pressure depending on the demographic development and the economic activities in relation to their impact on the environment<sup>7</sup>. It is important to highlight how the compounding of different factors that have been emerging during the past 3 centuries has been significant. In the first place there has been a substantial increase in human population and a corresponding growth in the cattle population<sup>8</sup> as well. Urbanization, industrial activities and energy use have dramatically increased: the first has increased more than tenfold; the second has been growing 40 times as much; the third has been growing 16 times as much. All those changes leave on Earth a footprint measurable in the quantity of emission emitted, so that the increasing in fossil fuel consumption in conjunction with the intensification of agricultural activities, deforestation, and intensive animal husbandry, has substantially increased several climatically important GHG in the atmosphere over the past two centuries<sup>9</sup>. Considering the present trends that impact on Earth, the

---

<sup>5</sup> "Science for Environment Policy": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol on the base of Parry, S. and Murphy, J. (2013). Towards a framework for analysing interactions between social science and environmental policy. *Evidence and Policy: A Journal of Research, Debate and Practice*, 9(4), pp.531-546. DOI: 10.1332/174426413X1383 6455133196.

<sup>6</sup> Parkes, C. (2018, December 17). How social science is driving a sustainable future (with special issue). Retrieved from: <https://www.elsevier.com/connect/how-social-science-is-driving-a-sustainable-future-with-special-issue> (accessed November 29, 2018).

<sup>7</sup> Selim, J. (2015). Human Development Report 2015. Work for Human Development. New York, NY: United Nations Development Programme (UNDP). Retrieved from [http://hdr.undp.org/sites/default/files/2015\\_human\\_development\\_report\\_1.pdf](http://hdr.undp.org/sites/default/files/2015_human_development_report_1.pdf). (accessed November 29, 2018).

<sup>8</sup> Relevant for the methane emission growth.

<sup>9</sup> Brauch, H. G., Spring, Ú. O., Mesjasz, C., Grin, J., Kameri-Mbote, P., Chourou, B., et al. (Eds.). (2011). *Coping with global environmental change, disasters and security: threats, challenges, vulnerabilities and risks* (Vol. 5). Springer Science & Business Media.

relation between humankind and environment and the impact the first produce on the latter has been revisited<sup>10</sup>. The discussion of the topic has experts maintaining that the current geological epoch is characterized by human activities that play a determinant pressure and are to modify the Earth functioning systems. For this reason it is reasonable to assume the necessity to use a different term that includes in its etymology a strong reference to the anthropic impact generated by mankind, the Anthropocene<sup>11</sup>. The concept of Anthtopocene is of “a new geologic epoch in which [hu]mankind has emerged as a globally significant – and potentially intelligent – force capable of reshaping the face of the planet”<sup>12</sup>.

Until few decades ago, it was known that the geological frame of reference was the one defined as Holocene. This era started with the end of the glacial period about 12,000 years ago; it is quite recent with respect to the other geological periods characterized by a much longer temporal arch. The Holocene has seen the blooming of the known high civilization (i.e. in the Mediterranean, China, India, and Mesoamerica) until the emergence of invasive interventions by mankind starting around the First Industrial Revolution. The consequent intensification of the anthropic pressure has been identified as the main factor responsible for the resultant changes in the ecosystem functioning. Such massive interventions have been quantified by indicators measuring the level of: world population, urban population, real GDP, FDI, primary use of energy, large dams, water use, paper production, fertilizer consumption, transportation, telecommunications, international tourism, carbon dioxide, methane, nitrous oxide, surface temperature, stratospheric ozone, marine and fish capture, ocean acidification, coastal nitrogen, shrimp aquaculture, tropical forest loss, domestic land, terrestrial biosphere degradation<sup>13</sup>. All of them have contributed to map the global trend called the Great Acceleration, which specifically refers to the rapid increase in socio-economic and environmental dynamics that exploded by the 1950s. This increase shows how the deep variation in the trends is the element that fosters the hypothesis according to which there is a concrete shift towards a new

---

<sup>10</sup> Steffen, W, Sanderson, A, Tyson, PD. (2004) *Global Change and the Earth System: A Planet Under Pressure*. The IGBP Book Series. Berlin, Heidelberg, New York: Springer-Verlag, 336 pp.

Steffen, W, Crutzen, PJ, McNeill, JR (2007) *The Anthropocene: Are humans now overwhelming the great forces of Nature?* *Ambio* 36: 614–621.

<sup>11</sup> Crutzen, Paul J. And Eugene F. Stoermer, 2000. *The “Anthropocene”*. *Global Change Newsletter* 41: 17-18.

<sup>12</sup> Clark, William C.; Crutzen, Paul J.; Schellnhuber, Hans Joachim, 2004: “Science and Global Sustainability: Toward a New Paradigm”, in: Schellnhuber, Hans Joachim; Crutzen, Paul J.; Clark, William C.; Claussen, Martin; Held, Hermann (Eds.): *Earth System Analysis for Sustainability* (Cambridge, MA: MIT Press): 1- 28. Ehlers, E. (2006). *Earth system science in the anthropocene*. T. Krafft (Ed.). Springer.

<sup>13</sup> Primary sources: *US Bureau of the Census (2000) International database; Nordhaus (1997) In: The economics of new goods. University of Chicago Press; World Bank (2002) Data and statistics; World Commission on Dams (2000) The report of the World Commission on Dams; Shiklomanov, I. A. (1990). Global water resources. Nature and resources, 26(3), 34-43.*

*International Fertilizer Industry Association (2002) Fertilizer indicators; UN Centre for Human Settlements (2001); The state of the world's cities, (2001); Pulp and Paper International (1993) PPI's international fact and price book; MacDonalds (2002) <http://www.mcdonalds.com>; UNEP (2000) Global environmental outlook 2000; Canning (2001) A database of world infrastructure stocks, 1950–95 World Bank; World Tourism Organization (2001) Tourism industry trends.* Another elaboration provided by International Geosphere-Biosphere Programme. Retrieved from: <http://www.igbp.net/globalchange/greatacceleration.4.1b8ae20512db692f2a680001630.html> (accessed November 29, 2018).

period, that is the Anthropocene.

The Great Acceleration has been evident since the second half of the 20<sup>th</sup> century, but the roots of the dynamics that have caused the described condition have to be observed over a longer time span, in conjunction with the crucial elements at the basis of the concurrent causes, as the emission of GHGs. The relevance of the GHG and particularly of Carbon Dioxide has been recognized by several authors<sup>14</sup> and organizations (UN, WHO, IOM). They have investigated the gas emissions implications at different scales, since the anthropic activities that induce an increase in emissions are responsible for the alteration of their absorption, causing a greenhouse effect by the anthropic activities which is added to the already existing natural one. As a consequence, the previous equilibrium of gas absorption and emission of thermal radiation has been distorted arising temperature and changing climate conditions<sup>15</sup>. The range of potential ecological, physical and health impacts deriving from the alteration of those conditions includes extreme weather events as floods, droughts, storms, and heatwaves; sea-level rise; altered crop growth; and disrupted water systems<sup>16</sup>. GHGs and so CO<sub>2</sub> not only affects climate in relation to their greenhouse effects, but have many side effects that directly affects how vegetation grows<sup>17</sup>, alters the carbonate chemistry in the ocean, which in turn affects marine organisms.

The principal greenhouse gases are methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydro fluorocarbons (HFCs), per fluorocarbons (PFCs), sulphur hexafluoride (SF<sub>6</sub>), and carbon dioxide (CO<sub>2</sub>). Since they have different characteristics, it has been calculated that converting all other greenhouse gases in CO<sub>2</sub> equivalents makes it possible to compare them and to determine their individual and total contributions to global warming<sup>18</sup>.

However, the environmental effects of carbon dioxide are of significant interest on their own as well, due to the fact that it makes up the largest share of the greenhouse gases contributing to global warming and climate change.

A quantitative dimension of these phenomena is represented in the figures below. Figures 1.1 and 1.2

---

<sup>14</sup> Steffen, W, Sanderson, A, Tyson, PD. (2004) *Global Change and the Earth System: A Planet Under Pressure*. The IGBP Book Series. Berlin, Heidelberg, New York: Springer-Verlag, 336 pp.

<sup>15</sup> The studies and acknowledgment in this fields date back to the 1900, when the scientists Arrhenius published his *Lärobok i teoretisk elektrokemi* (Textbook of theoretical electrochemistry); During all his work, he illustrated by his theory of the importance of the CO<sub>2</sub>-content of the atmosphere for the climate. Svante Arrhenius, 1896b, *On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground*, London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science (fifth series), April 1896. vol 41, pages 237–275.

<sup>16</sup> The most extensive source of analysis on the potential impacts of climatic change can be found in the 5th Intergovernmental Panel on Climate Change (IPCC) report, with a specific chapter on Impacts, Adaptation, and Vulnerability.

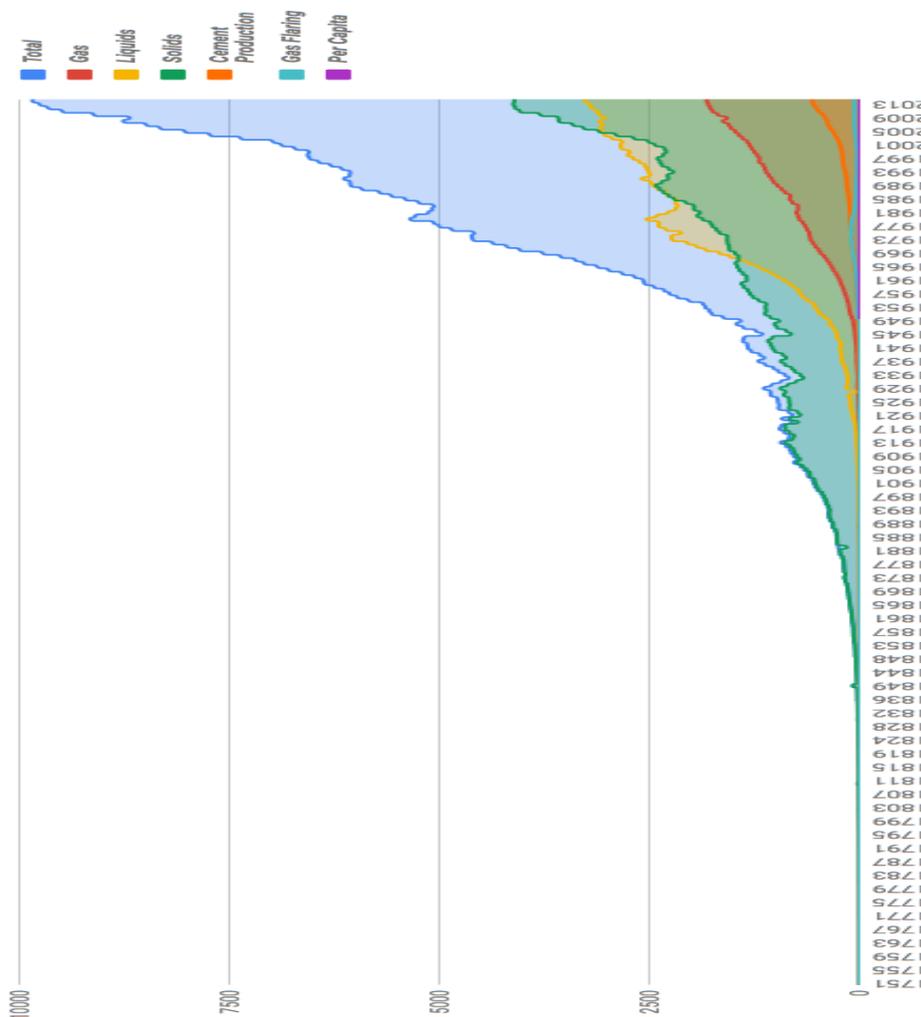
Krupa, S. V., & Kickert, R. N. (1989). The greenhouse effect: impacts of ultraviolet-B (UV-B) radiation, carbon dioxide (CO<sub>2</sub>), and ozone (O<sub>3</sub>) on vegetation. *Environmental Pollution*, 61(4), 263-393.

[https://doi.org/10.1016/0269-7491\(89\)90166-8](https://doi.org/10.1016/0269-7491(89)90166-8). (accessed November 29, 2018).

<sup>18</sup> Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K. B., .et alia (2007). IPCC, 2007: Climate change 2007: The physical science basis. Contribution of Working Group I to the fourth assessment report of the Intergovernmental Panel on Climate Change. *SD Solomon (Ed.)*.

respectively focus on the total amount of emissions estimated<sup>19</sup>, and the total amount of emission on the base of regional areas. Further analyses based on the identification of the major emission trends according to a regional base, have observed a discordant trend among the geographic areas in the same time range.

**Figure 1.1:** Total CO<sub>2</sub> emissions from 1751 to 2014



Source: Boden, T.A., G. Marland, and R.J. Andres. 2017. *Global, Regional, and National Fossil-Fuel CO<sub>2</sub> Emissions*. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. doi 10.3334/CDIAC/00001\_V2017. Author elaboration.

Figure 1.1 shows the CO<sub>2</sub> emission-raising trend from the beginning of the Industrial Revolution period, 1751, until recent years, where the most recent data are available for 2014. The emissions are just over 400 billion metric tonnes of carbon, which have been released into the atmosphere as primarily a

<sup>19</sup> Total greenhouse gas emissions (kt of CO<sub>2</sub> equivalent) details. World Bank Database. Retrieved from: <https://data.worldbank.org/indicator/EN.ATM.GHGT.KT.CE?view=chart>. (accessed November 29, 2018). Other reference: Ritchie, Hannah and Max Roser (2018) - "CO<sub>2</sub> and other Greenhouse Gas Emissions". Published online at OurWorldInData.org. (accessed November 29, 2018).

consequence of fossil fuels consumption and cement production. Since the Industrial Revolution, it is the energy-driven consumption of fossil fuels that has led to a rapid increase in CO<sub>2</sub> emissions, disrupting the global carbon cycle and leading to a planetary warming impact.

The progressive increasing trend has been even more significant since the late 1980s, when around half of these fossil-fuel CO<sub>2</sub> emissions have occurred. Following the methodology of the Carbon Dioxide Information Analysis Center, total emissions are the result of sectorial emission deriving from gas, liquids, solids, cement production and gas flaring. As reported, liquid and solid fuels accounted for 75.1% of the emissions from fossil-fuel burning and cement production in 2014 at the global level.

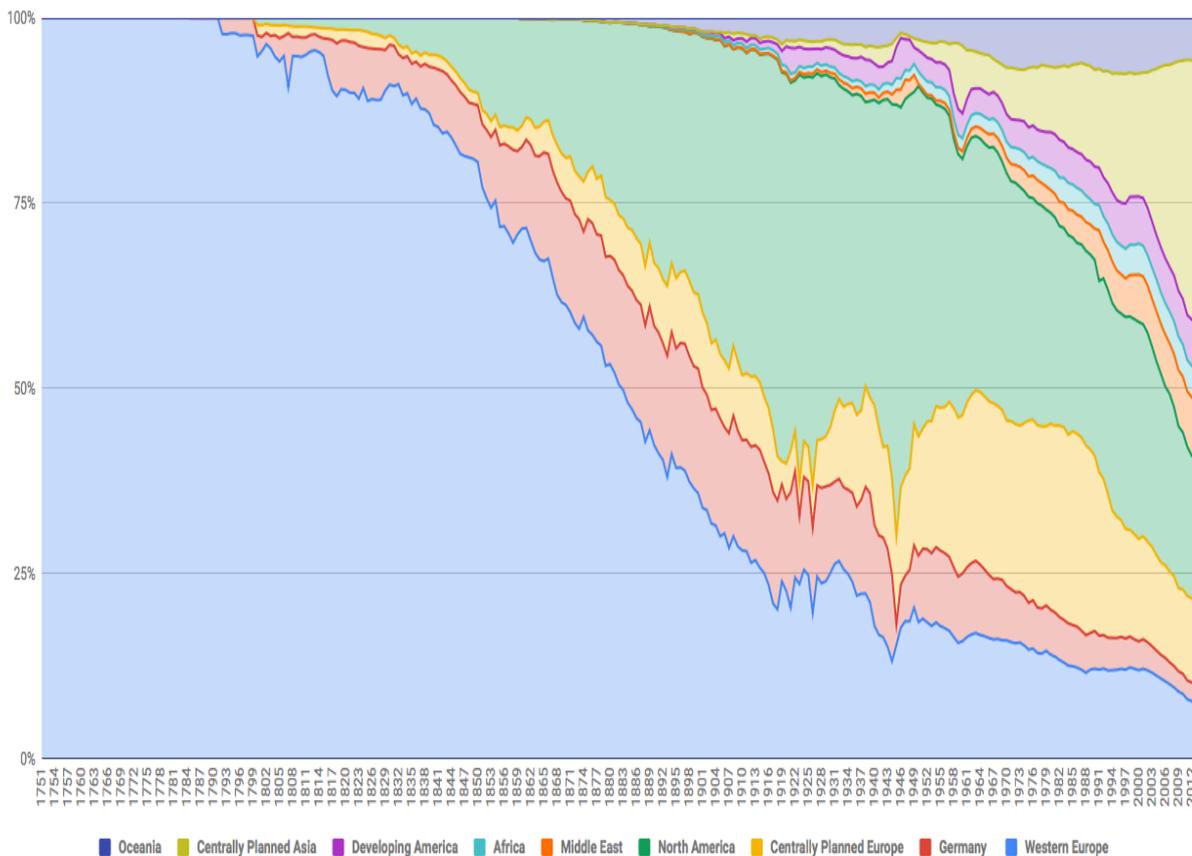
Combustion of gas fuels (e.g., natural gas) accounted for 18.5% (1823 million metric tons of carbon) of the total emissions from fossil fuels in 2014 and it reflects a gradually increasing global utilization of natural gas. Emissions from cement production (568 million metric tons of carbon in 2014) have more than doubled in the last decade and now represent 5.8% of global CO<sub>2</sub> releases from fossil fuel burning and cement production. Gas flaring, which accounted for roughly 2% of global emissions during the 1970s, now accounts for less than 1% of global fossil-fuel releases<sup>20</sup>.

However, the role of individual regions in the emission rise shows diverse trends as highlighted in Figure 1. 2. Western Europe and the North America regions have been particularly interested in the cumulative emission phenomena, followed by other areas just in the second part of the past century. This trend is typically counter posed to the annual emissions ranking, which highlights the contribution of emerging economies and developing countries in the considerable portion of emissions released in the atmosphere.

---

<sup>20</sup>Boden, T.A., G. Marland, and R.J. Andres. 2017. *Global, Regional, and National Fossil-Fuel CO<sub>2</sub> Emissions*. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. doi 10.3334/CDIAC/00001\_V2017

**Figure 1.2:** Global emission by world region



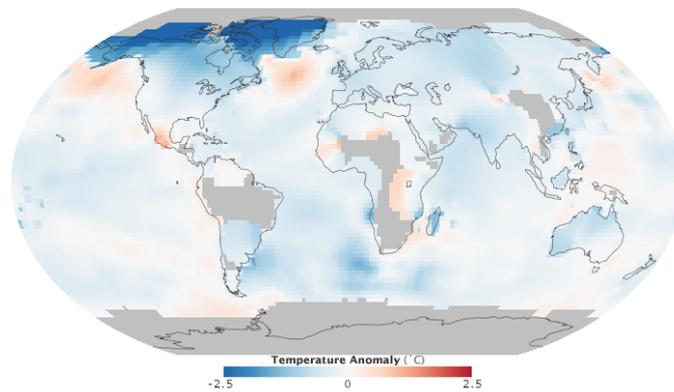
Source: Tom Boden and Bob Andres (Oak Ridge National Laboratory); Gregg Marland (Appalachian State University) DOI: 10.3334/CDIAC/00001\_V2017.

In Figures 1.3 a and b, temperature anomalies are compared for the period 1885-1894 and 2005-2014. After more than a century, anomalies have been detected in the same time range, with an increase of the median temperature in the North Hemisphere, and a modest but still confirmed increase in the Southern Hemisphere. Evidence suggests that this distribution is strongly related to ocean circulation patterns (notably the North Atlantic Oscillation), which has resulted in greater warming in the northern hemisphere.<sup>21</sup> According to an on-going temperature analysis conducted by scientists at NASA’s Goddard Institute for Space Studies (GISS), the average global temperature on Earth has increased by about 0.8° Celsius (1.4° Fahrenheit) since 1880. Two-thirds of the warming has occurred since 1975, at a rate of roughly 0.15-0.20°C per decade.

<sup>21</sup> Intergovernmental Panel on Climate Change (IPCC) report.

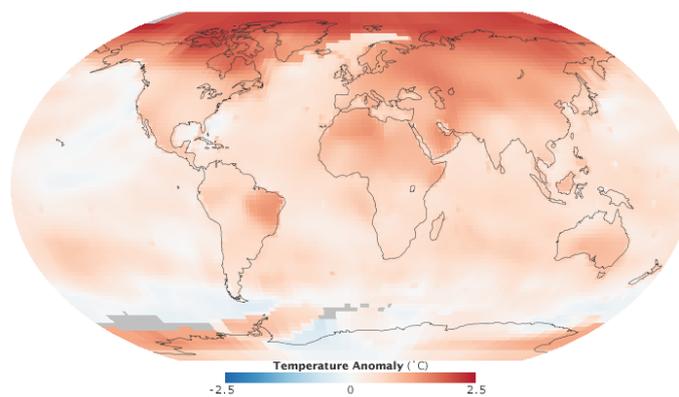
Documents available at: <https://www.ipcc.ch/ipccreports/tar/wg1/012.htm> (accessed November 29, 2018).

**Figure 1.3 a:** Anomaly in surface temperature in the period from 1885 to 1894



*Source: NASA Goddard Institute for Space Studies (n.d.). GISS Surface Temperature Analysis*

**Figure 1.3 b:** Anomaly in surface temperature in the period from 2005 to 2014



*Source: NASA Goddard Institute for Space Studies (n.d.). GISS Surface Temperature Analysis<sup>22</sup>.*

### 1.2.1 Behind and beyond the CO<sub>2</sub> emissions rise

As remarked in the first part of the chapter, emissions are an ambivalent indicator: if it is true that they have accompanied strong growth dynamics on the other they mirror the incumbent degradation of the environment. So, according to the sectors and the typology of material used on the basis of the resources available in context-specific areas, emissions may reflect the path of economic growth.

With respect to the traditional classification, which identifies primarily the sectors of energy, industry,

---

<sup>22</sup> NASA Goddard Institute for Space Studies. GISS Surface Temperature Analysis. Available at: <https://earthobservatory.nasa.gov/world-of-change/DecadalTemp> (Accessed December 13, 2018). The main discussion on temperature and anomalies are contained in Hansen, J., R. Ruedy, M. Sato, and K. Lo (2010). Global surface temperature change. *Reviews of Geophysics*, 48. Available at: <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2010RG000345> . (Accessed December 13, 2018).

transport and building efficiency, the dataset information presented by the FAO division provides a broader classification which includes also other sectors, such as international bunkers, residential, commercial and public buildings, wasted materials, agricultural activities, land use and other sources both of anthropogenic and not anthropogenic origin. For each sector it is possible to identify more specific fields of emission production.

The emissions deriving from energy sectors include manufacturing and construction industries and fugitive emissions, emissions deriving from public heat and electricity production; fugitive emissions from solid fuels, oil and gas. Transport includes road transportation, rail transportation, domestic navigation, other and more general types of transportation. International bunkers refer to the use of massive tanks as in the international aviation sector, international navigation and shipping. Industry concerns both industrial processes and product use: a vast variety of production from minerals, chemicals, metals, but also paper, food and drink, and other types of commodities such as refrigeration and air conditioning, aerosols, solvents; electronics manufacture and electrical equipment. Waste sector includes: solid waste disposal; wastewater handling; particularly waste incineration, and other waste handling. The emission that interests the agricultural sector are predominantly deriving from methane and nitrous oxide emissions from enteric fermentation; on another level there are those deriving from rice cultivation; synthetic fertilizers; manure applied to soils; manure left on pasture; crop residues; burning crop residues, and cultivation of organic soils. For what concerns the use of land there are the emissions from the net conversion of forest; cropland; grassland and burning biomass for agriculture or other uses.<sup>23</sup>

However, a substantial separation among sectors persists and is related to the distinction made for the agricultural sphere that is generically left aside from the sectors of energy, industry, transport and building efficiency, primarily because approximately 75% of the increase in concentration is ascribable to anthropogenic emissions deriving from the use of fossil fuels (oil, coal, natural gas), which are the source of about 88% of energy production primary. The remaining 25%, in the increase is attributed to deforestation, which therefore provides a contribution that is anything but negligible<sup>24</sup>.

In order to outline a more defined picture of emission trends, an analysis of macro regional based data from the World Bank has been conducted. Figure 1.4 shows the concentration of emissions by sectors in recent years, comparing the level in 1990 with those in 2014. The different histograms' bars represent the percentage of emission for each macro regional group, located on the x-axis of the graph. In all geographical macro regions there is an evident similarity regarding the dramatically high emission generated from electricity and heat production, followed by the transport sectors, and manufacturing industry and

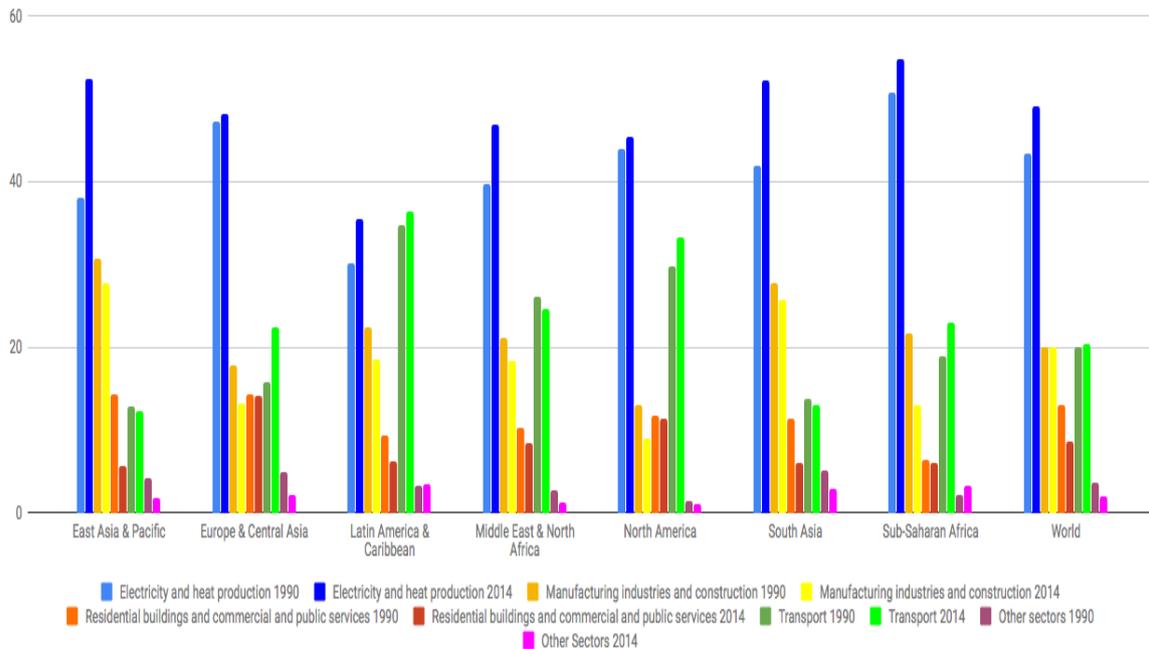
---

<sup>23</sup> FAO. Emissions by sector - dataset information. Retrieved from: [http://fenixservices.fao.org/faostat/static/documents/EM/EM\\_e.pdf](http://fenixservices.fao.org/faostat/static/documents/EM/EM_e.pdf). (Accessed December 13th 2018).

<sup>24</sup> Zucchetti, M. L'ambiente e l'energia, Chapter: I cambiamenti dovuti alle emissioni di origine antropica, in La Scienza. VOLUME 13 - Publisher: LA BIBLIOTECA DI REPUBBLICA, pp.555-566. DOI: 10.13140/RG.2.1.1550.4246

constructions, which however record different scores according to the macro region: the manufacturing industry and construction had seen intensive development in South East Asia and the Pacific region.

**Figure 1.4:** Carbon Dioxide emissions by sectors expressed in percentage of total fuel combustion by Regional Area (1990 -2014)



Source: World Development Indicators, The World Bank<sup>25</sup>. Author Elaboration

Macro regional area analysis is useful to undertake in a preliminary discussion and deduce the general aspects of emissions trends, but it is important to notice how macro regional grouping standardizes those trends that on a country-base examination report more discordant tendency due to the specific characteristics of each country, depending primarily on its demography and economic structure.

For instance, when comparing countries and selecting socio-economic indicators such as population and GDP, the level of emissions are ranked differently, as shown in Tables 1a-d. Each Table contains the ranks of the principal emitting countries on an annual basis in a range of ten years<sup>26</sup>. The Tables are divided in

<sup>25</sup> World Development Indicators, The World Bank. Available at <https://datacatalog.worldbank.org/dataset/world-development-indicators> (Accessed December 13th 2018).

<sup>26</sup> The only exception is the Table 1.d, having 2015 as time of reference. The methodology for collecting the data mirror the EDGAR dataset application. As reported on the dataset: "The time series report country-specific CO2 emission totals of fossil fuel use and industrial processes (cement production, carbonate use of limestone and dolomite, non-energy use of fuels and other combustion, chemical and metal processes, solvents, agricultural liming and urea, waste and fossil fuel fires). Excluded are: short-cycle biomass burning (such as agricultural waste burning), large-scale biomass burning (such as forest fires) and carbon emissions/removals of land-use, land-use change and forestry (LULUCF). The EDGARv4.3.2\_FT2016 emissions are calculated based on": IEA energy balance statistics (2014) ([http://www.oecd-ilibrary.org/energy/CO2-emissions-from-fuel-combustion-2014\\_CO2\\_fuel-2014-en](http://www.oecd-ilibrary.org/energy/CO2-emissions-from-fuel-combustion-2014_CO2_fuel-2014-en)) and IEA (2016) for China BP 2015-2016 data of the BP Statistical Review of World Energy, (June 2017). (<http://www.bp.com/en/global/corporate/about-bp/energy-economics/statisticalreview-ofworld-energy.html>) USGS 2013-2016 data of cement, lime, ammonia of the USGS Commodity Statistics (April 2017). (<https://minerals.usgs.gov/minerals/pubs/commodity/>). IFA 2011-2016 urea consumption and production statistics (June 2017) (<http://www.fertilizer.org/Statistics>) NOAA 2013-

three columns in accordance to the indicators for which countries are recorded. The first evident fact is the different composition between the first and the third column, exception made for countries from the BRICS group and countries of the European eastern border, such as Estonia and Ukraine. A further consideration arises in considering the third column alone: the first countries that gain the top positions in the list emit more carbon dioxide per unit of GDP.

In essence, the issue is to understand not just the amount of emission, but also with which intensity countries are emitting CO<sub>2</sub>. In this respect, two key variables are used: energy efficiency - that measures the amount of energy needed for one unit of GDP output - and carbon efficiency - that calculates the amount of CO<sub>2</sub> emitted per unit energy (grams of CO<sub>2</sub> emitted per kilowatt-hour). The first is often related to productivity and technology efficiency, or in other cases can also be related to the type of economic activity underpinning output<sup>27</sup>. On the other side, carbon efficiency is related to the energy mix. A country whose economy is carbon-based will produce higher CO<sub>2</sub> emissions per unit of energy in comparison to another that has an energy system with a high percentage of renewable energy.

---

2015 data for CO<sub>2</sub> from flaring (June 2017).  
REN21(2017), *Renewables 2017 Global Status Report* ([http://www.ren21.net/wp-content/uploads/2017/06/17-8399\\_GSR\\_2017\\_Full\\_Report\\_0621\\_Opt.pdf](http://www.ren21.net/wp-content/uploads/2017/06/17-8399_GSR_2017_Full_Report_0621_Opt.pdf)).

WSA 2012-2015 (June 2017) (<https://www.worldsteel.org/steel-by-topic/statistics/monthly-crude-steel-and-iron-production.html>).

For the per capita and per GDP emissions, the following auxiliary data have been used: *UNDP population statistics (2017)*, *World Population Prospects (WPP), The 2017 Revision Report United Nations, Department of Economic and Social Affairs, Population Division*. *IMF/WEO data of GDP (expressed in 1000 US dollar adjusted to the Purchasing Power Parity of 2011) (2017)*. *World Economic Outlook Update January 2017. International Monetary Fund*.

Other reference: Olivier JGJ, Schure KM, and Peters JAHW. (2017). Trends in global CO<sub>2</sub> and total greenhouse gas emissions. 2017 Report. PBL, The Hague. In prep. Internet: <http://www.pbl.nl/en/trends-in-global-CO2-emissions>.

The same Methodology is applied to the Table 1.b, Table 1.c, and Table 1.d.

<sup>27</sup> For example, when the economy of a given country is in transition from manufacturing to service-based output, the amount of energy required is lower and therefore less energy is used per unit of GDP.

**Table 1a:** Major 15 countries for emission by indicators (total amount of CO2 emissions, CO2 emissions per capita, and CO2 emissions per unit of GDP) in 1990

1990					
Country	Kton CO2	Country	ton CO2/cap	Country	ton CO2/1000\$
United States of America (the)	4955640.98	Qatar	35.29	Korea (the Democratic People's Republic of)	735.88
Russian Federation (the)	2379432.80	Luxembourg	30.52	Gibraltar	242.87
China	2305424.70	United Arab Emirates (the)	30.39	Somalia	11.65
Japan	1158222.40	Bahrain	26.08	Bosnia and Herzegovina	3.29
Germany	1003148.97	Estonia	23.55	Syrian Arab Republic	2.00
Ukraine	787879.77	Canada	20.02	Uzbekistan	1.97
India	655461.62	United States of America (the)	19.59	Estonia	1.64
United Kingdom of Great Britain and Northern Ireland (the)	575833.73	Curacao	18.14	Armenia	1.56
Canada	554684.30	Czechia	16.39	Kyrgyzstan	1.54
Italy and San Marino and Holy See (the)	423297.32	Australia	16.25	Turkmenistan	1.49
France and Monaco	376699.66	Russian Federation (the)	16.08	Ukraine	1.45
Poland	358699.97	Kuwait	15.32	China	1.34
Mexico	12056,2652 8	Ukraine	15.30	Moldova (the Republic of)	1.34
Australia	289350.22	Kazakhstan	15.19	Belarus	1.31
South Africa	268332.69	Brunei Darussalam	12.87	Mongolia	1.18
EU Average	4334975	EU Average	9.08	EU Average	0.36
World Total	22452432	World Total	4.21	World Total	0.48

Source: Author elaboration. Adapted from EDGAR dataset

**Table 1b:** Major 15 countries for emission by indicators (total amount of CO2 emissions, CO2 emissions per capita, and CO2 emissions per unit of GDP) in 2000.

2000					
Country	Kton CO2	Country	ton CO2/cap	Country	ton CO2/1000S
United States of America (the)	5810500.06	Qatar	52.69	Korea (the Democratic People's Republic of)	592.22
China	3638654.00	Curacao	43.12	Gibraltar	434.07
Russian Federation (the)	1662366.40	United Arab Emirates (the)	29.71	Turks and Caicos Islands (the)	2.04
Japan	1260277.50	Kuwait	26.38	Uzbekistan	1.98
India	1064431.15	Bahrain	23.88	Syrian Arab Republic	1.72
Germany	856420.80	Canada	23.72	Turkmenistan	1.62
Canada	728216.80	United States of America (the)	20.60	Ukraine	1.51
United Kingdom of Great Britain and Northern Ireland (the)	544277.89	Luxembourg	19.96	Trinidad and Tobago	0.96
Korea (the Republic of)	478432.04	Australia	18.67	Kazakhstan	0.86
Italy and San Marino and Holy See (the)	452908.02	Trinidad and Tobago	17.30	Mongolia	0.81
France and Monaco	393651.07	Brunei Darussalam	14.52	Russian Federation (the)	0.81
Mexico	377436.96	Czechia	12.61	Belarus	0.79
Ukraine	357879.94	Saudi Arabia	12.55	Moldova (the Republic of)	0.79
Australia	356572.55	Singapore	12.49	China	0.78
Iran (Islamic Republic of)	349416.78	Belgium	11.85	Azerbaijan	0.78
EU Average	4053669	EU Average	8.32	EU Average	0,27
World Total	25595733	World Total	4.17	World Total	0,41

Source: Author elaboration. Adapted from EDGAR dataset

**Table 1c:** Major 15 countries for emission by indicators (total amount of CO2 emissions, CO2 emissions per capita, and CO2 emissions per unit of GDP) in 2010.

2010					
Country	Kton CO2	Country	ton CO2/cap	Country	ton CO2/1000S
China	8938638.00	Qatar	40.82	Korea (the Democratic People's Republic of)	614.61
United States of America (the)	5460226.95	Curacao	33.38	Gibraltar	515.10
India	1843399.10	Trinidad and Tobago	30.97	Turkmenistan	1.22
Russian Federation (the)	1721152.70	Kuwait	28.93	Trinidad and Tobago	1.04
Japan	1223125.83	Luxembourg	21.94	Uzbekistan	0.89
Germany	799376.52	Oman	21.45	Ukraine	0.86
Canada	687784.40	United Arab Emirates (the)	20.70	Kazakhstan	0.72
Korea (the Republic of)	593505.43	Canada	20.11	China	0.71
Iran (Islamic Republic of)	568823.69	Australia	18.96	South Africa	0.66
United Kingdom of Great Britain and Northern Ireland (the)	489467.75	Brunei Darussalam	18.74	Estonia	0.63
Mexico	448128.69	United States of America (the)	17.67	Mongolia	0.63
Indonesia	423882.09	Bahrain	15.51	Guyana	0.62
Saudi Arabia	421456.86	Saudi Arabia	15.38	Bosnia and Herzegovina	0,61
Italy and San Marino and Holy See (the)	420034.69	Kazakhstan	14.94	Moldova (the Republic of)	0,59
Brazil	419760.21	Gibraltar	14.41	Djibouti	0,59
EU Average	3844938	EU Average	7.63	EU Average	0,22
World Total	33589795	World Total	4.83	World Total	0,37

Source: Author elaboration. Adapted from EDGAR dataset

**Table 1d:** Major 15 countries for emission by indicators (total amount of CO2 emissions, CO2 emissions per capita, and CO2 emissions per unit of GDP) in 2015.

2015					
Country	Kton CO2	Country	ton CO2/cap	Country	ton CO2/1000\$
China	10461742.00	Curacao	44.70	Gibraltar	553.17
United States of America (the)	5114424.01	Qatar	39.22	Korea (the Democratic People's Republic of)	325.38
India	2419637.23	Trinidad and Tobago	27.34	Cayman Islands (the)	1.47
Russian Federation (the)	1698007.49	Kuwait	25.41	Turkmenistan	0.94
Japan	1254799.82	United Arab Emirates (the)	22.90	Trinidad and Tobago	0.89
Germany	765922.93	Oman	20.48	Turks and Caicos Islands (the)	0.80
Canada	682765.34	Canada	19.02	Ukraine	0.68
Iran (Islamic Republic of)	628611.31	Brunei Darussalam	17.73	Bosnia and Herzegovina	0.67
Korea (the Republic of)	601322.45	Australia	17.61	Estonia	0.63
Saudi Arabia	512351.30	Bahrain	17.42	Libya	0.62
Indonesia	498097.78	Luxembourg	17.30	Uzbekistan	0.61
Brazil	492986.50	Estonia	16.80	Guyana	0.59
Mexico	450999.28	Falkland Islands (the) [Malvinas]	16.50	South Africa	0.58
Australia	419088.15	Saudi Arabia	16.21	China	0.57
United Kingdom of Great Britain and Northern Ireland (the)	392946.42	Gibraltar	16.17	Kazakhstan	0.53
EU Average	3424778	EU Average	6.75	EU Average	0.19
World Total	35633093	World Total	4.83	World Total	0.33

Source: Author elaboration. Adapted from EDGAR dataset

The transition toward efficiency has been discussed also applying a variation of Kuznets Curve hypothesis: the Environmental Kuznets Curve<sup>28</sup>. The hypothesis of Kuznets applied to the environmental case would suggest that once a given economy has reached the peak in its development, then also the environmental quality is likely to improve. The inverted-U shape curve links pollution and income. There have been applications of EKC emission<sup>29</sup>; however, the Kuznets curve application is quite controversial in the case of gas emission, and environmental concerns in general. Globally, market investment in efficiency in 2016 increased by 9% to US dollar 231 billion. Individually, China had the strongest rate of growth (24%), while Europe is still responsible for the largest share of global investment (30% of the total). By sector, the new

<sup>28</sup> Selden, Thomas M., Song, Daqing. (1994) Environmental Quality and Development: Is There a Kuznets Curve for Air Pollution Emissions? *Journal of Environmental Economics and Management*. Volume 27, Issue 2, September 1994, Pages 147-162. <https://doi.org/10.1006/jeem.1994.1031>

<sup>29</sup> Wang, Y. C. (2011). Short-and Long-run Environmental Kuznets Curve: Case Studies of Sulfur Emissions in OECD Countries. In *Australasian Meeting of The Econometric Society*. University of Adelaide

trend regards buildings, on which the major amount of energy efficiency investment is devoted (58%), followed by transportation (26%) and industry (16%)<sup>30</sup>.

As previously mentioned, the raise in emission has consequences on earth equilibrium, nevertheless the human existence in the actual global structure is profoundly linked to a carbon-constrained planet. The importance of reducing carbon dioxide is generally understood, but this acknowledgment has neither immediately nor simultaneously lead to the undertaking of action by states. Furthermore, the importance of sector-related reduction is important to be agreed upon, according to regional and national contexts. Since the CO<sub>2</sub> rise is strictly connected to the economic development of countries, the developing states have been less available to reduce their emissions levels. The Anthropocene has created new conditions of social and economic vulnerability, as it has exacerbated previous rivalries, conflicts and balance of power on a multi-level scale. As an example, it is sufficient to think of the shift of global production that, once traditionally based within OECD countries, has shifted towards BRICS nations -- Brazil, Russia, India, China and South Africa, where the middle classes are showing an increase in consumption<sup>31</sup>. To understand the dynamics of the production-consumption relations a frequently used approach to organize the discussion of the drivers of emissions is through the so-called IPAT identity:

$$\text{Impact} = \text{Population} \times \text{Affluence} \times \text{Technology}$$

The IPAT identity states that environmental impacts (e.g., emissions) are the product of the level of population times affluence (income per capita, i.e. gross domestic product (GDP) divided by population) times the level of technology deployed (emissions per unit of income). The IPAT identity has been widely discussed in analyses of energy-related carbon dioxide (CO<sub>2</sub>) emissions<sup>32</sup> in which it is often referred to as the Kaya identity<sup>33</sup> equation:

$$\text{CO}_2 \text{ Emissions} = \text{Population} \times (\text{GDP}/\text{Population}) \times (\text{Energy}/\text{GDP}) \times (\text{CO}_2 / \text{Energy})$$

---

<sup>30</sup> See IEA. Energy Efficiency 2017 Report Series Retrieved from: [https://www.iea.org/publications/freepublications/publication/Energy\\_Efficiency\\_2017.pdf](https://www.iea.org/publications/freepublications/publication/Energy_Efficiency_2017.pdf) (Accessed December 13th 2018).

<sup>31</sup>See IGBP (2015, January 15). Planetary dashboard shows "Great Acceleration" in human activity since 1950. Retrieved from: <http://www.igbp.net/news/pressreleases/pressreleases/planetarydashboardshowsgreataccelerationinhumanactivitiesince1950.5.950c2fa1495db7081eb42.html>. (Accessed December 13th 2018).

<sup>32</sup> E.g., Ogawa, Y. (1991). Economic activity and the greenhouse effect. *The Energy Journal*, 23-35.

Nakićenović, N., Grübler, A., Inaba, A., Messner, S., Nilsson, S., Nishimura, Y., ... & Swisher, J. (1993). Long-term strategies for mitigating global warming. *Energy*, 18(5), 401.

Parikh, J. K., & Painuly, J. P. (1994). Population, consumption patterns and climate change: a socioeconomic perspective from the south. *Ambio*, 434-437.

Alcamo, J., Krol, M., & Posch, M. (1995). An integrated analysis of sulfur emissions, acid deposition and climate change. *Water, air, and soil pollution*, 85(3), 1539-1550.

Gaffin, S. R., & O'Neill, B. C. (1997). Population and global warming with and without CO<sub>2</sub> targets. *Population and Environment*, 18(4), 389-413.

<sup>33</sup> Yamaji, K., R. Matsushashi, Y. Nagata, and Y. Kaya. 1991. "An integrated system for CO<sub>2</sub>/energy/GNP analysis: Case studies on economic measures for CO<sub>2</sub> reduction in Japan." Paper presented at the Workshop on CO<sub>2</sub> Reduction and Removal: Measures for the Next Century, 19-21 March, International Institute for Applied Systems Analysis, Laxenburg, Austria.

Focusing on the right side of the Kaya identity, the first two terms (population; and GDP over population) are less likely to be subject to a general and coercive reduction. Vice versa, as will be presented in paragraph 1.4, multilateral actions regard in the first place energy intensity and carbon intensity factors. Before that, the following paragraph contains the principal elements that define the institutional theory related to the emission case.

In sum, behind CO<sub>2</sub> emissions there are factors as demography and demographic structure, material capabilities to satisfy people needs using more or less conventional sources of energy and different energy mixes and financial capabilities to foster the shift from more to less intensive carbon-based activities. Behind the CO<sub>2</sub> emission rise there are the prospects of the domino effect that IPCC and UNFCCC have reported<sup>34</sup>. What instead there is beyond CO<sub>2</sub> emissions reduction is to be further analysed in the following sections in terms of the principles and framework of actions.

### **1.3 Institutional approach and the environmental dimension of institutional theory**

It is generally recognized that institutions and the ability of developing institutional settings have played a significant role in regulating and evolving human capability and improving life-standards in ancient communities as well as in modern societies. In the past, they were characterized by a different capacity of transmission and responsiveness to social needs in comparison to nowadays, since institutional development occurs also with respect to social diversification and economic specialization. According to Andrew Sobel, any mechanism that guides individual behaviours within a given community is called institution, or more precisely *socially effective institution*<sup>35</sup>. The function of an institution is to avoid that individual or collective behaviours produce sub-optimal conditions deriving from unintended results of interactions or induced by asymmetrical or limited information, which may limit rationality and capability.

However, institutions *per se* are connected to a long series of concepts and practices, which may roundly split in two main sub-categories: formal and informal institutions. In political field, and especially in political economy, the focus has been on the first type<sup>36</sup> while in general informal institutions are considered as complementary to those that are formal. The main difference among the two is that informal institutions lack a third-party enforcement mechanism, which instead is put in place in formal institutions and exercised by a constituted and specific authority. Institutions are generally characterized by effectiveness and

---

<sup>34</sup> UNFCCC (1999) Report of the Conference of the Parties on its fourth session, held at Buenos Aires from 2 to 14 November 1998. Addendum. Part two: Action taken by the Conference of the Parties at its fourth session. Available at: <https://unfccc.int/node/1572>. (Accessed December 13th 2018).

UNFCCC (2011) The LDCs. Reducing vulnerability to climate change, climate variability and extremes, land degradation and loss of biodiversity: environmental and developmental challenges and opportunities. Available at: [https://unfccc.int/resource/docs/publications/ldc\\_reducingvulnerability.pdf](https://unfccc.int/resource/docs/publications/ldc_reducingvulnerability.pdf). (Accessed December 13th 2018).

<sup>35</sup> Italic added. Sobel, A. (2012) *International Political Economy in Context*, Los Angeles: SAGE/CQ Press, p.277-312.

<sup>36</sup> North, D.C. (1990) *Institutions, Institutional Change and Economic Performance*. Cambridge University Press.

durability, and are mainly settled to decrease the cost of transactions. Another important aspect that substantially characterizes institutions is their task of overcoming the time-inconsistency dilemma. It generally emerges in political arenas when the choice among two options would consist in preferring the short run one that favours political (agent/actor) survival in spite of another option of long-run that would be preferable or even more desirable, as the case of environmental protection might be.

Furthermore, institutions tend to stabilize situations that nevertheless may favour a social condition in spite of another or a partial interest in spite of other (partial or general) interests. With the aim of solving certain issues, institutional settings are able to share resources or provisions differently, however creating a set of embedded interests that favour certain groups over others. The stability of embedded interests may increase frictions – originated by material and immaterial factors, lowering problem-solving capability and rising costs of cooperation. In order to investigate and understand institutional processes, institutional theories have increasingly developed from the 1960s and 1970s with the purpose of detecting how structures respond to changes and challenges according to certain parameters of analysis - i.e. unit of concerns, institutional scope and characteristics.

Beyond the theoretical apparatus that outlined the characteristic of specific approaches, institutional comparisons<sup>37</sup> have brought salient contributions in detecting the main features that characterized institutions in the former century, as reported in Table 1.2.

**Table 1.2:** Institutional principles developed in the twentieth century

• Institutions lower transactions costs by the provision and sharing information
• Institutions reduce uncertainty
• Institutions help made promises and commitments credible
• Institutions facilitate deal-making
• Institutions enhance compliance
• Institutions are vehicles for learning and socializations
• Institutions help shape collective identities <sup>38</sup>

Source: Richard Higgott

<sup>37</sup>Telò, M. (2016). Alternative Models of Regional Cooperation? The Limits of Regional Institutionalisation in East Asia. In *European Union and New Regionalism* (pp. 111-138). Routledge.

<sup>38</sup> As Higgott noted, the discussion on institutions and institutional theories may be further developed. However here is restricted in order to match spot the environmental dimension of institutional theory.

See Keohane, R. O. (1989). *International institutions and state power: Essays in international relations theory*.

Simmons, B. A., & Martin, L. L. (2002). International organizations and institutions. *Handbook of international relations*, 192-211. ISO 690.

Higgott, R. (2006). The theory and practice of region: the changing global context. In *Regional Integration in East Asia and Europe* (pp. 35-56). Routledge.

In the case of environmental issues, institutional setting occurrence provides solution applicable to solve the so cold tragedy of the commons, usually depleted by market defection and negative market externalities or processes, as in the case of emissions. Whether on the one hand it is possible to affirm the emergence of environmental specialized profile institutions, on the other there is the possibility for institutions that by scope have other priorities to develop environmental concerns and eventually to possess an environmental dimension by developing a further component or developing specific mechanisms to deal with the environmental concerns on the base of their original structures. Example of the first case at the international level are the 500 environmental organizations accredited by the UNEP, regionally distributed as follows: 164 in Europe; 22 in West Asia; 77 in Asia and the Pacific; 24 in Latin American and the Caribbean, 93 in North America; 119 in Africa<sup>39</sup>. While example of the second may be the creation section of public or private entities at different levels, that basically enlarge the already existing structure in order to include and elaborate elements of environmental concerns in order to perform their original function.

As institutions refer to different contexts, there are different ways they regulate complex dynamics especially in EG, where consistent actions are required in a multi-level and coordinated mechanism. Progression towards more efficient institutional mechanism is possible, even though factors as the source of legitimacy, veto players and previous historical dynamics generate frictions. However, evolutions of laws, policy and mechanisms that create new contexts for the proliferation of environmental protection modes have historically occurred, as presented in the following paragraph.

#### **1.4 The international community and Multilateral Environmental Agreements**

The legal dimension of EG deals with the necessity to ensure the fulfilling of the rights and establishing rules of behaviours that for a consistent period of time were primarily and essentially enjoyed by humans over nature on the one hand, and by states over individuals on the other. Nevertheless, law doctrine has been enriched in the last century, and in general the ethical, religious and cultural traditions have been playing a role in making environmental issues emerge. For what concerns the substance of international environmental law, a fundamental distinction is outlined among shared and non-shared resources. The shared resources include fresh and marine resources, the atmosphere and stratosphere, and the migratory species. The non-shared resources such as soil, forests and landscapes –although preserving their role in an interconnected environment - are bounded by the state territorial sovereignty<sup>40</sup>.

The air zones have to be considered by extension the primary shared spaces in the world, in which living creatures and chemical substance transit, crossing the several air basins flying over terrestrial boundaries. The impact of polluting substances have consequences on the living beings in the sky, as migratory birds, as well as on people and the other natural components of the environment (soil, lakes etc.)

---

<sup>39</sup> UNEP. (2018, December 11th). List of accredited Organizations. Available at: <https://www.unenvironment.org/civil-society-engagement/accreditation/list-accredited-organizations> (Accessed December 13th 2018).

<sup>40</sup> Kiss, A., & Shelton, D. (2007). *Guide to international environmental law*. Brill.

on which they fall as atmospheric precipitations. The efforts to preserve the air space and contrast air deterioration are classified under legal regulations against air pollutants, stratospheric ozone depletion and global climate change.

Under a juridical approach, legal regulations concerning air preservation and contrasting air deterioration find their place in the international environmental law, which is a branch of international public law. The roots of international environmental law date back to the 19<sup>th</sup> century, when the first regulations appeared<sup>41</sup>, although contents of the first international environmental agreements regarded the preservation of living beings as in the case of Migratory Birds (August 1916) and the Convention Relative to the Preservation of Fauna and Flora in the Natural State<sup>42</sup> (London Convention, 1933).

The Second World War altered the international community context in its fundamental components. The change in international economic structure, the investments for reconstruction and technological development seeded the germs of consciousness that expanded in the following two decades. Those are the years of the first widely spreading acknowledgments concerning chemicals and pollutant substances. For instance, in 1956 the physicist G. Plass calculated the consequent significant effect of CO<sub>2</sub> on the radiation balance<sup>43</sup>; and program implementation for monitoring emission trends and composition; in fact, two years later, the Mauna Loa Observatory<sup>44</sup> started its monitoring activities of atmospheric Carbon Dioxide (CO<sub>2</sub>) levels. Of particular relevance are the time series provided by the Observatory, which eventually became the main reference on global atmospheric change. Not just the experts but also the general public became interested in environmental issues.

The 1960s were years crossed by the first wave of non-conventional cleavages in which the environmental movements founded space. The first aim of the movements was the spread of environmental protection principles against ignorance through education and communication. At the end of those years, also at the international level, programs fostering the investigation of human and environment interactions were implemented, as the UNESCO's creation of the Man and the Biosphere Programme<sup>45</sup> hosted in the Paris Biosphere Conference. In the same year the Club of Rome was founded (1968). In terms of the quantitative analysis, whose computations have been revisited over time thanks to the rise of new technologies and models, the principal fact to highlight it is the progressive convergence of the epistemic community in addressing the concern over the exponential economic growth in a limited world. Researches such as the "Study of Critical Environmental Problems" organized in 1970 at the Massachusetts Institute of Technology, and the studies of Paul Crutzen, Sherwood Rowland and Mario Molina on the linkage between

---

<sup>41</sup> *Ibidem*.

<sup>42</sup> Convention relative to the Preservation of Fauna and Flora in their Natural State. Done at: London. Date enacted: 1933-11-08. In force: 1936-01-14.

<sup>43</sup> Plass, G. N. (1956), The Carbon Dioxide Theory of Climatic Change. *Tellus*, 8: 140-154. doi:10.1111/j.2153-3490.1956.tb01206.x

<sup>44</sup> Mauna Loa Observatory - NOAA Earth System Research Laboratory. Retrieved from: <https://www.esrl.noaa.gov/gmd/publications/search2.php?abstract=Mauna+Loa> (Accessed December 13th 2018).

<sup>45</sup> UNESCO (2018) Man and the Biosphere Programme. Retrieved from: <http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/man-and-biosphere-programme/> (Accessed December 13th 2018).

the breaking apart of chlorofluorocarbons (CFCs) in the atmosphere and the destruction of the ozone layer,<sup>46</sup> catalysed an epistemological and political turmoil that shook the international community with the Stockholm Declaration on the Human Environment of 1972, attended by over one hundred states. The real substance of the 26 principles contained in the Declaration relied on the recognition of the interdependency and the interrelation among pollution and degradation of the environment, and the importance of the latter for humanity. Even more, the Stockholm Conference fostered the environmental issues in political terms, allowing the inclusion of the environmental concerns in the policies of the various political institutions worldwide.

Historically, the 1970s is the decade of instability and disorder<sup>47</sup> under various aspects: the passage from a fixed exchange rate system to a floating system of exchanges, the price fluctuation of raw materials in conjunction with the two main clashes in the Middle East (the Arab – Israeli war of 1973 and the Iranian revolution of 1979), the noticeable drop of the industrial production recorded in 1974 and 1975, and the recession accompanied by a generalized increase of prices in the developed countries had the consequences of fomenting dissents in countries belonging to both blocs of the Cold war. The environmental waves triggered discordant dynamics and frictions, in addition to those concerning the classic political dichotomy.

The second part of the 20<sup>th</sup> century counts a vast number of the environmental disasters and manifestation of negative environmental externalities of diverse nature (nuclear, chemical, and largely industrial) the Southeast Asian haze<sup>48</sup> (1997), Yokkaichi asthma in Japan<sup>49</sup> (already emerged in 1960 – 1969), the Jinkanpo Atsugi Incinerator case<sup>50</sup>, Kuwaiti oil fires<sup>51</sup>; the unfortunately known Chernobyl Accident in 1986<sup>52</sup>, just to mention a few of them.

While the discussion on emissions, climate change and human responsibilities was controversial, provoking significant divergences in the establishment of one single approach fitting for all the situations, a turning point in the deal making was reached during the 1980s. In proximity of the Montreal Protocol, public opinion was still divided on the theme, as it was inconceivable for the many to figure out as a unitary picture

---

<sup>46</sup> Press release. NobelPrize.org. Nobel Media AB 2018. Wed. 19 Dec 2018. <<https://www.nobelprize.org/prizes/chemistry/1995/press-release/>>

<sup>47</sup> Sabatucci, G. Vidotto, V. 2008. Storia Contemporanea. Il Novecento. Bari, Editori Laterza.

<sup>48</sup> Osamu Kunii, Shuzo Kanagawa, Iwao Yajima, Yoshiharu Hisamatsu, Sombo Yamamura, Takashi Amagai & Ir T. Sachrul Ismail (2002) The 1997 Haze Disaster in Indonesia: Its Air Quality and Health Effects, Archives of Environmental Health: An International Journal, 57:1, 16-22, DOI: [10.1080/00039890209602912](https://doi.org/10.1080/00039890209602912)

<sup>49</sup> Tetsuzo Kitagawa (1984) Cause Analysis of the Yokkaichi Asthma Episode in Japan, Journal of the Air Pollution Control Association, 34:7, 743-746, DOI: [10.1080/00022470.1984.10465807](https://doi.org/10.1080/00022470.1984.10465807)

<sup>50</sup> Lorber, M., V. Wang, Y. Walker, AND P. Gilooly. Impacts Of Dioxin Emissions From The Shinkampo Incinerator To The U.S. Naval Air Facility At Atsugi, Japan. <https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=54729> (Accessed December 13th 2018).

<sup>51</sup> Draxler, R. R., McQueen, J. T., & Stunder, B. J. (1994). An evaluation of air pollutant exposures due to the 1991 Kuwait oil fires using a Lagrangian model. *Atmospheric Environment*, 28(13), 2197-2210. Available at: <https://www.arl.noaa.gov/documents/reports/pergulf.pdf> (Accessed December 13th 2018).

<sup>52</sup>As reported by the World Nuclear Association (2018, April):“the resulting steam explosion and fires released at least 5% of the radioactive reactor core into the atmosphere and downwind, and large quantities of radioactive substances were released into the air for about 10 days”. Available at: <http://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/chernobyl-accident.aspx> (Accessed December 13th 2018).

the on-going dynamics on the planetary atmosphere, the interconnection behind a not full-blown alteration on planetary scale. A path was defined by the Vienna Convention for the Protection of the Ozone Layer, adopted in 1985, finding a solution to drive countries in economic transition towards the cutting and progressively banning of CFCs resulted in a mandatory priority for the international community. The Montreal Protocol on Substances that Deplete the Ozone Layer<sup>53</sup> is remembered among Multilateral Environmental Agreements because it contains elements that are embedded like gears that, moving together, allow the operation of the mechanism on which is based the protocol enjoying a status of being internationally binding after two years from its adoption<sup>54</sup>.

Among the principles, this international environmental agreement was a precursor of the flexible approach, based on differentiated and distributed responsibility between developed and developing countries, that would be dominant in other negotiations. The protocol was an example of multi-actor participated actions as it has involved non-governmental organizations, economic and social organizations, regional groupings, and development banks, industry associations, scientific and technical organizations. Another characteristic element adopted in this occasion was the economic sanction in absence of compliance.

Among the elements that characterize the pragmatic organization towards the emission cutting transition, the coordination of National Phase-Out strategies played surely a role, not just in relation to the definition of a deadline date within which to reduce the amount of emissions, as for two other main reasons. One of the reasons is explained considering the specific characteristic of the agreement participants. Indeed, the proactive role of Europe and the United States prompted other countries to follow the compliance mechanism. Another reason deals with the fact that the Financial Mechanisms implemented by the Protocol was the first consistent example of monetary resources transfer under an international environmental treaty from the developed countries towards the developing ones to assist them in affording the costs of compliance. Finally, the improvements in targeting initiatives have made the Montreal Protocol more effective. While in the first phase, large economies and large industries were the principal subjects that had to comply with the new framework, small and medium-sized firms operating in sectors such as refrigeration (CFCs) and agriculture (methyl bromide) have been progressively included in the process.

In the meantime, during 1987 Gro Harlem Brundtland, president of the World Commission on Environment and Development (WCED, 1983), presented the report entitled *Our common future*, in which new approaches to environment and development were presented since as the document stated, they are linked.

---

<sup>53</sup>Which compose the frame of action with the previously mentioned Convention, the amendments to the protocol, the Meeting of the Parties, the Financial Mechanism and the Secretariat. In: Kiss, A., & Shelton, D. (2007). Guide to international environmental law. Brill.

<sup>54</sup>United Nations Environment Programme. Ozone Secretariat. (2000). *Montreal Protocol on Substances that Deplete the Ozone Layer as either adjusted and/or amended in London 1990, Copenhagen 1992, Vienna 1995, Montreal 1997, Beijing 1999*. Incumbent. [http://www.protocolodemontreal.org.br/site/images/publicacoes/programa\\_brasileiro Eliminacao\\_hcfc\\_s/Montreal\\_Protocol\\_Partnerships\\_Changing\\_the\\_World.pdf](http://www.protocolodemontreal.org.br/site/images/publicacoes/programa_brasileiro Eliminacao_hcfc_s/Montreal_Protocol_Partnerships_Changing_the_World.pdf) (Accessed December 13th 2018).

With Resolution 43/53 on the “Protection of the Global Climate for Present and Future Generations of Mankind” passed by the United Nation General Assembly (UNGA) in 1988, and the establishment of the IPCC by the UNEP and WHO, the steps toward the environmental and climate diplomacy were taken. The nature of the IPCC body is intergovernmental, open to all member countries of the United Nations (UN) and WHO. Governments participate in the review process and in the Plenary Sessions, where key decisions are made on the IPCC work program and scientific reports are accepted, adopted and approved. In the course of the years, the role of IPCC has been enriched by the focus on the relevant dynamics to understanding the risks of human-induced climate change, potential impacts and options, adaptation and mitigation. In 1990 the UNGA Resolution 45/ 212 gave birth to the intergovernmental negotiation committee to establish a legal instrument for climate change that was concluded with the establishment of UNFCCC in 1992 and entered into force in 1994.

The agreements were five, three non-binding at the international level, and two legally binding Conventions:

- Agenda 21 set the sustainable development action program, dividing it into four sections: economic and social dimensions, conservation and management of resources for development, reinforcement of the role of social forces and tools for implementation.
- The Rio Declaration on Environment and Development defines the rights and obligations of nations in 27 principles, recognizes the principles of causality and prevention as fundamental and defines, as prerequisites for sustainable development, the fight against poverty, an adequate demographic policy, the reduction of unsustainable modes of production and consumption as well as extensive information and participation of the population in decision-making processes.
- Followed the Declaration of Principles for Sustainable Forest Management that establishes the principles for the management, conservation and sustainable use of forests<sup>55</sup> and the Biodiversity Convention.
- The United Nations Framework Convention on Climate Change<sup>56</sup>, to stabilize greenhouse gas emissions at a level that does not endanger the global climate.
- In addition to the aforementioned conventions and agreements, the United Nations Commission on Sustainable Development (CSD)<sup>57</sup> was established during this first World Summit. It must ensure effective and concrete continuation of the decisions taken at Rio.

---

<sup>55</sup> *Agenda 21: Programme of Action for Sustainable Development ; Rio Declaration On Environment and Development ; Statement of Forest Principles: The Final Text of Agreements Negotiated By Governments At the United Nations Conference On Environment and Development (UNCED), 3-14 June 1992, Rio De Janeiro, Brazil.* New York, NY: United Nations Dept. of Public Information, 1993.

<sup>56</sup> UN General Assembly, *United Nations Framework Convention on Climate Change : resolution / adopted by the General Assembly*, 20 January 1994, A/RES/48/189, available at: <https://www.refworld.org/docid/3b00f2770.html> [accessed 19 December 2018]

<sup>57</sup> United Nations Department of Economic and Social Affairs. Commission on Sustainable Development (CSD). Retrieved from: <https://sustainabledevelopment.un.org/csd.html>

During the signature for the UNFCCC in the occasion of the Rio de Janeiro Conference, the attention was focused on GHGs emission and in particular on Carbon Dioxide, however without the definition of a time schedule<sup>58</sup>, that occurred with the Kyoto Protocol. During the five years that separate the Rio Summit and the conference of Rio+5 held in New York, the Assembly adopted the Program of Work of the Commission for 1998-2002 and the Program for the Further Implementation of Agenda 21, for the continuing implementation of Agenda 21 over the next five years, even though general participation was weakened by the worsening of the emission of greenhouse gases, as emerged during the COP negotiations.

The Conference of the Parties started to be held 1995 with the COP1 in Berlin, where the Berlin Mandate was established in order to organize future negotiations. The COPs that have marked the negotiations are: COP1 to COP5 in which the principal elements of the agreements were formulated; COP 6 and COP7 in which the comprehensive plan of action emerged; COP9 to COP14, when the Clean Developed mechanisms have been discussed in order to find a feasible solution to match the necessity of Industrialized and Developing Countries to cooperate in promoting less emission intensive processes, and contextually find a solution to measure the impact of the CDM action<sup>59</sup>; COP15 which is a standing alone case due to significant difficulties emerged during negotiations among the principal actors involved in the climate deal-making that had prevented the achievement of a unitary Accord framework and determined the development of separate and sectorial climate agreement in the future conferences<sup>60</sup>; COP16 to COP20 that consolidate this latter aspect and conclude a phase of climate political agenda followed by the one opened with COP21.

Between the first two blocks of conferences, COP3 and COP7 are highly connected, since in COP7 the ratifications of Kyoto Protocol were collected. The problem to preserve a shared space, without limiting economic development and without affecting the markets, has been faced by the Kyoto mechanism under the flexibility principle. The environmental agreement adopted in 1997 established a regime based on the principle of achieving quantitative reductions in GHG emissions by setting emission targets on individual parties of the Protocol<sup>61</sup>. The provisions are three “market-oriented mechanisms”:

- Joint implementation (JI);
- Emission trading (ET) and
- Clean Development Mechanism (CDM – for non-annex I parties)

---

<sup>58</sup> Kiss, A., & Shelton, D. (2007). Guide to international environmental law. Brill.

<sup>59</sup> UNFCCC. The Clean Development Mechanism. Available at:

<https://unfccc.int/process-and-meetings/the-kyoto-protocol/mechanisms-under-the-kyoto-protocol/the-clean-development-mechanism> (Accessed December 13th 2018).; and UNFCCC. The Clean Development Mechanism. Available at: <http://cdm.unfccc.int/index.html> (Accessed December 13th 2018).

See also: Olsen, K. H. (2007). The clean development mechanism’s contribution to sustainable development: a review of the literature. *Climatic change*, 84(1), 59-73.

<sup>60</sup> Falkner, R., Stephan, H., & Vogler, J. (2010). International climate policy after Copenhagen: Towards a ‘building blocks’ approach. *Global Policy*, 1(3), 252-262.

<sup>61</sup> Wemaere, M., Streck, C., & Chagas, T. (2009). Legal ownership and nature of Kyoto units and EU allowances. *Legal aspects of carbon trading: Kyoto, Copenhagen and beyond*. Oxford University Press, Oxford, UK.

To the Protocol is attributed the creation of transferable rights in the context of the trading emission scheme, but the question where the state's sovereign right to the atmosphere finds its borders was clarified in this context<sup>62</sup>. However, with the COP15 held in Copenhagen the path of EG shifted toward a system of voluntary carbon reduction pledges submitted by countries, in spite of the science-based binding targets and timetables negotiated under the UN<sup>63</sup>. More incisive actions had to wait the Durban agreement in 2011, where the negotiations saw a EU able to re-gain part of the leadership lost in Copenhagen.

Globally, the United Nations Conference on Sustainable Development - or Rio+20 of 2012, recharged the political sphere and reassembled the expired Millennium Development Goals in the new 2015 agenda, containing measures for implementing the resulting Sustainable Development Goals, in which the carbon emissions issues are found principally in Goals 7, 9, 11 and 13.

#### 1.4.1 Actors and Agency

In addition to Agreements, the EG is also the result of multiple actions generated by actors of the international systems. National positions substantially vary according to political agenda and resources available on which a country's development plans are based. State role is essential in the implementation of sustainable agendas because of the condition of sovereignty nations enjoy, and also because when general international principles are adopted, states may translate it into national provisions, enforcing them with civil liability and penal law regulatory and economic measures. The convergence on environmental objectives is likely to occur under an institutional framework more than spontaneously, as it has been argued in the previous paragraph. Whether there are cases of this type, where single states have freely adopted a particular EP action independently of the international context, this cannot be considered neither a praxis nor the first policy option put on the table by other states.

The institutionalization of an environmental protection regime has been extremely sensitive to the role of veto players during negotiations.

For example, the main difficulty faced by the UNFCCC with respect to the Montreal Protocol is not to be tracked back just to the amount of emission reduction established in Kyoto. In fact, not just the major quantity of emission that should have been cut, but also the predominance of domestic national politics that would have been affected by the agreement – mostly of China and US –clashed with the interest of decreasing emissions. What negotiation theory suggests is that the possible solution to move on from the

---

<sup>62</sup> *Ibidem*.

<sup>63</sup> Aldy, J. and Stavins, R. (2010) *Post-Kyoto International Climate Policy*, Cambridge: Cambridge University Press.  
Victor, D. (2011) *Global Warming Gridlock. Creating More Effective Strategies for Protecting the Planet*, Cambridge: Cambridge University Press.

stalemate is to recall the issue-specific power in the hand of the actor<sup>64</sup>. Nevertheless, while this frame is theoretically applicable in the evolving EG process to the EU, the US and China were progressively playing a veto player role. The capability to perform as veto players derives both from the size and the trends of their economies as well as the level of emissions that these countries contribute to release<sup>65</sup>.

International institutions play a major role as well, as demonstrated by the World Bank, having implemented in 1997 the environmental department to establish a Global carbon initiative, the portfolio approach. Other subjects as the private sector, enterprises, MNCs and industries are to be treated with different approaches, because while the primary subjects of international governance are the states, it is undeniable that actions and support from the private sectors makes the difference in the application of policy. Public participation and individuals' participation today are facilitated in the advocacy processes by the new communications tools. In addition, public participation has been possible internationally for example under the UNFCCC, which includes broad public participation provisions<sup>66</sup> that involved business and industry and non governmental organizations (BINGO); environmental non governmental organization (ENGO); indigenous people organization (IPO); local government and municipal authorities (LGMA); research-oriented and independent organizations (RINGO)<sup>67</sup>

In general the UN policy framework, for the engagement of stakeholders and partnerships is included in the classification shown in Table 1.3:

**Table 1.3 Main categories of partner typology**

	Governmental	Non governmental	Intergovernmental
Not for profit	<i>Includes: National government (agencies and subsidiary bodies) and sub-national government</i>	<i>Includes: NGOs, (Research institutions, foundations)</i>	<i>Includes: Intergovernmental organizations (UN agencies, OECD)</i>
For profit/business sector	<i>Includes: State-owned companies</i>	<i>Includes: Companies, business associations and coalitions, corporate philanthropic foundations</i>	

<sup>64</sup> Keohane, R.O. and Nye, J.S. (1977) Power and Interdependence. World Politics in Transition, Boston, MA: Little Brown

<sup>65</sup> Bäckstrand, K., & Elgström, O. (2013). The EU's role in climate change negotiations: from leader to 'leadiator'. *Journal of European Public Policy*, 20(10), 1369-1386.

<sup>66</sup> UNFCCC. Standard Admission Process. Mandate for admission. Extract From The United Nations Framework Convention On Climate Change. Available at: <https://unfccc.int/process-and-meetings/parties-non-party-stakeholders/non-party-stakeholders/how-to-obtain-observer-status#eq-1> (Accessed December 13th 2018).

<sup>67</sup> UNFCCC. Process and meeting. Available at: <https://unfccc.int/process-and-meetings/parties-non-party-stakeholders/non-party-stakeholders/admitted-ngos>. (Accessed December 13th 2018).

#### 1.4.2 Role of regional organizations in applying international principles

General principles are often more effective when implemented and enforced regionally. As maintained by the UNEP principle of “Delegating to Divisions”<sup>69</sup>, the choice to apply a regional approach has multiple motivations.

Firstly, regional organizations show similarities among neighbouring states. As stated at the Johannesburg summit, regional sustainable development strategies are useful for regional-level cooperation and integration because many economic, social and environmental issues-- including trade and finance, natural disaster mitigation, integrated river basin management and waste management-- are of a trans-border nature and cannot be dealt with at the national level alone<sup>70</sup>.

Secondly, actions taken at the regional or sub-regional level provide a bridge between national realities and global priorities, while also addressing common areas of concern and shared interests associated with geographic proximity, relative homogeneity and shared history.

Furthermore, regional groups give smaller countries a collective voice and, through regional networks, put them on a more equal footing in the global order.

#### 1.4.3 The EU case

When discussing about environment and Europe it has to be taken into account that there are several European organizations that may be included and that they are quite different. Primarily, this thesis refers to the EU.

Geographically, the forecast of future changes that will affect the European Continent is represented in Figure 1.5 below, and they include: intensification of heavy precipitation events, increasing frequent heat waves, glaciers melting and changing terrestrial ecosystems. As a consequence, heat-related health risks and mortality rates have been rising especially in urban heat islands. In specific part of the continent there will be specific changes.

In Central and Eastern Europe, higher water stress is foreseen as a consequence of summer rainfall decrease, leading to an increase in peat land fires. In Northern Europe, more frequent winter floods, endangered ecosystems, and ground destabilization are foreseen. In the Mediterranean and Southern Europe, higher temperatures and drought are predicted to reduce water availability and crop productivity as well as to

---

<sup>68</sup> UNEP (2011). Policy Outline No.1/2011. UNEP Partnership Policy And Procedures. Available at: <https://wedocs.unep.org/bitstream/handle/20.500.11822/20739/Resource%20Doc%20-%20Partnership%20Policy.pdf?sequence=1&isAllowed=y> (Accessed December 13th 2018).

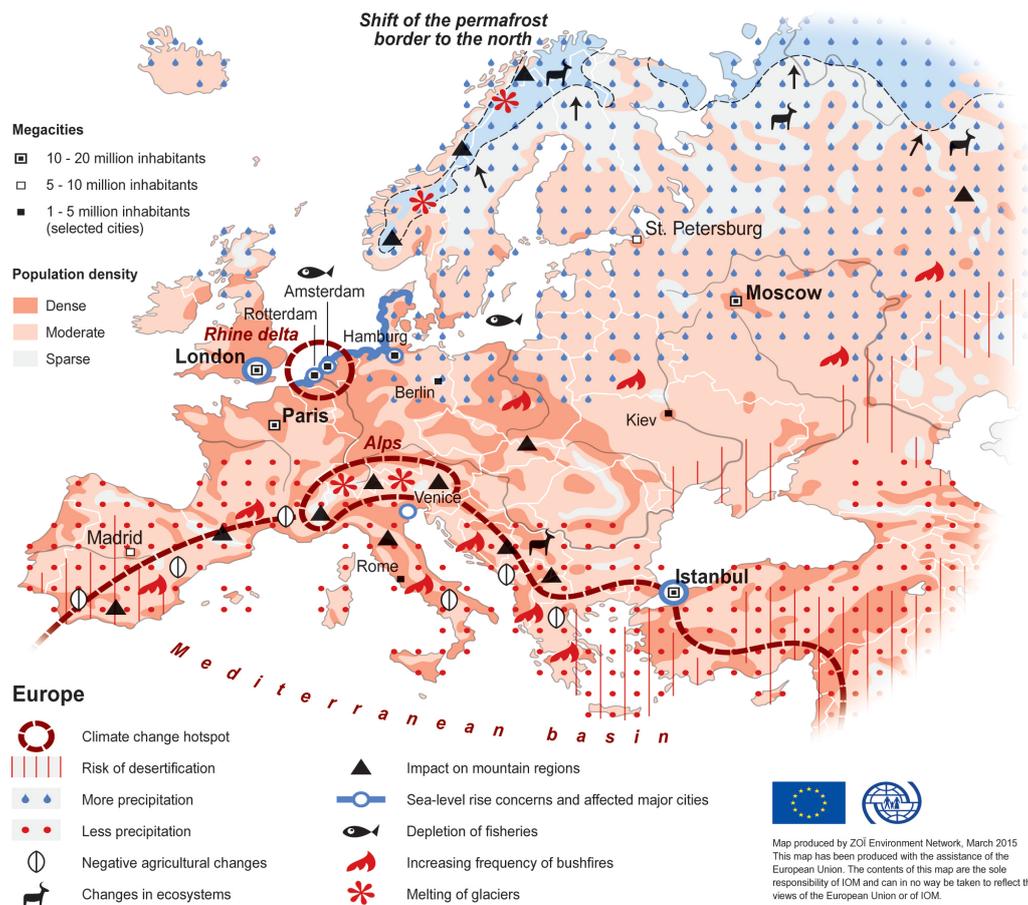
<sup>69</sup> *Ivi*, p. 6.

<sup>70</sup> Environmental Migration Portal. Knowledge Platform on People on the Move in a Changing Climate. Available at: <https://environmentalmigration.iom.int/maps> (Accessed December 13th 2018).

increase the risk of wildfires<sup>71</sup>. The regional analysis is essential in planning and organizing policy response, since the effect of climate and environmental changes differs substantially across geographic and socio-economic areas<sup>72</sup>.

Also it is essential due to environmental changes that are going to occur in the neighbouring zones (central Asia, Middle East and Africa) and are bound to amplify political tension linked to primary resource security and socio-economic instability caused by massive migratory flows. Furthermore, future energy scenarios may foster tensions, since the energy mix of the EU remain anchored to foreign resources.

**Figure 1.5:** Regional Map on Migration, Environment and Climate Change



Source: Migration, Environment and Climate Change: Evidence for Policy (MECLEP) project, in collaboration with IOM - Sciences Po project on the Atlas of Environmental Migration.

In all major global environmental fora, the EU has been one of the few actors to consistently argue in favour of institutional reforms and the speedy and accountable implementation of existing commitments<sup>73</sup>.The

<sup>71</sup> *Idem*.

<sup>72</sup> McCarthy, J. J., Canziani, O. F., Leary, N. A., Dokken, D. J., & White, K. S. (Eds.). (2001). *Climate change 2001: impacts, adaptation, and vulnerability: contribution of Working Group II to the third assessment report of the Intergovernmental Panel on Climate Change* (Vol. 2). Cambridge University Press.

<sup>73</sup> Vogler, J., & Stephan, H. R. (2007). The European Union in global environmental governance: Leadership in the making?. *International Environmental Agreements: Politics, Law and Economics*, 7(4), 389-413.

Union aid programmes (EC and the Member States) form the largest development donor on earth with a special responsibility for the 77 ACP countries. Provisions of sustainable development have been included in the internal European framework with TEU Art. 2; while in TEC it is defined the integration of environmental requirements into the definition and implementation of the EU's other policies and activities<sup>74</sup>.

However, its aspirations have not been necessarily followed by pragmatic results, creating a mismatch<sup>75</sup>. Researchers<sup>76</sup> have identified four phases of the EU's effort to build a global climate regime:

- the design of the UN Climate Convention and the Kyoto Protocol (1992–1997);
- the operationalization of the Kyoto Protocol (1998–2005);
- the post-Kyoto strategy (2005–2009); and
- the post-Copenhagen era (2009– 2012).

Mostly during the third phase, the EU lost part of its efficiency in negotiation due to the binding norm driven approach but also due to a partial inner inconsistency that let the EU fall in a sub-alter position with respect to the G2 powers (i.e. China and the US). The EU isolation in EG dynamics has been studied in order to explain the sub-optimal output of the negotiation during the COP 15 and to provide an answer to the fatigue encountered by the EU. According to some, the EU was supporting a negotiation line set up to a naïve dialectic, disregarding the pragmatic divergences of other countries. This mandatory line may had been working on the EU EG internal dimension, for example through the conditionality mechanism that is going to be discussed in the following chapters. Others maintain that European objectives were not credible, due to the internal disunity of the Union, with some MS openly questioning the targets set by the Commission<sup>77</sup>.

## 1.5 Observations

The rise of emission depends largely on energetic mix and scarce efficiency due to technological gap and lack of resources. The anthropogenic pressures are exacerbating cross cutting and persistent crises. The lack of a consolidated EG allowed States to be distant from formulation or implementation of actions, continuing

---

<sup>74</sup> The TEU, Treaty on European Union, was agreed at Maastricht in 1992, while the incorporation of sustainable development as a Community objective was achieved by the revision of the TEC, treaty establishing the EC, at Amsterdam in 1997.

<sup>75</sup> Chaban, N., Elgstrom, O., & Holland, M. (2006). The European Union as others see it. *European Foreign Affairs Review*, 11, 245-262.

<sup>76</sup> Bäckstrand, K., Elgström O. (2013) The EU's role in climate change negotiations: from leader to 'leadiator', *Journal of European Public Policy*, 20:10, 1369-1386, DOI: [10.1080/13501763.2013.781781](https://doi.org/10.1080/13501763.2013.781781) and Van Schaik, L., & Schunz, S. (2012). Explaining EU activism and impact in global climate politics: is the Union a norm-or interest-driven actor?. *JCMS: Journal of Common Market Studies*, 50(1), 169-186.

<sup>77</sup> Parker, C. and Karlsson, C. (2010) 'Climate change and the European Union's leadership moment: an inconvenient truth?', *Journal of Common Market Studies* 48(4): 923-43. doi: 10.1111/j.1468-5965.2010.02080.x

Roberts, J. T. (2011) 'Multipolarity and the new world (dis)order: US hegemonic decline and the fragmentation of the global climate regime', *Global Environmental Change* 21, 776-84. doi: 10.1016/j.gloenvcha.2011.03.017

in the path of the non-binding political attitude and free rider behaviour<sup>78</sup>. Unfortunately, this lack of EG is accompanied by increasing inequality, violation of rights and natural heritage losses.

However it has to be said that in 2013, the UN HR Council report of Independent experts contained the examination of the texts of human rights of treaties, statements by human rights treaty body, decisions of regional human rights tribunal and other sources such as statements by states. It stated that there has been an evolution in the bodies of environmental human rights<sup>79</sup> which includes: substantive principles of international environmental law such as prevention of harm and adopting precaution; principle of process or procedural obligation such as duty to know, duty to inform and consult through public participation. With the strengthening of sustainable development agenda, the equitable principle affirming the general value of intergenerational equity also stressed the importance to speed up the transition toward more sustainable economies and societies, because on the basis of future policy scenario projections, there is less to leave as heritage to future generations. Articulating the general principles of sustainable development, regional organizations are suitable to implement solutions on region specific contexts and necessities. Overall, the EU represents a peculiar and positive case of regionalism, whereof it is possible to study in depth the changing phenomenon of EG.

The capacity to perform this transition relies in part on the capacity to sustain the expensive costs both domestically and internationally, but also to occupy a relevant seat in negotiating the framework of action. Externally, for the EU it remains vital to improve its coalition building capacity: when this fails, the results are evidently sub-optimal. Coalition and compromises are possible acting the bridge-building strategy as a “leadator”<sup>80</sup>, positioning among veto players such as China and the US<sup>81</sup>. When this strategy has been applied, as in the Durban negotiations, the dichotomy between developed and developing countries at the foundations of the Kyoto Protocol has been discussed<sup>82</sup>, avoiding to fall in the scheme that had been dominating in the previous cases. However, as argued by Vogler and Stephan the consistency between MS and the Commission<sup>83</sup> remains the line on which the EU can work to enforce its capacity to act at the international level, since the EU has opted for a directional leadership which is related to the idea of leading by example. Hence, whether appropriateness and coherence are essential to consolidate EU agency, internal unity and coordination result vital to act as well<sup>84</sup>.

---

<sup>78</sup> Christoff, P. (2010). Cold climate in Copenhagen: China and the United States at COP15. *Environmental Politics*, 19(4), 637-656.

<sup>79</sup> Statement by John H. Knox, Independent Expert on Human Rights and the Environment at "The Development of Environmental Human Rights". <https://www.ohchr.org/en/NewsEvents/Pages/DisplayNews.aspx?NewsID=15274> (Accessed December 13th 2018).

<sup>80</sup> Term used to merge the characteristic of “leader” and “mediator” in international relations negotiations. See: Bäckstrand, K., & Elgström, O. (2013) The EU's role in climate change negotiations: from leader to 'leadator', *Journal of European Public Policy*, 20:10, 1369-1386, DOI: [10.1080/13501763.2013.781781](https://doi.org/10.1080/13501763.2013.781781)

<sup>81</sup> *ibidem*.

<sup>82</sup> *ibidem*.

<sup>83</sup> Vogler, J. & Stephan, H.R. *Int Environ Agreements* (2007) 7: 389. <https://doi.org/10.1007/s10784-007-9051-5>

<sup>84</sup> Marsh, D. R. (2005). Friends and foes: Industrialised countries in multilateral environmental negotiations. In A. C. Kallhauge, G. Sjöstedt, & E. Corell (Eds.), *Global challenges: Furthering the multilateral process for sustainable development* (pp. 144-170). Sheffield: Greenleaf.

In the following chapter, the focus on the EU internal dynamics are presented in the light of these considerations.

## CHAPTER 2

### **Focus and inclusion of emission concerns in the EU Cohesion Policy: Adjusting goals and objectives for emission reduction in the enlarging Europe**

*“Our CO2 mixes with everyone else's within a year,  
then hangs around for centuries  
like a shroud.”*

*William H. Calvin*

In this chapter the analysis is focused on the main features of the domestic EU's Environmental Policy (EP).

The progressive inclusion into policy of environmental concerns by the EU, which has reached transversal and multi-level dimensions, is the result on the one hand of its adherence to international commitments, while on the other it represents the EU adjustment to the entrance in 2004 and 2007 of new MS, which were characterized by different political, economic and environmental conditions.

The analysis that moves from the general EU institutional framework of action towards the specific case of the Cohesion Policy, considers multi-dimensional factors that have influenced the reforms of this policy within and particularly across MS during its fourth program cycle (2007-2013).

With this aim, the structure of the chapter is divided as follows:

- a) The first paragraph presents the institutional framework: the structure and the policy subject of the EU. Furthermore, the process of Enlargement is introduced as an intervening variable in the EU functioning system.
- b) The second paragraph investigates the principles of EP in the EU, under the normative and policy perspectives.
- c) The third paragraph presents the analysis of the EU Emission trends.
- d) In the fourth paragraph, the policy responses of the EU are presented with the focus on the Structural and Cohesion funds. Furthermore, these are presented taking into consideration the relation they have with other frames of action formulated in order to address the carbon intensity issues.

- e) The last paragraph offers additional observations regarding the points previously defined.

## 2.1 The EU domestic context

### 2.1.1 The EU horizontal, vertical and multi-level dimensions

The EU's institutional system involves a set of components of different nature. The process of institution building has produced a polycentric and fragmented system<sup>85</sup> since the beginning of the Community experience born in the critical juncture of the 1950s<sup>86</sup>. The original nature of the agreements that have reconstructed the European state relations after the destructive event of the second world conflict<sup>87</sup>, and the following updates of fundamental treaties, have contributed to the realization of a complex and multi-level system of governance that exercises its functions in a way different from that of nation-based governments.

Traditionally, in the domestic polity model, the governmental institutions enshrine the way in which citizens can express preferences towards their representatives, desirable objectives and acceptable solutions.

The main common feature that characterizes European national democracies is the *fusion* of power, the condition by which the executive is generated by a part of the renewed legislative after the general elections. Leaving aside the traditional classifications<sup>88</sup>, it can be said that in both consensual and competitive democracies the aim of the political system is the creation of a defined government as ultimate body of decision-making and decision-taking, linked and bonded to the legislative by the confidence vote.

Instead, the model of democracy applied by the EU is different. Scholars have highlighted its compounded nature<sup>89</sup>. The meaning of this architecture is to be found mainly in the *multiple separations* of powers splitting the representative and operational functions of each institutional body, which can be divided into supranational and intergovernmental<sup>90</sup>. However the development of both characteristics has kept the Community experience alive, as the studies on the experiences of the 1960s and 1970s show.

The supranational institutions such as the Commission and the European Court of Justice have the functions to: 1) control MS compliance; 2) solve incomplete contracting; 3) perform as regulation authority; and in the specific case of the Commission (Article 294 of the Treaty on the Functioning of the European

---

<sup>85</sup> Fabbrini, Sergio. "Compound democracies." *Why the United States and Europe are becoming similar* (2007).

<sup>86</sup> Pierson, Paul, and Theda Skocpol. "Historical institutionalism in contemporary political science." *Political science: The state of the discipline* 3 (2002): 693-721.

<sup>87</sup> Martin Holland, (1993) *European Integration. From Community to Union* (London: Pinter), ch. 1 ; P. Stirk (2006) 'Integration and Disintegration before 1945' in D. Dinan (ed.) *Origins and Evolution of the European Union* (Oxford: Oxford University Press), pp. 7-28

Martin Holland, (1993) *European Integration. From Community to Union* (London: Pinter), ch. 2;

S. Martin (2006) 'Building on Coal and Steel: European Integration in the 1950s and the 1960s' in Dinan (ed.), pp. 125-140

<sup>88</sup> Lijphart, A. (1999). *Patterns of democracy*. New Haven, CT: Yale University Press.

<sup>89</sup> Fabbrini, Sergio (2015). *Which European Union? Europe and the Euro Crisis*. Cambridge University Press.

<sup>90</sup> Pollack, M. (1995) 'Regional Actors in an Intergovernmental Play: The Making and Implementation of EC Structural Policy', in C. Rhodes and S. Mazey (eds) *The State of the European Union*, Vol. 3, London: Longman, 361-390.

Union), the right of legislative initiative in the interests of the Union<sup>91</sup>. The Council is similar to the Commission in its internal thematic segmentation (DG Division for the latter and the Secretariat and Council Committee according to the Ministry competences for the former). Eventually, with the last reforms the Council has opened to co-decision, a mechanism that includes the EU citizen direct representative body.

The European Parliament lacks a degree of polarization of European Parties de-linked from their national political belonging, which nowadays is present particularly for the position in favour or against the EU more than on specific thematic objectives. Other bodies that comprise the EU institutional architecture are: the Court of Auditors, the European Economic and Social Committee, The European Central Bank and the European Investment Bank. While horizontally, the separation implies different sources of legitimacy, role and functions of the main European bodies, vertically the institutional relations reflect the separation between the communitarian institutions – merged in the Brussels synecdoche – and the Members of the European Union.

Unsolved questions remain on the table after the Lisbon Treaty. Over time, the crucial knot of institutional differentiation has produced an imperfect bicameralism with an undefined executive. This latter results characterized by national dimension and tendencies both of decentralization and de-concentration among European institutions, MS and sub-national entities. Consequently, both the decision making process and the outcomes' evaluations are problematic, especially when the policy has cross cutting nature over transnational, central and local authorities.

Eventually, the competences in which the EU exercises responsibility can be divided according to its vertical relations. Outstanding EU responsibility regards: custom union; rules governing competition within the single market; monetary policy for countries using euro; conservation of marine biological resources under the common fisheries policy; common commercial policy; concluding an international agreement following the EU legislation. The shared responsibility regards the single market; aspects of social policy defined in the Lisbon Treaty; economic and social cohesion; agricultural and fisheries (exception made for the matter cited above); the environment; consumer protection; transport; trans-European networks; energy; research, technological development and humanitarian aid. MSs have the responsibility for industry, culture, tourism, education and youth policy, administrative cooperation and human health issues, while the EU has solely a role of support<sup>92</sup>.

As results, the structural nature of the *loci*<sup>93</sup>, where decisions are made and taken among different organs, is split between the EU and the MS level and it generates two main considerations. The first is that executive is no longer a distinctive and singular entity, and the second is that the government is mostly a

---

<sup>91</sup> Pollack, M. A. (1996), The New Institutionalism and EC Governance: The Promise and Limits of Institutional Analysis. *Governance*, 9: 429-458. doi:10.1111/j.1468-0491.1996.tb00251.x

<sup>92</sup> Corporate author(s): Directorate-General for Communication (European Commission) Personal author(s): Fontaine, Pascal. Published: 2014-10-10. Retrieved from: <https://publications.europa.eu/en/publication-detail/-/publication/2d85274b-0093-4e38-896a-12518d629057> (Accessed December 13th 2018).

<sup>93</sup> Fabbrini, S. (2015). *Which European Union?*. Cambridge University Press.

process generated by the intersection among diverse institutional spheres<sup>94</sup>.

In this context, States have remained the principal interlocutors of negotiations and agreements, whose outcome is the result of a more or less significant Europeanization process<sup>95</sup> which measures the effect of the EU on the domestic system<sup>96</sup> according to a re-orientation or a re-shaping of politics in its policies, practices or preferences<sup>97</sup>. Europeanization is explained also as the EU process impact onto domestic institutional structures and system of governance, for example by the focus on the evaluation of public policy aspects such as: a) policy implementation; b) policy change /adaptation; c) contribution of the private sector in EU programme implementation, d) level of development and institution-building<sup>98</sup>.

The introduction of this concept and the studies on Europeanization have fostered the development of a new type of institutional paradigm, as the study of Hall and Taylor assesses<sup>99</sup>, one which has contributed to the emerging pattern of the multi-level governance<sup>100</sup>, in which regions and smaller territorial authorities have increased their involvement in policy areas<sup>101</sup>. As noticed by some authors<sup>102</sup>, the regions' ability is not very significant, even though it has been intensified in the last 20 years<sup>103</sup>; furthermore, the capability of the sub-national actors is not homogeneous across the EU. The role of the European Cohesion Policy has been predominant is supporting the regions' emergence and role, with the intent of creating a closer understanding of local needs and facilitating solutions based on territorial assets.

### 2.1.2 Eastern enlargement and its institutional implications

The process of enlarging the EU consists of the integration of new members in the communitarian experience. The integration is an intervening variable that has occurred at different stages in the European experience and it brings a set of institutional implications that are multidimensional in nature.

On a formal point of view, the legal provisions, norms and requirements that assess the condition of membership today comprise more than 700 measures contained in 31 chapters which form the principles of the *acquis communautaire* also known as the Copenhagen criteria. An accession treaty establishing the entrance of new members has the nature of an international agreement.

The fundamental principle is stated in the Treaty of Rome of 1957, but provisions have been

---

<sup>94</sup> *Ibidem*.

<sup>95</sup> Paraskevopoulos, C. J., & Leonardi, R. (2004). Introduction: adaptational pressures and social learning in European regional policy-cohesion (Greece, Ireland and Portugal) vs. CEE (Hungary, Poland) countries. *Regional & Federal Studies*, 14(3), 315-354.

<sup>96</sup> Olsen, J. 2002. The many faces of Europeanization. *Journal of Common Market Studies*, 40: 921-52.

<sup>97</sup> Bache, I. and Jordan, A. 2006. "Europeanization and domestic change". In *The Europeanization of British politics*, Edited by: Bache, I. and Jordan, A. 17-36. Basingstoke: Palgrave Macmillan

<sup>98</sup> Leonardi, R. (1998). *Coesione, convergenza e integrazione nell'Unione Europea*. Società Editrice Il Mulino.

<sup>99</sup> Hall, Peter A., and Rosemary CR Taylor. "Political science and the three new institutionalisms." *Political studies* 44.5 (1996): 936-957.

<sup>100</sup> Gualini, E. (2016) 'Multilevel governance and multiscale forms of territorialisation' in *ibid*. pp. 506-523

<sup>101</sup> Bauer, M. Borzel, T. (2010) Regions and the European Union. in Handbook on Multi-level Governance.

<sup>102</sup> Hooghe, Liesbet, Gary Marks, and Gary Wolfe Marks. *Multi-level governance and European integration*. Rowman & Littlefield, 2001.

<sup>103</sup> Marks, G., Hooghe, L., & Schakel, A. H. (2008). Patterns of regional authority. *Regional and Federal Studies*, 18(2-3), 167-181.

progressively included in the *ex ante* formal requirement with Maastricht 1992 and in the work on accession as provided since the Amsterdam Treaty in 1997. Enlargement was experienced with the six countries of the CECA in 1973, following ten year of negotiations and tension among France and the United Kingdom; then, the southern enlargement, with Greece, Spain, and Portugal occurred in 1981 and 1986; the EFTA countries acceded in 1995; and the Eastern Enlargement happened in 2004, and was concluded in 2007 and 2013.

Mikalski has studied the enlarging experiences<sup>104</sup>, offering an institutional analysis of the main features of the past experiences and the concerns they generated specifically in relation to their impact on the EU decision-making process, due to the increasing number of MSs.

Among the fundamental principles of enlargement, two are particularly evident: on the one hand, enlargement is regulated by conditionality, that implies asymmetry among the applicant country and the EU; and on the other by flexibility, since the interactions and cooperation among the two levels may be enforced in accordance to non mandatory partnerships. The Eastern enlargement embodied a turning point for the recent development path of the EU. The first evidence was the disproportion resulting from the assimilation of the CEE countries into the EU, since their total would have represented 24% of the EU territory, the 21 % of its population, but just 5% of the EU GDP<sup>105</sup>.

For what concerns diplomatic relations, the negotiations started in the historical temporal window during which the polarization of the two blocs of the Cold war was influenced by the fall of the Berlin wall and the collapse of the Soviet Union to the detriment of the communist regimes: thus, enlargement would have implied the culmination of German unification, and the entrance of Eastern block states undergoing change. The characteristics of the applicant countries meant national planned economies and centralized state structures, reflecting a political elite that left little room for intermediate subjects and political pluralism, all of which made it a challenge to adhere to the fundamental principles and structures of the EU system.

## **2.2 The EU normative and policy framework for emission reduction**

### **2.2.1 From the beginning to the Lisbon Treaty**

In the matter of EP, until 1986 there was no explicit treaty provision for what had been the European Community. After Maastricht the EU has shared competence with MS to regulate the environment. This

---

<sup>104</sup> Michalski, A., & Wallace, H. (1992). *The European Community: the challenge of enlargement*. Royal Institute of international affairs.

<sup>105</sup> Bachtler, J., Gorzelak, G. (2007) *Reforming EU Cohesion Policy A reappraisal of the performance of the Structural Funds*, Routledge Policy Studies, Vol 28, No 4.

means that the EU can only legislate as far as the Treaties allow and must observe the principles of necessity, subsidiarity and proportionality.

The evolution of the integration of environmental requirements has been studied in relation to the European Treaty primary Law development<sup>106</sup>. Whether the economic project was clearly expressed in the original Treaty of Rome<sup>107</sup>, it is the Declaration of the Council of the European Communities that first impressed the importance of including environmental protection<sup>108</sup>, so that scholars identify 1973 as the start of EU EP<sup>109</sup>. Without a legal basis, the intervention justification relied on the Art. 100 EEC<sup>110</sup> and the Art. 235 EEC<sup>111</sup>. The question of the competences of the EU institutions on the matter received an answer by the European Court of Justice, addressing that:

*“provisions which are made necessary by considerations relating to the environment and health may be a burden upon the undertakings to which they apply and if there is no harmonization of national provisions on the matter, competition may be appreciably distorted”<sup>112</sup>.*

Not just the allocation of competences, also the identification of environmental protection as an essential objective<sup>113</sup> of the EEC was established by the Court in other occasions<sup>114</sup>. As pointed out by Homeyer<sup>115</sup> the action of the Council was developing towards a harmonization among environment and economy thanks to the specific provision of Art. 130 (s) EEC<sup>116</sup>, even though at the beginning of the EP, the unanimity voting procedure of the Council was forcing to choose among the most acceptable agreements the lowest agreement possible<sup>117</sup>.

---

<sup>106</sup> Holder, Jane, Elworthy, Sue, Lee, Maria. Environmental protection, law and policy: text and materials. 2nd ed. Vol. Law in context. Cambridge: Cambridge University Press; 2007.

<sup>107</sup> Art 2 EEC.

<sup>108</sup> Council Directive 73/405/EEC of 22 November 1973 on the approximation of the laws of the Member States relating to methods of testing the biodegradability of anionic surfactants.

<sup>109</sup> Sellheim, N. (2017), EU Environmental Law and the Internal Market, by Nicolas De Sadeleer, published by Oxford University Press, 2014.

<sup>110</sup> Then Art. 94 EC, art. 113 TFEU

<sup>111</sup> Then Art. 308 EC, art. 352 TFEU

<sup>112</sup> Judgment of the Court of 18 March 1980. - Commission of the European Communities v Italian Republic. - Maximum sulphur content of liquid fuels. - Case 92/79.

<sup>113</sup> Sellheim, N. (2017), EU Environmental Law and the Internal Market, by Nicolas De Sadeleer, published by Oxford University Press, 2014. Pag 10.

<sup>114</sup> Judgment of the Court of 7 February 1985. - Procureur de la République v Association de défense des brûleurs d'huiles usagées (ADBHU). - Reference for a preliminary ruling: Tribunal de grande instance de Créteil - France. - Free movement of goods - Waste oils. - Case 240/83.

<sup>115</sup> Homeyer, I. (2001, May 25–26). Enlarging EU environmental policy. Paper prepared for pre- sentation at the Environmental Studies Workshop ‘Environmental challenges of EU Eastern enlargement’ organised by the Robert Schumann Centre at the European University Institute, Florence, Italy.

<sup>116</sup> Then Art. 192 TFEU

<sup>117</sup> Pallemarts, M. (2003). Toxic and Transnational Law. Oxford: Hart Publishing.

In the years from 1982 to 1986, the Third Environmental Programme outlined the passage from efforts to contain environmental damage to action to prevent it from occurring in the first place<sup>118</sup> through a wider use of the environmental impact assessments.

With the Single European Act, the environmental protection was encapsulated as: 1) an objective of the EEC (ex Art. 3 EEC); as a compulsory element to be included in other policy fields (ex Art- 130r EEC<sup>119</sup>); and as a specific element in the completion of the internal market (ex Art. 100a (3) EEC<sup>120</sup>). The Commission's White Paper of 1985<sup>121</sup> contributed to the merging of internal market and environmental concerns.

The 1992 Treaty of Maastricht marked the passage from the EEC to the EU, as well as a further step in the evolution of the EP. Whether some matters relied on the unanimity principle of decision making, the cooperation procedure decreased the veto power in the Council.

The institutionalization of the EP was reached in the 1997 with the Treaty of Amsterdam, which gave it a democratic dimension thanks to the co-decision role of the European Parliament and the higher consideration, which no longer relegated it to a secondary role, of the market dimension. However, in practice core issues remain blocked by the unanimity vote procedure (i.e. Eco taxes). With the aim of consolidating the steps undertaken in 1997 and 2001, the Treaty of Lisbon of 2007 underscores the "prudent and rational use of natural resources"<sup>122</sup> and the role of the EU to aim to high level of environmental protection<sup>123</sup>.

Within the framework of the Lisbon Treaty, the EU has undertaken to make the environmental, economic and social spheres coexist as fundamental components of the EU development, as shown by Art. 3(3)-(5) and 21(2)(d)-(f) TEU, Art. 11 TFEU . In particular, Art. 3 TEU marks the overcoming of Art.2 EC, which includes the principle of sustainability just in relation to non-inflationary growth<sup>124</sup>. However, whether theoretical principles have been largely included in European strategies<sup>125</sup> they find barriers due to the heterogeneity of the application fields, as they may emerge from the secondary law provisions<sup>126</sup>. The

---

<sup>118</sup> Office for Official Publications of the European Communities.(1983). The European Community's Environmental Policy. Periodical 1/ 1984. Second Edition. Retrieved from: <http://aei.pitt.edu/13512/1/13512.pdf> (Accessed December 13th 2018).

<sup>119</sup> Then Art. 191 TFEU

<sup>120</sup> Then Art. 114 (3) TFEU

<sup>121</sup>Completing the Internal Market. White Paper from the Commission to the European Council (Milan, 28-29 June 1985). COM (85) 310 final, 14 June 1985. [EU Commission - COM Document] Retrieved from: <http://aei.pitt.edu/1113/>. (Accessed December 13th 2018).

<sup>122</sup> Art. 191 (1) TFEU

<sup>123</sup> Art. 191 (2),

<sup>124</sup> Sellheim, N. (2017), EU Environmental Law and the Internal Market, by Nicolas De Sadeleer, published by Oxford University Press, 2014.

<sup>125</sup> Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - Mainstreaming sustainable development into EU policies: 2009 Review of the European Union Strategy for Sustainable Development/\* COM/2009/0400 final \*/

<sup>126</sup> Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community<sup>13</sup>; Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020, hereafter referred to as the Effort Sharing Decision<sup>14</sup>;

coexistence of differentiated strategies under the sustainable-labelling can be noticed in the policies that include environmental requirements, as water management<sup>127</sup>, energy efficiency<sup>128</sup>, or waste<sup>129</sup>.

## 2.2.2 EU Environmental Policy: Objective, Programmes and Implementation Gap

Whether on the one hand environmental protection is an achievement under the legal point of view, implementation of actions that favour the co-existence of socio-economic development and the respect of the environment is something that goes beyond the theoretical formulation. According to Jordan, implementation is the factor that determines the success of a policy or in general of a process, that otherwise risks to become a “paper exercise”<sup>130</sup>. An interesting aspect of the investigation of the implementation dynamics within the EU finds one of the crucial points in the fact that the MS<sup>131</sup> are simultaneously the policymaker and the primary implementing agent of the policy<sup>132</sup>. At the EU institutional level, the structure of the bodies dealing with the EP has evolved as in the case of the Commission. Indeed, the collaboration over time among different DGs has allowed implementing actions in different spheres to ensure the reduction of CO2 emissions.

Analysis conducted regarding the European EP<sup>133</sup> contributed to the focus on the implementation of EU legislation, for instance by providing a quantitative overview from a policy sector that has a predominantly market-correcting character by setting production and product standards to fight environmental pollution (Art. 191 TFEU). As it is stated in the doctrine, EU environmental law has become highly diverse in terms

---

Capros, P., Mantzos, L., Papandreou, V., & Tasios, N. (2008). Model-based analysis of the 2008 EU policy package on climate change and renewables. *Report to DG ENV*;

Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC<sup>15</sup>;

Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels<sup>16</sup>.

Regulation (EC) No 443/2009 of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles<sup>17</sup>;

Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide.

<sup>127</sup> Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

<sup>128</sup> Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (Text with EEA relevance).

<sup>129</sup> Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance).

<sup>130</sup> Jordan, A. J. (1999). The implementation of EC environmental policy: A policy problem without a political solution?<sup>130</sup> *Environment and Planning C: Government and Policy*, 17(1), 69–90.

<sup>131</sup> To be fair, the same reasoning would be applicable –with the needed exceptions and proportionally - to subnational entity.

<sup>132</sup> *Ivi*, p. 72.

<sup>133</sup> Börzel, Tanja A., and Aron Buzogány. "Compliance with EU environmental law: The iceberg is melting." *Environmental Politics*. (2018).

of policy tools and governance approaches<sup>134</sup>, increasing the difficulties to compare results.

Recently, the tradition of policy evaluation counts a vast numbers of indices, indicators and method to assess the performance of the policy processes and results. For instance, the Smart regulation approach of the Commission tests regulatory framework validity towards the Fitness check<sup>135</sup>. Nowadays, it is extended to: 1) Information and consultation of workers under the Responsibility of Directorate- General Employment, Social Affairs and Inclusion; 2) Motor vehicle type approval framework under the Responsibility of Directorate- General Enterprise and Industry; 3) Protection of EU fresh water resources under the Responsibility of Directorate- General Environment; 4) Internal market for aviation under the Responsibility of Directorate- General Mobility and Transport; 5) Coordination and guidance (coordinator for the fitness check on agro- food industry) under the Responsibility of Secretariat General. The list<sup>136</sup> of the Environmental legislation covered under the fitness check includes 56 acts, among directives, regulations and council acts of different nature.

Another tool is the Environmental Policy Stringency Index<sup>137</sup> designed by the OECD, composed by the collection of the principal regulatory instruments used by the States. Stringency is defined essentially by the policy-induced cost. The degree of the stringency depends on which measure and to what extent environmental policies put an explicit or implicit price on polluting or environmentally harmful behaviour. In Figure 2.1, the line has been expanding over time from the centre, which represents the lowest degree of stringency. In red, the lines of the first and last year, respectively 1990 and 2012 mark this expansion, however there is a decreasing of stringency in the last years, perceivable from the difference of the 2010 and 2012 values. As it emerges from Figure 2.1, Germany, the Netherlands, Finland and Nordic countries in general registered better scores with respect to Greece, Portugal, Ireland and Hungary. The other countries are in line with the OECD average. As noted in studies concerning the application of the index and the analysis of cross-Country measures of EP, this type of index is partially limited in representing the policy inclusiveness of provision to regulate negative market externalities on the environment. Since the indicator is based on a selected basket of instruments and thematic areas (i.e. air pollution and climate as topics;

---

<sup>134</sup> Holzinger, Katharina, Christoph Knill, and Ansgar Schäfer. "Rhetoric or reality? 'New governance' in EU environmental policy." *European Law Journal* 12.3 (2006): 403-420.

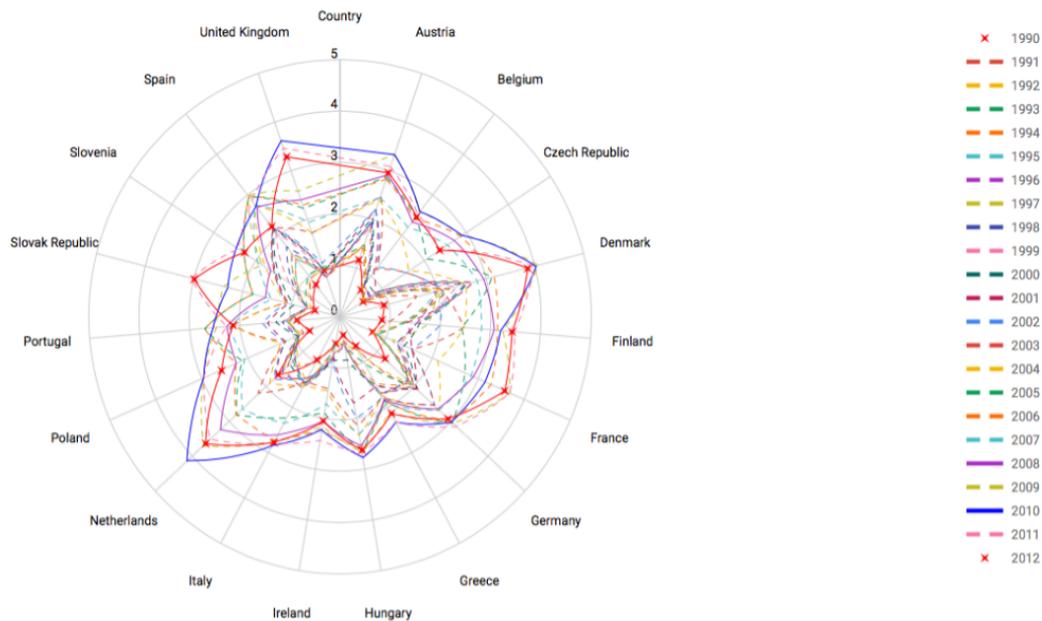
<sup>135</sup> Commission Communication on Smart Regulation in the European Union - COM(2010)543 (8 October 2010). See also: [http://ec.europa.eu/smart-regulation/evaluation/docs/fitness\\_checks\\_2012\\_en.pdf](http://ec.europa.eu/smart-regulation/evaluation/docs/fitness_checks_2012_en.pdf) (Accessed December 20th 2018).

<sup>136</sup> List of the environmental legislation currently covered by the Fitness Check on Monitoring and Reporting. Available at: <http://ec.europa.eu/environment/legal/reporting/pdf/Environmental%20Legislation%20currently%20covered%20by%20the%20Fitness%20Check.pdf> (Accessed December 20th 2018).

<sup>137</sup> As explained by materials available on OECD webpage: "the OECD Environmental Policy Stringency Index (EPS) is a country-specific and internationally-comparable measure of the stringency of environmental policy. The index ranges from 0 (not stringent) to 6 (highest degree of stringency). The index covers 28 OECD and 6 BRIICS countries for the period 1990-2012. The index is based on the degree of stringency of 14 environmental policy instruments, primarily related to climate and air pollution. Variables included: Market EPs, Taxes, Tax on CO<sub>2</sub>, Trading Schemes, Green Certificates Trading Schemes CO<sub>2</sub>, White Certificates Feed-in Tariffs Feed-in Tariffs Wind Feed-in Tariffs Solar, Non-market EPS Standards Emission limit Sulphur content limit for diesel, R&D subsidies, Renewable energy, public RD&D budget."

energy and transport as sectors) there is the possibility that the EPS index would assume a value equal to zero measuring a country policy relying predominantly just on voluntary approaches<sup>138</sup>.

**Figure 2.1:** Evolution in policy stringency<sup>139</sup> for environmental action in EU OECD countries



Source: OECD. Author Elaboration

### 2.2.3 Overlapping problems: environmental and integration binomial

Enlargement has exacerbated debate on the expansion of the EU both on an identity basis and on its capacity of action<sup>140</sup>. With the exception of the first attempts of Environmental Action Programmes (EAP)<sup>141</sup>, the 1980s EAP<sup>142</sup> applications were market-related. The gap between legal transposition and practical implementation<sup>143</sup> has emerged as a consequence of the increasing number of provisions formulated, both for the MS as well as for the applicant countries that saw an increased number of the formal and the practical aspects of compliance<sup>144</sup> to deal with. The magnitude of this gap may derive from the administrative culture of each MS, which remains one of the elements that may influence the perception of

<sup>138</sup> Albrizio, S., Botta, E., Koźluk, T., & Zipperer, V. (2014). Do Environmental Policies Matter for Productivity Growth?: Insights from New Cross-Country Measures of Environmental Policies (No. 1176). OECD Publishing.

<sup>139</sup> Botta, E. and T. Koźluk (2014), "Measuring Environmental Policy Stringency in OECD Countries: A Composite Index Approach", *OECD Economics Department Working Papers*, No. 1177, OECD Publishing, Paris. <http://dx.doi.org/10.1787/5jxrjnc45gvg-en> (Accessed December 20th 2018).

<sup>140</sup> Wallace and Wallace (2005) ch. 16 'Eastern Enlargement: Towards a European EU?' in *ibid* pp. 401-428

<sup>141</sup> 1973 – 1977 First Environmental Program; 1977-1982 Second Environmental Action Programme

<sup>142</sup> Hertzman, C. (1995). *Environment and Health in Central and Eastern Europe: A Report for the Environmental Action Programme for Central and Eastern Europe*. The World Bank.

<sup>143</sup> Jordan, A. J. (1999). The implementation of EC environmental policy: A policy problem without a political solution?<sup>143</sup> *Environment and Planning C: Government and Policy*, 17(1), 69–90.

<sup>144</sup> Haigh N, 1992 *Manual of Environmental Policy* (Longman, Harlow, Essex)

the process of implementation, determining an outstanding qualitative interpretation of it.

On a market perspective, the entrance of new subjects in the economic cycle shaped the issue of integrating the new countries' difficult to regulate with respect to the emergence of environmental concerns. In order to organize systemically the relation among EP and enlargement, Kramer has identified the challenges regarding the Eastern Enlargement and the environmental issues, as follows in Table 2.1. Some of the challenges are included in this section, while the others are addressed in the following parts of the chapter.

**Table 2.1: Six Challenges of Environmental Politics and Policy**

Nature of the Challenge	Description
Fiscal	allocation of monetary resources
Administrative	building both institutional and staffing capacity
Environmental	promoting a sustainable environment while fulfilling the acquis
Democratic	ensuring substantive input for Vox Populi
Energy	reducing the excessive consumption of environmentally threatening liquid and, especially, solid fuels and coping with the dangers of obsolete nuclear power stations built in the Soviet era
Political	mobilising the support necessary to respond effectively to these foregoing challenges

Source: Table elaborated on Kramer' study<sup>145</sup>.

Even before the Enlargement, the environmental conditions in the Europe of 1990-2000 changed as a consequence of the vicinity of the new candidate territory. The main worries concerned the significant level of trans-border pollution produced by the CEE applicants, as in the case of acid rain. With the collapse of their communist regimes, there had been much more information on their environmental conditions.

Studies on the characteristics of the new Members have been conducted to evaluate the impact of their accession<sup>146</sup>. Among the better-known cases, is that of the young children in the Slesia region (Poland) who recorded levels of lead five times higher than in the Western countries; so that half of the children in that area were affected by health problems as a side effect of exposure to pollution<sup>147</sup>. In Romania, which had no control on atmospheric pollution, cattle could not stay more than two or three years in the same zone<sup>148</sup>. The most polluted areas were: the southern region of East Germany, and its border with the Czech

<sup>145</sup> Kramer, J. (2004) EU Enlargement and the Environment: Six Challenges, *Environmental Politics*, 13:1, 290-311, DOI: 10.1080/09644010410001685245

<sup>146</sup> UE E PECO: impatto ambientale dell'allargamento. A cura di Guido Paggi. Cacucci editore - Bari - 2004

<sup>147</sup> Baker, S. "The impact of Eastern enlargement on EU environmental governance." *Environmental Studies Workshop on "Environmental Challenges of EU Eastern Enlargement*. 2001.

<sup>148</sup> Ministry of Water and Environment Protection, Romania (2001)"*State of the environment in Romania,2000*".

The causes of the persistency of environmental impoverishment have been studied as well<sup>150</sup>, particularly after the regimes fall. On the one hand, environmental impoverishment appears as a heritage from a materialist dialectic that does not include environmental capital as a valuable asset, because it is outside the chain work-productivity. On the other hand, there were inconsistent actions that would have allowed the implementation of corrective measures to decrease negative externalities impacts. During the 1970s and 1980s, the forced industrialisation in CEE countries expanded extensive production methods and increased the demand for, and reliance on, low-quality local coal for electricity generation<sup>151</sup>. By the way, there were important similarities between state socialism and capitalism in these production and consumption processes, with parallels in both environmental consequences and ideological understandings of nature and society<sup>152</sup>.

In relation to the state of the environment, the applicant countries had worked on the measurements of the atmospheric, water and nuclear pollution deriving from the inefficient production in the industrial, energy and transport sectors.

For what concerns industrial activity, the levels of pollution were consistent overall in the region characterized mainly by heavy industry such as iron, steel, and chemical also known as the Black triangle (that included Bohemia, Silesia and Saxony).

The transport sector weighted consistently on air pollution, since applicant countries maintained old cars, increasing at the same time urban traffic due to car circulation. In spite of the fact that fuel consumption pro capite and emission pro capite related to this sector were three or four times less than for the other EU members, in practice the energy consumption increased by 22% from 1992-1999.

In CEEs, forests were subject to massive change deriving from the needs of infrastructure and land use; as a consequence, road constructions produced deforestation of habitats that for their humidity and characteristics would have been precious for conservation<sup>153</sup>. While natural or semi-natural forest persists, significant losses of these environmental goods occurred as a consequence of strong urbanization and intensive agricultural practices.

The process of Europeanization of environmental concerns about the CEE enlargement started after the Council of Copenhagen. The trajectory outlined in the Essen Council on December 1994 -in which the

---

<sup>149</sup> Úrge-Vorsatz, Diana, Gergana Miladinova, and László Paizs. "Energy in transition: From the iron curtain to the European Union." *Energy Policy* 34.15 (2006): 2279-2297.

<sup>150</sup> Zamparutti, T., and Brendan Gillespie. (2000) "Environment in the transition towards market economies: an overview of trends in Central and Eastern Europe and the New Independent States of the former Soviet Union." *Environment and Planning B: Planning and Design* 27.3 (2000): 331-347.

<sup>151</sup> Goldman, M.I. (1972) *The Spoils of Progress: environmental Pollution in the Soviet Union*. Cambridge Mass. MIT Press, Cambridge.

<sup>152</sup> Pavlínek, P., Pickles J. (2004) *Environmental Pasts/ Environmental Futures in Post-Socialist Europe*, *Environmental Politics*, 13:1, 237-265, DOI: 10.1080/09644010410001685227

<sup>153</sup> EEA. Conservation status of forest habitat types by region. Available at: [https://www.eea.europa.eu/data-and-maps/daviz/conservation-status-forest-habitat-types#tab-chart\\_1](https://www.eea.europa.eu/data-and-maps/daviz/conservation-status-forest-habitat-types#tab-chart_1) (Accessed December 20th 2018).

Commission formulated the strategy of pre-accession - was reinforced by the Luxemburg 1997 Council . In this occasion, the partnership for community program was introduced. In November 2002 the EU proposed a strategy to complete the negotiation for the accession of new countries, while the conclusion of the Road map was approved by the Council in Lisbon (2000), Gothenburg (2001) and Laeken (2001). The 2001 was a year with much discussion on the issue. Studies, reports and prospects were discussed in the regular meetings of environment ministers of the candidate countries with the EU representatives. In the case of the Environment Commissioner of the time, Margot Wallström, and the President of the Environment Council, Belgian Environment Minister Magda Aelvoet, they were very active contributors.<sup>154</sup>

The negotiations related to the environmental Chapter (22) started in 2000 and closed in 2001 for the majority of the countries. The criteria of Copenhagen required that the alignment of national legislation should have been in accordance with the EU framework. This approximation process is in part included in the Europeanization process and outlined by the Commission as the transposition of legislation, institutional and administrative improvement. For the latter, compliance has been often difficult because of both pre-institutional setting and financial capability.

There was the necessity to regulate as much as possible in order to implement the chapters of the acquis. Regulation on NUTS region occurred in 2001 and was enforced by the Regulation enacted in May 2003<sup>155</sup>. In this context, overcoming the lack of local administration of the candidate countries was a prerogative feasible particularly at the level of NUTS II. According to scholars<sup>156</sup>, there have been trends visible from the opinions and regular reports dating from 1998 to 2003 by which the Commission's focus shifted from the formal codification of the Copenhagen criteria to the capacity to absorb the acquis, and eventually towards a managerial administrative capacity to receive and implement budgetary fund allocations<sup>157</sup>

This tendency has been gradual: applicant countries enjoyed a transition period in order to adhere to the alternative approach. An example are the delays in EP allowed by the EU to facilitate improvement of water management, industrial pollution control and even more time to convert the EU mandate into national provisions. On the contrary, there have been the provisions related to air quality, nature protection, and environmental assessment<sup>158</sup>. The Sixth Environmental Action Program<sup>159</sup> adopted by the EP and the

---

<sup>154</sup> Euractiv. Commission's study on "The Benefits of Compliance with the Environmental *Acquis* for the Candidate Countries". Retrieved from: <https://www.euractiv.com/section/enlargement/news/environment-ministers-discuss-enlargement-benefits/>; (Accessed December 20th 2018).

<sup>155</sup> Regulation (EC) No 1059/2003 of the European Parliament and of the Council of 26 May 2003 on the establishment of a common classification of territorial units for statistics (NUTS).

<sup>156</sup> Hughes, J., Sasse G., and Gornon C. 2004 *Europeanization and Regionalization in the EU's Enlargement to central and Eastern Europe. The myth of Conditionality*. Palgrave Macmillan

<sup>157</sup> *ibidem*.

<sup>158</sup> Commission Staff Working Document Executive Summary Of The Impact Assessment Accompanying The Document Report From The Commission To The European Parliament And The Council On The Voluntary Ecodesign Scheme For Imaging Equipment. /\* Swd/2013/014 Final \*/

<sup>159</sup> Final Report for the Assessment of the 6th Environment Action Programme DG ENV.1/SER/2009/0044. Available at: [https://www.ecologic.eu/sites/files/project/2013/ecologic\\_6eap\\_report.pdf](https://www.ecologic.eu/sites/files/project/2013/ecologic_6eap_report.pdf) (Accessed December 20th 2018).

Council on 22 July 2002 highlighted the necessity to improve environmental integration, precaution and transparency principles, with a major concern to focus on GHG reduction<sup>160</sup>.

Countries like Estonia, Lithuania, Bulgaria and Romania established an inter ministerial committee for the monitoring of the national adoption of the above principle. The preventive approach is in practice called for by the Directive “Seveso II”<sup>161</sup> which fulfils a lack in CEE countries’ legislation for risk management as well as by the introduction of the Environmental Impact Assessment. The Directive has then evolved in 2012, with the Seveso III<sup>162</sup>.

On the side of transparency and the right to information, the Aarhus Convention improved public information on the environmental conditions, producing a positive impact in terms of the increased interest in environmental concerns<sup>163</sup>. In CEE countries, environmentalists through the first eco-political movement have taken position in the first government coalition (i.e. the Slovene environmental party).

Social movements and Non-Governmental Organizations emerged during the 1990s, particularly in the Czech Republic, Hungary and Poland, but their impact has been reduced as a consequence of lack of financial resources. Spreading information and raising awareness is also a way to include operators in the economic field in the defence of the environment, as well as consumers, producers and public officials.

The exigency of coping with rules was not just a pro forma requirement. In the EU a consistent number of provisions regards primarily the functioning of market mechanisms which in this specific case implies also diverse tools such as tax, subsidies and allowances or other discretionary measures (Eco label, audit, voluntary agreements). For example, for Hungary, Poland and Slovenia the deadline for the application of the water directive was set as 2015, and for Lithuania as 2009. The provision related to waste management was set for Estonia as 2009, while Hungary received a delay for fuel combustion until 2004, and Poland for the VOCs (volatile organic compounds) had until 2005. However, the risk not to comply with the requirements and the concerns about environmental dumping were the main worries of the EU15 MS since small local entrepreneurs were numerous in the CEE countries, and remained a presence in the market in spite of the numerous multinational environmental firms that entered the Central European market in those years<sup>164</sup>.

---

<sup>160</sup> *Ivi*, p.151, in this specific case the highlight refers to transport sector.

<sup>161</sup> Decision No 1600/2002/EC Of The European Parliament And Of The Council of 22 July 2002 laying down the Sixth Community Environment Action Programme.

<sup>162</sup> Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC Text with EEA relevance.

<sup>163</sup> Lee, M., & Abbot, C. (2003). The usual suspects? Public participation under the Aarhus Convention. *The Modern Law Review*, 66(1), 80-108.

<sup>164</sup> Euractive. 2002. Environmental Aspects of the EU Enlargement. Available at: <https://www.euractiv.com/section/climate-environment/opinion/environmental-aspects-of-the-eu-enlargement/> (Accessed December 20th 2018).

The concerns about CEE countries were based on the preoccupation that low environmental sensitivity would have played a role once those countries entered into the EU decision-making regime, thus minimizing the policy output. The enlargement experience of the 1980's had marked the division among states with more versus less environmental sensitivity. The entry of Spain, Portugal and Greece in those years delayed the improvement of environmental provisions in the European parliamentary work, for reasons of support of national growth. The division among MS environmental leaders, such as Austria, Denmark, Finland, Germany, the Netherlands and Sweden and laggards such as Greece, Ireland, Portugal and Spain has been based on demand and supply for EP and GDP levels<sup>165</sup>.

The 'leader-laggard' dynamic within the EU has been identified as one important driver behind the expansion of EU EP<sup>166</sup>. Its core mechanism is based on environmental front-runners and regulatory competition, which would foster the drive of the EU EP forward<sup>167</sup>. Not just members of the governments, also NGOs shared doubts on the CEE countries and seriously questioned their capacity to follow the energy and climate standards of the Union<sup>168</sup>. In addition, the clause for the missed infrastructural transformation was provided by the Art.226 of the Amsterdam Treaty. This was done with the intention to sanction lack of compliance of the objective stated in the provision.

Assessing compliance after accession has been an object of research<sup>169</sup> to understand the differential degree of integration among states. Whether the CEE countries shared many symptoms of the 'Mediterranean Syndrome'<sup>170</sup> in the first period, eventually they seem to perform not so badly. The differentiated integration may explain why non-compliance has not increased after enlarging the EU. To assist MS comply with EU environmental legislation, are the EU technical assistance and the funding schemes such as Cohesion Funds and other Community programs (i.e. the Action for the Protection of the Environment in the Mediterranean Region (MEDSPA)<sup>171</sup>, the Regional Action Programme on the Initiative of the Commission Concerning the Environment (ENVIREG)<sup>172</sup>, or the Financial Instrument for the Environment (LIFE))<sup>173</sup>.

---

<sup>165</sup> Andersen, M. S., & Liefferink, D. (1997). *European environmental policy: The pioneers*. Manchester: Manchester University Press.

<sup>166</sup> Homeyer, I. (2001). *Enlarging EU environmental policy*. Paper prepared for presentation at the Environmental Studies Workshop 'Environmental challenges of EU Eastern enlargement' organised by the Robert Schumann Centre at the European University Institute, Florence, Italy.

<sup>167</sup> *Ibidem*.

<sup>168</sup> Grouping of NGOs from CEE states: Open Letter to the Heads of Governments of Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. See also The Regional Environmental Center. *For Central And Eastern Europe*. DG ENV-NGO Dialogue Group. *Summary of the Seventh Meeting. November 17-19, 2002*. Available at: [http://documents.rec.org/publications/DGENV\\_NGO\\_dialogue7\\_Nov2002\\_EN.pdf](http://documents.rec.org/publications/DGENV_NGO_dialogue7_Nov2002_EN.pdf)

<sup>169</sup> Börzel, T.A. and Buzogány, A., 2010. Environmental organisations and the Europeanisation of public policy in Central and Eastern Europe: The Case of Biodiversity Governance. *Environmental Politics*, 19 (5), 708-735.

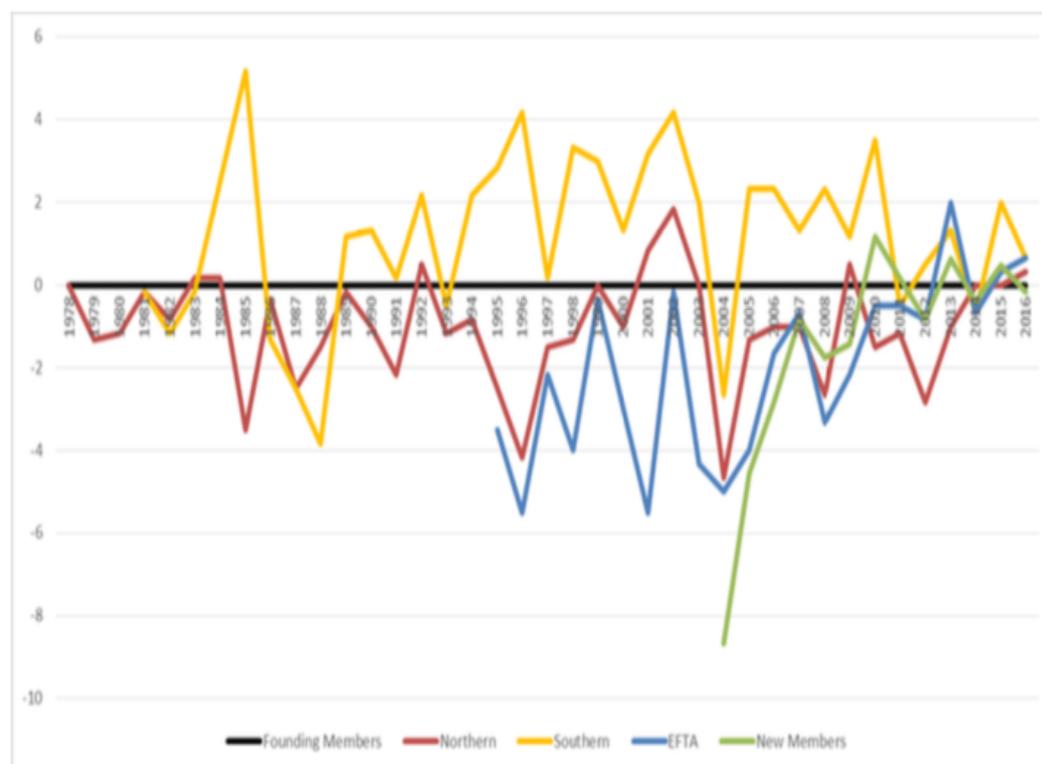
<sup>170</sup> *Ibidem*. Inefficient administrations ridden by patronage and corruption, legacies of authoritarianism, weakly organized societal interests, and low levels of socio-economic development.

<sup>171</sup> Council Regulation (EEC) No 563/91 of 4 March 1991 on action by the Community for the protection of the environment in the Mediterranean region (Medspa).

<sup>172</sup> 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' Text with EEA relevance

The volume of EU Structural Funds and of the Cohesion Fund and sector specific funding programs as they have multiplied are to be addressed in the following paragraphs. Evidence provided by the study of the infringement procedures<sup>174</sup> is that whether the Southern enlargement has brought consistently level of non compliance among new Members with respect to environmental requirements, the other three enlargement rounds did not share the same non-compliance deficit with respect of EU environmental normative framework, as shown in Figure 2.2.

**Figure 2.2:** Non-compliance of Accession Groups Compared to the Founding Members



Source: Börzel, T. A., & Buzogány, A. *Study on Berlin Infringement Database*

As maintained by many in the literature on the topic, pre and post- accession financial instruments and twinning programs have played a major role in bringing new MS into compliance and may explain why Eastern enlargement has not exacerbated problems of compliance<sup>175</sup>.

<sup>173</sup> Regulation (EU) No 1293/2013 of the European Parliament and of the Council of 11 December 2013 on the establishment of a Programme for the Environment and Climate Action (LIFE) and repealing Regulation (EC) No 614/2007 Text with EEA relevance.

<sup>174</sup> Börzel, T. A., & Buzogány, A. (2019). Compliance with EU environmental law. The iceberg is melting. *Environmental Politics*, 28(2), 315-341.

<sup>175</sup> Dimitrova, A. (2002). Enlargement, institution-building and the EU's administrative capacity building. *West European Politics*, 25 (4): 171-198.

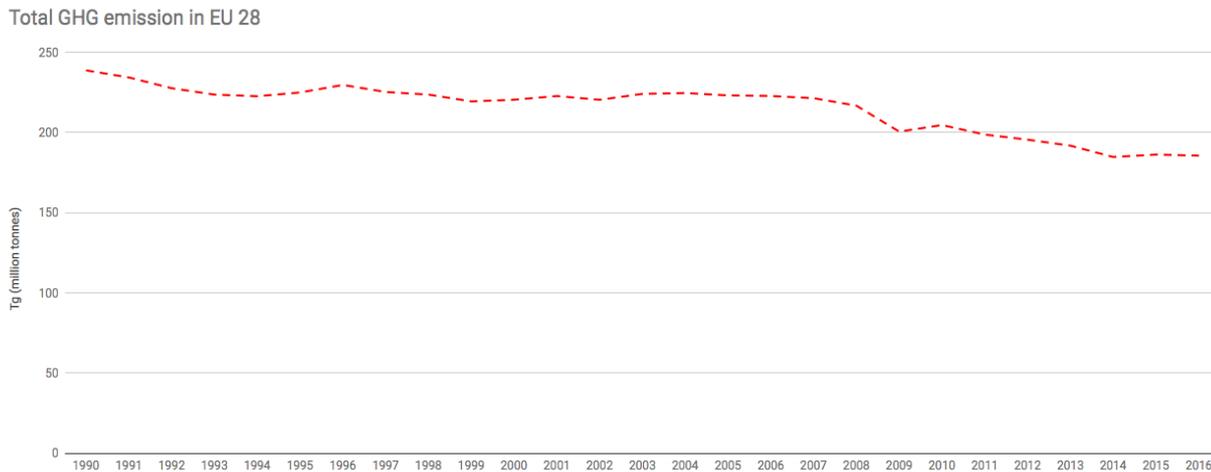
Grabbe, Heather. (2003). Europeanization Goes East: Power and Uncertainty in the EU Accession Process. In: Kevin Featherstone/Claudio M. Radaelli (ed.). *The Politics of Europeanization*. Oxford: Oxford University Press: 303 - 331.

Schimmelfennig, Frank and Ulrich Sedelmeier. 2004. Governance by conditionality: EU rule transfer to the candidate countries of Central and Eastern Europe. *Journal of European Public Policy*, 11 (4): 661-679.

### 2.3 Analysis of EU Emissions

The EU comprises more than 500 millions inhabitants, is one of largest economies in the world totalling 3,956.898.4 millions euro of GDP<sup>176</sup> and is the fourth contributor of CO<sub>2</sub> emissions<sup>177</sup>, a trend that has slightly decreased between 1990 and the 2016, as shown in Figures 2.3a, b.

**Figure 2.3a:** EU average of GHG emission from 1990 – to 2016



Source: EEA on the basis of data viewer on greenhouse gas emissions and removals, sent by countries to UNFCCC and the EU Greenhouse Gas Monitoring Mechanism (EU Member States).<sup>178</sup> Author elaboration.

Disaggregating the general trend by gas composition and market-based activities, it is possible to obtain a further level of analysis<sup>179</sup>. Figure 2.3b shows how the trend of CO<sub>2</sub> emission related to production-based and consumption-based activities from 1990 to 2014; it is possible to notice how emissions are relatively higher for consumption-based activities than for production-based, even if the trend<sup>180</sup> of the first follows the trend of the latter, making the EU as a whole a net importer of Carbon Dioxide.

<sup>176</sup> 2018, Q3 at current prices. Source Eurostat: GDP and main components (output, expenditure and income)[namq\_10\_gdp]. [http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=namq\\_10\\_gdp&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=namq_10_gdp&lang=en) (Accessed December 20th 2018).

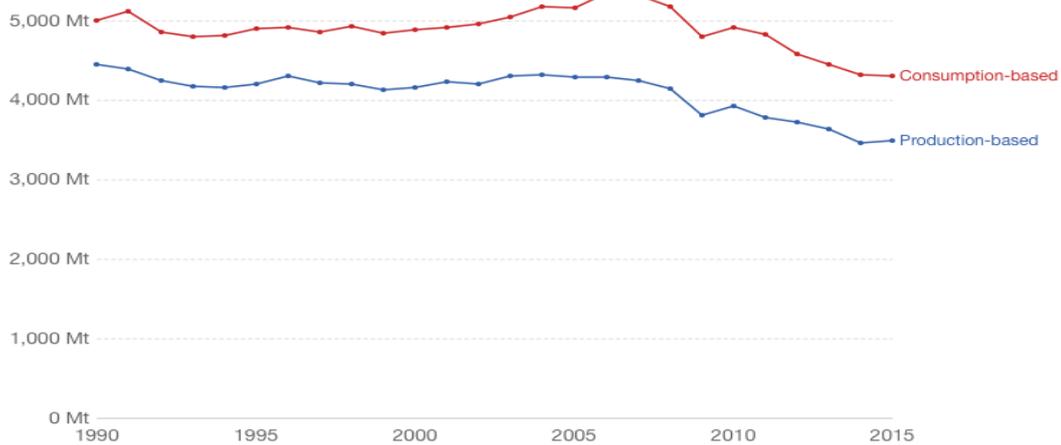
<sup>177</sup> European Commission Statistical Pocketbook 2018. Luxembourg: Publications Office of the European Union, 2018. <https://publications.europa.eu/en/publication-detail/-/publication/99fc30eb-c06d-11e8-9893-01aa75ed71a1/language-en/format-PDF/source-77059768>. doi:10.2833/105297 MJ-AB-18-001-EN-N (Accessed December 20th 2018).

<sup>178</sup> EEA greenhouse gas - data viewer. Retrieved from: <https://www.eea.europa.eu/media/newsreleases/data-and-maps/data/data-viewers/greenhouse-gases-viewer> (Accessed December 20th 2018).

<sup>179</sup> Hannah Ritchie and Max Roser (2018). "CO<sub>2</sub> and other Greenhouse Gas Emissions". Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/CO2-and-other-greenhouse-gas-emissions'. (Accessed December 20th 2018).

<sup>180</sup> Full reference: Le Quéré, Corinne, Robbie M. Andrew, Pierre Friedlingstein, Stephen Sitch, Julia Pongratz, Andrew C. Manning, Jan Ivar Korsbakken, Glen P. Peters, Josep G. Canadell, Robert B. Jackson, Thomas A. Boden, Pieter P. Tans, Oliver D. Andrews, Vivek Arora, Dorothee C. E. Bakker, Leticia Barbero, Meike Becker, Richard A. Betts, Laurent Bopp, Frédéric Chevallier, Louise P. Chini, Philippe Ciais, Cathy Cosca, Jessica Cross, Kim Currie, Thomas Gasser, Ian Harris, Judith Hauck, Vanessa Haverd, Richard A. Houghton, Christopher W. Hunt, George Hurtt, Tatiana Ilyina, Atul K. Jain, Etsushi Kato, Markus

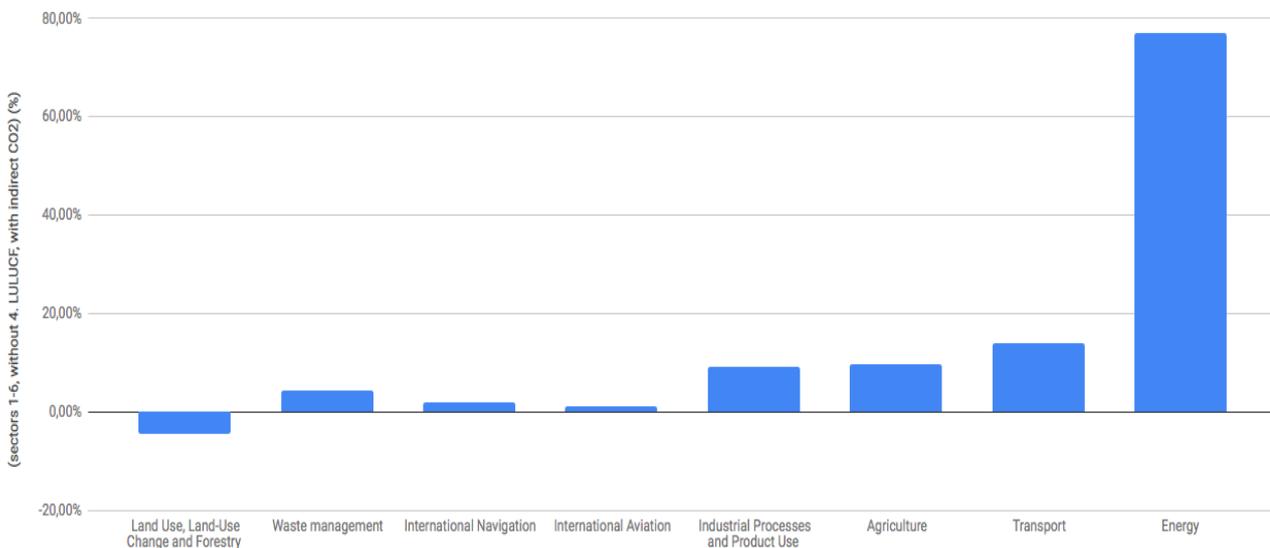
**Figure 2.3b:** Trends of CO2 emission divided by consumption and production



Source: UNFCCC and CDIAC

Whether each sector of the economy has its share in emission contribution, there is a dramatic difference in emission levels according to specific activities. In 1990, as shown in Figure 2.4, the major concentration of emissions involved the energy sector, followed by transport, industrial production and agricultural activities.

**Figure 2.4:** Share (of total emission) by sector EU average in 1990



Source: EEA. Author elaboration.

Kautz, Ralph F. Keeling, Kees Klein Goldewijk, Arne Körtzinger, Peter Landschützer, Nathalie Lefèvre, Andrew Lenton, Sebastian Lienert, Ivan Lima, Danica Lombardozzi, Nicolas Metzler, Frank Millero, Pedro M. S. Monteiro, David R. Munro, Julia E. M. S. Nabel, Shin-ichiro Nakaoka, Yukihiro Nojiri, X. Antoni Padin, Benjamin Pfeil, Denis Pierrot, Benjamin Poulter, Gregor Rehder, Janet Reimer, Christian Rödenbeck, Jörg Schwinger, Roland Séférian, Ingunn Skjelvan, Benjamin D. Stocker, Hanqin Tian, Bronte Tilbrook, Ingrid T. van der Laan-Luijkx, Guido R. van der Werf, Steven M. A. C. van Heuven, Nicolas Viovy, Nicolas Vuichard, Anthony P. Walker, Andrew J. Watson, Andrew J. Wiltshire, Sönke Zaehle, Dan Zhu: Global Carbon Budget 2017, Earth Syst. Sci. Data Discussions, 2017. <https://doi.org/10.5194/essdd-2017-123>

In countertrend, the land use change sectors and forestry management recorded negative scores, since the vegetation photosynthesis functioning required the absorption of CO<sub>2</sub>. Details on the different emission trends are available consulting the Eurostat inventory reporting<sup>181</sup> for 2007, whereby the net result of forest management and land converted to forest in the EU-27 was 518 million tonnes of carbon dioxide being removed from the atmosphere.

Moving on, the contribution of agriculture<sup>182</sup> in terms of level of GHGs emitted in the EU-27 fell from 10.4% of the total in 1990 to 9.2% by 2007, when emissions amounted to 462.2 million tons of CO<sub>2</sub> Equivalents. The overall reduction of agriculture-based emission was 20.2% between 1990 and 2007, faster with respect to the EU-27 average general reduction of GHG (-9, 3%)<sup>183</sup>. Part of the reductions may be attributed to the decline in the number of cattle, to more efficient agricultural practices, to the reduced application of nitrogen fertilizers<sup>184</sup> (after the introduction of Nitrates Directive). In addition to farm-related emissions, the other main source of greenhouse gas in the agricultural sector is the management of agricultural land. The EEA estimates that the soil use represented 49.0% of total agricultural emissions in the EU-27 in 2007, or about 226.4 million tonnes of CO<sub>2</sub> equivalent<sup>185</sup>.

Part of the reduction or elimination of fertilizers, pesticides and part of the growth of a series of regulated production rules, certification procedures and specific labelling schemes, are to be considered a result deriving from the necessity to comply with Regulation (EEC) n .2092/91.<sup>186</sup>

For what concerns the sector of waste management, it influences the presence and the composition of GHGs as well. The gases released by those activities included methane from solid waste disposal sites or wastewater treatment and discharge. Carbon dioxide emissions are involved as well in waste treatment, for instance from incineration or open-burning of waste. Other emissions, such as nitrous oxide and ammonia, can derive from the biological treatment of solid waste or septic tanks and latrines. In 2006, the composition of EU-27 waste generated was classified as coming from minerals almost for two thirds<sup>187</sup>.

In the rank, other typologies of waste that contribute to emissions release are household waste (6.9 %) and combustion (5.4 %). Of the 81.3 million tonnes of packaging waste that was generated in the EU-27 in 2006, some 56.5 % was recycled, a share that rose to 68.9 % when also taking account of the recovery,

---

<sup>181</sup> EUROSTAT, EC. "Using official statistics to calculate Statistical books greenhouse gas emissions. A statistical guide " *Statistical book* (2010). Retrieved from: <https://ec.europa.eu/eurostat/documents/3217494/5724229/KS-31-09-272-EN.PDF/16497950-fa38-465d-a1fc-fe6b50ac092c?version=1.0> (Accessed December 20th 2018).

<sup>182</sup> *Ibidem*.

<sup>183</sup> *Ibidem*.

<sup>184</sup> EEA. Annual European Community greenhouse gas inventory 1990–2007 and inventory report 2009. <http://www.eea.europa.eu> (Accessed December 20th 2018).

<sup>185</sup> *Ibidem*.

<sup>186</sup> Council Regulation (EEC) No 2092/91 of 24 June 1991 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs.

<sup>187</sup> EUROSTAT, EC. "Using official statistics to calculate Statistical books greenhouse gas emissions. A statistical guide " *Statistical book* (2010). Retrieved from: <https://ec.europa.eu/eurostat/documents/3217494/5724229/KS-31-09-272-EN.PDF/16497950-fa38-465d-a1fc-fe6b50ac092c?version=1.0> (Accessed December 20th 2018).

with the necessary attention to the large variations across MS. The issue has been addressed by the Packaging and Packaging Waste Directive (2004/12/EC)<sup>188</sup>, which has set a target for recycling 55% of the EU-27's packaging waste by 2008.

As acknowledged, other sectors that record consistent amount of emission generations are industry and services. The majority of emissions from these two sectors in 2007 derived from fuel combustion within manufacturing and construction (51.1%), while just over a third came from industrial processes and product use (35.4%); the only other major contributor was service-related commercial/institutional activities (13.2%). Among industry and services during the period 1990 to 2007, the reductions of emissions recorded were in relation to: the production of halo-carbons and sulphur hexafluoride (-93.3%); industrial processes in the chemicals industry (-40.1%); emissions relating to the application of paint (-27.5%); fuel combustion in iron and steel (-25.0%), and fuel combustion in commercial/institutional activities (-18.1%)<sup>189</sup>, from abatement technologies (in new plants or through retrofitting) or from the substitution/phasing-out of industrial processes<sup>190</sup>.

At EU level, the Directive concerning Integrated Pollution Prevention and Control (IPPC)<sup>191</sup> has provided principles for granting permits, establishing environmental controls and ensuring best available techniques are used. Then, the European Commission adopted in 2010 the Directive on Industrial Emissions<sup>192</sup> seeking to recast seven existing Directives.

Being the EU a fossil fuels based system, carbon dioxide emission are generated from oil, gas and coal. These materials compose the most important share of two sectors: energy industry and transport sector. Particularly, carbon dioxide emission from the process of combustion of these fuels is primarily linked to the carbon content of the fuel in question. Having the important role of providing energy and electricity, on which many activities of socio-economic relevance relied on, also emissions inventories have been developed on the basis of those material containing carbon components, which characterize energy supply.

The approach adopted by the EU, which consists in shifting from relatively high-carbon energy sources to those having less carbon impact, has followed the analysis of substitute assets of oil, considering the natural gas has the future material in which invest. Indeed, natural gas contains approximately 25% less than oil, and

---

<sup>188</sup> Directive 2004/12/EC of the European Parliament and of the Council of 11 February 2004 amending Directive 94/62/EC on packaging and packaging waste - Statement by the Council, the Commission and the European Parliament

<sup>189</sup>EUROSTAT, EC. ". Using official statistics to calculate Statistical books greenhouse gas emissions. A statistical guide " Statistical book (2010) <https://ec.europa.eu/eurostat/documents/3217494/5724229/KS-31-09-272-EN.PDF/16497950-fa38-465d-a1fc-fe6b50ac092c?version=1.0> (Accessed December 20th 2018).

<sup>190</sup> *Ibidem*.

<sup>191</sup> Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control (Codified version) (Text with EEA relevance )

<sup>192</sup>Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) Text with EEA relevance. *OJ L 334, 17.12.2010, p. 17–119*.

practically 40% less carbon content than coal. Therefore, the relevance of addressing changes in the energy mix can have considerable implications for the level of greenhouse gas emissions. Whether the contribution to gas releases is clear considering its chemical potential, estimates of the other GHGs that are emitted by industries working in the energy sector seem to be more difficult. This impediment may depend on diverse factors: the combustion conditions, technologies at disposition, and emission control policies. Referring to this context, it has been assessed that EU-27 emissions had decreased for half of their amount between 1990 and 2007 (86.6 million tonnes of CO<sub>2</sub> equivalents). In other terms, in the quoted period the share of fugitive emissions in GHGs fell from 2.8 % to 1.7 % in the EU-27<sup>193</sup>.

Road transport emissions were almost three times as high as the combined emissions from international aviation and maritime transport. The EU-27's transport sector (excluding international aviation and maritime transport) contributed 982.5 million tonnes of CO<sub>2</sub> equivalents in 2007, with transport emissions increasing, on average, by 1.4 % per annum from 1990<sup>194</sup>. Some 19.5 % of the EU-27's greenhouse gas emissions in 2007 were related to transport, a share that was 5.5 percentage points higher than in 1990, whereof road transport may be considered the largest emission source (e.g. 93.7 % of transport emissions in 2007).

The main driving force behind increased emissions from transport was increased freight transport (more specifically, by road and inland waterway), as well as an increase in the use of the passenger car. Regulation No 443/2009 of the EP and of the Council<sup>195</sup> set emission performance standards for new cars. The Euro vignette Directive<sup>196</sup> is currently under revision, its amendment should allow M to internalise the costs related to pollution and congestion caused by heavy goods vehicles. Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2008 integrates aviation into the Emissions Trading Scheme (ETS)<sup>197</sup>.

### 2.3.1 Analysis of EU Emission and Emission Intensity among old and new MS

What is useful to address is the carbon intensity of the EU countries. To measure CO<sub>2</sub> intensity, the IEA key parameter of kilogram of emission for one unit of GDP has been selected per each country of the EU, divided by groups. The two following Figures 2.5.a and 2.5.b show the overall decreasing trend of CO<sub>2</sub> production over more than two decades in the EU 15 and EU by the same unit of GDP.

The carbon intensity of an economy is linked to the factor of production. Generally the elements that compose the economy of the MS are those already reported in the Figures divided by sectors. The major

---

<sup>193</sup> EUROSTAT, EC. "Using official statistics to calculate Statistical books greenhouse gas emissions. A statistical guide " Statistical book (2010) <https://ec.europa.eu/eurostat/documents/3217494/5724229/KS-31-09-272-EN.PDF/16497950-fa38-465d-a1fc-fe6b50ac092c?version=1.0> (Accessed December 20th 2018).

<sup>194</sup> *ibidem*.

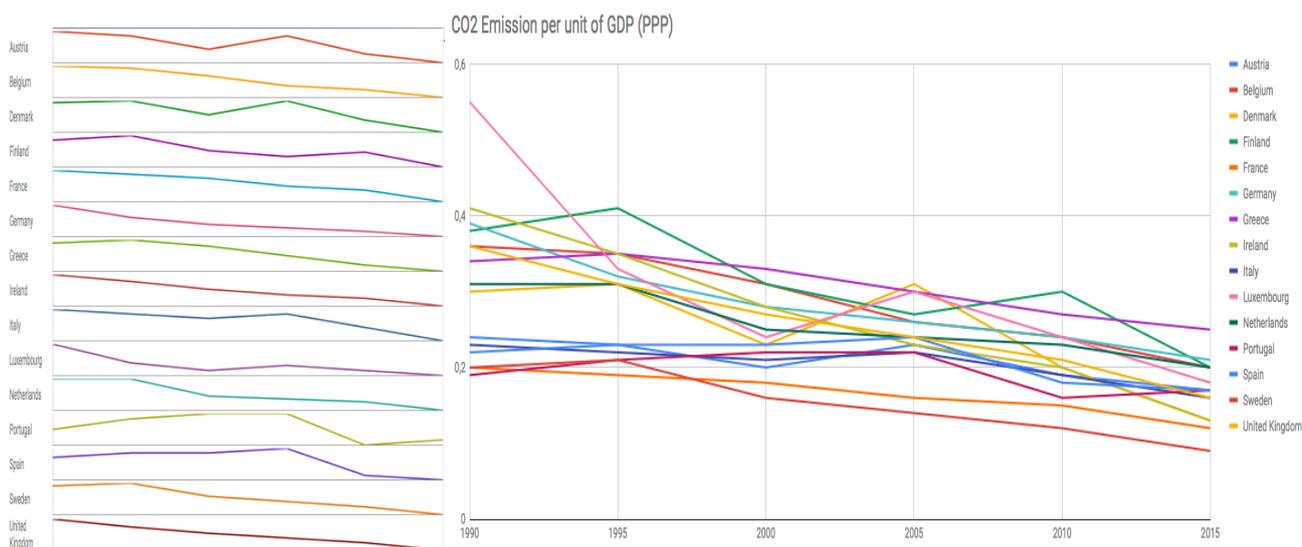
<sup>195</sup> *Ibidem*.

<sup>196</sup> *Ibidem*.

<sup>197</sup> Directive 2008/101/EC Of The European Parliament And Of The Council Of 19 November 2008 Amending Directive 2003/87/EC So As To Include Aviation Activities In The Scheme For Greenhouse Gas Emission Allowance Trading Within The Community (Text With EEA Relevance)

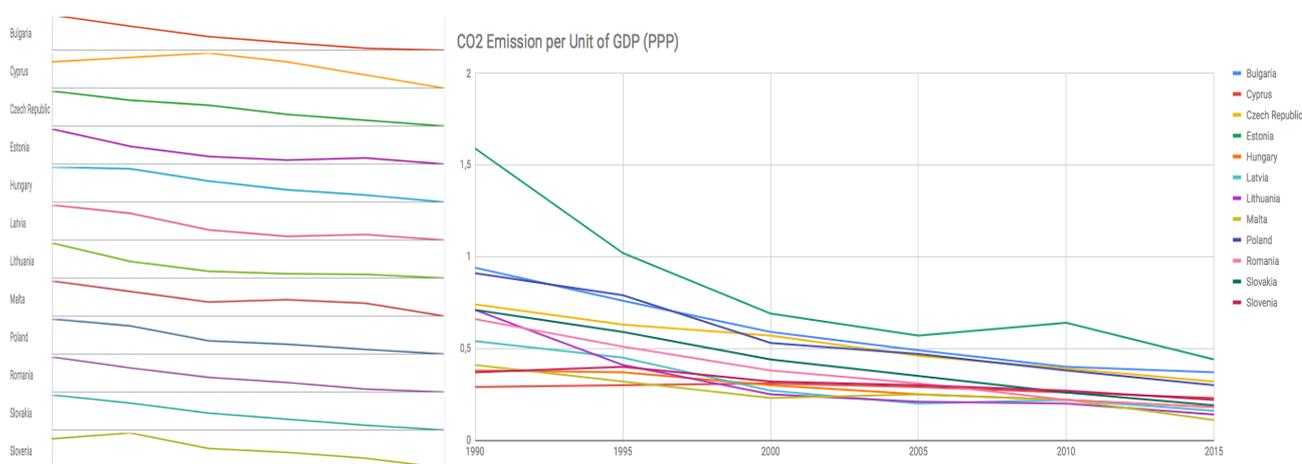
emitter in the EU 15 is Greece, while for the second group is Estonia. To be fair and complete the picture, the dimension of the economy matters as well to identify trends in the carbon footprint of the European States. For instance in 1995 the major levels of GDP were shared by Germany, France and the United Kingdom for the EU15 and by Poland, Hungary, the Czech Republic and Slovakia for the new MS; the trend was confirmed in 2005<sup>198</sup>.

**Figure 2.5.a:** CO<sub>2</sub> Emission per Unit of GDP EU 15 (KGCO2/2010USD)



Source: IEA<sup>199</sup>. Author Elaboration

**Figure 2.5.b:** CO<sub>2</sub> Emission per Unit of GDP of CEECs (KGCO2/2010USD)



Source: IEA<sup>200</sup>. Author Elaboration

<sup>198</sup> *Ibidem*.

<sup>199</sup> IEA. 2018 Statistics and Data. Retrieved from:

<https://www.iea.org//statistics/?country=EU28&year=1992&category=Key%20indicators&indicator=CO2ByGDPPPP&mode=chart&categoryBrowse=false&dataTable=INDICATORS&showDataTable=true> (Accessed December 20th 2018).

<sup>200</sup> IEA. 2018 Statistics and Data. Retrieved from:

<https://www.iea.org//statistics/?country=EU28&year=1992&category=Key%20indicators&indicator=CO2ByGDPPPP&mode=chart&categoryBrowse=false&dataTable=INDICATORS&showDataTable=true> (Accessed December 20th 2018).

## 2.4 The European Funds as a solution for Gap Reduction Implementation

The understanding of the link among environmental protection, emission reductions and Cohesion Policy deserves to be investigated for several reasons, part of which are accurately discussed in Chapter 3. Firstly, the quoted policy has become substantially significant on a theoretical as well as an empirical point of view. Part of this increase in relevance depends on the amount of resources destined to this policy, which account to one-third of the EU budget. This implies implications both for the economic perspective, since the policy aim has been to facilitate European economy growth<sup>201</sup>, and also for redistributive reasons<sup>202</sup>. As for the EP, its socio-economic contribution to, and thus 'harmonization' with, development across European Regions has also evolved over time. Indeed, harmony as balance in development is the concept that transpires from the Treaty of Rome (1957). The issue of "budget stabilization", although recurrent in the EU negotiations, clearly emerged in order to reconcile the distributive interests of an enlarged Europe<sup>203</sup>, which would exacerbate the already known socio-economic distortions (agglomeration effect in particular industries, unemployment, etc.) recognized by Krugman and Padoa Schioppa<sup>204</sup>.

The European integration has been progressively shifting from the sectorial integration that arose from the experience of the ECSC based on the Treaty of Paris (1951)<sup>205</sup> towards a more inclusive model. Leaving aside the 1960s, that were strongly influenced by the after war "realpolitik" approach, the new way of considering the funds as financial instruments for development has its roots in the 1970s events.

Not surprisingly, in this period of economic stress, the attractiveness of financial resources showed its potential, in spite of the modest amount of finance originally allocated. Other policies such as regional policy became significant for the Community and for the MS that had accessed it. In the middle 1980s, with the passage of the Single European Act (SEA) and the step toward a single market, the push for the EEC institutions to be active in the reduction of differences existing across regions came from the worry that the progressive consolidation of the EMU project at the end of the 1980s would have increased the disadvantages of the backward regions by making it impossible for national governments to increase their countries' competitive edge in international markets by means of currency devaluation<sup>206</sup>.

The earlier support for the actions devoted to foster poles of competition and development was shifted by the changing values, the questioning of the role of the state, and the growing awareness of certain

---

<sup>201</sup> Leonardi, R (2011) *Study on the impact of the Single Market on Cohesion: Implications for Cohesion Policy, Growth and Competitiveness: Task 2* (Brussels: European Commission)

<sup>202</sup> Ackrill, R., & Kay, A. (2006). Historical-institutionalist perspectives on the development of the EU budget system. *Journal of European Public Policy*, 13(1), 113-133.

<sup>203</sup> Lindner, Johannes. Conflict and change in EU budgetary politics. Routledge, 2006.

<sup>204</sup> Krugman, P. R. (1987). "L'integrazione economica in Europa: questioni concettuali." equità: una strategia per l'evoluzione del sistema economico della Comunità Europea, a cura di T. Padoa Schioppa, Bologna, il Mulino

<sup>205</sup> Martin, S. (2006) 'Building on Coal and Steel: European Integration in the 1950s and the 1960s' in Dinan (ed.), pp. 125-140

<sup>206</sup> Griffiths, Richard T. "A dismal decade? European integration in the 1970s." *Origins and evolution of the European Union* (2006): 169-190.

ill effects of growth such as environment or urbanization<sup>207</sup>. The evolution of political awareness and policy approach are marked by the Delors Package I in the context of SEA (1986), that provided the legal basis for regional policy after the Mediterranean enlargement (1981-6), and by the Delors Package II launched after 5 days TUE was formally signed, which provided the opportunities for further reforms in (1993,1999, and 2006). It is in 1989 and the following years that the Cohesion principles found their operative application in the reform of the Structural Funds and the Regulations mandating their use, shifting towards a territorial and multi-sectorial approach, as has emerged by the studies on the comparison among national regional policy and EU Cohesion Policy before and after the reform. The principle of Subsidiarity that was applicable by virtue of Art. 130r (2) just in the EEC EP<sup>208</sup>, was generalized and became applicable to all policy areas with the Maastricht treaty, introducing the new Cohesion Fund and the Committee of the Regions.

Once the enlargement process became a serious near term prospect (from 1996-1997) PHARE<sup>209</sup>, and pre-accession instruments such as SAPARD<sup>210</sup> and ISPA<sup>211</sup> were supplemented from EU structural funds. The Commission formulated a stronger pre-accession strategy in the occasion of the implementation of the Agenda 2000 with respect to the new candidate states. The already quoted Road map established in 2000 included: the socio-economic Lisbon Council agenda (2000), whereof goals are targeted as “Lisbon earmarking” priorities<sup>212</sup> and the mutual reinforcement principle formulated with the Gothenburg Declaration<sup>213</sup>, which remarked the inclusion of the environment as a component to take into account in the sustainable development paradigm.

In the years 2000 - 2006, the priorities were targeted to reflect the Lisbon strategy’s goals. This was followed by a shift in focus to the national level and the unit of analysis and so by the National Programme for the Adoption of the Acquis (NPAA). As emerged from the comparison of the MFF, the pre-accession

---

<sup>207</sup> Davignon, E. (1982) ‘The End of the Road for Europe or a New Beginning?’ in R. Dahrendorf (ed.) *Europe’s Economy in Crisis* (Holmes and Meier), pp. 119-138

<sup>208</sup> Sellheim, N. (2017), *EU Environmental Law and the Internal Market*, by Nicolas De Sadeleer, published by Oxford University Press, 2014, footnote p. 12

<sup>209</sup> Council Regulation (EEC) No. 3906/89, of 18 December 1989, on economic aid to the Republic of Hungary and the Polish People’s Republic [“Poland Hungary Aid for the Reconstruction of the Economy”] – as amended – and also re-named as “on economic aid to certain countries of Central and Eastern Europe”.

In 1990 the following countries became beneficiaries of the PHARE programme: Bulgaria, Czechoslovakia (as of 1993 separately as the Czech Republic and the Slovak Republic), and Romania [as well as support for the former Yugoslavia and, for 1990 only, also the former East Germany / GDR]. In 1991 the following countries also became beneficiaries of the PHARE programme: Estonia, Latvia, and Lithuania [as well as Albania]. In 1992 Slovenia was also added as a beneficiary. [Other Western Balkan states were also partially supported] Council Regulation (EC) No. 555/2000, of 13 March 2000, on the implementation of operations in the framework of the pre-accession strategy for the Republic of Cyprus and the Republic of Malta.

<sup>210</sup> Council Regulation (EC) No 1268/99 of 21 June 1999 on Community support for pre-accession measures for agriculture and rural development in the applicant countries of central and eastern Europe in the pre-accession period  
Council Regulation (EC) No 1258/1999 of 17 May 1999 on the financing of the common agricultural policy  
OJ L 160, 26.6.1999, p. 103–112

<sup>211</sup> Council Regulation (EC) No 1267/1999 of 21 June 1999 establishing an Instrument for Structural Policies for Pre-accession

<sup>212</sup> Brink,T., P. Medhurst, J. Hjerp, P. and Medarova-Bergstrom, K. (2010) *Cohesion Policy and Sustainable Development-Cohesion Policy Performance*, Supporting Paper 2. A report for DG Regio, September 2010.

<sup>213</sup> Commission Communication “A sustainable Europe for a better world: A European strategy for Sustainable Development” COM(2001) 264 final

Commission proposes bold EU strategy for sustainable development (press release IP/01/710 of 16/05/2001)

funding<sup>214</sup> is a peculiarity of the period 2000-2006. Specific budget allocated for the new MS came in 2004-2006.<sup>215</sup> This evolution of the MFF was followed by the expansion in the content of the funds for the period 2007-2013 which included in the Cohesion Policy scheme the implementation of EU EP across six sectors such as: 1) Water; 2) Solid waste management; 3) Nature protection; 4) Land rehabilitation; 5) Air quality; 6) Climate change.

**TABLE 2.2:** Comparison Multiannual Financial Frameworks from 1988-92 to 2014-2020

MULTIANNUAL FINANCIAL FRAMEWORK				
1988-1992	1993-1999	2000-2006	2007-2013	2014-2020
1. EAGGF Guarantee	1. Common agricultural policy	1. Agriculture	1. Sustainable growth	1. Smart and Inclusive Growth 1a: Competitiveness for growth and jobs
		1a: Common agricultural policy	1a: Competitiveness for growth and employment	1b: Economic, social and territorial cohesion
		1b: Rural development	1b: Cohesion for growth and employment	
2. Structural operations	2. Structural operations *Structural Funds *Cohesion Fund *EEA financial mechanism	2. Structural actions *Structural Funds *Cohesion Fund	2. Preservation and management of natural resources *of which market related expenditure and direct payments	2. Sustainable Growth: Natural Resources *of which: market related expenditure and direct payments
3. Policies with multiannual allocations (IMPs, research)	3. Internal policies	3. Internal policies	3. Citizenship, freedom, security and justice	3. Security and citizenship
4. Other policies of which: non- compulsory	4. External action	4. External action	4. The EU as a global partner	4. Global Europe
5. Repayments and administration (including financing of stock disposal)	5. Administrative expenditure	5. Administration	5. Administration	5. Administration
6. Monetary reserve	6. Reserves	6. Reserves	6. Compensations	6. Compensations
	7. Compensation	7. Pre-accession strategy *Agriculture *Pre-accession structural instrument *PHARE (applicant countries)		
		8. Compensation		

Source: DG Budget<sup>216</sup>

<sup>214</sup> Leonardi R. (2005) The CSF Revolution: The Origins and Structure of EU Cohesion Policy. In: Cohesion Policy in the European Union. Palgrave Macmillan, London. DOI [https://doi.org/10.1057/9780230503861\\_2](https://doi.org/10.1057/9780230503861_2).

<sup>215</sup> Allen, D. (2005), Cohesion and Structural Funds: Competing Pressures for Reform? In Wallace, H., and Wallace, W. And Pollack, M. (eds) Policy-Making in the European Union, Fifth Edition. Oxford: Oxford University Press.

<sup>216</sup> European Commission Budget. Available at: [http://ec.europa.eu/budget/budget4results/index\\_en.cfm](http://ec.europa.eu/budget/budget4results/index_en.cfm) (Accessed December 20th 2018).

#### 2.4.1 Instruments and strategy from 1989 to 2000

Studies as well as the Final Report prepared on behalf of DG XVI for the 1989-1999 period, show the results of those funding cycles, which were based on specific analyses concerning the evolution of Objective 2<sup>217</sup> also in relation to the environmental integration progress.

With respect to budget allocation, the ex post evaluation of the 1989-1993 Programme has reported that a consistent part of the Objective 2 total resources (32.9%) arrived to those that at the time were new MS, among which United Kingdom, followed by Spain (24.5%). At the sub-national level, regions that received major benefits from the allocation were Eastern Scotland (ECU 151.1 million), Western Scotland (ECU 423.4 million) and North East England (ECU 317.7 million). In Spain, Cataluña (ECU 558.4 million) and Pais Vasco (ECU 401.1 million) were included in major programmes. Other regions in the old MS such as the French Nord-Pas-de-Calais (ECU 385.6 million) and Nordrhein-Westfalia (ECU 337.9 million) in Germany, which were eligible as well for Objective 2 assistance, also received their shares<sup>218</sup>.

In general, the main findings for the first cycle of funding 1989-1993 highlighted problems in:

- addressing specific objectives in the Operational Programs, with the consequent intervention of the Commission in re-orienting and focusing the aim of the specific operations that otherwise would be easily interchangeable with other economic contexts<sup>219</sup>;
- outlining the additionality of EU resources to address transparency issues as wanted by the Commission towards MS; and
- facing MS's reluctance to include the sub-national level in negotiations for partnerships.

The graphic representation in Figure 2.6 below shows the aggregate expenditure by area of intervention under the Objective 2, which are: 'productive environment', physical regeneration, training and technical assistance, ordered from the higher to the lower in term of expenditures. The so called productive environment registered 40.9% of Objective 2 expenditure during the period. Among the measures supported under this priority there had been: support for Small and Medium Enterprises, activities to

---

<sup>217</sup> Bachtler, J., & Taylor, S. (1999). Objective 2: Experiences, lessons and policy implications. Report to the Commission of the European Communities. Union européenne. Commission européenne. (2001). *Unity, Solidarity, Diversity for Europe, Its People and Its Territory: Second Report on Economic and Social Cohesion, Volume 2: Statistical Annexe*. Office for official publications of the European Communities.

<sup>218</sup> Ernst & Young (1997) *Ex Post Evaluation of the 1989-93 Objective 2 Programmes: Synthesis Report*, DG XVI Series: Evaluation and Documents, No.4, Commission of the European Communities, Brussels.

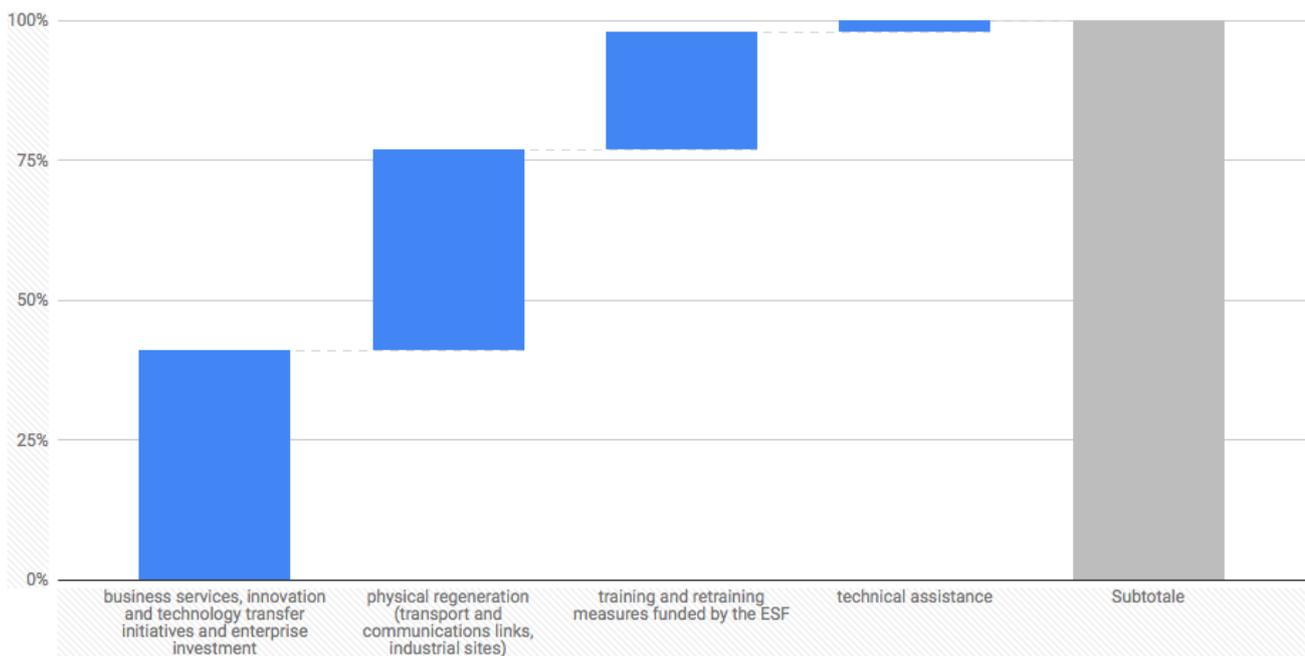
<sup>219</sup> Piedad (1994) *Interim Evaluation of Eastern England CSF Programmes*, Piedad, Manchester.

encourage innovation, transfer and circulation of technologies, fostering of business related services, and investment to support industrial enterprises in modernization and restructuring activities.

Physical regeneration priority represented 36.0% under Objective 2 expenditure. This priority included advancement in transport and communications networks, industrial sites development, as well as environmental measures,

Lastly the expenditure for training programmes accounted for 21.3%, whereof part of the contribution derived from the ESF <sup>220</sup>.

**Figure 2.6:** Aggregate Funding 1989-1993 by theme



Source: European Commission

The comparison of the 1989-1993 programme cycle and the one that followed for the period 1994-1999 <sup>221</sup> shows that the main aggregate variation in terms of expenditure allocation occurred in the sector of physical environments, in which the amount of recourses decreased; vice versa the productive environment (i.e economic context) increased. From the Commission point of view:

*“there was still scope for improvements in linking this instrument to the translation of the strategies into priorities and measures”<sup>222</sup>.*

<sup>220</sup> Ernst & Young (1997) *Ex Post Evaluation of the 1989-93 Objective 2 Programmes: Synthesis Report*, DG XVI Series: Evaluation and Documents, No.4, Commission of the European Communities, Brussels.

<sup>221</sup> Bachtler, J., & Taylor, S. (1999). *Objective 2: Experiences, lessons and policy implications*. Report to the Commission of the European Communities.

<sup>222</sup> CEC (1997) *The New Regional Programmes 1997-1999 under Objective 2 of the Community’s Structural Policies – Focusing on Job Creation*, Commission of the European Communities, COM (97) 524 final 14.11.97, Brussels

Tangible action concerning the inclusion of environmental externalities awareness was still small also in other sectors as the energy one, in which the main but still broad approach was to reduce the consumption of non-renewable resources, support the improvement of energy efficiency and to promote less carbon-intensive energy sources in order to reduce GHG emissions.

In this period, studies recognize that with reference to the specific case of the inclusiveness of environmental concerns, there emerged three levels of integration:

- 1) Horizontal: it consists of external consultations and thus limited influence;
- 2) Vertical: in which the Committee composed of experts in the environmental sectors assess the budget of environmental projects;
- 3) Strategic: characterized by national environmental expertise, oriented toward regional environmental competitiveness<sup>223</sup>.

Nevertheless, other observations of qualitative and quantitative nature may be added about the second cycle. Qualitatively, it had been assessed that the principal objective was to encourage change in the environmental sector by stimulating competitiveness. Quantitatively, the main aspect concerned the identification of targets and indicators. The necessity of outlining numerical targets aimed in the first place to gain better understanding of the context in which the funds operation would have intervened, and secondly to analyse the result at the end of the action undertaken. According to this logic, a programmatic path would include the alignment of the Strategic Environmental Assessment<sup>224</sup> with the final assessments.

A more articulated challenge concerns the evaluation of the same environmental issues through different measures of the same programme cycle. However, until the programme cycle 2007-2013 that is analysed in the third Chapter, the actions devoted to the inclusion and implementation of environmental concerns have not been seen as a complementary tool to foster economic development nor as an organic passage in the process of decision-making. Rather, they have occupied a sub alternate position<sup>225</sup> and been perceived as an additional formality that contributes to the possible obstruction by the bureaucracy.

Under the profile of the instruments introduced, the SAPARD, PHARE and ISPA funding had the objective of sustaining the preparation of the countries for the accession. For the Eastern Enlargement, resources allocated by the Community for pre-accession assistance more than doubled starting from the 2000: an

---

<sup>223</sup> Bachtler, J., & Taylor, S. (1999). Objective 2: Experiences, lessons and policy implications. Report to the Commission of the European Communities.

<sup>224</sup> Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment. *OJ L 197, 21.7.2001, p. 30–37*

<sup>225</sup> Clement K, Schremmer C and Tortto H (1998) *Utilisation of SEA in Programme Design and Project Selection*, Report for European Commission (DG XVI), Brussels.

amount of 3.174 million euro annually shared among PHARE (1.587 million euro), ISPA (1.058), and SAPARD (529)<sup>226</sup>.

The instruments address environmental considerations and actions, however the relation among them has been determined by the general pre-eminence of the PHARE program with respect to the others<sup>227</sup>.

The environmental aspect of SAPARD – which is oriented towards the agricultural sector – was disciplined by the agri-environment measure number 4 but it was simultaneously connected to water protection, in accordance to the previously quoted Nitrate Directive and Waste Water Directive<sup>228</sup>.

The PHARE<sup>229</sup> programme was established in 1989, and originally it had as principal recipients Poland and Hungary. It became the main channel used by the EU to provide financial and technical cooperation to the countries of Central and Eastern Europe (CEECs) and in the 2000s it radically increased the size of projects.

For what concerns ISPA (instrument of structural pre-accession) it was designed for 10 applicant countries - with the specific objective to foster environmental and transport infrastructures.

In terms of scope, pre-accession programme schemes during the Eastern enlargement addressed institution-building projects in the environment sector as well<sup>230</sup>. Part of the strategy formulated by the Commission<sup>231</sup>, was adjusted over time, because in the years before 2000 there were severe structural and administrative problems affecting the applicant countries. As noted by the Court of Auditors<sup>232</sup>, weaknesses in administration were evident for the ISPA in the sustainability of the infrastructure projects, which were mirrored at the national and final beneficiary levels. Another problem was the lack of specialized teams (i.e. engineers), since ISPA did not include systematically resources devoted to their recruitment.

For what concerns the PHARE program, the main impediments were represented by the lack of experience of the newly established Ministry of the Environment in the new MS and by the general coordination difficulties experienced by the ministries. In this respect, the Environmental Ministries did not

---

<sup>226</sup>European Commission. 2001. Report From the Commission to the Council, the European Parliament and social Committee and the Committee of the Regions. Sapard annual Report – year 2000. Brussels. COM (2001) 341 final. Retrieved from: [http://edz.bib.uni-mannheim.de/daten/edz-k/gde/01/sapard\\_annualreport01.pdf](http://edz.bib.uni-mannheim.de/daten/edz-k/gde/01/sapard_annualreport01.pdf) (Accessed December 20th 2018).

<sup>227</sup> Council Regulation (EC) No 1266/1999 of 21 June 1999 on Community support on co-ordinating aid to the applicant countries in the framework of the pre-accession strategy and amending Regulation (EEC) No 3906/89.

<sup>228</sup>CEC. 2001. Report From the Commission to the Council, the European Parliament and social Committee and the Committee of the Regions. Sapard annual Report – year 2000. Brussels. COM (2001) 341 final. Retrieved from: [http://edz.bib.uni-mannheim.de/daten/edz-k/gde/01/sapard\\_annualreport01.pdf](http://edz.bib.uni-mannheim.de/daten/edz-k/gde/01/sapard_annualreport01.pdf)

<sup>229</sup>Council Regulation (EEC) No 3906/89 of 18 December 1989 on economic aid to the Republic of Hungary and the Polish People's Republic *OJ L 375, 23.12.1989, p. 11–12*.

<sup>230</sup> Communication from the Commission the Challenge of Environmental Financing in the Candidate countries  
/\* COM/2001/0304 final \*/

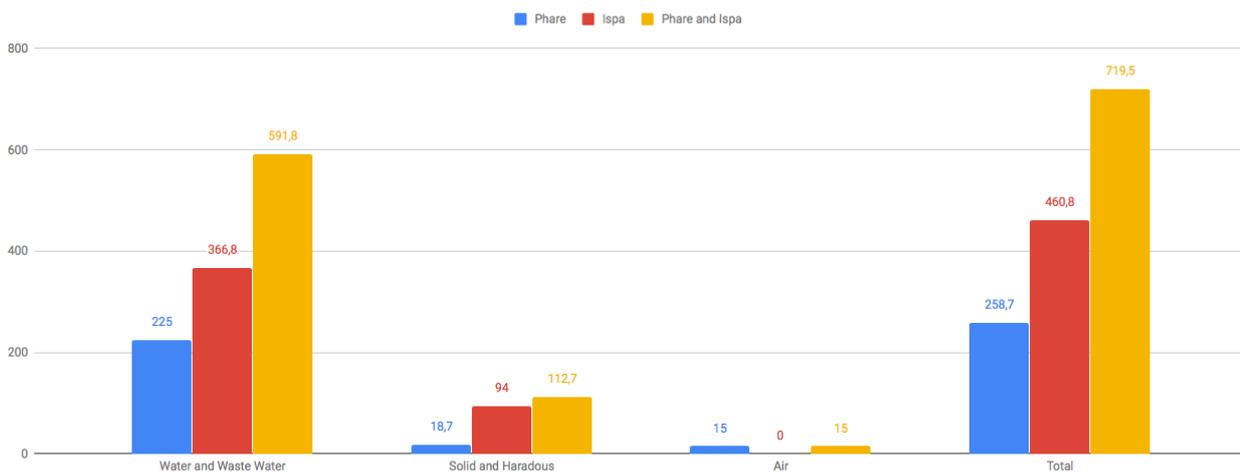
<sup>231</sup> Towards the enlarged Union - Strategy Paper and Report of the European Commission on the progress towards accession by each of the candidate countries {SEC (2002) 1400 - 1412}  
/\* COM/2002/0700 final \*/

<sup>232</sup> B&S Europe. 2015. Evaluation of PHARE financial assistance to Bulgaria (BG), Cyprus (CY), Czech Republic (CZ), Estonia (EE), Hungary (HU), Latvia (LV), Lithuania (LT), Malta (MT), Poland (PL), Romania (RO), Slovakia (SK), Slovenia (SI). Final Report. Retrieved from: <http://ec.europa.eu/smart-regulation/evaluation/search/download.do?documentId=14565913> (Accessed December 20th 2018).

enjoy particularly strong political authority, and this may be an explanation of the tendency to allocate the PHARE program to other and more established Ministries<sup>233</sup>.

In both of the investments analysed which belong to the pre- accession programmes, the key 'Investments' were primarily in the water and wastewater sectors, while the last was in the air sector as shown in Figure 2.7 below. The main finding in the comparison of the amount of resources from the program and the estimate of the total expenditure to comply with the CEEC 1997 Approximation was the insufficiency of the resources with respect to the expenditure foreseen. For instance, for the estimated total need (54,000 million for the water and wastewater sector) PHARE and ISPA as a share of total need represented only 1,1%; for the estimated 15,000 million for the solid and hazardous activities sectors, they represented 0,75 %; and for the 53,000 million for air quality sector, they were only 0,03 %.

**Figure 2.7:** EU pre-accession fund allocation by environment sector 1995-2000



Source: Court of Auditor<sup>234</sup>. On the study of 67% of PHARE environment projects and two third of the ISPA environmental commitments. Graphic: Author Elaboration

In Figure 2.8 below, the level of PHARE and ISPA resources devoted to environmental measures has being disaggregated by country.

For Bulgaria<sup>235</sup> the basis of the priorities had been identified in the Accession Partnership, approved in December 1999<sup>236</sup>. As suggested by studies, the measurement of the impact relative to pre accession instruments has been problematic. Consequently, it is difficult to ascribe the contribution of EU financial

<sup>233</sup> *Ibidem*.

<sup>234</sup> Official Journal of the European Union. 2003. C 167, Volume 46 17 July 2003. Special Report No 5/2003 concerning PHARE and ISPA funding of environmental projects in the candidate countries together with the Commission's replies Special Report No 6/2003 concerning twinning as the main instrument to support institution-building in candidate countries together with the Commission's replies.

<sup>235</sup> *Regular report from the Commission on Bulgaria's progress towards accession 2000. COM (2000) 701 final, 8 November 2000. [- COM Document]. Available at: <http://aei.pitt.edu/44544/>. (Accessed December 27th 2018).*

<sup>236</sup> *Ibidem*.

instruments with respect to other programmes, which have been complementary but diverse, deriving from international financial institutions or bilateral agencies<sup>237</sup>. The main finding shows that the projects in the environment sector support local authorities in the adoption and implementation of air quality, wastewater and waste management, nature protection, and the IPPC and Seveso Directives<sup>238</sup>.

In Czech Republic, there had been cases of forest regeneration, vocational education training courses, and improvements in the agricultural sector. In the infrastructure and environment sector, one of the largest projects financed by PHARE (34 million of euro from PHARE) supported the improvement of the Brno-Vranovice railway line<sup>239</sup>. Indeed, thanks to the instruments of pre accession many projects including sewage pipelines, waste water treatment plants, gas pipelines, road building, improvement of bus and railway stations were completed in 2000.<sup>240</sup>

For Estonia, the main programmes financed were included in the PHARE National Programme, the Baltic Sea Cross-Border Co-operation Programme, and the Baltic Sea Special Action. Other resources to fund initiatives such as Supplementary Investment Facility, Access II (special programme for strengthening Civil Society; 0.9 million of euro) and participated in a number of Community Programmes (3.383 million of euro) received resources through national allocations<sup>241</sup>.

For Hungary, in terms of management, the greatest task was move to extended decentralisation – this means moving from the ex-ante system of control for contracting and disbursement, to a system of ex-post controls more similar to that used in MS. Originally the Hungarian administration, with assistance provided by PHARE twinning, established a framework for the NDP programming process. This typology of assistance was applied for the themes of economic competitiveness, infrastructure, human resources, agriculture and rural development and generally while regional development was a key element of the Special Preparatory Programme to prepare Hungary for pre-accession aid management (ISPA and SAPARD) and for subsequent management of EU structural funds after accession<sup>242</sup>.

Latvia represents a case in which pre accession had success at the local level. One of the main examples is the construction of iron removal plants in Madona and Liepaja. Other projects completed in the environment sector were reported in 2000 OMAS Consortium. The projects regarded: Energy, Cross Border Co-operation, Statistics, Environment, Education, Justice and Home Affairs, Banking, Public Finance,

---

<sup>237</sup> *Ibidem*.

<sup>238</sup> European Commission. *The Phare programme annual report 2000*. [COM Document]. Available at: <https://www.esiweb.org/enlargement/wp-content/uploads/2009/02/ec-phare-annual-report-2000.pdf> (Accessed December 27th 2018).

Water Framework Directive (WFD); Integrated Pollution Prevention Control (IPPC); Seveso Directives; Natura 2000; Biological Safety Directive; and Directive on Environmental Impact Assessment.

<sup>239</sup> However, part of the major investment not contained in the graph were made under cross-border cooperation frame.

<sup>240</sup> European Commission. *The Phare programme annual report 2000*. [COM Document]. Available at: <https://www.esiweb.org/enlargement/wp-content/uploads/2009/02/ec-phare-annual-report-2000.pdf> (Accessed December 27th 2018).

<sup>241</sup> *Ibidem*.

<sup>242</sup> *Ibidem*.

Agriculture, Aid Co-ordination<sup>243</sup>. The main findings are concentrated on the one hand on the evidence of the support to the approximation and enforcement of the environmental acquis, on the other on the analysis of the state capacity of environmental study and monitoring<sup>244</sup>.

For Lithuania, the high rate of contracting funds has been initially problematic to be qualified, so for the 2000 has been difficult to collect the cases for the evaluation<sup>245</sup>.

For Poland, one of the sectors to finance was specifically the transport sector. Under PHARE 97 the Szypliszki-Suwalki (Northeast) and Zywiec-Wardon (South) road were completed. Other PHARE finance such as: PHARE 94 and 96 financed the completion of A4 motorway between Bielany and Dabówka. Wastewater treatment and environmental central heating projects were the Environmental projects completed in 2000, funding municipal infrastructure as well as investing in institutional human resource development in the least developed regions<sup>246</sup>. Specific examples of Projects funding concerned the use of geothermic water for heating (Geotermia Podhalanska (€ 14 million), and wastewater treatment plants (in Bielsko-Biala, Bydgoszcz, Wroclaw and Gdansk). Particularly, a first attempt to focus the effort on former coal miners included the solution to make available preferential loans for business start-ups and for investments in SMEs on the basis of employing former coal miners for a minimum period of time<sup>247</sup>.

For Romania, the lack of progress in key areas and the low status of acquis approximation required an increased in the level of efforts, especially in the environmental sector, whereof the implementation corresponded to the improvement of the road-worthiness of vehicles. An important achievement was reached in the waste-water treatment plant in Danutoni in August 2000, that allows the rehabilitation of municipal water and waste-water infrastructure through the RO9608-Jiu Valley Programme.

Improvement in Slovakia has been substantially pursued through legislative alignment, with the implementation of the environmental impact assessment Directive and reinforcement of the environmental inspectorates<sup>248</sup>.

Lastly Slovenia met a significant number of the short-term Accession Partnership priorities, especially in the areas of the economic criteria, transport, environment, employment and social affairs. In other areas the priorities were met partially. Eleven sectors were assessed by OMAS during 2000.

---

<sup>243</sup> See also: B&S Europe. 2015. Evaluation of PHARE financial assistance to Bulgaria (BG), Cyprus (CY), Czech Republic (CZ), Estonia (EE), Hungary (HU), Latvia (LV), Lithuania (LT), Malta (MT), Poland (PL), Romania (RO), Slovakia (SK), Slovenia (SI). Final Report. Retrieved from: <http://ec.europa.eu/smart-regulation/evaluation/search/download.do?documentId=14565913>. (Accessed December 27th 2018).

<sup>244</sup> European Commission *The Phare programme annual report 2000*. [COM Document]. Available at: <https://www.esiweb.org/enlargement/wp-content/uploads/2009/02/ec-phare-annual-report-2000.pdf> (Accessed December 27th 2018).

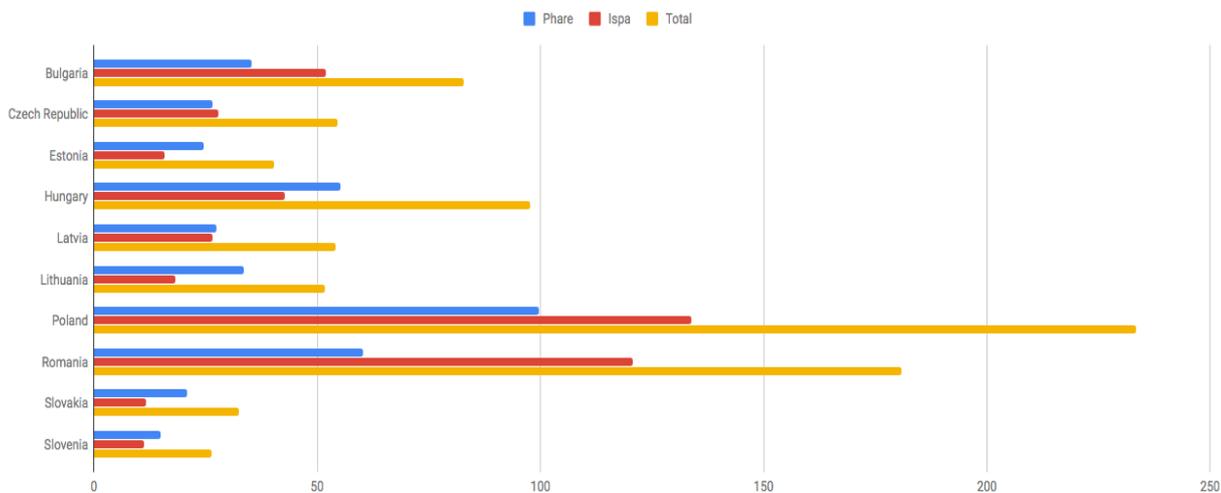
<sup>245</sup> *Ibidem*.

<sup>246</sup> *Ivi*. Regional development programmes, specifically STRUDER and INRED, PHARE continued to and The total amounts allocated to STRUDER 2 and INRED throughout their implementation amounted to € 20,3 million.

<sup>247</sup> *Ivi*. "Alleviation of social and regional costs of coal and steel restructuring"

<sup>248</sup> European Commission. *The Phare programme annual report 2000*. [COM Document]. Available at: <https://www.esiweb.org/enlargement/wp-content/uploads/2009/02/ec-phare-annual-report-2000.pdf> (Accessed December 27th 2018).

**Figure 2.8:** EU pre-accession fund allocation for environment sector by country 1995-2000



Source: Court of Auditor<sup>249</sup>. On the study of 67% of PHARE environment projects and two third of the ISPA environmental commitments. Graphic: Author Elaboration

At the conclusion of the 1994-1999 funding period, the main findings addressed by the Commission concerned the necessity to: 1) continue with institution building; 2) target financial grants more accurately; 3) increase project preparation to foster absorption capacity.

Noteworthy is that environmental assistance was addressed by PHARE programme. The investments were allocated following a strategic approach for *acquis* and institution-building approximation. On another perspective, the PHARE programme did not incisively determine the side of direct investment in infrastructure.

From the financial evaluation of PHARE, the approach that characterized direct infrastructure investments regarded numerous investments of small flow. Consequently, interventions resulted fragmented, which could yield positive as well as negative considerations. On the one hand, advantages arrived to local communities, however the socio-economic benefits were not so consistent and did not produce a systematic result in the environment-related sectors. To give an example, implementation of these types of investments that interested the environmental infrastructure occurred in the absence of sufficiently qualified staff and in an administrative context not always adequately structured. However as a side effect, the PHARE approach facilitated the opening up of such administrative contexts, implicitly favouring the addition of major investments through ISPA, EIB, EBRD<sup>250</sup>. The direction stated has reference in the report of the

<sup>249</sup> Official Journal of the European Union. 2003. C 167, Volume 46 17 July 2003  
Special Report No 5/2003 concerning PHARE and ISPA funding of environmental projects in the candidate countries together with the Commission's replies, Special Report No 6/2003 concerning twinning as the main instrument to support institution-building in candidate countries together with the Commission's replies.

<sup>250</sup> MWH Consortium. 2007. Phare *Ex Post* Evaluation. Phase 3, Thematic Evaluation: Environment. Available at: <https://ec.europa.eu/neighbourhood->

Commission<sup>251</sup>, which assesses the orientation towards major decentralization in the future under the Structural Funds management approach in order to pursue the sustainable development strategy of 2001.

Since the objective of creating a fair context of regional competitiveness can be pursued in the case in which the basic conditions allow the emergence of disadvantages regions, and it is acknowledged that economic growth is determined as well as it determines Environmental infrastructures, it follows that Cohesion Policy has progressively considered Environmental infrastructure investments as an integral part of the policy<sup>252</sup>. The identification of environmental concerns in infrastructure interventions and environmental investments in the political agenda was established during the European Council at Vienna in 1998. After one year, the Berlin European Council established the agreement on the new allocation for the period 2000-2006<sup>253</sup>.

Within the Programme period framework, the progress made by the evaluation method started in 1988. . Starting from the first cycle, simplification has occurred which has reduced the amount of documentation required, allowing for the streamlining of the matching among the objectives formulated by the MS and the conditions set by the funding framework. In practice, simplification concerned also the reduction of Objective Priorities, to which corresponded a major concentration of initiatives. It is important to stress how the phase 2000-2006 of the EU Programme evolution corresponded to the beginning of a major simplification process that continued in the following cycles. Ensuring correspondence among actions thanks to the identification of Priority axes and expenditures meant to control budget allocations and measuring effectiveness in terms of expenditure in order to assess the efficiency of the Policy.

However, as it is going to be highlighted, difficulties in assessing EU policy role and efficiency remain. They are pointed out by the corresponding difficulties to establish an architecture of evaluation in which it is possible to determine a cause-effect logic. Whether the 2000-2006 cycle had started to face issues

---

[enlargement/sites/near/files/pdf/financial\\_assistance/phare/evaluation/env\\_thematic\\_may\\_2007.pdf](http://enlargement/sites/near/files/pdf/financial_assistance/phare/evaluation/env_thematic_may_2007.pdf) (Accessed December 27th 2018).

<sup>251</sup> Report from the Commission to the European Parliament and the Council - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2005 [COM/2006/746 final - Not published in the Official Journal]  
Report from the Commission to the European Parliament and the Council - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2004 [COM(2006) 137 final - Not published in the Official Journal].  
Report from the Commission to the European Parliament and the Council - General Report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2003 [COM/2005/178 final - Not published in the Official Journal]  
Report from the Commission - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2002 [COM(2003) 844 final - Not published in the Official Journal].  
Report from the Commission - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2001 [COM(2003) 329 final - Not published in the Official Journal].  
Report from the Commission - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2000 [COM(2002)781 final - Not published in the Official Journal]

<sup>252</sup> European Commission, Directorate-General for Regional Policy. 2008. Working for the regions EU Regional Policy 2007-2013. Available at: [https://ec.europa.eu/regional\\_policy/sources/docgener/presenta/working2008/work\\_en.pdf](https://ec.europa.eu/regional_policy/sources/docgener/presenta/working2008/work_en.pdf) (Accessed December 27th 2018).

<sup>253</sup> Council Regulation (EC) No 1263/1999 of 21 June 1999; Council Regulation (EC) No 1257/1999 of 17 May 1999; Council Regulation (EC) No 1260/1999 of 21 June 1999; Regulation (EC) No 1783/1999 of the European Parliament and of the Council of 12 July 1999; Regulation (EC) No 1784/1999 of the European Parliament and of the Council of 12 July 1999 (OJ L213, 13 August 1999).

relating to programme content, management, monitoring, evaluation and control (including an environmental dimension), nonetheless it did not solve the harmonization of substantial elements such as indicators, which contribute to the evaluation of Cohesion policy results.

In general, during the 2000-2006 cycle, part of these processes were led by MS, contributing to the process of decentralization<sup>254</sup>.

#### 2.4.2 The 2000-2006 cycle and the problem of ensuring consistent evaluation

The 2004 year represents a watershed, with the Third Report on Economic and Social Cohesion<sup>255</sup> reforming the Cohesion Policy in the following programme cycle with its emphasis on the territorial dimension of cohesion<sup>256</sup>. Ex post Evaluation of Cohesion Policy Programmes 2000-2006 on Environment and Climate Change<sup>257</sup> highlights how not all the funds that cooperate to provide resources contributed equally to environmental investments. Particularly, there was a difference - and major - contribution of the ERDF with respect to others, as the CF. The context of environmental actions appeared enriched by the inclusion of the climate section and so by the presence of reference to emission-related issue.

However addressing GHG emission issues resulted more from an exploratory practice than a concrete interest pursued by the old and new MS regions that in some cases for the first time entered into contact with this type of environmental problems. In general, MS characterized by low level of national resources used more intensively EU funds for funding environmental investments. In particular this was the case of the new EU-10 countries. In which the principal sector of the expenditure had to deal with the water sector.

This sector results to be the one that received more investments both in 2000-2006 and in the following two cycles, with respects to other categories such as: waste management, Biodiversity and nature, land rehabilitation, air and other climate actions.

This trend is reported in Figure 2.9 that compares the amount of allocations spent in all the MS that used EU funds in environmental and climate related activities. Clearly, the water management sector was the most affected by the direct investments, which in essence it contributed directly to the achievement of EU legislative requirements in areas such as drinking water supply, solid waste management and wastewater treatment. Green infrastructures were included as well. However, there were also indirect environmental

---

<sup>254</sup> Manzella, G. P., & Mendez, C. (2009). The turning points of EU cohesion policy, Working Paper Report to Barca Report.

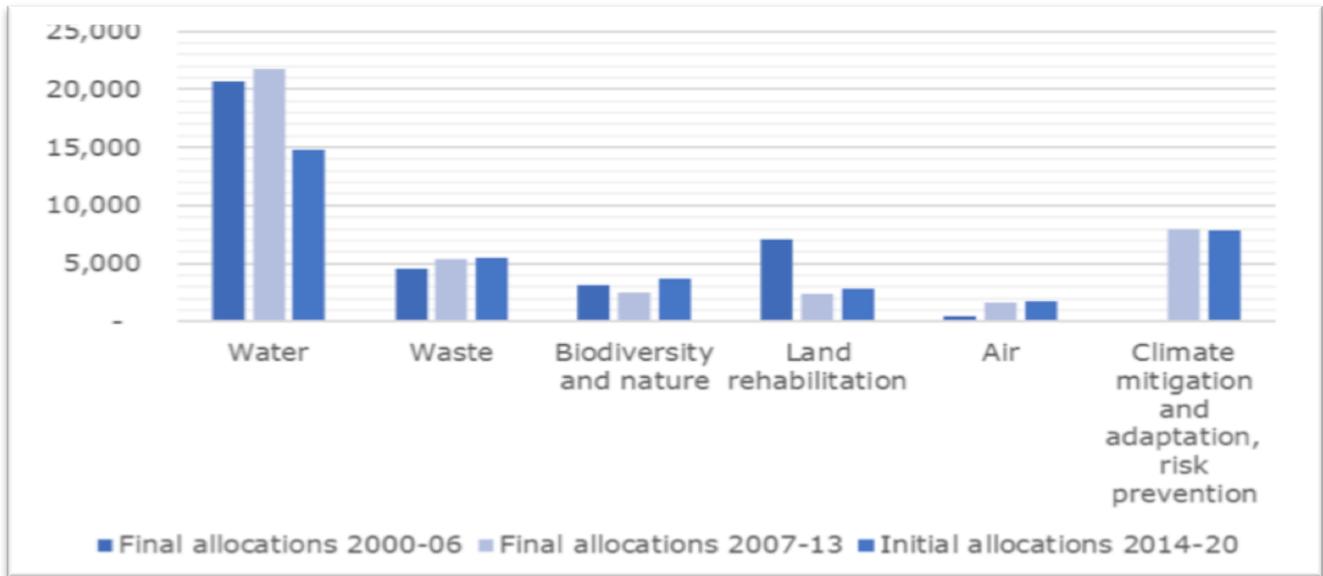
<sup>255</sup> European Commission. 2004. A new partnership for cohesion convergence competitiveness cooperation. Third Report on Economic and Social Cohesion.

<sup>256</sup> European Commission. Environment. Sustainable Development. Available at: <http://ec.europa.eu/environment/eussd/> (Accessed December 27th 2018).

<sup>257</sup> ADE. 2009. Ex post Evaluation of Cohesion Policy Programmes 2000-2006 co-Financed by the European Fund for Regional Development (Objectives 1 and 2) – Work Package 5b: Environment and Climate Change Final Report – Volume 1 October 2009.

investments, which included the investments in the broader transition framework towards a low- carbon, resource-efficient, safe and sustainable economy<sup>258</sup>.

**Figure: 2.9:** Comparison of allocations (EUR million) by sector across the three financing periods (all Member States aggregated)



Source: DG Regional and Urban Policy (2016) for 2000-2006; DG Regional and Urban Policy (2016) for 2007- 2013; InfoRegio, ESIF categorisation (2016) for 2014-2020.

Direct and indirect environmental investments are not distinguished by the criteria of direct or indirect management stated by the Council Regulation (EC) No 1083/2006<sup>259</sup>. They are just divided according to the degree of proximity towards certain environmental issues. Both of them fall under the Cohesion and Regional Development Funds. A qualitative interpretation of the diverse concentration of investments has been provided by Ten Brink et al. (2010), who refer to the Lisbon earmarking as a factor that has not overcome the persistent importance of economic objectives over environmental ones<sup>260</sup>.

As shown in Figure 2.10, the trajectory of the two types of investment goes in opposite directions: direct environmental investments decreased from 23.4% of total ERDF and Cohesion Fund spending in the 2000-2006 cycle to 14.1% in the 2014-2020 cycle, while indirect environmental investments rose from 1.8% to 17.9% relatively to the same year-base<sup>261</sup>.

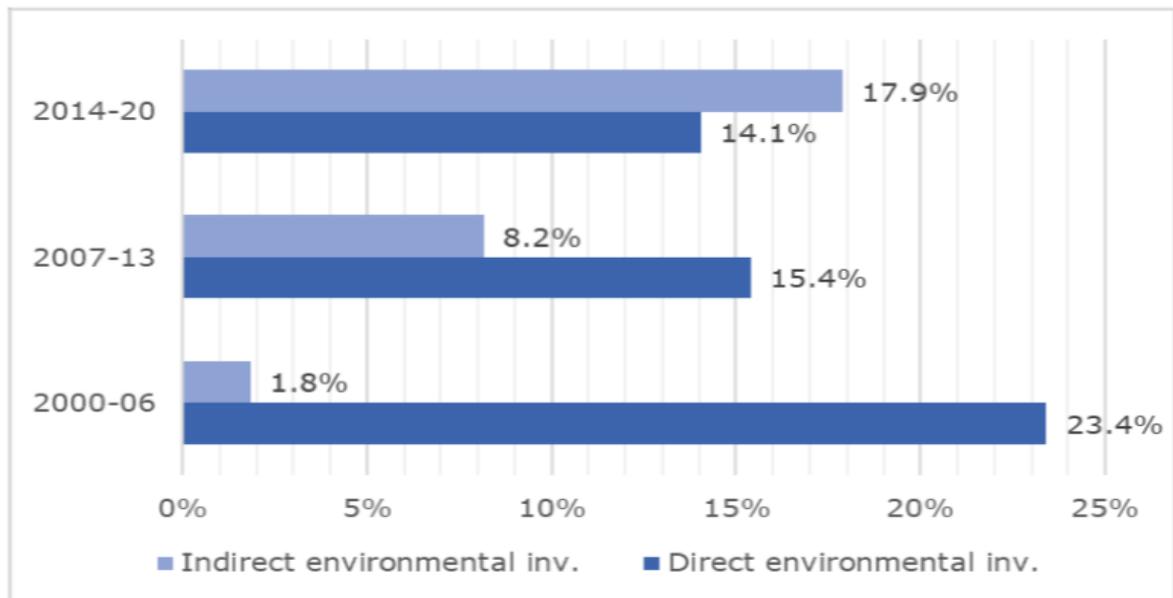
<sup>258</sup> Contribute to the 7th EU Environment Action Programme's (7th EAP)

<sup>259</sup> COUNCIL REGULATION (EC) No 1083/2006 of 11 July 2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and repealing Regulation (EC) No 1260/1999

<sup>260</sup> Brink, T., P. Medhurst, J. Hjerp, P. and Medarova-Bergstrom, K. (2010) Cohesion Policy and Sustainable Development- Cohesion Policy Performance, Supporting Paper 2. A report for DG Regio, September 2010.

<sup>261</sup> COWI A/S, Milieu Ltd. 2017. Integration of environmental concerns in Cohesion Policy Funds (ERDF, ESF, CF). Results, evolution and trends through three programming periods (2000-2006, 2007-2013, 2014-2020) - Final report. Available at:

**Figure: 2.10:** Direct and indirect environmental investments (% of total ERDF and Cohesion Fund allocations) compared



Source: DG Regional and Urban Policy (2016) for 2000-2006; DG Regional and Urban Policy (2016) for 2007- 2013; InfoRegio, ESIF categorisation (2016) for 2014-2020<sup>262</sup>.

Moving to the costs and the relative benefits in terms of reduction emissions, there are different views to be discussed. There are scholars arguing that the process of liberalization and reform of 1989 is not at the origin of the improvements in environmental conditions of the CEE countries in the years that followed. The positive effect would have been overall due to the decrease of heavy industry production, and the shift towards a more service-based economy. However, marketization<sup>263</sup> would have played a role in the increase of transport and private car pollution.

For what concerns the general economic resources put in place for the enhancement of environmental compliance, it has to be said that the primary fiscal resources were from national accounts. For assistance that included ‘Instrument for Structural Policies for Pre-Accession’, in which the European Bank for Reconstruction and Development (ERBD) together with the World Bank as well as private financiers participated, the share of funding was limited.

In 2000 ECOTEC<sup>264</sup>, an advisor to DG Environment had estimated that candidate countries would have made investment. The total costs estimated were between 78 and 108 billion of Euro<sup>265</sup>. Later on, it has

[http://ec.europa.eu/environment/integration/pdf/enea/Cohesion%20Pol\\_COWI-Milieu\\_December2017.pdf](http://ec.europa.eu/environment/integration/pdf/enea/Cohesion%20Pol_COWI-Milieu_December2017.pdf) (Accessed December 27th 2018).

<sup>262</sup> *Ibidem*.

<sup>263</sup> Pavlínek, P. and John Pickles (2004) Environmental Pasts/ Environmental Futures in Post-Socialist Europe, *Environmental Politics*, 13:1, 237-265, DOI: 10.1080/09644010410001685227

<sup>264</sup> ECOTEC (2000), ‘The benefits of Compliance with the Environmental Aquis for the Candidates Countries2, DGENV Contract B7-8110/2000/159960/MAR/H1, Final Report.

<sup>265</sup> Euractive. 2002. Environmental Aspects of the EU Enlargement. Available at:

been estimated that the costs of implementing EU environmental directives for the new MS of the 2004 enlargement would have been approximately between 50 and 100 billion of Euro. Table 2.3 shows the comparison of the share of costs supported by CP in 2000-2006 and 2007-2013 with respect to other resources allocated by other subjects in the main environmental investment sectors of those years.

**TABLE 2.3:** Comparison of Cohesion Policy allocations with other sources of financing for direct environmental investments, in 2000-06 and 2007-2013 financing period, yearly average

Category	MS groups	Cohesion Policy		General government		Business sector		Spec. producers		EIB		EBRD		Total		CP as share of total	
		2000-06	2007-13	2000-06	2007-13	2000-06	2007-13	2000-06	2007-13	2000-06	2007-13	2000-06	2007-13	2000-06	2007-13	2000-06	2007-13
<b>Total direct Env,</b>	EU-28	5464	5939	20638	30559	11580	11605	17053	15713	1910	3582	-	-	56645	67399	10%	9%
	EU-15	3926	2097	17806	25438	9468	8795	16363	14556	1,649	3017	-	-	49211	53903	8%	4%
	EU-13	1128	3655	2832	5121	2112	2810	691	1157	261	566	47	-	7071	13310	16%	27%
<b>Water</b>	EU-28	2954	3106	11713	16246	276	2666	10614	9475	1,62	3052	-	-	29641	34545	10%	9%
	EU-15	2041	1090	9385	12526	2167	2760	10258	8826	1365	2545	-	-	25216	26743	8%	4%
	EU-13	895	1991	2328	3720	592	2167	356	649	235	507	45	84	4451	7862	20%	25%
<b>Waste</b>	EU-28	652	766	3175	6612	1222	592	6273	6017	212	306	-	-	11534	14799	6%	5%
	EU-15	506	200	2901	6082	992	1222	5948	5528	191	269	-	-	10539	12919	5%	2%
	EU-13	136	559	273	530	230	992	325	489	22	37	2	-	9873	187	14%	30%
<b>Bio-diversity</b>	EU-28	441	365	3454	3590	515	230	n.a.	n.a.	-	-	-	-	4410	4410	10%	8%
	EU-15	392	170	3323	3330	471	515	n.a.	n.a.	-	-	-	-	4185	4028	9%	4%
	EU-13	31	168	132	260	44	471	n.a.	n.a.	-	-	-	-	207	465	15%	36%

Sources COWI A/S, Milieu Ltd<sup>266</sup>: Graphic Author Elaboration

#### 2.4.3 Inclusion of Cohesion policy in the Low-carbon strategy

Whether the environmental dimension of some sectors of the Cohesion Policy increased, however there was not a full correspondence to the Commission acknowledgment<sup>267</sup>. In fact, the trend, which emerges from the

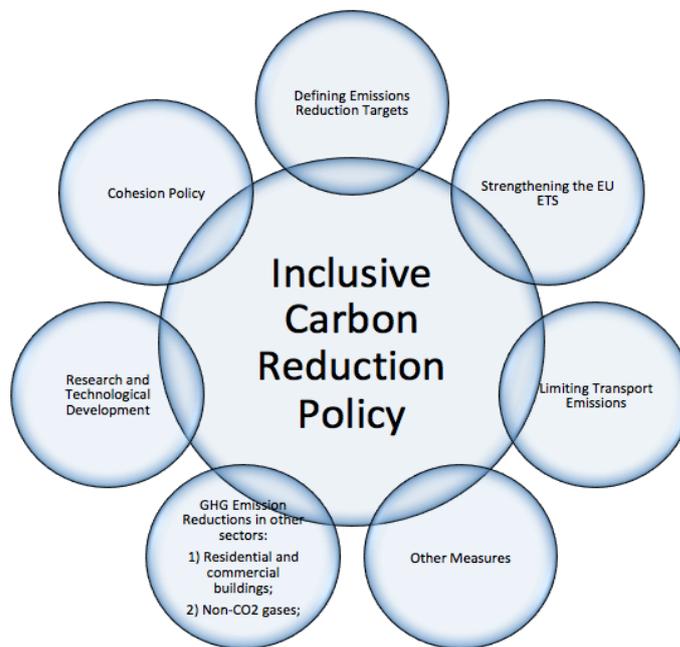
<https://www.euractiv.com/section/climate-environment/opinion/environmental-aspects-of-the-eu-enlargement/>  
(Accessed December 27th 2018).

<sup>266</sup> As reported in DG REGIO, (2016) for Cohesion Policy; Eurostat, General government expenditure by function (COFOG) for general government; Eurostat, Environmental protection expenditure in Europe - detailed data (NACE Rev. 2) for business sector and specialised producers; EIB website; EBRD website. it has to be noted that the Table does not include other EU funding sources for biodiversity, such as the European Agricultural Fund for Rural Development (EAFRD) and the LIFE Programme.

analysis, shows the consolidation of only some environmental actions devoted to the improvements of water, waste and biodiversity sectorial services; while other environmental actions related to carbon intensity were not outlined with the same clarity within the CP Fund Framework.

The switch towards a more inclusive carbon reduction policy occurred with the reinforcement by the EU Commission of the commitment outlining the mutual relationship between emission reduction schemes and other policy instruments. Not just inclusiveness, but also coordination and mutual reinforcement across sectorial actions is an important factor that had been considered. The mutual relation of the main actions detected by the EU<sup>268</sup> for this purpose is represented in Figure 2.11.

**Figure 2.11:** EU action and benefits of action relationship with other policy areas



Source: on the base of EU Communication 2007, Author elaboration

Starting from the first circle, the inclusion of the carbon reduction as a crosscutting objective of EU policy passed through the definition of targets. It has to be noticed that the emission target is not necessarily the optimum level for the environment. The majority of the times it is just the most acceptable by the governments, as a minimum standard.

The second circle represents the emission trading system, a EU’s attempt to reduce GHG emissions and it covers 45 % of its CO2 emission<sup>269</sup>. The functioning of the emission market is based on the industry emission trading: each industry may cumulate, buy or sell emissions within the limit established by the EU, which it is progressively decreased, thus creating an economic disincentive in emission production. At the

<sup>267</sup> Commission Communication concerning the Structural Funds and their coordination with the Cohesion Fund - Guidelines for programmes in the period 2000 to 2006. *OJ C 267, 22.9.1999, p. 2-21*

<sup>268</sup> Communication From The Commission To The Council, The European Parliament, The European Economic And Social Committee And The Committee Of The Regions. Limiting Global Climate Change to 2 degrees Celsius The way ahead for 2020 and beyond {SEC(2007) 7} {SEC(2007) 8}. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0002:FIN:EN:PDF> (Accessed December 27th 2018).

<sup>269</sup> *Ivi*, p. 6

European level, the industries involved were from the energy and manufacturing sectors, while in 2012 the aviation sector was also included in the system, and the expansion of the system increased in 2013. As reported by studies<sup>270</sup>, implementation of the EU ETS should provide the CEECs with good opportunities.

However, they have had several problems as in the cases of the Czech Republic, Hungary and particularly Poland. CEECs had a somewhat later deadline than the EU-15 in applying National Action Plans. These delays have also meant delays in getting the registries in these countries operative. The substantial delay in such important countries as Poland – which experienced severe conflicts between government and industry - has been mentioned as one factor that has contributed to a less mature market than it had been foreseen and also to higher initial prices in the EU ETS than expected<sup>271</sup>.

Transport and other measures cooperate as well to reach less carbon impacts, as is the case of the promotion of public transports or the enhancement of carbon-intensive machine commercial diffusion.

The general decreasing of GHGs generated by anthropic activities reduce carbon impact as well, but necessarily deals with procedural path, generally established by the EU specific Directives.

Research and technological development foster the reduction of CO<sub>2</sub> diminishing resource uses but also changing economic activities implementing innovations. Innovative ways, sometimes inspired by natural mechanisms switch the economy from unsustainable dynamics to more feasible solutions to deal with the limit of the ecosystem. This theme has been deeply discussed by Gunter Pauli<sup>272</sup>, who identified three typologies of systems: red, green and blue. The first system, to which the red colour is assigned, represents the societies that rely on carbon intensive economies and do not adopt any strategy of diversification to modify their current status. The green economy is characterized by an increase of the investments in sectors that are considered more sensitive or strategic for the system. However, in this typology the major expenditures do not ensure an improvement in terms of results that may remain the same as those of the red economic model. Furthermore, this approach may be threatened by economic system fragilities, as is the case of the economic crises experienced during the years following 2008. In spite of the precedent systems, in the third typology, defined as blue economy, investments are oriented toward innovation and research so that the system is altered by the fact that the anthropic actions are in fact able to reinforce the natural system and promote economic growth while respecting the planet. This is done through regeneration activities and promoting creation of new processes that on the one hand are able to stimulate new economic demand and on the other are able to match ordinary necessities.

---

<sup>270</sup> Skjærseth Jon Birger Æ Jørgen Wettestad. (2007) Is EU enlargement bad for environmental policy? Confronting gloomy expectations with evidence. *Int Environ Agreements* 7:263–280 DOI 10.1007/s10784-007-9033-7

<sup>271</sup> *Ibidem*.

<sup>272</sup> Pauli, G. (1997). Zero emissions: the ultimate goal of cleaner production. *Journal of cleaner production*, 5(1-2), 109-113. Pauli, G. A. (2010). *The blue economy: 10 years, 100 innovations, 100 million jobs*. Paradigm publications.

In spite of the intention to generate a system of mutual support among different areas as well as one which is articulated at different levels, the implementation gap was still present. A possible explanation of that is that the time required for the consolidation of a new praxis is not the same in different MS; rather, it varies as it deals with acceptance or introduction of legal provisions. A regulatory policy method is mainly in terms of emission reduction, but indirectly it is included in other modalities as traditional policy modes, as the Cohesion Policy case shows. The outcome of a carbon reduction policy is not to be measured just from the numbers of years passed. On the contrary, evaluation of principles and their institutionalization pass through a process of social learning.<sup>273</sup>

What emerges is that not all the activities perform according to the same logic. As it appears from the comparison among the ETS, some of the approaches deal essentially with market dynamics and regulatory mechanism, (e.g. establishment of emission trade under a market mechanism). Other policies such as the Cohesion Policy and its EU funds might accomplish a pedagogical role in guiding society away from a carbon intensity mechanism. That is, diffusion of horizontal monitoring and process evaluation increased in relation to the ex-ante assessments, on-going and ex post estimations, whose introduction occurred in 2000-2006. As it is presented in the following chapter, part of the capability of the CP to participate in the circle of the carbon reduction policy passes through the steps that imply integration of indicators and evolution of assessment, able to catch the dynamic of investments and select the allocation by sectors, which are not traditionally defined in the environmental field but that are related to environmental externalities in terms of emissions produced and therefore have an environmental dimension.

## 2.5 Final remarks

The harmonization of environmental safeguard concerns has required the transposition of a large body of environmental provisions, such as Directives on air quality, water quality, waste management, nature protection and industrial pollution control. For the new MS the approximation to the EU objectives has passed through the consolidation of the *acquis*, favoured by the instruments of pre-accession. Whether scholars are accurate in maintaining that Structural and Cohesion funds support significant changes in the poorer CEE regions, and that environmental condition improvements pass significantly through industry and agriculture<sup>274</sup>, it is also true that the parameters according to which policy results are measured respond to considerations that go beyond the traditional sectorial division.

The traditional discussion that sees scholars maintaining that Cohesion Policy is the reply to a European lack of social policy and is a form a compensation for worst-off regions and MS<sup>275</sup> and others

---

<sup>273</sup> Polverari, L., Piattoni, S. (2016). Handbook on cohesion policy in the EU. Edward Elgar. ISBN: 9781784715663. <https://doi.org/10.4337/9781784715670.00034>

<sup>274</sup> Pavlínek, P., Pickles, P. (2004) Environmental Pasts/ Environmental Futures in Post-Socialist Europe, *Environmental Politics*, 13:1, 237-265, DOI: 10.1080/09644010410001685227

<sup>275</sup> Pollack, Mark A. (2007) *The new institutionalisms and European integration*. No. p0031. University of Hamburg, Faculty for Economics and Social Sciences, Department of Social Sciences, Institute of Political Science.

arguing that it is the policy option to complete the market through the restructuring of the less-developed periphery<sup>276</sup>, may be enriched by a non-conventional interpretation. Which is, that Cohesion Policy could be assessed on the fact that it has progressively absorbed the environmental protection mandate for the purpose to support the shift towards a less carbon oriented economy, thus contributing to foster the emancipation of less developed regions from carbon intensity activity. In turn, the Cohesion Policy contributes to the decoupling of GDP rise from the carbon emission.

The relationship between Cohesion Policy and environmental objectives is then formulated and summarized in the following points:

- 1) Environmental issues can be addressed and consequent action can be undertaken, co- financed under all proposed Objectives – i.e. Convergence, Competitiveness and Employment & Cooperation—included in the MFF;
- 2) The Cohesion Strategy has shifted greater attention towards the Environment, as reported in paragraph 2.4; making it a key factor of competitiveness and thus a driver for implementing the relation among environmental safeguards and economic goals as well as for employment and the strategic orientation of investments;
- 3) Compliance with environmental legislation is likely to increase the sustainability of the European system across and within its MS, even though it is strongly influenced by the administrative culture and the relations among levels. Nevertheless, from the analysis of the passage from the cycle 2000-2006 (in particular after the mid-term evaluation of 2003- 2004) and the cycle 2007-2013 the necessity of fulfilling the gap between compliance and performance has been acknowledged. This management of gap reduction concerns the delivery of the strategic objectives<sup>277</sup> and the way they are selected, planned, measured and evaluated.

Another consistent part of legislative tools, such as environmental impact assessments and access to environmental information, had to be included at the national level<sup>278</sup>. However, in the plan of the Commission, sub-national entities of MS are actors of concerns, able to also implement the EU agenda. The limited resources of the national plans, and the consequent restricted share deriving from the national plans fostered the inclusion of subnational entities in the planning and implementation of EU funds<sup>279</sup>. In turn,

---

<sup>276</sup> Leonardi, R, and Raffaella Y. Nanetti, eds. *Lo sviluppo regionale nell'economia europea integrata: il caso toscano*. Marsilio, 1993.

Nanetti, Raffaella Y. (1996) "EU cohesion and territorial restructuring in the member states." *Cohesion policy and European integration: Building multi-level governance*.

<sup>277</sup> Inforegio. Ex Post Evaluation of the ERDF in Objectives 1 & 2 (2000-2006). Available at: [https://ec.europa.eu/regional\\_policy/sources/docgener/evaluation/expost2006/wp11\\_en.htm](https://ec.europa.eu/regional_policy/sources/docgener/evaluation/expost2006/wp11_en.htm) (Accessed December 27th 2018).

<sup>278</sup> Special Report No 5/2003 concerning PHARE and ISPA funding of environmental projects in the candidate countries together with the Commission's replies

<sup>279</sup> Borrás-Alomar, Susana, Thomas Christiansen, and Andres Rodriguez-Pose. "Towards a 'Europe of the regions'? Visions and reality from a critical perspective." *Regional & Federal Studies* 4.2 (1994): 1-27.

this shift is allowing a more direct relation among regions and the EU level, speeding up the process of assimilation of the new approach formulated in 2007, whereby the Cohesion Policy Funds (ERDF, and CF) have become the major source of finance for instance in environment-related infrastructure projects that are investment-intensive<sup>280</sup>. This non-conventional interpretation is going to be the main focus of the third chapter, in which the dynamics of the period 2007-2013 are analysed.

---

<sup>280</sup> European Commission, Directorate-General for Regional Policy. 2008. Working for the regions EU Regional Policy 2007-2013. Available at: [https://ec.europa.eu/regional\\_policy/sources/docgener/presenta/working2008/work\\_en.pdf](https://ec.europa.eu/regional_policy/sources/docgener/presenta/working2008/work_en.pdf) (Accessed December 27th 2018).

## CHAPTER 3

### **The 2007-2013 Budget Cycle and the Formulation of Carbon Footprint Assessment**

*“Unless you try to do something beyond  
what you have already mastered,  
you will never grow”*

*Ralph Waldo Emerson*

This last chapter focuses on the main issues faced in assessing carbon footprint in relation to the investments made under the EU co-financing mechanism. What emerged in the previous sections is that there have been legislative efforts deriving from the EU’s incremental inclusion of environmental concerns into its political agenda and the consequential allocation of resources in order to support sustainable development in old and new MS. However, in spite of this progress, there are two main points to be highlighted to understand the state of implementation of the EP mandate on MS.

Firstly, the co-financing structure – and in general the implementation of the EU principle framework – faces different national contexts in terms of the economic situation and the administrative culture within the EU MS. Consequently it is difficult not just to agree with a unitary strategic framework, but also to establish criteria of evaluation widely accepted.

Secondly, within the specific reference of the Cohesion Policy and its environmental dimension, the main challenge is dealing with the measurement of value added by the EU. Indeed, there is the tendency to recognize the difficulties to establish or measure the size of this link and simultaneously to assume that it is present and validated.

In order to assess the policy coherence of the EU co-financing instruments in terms of the emerging necessity to evaluate their carbon impact, the research in this chapter is organized in the following way.

- a) In the first section, Environmental Impact Assessment and Strategic Environmental Assessment Directives are introduced as elements that facilitate the harmonization of the environmental concerns with respect to the formulation of projects and plans.

- b) In the second section, the relationship between environmental assessment and Cohesion Funds is analysed in order to verify if there is a mutual relationship of consolidation of procedural environmental protection, deriving from the general guidelines and the environmental *ex ante* evaluation procedure contained in the SEA. In particular, the focus highlights the different speed at the national level in terms of national implementation of the SEA<sup>281</sup>, reporting methodological differentiation among the accuracy of the quoted Directive applications.
- c) In the third section, the programme cycle 2007-2013 is introduced to test most recent evolutions of the two factors presented in the second part (i.e. the Fund resources and the SEA *ex ante* evaluation).
- d) In the last section, the best practice of carbon footprint model developed in the 2007-2013 cycle is presented as a possible solution for the problem of accounting emissions in relation to the EU RP investments. This part includes: the origin of the model; functions; application in test regions; evaluation and limits of application.

### 3.1 The EIA and SEA Directives' role in addressing evaluation of environmental concerns

Evaluation is important because it is the part of the policy cycle that allows to check whether the principles formulated under the normative framework and within the strategy guidelines have been applied or not. Studies concerning the integration of the environmental concern have highlighted how the tools that have been implemented in this regard are primarily the Environmental Impact Assessment (EIA)<sup>282</sup> and the Strategic Environmental Assessment (SEA)<sup>283</sup>.

Some authors<sup>284</sup> had highlighted the role of the National Environmental Action Plan implemented by the USA in 1969 as a precursor of the environmental assessment. The first EIA was approved in 1985, but it was subjected to several amendments during the years<sup>285</sup>. Each amendment has conferred to the EIA an additional element, as it emerged from the guidance on the evolution of the EIA Directive<sup>286</sup>.

The alignment<sup>287</sup> with the Espoo Convention on EIA was introduced with the Directive of 1997. Since then, the EIA Directive has implemented its trans boundary dimension and increased the project areas

<sup>281</sup> Sheate, W., Dagg, S., Richardson, J., Aschemann, R., Palerm, J., & Steen, U. (2001). SEA and integration of the environment into strategic decision-making. *ICON: London, UK*.

<sup>282</sup> Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance. OJ L 26, 28.1.2012, p. 1-21

<sup>283</sup> Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment. OJ L 197, 21.7.2001, p. 30-37

<sup>284</sup> Dalal-Clayton D.B., Sadler B. 1999 "Strategic Environmental Assessment: A Rapidly Evolving Approach", Environmental Planning Issues No.18, International Institute for Environment and Development, London;  
Dalal-Clayton D.B., Sadler B. 2010 "Generic SEA Quality Review Methodology Revised Draft" Proposal to OECD DAC Task Team on SEA. OECD, Paris April 2010

<sup>285</sup> in 1997, in 2003 and in 2009.

<sup>286</sup> European Union. 2017. Environmental Assessments Of Plans, Programmes And Projects. Rulings Of The Court Of Justice Of The European Union. Available at: [http://ec.europa.eu/environment/eia/pdf/EIA\\_rulings\\_web.pdf](http://ec.europa.eu/environment/eia/pdf/EIA_rulings_web.pdf) (Accessed December 27th 2018).

<sup>287</sup> Marsden, S. (2011), The Espoo Convention and Strategic Environmental Assessment Protocol in the European Union: Implementation, Compliance, Enforcement and Reform. *Review of European Community & International Environmental Law*, 20: 267-276. doi:10.1111/j.1467-9388.2011.00729.x

covered. Part of the projects are disciplined by an environmental impact assessment which is mandatory<sup>288</sup>, while for others the requirements are not so stringent and the standard that determines the assessment considers as sufficient just the information concerning the projects<sup>289</sup>, without adding other elements of analysis. Later on, the EIA has included elements to foster public participation and improve the justiciability<sup>290</sup> of environmental issues. These two changes occurred with the amendment in 2003<sup>291</sup>.

The focus on carbon emission has been introduced with the Directive 2009/31/EC. These three modifications of the original EIA Directive have been wrapped up in the Directive 2011/92/EU<sup>292</sup> that was meant to harmonize the effects of the stated provisions.

As the recent studies on the law and jurisprudence have highlighted<sup>293</sup>, the EIA Directive is relevant for the inclusion of environmental concerns into the project analysis. The relation between the environmental mandate and the application follows the connection established through Articles 2 and 4 of the provision. On the one hand, each MS may discretionally establish a threshold in order to apply the Directive according to the Article 4(2)(b). On the other, the balance to discretion is provided by the obligation expressed in the Article 2(1). As remarked also by the ECJ<sup>294</sup>, the EIA Directive requirements can be applied as a consequence of the match between the contents of the Directive and the criteria applied by the MS.

Notwithstanding, the EIA Directive is subject to some limitations. The first is technical<sup>295</sup> since other references may be used in the case of integrated pollution prevention and control as provided by the IPPC Directive<sup>296</sup>. The second limitation derives from the mismatch among the general provision and the context-base application, in which the ECJ has expressed its point of view with respect to definition, description and

---

<sup>288</sup> Annex I of the quoted Directive

<sup>289</sup> Annex II of the quoted Directive

<sup>290</sup> Justiciability is the condition under which a subject may address an issue to the Court.

<sup>291</sup> Directive 2003/35/EC of the European Parliament and of the Council of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC - Statement by the Commission. *OJ L 156, 25.6.2003, p. 17-25*

<sup>292</sup> Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance. *OJ L 26, 28.1.2012, p. 1-21*

<sup>293</sup> Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment. *OJ L 175, 5.7.1985, p. 40-48*. Replaced by: Directive 2011/92/EC

<sup>294</sup> Case C-244/12: Judgment of the Court (Fifth Chamber) of 21 March 2013 (reference for a preliminary ruling from the Verwaltungsgerichtshof — Austria) — Salzburger Flughafen GmbH v Umweltsenat (Assessment of the effects of certain projects on the environment — Directive 85/337/EEC — Articles 2(1) and 4(2) — Projects listed in Annex II — Extension works to the infrastructure of an airport — Examination on the basis of thresholds or criteria — Article 4(3) — Selection criteria — Annex III, point 2(g) — Densely populated areas) Select: 1. *OJ C 156, 1.6.2013, p. 15-15* Case C-531/13: Request for a preliminary ruling from the Verwaltungsgerichtshof (Austria) lodged on 8 October 2013 — Kornhuber and Others. *OJ C 15, 18.1.2014, p. 5-5*

<sup>295</sup> For a further discussion see: Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment (EIA Directive). Interpretation of definitions of certain project categories of annex I and II of the EIA Directive. Available at: [http://ec.europa.eu/environment/archives/eia/pdf/interpretation\\_eia.pdf](http://ec.europa.eu/environment/archives/eia/pdf/interpretation_eia.pdf) and See C-486/04, *Commission v Italy*, paragraphs 43 and 44.

<sup>296</sup> Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control (Codified version) (Text with EEA relevance). *OJ L 24, 29.1.2008, p. 8-29*. Then: Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) Text with EEA relevance. *OJ L 334, 17.12.2010, p. 17-119*

scope of individual projects<sup>297</sup>. The last is attitudinal, and is manifested by the practice of project splitting or ‘salami-slicing’ as it is referred to. As reported by the Commission:

*“Salami slicing refers to the practice of splitting an initial project into a number of separate projects, which individually do not exceed the threshold set or do not have significant effects on a case by case examination and therefore do not require an impact assessment but may, taken together, have significant environmental effects”<sup>298</sup>.*

The SEA approach is determined within the Directive of 2001 and transposed into national measures in 2004, with the exception of Romania and Croatia which did so respectively in 2007 and 2013<sup>299</sup>. As shown in Figure 3.1, there is a substantial difference among the MS, measured also in relation to the numbers of acts that over time have supported the implementation of the Directive.

The difference may also be explained according to the legal framework of the MS, specifically in terms of the division of competencies (shared between the federal and the provincial level or centralized at national level). Consequently, in MS such as Austria there is a constellation of many Acts (amended, revised or new) that have been passed, while in others the number of Acts passed in order to transpose the Directive are fewer or just one, as in the cases of Luxembourg and Portugal.

---

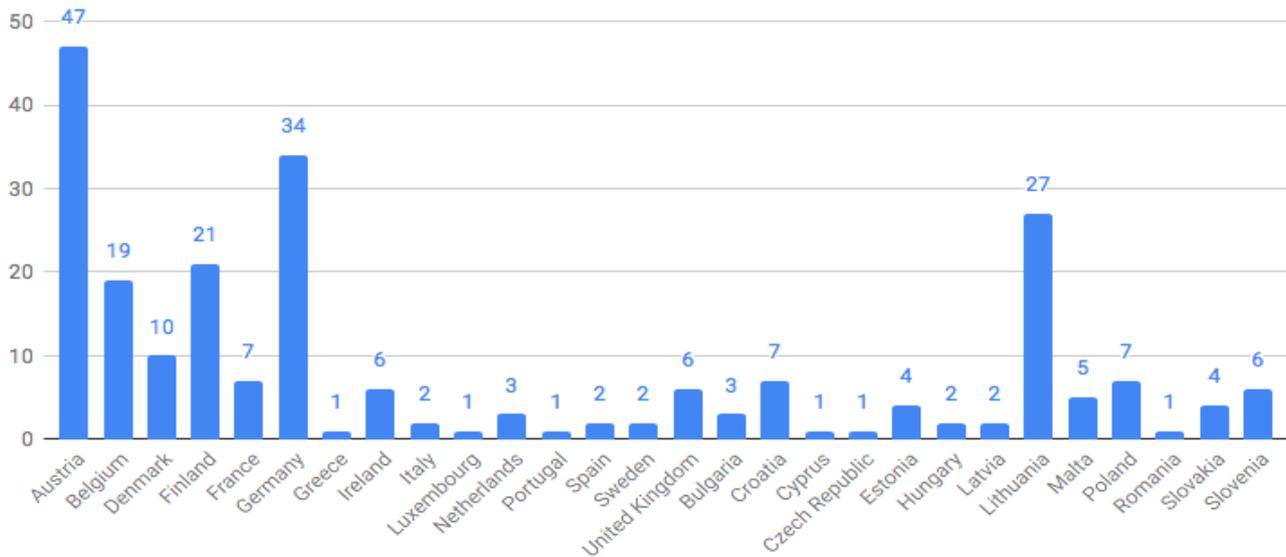
<sup>297</sup> The ECJ rulings in the following cases were investigated: C-396/92, C-431/92, C-313/93, C-133/94, C-72/95, C-301/95, C-81/96, C-392/96, C-150/97, C-435/97, C-287/98, C-474/99, C-230/00, C-366/00, C-227/01, C-319/01, C-348/01, C-87/02, C-117/02, C-127/02, C-201/02, C-83/03, C-290/03, C-508/03, C-98/04, C-332/04, C-486/04 and C-255/05.

<sup>298</sup> Report from the Commission to the European Parliament and the Council on the Application and Effectiveness of the EIA Directive (Directive 85/337/EEC as amended by Directive 97/11/EC) - How successful are the Member States in implementing the EIA Directive /\* COM/2003/0334 final \*/

<sup>299</sup> National transposition measures communicated by the Member States concerning:

Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment. *OJ L 197, 21.7.2001, p. 30–37*

**Figure 3.1:** Ranking of national transposition measures from 2004



Source: European Commission and National Official Publications. Author Elaboration.

As shown in Figure 3.2 below, the inclusion of the environmental assessment follows different paths among the EU MS. On the head row, the main typologies of Environmental assessment integration are divided into four main categories: Specific SEA legislation, Code or Protection Act, EIA legislation and Sectorial legislation. At the time of the Milieu 2016 study, none of the MS had proceeded with the implementation according to all of the four typologies. In part, this might be explained by the division of competences, which depends on the level of the MS’ centralization/ decentralization. Secondly, it might also be seen as an attempt to avoid instruments overlapping that may complicate rather than increase the effectiveness of the Directive’s contents.

**Table 3.1:** Focus on Environmental Assessment integration by MS

Country	Specific legislation	SEA	Environmental Code/Environmental Protection Act	EIA legislation	Sectorial legislation
Austria	X (in some provinces)				X (federal level and in some provinces)
Belgium Federal	X			X	X
Belgium - Flanders Region	X		X		X
Belgium - Brussels Capital Region					
Belgium - Wallonia Region					
Bulgaria		X	X		
Croatia		X	X		
Cyprus		X			

<b>Czech Republic</b>			X	X
<b>Denmark</b>	X			
<b>Estonia</b>			X	X
<b>France</b>		X		X
<b>Finland</b>	X			X
<b>Germany</b>			X	X
<b>Greece</b>	X			
<b>Hungary</b>	X	X (general principles for environmental assessment)		
<b>Ireland</b>	X			X
<b>Italy</b>	X	X (SEA/EIA at national/regional level)	X (some regions)	
<b>Latvia</b>	X		X	
<b>Lithuania</b>	X			X
<b>Luxemburg</b>	X			X
<b>Malta</b>	X			
<b>Netherland</b>		X	X	X
<b>Poland</b>		X	X	X
<b>Portugal</b>	X			X
<b>Romania</b>	X			
<b>Slovakia</b>			X	
<b>Slovenia</b>		X		
<b>Spain</b>	X		X	
<b>Sweden</b>		X	X	
<b>United Kingdom</b>	X			X

Source: Milieu 2016. Study concerning the preparation of the report on the application and effectiveness of the SEA Directive

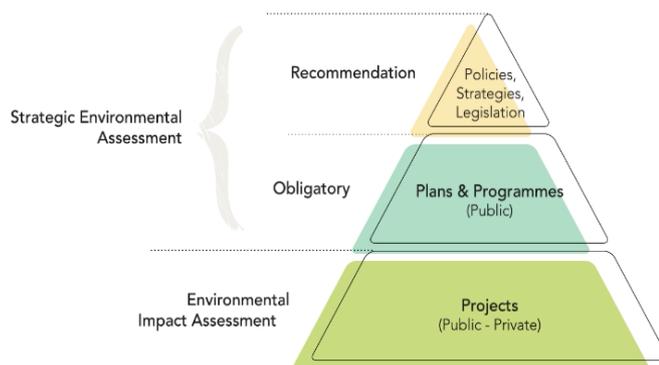
In spite of the similarities at first sight, as noted by some authors<sup>300</sup> the SEA may be applied to estimate policy, plans and programmes performances which are generally already formulated under the National Development Plans; or as the instrument applied more pervasively during the different stages of the of policy, plans and programmes performance.

<sup>300</sup> Sheate, W. R., Dagg, S., Richardson, J., Aschemann, R., Palerm, J. and Steen, U. (2003), Integrating the environment into strategic decision-making: conceptualizing policy SEA. Eur. Env., 13: 1-18. doi:[10.1002/eet.305](https://doi.org/10.1002/eet.305)

According to the legal text – especially Article 3(2)(a) and (b) - the assessment is mandatory for plans and programmes involving: agriculture, forestry, fisheries, energy, industry, transport, waste management, water management, telecommunications, tourism, town and country planning or land use<sup>301</sup>. Another mandatory assessment has to be fulfilled when side effects of plans and programmes encounter the limitation stated under the Habitats Directive 92/43/EEC. Because the SEA is meant to be applied systematically, it shapes the Environmental Reports (ERs) preparation, with inclusion of two important elements: the ‘baseline information’ and the ‘reasonable alternatives’<sup>302</sup>.

Other activities that are involved in the process of environmental assessment are activities of public consultation, decision-making, and monitoring, those elements that provide implementation of the principles stated in the Conventions of the chapters and that find in the case reported a context of application and meaning. For what concern the relation among SEA and production of the programme it is important to notice how the function of the SEA is not to promote specific plans and programmes in MS. Conversely, the SEA Directive provisions are applied as long as there is a match among the criteria of the plan and the content of the quoted Directive. The two instruments, SEA and EIA, foster the inclusion of environmental concerns relating to: biodiversity, fauna and flora; population and human health; soil; water; air and climatic factors; material assets; cultural heritage, including architectural and archaeological heritage; and landscape. Other environmental concerns relate to: energy efficiency; adaptation to climate change; use of renewable and non-renewable resources; and transport demands, accessibility and mobility. In substance, the main distinction between the two Directives is showed in Figure 3.3.

**Figure 3.2:** Configurations of the EIA and the SEA



Source: European Commission<sup>303</sup>

<sup>301</sup> European Union. 2017. Environmental Assessments Of Plans, Programmes And Projects. Rulings Of The Court Of Justice Of The European Union. Available at: [http://ec.europa.eu/environment/eia/pdf/EIA\\_rulings\\_web.pdf](http://ec.europa.eu/environment/eia/pdf/EIA_rulings_web.pdf) (Accessed December 27th 2018).

<sup>302</sup> Reasonable alternatives are required within the process of ex ante assessment framework in order to allow different paths of development and find the most feasible plan that balance economic necessities and environmental protections.

<sup>303</sup> European Commission. Protocol Info. 2018. Available at: [http://ec.europa.eu/environment/temp/SEA\\_protocol\\_v5\\_ENG.mp4](http://ec.europa.eu/environment/temp/SEA_protocol_v5_ENG.mp4) (Accessed December 27th 2018).

The legal frameworks of the SEA deal with environmental strategies, policies, action plans; sustainable development strategies; sector strategies and policy documents (e.g. environmental objectives under energy policy, transport strategy). While the EIA concerns primarily public and private projects that usually have standing-alone and case-by-case dimensions. Both try to identify objectives taking into account the trans-boundary nature of environmental externalities. As pointed out by the Commission:

*"[...] the two Directives are to a large extent complementary: the SEA is "up-stream" and identifies the best options at an early planning stage, and the EIA is "down-stream" and refers to the projects that are coming through at a later stage. In theory, an overlap of the two processes is unlikely to occur. However, different areas of potential overlaps in the application of the two Directives have been identified"<sup>304</sup>.*

Further differences between the two Assessments emerge from the comparisons of the legal texts. Firstly, there are diverse procedural requirements<sup>305</sup>.

For the Screening activity, the level of the consultation is higher under SEA than under the EIA, since it is necessary to involve in it the environmental authorities. For the ERs and in general the circulation of environmental information, the SEA imposes that they have to ensure sufficient quality, while the quality control is not mandatory for the EIA.

The monitoring activity is obligatory just under the SEA. In addition, the nature of the impact prediction during the decision-making activities for the SEA is qualitative and potential; while for the EIA is quantitative and absolute<sup>306</sup>.

From the Report of the Commission of 2009 on the relations between the Assessments and Climate Change<sup>307</sup>, a direct connection had not been yet identified. As discussed in the official document, national standings also remarked the lack of clarification on specific aspects of the environmental and climate binomial and the lack of substantial provisions in the procedural requirements. On the one hand, the main reference in this respect is precisely on the state of the CO<sub>2</sub> or in general GHG emissions, produced by industry or transportation.

However, the main findings concern current emissions status while the threshold of the efforts made is set on the limit of complying with the air quality provisions. MS have addressed the integration of climate

---

<sup>304</sup> Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the application and effectiveness of the Directive on Strategic Environmental Assessment (Directive 2001/42/EC)

/\* COM/2009/0469 final \*/

<sup>305</sup>Sheate W., Byron, H., Dagg S., Cooper, L. (2005). The Relationship between the EIA and SEA Directives. Final Report to the European Commission. ENC.G.4./ ETU/2004/0020r. Imperial College London Consultants. Available at: [http://ec.europa.eu/environment/archives/eia/pdf/final\\_report\\_0508.pdf](http://ec.europa.eu/environment/archives/eia/pdf/final_report_0508.pdf)

<sup>306</sup> *Ibidem*.

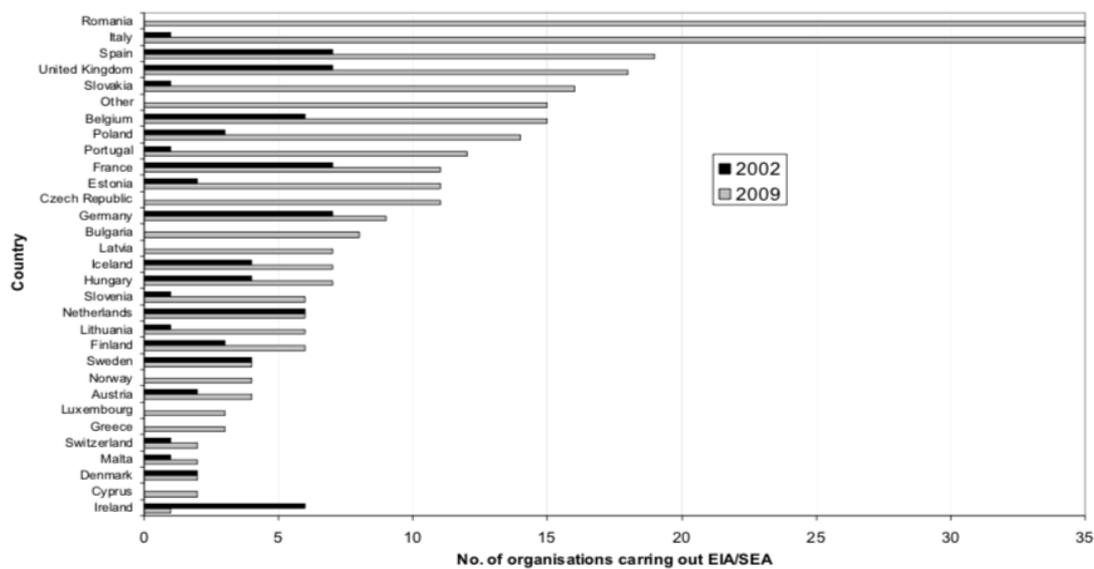
<sup>307</sup> Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the application and effectiveness of the EIA Directive (Directive 85/337/EEC, as amended by Directives 97/11/EC and 2003/35/EC)

/\* COM/2009/0378 final \*/

concerns within the Assessment framework, and the Commission since 2011 has contributed in the evolution of this aspect.

The application of EIA and SEA has varied across countries and over time, as shown in Figure 3.3. From the main findings of the studies undertaken in 2010<sup>308</sup>, the specific issue of using spatial data for the preparation of the ERs has been revealed as the main problem faced by practitioners. Specifically, access to data and data quality is difficult to be provided, and this implies an increase of efforts measurable in terms of cost and time spent to elaborate the ERs.

**Figure 3.3:** Comparison of the 2002 and 2009 concentration of organizations that carry out EIA and SEA by MS



Source: Craglia, M., Pavanello, L., & Smith, R. S. 2010

### 3.2 Relationship among Environmental Assessment and Cohesion Funds

The integration of environmental protection and the assessment of the impact of the EU funds in providing support for sustainable development find concrete application in plans and programmes determination. The Commission has highlighted the relation among SEA and Community Funds<sup>309</sup>. The verification of the link between the CP and the SEA relies on the following dynamic. On the one hand, the CP is characterized by the analysis of the performance of programmes and intervention concerning development. On the other hand, the SEA focuses on the specific aspects of this programming and planning process. Doing so, there is the possibility to introduce or modify aspects of a plan in order to improve the environmental benefits

<sup>308</sup> Craglia, M., Pavanello, L., & Smith, R. S. (2010). The use of spatial data for the preparation of environmental reports in Europe. European Commission Joint Research Centre Institute for Environment and Sustainability, Ispra, Italy. Available at: [http://ies.jrc.ec.europa.eu/uploads/SDI/publications/JRC\\_technical%20report\\_2009%20EIA-SEA%20survey.pdf](http://ies.jrc.ec.europa.eu/uploads/SDI/publications/JRC_technical%20report_2009%20EIA-SEA%20survey.pdf). (Accessed December 27th 2018).

<sup>309</sup> Report from the Commission - Relationship between the SEA Directive and community funds {SEC(2006) 1375} /\* COM/2006/0639 final \*/

deriving from it, and also to reduce or offset the negative externalities which impact on the environment<sup>310</sup>.

The SEA stages in Structural Fund Programming had first been addressed in 1998, so in conjunction with the preparation of the Regulation of the Community Funds of the next year<sup>311</sup>.

The key steps were listed as follows:

- 1) Assessment of the Environmental situation (or baseline);
- 2) Objectives, targets and priorities;
- 3) Draft development proposal and identification of alternatives;
- 4) Environmental assessment of the draft proposal;
- 5) Environmental indicators;
- 6) Integrating the results of the assessment into the final decision on plans and programmes<sup>312</sup>.

The environmental evaluation of the 2000-2006 Structural Funds plans and programmes did not rely on the proper application of the SEA Directive. Rather, the first SEAs were incorporated into the process of the 2004-2006 EU Structural Funds programming in the CEECs. In all the processes, the SEAs experts have followed the programme cycle and based their work on the draft documents that were made available. They have also clarified doubts and provided information during the regular meetings, and met environmental authorities for operative consultations<sup>313</sup>.

Experiences have been studied, particularly in CEE Countries such as Estonia, Hungary and Poland<sup>314</sup>. The main finding from the analysis made concerns the flexibility required by the national SEA systems in order to integrate SEA elements into national strategies. Establishing policy coherence in this situation is a process that can be imagined as a line linking several points of contact. These points are the diverse national and EU documents that are formulated. However, in spite of the specific necessity that each document satisfies, not all the documents provide management instruments that may support the fulfilment of the intent stated in the documents. An example of this are documents such as the National Strategic Reference Framework on which the orientation of the thematic strategies relies. In Estonia, in spite of the formal

---

<sup>310</sup> Lamers, G., Platzer-Schneider, U., Prettenthaler, F., et al. (2006). Handbook on SEA for Cohesion Policy 2007-2013. Available at: [https://ec.europa.eu/regional\\_policy/sources/docoffic/working/doc/sea\\_handbook\\_final\\_foreword.pdf](https://ec.europa.eu/regional_policy/sources/docoffic/working/doc/sea_handbook_final_foreword.pdf) (Accessed December 27th 2018).

<sup>311</sup> Regulation (EC) No 1783/1999 of the European Parliament and of the Council of 12 June 1999 on the European Regional Development Fund *OJ L 213, 13.8.1999, p. 1-4*

<sup>312</sup> Handbook on Environmental Assessment of Regional Development Plans and EU Structural Funds Programmes (European Commission DG Environment, 1998). Available at: <http://ec.europa.eu/environment/archives/eia/sea-guidelines/pdf/handbook-full-text-part2.pdf> (Accessed December 27th 2018).

<sup>313</sup> Handbook on SEA for Cohesion Policy 2007-2013- February 2006 Greening Regional Development Programmes Network. Available at: [https://ec.europa.eu/regional\\_policy/sources/docoffic/working/doc/sea\\_handbook\\_final\\_foreword.pdf](https://ec.europa.eu/regional_policy/sources/docoffic/working/doc/sea_handbook_final_foreword.pdf) (Accessed December 27th 2018).

<sup>314</sup> Dusik, J., & Sadler, B. (2004). Reforming strategic environmental assessment systems: lessons from Central and Eastern Europe. *Impact Assessment and Project Appraisal*, 22(2), 89-97.

adoption of environmental objectives, there was not a clear methodology for the inclusion and integration of environmental issues in policy and development planning. The statements of the SEA experts agreed on the conclusion that there was a mismatch among the objectives and the formulation of quantifiable indicators.

This problem has found a solution with the introduction of ad hoc environmental objectives<sup>315</sup>. In Hungary, the SEA experts had the aim to assess the match of the Hungarian Regional Operational Programme documents with respect to the environmental objectives formally recognized by other plans and programmes. However, also in this case the main problem was the lack of a common approach, and particularly the different assumptions on which each approach relied on. Eventually, the SEA experts' solution was to select 32 EP objectives characterized by a quantitative dimension in order to harmonize the evaluation of the policy and various impact factors<sup>316</sup>. In Poland, in order to define the main relevant actions in relation to the national plan framework, the examination of the SEA experts interested over 100 documents among plans, programs, national and international juridical acts. From the study, over 250 actions were defined relevant for the environmental and the resource management. Consequently, the criteria settled for the evaluation arrived to 52, then simplified down to 24<sup>317</sup>. As learned, the adaptation approach undertaken by the experts in order to apply or include the SEA has faced the common problem deriving from the mismatch among theory and practice (i.e. strategy formulation and evaluation process) within the MS, arriving ultimately to the adoption of ad hoc criteria. However, the problem of evaluating under a shared approach the impact of National or Regional plans and programmes remained unsolved in terms of a common methodology.

The Court of Auditors has made observations on the occasion of the mid-term evaluation of the 2000-2006 cycle. In the first place, the Court has recognized an improvement in the absorption capacity of financial resources, as a consequence of the application of the N+2 rule. This factor has oriented also the efficiency assessment in this direction with respect to other dynamics (i.e. relation cost-output or achievement of stated results)<sup>318</sup>. However, the Court has acknowledged that the horizontal integration of environmental issues was not satisfactory and it remained in place.

Furthermore, The Court remarked the role of the *ex ante* evaluation, recalling the discussion on the topic reported in Special Report No 7/2003 of the Commission. In that occasion, the statement on the *ex ante* evaluation expressed a low influence on the programme cycle. What was instead highlighted was the use that MS had done of it, which had often been merely instrumental. This observation came from the lack

---

<sup>315</sup> *Ibidem*.

<sup>316</sup> *Ivi*: Specific Plans and Programs were: the National Programme for the Protection of the Environment, National Nature Conservation Plan, National Environmental Health Action Programme, National Regional Development Concept and the National Agro-Environmental Programme.

<sup>317</sup> *Ibidem*.

<sup>318</sup> European Commission. Commission Report: 'The Mid-Term Evaluation in Objective 1 and 2 Regions — Growing Evaluation Capacity' — November 2004 (page 19).

of quantitative and realistic appraisal and the absence of alternative strategy formulations<sup>319</sup>.

One of the objectives of the 2007-2013 cycle consisted of improving the efforts for strengthening the phases of monitoring, evaluation and decision-making. Relevant to be remarked is that each phase that composes the planning activity has a function. The planning actions (i.e. ex-ante evaluation, monitoring and ex post evaluation) are more likely to outline a clear picture of the plan or project adopted. For this reason, in order to assess the state of implementation, periodic check cannot rely just on the monitoring data.<sup>320</sup> Without the assessment and the evaluation phases, many elements that may help to define the progress of the policy may be lost.

As addressed during the 5<sup>th</sup> International Congress of the European Regional Science Association on the Governance of the SEA in the 2007-2013 EU Programmes<sup>321</sup>, the process of the *ex-ante* assessment undertaken by independent evaluators of the European Funds Programme was similar to the SEA. This process was characterized by the formulation of the assessment in the early programme phase and followed by on-going and an ex-post assessments. Consequently, an efficient *ex ante* assessment required coordination and mutual consolidation in order to ensure the unity of social, economic and environmental aspects of the programme. A different point of view is that coordination resulted as necessary also to avoid the confusion due to procedure duplication<sup>322</sup>. In practice, a large number of actors were called to cooperate at different levels to fulfil the efficient application of the *ex ante* assessment. Vertically, this coordination among the Commission, MS policy makers and the Regions was set in the context of the Strategic Frameworks negotiation. Horizontally, the main relation involved each Region, the organisation to be entrusted with the ex- ante and the environment assessments and the Planner<sup>323</sup>. However, programme and assessments relied on the approval of the Commission, and this latter had neither provided SEA Directive interpretations nor guidance for its application to operational programmes. Thus responsible for ensuring environmental assessment quality and accuracy were the MS and consequently each Planning Authority that pursued this aim more or less on its own . The problem was solved when the Commission understood the necessity to provide documentation<sup>324</sup> – even though minimal. In this way, MS had the occasion to have some indications on the application of SEA to OP *ex ante* assessment.

---

<sup>319</sup> Special Report No 7/2003 on the implementation of assistance programming for the period 2000-2006 within the framework of the Structural Funds ([OJ C 174, 23.7.2003](#)).

<sup>320</sup> Special Report No 1/2007 concerning the implementation of the mid-term processes on the Structural Funds 2000-2006 together with the Commission's replies. *OJ C 124, 5.6.2007, p. 1-16*

<sup>321</sup> Del Ciello, R., Forni, A., Scipioni, F., Disi, A., & Salama, A. (2011). The Governance of the SEA in the 2007-2013 EU Programs: the case of Italy.

<sup>322</sup> National Assessment System 2006, "Indications for the drafting of the report of ex-ante evaluation of Operational Programmes 2007-2013", mimeo, november 2006.

<sup>323</sup> Del Ciello, R., Forni, A., Scipioni, F., Disi, A., & Salama, A. (2011). The Governance of the SEA in the 2007-2013 EU Programs: the case of Italy.

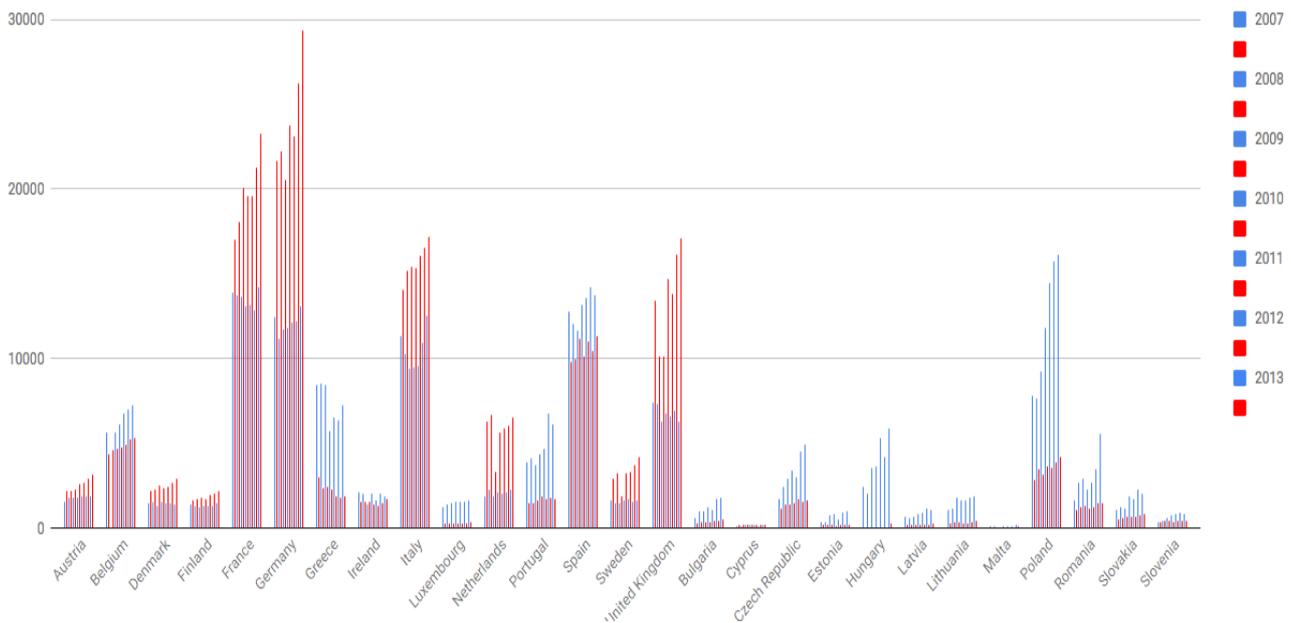
<sup>324</sup> European Commission, 2007 DG Regio - DG Employment "*Indicative guidelines on evaluation methods: evaluation during the programming period*" - Working document n°5, April 2007.

### 3.3 The 2007-2013 cycle

#### 3.3.1 The budget

Within the debate on budget allocation emerged the main contrasts of the enlarged EU. In the first place, was the contributors-beneficiaries confrontation which saw the passage to the contributors' side of MS that used to be beneficiaries of the Structural Funds<sup>325</sup>. This change in the flow of expenditure and revenue occurred in the cycle 2007-2013 and are reported in Figure 3.4 below. Where the red lines are higher, the MS have registered higher level of expenditures. MS of this group, in which the trend is marked, are France, Germany, Italy, Netherlands and United Kingdom. Among the second group, the composition is less homogenous. MS such as Spain and Portugal still registered more revenue than expenditures; however, their share is not consistent as it appears for countries such as Poland and Hungary.

**Figure 3.4:** Total Expenditure and Revenue by MS for the 2007-2013 cycle



Source: European Commission. Author Elaboration. (red: MS Expenditure per year; blue: MS Revenue per year)

Secondly, the allocation pending had to be reshaped in order to fully match the Lisbon and Gothenburg Criteria. Consequently, the Objectives for the period 2000-2006 had been reformulated in the three priorities of Convergence<sup>326</sup>, Competitiveness<sup>327</sup>, and Territorial Cooperation<sup>328</sup>.

<sup>325</sup> Euractive. The new EU cohesion policy (2007-2013). Available at: <https://www.euractiv.com/section/regional-policy/linksdossier/the-new-eu-cohesion-policy-2007-2013-archived/>

<sup>326</sup> I quote the definition stated by the Commission: "Convergence (formerly Objective 1): support for growth and job creation in the least developed member states and regions. Regions whose per capita GDP is less than 75% of the EU average will be eligible (mostly regions from new member states), but temporary support (until 2013) will be given to regions where per capita GDP is below 75% for the EU-15 (the so-called 'statistical effect')".

<sup>327</sup> Ivi: "Competitiveness and employment (formerly objective 2): designed to help the richer member states deal with economic and social change, globalisation and the transition to the knowledge society. Employment initiatives are to be based

In terms of expenditure covered, the 2007-2013 CP budget allocation amounted to €347 billion, which in percentage represented the 35.7% of the overall budget for the same period<sup>329</sup>. The increase is evident, since the previous budget had covered 318 billion of euro among the Structural Funds (278 billion) and Cohesion Fund (70 billion). However, the terms of expenditure do not consider just the amount of funding provided by the budget. The co-financing method applied to the programs increased the available resources to around 700 billion of euro. The co-financing rates for the convergence objective were settled between 75 % and 85 %; for the competitiveness<sup>330</sup> objective between 50 % and 85 %, and for territorial cooperation: between 75 % and 85 %. The Cohesion Fund co-financing rate was settled to 85%. A positive element developed in the 2007-2013 period is the simplification of the documentation. Above all, introduction of the Community strategic guidelines on Cohesion Policy, suggested by the Commission and adopted by the Council in accordance with the Parliament's opinion, had the aim to support national and regional authorities in adapting plans and programmes proposed with respect to the Lisbon agenda. For example, the 2000-2006 Development plans were submitted by the MS and gave less continuity to the Community action. The Operational programmes that are common in both periods, in the 2007 -2013 cycle saw the regions in a greater role.

### 3.3.2 Principles

The principles of proportionality, equality between men and women and non-discrimination, as well as sustainable development and using the funds to focus on the Lisbon strategy priorities were added to the principles of intervention, complementarity, coherence, coordination, conformity and additionally which were covered in the period 2000–2006<sup>331</sup>.

### 3.3.3 Programming, measurement and evaluation issues

While it is true that CP resources represent an opportunity for plans and their projects, it still not clear whether these investments are able to offset climate change emissions, and if so by which degree. In the implementing Regulation for the Structural and Cohesion Funds 2007-2013, the Commission included the

---

*on the European Employment Strategy (EES) (adaptability of the workforce, job creation and accessibility to the labour market for vulnerable persons)".*

<sup>328</sup>Ivi: *"Territorial co-operation: to stimulate cross-border co-operation in order to find joint solutions to problems such as urban, rural and coastal development, the development of economic relations and the networking of SMEs. A new cross-border authority will be set up to manage co-operation programmes".*

<sup>329</sup>European Parliament Website. 2007. Press release. MEPs approve €308bn Structural Funds 2007-13 package Regional policy. Available at: <http://www.europarl.europa.eu/sides/getDoc.do?language=EN&type=IM-PRESS&reference=20060628IPR09333> (Accessed December 27th 2018).

<sup>330</sup> Maximum co-financing rates (exceptions contained in the regulation's Annex)

<sup>331</sup> Communication from The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions Regional Policy Contributing To Sustainable Growth In Europe 2020 /\* COM/2011/0017 final \*/

management rules to address the use of cohesion financial instruments<sup>332</sup>. Perhaps to answer the general question about the role of EU added value on project implementation, the importance of the *ex ante* quantification of programme objectives was increased. The reason why the *ex ante* quantification has remained a weak passage in the phase of program formulation is rooted in the fact that it requires the establishment of an indicator system, including definitions, data availability and data quality. In essence, it could be said that the definition target and the accuracy of indicators establish a good base on which the quality check is carried out<sup>333</sup>.

It is not surprising that problems arise on the evaluation of investments carbon footprint. Because of the divergent interpretations of the definition of sustainable targets, major efforts are required to provide coherence among environmental and climate policy objectives and socio-economic objectives, considering the persistent differences in the quantification of policy impacts according to national administrative cultures. Furthermore, among the three objectives of the 2007-2013 period, the convergence regions are those in which investments (above all in infrastructure) are likely to be persistently carbon intensive. On the one hand, this may bring an increase of emissions in the effort to improve socio-economic conditions, on the other it may require more effort in the attempt to pursue socio-economic development applying measures to keep emission at the lowest possible level<sup>334</sup>.

With these considerations, the SEA Directive may be required in order to improve the comprehensiveness of the Operational Programmes assessment. However considerations concerning the development of the SEA instrument itself deserve to be addressed as well<sup>335</sup>, as the system of indicators that should be included in order to measure the carbon footprint of the investments made or to make. This issue has been presented in the Final Report to the European Commission, Directorate- General for Regional Policy. The Report has highlighted that 13<sup>336</sup> of 27 MS referred to GHG emissions in their national indicators. In spite of this, the comparison of the amount of carbon dioxide that will be reduced by the programmes is not possible to be undertaken since MS refer to reduction of GHG emissions in different units. Just to give an example, France and Hungary quantify generation or reduction of GHG emissions on an annual basis; in Italy the

---

<sup>332</sup> Commission Regulation (EC) No 1828/2006 of 8 December 2006 setting out rules for the implementation of Council Regulation (EC) No 1083/2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and of Regulation (EC) No 1080/2006 of the European Parliament and of the Council on the European Regional Development Fund (<http://data.europa.eu/eli/reg/2006/1828/oj>)

<sup>333</sup>European Commission Directorate-General. Regional Policy, 2006. Thematic Development, Impact, Evaluation And Innovative Actions. Evaluation And Additionality. The New Programming Period 2007-2013. Indicative Guidelines On Evaluation Methods: Monitoring And Evaluation Indicators Working Document No. 2 –Available at: [https://ec.europa.eu/regional\\_policy/sources/docoffic/2007/working/wd2indic\\_082006\\_en.pdf](https://ec.europa.eu/regional_policy/sources/docoffic/2007/working/wd2indic_082006_en.pdf) (Accessed December 27th 2018).

<sup>334</sup> Baltazar, E., Varbova, V., Zhechov R. 2009. Improving the Climate Resilience of Cohesion Policy Funding Programmes . An overview of member states' measures and tools for climate proofing Cohesion Policy funds. Available at: [http://ec.europa.eu/environment/integration/pdf/enea/climate\\_resilience\\_cfr\\_pr.pdf](http://ec.europa.eu/environment/integration/pdf/enea/climate_resilience_cfr_pr.pdf) (Accessed December 27th 2018).

<sup>335</sup> Particularly if there is the occasion to harmonize the projects assessment covered by the Environmental Impact Assessment Directive.

<sup>336</sup> Austria, France, Germany, Italy, Portugal, the UK, Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia.

quantification of GHG reduction is measured per capita; in Slovenia for the same target the reference is in percentage units<sup>337</sup>.

Within the framework of CP, the reduction of GHG emissions (carbon dioxide and equivalents, in kg) has become one of the core indicators. For Competitiveness, it is recalled in the 31.5 per cent of Programmes (35 OPs); while for Convergence it is the 15.7 per cent of Programmes (17 OPs) that provide indicators for the reduction of GHG emissions<sup>338</sup>. In sum, the core indicators, which should avoid or at least decrease arbitrariness in the interpretation of investment impact, eventually are targeting different units that cannot be aggregated. In the first place, this is an impediment to the comparison among MS. Secondly this impedes also the possibility to evaluate the impact of CP investments. In 2010, the Committee of the Regions expressed clearly the main difficulties. It articulated that it:

- *“underlines the need for both Directives to have formal links with the Habitats Directive and the Biodiversity Action Plan, and to contain a well-established methodology to determine the impacts of climate change;*
- *proposes the screening mechanism of the EIA Directive to be simplified and clarified and recommends that the Directive introduces mandatory scoping and a transparent accreditation process for consultants where utilised;*
- *recommends that the EIA Directive makes that the assessment of alternative solutions, the establishment of the duration of validity of the EIA and the monitoring of the possible significant environmental effects and of the protective and corrective measures obligatory;*
- *Stresses that public consultation for EIAs should begin as early as possible, for instance at the scoping and screening stage, and that minimum requirements must be prepared on how to make the EIA documentation available to the public concerned;*
- *Concerning the SEA Directive, draws attention to the need to specify unambiguously its scope, to better define what information the environmental report must contain, to make it obligatory to provide a specific definition of reasonable alternatives and to establish methods and indicators for the monitoring of significant environmental effects and of protective and corrective measures; any initiatives taken must incorporate the principles of subsidiarity, proportionality and better regulation;*
- *considers that there is a vital need to develop capacity in the Member States so as to ensure effective implementation of the SEA Directive”*<sup>339</sup>.

---

<sup>337</sup> Nordregio. Final Report to the European Commission, Directorate- General for Regional Policy, Evaluation Unit, No 2007.CE.16.0.AT.041, *The Potential for Regional Policy Instruments, 2007–2013, to contribute to the Lisbon and Gothenburg objectives for growth, jobs and sustainable development*, Stockholm, February 13, 2009

<sup>338</sup> *Ibidem*.

<sup>339</sup> OPINION of the Committee of the Regions on IMPROVING THE EIA AND SEA DIRECTIVES - 84th plenary session 14 and 15 April 2010 - CdR 38/2010 fin  
Reference documents  
Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the application and effectiveness of the EIA Directive COM(2009) 378 final  
and

Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the application and effectiveness of the Directive on Strategic Environmental Assessment (SEA). COM(2009) 469 final

Hence, following is the analysis of one of the solutions developed to respond, at least in part, to these needs.

### 3.4 Towards a common carbon footprint approach

What emerged in 2007-2013 is the formulation of three main aspects of applied sustainability: decrease of the level of carbon footprint of the economy (i.e. low carbon economy), provisions of ecosystem services and respect of biodiversity, fostering eco-innovation. So, the Cohesion Policy became a driver to support the development of the worst-off regions to recover delays in terms of socio-economic growth, while considering the dynamics of low-carbon transition. Nevertheless, this effort has found limited concrete application to guarantee not just efficient investment but also a comprehensive approach that harmonizes the impact of sectorial investments. Examples follow.

#### 3.4.1 The French carbon neutrality approach

The French government strategy is rooted in the domestic policy undertaken in 2009. Part of the French national proposal on carbon footprint quantification and on the introduction of such criteria in the monitoring activity of projects and plans founded application during precedent years of the time framework selected but also in 2007-2013. It has been applied to different types of investment-related activities, mainly the State-Region Project Contracts (CPER) and ERDF-funded Operational Programmes (OP)<sup>340</sup>.

The monitoring action was possible thanks to an IT system, named NECATER<sup>341</sup>. The available national calculation had been expressed during the French Presidency of the EU. Among the priorities addressed, there was the attempt to adopt the “climate- energy package”<sup>342</sup> and move a territorial climate-energy plan implementation to the urban dimension, by inserting parts related to it in the planning documents. The tool had been developed by the Government services (DGEC, DATAR and ADEME<sup>343</sup>).

Thus, one of the first practices in systemic carbon accounting derives from the experience of the French. Since the beginning of the 2007-2013 cycle, the National Strategic Reference Framework contained the principle of carbon neutrality and fostered the application of regional statistics; then, the CO<sub>2</sub> quantities were generated as a result of the planned investments, showing an explicit relation among the two factors (i.e. investments and emissions). Furthermore, the system provided the possibility to change the values - or

---

<sup>340</sup> European Commission. Regional Policy. France Cohesion Policy 2002-2013. Available at: [https://ec.europa.eu/regional\\_policy/archive/atlas2007/fiche/fr\\_en.pdf](https://ec.europa.eu/regional_policy/archive/atlas2007/fiche/fr_en.pdf) (Accessed December 27th 2018).

<sup>341</sup> Mid-programme carbon neutrality analysis for ERDF-funded State-Region Project Contracts and Operational Programmes for 2007-2013. Appendix: Joint Memorandum from Datar/ French Environment and Energy Management Agency (Ademe)/ French Ecology Ministry on the Greenhouse Gas Emission measurement systems used. June 2011 Edition.

<sup>342</sup> required for the subsequent international events (Poznan, December 2008, then Copenhagen, late 2009).

<sup>343</sup> Respectively: French Directorate General for Energy and Climate, Ministry of Ecology, Energy, Sustainable Development and the Sea Interministerial Delegation for Territorial Development and Regional Attractiveness, service of the Prime Minister French Environment and Energy Management Agency

the parameters - inserted into it before the implementation phase. In this way, once the values had been replaced there was the chance to sharpen the monitoring as a consequence of new calculation, taking into account the different funding amounts.

Another element included in this first experiment was the extended timeframe: the calculation of CO<sub>2</sub> emissions was generated also on the basis of the duration that follows the definition and implementation of the Operational Programme. These characteristics were included principally for two reasons. The first, more technical, was to provide the regional authorities a tool that would allow ex-ante assessment and ex-post evaluation in terms of carbon impact.

A second aspect, not necessarily of secondary importance, was to fulfil a pedagogical function making more evident the carbon impact of investments to the public authorities. The comprehensiveness of the assessment derives from the costs that the system can include. These may be by national, regional or European, as well as private. So NECATER was able to measure programme allocations impacts, enlarging the possibility to include other financial amounts.

The NECATER System could be adapted to other programs, covering infra-regional territories or to other European regions at certain conditions. For example, the reference database can be updated; of course, the data and statistics available have to be accurate. The higher the quality of the data, the more precisely the system will assess carbon impact with respect to specific characteristics of the local dimensions. As suggested by the study of the System factors that must be taken into consideration because of their influence on the reliability of the results, they are mainly three: 1) reliability of the financial allocations entered into NECATER; 2) commitment rate on the key budget lines from the carbon perspective; and 3) quality of the PRESAGE data processed by NECATER (types of CO<sub>2</sub> expenditure, indicators)<sup>344</sup>.

According to this system of accounting, the measurement of the carbon neutrality objective has been reached in relation to the OPs funded by the ERDF. The main evidence is related to the category of the OPs, especially to the “renewable energies and energy control” one. Since in this category diverse types of operations are included<sup>345</sup>, the carbon impact per euro invested can be substantially different. This difference may also be accentuated by specific conditions of the local context. It is important to stress that the concept of carbon neutrality implies that the balance investment -emission has to be zero, even though in practice this is not going to be realized. In order to measure the proximity to this objective, the NECATER system develops a Carbon Neutrality Index (CNI). The measurement of the indicator weighs the emission produced and compensated.

---

<sup>344</sup> Mid-programme carbon neutrality analysis for ERDF-funded State-Region Project Contracts and Operational Programmes for 2007-2013. Appendix: Joint Memorandum from Datar/ French Environment and Energy Management Agency (Ademe)/ French Ecology Ministry on the Greenhouse Gas Emission measurement systems used. June 2011 Edition.

<sup>345</sup> *Ivi*. As reported in the study, they are: solar photovoltaic energy, biomass, wind energy, geothermal and solar thermal energy, operations to control electricity demand in the service sector, industry, etc.

### 3.4.2 The Italian economic – environmental accounting experience

In Italy, in the period there has been assessment preparation for the emission calculation as well. The necessity to assess effectiveness in addressing climate change mitigation and adaptation, beside traditional economic policy objectives, has been to include all the feedbacks that are produced within the production structure and which follow the introduction into the economic system of a cost impulse. Since investments produce a variation in production levels in sectors where otherwise the economic stimulus would not occur, the environmental impact is to a certain degree induced. As reported by the major study in the field, carried out by the Italian Agency ENEA, the approaches developed in this field of research have been both “top-down” and “bottom-up”. The discussion of the second type of approach is going to be reported in the following section. While for the first, the focus is on the IO- NAMEA approach<sup>346</sup> in the current paragraph.

A pragmatic application has been applied to assess the effects on the greenhouse gas emissions of the programs related to the National Strategic Framework (QSN) and financed by the European Regional Development Fund (ERDF). The study<sup>347</sup> of the IO-NAMEA approach explains its functioning according to:

- a) methodology;
- b) reference scenario;
- c) setting of input-output matrix projected to 2020 and 2030;
- d) setting of NAMEA<sup>348</sup> matrix projected to 2020 and 2030;
- e) setting of expenditure carriers;
- f) estimation of the environmental and economic impact.

Regarding the methodology of IO-NAMEA, inter-sectorial matrices of the Italian economy (the Input-Output Tables) have been integrated with the environmental accounting matrix (NAMEA), allowing to construct a scenario of potential impact of the expenditure. Taking into account the cross-sector effects, it was possible to capture the total, direct and indirect, impacts for both the emissive framework and for the evolution of the economic aggregates of Added Value and employment. The fundamental step becomes the

---

<sup>346</sup> Bonazzi and Sansoni (2012), Development and use of a regional NAMEA in Emilia- Romagna (Italy) in Hybrid Economic-Environmental Accounts, edito da V. Costantini, M. Mazzanti e A. Montini. Routledge studies in ecological economics, UK pp.65-79

<sup>347</sup> Del Ciello R, Velardi M., Camporeale C., Galli G., Biagio Quattrocchi “Dynamic Input-Output and NAMEA matrices: a tool to assess the overall effects of European programmes” paper presented at IAEE European Energy Conference “Sustainable Energy Policy and Strategies for Europe” October 28-31, 2014 in Rome, Italy LUISS University of Rome

<sup>348</sup> According to ISTAT definition: “The acronym NAMEA stands for National Accounts Matrix including Environmental Accounts, ie “matrix of national economic accounts integrated with environmental accounts”: it is therefore an accounting system that represents the interaction between economy and environment in line with the logic of national accounting and in such a way as to ensure the comparability of economic and social data with those relating to the pressures that human activities involve on the natural environment. The basis of this possibility of comparison and joint reading is the fact that the socio-economic and environmental factors are from time to time referred to the same entities, or to homogeneous groupings of economic or consumer activities. Moreover, this joint legibility is a distinctive feature of environmental accounting systems, which thus offer information with a high “added value” . Available at: <https://www.istat.it/it/archivio/14156> (Accessed December 27th 2018).

analysis and the characterization of the expenditure with the opportune integration - taking into account the temporal distribution in the considered time interval - with the sectorial entries of the IO matrix. Once the items of expenditure and sectorial integrations have been identified, the analysis moves on to the characteristics of the production structure in order to achieve a modelling of the structure of emissions: different sectors and different environmental efficiency. All factors are looked at that can contribute to production structure changes that ultimately lead to sectorial composition changes in the final levels of activity, which are therefore able to change the impact of the economic system's activity on emissions.

For what concerns the reference scenarios generated by models, they mirror the three rigorous scientific criteria: the plausibility of the assumptions on which the scenario is based, the internal consistency (i.e. the values assumed by the different variables must be consistent across them), and transparency (i.e. reproducibility of the scenario)<sup>349</sup>. Literature review and projections of average economic system in the medium terms are included in the working hypothesis in order to outline the Business as usual (BAU) scenarios. They have been developed considering: 1) the growth tendency of the economic system; 2) variation in the productive structure; 3) variation in emission deriving from efficiency by sector. For the purpose of developing a BAU scenario, the specific sector-level relations between productivity and environmental efficiency could provide a relevant evaluation basis, and in this sense scenario choices can be moved to assumptions regarding productivity, or alternatively considering the uniform application of a growth trend of overall productivity to the various sectors. As an alternative, the NAMEA data offer the opportunity to evaluate estimates of the elasticity of emission levels with respect to the production levels of the individual sectors. BAU scenarios do not constitute forecasts, but representations of the possible future economic structure of the MS and therefore of its GHGs emissions, defined by the assumption of hypotheses about the development processes over the long period of the national productive structure.

The reconstruction of the Input-Output Tables, for each reference year of the time horizon and for the different hypotheses of economic growth, requires: the estimate of the sectorial growth of Added Value and employment at the level of articulation required by the ISTAT Input-Output matrices, bound to respect the growth rate of the national economy at the basis of the trend growth scenarios; as well as the reconstruction of the intersectoral Tables from the desired year and the calculation of the multipliers of direct, indirect and induced impacts for the different intersectoral Tables. Furthermore, the reconstruction of model by sector requires to disaggregate growth estimation that is at the basis of the trend scenario within the 59 branches of activity (NACE Nomenclature statistique des activités économiques dans la Communauté européenne) or products (Classification of Products by Activities - CPA) that constitute the Input-Output Tables. Therefore, different scenarios of economic growth can be placed at the basis of the growth estimate of the national economy and the results of the model can be provided either by branch of economic activity or by product

---

<sup>349</sup> Gracceva F., Contaldi M. (2004), *Scenari energetici italiani. Valutazione di misure di politica energetica*, ENEA.

(CPA) according to the needs required to reconstruct the matrices NAMEA. Basically, the problem that is faced in the construction of these accounts is due to the transition from a classification by processes (nomenclature SNAP97 for CORINAIR) to a classification by economic activity (NACE Rev. 1.1) and by household consumption function (based on COICOP ) as regards the NAMEA<sup>350</sup>.

The IO-NAMEA has aimed to achieve the integration of technical-engineering knowledge available, and / or reconstructed in the form disaggregated, into an articulated representation of the productive structure of the economic system and of the relationship between it and the "environmental pressures". In general terms, the relationship between environmental efficiency (emissions per unit of added value) and productivity (value added per employee) was evaluated (also from an econometric profile). These developments are also interesting for the purpose of the assessment phase of the impact of the investments activated by the NSF on greenhouse gas emissions, where the technological connotation of investments allows to formulate hypotheses on changes in environmental efficiency values inferable from the module NAMEA starting from the regional level<sup>351</sup>.

For what concerns the setting of expenditure carriers, the first necessary step consists in the reconstruction of the overall picture of the financial resources - public and private - destined to development policies that could in turn be easily associated with specific expense carriers. The financial resources for each category of expenditure, grouped by homogeneous macro-types of intervention, were grouped into ten types of intervention deriving from the exercise carried out with the QSN (i.e. research and development; infrastructure; power; material investments of SMEs; ICT; service activities; water management, distribution and treatment; waste management; training; rolling stock).

In sum, on the side of the advantages, the Italian case has proved to manage relatively disaggregated and specific information on the characteristics of the various technologies involved, both in terms of costs and in terms of effects on the reduction of emissions to set up a sound methodology. While on the side of limits, the relative accuracy of the assessment concerning the relationship between financial flows invested in technologies and changes in emissions was unable to reach the objective of an assessment regarding the whole economic context<sup>352</sup>. The objective is to show the presumed trends in greenhouse gas emissions for the period up to 2020 in the absence of policies and measures specifically designed to reduce or limit emissions (trend scenario). The effect of the policies and measures is then introduced by assessing their

---

<sup>350</sup> Del Ciello R, Velardi M., Camporeale C., Galli G., Biagio Quattrocchi. 2014. "Dynamic Input-Output and NAMEA matrices: a tool to assess the overall effects of European programmes" paper presented at IAEE European Energy Conference "Sustainable Energy Policy and Strategies for Europe" October 28-31, 2014 in Rome, Italy LUISS University of Rome

<sup>351</sup> ENEA (2010) Quadro Strategico Nazionale 2007-2013. Valutazione Dell'impatto Potenziale Dei Programmi Operativi Fesr Sulla Riduzione Delle Emissioni Di Gas Serra. ENEA Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile Lungotevere Tahon di Revel, 76. 00196 Roma. Available at: [http://old.enea.it/produzione\\_scientifica/pdf\\_volumi/V2010\\_QSN.pdf](http://old.enea.it/produzione_scientifica/pdf_volumi/V2010_QSN.pdf) (Accessed December 27th 2018).

<sup>352</sup> *Ibidem*.

potential for reducing emissions in the time spans up to 2020. This also makes it possible to highlight how the structure of greenhouse gas emissions by sector of economic activity is modified in 2020.

Some of the limits deriving from this experience are to be conducted to a statistical dimension and to the necessary standardization of process that modelling requires. In particular, the use of industrial sector classification may not mirror the mix of different technologies and productive assets<sup>353</sup>. By construction, the methodology is presented as a whole with the characteristics of a top-down approach. The items of the productive activities of which the IO and NAMEA matrices (NACE classification of economic activities) are composed represent industries or economic activities, sometimes also defined at high levels of aggregation.

In particular, with respect to specific assessments on the relationship between "spending capacity" and technical-economic characteristics of the plants provided in the bottom-up analyses, the matrix instrumentation allows to capture the "systemic" relationship between investments and changes in emissions, according to a line of continuity with the development objectives foreseen by the allocations of European funds, allowing to distribute the effects that can be generated. However, as it is addressed in the following paragraph, the bottom-up approach is more doable and reliable for the introduction of carbon impact accounting at the local level of decision-making.

### 3.4.3 The Co2mpare model as a solution for the Commission call

The years 2009 -2011 represent the turning point in climate diplomacy. Once it emerged the lack of international coordination, the setting of a European based Roadmap<sup>354</sup> was conceived to face the increasing need to undertake action of adaptation and mitigation against climate change. The stimulus to keep going in the direction of the French and Italian cases derived from the Call for tenders of the DG Region in 2011<sup>355</sup>.

The project, financed by the European Commission for an amount of 860 thousand euro, contained in the tender specifications the necessity to provide a model to assess CO2 Emission of Regional Policy Programmes. In the document there is explicit reference to the need to verify whether the investment by the programmes might be a tool for decreasing GHG emission or be emission neutral; or, on the contrary, whether it might be a driver for increasing emission gases. The target on CO2 emission was selected in order to develop a monitoring system and provide reliable information. In the objective stated in the call, the study's purpose was to commission a test model to evaluate the CO2 effects of investment decisions under the co-financing framework of CP in EU testing regions. Explicitly, the model objective was to increase the

---

<sup>353</sup> Miernyk W. H., 1977, "A projection of technical coefficients for medium-term forecasting", in W. F. Gossling (ed.) "Medium-Term Dynamic Forecasting: The London Input Output Conference", Input-Output Publishing Company, London, pp. 29-41; DIETZENBACHER E., LAHR M. L. (ed.), 2004, "Wassily Leontief and Input- Output Economics", Cambridge University Press.

<sup>354</sup> European Commission (2011) *A resource-efficient Europe—Flagship Initiative under the Europe 2020 Strategy*. Brussels.

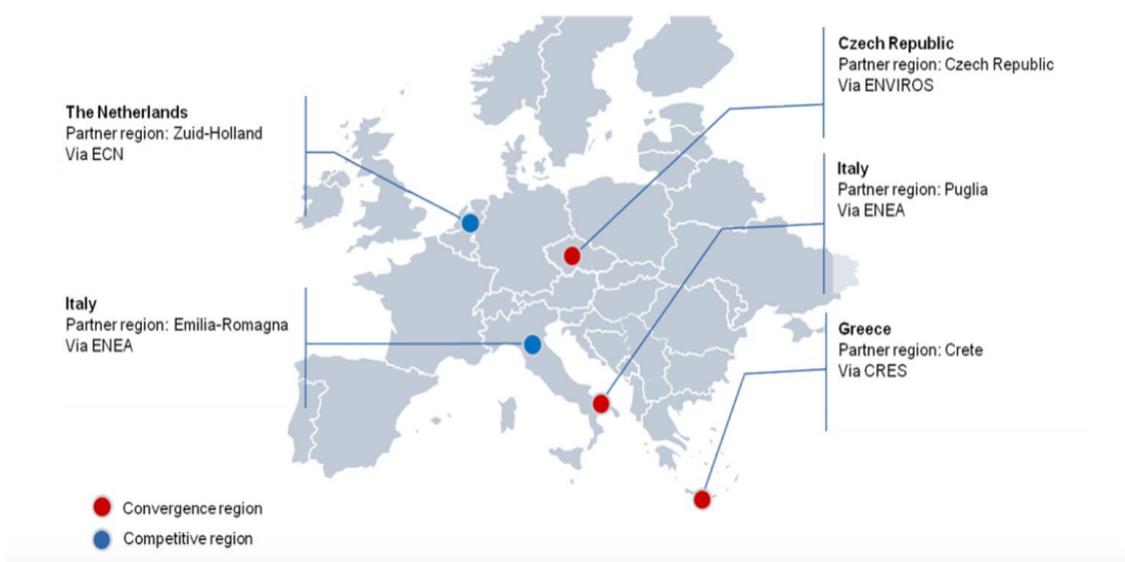
<sup>355</sup> European Commission. DG REGIO (2011) N° 2011.CE.160.AT.001 - Model to assess CO2 Emissions of Regional Policy Programmes Invitation & Terms of reference available at European Commission website- Publication of Calls for Tender: [https://ec.europa.eu/regional\\_policy/en/newsroom/funding-opportunities/calls-for-tender/2011/](https://ec.europa.eu/regional_policy/en/newsroom/funding-opportunities/calls-for-tender/2011/) (Accessed December 27th 2018).

authorities' decision capacity in making choices that consider carbon footprint when managing and implementing CP funds in the context of OP investments.

The call provided also the duration of 12 months<sup>356</sup> for the operation of modelling and testing; the request of empirical application in 5 regions of the EU, selected by geographical spread, data availability and convergence regions and at least one from competitiveness regions.

The level of the operation is NUTS 2. In addition, the trends of emissions level were to be included as detailed as possible in order to guarantee a complete view on the course of emission. For this reason, the model recognizes the emissions dividing the process in phases referring to construction, operation and disposal timeframe<sup>357</sup>. On the side of the EU, the organization relied on the DG REGIO, while the study had to be accompanied also by DG CLIMA, DG ENERGY, DG ENVIRONMENT, DG AGRICUTLURE, and DG INFSO. The competition was won by the Project consortium composed of six European partners: the Energy research Centre of the Netherlands ECN (project coordinator), Énergies Demain, the Italian national agency for new technologies, energy and sustainable economic development ENEA, University College London (UCL), ENVIROS and the Centre for Renewable Energy Sources and Saving (CRES). To be noted, the Italian and the French values had provided the experience and the methodology to satisfy the criteria and requirements set by the Commission. The regions have contributed to the assessment of functional needs, essential data, and to the practical testing of the model. The project has been developed in close cooperation with five EU regions; Puglia (Italy), Emilia Romagna (Italy), Czech Republic, Crete (Greece), and Zuid Holland (the Netherlands), reported in Figure 3.5 below.

**Figure 3.5:** Test Regions in the 2007-2013 Programme Cycle



Source: Compare Report

<sup>356</sup>Ivi specified: From January to December 2012

<sup>357</sup>Ivi pag. 6

The ERDF of 2007-2013 budget allocation amounted to 201 billion of euro to support: direct aid to companies (in particular SMEs) to create sustainable jobs; infrastructures for research and innovation, telecommunications, the environment, energy and transport; financial instruments (e. g. local development funds) aimed at supporting regional and local development and promoting cooperation between local authorities and regions; and technical assistance measures. The functioning of the model has been established as follows.

The CO<sub>2</sub> impact of an OP is based on the financial allocation of the available budget. The available budget is divided into a maximum of 86 categories of expenditure (or priority themes). Each category of activated expenditure is traced back to the different types of intervention, which are 26 and are called Standardized Investment Components (SICs). These interventions involve realized or consumed physical or intangible quantities (determinants) that are calculated from the model through a first series of coefficients. A second set of coefficients makes it possible to calculate the CO<sub>2</sub> emissions per realized or consumed physical or intangible unit. The transformation coefficients are called ratios, around 1,700 in the model<sup>358</sup>.

The considerations of emissions foreseen by the model are mainly two. First, emissions are related separately, according two phases of the model: construction and operation. In this way, the user may distinguish and so identify different elements according to the phase.

This distinction has been created since part of the emission impacts may be generated during the construction phase of some plans financed under the OPs, while in others cases the operational phase may be the most emission-intensive among the two. According to the studies, while the additional emissions are usually related to the construction phase, the trend of the emission in the operational phase may show an additional amount of emissions or reductions of those.

Secondly, the model is structured so it can be differentiated between emissions released directly and / or indirectly. The first type includes emissions that are released forthwith on the site of the activities. The emission of the second type may be a side effect of activities used to implement the main ones; an example is electricity generation. For what concerns the system of SICs, it includes those principal physical activities that are generally linked to the investment taken in consideration.

For example, the SIC 'road building construction' includes activities that contribute to the realization of road construction, as earthworks, paving, and construction. Furthermore, the model considers also the additional transport that is generated through the improved road network. Co2mpare uses a set of 26 SICs to describe all the activities that may take place within the various theme elements, which are reported in synthesis in Table 3.2.

---

<sup>358</sup>CO<sub>2</sub>MPARE, (2013), Technical background and guidance for deployment in EU regions: Hekkenberg M. (ECN), Le Pierrès S. (Énergies Demain), Del Ciello R. (ENEA), I. Keppo (UCL), Harnych J. (Enviros), Papagianni S. (CRES); ECN-O--12-032 -

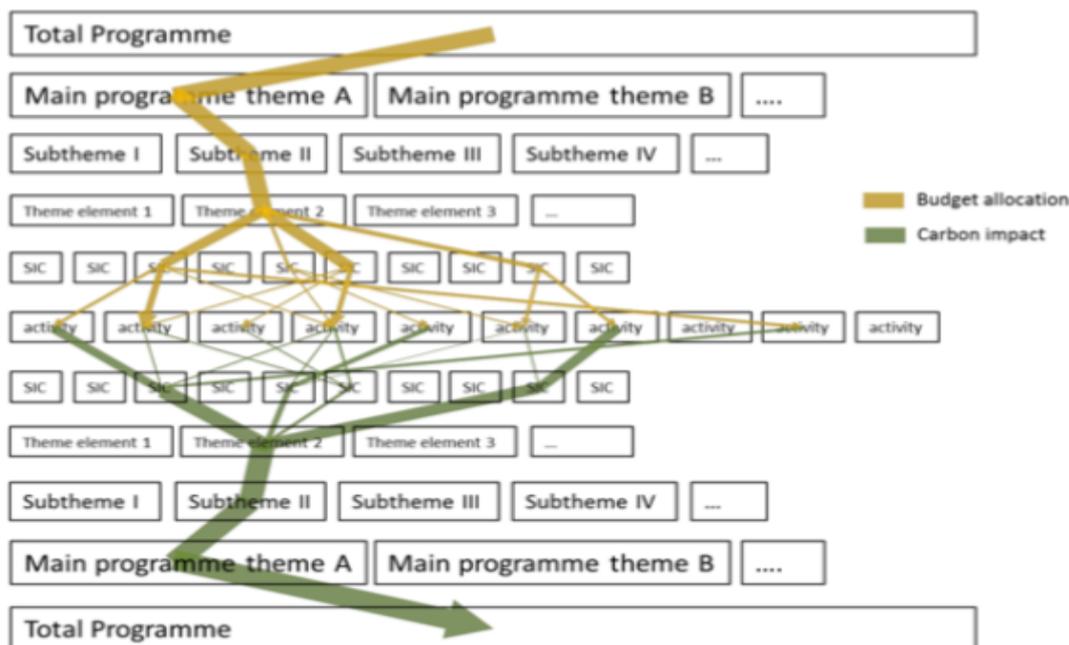
**Table 3.2:** List of the principal fields of intervention and principal SICs

Theme	SICs	Theme	SICs
Building	<b>Building construction</b>	<b>Energy</b>	Energy switch equipment
	<b>Building refurbishment</b>		<b>Fossil fuel energy</b>
	<b>Building demolition</b>		<b>Renewable centralised energy</b>
Transport	Rail construction		<b>Renewable decentralised energy</b>
	Rail renovation		<b>Energy efficiency</b>
	Rail electrification	<b>Waste and water</b>	Wastewater treatment
	Road construction		Water supply treatment
	Road renovation		Waste management infrastructure
	Cycling infrastructure	<b>Other</b>	Reforestation
	Public transportation infrastructure		Equipment
	Maritime and inland-waterway infrastructure		Civil engineering
	Port infrastructure		Immaterial services
	Airport infrastructure		Configurable SIC

Source: DG Regio Compare Final Report

Figure 3.6 is the graphic representation of the path that links budget allocations and carbon impact. The yellow line starts from the section “total program”, which represents the most general element of the programming. Downwards, the trend of the line follows the budget allocation according to the national or regional OPs. According to the type of expenditures chosen, the line is then split in the main fields, which are included in the model and consequently related to the SICs. Then the line follows the elaboration backwards. At each step, from the last, there is the association by the model of the amount of emission involved in the process that so rebuilds the emission impact of the Programme.

**Figure 3.6:** Graphic representation of investment-emission relation



Source: DG Regio Compare Final Report

### 3.4.4 Application and regionalization of the model

#### *The Italian Case*

For what concerns the SEA in Italy, the legal provision that has disciplined its implementation are Laws 152/2006 and 4/2008<sup>359</sup>. As noted, SEA Directive transposition in Italy has faced difficulties of both an administrative and procedural nature. Some of these difficulties have been studied in the light of the comparison between national and regional legislation<sup>360</sup>.

Others have focused on the implementation analysis in specific regions<sup>361</sup>. In other cases, the attention has been pointed toward the definition of the threshold to determine the distinction between ‘

<sup>359</sup> Laws 152/2006 and 4/2008

<sup>360</sup> Casini C., Santini L. 2007 “Sei anni dalla VAS: le regioni e la valutazione dei piani a scala locale”, XXVIII Conferenza Italiana di Scienze Regionali – AISRe, Bolzano 26-28 settembre 2007; Casini C., Santini L. 2009 “Dal recepimento della Direttiva europea alla legge nazionale: la valutazione ambientale strategica a scala regionale”, XXX Conferenza Italiana di Scienze Regionali – AISRe, Firenze 9-11 settembre 2009  
Rega C. 2006 “La Valutazione Ambientale Strategica: proposte metodologiche di ricerca e riflessioni sul quadro normativo nazionale” XXVII Conferenza Italiana di Scienze Regionali – AISRe, Pisa 12-14 ottobre 2006

<sup>361</sup> Gazzola P., Caramaschi M. 2005 “Implementing SEA in Italy: The Case of the Emilia Romagna Region” in: Schmidt M., João E., Albrecht M. 2005 (eds.) “Implementing Strategic Environmental Assessment” 2005 Springer-Verlag

aprojects' and 'plan'. Indeed, this distinction—with the latter comprising up to several of the former—is not easy to determine, as in the case of the realization of great infrastructures<sup>362</sup>.

For what concerns the reference to the whole Italian regional development policy in the period 2007-2013, the NSF<sup>363</sup> defined the programming framework for: the additional Community and national resources allocation; the set of Structural funds (ERDF, ESF) co-financing; national funds for regional policy; Funds for underdeveloped areas. In addition, it provided the guidelines for a coherent activation, in support of regional development, of ordinary policies at the national, regional, local levels.

#### *Application to ROP Emilia-Romagna*<sup>364</sup>

In 2012, the application at the regional level was undertaken during the last part of the life of the OP of Emilia-Romagna; the management phase. The model has been applied in order to assess on-going and ex-post performances. It has been possible to calibrate data and indices (RATIOS) as the default setting uses the data available, which can be an average at the national and/or European level. The user could substitute the default values with a regional level value<sup>365</sup>.

In its first version, the OP has been approved with decision C (2007) 3875 of 07/08/2007. The amount of economic resources allocated was about 347 million of euro, aimed to support the Emilia-Romagna Region in achieving the Lisbon and Gothenburg objectives, notably growth in research and development expenditure, creation of a knowledge society and diffused sustainable development. Hence, the general objective was to strengthen social and economic dynamism, innovation capacity and the quality of development. The budget allocation is reported in Table 3.3 below<sup>366</sup>.

---

<sup>362</sup> Morandini G., Norberti S. 2008 *“La Valutazione Ambientale Strategica delle grandi opere: l’arretramento del porto di Genova”*, XXIX Conferenza Italiana di Scienze Regionali – AISRe, Bari 24-26 settembre 2008

<sup>363</sup> Regolamento (CE) n. 1828/2006 della Commissione dell’8 dicembre 2006 che stabilisce modalità di applicazione del regolamento (CE) n. 1083/2006 del Consiglio recante disposizioni generali sul Fondo europeo di sviluppo regionale, sul Fondo sociale europeo e sul Fondo di coesione e del regolamento (CE) n. 1080/2006 del Parlamento europeo e del Consiglio relativo al Fondo europeo di sviluppo regionale. ELI: <http://data.europa.eu/eli/reg/2006/1828/2011-12-01>

<sup>364</sup> Del Ciello R., Cagnoli P., Sansoni M., Vignoli L., Amerighi O., Forni A., Regina P. 2014. “Emissioni, il modello CO2MPARE in Emilia-Romagna”, ECOSCIENZA, Numero 3 - Anno 2014

<sup>365</sup> Cagnoli, P., Vignoli, L., Sansoni, M., Amerighi, O., Del Ciello, R., Forni, A., & Regina, P. (2013). ASSESSING CO2 EMISSIONS OF REGIONAL POLICY PROGRAMMES: AN APPLICATION OF CO2MPARE TO EMILIA-ROMAGNA. *Environmental Engineering and Management Journal*, 12(9 Supplement), 237-240.

<sup>366</sup> Arpa Emilia-Romagna, (2011), Annuario regionale dei dati ambientali, On line at: <http://www.arpa.emr.it>. Arpa Emilia-Romagna, (2012) Rapporto ambientale della integrazione al POR 2007-2013 della Regione Emilia-Romagna. Available at: <http://fesr.regione.emilia-romagna.it/documentazione>

CO2MPARE, (2013a), *Final Report*: Hekkenberg M. (ECN), Schram J. (Énergies Demain), Amerighi O. (ENEA), Keppo I. (UCL), S. Papagianni (CRES), ten Donkelaar M. (ENVIROS); ECN-O-12-038 – March. CO2MPARE, (2013b), User Tutorial: Hekkenberg M. (ECN), Vincent-Genod C. (Énergies Demain), Regina P. (ENEA), Keppo I. (UCL), Papagianni S. (CRES), Harnych J. (ENVIROS); ECN-O-12-038 – March.

CO2MPARE, (2013b), Technical background and guidance for deployment in EU regions: Hekkenberg M. (ECN), Le Pierrès S. (Énergies Demain), Del Ciello R. (ENEA), I. Keppo (UCL), Harnych J. (Enviros), Papagianni S. (CRES); ECN-O--12-032 -

**Table 3.3:** Original Financial Allocation of ROP Emilia- Romagna

Priority Axis	EU Fund contribution	National Fund Contribution	Composition of National Fund		Total Fund
	(a)	(b)=(c)+(d)	National public Fund (c)	National private Fund (d)	(e)=(a)+(b)
<b>Asse I – Ricerca industriale e trasferimento tecnologico</b>	42.218.240,00	72.109.924,00	72.109.924,00	0	114.328.164,00
<b>Asse II – Sviluppo innovativo delle imprese</b>	25.698.059,00	43.892.997,00	43.892.997,00	0	69.591.056,00
<b>Asse III – Qualificazione energetico ambienta e sviluppo sostenibile</b>	29.369.210,00	50.163.425,00	50.163.425,00	0	79.532.635,00
<b>Asse IV - Valorizzazione e qualificazione del patrimonio culturale e ambientale</b>	25.698.059,00	43.892.997,00	43.892.997,00	0	69.591.056,00
<b>Asse VI – Assistenza tecnica</b>	5.124.315,00	8.752.473,00	8.752.473,00	0	13.876.788,00
<b>Total</b>	128.107.883,00	218.811.816,00	218.811.816,00	0	346.919.699,00

Source: ROP 2007-2013<sup>367</sup>

In 2012 a large and densely populated area<sup>368</sup> in which 550 thousand people live, was hit by an earthquake of 5.8 magnitude. The area is characterized by high industrialization and flourishing agriculture; furthermore, it accounts for high employment rates (e.g. around 270 thousand employees at the time). In addition, the contribution to the national economy of the area affected by the earthquake was around 2% of GDP.

A new allocation of the budget followed and it included two new operational objectives, one for each axis, in priorities 2 and 4. These were introduced in order to ensure the level of competitiveness of the economic system of the affected areas and to support the recovery of the quality of life of the territory. Measure 2.02 accounted for an addition of € 22 million of euro in order to support business recovery and development. Measure 4.03 received 15 million more to stimulate economic activities and services. The adjustment to the budget thus aimed to also improve security of the area and transform the serious problems caused by the earthquake into new opportunities for sustainable development.

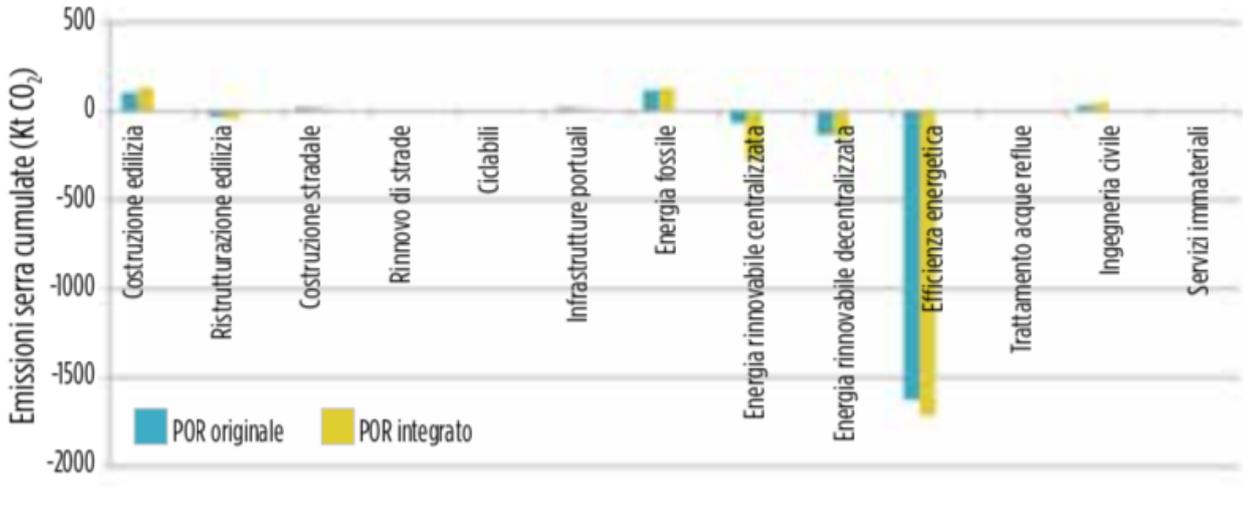
In this contest the CO2MPARE model has been used in order to verify the SEA adjusted with the integration post earthquake and to estimate the environmental effects in terms of CO2 emission resulting

<sup>367</sup> Regione Emilia-Romagna (2007), ROP 2007-2013 della Regione Emilia-Romagna, Available at: <http://fesr.regione.emilia-romagna.it/documentazione>. (Accessed December 27th 2018). Regione Emilia-Romagna, (2011), Secondo Piano attuativo 2011-2013 del Piano energetico regionale, Available at: <http://energia.regione.emilia-romagna.it/entra-in-regione/programmazione-regionale/piano-energetico-regionale>. (Accessed December 27th 2018).

<sup>368</sup> The area of 4 provinces (BO, MO, FE and RE). Further information are provided in materials available at: [http://valutazioneinvestimenti.formez.it/sites/all/files/sansoni\\_co2mpare\\_20nov13.pdf](http://valutazioneinvestimenti.formez.it/sites/all/files/sansoni_co2mpare_20nov13.pdf). (Accessed December 27th 2018). See also: Amerighi O., Cagnoli P., Del Ciello R., Forni A., Regina P., Sansoni M., Vignoli L. "Assessing CO2 emissions of regional policy programmes: an application of CO2MPARE to Emilia Romagna 2007-2013 regional operational program" in: Environmental Engineering and Management Journal September 2013, Vol.12, No. 9 Supplement, 237-240. Impact factor 1.117; <http://omicron.ch.tuiasi.ro/EEMJ/index.htm> eISSN 1843-3707. (Accessed December 27th 2018).

from the new investment additions. The effect of the added measures brought positive results. The 2.02 measure did implement activities of construction, renovation, demolition of buildings destroyed or heavily affected by the earthquake. In addition, during the reconstruction work, there was the opportunity to increase the energy use of the industrial sector, inclusive of renewable energy and energy efficiency use. Figures 3.6 and 3.7 below show the comparative results of the emissions scenario by sector and cumulative trends.

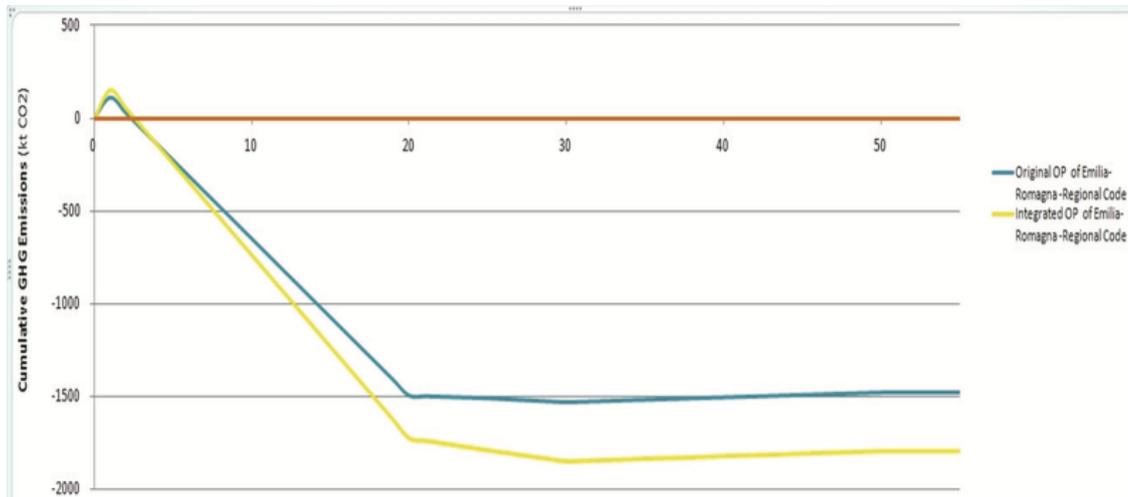
**Figure 3.6:** Emissions Scenario of the Original and Integrated OP of Emilia- Romagna Region by sectors



Source: Arpa Emilia Romagna

As reported in Figure 3.7, the blue line represents the original ROP, while the yellow is the adjusted one. The initial additional expenditure has brought a small but still noticeable increase in the emission, since higher construction site emissions (+45 kt CO<sub>2</sub>) for construction activities had been foreseen in the new objectives.

**Figure 3.7:** Emissions Scenario trends of the Original and Integrated OP of Emilia- Romagna Region



Source: Arpa Emilia-Romagna, 2011, 2012<sup>369</sup>

<sup>369</sup> Ibidem.

However, emissions are accounted to be offset during the lifetime span of the OP. There is a divergence among the two projection lines, because of operating emissions (-376 kt CO<sub>2</sub>) for better energy performance (energy efficiency and use of renewable sources) of new and redeveloped buildings and cumulative total emissions (-331 ktCO<sub>2</sub>) are lower.

### *Application to ROP Puglia*

The evaluation results of the ROP Puglia were presented at the XXXIV Italian conference of Regional Science<sup>370</sup>. The way in which the two scenarios were set is the following. The original data presented for the ROPs 2007-2013 are reported in Table 3.4.

**Table 3.4:** Original Financial Allocation of ROP Puglia

Priority Axis	EU Fund contribution	National Fund Contribution	Composition of National Fund		Total Funf
	(a)	(b)=(c)+(d)	National public Fund (c)	National private Fund (d)	(e)=(a)+(b)
Asse I - Promozione, valorizzazione della ricerca e dell' innovazione per la competitività	290 500 000	290 500 000	290 500 000	0	581 000 000
Asse II - Uso sostenibile e efficiente delle risorse ambientali ed energetiche per lo sviluppo	454 000 000	454 000 000	454 000 000	0	908 000 000
Asse III - Inclusione sociale e servizi per la qualità della vita e l' attrattività territoriale	285 000 000	285 000 000	285 000 000	0	570 000 000
Asse IV - Valorizzazione delle risorse naturali e culturali per l' attrattività e lo sviluppo	196 000 000	196 000 000	196 000 000	0	392 000 000
Asse V - Reti e collegamenti per la mobilità	525 000 000	525 000 000	525 000 000	0	1 050 000 000
Asse VI - Competitività dei sistemi produttivi e occupazione	551 000 000	551 000 000	551 000 000	0	1 102 000 000
Asse VII - Competitività e attrattività delle città e dei sistemi urbani	260 000 000	260 000 000	260 000 000	0	520 000 000
Asse VIII - Governance, capacità istituzionali e mercati concorrenziali ed efficaci	57 521 978	57 521 978	57 521 978	0	115 043 956
<b>TOTAL</b>	2 619 021 978	2 619 021 978	2 619 021 978	0	5 238 043 956

Source: Puglia - ENEA UTEE-GED Bari. <sup>371</sup>

<sup>370</sup> Del Ciello, R. , Camporeale, C. , Forni, A., Olivetti, I., Velardi, M. 2014 .Metodologie Di Stima Della CO<sub>2</sub> Nella Programmazione Comunitaria in Mazzola F., Musolino D., Provenzano F. Reti, nuovi settori e sostenibilità. F. Angeli, Collana Scienze Regionali n. 51.

<sup>371</sup> ENEA UTEE-GED Bari. Materials Available at: [http://valutazioneinvestimenti.formez.it/sites/all/files/regina\\_co2mpare\\_20nov13.pdf](http://valutazioneinvestimenti.formez.it/sites/all/files/regina_co2mpare_20nov13.pdf) (Accessed December 27th 2018).

For the first, the analysis concerned the program undertaken and applied until December 2012. The data were made available from the monitoring system MONIT that allowed registering the financial implementation of the OPs. Consequently, assessment qualification of the CO<sub>2</sub> emission related to the programming were on-going /ex-post. For the second, the analysis concerned the estimation of an ex-ante assessment of the CO<sub>2</sub> emissions impact of the new programming made by the region in December 2012. The elaboration carried out concerned the ERDF of the Puglia ROP as well as of the Interregional Operational Program (OPIN) Convergence<sup>372</sup>. However, not all OPIN items could be attributed to Puglia, hence, the amounts were divided equally between the 4 target regions of Convergence (Puglia, Calabria, Campania and Sicily).

For the elaboration of the OP in the model, MONIT data were used in relation to the projects already implemented in Puglia in December 2012. The total number of the projects was 7780, aggregated in the 86 categories of expenditure. Eventually, the funds allocated to each categories of expenditure were divided into the 26 SIC configured in the model. Thanks to the data on the financing funds, distinguished between EU and other funds, it was possible to calculate the leverage, an element that was used also for the preparation of the ex-ante exercise on the reprogramming data.

The first examination<sup>373</sup> of the monitoring data of what had been implemented by December 2012 shows that with respect to 2.377 billion euro provided by the EU funding, to which are added about 2.481 billion of other contributions for a total of 4.857 billion euro, the projects had generated total cumulative emissions of 5.9 Mt CO<sub>2</sub>. These emissions included those generated during both the construction phase and throughout the life of the intervention.

The second elaboration was carried out on the new ERDF and it included around 3.495 billion of EU funding, to which were added 2.988 billion of other contributions, for a total of 6.448 billion euros. The cumulative emissions so determined were negative, thus recording a reduction in emissions of 4.5 Mt CO<sub>2</sub>.<sup>374</sup> The comparison between these two scenarios shows that if the allocation of the new reprogramming funds reflected what had been achieved up to that time, there would be a considerable reduction in emissions, mainly linked to the implementation phase of the projects.

In addition, the model provides a summary indicator called "Carbon content indicator", which shows how close the Program was to clearing its emissions.

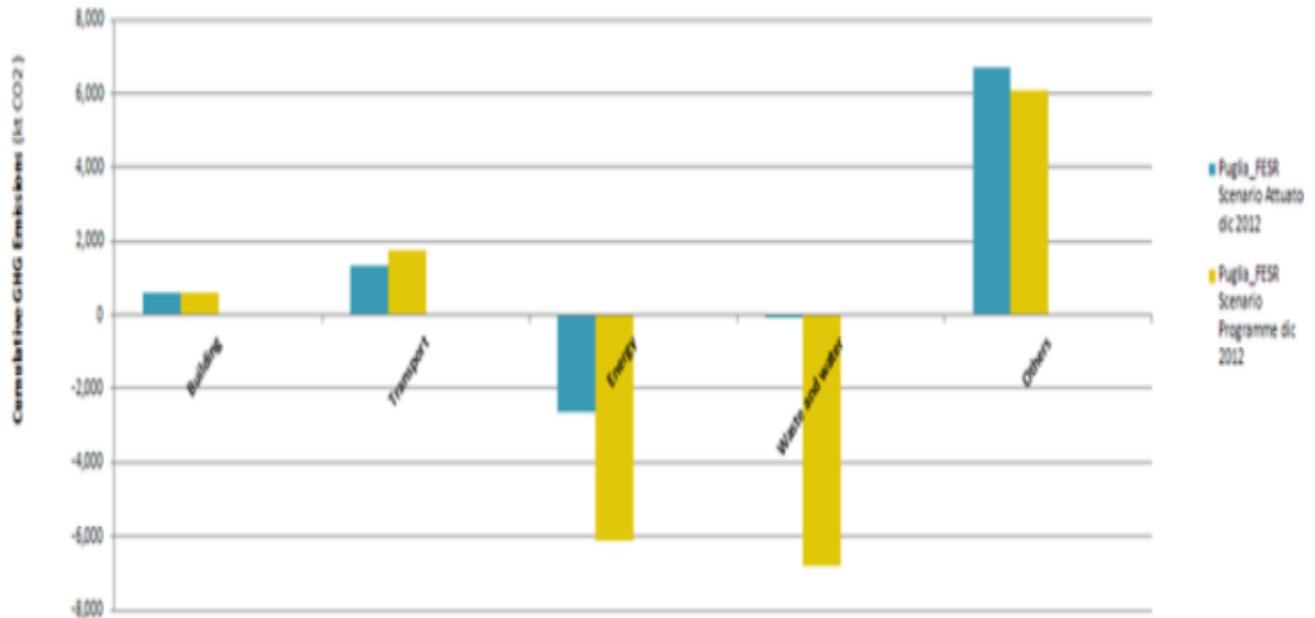
---

<sup>372</sup> Interregional Operational Programme

<sup>373</sup> Del Ciello, R., Camporeale, C., Forni, A., Olivetti, I., Velardi, M. 2014 .Metodologie Di Stima Della CO<sub>2</sub> Nella Programmazione Comunitaria in Mazzola F., Musolino D., Provenzano F. Reti, nuovi settori e sostenibilità. F. Angeli, Collana Scienze Regionali n. 51.

<sup>374</sup> *Ivi*: In assessing the emission impacts of what was planned, reference was made to what was found in the ex-post analysis of the program, both in terms of leverage and of the division between SIC and SIC targets. This means, in essence, that the processing of the new reprogrammed is based on what was recorded for the historical series.

**Figure 3.8:** Emissions Scenario of the Original and Integrated OP of Puglia Region by sectors



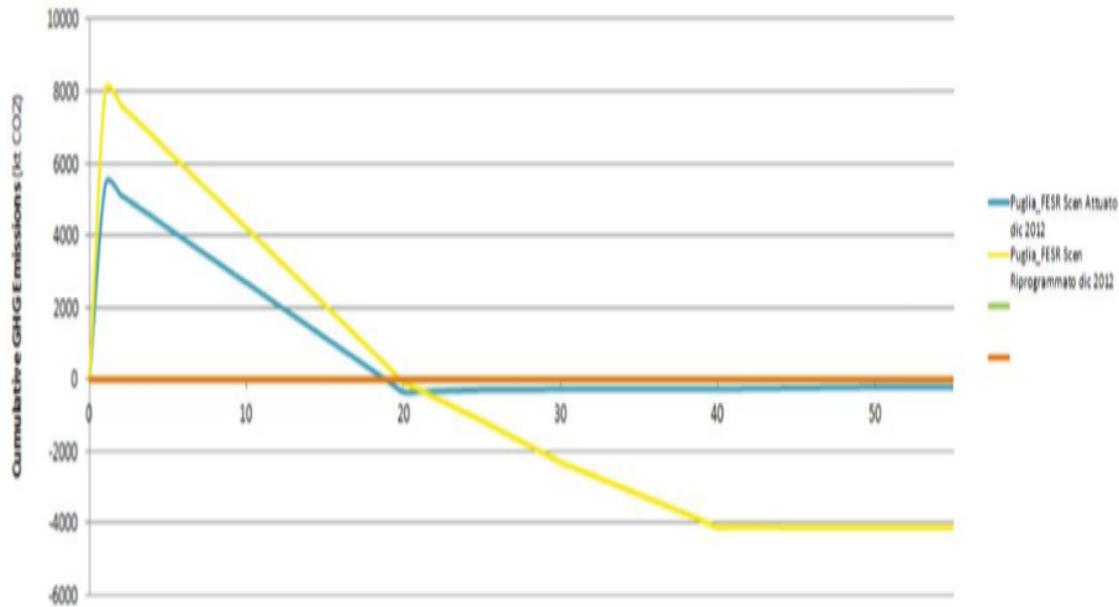
Source: Del Ciello, R., Camporeale, C., Forni, A., Olivetti, I., Velardi, M. 2014

The indicator ranges from 100 to -100 and includes the duration of emissions for all projects in the Program: compared to a Program that only contains emissive activities, the corresponding score would be 100, while for the one with only emission reductions the score would be -100; a program with a score of 0 is a carbon-neutral program. Thus, the Program scenario was closer to carbon neutrality (-16) than the Actuated scenario (+44). From the comparison of the division of the projects on the basis of the 5 priority themes, which is represented in Figure 3.8, it emerges that the major reduction in the Program scenario is linked to the Energy and the Waste and Water interventions.

The emission reduction linked to the Energy theme were linked to a delay in the start of the POIN. For what concerns the Waste and Water theme, the explanation was to be seen in the desire to increase improvement activities of the sewage and water network of the region, as well as other waste management and treatment measures.

The analysis of annual emissions for both scenarios, is characterized by positive emissions in the first years, corresponding to the implementation of the intervention, followed by the trend of annual emissions during use of the intervention. From the second year onwards the annual emissions linked to the second scenario shows a contraction of 88 kt CO<sub>2</sub> / year, lower than the one recorded in the first scenario, where CO<sub>2</sub> emissions contracted by 428 kt CO<sub>2</sub> / year.

**Figure 3.9:** Emissions Scenario of the Original and Integrated OP of Puglia Region



Source: Del Ciello, R., Camporeale, C., Forni, A., Olivetti, I., Velardi, M. 2014<sup>375</sup>

### 3.4.6 Beyond time inconsistency: model application in the new 2014-2020 Program Cycle

Recently, the ENEA has worked to update the model, and so allowing its application to all the Operational Programs of the 2014-2020 Programming Period.

Back to the 2007-2013 cycle, the validity has been ensured by the general provision that regulates the budget allocations of the funds. Furthermore, the Community in the 2014-2020 cycle provides obligation addressed to Funds Managing Authorities, requiring the use of 34 (ex 30) common indicator concerning the GHG reduction expected from the implementation of the OP measures. To measure their carbon impact, several Italian regions have therefore expressed interest in applying CO2MPARE to their Operational Programs.

In particular, the Autonomous Region of Sardinia (RAS) has decided to make use of the potential of the CO2MPARE model for the development and application of the environmental sustainability assessment methodology of its regional programs developed and proposed within the Strategic Environmental Assessment procedure. The RAS therefore supported the ENEA proposal for a Pilot Project whereby it was possible to:

<sup>375</sup> Hekkenberg, N., Le Pierrès, S., Del Ciello, R. Keppo, L., Harnych, J., Papagianno, S. 2012. CO2mpare. CO2 Model for operational Programme Assessment in EU Regions. Technical background and guidance for deployment in EU regions.

- program (and re-program) its own regional, national and European resources, having knowledge of the effects on GHG and having relevant information on physical achievements to use program indicators;
- incorporate elements of environmental sustainability into integrated planning; - having a monitoring tool capable of assessing the effects of implementation; -to support the Evaluation Unit in the elaboration of the *ex ante* evaluations and also of the on-going evaluation of relevance<sup>376</sup>.

The interest in the Pilot Project is also due to its consistency with the programmatic commitments undertaken by the RAS, which adhered to the "UNDER 2 MOU" Protocol (Subnational Global Climate Leadership Memorandum of Understanding) which sets precise objectives, in line with the levels of scientifically established emissions, to limit global warming to within 2 degrees Celsius and offers the opportunity for states, regions and cities to share experiences and best practices not only for the reduction of greenhouse gases and the promotion of renewable energy, but also for scientific research, the reduction of emissions in transport and, in general, the sustainability of production systems<sup>377</sup>.

The Pilot Project has two scenarios: an *ex ante* scenario, which refers to the program as originally defined in 2014, and a scenario on-going, or more correctly, re-programmed, given that this scenario incorporates the changes to the original program. Following the rescheduling of half the route taken at the end of 2017<sup>378</sup>.

### 3.5 Evidences

More difficult to define was the analysis to understand and establish the link between the CP contribution and impact. This link has been studied by many authors<sup>379</sup>.

The importance of the SEA approach and the relative absorption of inclusive processes such as spread of communication and fostering participation have been recognized by scholars as an achievement of environmental concern in an extended decision making process at strategic levels<sup>380</sup>.

From the test conducted, the results show that regions can allocate funding in measures that have a negative impact in terms of emission-related levels. At the same time, regions can compensate with the positive measures that reduce the impact of CO<sub>2</sub> or can be emission neutral. Without this kind of model, an informed assessment process is unlikely to be undertaken.

---

<sup>376</sup>Del Ciello, R., Mancuso E., Sanna S. 2018. La Valutazione Della Sostenibilità Ambientale E La Stima Delle Emissioni Climateranti Dei Programmi Operativi Regionali 2014-2020: Un Esempio Virtuoso Di Collaborazione Istituzionale Tra La Regione Autonoma Della Sardegna E L'enea. Xxxix Conferenza scientifica annuale AISRe, Bolzano, 17-19 Settembre 2018.

<sup>377</sup> *Ibidem*.

<sup>378</sup> *Ibidem*.

<sup>379</sup> Bachtler, J., & Wren, C. (2006). Evaluation of European Union Cohesion policy: Research questions and policy challenges. *Regional studies*, 40(02), 143-153.

<sup>380</sup> Sheate, W. R., Dagg, S., Richardson, J., Aschemann, R., Palerm, J., & Steen, U. (2003). Integrating the environment into strategic decision-making: conceptualizing policy SEA. *European environment*, 13(1), 1-18.

Information is systematized also thanks to the use of indicators that decrease the volume and complexity of the information that is required in the process of decision making. Scholars have studied the typology and the functioning of this. In the context of the SEA, indicators may be used to demonstrate the changes in environmental quality resulting from the implementation of plans and programmes. Indicators must provide appropriate information to enable objectives and targets to be addressed<sup>381</sup>. Hence another aspect that has to characterize indicators is the validity during the use, which is based on the scientific design that allows the driving of information<sup>382</sup>.

In conclusion, taking into account the previous considerations, the model CO2mpare introduces a quantitative measurement that allows:

- a) set of a model in which the indicator is not for the description of the context but is able to simplify a complex process in relation to its input and output;
- b) improvement of decision making thanks to the increase of reliable environmental information;
- c) improvement of decision making due to the elaboration of alternatives sustainable development actions;
- d) improvement of the monitoring activities and increase of materials available also for on-going and ex-post evaluation checking;
- e) regionalization of ratios and parameters (where possible), which may improve environmental and climate related knowledge, implementing the relative policy at the local level and contributing to the eradication of Business as usual schemes;
- f) increasing awareness of the effective connection among different operations that taken together may contribute to climate mitigation or to its contrary.

Figure 3.10 below shows the representation of the SEA before the introduction of the model, and after it. Even though both of them include the alternative scenarios, only the second allows a comparison less dependent on subjectivity.

However, a compensation of quality aspects has to accompany the indicators presented in the model elaboration. As demonstrated in the ROP Puglia, the CO2 reductions have to be justified in light of interconnected phenomena. Without an holistic view of the emission factors and their trend, the risk is to shift from an arbitrary interpretation towards a statistical bias.

---

<sup>381</sup> Donnelly, A., Jones, M., O'Mahony, T., & Byrne, G. (2007). Selecting environmental indicator for use in strategic environmental assessment. *Environmental Impact Assessment Review*, 27(2), 161-175.

<sup>382</sup> Bockstaller, C., & Girardin, P. (2003). How to validate environmental indicators. *Agricultural systems*, 76(2), 639-653.

**Figure 3.10:** Comparison among SEA without (up side of the image) and with (down side of the picture) Co2 impact

Valutazione comparativa tra scenari alternativi							
	Alternativa A0		Alternativa A1min		Alternativa A1max		Note
	Tendenza	Criticità	Tendenza	Criticità	Tendenza	Criticità	
Riduzione Emissioni di CO <sub>2</sub>	☹	☹	+	0	++	+	Per la Regione, in assenza di interventi strutturali sostanziali, nel medio periodo verosimilmente si confermerà l'attuale tendenza all'aumento del consumo energetico e del contributo emissivo che renderà pressoché impossibile il perseguimento degli obiettivi fissati dal PO

Programme : POR FESR 2007-2013			
	Proiezione attuato 2013	Attuato dicembre 2012	Riprogrammato 2011
ID Scenario :	9	10	12
Date of creation :	16/10/2013	16/10/2013	15/10/2013
Last modification :	08/08/2013	21/08/2013	14/10/2013
EU expenses (k€) :	338.467	281.751	338.467
No EU expenses (private & other public)(k€) :	788.186	1.071.521	788.186
Total (k€):	1.126.652	1.353.272	1.126.652
Construction phase emissions (kt CO2):	810	543	827
Operation phase emissions (kt CO2):	-1.762	-1.599	-2.782
Total cumulative emissions (kt CO2):	-952	-1.057	-1.955
Duration of CO2 evaluation (year):	Lifetime of projects	Lifetime of projects	Lifetime of projects
Carbon content indicator :	-26	-33	-52

Source: DG Regio Compare Report

## CONCLUSION

At this point, sufficient factors are available so that a reply to the research questions addressed at the beginning of this thesis seems possible. Thus, in the conclusions of the work the attempt is made to answer the two-part question that was articulated in the first chapter. This is to say, whether the CP addresses a EU action aimed at reducing carbon emissions or whether it does not. . Secondly, to respond to the second part of the question, considering the modality and the criteria according to which it is possible to determine the contribution of CP.

*CP is formally addressing de-carbonization through funding conditionality*

CP has continued to develop during the process of Enlargement and particularly during the Eastern Enlargement of 2004. From this evolutionary perspective, it can be seen that the policy has become much more than a mere exercise in redistributing funds from rich MS to the less wealthy ones, although this is still a fair characterisation of some of the financial decisions during the budgetary discussions and decisions.

More than that, CP has developed into a powerful regional development instrument in its own right with the potential to steer resources towards EU objectives and to improve administrative practices and culture across Europe. Across the interventions formulated for the purpose of including less favoured regions in the market mechanisms that animate the process of European integration, the environmental concerns have been gaining more spaces. The problem at the basis of human proactive action - and so the action in the policy framework - in the Anthropocene consists of facing continuously the application of the principle of sustainability to practice. It is frequently the case that the triangle of sustainable development paradigm, in which economic and social development may coexist with the environmental dynamics and so that they mutually support each other, turns into a trilemma of sustainable development, in which the options available seem to include just two out of the three poles. The categorization of what belongs to EP and what is outside the definition provided by the label – in other words, what is processed under formalized norms and what is not - in part persists, while in part it is on the way to be overcome by a more holistic approach that may support the abatement of the sustainability trilemma.

The answer to the first question finds the majority of the elements in the central part of the study, drawing on the experiences of the programming cycles during the Enlargements. Especially the Eastern Enlargement polarized the attention on the economic-environmental dimensions of the integration, increasing the attention on what were the gaps that divided countries.

Having considered both the documentation of the Commission and other EU bodies such as the Court of the Auditors, and the way in which the process of Europeanization has been applied in its operational dynamics of the CP introducing horizontal pro-environmental elements in the OP, the role of the CP in the reduction of emissions in the cycle 2007-2013 has been verified. A better definition of the action framework

has then been oriented by EC Communication: “GDP and Beyond. Measuring Progress in a Changing World” Com (2009) 433 and formalized with the Regulation of the European Parliament and of the Council On “European Environmental Economic Accounts”.

### *CP carbon impact remains uncertain*

More difficult to define was the analysis to understand and establish the link between the CP contribution and impact and it finds the same toughness in determining results in terms of emission reduction. Indeed, different elements took place and are considered in order to answer. Undoubtedly, the first has a structural nature and is concerned with the introduction of an indicator system that, despite being present in reference to the emission condition, is more often than not oriented to give a definition of a contest rather than the related dynamics in order to measure the policy results.

So, on the theoretical point of view, the emission impact of CP gives rise to the issue of causality-effect condition that is difficult to determine when there are heterogeneous dynamics like those that occur in the national or regional OP interventions. Practical limits are the difficulties in measuring, finding data and the need for personnel who are continuously trained to use their sources. Furthermore, the administrative staffs are engaged with objectives considered primary such as employment and social inclusion.

The lack of a vision of medium and long-term on issues such as the environmental ones is then one of the first barriers that are obstacles in terms of the implementation of new practices of evaluation. This vacuum increases the distance between economic self-sufficiency and the implementation of environmental safeguards. In part, environmental and national authorities have acted compensating the lack of coordination. Indeed, the role of institutions involved in the development of this type of accounting promotes the dissemination of new accounting methods. Without these institutions, the activity of administrative entities could not be updated in the light of new environmental needs.

The technical and statistical limits are intrinsic in the quantitative study. A possible solution for the improvement of the current state of the model lies in the creation and/or reinforcement of the synergy between socio-political and technical-scientific approaches. Their cooperation is often seen as an irreconcilable binomial, but in reality they are two sides of the same coin whose value must be rediscovered. The Commission itself has expressed the necessity of convergence among these two fields as demonstrated by the call for tenders in 2011.

The methodological approaches for the calculation of the carbon impact have been developed to simplify procedural passages required in order to approach these themes. Conversely, scientific development has allowed enlarging the interconnections among concurrent operations, improving the quality of the feasibility of ex-ante assessment processes.

Therefore, the expenditure-unit of emission association has brought the environmental and economic dynamics closer together even at the level of the less favoured regions, as demonstrated by the convergence region test in the South of Italy.

There are several perspectives that are reasonable to consider as opportunities to improve the current state of evaluation of the CP carbon impact.

One opportunity is given by the weak - but at least present – suggestion provided in the Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment by the Commission in 2015. Using the model as it is, the comparison among emissive effects of OPs remains difficult. Nevertheless the model is useful for identifying the alternatives of development plans and is applicable also in on-going evaluation. Another opportunity is provided by the bottom up stimulus that came from some MS that are strengthening the carbon impact approach in cooperation with institutional bodies such as the ENEA in Italy. These signals are the proof that there is the possibility to achieve the strategic integration of the environmental concerns cited in chapter 2.

In addition, during the current cycle (i.e.2014-2020), the orientation towards result achievement has implied a revision of assessment procedure and impact examination, as elements that contribute to policy change.

The thesis has contributed to identify also the weaknesses that affect the institutionalization of carbon footprint assessment. The position taken by the Commission for the indicators adopted for the cycle 2014-2020 does not really correspond to a formal statement and practical necessity to have more details on the impact of the resources allocated, that have to be evaluated not just and not only under the perspective of expenditure capacity, but also according to the results achieved.

As mentioned in chapter 3, it is the Commission that directs the work for the CP in the interest of the Union. So if the Commission does not act to coordinate the evaluation methods defined in the criteria, thus fulfilling the role that the institutions have to define behaviour of the individual components of the system, such as MS and regions are, it is difficult to think on a spontaneous coordination of indicators.

## *Policy Recommendation*

The thesis aims to provide a contribution to the field of discussion concerning the EU Funds by articulating a suggestion applicable without extreme efforts.

The first suggested step implies a deepening focus on the carbon impact of the CP contributing to explain and not just to describe the emission phenomena. This can be done in the occasion of the ex post evaluation at the end of the current programme cycle 2014-2020. During this phase of the evaluation, certain elements have to be discussed as:

- the state of the carbon impact indicators, whose validity may emerge from mapping the typology of indicators used and the analysis of the best practices;
- the analysis should be conducted in order to differentiate the fields of application, but maintaining for each field the criteria of universal application in the EU context and at the best level of regional accuracy for the data collection;
- the ascertainment of the current condition of environmental network capability to support low-carbon transition in the EU MS, evaluating whether or not they may be capable to provide support also through training activities and data acquisition;
- the attempt to match the estimation of CO<sub>2</sub> in relation to the areas identified by the Commission and highlighted in chapter 2.

There are not sufficient points of information to provide a comment concerning the programme cycle 2021-2027. The Brexit and the possibility to have a EU at different speed are evident signs of disaggregation.

As far as it goes, CP policy contributes to foster an harmonized path of development within the EU in spite of the diversity occurring at the national level. So, the CP is an element that contributes to the consolidation of those steps that allows to move from politics to policy and from policy to politics as Lowi would say. The general EG dynamics occurring at the international level finds threat and opportunities at lower levels, in which practical actions can truly be carried out. A clearer definition of the CP impact would help to include less developed regions of the EU in the framework of environmental actions, stimulating harmonization of the interventions whereof otherwise the meaning and overall scope would be missed. Replying to the issue addressed in the last part of chapter 1, being a factor of harmonization CP would so contribute to reinforce the unity of the EU and consequently to enable it to better perform e in its proper role of the international level.

## ANNEX

Interview with Roberto del Ciello<sup>383</sup>.

Technical and Strategic Support Unit

Department of Sustainable Development for Productive System and for Territorial Development – ENEA

### ***Question (Q): What is the origin of the Co2mpare Model?***

*Answer (A): The reason why Co2mpare model has been formulated arises from two main inputs. On the one hand, it responds to the necessity of fund managers of having a tool to evaluate both the socio-economic as well as the ecological impact of a given investment. On the other, it responds to the request of the Regional DG to share a sound methodology to fulfil the lack of quantification of the impact in terms of GHG emission in the issuance of programs. Compare enriches the assessment required by the SEA (Strategic Environmental Assessment). Compare manages to overcome the merely subjective and qualitative aspects that belonged to the SEA for the 2007-2013 evaluation.*

*The model was formally formulated in 2011, after the call for proposal of the DG Regio, amounting to 860 thousand euros. ENEA responded to this call in conjunction with a heterogeneous consortium composed of Énergies Demain, University College London (UCL), ENVIROS and The Centre for Renewable Energy Sources and Saving CRES. The Energy Research Centre of the Netherlands ECN had the role of coordinator.*

*The consortium involved also other DGs. The duration of the project in order to conclude the work for the formulation of programs for the new cycle was of one year, so during 2012. In sum, Compare has explicitly become the answer to the Commission's necessity to respond to the manifested need to value the impact in co2 terms of the operational programs co financed by the EU structural funds and to quantify the impact through a relevant set of common indicators.*

### ***(Q): Is Co2mpare the first successful attempt of investment-related carbon footprint measurement?***

*(A): Before the interest addressed by the Commission in the cycle 2007-2013, there had already been preliminary studies in this field. For what concern the Italian case, ENEA had already understood the need for the development of a tool of this kind. This objective has found a corresponding support from the evaluation unit of the Department for Cohesion and Development Policies (i.e. QUSN evaluation by region) in 2010. In practice, the request forwarded by this Department addressed the direction of the work towards*

---

<sup>383</sup>Interview of the 21 January 2019.

Interview Transcription has been made with respect of consent conditions.

*a more accurate quantification of assessment impacts for the operational programs. The particularity of the impact quantification was the direct link among investment impact and GHG reduction. Even though the evaluation was already oriented towards the direction undertaken in the following years, the application was limited to few sectors (Energy, Transport, Waste). This first attempt allowed to develop skills for the development of the next model, deriving from studies on the evaluation carried out.*

*The application of the preliminary model has been applied to review ex ante estimations presented by the managing authorities. From the calculation performed by ENEA, that were evidently more accurate since they enjoyed a more robust and well defined methodology, the necessary measures have been taken to correct forfeit estimates.*

*A second passage that tested the validity of the approach was not foreseen, and so it is even more interesting. An audit of the EU Court of Auditors requested a note on the revised data proposed by ENEA. In light of the comparison, the data presented by the ex ante management authority were evidently arbitrary, and the procedural revision of the model have avoided severe sanction consequences.*

*However, it has to be said that other Agencies have contributed substantially to the model as it is today. Above all, the involvement of the French team Énergies Demain is predominant since it has had the merit of introducing a modelling structure deriving from a previous research experience named NECATER.*

*The French archetype was focusing on the measurement of operational program effects in relation to carbon neutrality, so taking into account the balance between additional emissions and those avoided and / or reduced in relation to the operational programme investments.*

***(Q): Which are the elements that would ensure scale-up application of the model?***

*(A): In the first place, the characteristic of universality, since the model has been developed as a generic model. This element was clearly stated in the request of the DG, which imagined the implementation of a tool applicable throughout Europe. So a model that can theoretically be applied on different territorial areas and levels as 27 member states, 123 nuts I, 296 NUTS II.*

*Within the mandate's constraint, the universality was accompanied by a corresponding flexibility, necessary to take into account the territorial specificities of each area. For this reason, the call for proposals has foreseen the involvement of testing regions. In the 2012 project they were five: two of which were Italian and were Puglia and Emilia Romagna. Other regional territories were Czech Republic (with the exclusion of the Prague area), Crete (Greece), and Zuid Holland (the Netherlands).*

***(Q): Which role have the NUTS II played in testing Co2mpare model?***

*(A): The regions have allowed the practical sedimentation of the model. They had provided data; feedback and demonstrated the effectiveness of the model. Their involvement has highlighted another feature that*

characterizes Co2mpare model, which is the regionalization of the parameters, which is by default available for test and non-test regions.

**(Q): Which is the methodology behind the Investment – emission relations?**

(A): The model is based on three diverse blocks.

The first deals with the economic amount of the investments. The impact in terms of CO<sub>2</sub> emissions of an operational program is based on the financial allocation of the available budget. For the 2007 – 2013 period, the available budget was divided into a maximum of 86 categories or priority themes; which have increased up to 104 in the 2014 – 2020 programme cycle. This diversity in spending categories, emerged as a consequence of the changes introduced with the new programme period, had led to an evolution of the model rather than an alteration of its original structure. It has to be specified that the spending categories are not defined for their functionality in terms of emissions estimates. They rather reflect a formal (financial) articulation of the budget.

The second concerns the breakdown of the generic amount of economic resources in categories that are involved in the release of CO<sub>2</sub>. So, the main problem solved was to return each category of expenditure to a library of different categories called SIC (standardized Investment components), that eventually have turned into a list of 26.

The third block regards the allocation of expenditure in the same expenditure category. Furthermore the model is able to recognize direct or indirect emission production, and recognize emission production according to the phase of the programme. In essence, the model is able to recognize the emission produced in the preliminary phase and on-going.

Thanks to this architecture, the model allows comparison and evaluation *ex ante* of scenarios deriving from different budget allocation by sector and by action within the same sector.

The financed interventions contribute to a series of physical or intangible activities that are realized or consumed, whereof carbonic impacts are calculated from the model with a series of coefficients – or ratios - which altogether are 1700. Following the algorithms calculation, the model proceeds from the allocation of the program amount to the main investments areas to co<sub>2</sub> association. Then it proceeds to re-aggregate emissions for the whole program. In summary, the program broadcasts the amount of investments and the amount of the emissions.

Eventually, the last value obtained from the computation can be positive or negative. In the last case it indicates that the emissions avoided or reduced exceed those produced, for example in the initial phase. Compare was born to estimate the carbon impact but it is also useful for the management authority to determine *ex ante* the indicators avoiding randomness.

***(Q): Which is the importance of Standardized Investment Components (SICs)?***

*(A): The main categories of investments are divided into five macro areas: Building, Energy, Transports, Water, and Others which is a miscellaneous. The five macro areas detail other sub-categories in order to penetrate quite deeply and to grasp the main dynamics related to the macro sectors.*

*An example useful for understanding is the one involving the building sector. Firstly, the categorization of activities under the building sector depends to a large extent on its functionality, since it is different to foresee the restructuring of a hospital with respect to a private residence. Furthermore, restructuring activities may require different types of intervention due to the nature of the action itself. Changing the colour of a wall surface does not imply the same effect as changing frames or changing the thermal insulation system of the building. Consequently, not all of them have a significant impact in terms of co2. The model therefore captures both types to provide a realistic representation of the action to undertake, but according to a standardization which is essentially the restraint of categories and sub-categories in a restricted list.*

***(Q): How is the universality of the model matched to the sub-regional specificities?***

*(A): A process of model regionalization is allowed thanks to the coefficient section. The shift from the standard model to the contextualized one is possible by modifying a series of operations that belong to two main domains.*

*The first action to undertake is the understanding and determination of the objectives to achieve, and consequently the accurate determination of the financial data allocation in order to pursue that achievement. This passage is pragmatically undertaken in the transition from financial allocations and sic categories.*

*The second is the regionalization – or contextualization - of the coefficients. Even though the model contains all the necessary coefficients, they often are national or European averages available. The possibility to modify coefficients' values and update the model make the approximation more precise, and so more context-based. The more knowledge and local data availability there are, the more precise and the more useful is the use of the model. By setting, the model visualizes the ratio managements for the purposes of regionalization. Nevertheless, not all the coefficients have been prepared to be modified.*

*The consequent hierarchical order derives from the fact that some elements (i.e. the indirectly emitted co2 bound in cement) do not have a regional dimension. This is equal to those coefficients that do not change according to the local context, but ultimately depend on the type of action (use of cement). On the contrary, other coefficients that involve the cost of construction or those related to energy efficiency are strongly influenced by the regional dimension.*

**(Q): Are there any temporal limit to the application of the model?**

(A): *The expenditure categories are defined by the ERDF investment guidelines, which are valid in all the EU MS, supporting the universality of the model previously stated. Since completed in 2012, the workers that contributed to the elaboration of the model have taken into account the possibility of not binding the model in a single programme cycle. Since the programming of 2014-2020 was not in progress - it was created in such a way as not to be bound by variations deriving from subsequent programming. So, the various and future adjustments may be fostered just as a reformulation of the financial architecture without altering the dynamics of the model, which remains essentially unchanged. To give a pragmatic example, the procedure to update categories for the cycle 14-20 has firstly passed through a phase of comparison among the old and new ones; secondly the match had brought out the areas of correspondence and eventually the areas of divergence. This passage has occurred through the "program management" interface, in which the activation of coefficients by category of expenditure have been inserted again in the skeleton of the program.*

**(Q): Is Co2mpare limited to which type of funding scheme?**

(A) *For what concerns the origins of resources, they may also be different from those of the ERDF, for example funds may belong to a public contribution typology.*

*On another perspective it has to be said that Compare was born to measure OPs' impacts. This implies that its application can be admitted also for regional energy plans, as well as transport plans. It may be applied to plans and programs, however it does not suit well the CO2 impact of singular projects. This points out the interpretation of the limit of Co2mpare application; it is sufficient to recall the area of application of the SEA, to which Co2mpare refers. The single intervention already has the possibility of being monitored and evaluated with indicators, instead it appears clear the aim of filling a lack in the procedure for the evaluation of plans that contain heterogeneous interventions as the regional and national OP may be. It is in order to cope with this heterogeneity that we resort to a more accurate modelling.*

**(Q): In which moment of the programme cycle could Co2mpare be used?**

(A): *The model can be used ex ante - in itinere and ex post. It is up to the referent of the programme, whose decisions for allocating economic resources are based on preferences dictated by the achievement of primary objectives, such as employment and economic development.*

*With this tool it is possible to highlight the interaction between economic impact and carbon impact in different scenarios. So the model allows a conscious comparison predominantly in the ex ante phase.*

***(Q): How receptive had the Public Administration been in Italy with respect to the absorption of this new method of evaluation? And was there a line of continuity after the end of the test phase?***

*(A): Taking into account that the model was completed at the end of 2012, the tool already had the intent to project itself into the next programming. At the European level there has been just a single presentation in June 2013 held in Brussels, to which the European network of environmental authorities and managing authorities have participated, however without a general opinion on future implementation.*

*ENEA was concerned to implement this initiative as far as possible within the Italian territory, divulging the model in a presentation in November 2013.*

*In March 2014, The National Rural Network manifested interest towards the initiative because, as I had foreseen, with the due adjustments the model would fit also rural development plans. However, the planning for rural development plans is very different, both from a sectoral point of view as much as for the need for technical specialization. Between September and December 2014, ENEA carried out a series of training activities, solicited by the UVAL and funded by FORREZ in order to respond to a need to promote and disseminate the skills needed to use the tool. The activity consisted of 10 modules, each of which included two days. A total of 62 technicians participated in the activities, representing 17 regions. Therefore, beyond the test regions, efforts have been made to maximize the dissemination of the instrument.*

*Nevertheless, the implementation has certain limits. In the first place, the learning process do not manifest immediately results in term of praxis consolidation. In other words, it is not likely that after a training schedule the person in chief is going directly to determine a change in the administrative culture of his/ her office. A second aspect that is connected to the first is that consolidation of a change is difficult to occur without sistematic practice and without a clear direction and organic coordination at different levels.*

*There has been an input from local administrations that is worthy to be mentioned. From the administrations aware of the initiative, in particular from the one representing the region of Piemonte which has been the leader of the State-Regions Conference at the beginning of the new cycle, a communication has been sent to the Ministry of the Environment, requiring a major effort in the direction of increasing the carbon footprint assessment. The communication contained also the explicit reference to work undertaken by ENEA and its role for a follow-up of the model. Consequently, the Ministry has contacted ENEA for involvement in a further project. However, once the new configuration was produced, the model was made available on free sources online on the ENEA website in order to increase the diffusion of the tool also for those who would have not been included in the project.*

*To be precise, the interests manifested by the administrations have concerned more the ex post evaluations of the 2007-2013 cycle as it could appear obvious from the premises. However, what is not obvious is the*

*motivation that has pushed the administrations to get interest in the model. The interest to use the model was amenable to differential sensitivity to the topic, that varies on a case by case basis. The same logic has been applied to the ex ante evaluations of the new programming.*

***(Q): Which is the current state of play for the application of the model in Italy?***

*(A): Three years after the start of the 2014- 2020 period, the Department for Territorial Cohesion has started a project with ENEA concerning the improvement of public administration in the field of Governance development. This project particularly looks at the managing authorities, and outlines 51 lines of activity, of which two main aspects are pregnant in relation to the enforcement of the model diffusion. So, in the ESPA Program it was possible to start the 3.1.1 action which ideally can concern the managing authorities and covering 27 programs among National and Regional OPs.*

*Summing up, progress is likely to be achieved, considering the large participation of 17 regions out of 21 in the Italian territory, even though or maybe above all on the voluntary basis of the interests. Among the regions that have participated in training courses, and that in September 2017 have initiated contacts to get closer to the model are regions such as Sardinia, Umbria, Liguria, Calabria. Other regions are more problematic to include, also because they are facing renewal of their electoral bodies and the managing authority.*

*In this situation, an aspect to take into consideration is the following: given the current state of play, it is not reasonable to assume a full coverage for training and monitoring activities for all the Italian regions. One limit derives from the lack of support to reinforce the coordination among different levels. Another concerns the fact that projects usually last three years, in which a continuous commitment has to be ensured. So at current levels of available resources, the overbooking of region would not correspond to a improvement in the sedimentation of the approach.*

*Lastly, time and the sense of timing plays a role as well in the evolution of the mindset, as it is clearer looking at the case of Sardinia. The region has responded positively since 2014, and has worked enthusiastically on the implementation of the initiative; however, almost four years passed before the project officially began in 2018. This mismatch may be a factor of delay to consider in the phase of analysis of implementation and evaluation.*

***(Q): What potentiality can be foreseen for the future?***

*(A): For what concerns the extension of the model, further achievements may be reached in the extension of the evaluation also for chemical substance and other sectors of investments as previously said.*

*For what concerns the implementation on the national territory, the duality of the country persists and is anchored to territorial differences from north to south. This is accentuated by political instability deriving from electoral cycles. It must be stressed that training in itself is not enough, even though it is highly recommended.*

*Therefore, a mutual collaboration across the vertical dimension of the EU is desirable, since the higher levels may incisively imprint a direction across and within the MS.*

## Bibliography

### Chapter 1

Agenda 21: Programme of Action for Sustainable Development; Rio Declaration On Environment and Development ; Statement of Forest Principles: The Final Text of Agreements Negotiated By Governments At the United Nations Conference On Environment and Development (UNCED), 3-14 June 1992, Rio De Janeiro, Brazil. New York, NY: United Nations Dept. of Public Information, 1993

Alcamo, J., Krol, M., & Posch, M. (1995). An integrated analysis of sulfur emissions, acid deposition and climate change. *Water, air, and soil pollution*, 85(3), 1539-1550.

Aldy, J. and Stavins, R. (2010) *Post-Kyoto International Climate Policy*, Cambridge: Cambridge University Press.

Bäckstrand, K., & Elgström, O. (2013). The EU's role in climate change negotiations: from leader to 'leadior'. *Journal of European Public Policy*, 20(10), 1369-1386.

Boden, T.A., G. Marland, and R.J. Andres. 2017. *Global, Regional, and National Fossil-Fuel CO<sub>2</sub> Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. doi 10.3334/CDIAC/00001\_V2017*

Brauch, H. G., Spring, Ú. O., Mesjasz, C., Grin, J., Kameri-Mbote, P., Chourou, B., et al. (Eds.). (2011). *Coping with global environmental change, disasters and security: threats, challenges, vulnerabilities and risks* (Vol. 5). Springer Science & Business Media.

Brown, L. R. (2001). *State of the World, 2001: A Worldwatch Institute Report on Progress Toward a Sustainable Society*. WW Norton & Company.

Chaban, N., Elgstrom, O., & Holland, M. (2006). The European Union as others see it. *European Foreign Affairs Review*, 11, 245–262.

Chakrabarty, D. (2015). The Anthropocene and the convergence of histories. In *The Anthropocene and the Global Environmental Crisis* (pp. 56-68). Routledge.

Christoff, P. (2010). Cold climate in Copenhagen: China and the United States at COP15. *Environmental Politics*, 19(4), 637-656.

Clark, William C.; Crutzen, Paul J.; Schellnhuber, Hans Joachim, 2004: "Science and Global Sustainability: Toward a New Paradigm", in: Schellnhuber, Hans Joachim; Crutzen, Paul J.; Clark, William C.; Claussen, Martin; Held, Hermann (Eds.): *Earth System Analysis for Sustainability* (Cambridge, MA: MIT Press): 1-28.

Crutzen, Paul J. And Eugene F. Stoermer, (2000). The "Anthropocene". *Global Change Newsletter* 41: 17-18.

Diamond, J. (2005). *Collapse: How societies choose to fail or succeed*. Penguin.

Diamond, J. (2013). *Guns, Germs And Steel*. Random House.

Draxler, R. R., McQueen, J. T., & Stunder, B. J. (1994). An evaluation of air pollutant exposures due to the 1991 Kuwait oil fires using a Lagrangian model. *Atmospheric Environment*, 28(13), 2197-2210.

- EDGAR. Emissions Database for Global Atmospheric Research. (2018). <http://edgar.jrc.ec.europa.eu/overview.php?v=CO2andGHG1970-2016> (Accessed December 13th 2018).
- Ehlers, E. (2006). Earth system science in the anthropocene. T. Krafft (Ed.). Springer.
- Environmental Migration Portal. Knowledge Platform on People on the Move in a Changing Climate. Available at: <https://environmentalmigration.iom.int/maps>. (Accessed December 13th 2018).
- FAO. Food and Agriculture organization. Emissions by sector - dataset information. Retrieved from: [http://fenixservices.fao.org/faostat/static/documents/EM/EM\\_e.pdf](http://fenixservices.fao.org/faostat/static/documents/EM/EM_e.pdf). (Accessed December 13th 2018).
- Gaffin, S. R., & O'Neill, B. C. (1997). Population and global warming with and without CO<sub>2</sub> targets. *Population and Environment*, 18(4), 389-413.
- Higgott, R. (2006). The theory and practice of region: the changing global context. In *Regional Integration in East Asia and Europe* (pp. 35-56). Routledge.
- IEA. International Energy Agency. Energy Efficiency 2017 Report Series Retrieved from: [https://www.iea.org/publications/freepublications/publication/Energy\\_Efficiency\\_2017.pdf](https://www.iea.org/publications/freepublications/publication/Energy_Efficiency_2017.pdf) (Accessed December 20th 2018)
- IGBP (2015, January 15) Planetary dashboard shows “Great Acceleration” in human activity since 1950. Retrieved from: <http://www.igbp.net/news/pressreleases/pressreleases/planetarydashboardshowsgreataccelerationinhumanactivitysince1950.5.950c2fa1495db7081eb42.html>. (Accessed December 20th 2018)
- IPCC. Intergovernmental Panel on Climate Change report. Documents available at: <https://www.ipcc.ch/ipccreports/tar/wg1/012.htm> (Accessed December 20th 2018)
- James J. McCarthy, Groupe d'experts intergouvernemental sur l'évolution du climat, Intergovernmental Panel on Climate Change. Working Group II. 2001)
- Jamieson, D. (2014). *Reason in a dark time: why the struggle against climate change failed--and what it means for our future*. Oxford University Press.
- Jamieson, D. and Bonnie Nadzam. (2015). *Love in the Anthropocene*. New York: OR Books LLC.
- Keohane, R.O. and Nye, J.S. (1977) *Power and Interdependence*. World Politics in Transition, Boston, MA: Little Brown
- Keohane, R. O. (1989). *International institutions and state power: Essays in international relations theory*.
- Kiss, A., & Shelton, D. (2007). *Guide to international environmental law*. Brill.
- Knox, J.H. Independent Expert on Human Rights and the Environment at "The Development of Environmental Human Rights". Statement available at: <https://www.ohchr.org/en/NewsEvents/Pages/DisplayNews.aspx?NewsID=15274> (Accessed December 20th 2018)
- Krupa, S. V., & Kickert, R. N. (1989). The greenhouse effect: impacts of ultraviolet-B (UV-B) radiation, carbon dioxide (CO<sub>2</sub>), and ozone (O<sub>3</sub>) on vegetation. *Environmental Pollution*, 61(4), 263-393.

Lorber, M., V. Wang, Y. Walker, AND P. Gillooly. Impacts Of Dioxin Emissions From The Shinkampo Incinerator To The U.S. Naval Air Facility At Atsugi, Japan.

Marsh, D. R. (2005). Friends and foes: Industrialised countries in multilateral environmental negotiations. In A. C. Kallhauge, G. Sjöstedt, & E. Corell (Eds.), *Global challenges: Furthering the multilateral process for sustainable development* (pp. 144–170). Sheffield: Greenleaf.

Mauna Loa Observatory - NOAA Earth System Research Laboratory. Retrieved from: <https://www.esrl.noaa.gov/gmd/publications/search2.php?abstract=Mauna+Loa> (Accessed December 20th 2018)

McCarthy, J. J., Canziani, O. F., Leary, N. A., Dokken, D. J., & White, K. S. (Eds.). (2001). *Climate change 2001: impacts, adaptation, and vulnerability: contribution of Working Group II to the third assessment report of the Intergovernmental Panel on Climate Change* (Vol. 2). Cambridge University Press.

Nakićenović, N., Grübler, A., Inaba, A., Messner, S., Nilsson, S., Nishimura, Y., et alia. (1993). Long-term strategies for mitigating global warming. *Energy*, 18(5), 401.

North, D.C. (1990) *Institutions, Institutional Change and Economic Performance*. Cambridge University Press.

OECD Online. (July 2018). Oxford University Press. Retrieved from: <http://www.oed.com/view/Entry/63089?redirectedFrom=environment> (accessed November 29, 2018).

Ogawa, Y. (1991). Economic activity and the greenhouse effect. *The Energy Journal*, 23-35.

Olivier JGJ, Schure KM, and Peters JAHW. (2017). Trends in global CO2 and total greenhouse gas emissions. 2017 Report. PBL, The Hague.

Osamu Kunii, Shuzo Kanagawa, Iwao Yajima, Yoshiharu Hisamatsu, Sombo Yamamura, Takashi Amagai & Ir T. Sachrul Ismail (2002) The 1997 Haze Disaster in Indonesia: Its Air Quality and Health Effects, *Archives of Environmental Health: An International Journal*, 57:1, 16-22,

Parikh, J. K., & Painuly, J. P. (1994). Population, consumption patterns and climate change: a socioeconomic perspective from the south. *Ambio*, 434-437.

Parker, C. and Karlsson, C. (2010) 'Climate change and the European Union's leadership moment: an inconvenient truth?', *Journal of Common Market Studies* 48(4): 923–43. doi: 10.1111/j.1468-5965.2010.02080.x

Parry, S. and Murphy, J. (2013). Towards a framework for analysing interactions between social science and environmental policy. *Evidence and Policy: A Journal of Research, Debate and Practice*, 9(4), pp.531-546. DOI: 10.1332/174426413X1383 6455133196.

Plass, G. N. (1956). The carbon dioxide theory of climatic change. *Tellus*, 8(2), 140-154.

Press release. NobelPrize.org. Nobel Media AB 2018. Wed. 19 Dec 2018. <https://www.nobelprize.org/prizes/chemistry/1995/press-release/>. (Accessed December 20th 2018)

Ritchie, Hannah and Max Roser (2018) - "CO<sub>2</sub> and other Greenhouse Gas Emissions". Published online at OurWorldInData.org.

- Roberts, J. T. (2011) 'Multipolarity and the new world (dis)order: US hegemonic decline and the fragmentation of the global climate regime', *Global Environmental Change* 21, 776–84. doi: 10.1016/j.gloenvcha.2011.03.017
- Sabatucci, G. Vidotto, V. (2008). *Storia Contemporanea. Il Novecento*. Bari, Editori Laterza
- Science for Environment Policy: European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol on the base of Parry, S. and Murphy, J. (2013). Towards a framework for analysing interactions between social science and environmental policy. *Evidence and Policy: A Journal of Research, Debate and Practice*, 9(4), pp.531-546. DOI: 10.1332/174426413X13836455133196
- Selden, Thomas M., Song, Daqing. (1994) Environmental Quality and Development: Is There a Kuznets Curve for Air Pollution Emissions? *Journal of Environmental Economics and Management*. Volume 27, Issue 2, September 1994, Pages 147-162. <https://doi.org/10.1006/jeeem.1994.1031>
- Selim, J. (2015). Human Development Report 2015. Work for Human Development. New York, NY: United Nations Development Programme (UNDP). Retrieved from [http://hdr.undp.org/sites/default/files/2015\\_human\\_development\\_report\\_1.pdf](http://hdr.undp.org/sites/default/files/2015_human_development_report_1.pdf).
- Shiklomanov, I. A. (1990). Global water resources. *Nature and resources*, 26(3), 34-43.
- Simmons, B. A., & Martin, L. L. (2002). International organizations and institutions. *Handbook of international relations*, 192-211. ISO 690.
- Sobel, A. (2012) *International Political Economy in Context*, Los Angeles: SAGE/CQ Press
- Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K. B., .et alia (2007). IPCC, 2007: Climate change 2007: The physical science basis. Contribution of Working Group I to the fourth assessment report of the Intergovernmental Panel on Climate Change. *SD Solomon (Ed.)*
- Svante Arrhenius, (1896), *On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground*, London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science (fifth series), April 1896. vol 41, pages 237–275.
- Steffen, W, Sanderson, A, Tyson, PD. (2004) *Global Change and the Earth System: A Planet Under Pressure*. The IGBP Book Series. Berlin, Heidelberg, New York: Springer-Verlag, 336 pp.
- Steffen, W, Crutzen, PJ, McNeill, JR (2007) The Anthropocene: Are humans now overwhelming the great forces of Nature? *Ambio* 36: 614–621.
- Telò, M. (2016). *Alternative Models of Regional Cooperation? The Limits of Regional Institutionalisation in East Asia*. In *European Union and New Regionalism* (pp. 111-138). Routledge.
- Tetsuzo Kitagawa (1984) Cause Analysis of the Yokkaichi Asthma Episode in Japan, *Journal of the Air Pollution Control Association*, 34:7, 743-746
- United Nations Department of Economic and Social Affairs. Commission on Sustainable Development (CSD). Retrieved from: <https://sustainabledevelopment.un.org/csd.html> (Accessed December 20th 2018)
- UNGA. United Nations General Assembly, United Nations Framework Convention on Climate Change : *resolution / adopted by the General Assembly*, 20 January 1994, A/RES/48/189, available at: <https://www.refworld.org/docid/3b00f2770.html> [accessed 19 December 2018]

UNEP: United Nation Environment Programme (2000) *Global environmental outlook 2000*.

UNEP. United Nations Environment Programme. Ozone Secretariat. (2000). *Montreal Protocol on Substances that Deplete the Ozone Layer as either adjusted and/or amended in London 1990, Copenhagen 1992, Vienna 1995, Montreal 1997, Beijing 1999*. Available at: [http://www.protocolodemontreal.org.br/site/images/publicacoes/programa\\_brasileiro\\_eliminaacao\\_hcfcs/Montreal\\_Protocol\\_Partnerships\\_Changing\\_the\\_World.pdf](http://www.protocolodemontreal.org.br/site/images/publicacoes/programa_brasileiro_eliminaacao_hcfcs/Montreal_Protocol_Partnerships_Changing_the_World.pdf) (Accessed December 20th 2018)

UNEP United Nations Environment Programme (2011). Policy Outline No.1/2011. UNEP Partnership Policy And Procedures. Available at: <https://wedocs.unep.org/bitstream/handle/20.500.11822/20739/Resource%20Doc%20-%20Partnership%20Policy.pdf?sequence=1&isAllowed=y>(Accessed December 20th 2018)

UNEP. United Nations Environment Programme. (2018, December 11th). *List of accredited Organizations*. Available at: <https://www.unenvironment.org/civil-society-engagement/accreditation/list-accredited-organizations>

UNESCO. United Nations Educational Scientific And Cultural Organization (2018) *Man and the Biosphere Programme*. Retrieved from: <http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/man-and-biosphere-programme/> (Accessed December 20th 2018)

UNFCC. United Nations Framework Convention on Climate Change. *Process and meeting*. Available at: <https://unfccc.int/process-and-meetings/parties-non-party-stakeholders/non-party-stakeholders/admitted-ngos>. (Accessed December 20th 2018)

UNFCC. United Nations Framework Convention on Climate Change *Standard Admission Process. Mandate for admission. Extract From The United Nations Framework Convention On Climate Change*. Available at: <https://unfccc.int/process-and-meetings/parties-non-party-stakeholders/non-party-stakeholders/how-to-obtain-observer-status#eq-1>(Accessed December 20th 2018)

UNFCC. United Nations Framework Convention on Climate Change. *The Clean Development Mechanism*. Available at: <https://unfccc.int/process-and-meetings/the-kyoto-protocol/mechanisms-under-the-kyoto-protocol/the-clean-development-mechanism> (Accessed December 20th 2018)

UNFCC. United Nations Framework Convention on Climate Change. *The Clean Development Mechanism*. Available at: <http://cdm.unfccc.int/index.html> (Accessed December 20th 2018).

UNFCC. United Nations Framework Convention on Climate Change (1999) *Report of the Conference of the Parties on its fourth session, held at Buenos Aires from 2 to 14 November 1998. Addendum. Part two: Action taken by the Conference of the Parties at its fourth session*. Available at: <https://unfccc.int/node/1572>. (Accessed December 20th 2018).

UNFCC. United Nations Framework Convention on Climate Change (2011) *The LDCs. Reducing vulnerability to climate change, climate variability and extremes, land degradation and loss of biodiversity: environmental and developmental challenges and opportunities*. Available at: [https://unfccc.int/resource/docs/publications/ldc\\_reducingvulnerability.pdf](https://unfccc.int/resource/docs/publications/ldc_reducingvulnerability.pdf). (Accessed December 20th 2018).

Van Schaik, L., & Schunz, S. (2012). Explaining EU activism and impact in global climate politics: is the Union a norm or interest driven actor?. *JCMS: Journal of Common Market Studies*, 50(1), 169-186.

Victor, D. (2011) *Global Warming Gridlock. Creating More Effective Strategies for Protecting the Planet*. Cambridge: Cambridge University Press.

Vogler, J., & Stephan, H. R. (2007). The European Union in global environmental governance: Leadership in the making?. *International Environmental Agreements: Politics, Law and Economics*, 7(4), 389-413.

Wang, Y. C. (2011). Short-and Long-run Environmental Kuznets Curve: Case Studies of Sulfur Emissions in OECD Countries. *In Australasian Meeting of The Econometric Society. University of Adelaide*

Wemaere, M., Streck, C., & Chagas, T. (2009). Legal ownership and nature of Kyoto units and EU allowances. *Legal aspects of carbon trading: Kyoto, Copenhagen and beyond. Oxford University Press, Oxford, UK*.

*World Nuclear Association. Available at: <http://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/chernobyl-accident.aspx> (Accessed December 20th 2018).*

Yamaji, K., R. Matsubishi, Y. Nagata, and Y. Kaya. 1991. "An integrated system for CO2/energy/GNP analysis: Case studies on economic measures for CO2 reduction in Japan." Paper presented at the Workshop on CO2 Reduction and Removal: Measures for the Next Century, 19-21 March, International Institute for Applied Systems Analysis, Laxenburg, Austria.

Zucchetti, M. L'ambiente e l'energia, Chapter: I cambiamenti dovuti alle emissioni di origine antropica, in *La Scienza*. VOLUME 13 - Publisher: LA BIBLIOTECA DI REPUBBLICA, pp.555-566. DOI: 10.13140/RG.2.1.1550.4246

## Chapter 2

Ackrill, R., & Kay, A. (2006). Historical-institutionalist perspectives on the development of the EU budget system. *Journal of European Public Policy*, 13(1), 113-133.

ADE. 2009. Ex post Evaluation of Cohesion Policy Programmes 2000-2006 co-Financed by the European Fund for Regional Development (Objectives 1 and 2) – Work Package 5b: Environment and Climate Change Final Report – Volume 1 October 2009.

Albrizio, S., Botta, E., Koźluk, T., & Zipperer, V. (2014). Do Environmental Policies Matter for Productivity Growth?: Insights from New Cross-Country Measures of Environmental Policies (No. 1176). OECD Publishing.

Allen, D. (2005), Cohesion and Structural Funds: Competing Pressures for Reform? In Wallace, H., and Wallace, W. And Pollack, M. (eds) *Policy-Making in the European Union, Fifth Edition*. Oxford: Oxford University Press.

Andersen, M. S., & Liefferink, D. (1997). *European environmental policy: The pioneers*. Manchester: Manchester University Press

Bache, I. and Jordan, A. 2006. "Europeanization and domestic change". In *The Europeanization of British politics*, Edited by: Bache, I. and Jordan, A. 17–36. Basingstoke: Palgrave Macmillan

Bachtler, J., & Taylor, S. (1999). *Objective 2: Experiences, lessons and policy implications*. Report to the Commission of the European Communities.

Bachtler, J., Gorzelak, G. (2007) *Reforming EU Cohesion Policy A reappraisal of the performance of the Structural Funds*, Routledge Policy Studies, Vol 28, No 4.

Bachtler, J. and McMaster, I. (2008). EU cohesion policy and the role of the regions: Investigating the influence of structural funds in the new member states. *Environment and Planning C: Government and Policy*, 26: 398–427.

Baker, S. (2001). "The impact of Eastern enlargement on EU environmental governance." *Environmental Studies Workshop on "Environmental Challenges of EU Eastern Enlargement*.

Bauer, M. Borzel, T. (2010) *Regions and the European Union. in Handbook on Multi-level Governance*.

Borras A., T Christiansen, and A. Rodriguez Pose. "Towards a 'Europe of the regions'? Visions and reality from a critical perspective." *Regional & Federal Studies* 4.2 (1994): 1-27.

Börzel, T. A., & Buzogány, A. (2019). Compliance with EU environmental law. The iceberg is melting. *Environmental Politics*, 28(2), 315-341

Börzel, T.A. and Buzogány, A., 2010. Environmental organisations and the Europeanisation of public policy in Central and Eastern Europe: The Case of Biodiversity Governance. *Environmental Politics*, 19 (5), 708-735.

Botta, E. and T. Koźluk (2014), "Measuring Environmental Policy Stringency in OECD Countries: A Composite Index Approach", *OECD Economics Department Working Papers*, No. 1177, OECD Publishing, Paris. <http://dx.doi.org/10.1787/5jxrjnc45gvg-en>

- Brink, T., P. Medhurst, J. Hjerp, P. and Medarova-Bergstrom, K. (2010) Cohesion Policy and Sustainable Development-Cohesion Policy Performance, Supporting Paper 2. A report for DG Regio, September 2010.
- Bruszt, L. 2008. Multi-level governance – the eastern versions: Emerging patterns of developmental governance in the new member states. *Regional and Federal Studies*, 18(5): 607–27
- Bulmer, S. J. (1998) "New institutionalism and the governance of the Single European Market." *Journal of European Public Policy* 5.3 (1998): 365-386.
- B&S Europe. (2015). Evaluation of PHARE financial assistance to Bulgaria (BG), Cyprus (CY), Czech Republic (CZ), Estonia (EE), Hungary (HU), Latvia (LV), Lithuania (LT), Malta (MT), Poland (PL), Romania (RO), Slovakia (SK), Slovenia (SI). Final Report. Retrieved from: <http://ec.europa.eu/smart-regulation/evaluation/search/download.do?documentId=14565913> (Accessed December 20th 2018).
- Cappelletty, M. Seccombe, and Weiler, J. (1986). Integration Through Law: Europe and America Through the Federal Experience. A General Introduction. In Cappelletty, M. Seccombe, and Weiler, J. (eds) *Integration Through Law: Europe and America Through the Federal Experience. A General Introduction*. 1,1. Berlin: De Gruyter pp. 3-36
- Capros, P., Mantzos, L., Papandreou, V., & Tasios, N. (2008). Model-based analysis of the 2008 EU policy package on climate change and renewables. *Report to DG ENV*.
- Clement K, Schremmer C and Tortto H (1998) *Utilisation of SEA in Programme Design and Project Selection*, Report for European Commission (DG XVI), Brussels.
- Commission of the European Communities CEC (1997) *The New Regional Programmes 1997-1999 under Objective 2 of the Community's Structural Policies – Focusing on Job Creation*, COM (97) 524 final 14.11.97, Brussels
- Council Directive 73/405/EEC of 22 November 1973 on the approximation of the laws of the Member States relating to methods of testing the biodegradability of anionic surfactants
- Council Regulation (EEC) No. 3906/89, of 18 December 1989, on economic aid to the Republic of Hungary and the Polish People's Republic ["Poland Hungary Aid for the Reconstruction of the Economy"] – as amended – and also re-named as “on economic aid to certain countries of Central and Eastern Europe”
- Council Regulation (EEC) No 563/91 of 4 March 1991 on action by the Community for the protection of the environment in the Mediterranean region (Medspa)
- Council Regulation (EEC) No 2092/91 of 24 June 1991 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs
- Council Regulation (EC) No 1258/1999 of 17 May 1999 on the financing of the common agricultural policy OJ L 160, 26.6.1999, p. 103–112
- Council Regulation (EC) No 1267/1999 of 21 June 1999 establishing an Instrument for Structural Policies for Pre-accession
- Council Regulation (EC) No 1268/99 of 21 June 1999 on Community support for pre-accession measures for agriculture and rural development in the applicant countries of central and eastern Europe in the pre-accession period

Council Regulation (EC) No 1083/2006 of 11 July 2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and repealing Regulation (EC) No 1260/1999

COWI A/S, Milieu Ltd. 2017. Integration of environmental concerns in Cohesion Policy Funds (ERDF, ESF, CF). Results, evolution and trends through three programming periods (2000-2006, 2007-2013, 2014-2020) -Final report. Available at: [http://ec.europa.eu/environment/integration/pdf/enea/Cohesion%20Pol\\_COWI-Milieu\\_December2017.pdf](http://ec.europa.eu/environment/integration/pdf/enea/Cohesion%20Pol_COWI-Milieu_December2017.pdf) (Accessed December 20th 2018).

Davignon, E. (1982) 'The End of the Road for Europe or a New Beginning?' in R. Dahrendorf (ed.) *Europe's Economy in Crisis* (Holmes and Meier), pp. 119-138

Decision No 1600/2002/EC of The European Parliament and Of The Council of 22 July 2002 laying down the Sixth Community Environment Action Programme

Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020, hereafter referred to as the Effort Sharing Decision<sup>14</sup>

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' Text with EEA relevance

Delors, Jacques. (1988) *Programme of the Commission for 1988. Address by Jacques Delors, President of the Commission, to the European Parliament. Strasbourg, 20 January 1988. Bulletin of the European Communities, Supplement 1/88.* [EU Commission - Working Document]

Dimitrova, Antoaneta. 2002. Enlargement, institution-building and the EU's administrative capacity building. *West European Politics*, 25 (4): 171-198.

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment. *OJ L 197, 21.7.2001, p. 30-37*

Directive 2004/12/EC of the European Parliament and of the Council of 11 February 2004 amending Directive 94/62/EC on packaging and packaging waste - Statement by the Council, the Commission and the European Parliament

Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control (Codified version) (Text with EEA relevance )

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance)

Directive 2008/101/EC Of The European Parliament And Of The Council Of 19 November 2008 Amending Directive 2003/87/EC So As To Include Aviation Activities In The Scheme For Greenhouse Gas Emission Allowance Trading Within The Community (Text With EEA Relevance)

Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (Text with EEA relevance)

Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community<sup>13</sup>;

Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels<sup>16</sup>;

Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) Text with EEA relevance. *OJ L 334, 17.12.2010, p. 17–119*

Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC Text with EEA relevance

EEA. European Environmental Agency. *Annual European Community greenhouse gas inventory 1990–2007 and inventory report 2009*.

EEA. European Environmental Agency. *Conservation status of forest habitat types by region*. Available at: [https://www.eea.europa.eu/data-and-maps/daviz/conservation-status-forest-habitat-types#tab-chart\\_1](https://www.eea.europa.eu/data-and-maps/daviz/conservation-status-forest-habitat-types#tab-chart_1) (Accessed December 20th 2018).

ECOTEC (2000), “The benefits of Compliance with the Environmental Acquis for the Candidates Countries<sup>2</sup>, DGENV Contract B7-8110/2000/159960/MAR/H1, Final Report.

Ernst & Young (1997) *Ex Post Evaluation of the 1989-93 Objective 2 Programmes: Synthesis Report*, DG XVI Series: Evaluation and Documents, No.4, Commission of the European Communities, Brussels

Euractiv. 2002. *Environmental Aspects of the EU Enlargement*. Available at: <https://www.euractiv.com/section/climate-environment/opinion/environmental-aspects-of-the-eu-enlargement/> (Accessed December 20th 2018).

Euractiv. *Commission’s study on “The Benefits of Compliance with the Environmental Acquis for the Candidate Countries”*. Retrieved from: <https://www.euractiv.com/section/enlargement/news/environment-ministers-discuss-enlargement-benefits/> (Accessed December 20th 2018).

European Commission. *Budget*. Available at: [http://ec.europa.eu/budget/budget4results/index\\_en.cfm](http://ec.europa.eu/budget/budget4results/index_en.cfm) (Accessed December 20th 2018).

European Commission. Environment. Sustainable Development. Available at: <http://ec.europa.eu/environment/eussd/> (Accessed December 20th 2018).

European Commission. 14 June 1985 *Completing the Internal Market. White Paper from the Commission to the European Council*. Retrieved from: <http://aei.pitt.edu/1113/> (Accessed December 20th 2018).

European Commission. *The Phare programme annual report 2000*. [COM Document]. Available at: <https://www.esiweb.org/enlargement/wp-content/uploads/2009/02/ec-phare-annual-report-2000.pdf> (Accessed December 20th 2018).

- European Commission. (2001) *Final Communication from the Commission the Challenge of Environmental Financing in the Candidate countries*.
- European Commission. (2001). *Unity, Solidarity, Diversity for Europe, Its People and Its Territory: Second Report on Economic and Social Cohesion, Volume 2: Statistical Annexe*. Office for official publications of the European Communities.
- European Commission. (2001). *Report From the Commission to the Council, the European Parliament and social Committee and the Committee of the Regions. Sapard annual Report – year 2000*. Brussels. Retrieved from: [http://edz.bib.uni-mannheim.de/daten/edz-k/gde/01/sapard\\_annualreport01.pdf](http://edz.bib.uni-mannheim.de/daten/edz-k/gde/01/sapard_annualreport01.pdf) (Accessed December 20th 2018).
- European Commission, (2002) *781 Report from the Commission - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2000*
- European Commission (2002) *Towards the enlarged Union - Strategy Paper and Report of the European Commission on the progress towards accession by each of the candidate countries {SEC (2002) 1400 - 1412} COM/2002/0700 final*
- European Commission, (2003) *329 final Report from the Commission - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2001*
- European Commission, (2003) *844 final – Report from the Commission - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2002*
- European Commission, (2005) *178 final Report from the Commission to the European Parliament and the Council - General Report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2003 [COM/2005/178 final*
- European Commission, (2006) *137 final Report from the Commission to the European Parliament and the Council - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2004 [COM(2006) 137 final*
- European Commission, (2006) *746 final Report from the Commission to the European Parliament and the Council - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2005*
- European Commission, (2007) *Communication From The Commission To The Council, The European Parliament, The European Economic And Social Committee And The Committee Of The Regions Limiting Global Climate Change to 2 degrees Celsius The way ahead for 2020 and beyond {SEC(2007) 7} {SEC(2007)*
- European Commission, Directorate-General for Regional Policy. 2008. *Working for the regions EU Regional Policy 2007-2013*. Available at: [https://ec.europa.eu/regional\\_policy/sources/docgener/presenta/working2008/work\\_en.pdf](https://ec.europa.eu/regional_policy/sources/docgener/presenta/working2008/work_en.pdf) Accessed December 20th 2018).
- European Commission, (2009) *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - Mainstreaming sustainable development into EU policies : 2009 Review of the European Union Strategy for Sustainable Development*
- European Commission, (2010) *Communication on Smart Regulation in the European Union*.

- European Commission, (2013). *Staff Working Document Executive Summary Of The Impact Assessment Accompanying The Document Report From The Commission To The European Parliament And The Council On The Voluntary Ecodesign Scheme For Imaging Equipment*.
- European Commission. 2018. *Statistical Pocketbook*. Luxembourg: Publications Office of the European Union, 2018.
- EUROSTAT. (2010) Using official statistics to calculate Statistical books greenhouse gas emissions. A statistical guide. *Statistical book*.
- EUROSTAT. GDP and main components (output, expenditure and income)[namq\_10\_gdp]. [http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=namq\\_10\\_gdp&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=namq_10_gdp&lang=en) (Accessed December 20th 2018).
- Fabbrini, S. "Compound democracies." *Why the United States and Europe are becoming similiar* (2007).
- Fabbrini, S. (2015). *Which European Union?*. Cambridge University Press.
- Final Report for the Assessment of the 6th Environment Action Programme DG ENV.1/SER/2009/0044. Available at: [https://www.ecologic.eu/sites/files/project/2013/ecologic\\_6eap\\_report.pdf](https://www.ecologic.eu/sites/files/project/2013/ecologic_6eap_report.pdf) (Accessed December 20th 2018).
- Goldman, M.I. (1972) *The Spoils of Progress: environmental Pollution in the Soviet Union*". Cambridge Mass. MIT Press, Cambridge
- Grabbe, Heather. (2003). Europeanization Goes East: Power and Uncertainty in the EU Accession Process. In: Kevin Featherstone/Claudio M. Radaelli (ed.). *The Politics of Europeanization*. Oxford: Oxford University Press: 303 - 331.
- Griffiths, Richard T. (2006). "A dismal decade? European integration in the 1970s." *Origins and evolution of the European Union* (2006): 169-190.
- Gualini, E. (2016) 'Multilevel governance and multiscalar forms of territorialisation' in *ibid.* pp. 506-523
- Haigh N, (1992) *Manual of Environmental Policy* (Longman, Harlow, Essex)
- Hall, Peter A., and Rosemary CR Taylor. "Political science and the three new institutionalisms." *Political studies* 44.5 (1996): 936-957.
- Hertzman, C. (1995). *Environment and Health in Central and Eastern Europe: A Report for the Environmental Action Programme for Central and Eastern Europe*. The World Bank.
- Holder, Jane, Elworthy, Sue, Lee, Maria. (2007) *Environmental protection, law and policy: text and materials*. 2nd ed. Vol. Law in context. Cambridge: Cambridge University Press.
- Holland, M. (1993) *European Integration. From Community to Union* (London: Pinter), ch. 1 ;
- Holzinger, Katharina, Christoph Knill, and Ansgar Schäfer. (2006) "Rhetoric or reality? 'New governance' in EU environmental policy." *European Law Journal* 12.3 (2006): 403-420.
- Homeyer, I. (2001, May 25–26). Enlarging EU environmental policy. Paper prepared for presentation at the Environmental Studies Workshop 'Environmental challenges of EU Eastern enlargement' organised by the Robert Schumann Centre at the European University Institute, Florence, Italy.

Hooghe, Liesbet, Gary Marks, and Gary Wolfe Marks. (2001). *Multi-level governance and European integration*. Rowman & Littlefield.

Hughes, J., Sasse, G. and Gordon, C. (2004). Conditionality and compliance in the EU's eastward enlargement. *Journal of Common Market Studies*, 42(3): 523–51.

Hughes, J., Sasse G., and Gornon C. (2004) *Europeanization and Regionalization in the EU's Enlargement to central and Eastern Europe. The myth of Conditionality*. Palgrave Macmillan

IEA. (2018) *Statistics and Data*. Retrieved from: <https://www.iea.org/statistics/?country=EU28&year=1992&category=Key%20indicators&indicator=CO2ByGDPPP&mode=chart&categoryBrowse=false&dataTable=INDICATORS&showDataTable=true> (Accessed December 20th 2018).

Inforegio. *Ex Post Evaluation of the ERDF in Objectives 1 & 2 (2000-2006)*. Available at: [https://ec.europa.eu/regional\\_policy/sources/docgener/evaluation/expost2006/wp11\\_en.htm](https://ec.europa.eu/regional_policy/sources/docgener/evaluation/expost2006/wp11_en.htm)

Integration of environmental concerns in Cohesion Policy Funds (ERDF, ESF, CF) Results, evolution and trends through three programming periods (2000-2006, 2007-2013, 2014-2020) - Final report

Jordan, A. J. (1999). The implementation of EC environmental policy: A policy problem without a political solution? *Environment and Planning C: Government and Policy*, 17(1), 69–90.

Judgment of the Court of 18 March 1980. - Commission of the European Communities v Italian Republic. - Maximum sulphur content of liquid fuels. - Case 92/79.

Judgment of the Court of 7 February 1985. - Procureur de la République v Association de défense des brûleurs d'huiles usagées (ADBHU). - Reference for a preliminary ruling: Tribunal de grande instance de Créteil - France. - Free movement of goods - Waste oils. - Case 240/83.

Kramer, J. M. (2004) EU Enlargement and the Environment: Six Challenges, *Environmental Politics*, 13:1, 290-311, DOI: 10.1080/09644010410001685245

Krugman, P. R. "L'integrazione economica in Europa: questioni concettuali." equità: una strategia per l'evoluzione del sistema economico della Comunità Europea, a cura di T. Padoa Schioppa, Bologna, il Mulino (1987).

Le Quéré, Corinne, Robbie M. Andrew, Pierre Friedlingstein, Stephen Sitch, Julia Pongratz, Andrew C. Manning, Jan Ivar Korsbakken, Glen P. Peters, Josep G. Canadell, Robert B. Jackson, Thomas A. Boden, Pieter P. Tans, Oliver D. Andrews, Vivek Arora, Dorothee C. E. Bakker, Leticia Barbero, Meike Becker, Richard A. Betts, Laurent Bopp, Frédéric Chevallier, Louise P. Chini, Philippe Ciais, Cathy Cosca, Jessica Cross, Kim Currie, Thomas Gasser, Ian Harris, Judith Hauck, Vanessa Haverd, Richard A. Houghton, Christopher W. Hunt, George Hurtt, Tatiana Ilyina, Atul K. Jain, Etsushi Kato, Markus Kautz, Ralph F. Keeling, Kees Klein Goldewijk, Arne Körtzinger, Peter Landschützer, Nathalie Lefèvre, Andrew Lenton, Sebastian Lienert, Ivan Lima, Danica Lombardozzi, Nicolas Metzl, Frank Millero, Pedro M. S. Monteiro, David R. Munro, Julia E. M. S. Nabel, Shin-ichiro Nakaoka, Yukihiro Nojiri, X. Antoni Padin, Benjamin Pfeil, Denis Pierrot, Benjamin Poulter, Gregor Rehder, Janet Reimer, Christian Rödenbeck, Jörg Schwinger, Roland Séférian, Ingunn Skjelvan, Benjamin D. Stocker, Hanqin Tian, Bronte Tilbrook, Ingrid T. van der Laan-Luijkx, Guido R. van der Werf, Steven M. A. C. van Heuven, Nicolas Viovy, Nicolas Vuichard, Anthony P. Walker, Andrew J. Watson, Andrew J. Wiltshire, Sönke Zaehle, Dan Zhu: Global Carbon Budget 2017, *Earth Syst. Sci. Data Discussions*, 2017

- Lee, M., & Abbot, C. (2003). The usual suspects? Public participation under the Aarhus Convention. *The Modern Law Review*, 66(1), 80-108.
- Leonardi, R. (1998). *Coesione, convergenza e integrazione nell'Unione Europea*. Società Editrice Il Mulino.
- Leonardi R. (2005) The CSF Revolution: The Origins and Structure of EU Cohesion Policy. *In: Cohesion Policy in the European Union*. Palgrave Macmillan, London. DOI [https://doi.org/10.1057/9780230503861\\_2](https://doi.org/10.1057/9780230503861_2)
- Leonardi, R. (2011) *Study on the impact of the Single Market on Cohesion: Implications for Cohesion Policy, Growth and Competitiveness: Task 2* (Brussels: European Commission)
- Leonardi, R., and Raffaella Y. Nanetti, (1993) Eds. *Lo sviluppo regionale nell'economia europea integrata: il caso toscano*. Marsilio,
- Lindner, J. (2006). Conflict and change in EU budgetary politics. Routledge,
- Manzella, G. P., & Mendez, C. (2009). *The turning points of EU cohesion policy*, Working Paper Report to Barca Report.
- March, James G., and Johan P. Olsen. (2006) "Elaborating the "new institutionalism"." *The Oxford handbook of political institutions* 5 (2006): 3-20.
- Marks, G., Hooghe, L., & Schakel, A. H. (2008). Patterns of regional authority. *Regional and Federal Studies*, 18(2-3), 167-181.
- Martin, S. (2006) 'Building on Coal and Steel: European Integration in the 1950s and the 1960s' in Dinan (ed.), pp. 125-140
- Michalski, A., & Wallace, H. (1992). *The European Community: the challenge of enlargement*. Royal Institute of international affairs.
- Ministry of Water and Environment Protection, Romania (2001) "State of the environment in Romania, 2000".
- MWH Consortium. (2007). Phare *Ex Post* Evaluation. Phase 3, Thematic Evaluation: Environment. Available at: [https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/pdf/financial\\_assistance/phare/evaluation/env\\_thematic\\_may\\_2007.pdf](https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/pdf/financial_assistance/phare/evaluation/env_thematic_may_2007.pdf) (Accessed December 20th 2018).
- Nanetti, Raffaella Y. (1996). "EU cohesion and territorial restructuring in the member states." *Cohesion policy and European integration: Building multi-level governance*.
- Office for Official Publications of the European Communities.(1983). The European Community's Environmental Policy. Periodical 1/ 1984. Second Edition. Retrieved from: <http://aei.pitt.edu/13512/1/13512.pdf> (Accessed December 20th 2018).
- Official Journal of the European Union. (2003). C 167, Volume 46 17 July 2003  
Special Report No 5/2003 concerning PHARE and ISPA funding of environmental projects in the candidate countries together with the Commission's replies, Special Report No 6/2003 concerning twinning as the main instrument to support institution-building in candidate countries together with the Commission's replies
- Olsen, J. (2002). The many faces of Europeanization. *Journal of Common Market Studies*, 40: 921–52.
- Pallemaerts, M. (2003). *Toxic and Transnational Law*. Oxford: Hart Publishing.

Paraskevopoulos, C. J., & Leonardi, R. (2004). Introduction: adaptational pressures and social learning in European regional policy-cohesion (Greece, Ireland and Portugal) vs. CEE (Hungary, Poland) countries. *Regional & Federal Studies*, 14(3), 315-354.

Pascal, F. 2014 Europe in 12 Lessons. Available at: <https://publications.europa.eu/en/publication-detail/-/publication/2d85274b-0093-4e38-896a-12518d629057> (Accessed December 20th 2018).

Pauli, G. (1997). Zero emissions: the ultimate goal of cleaner production. *Journal of cleaner production*, 5(1-2), 109-113.

Pauli, G. A. (2010). *The blue economy: 10 years, 100 innovations, 100 million jobs*. Paradigm publications.

Pavlínek, P., Pickles, P. (2004) Environmental Pasts/ Environmental Futures in Post-Socialist Europe, *Environmental Politics*, 13:1, 237-265, DOI: 10.1080/09644010410001685227

Pieda (1994) *Interim Evaluation of Eastern England CSF Programmes*, Pieda, Manchester.

Pierson, P, and Skocpol, T. (2002): "Historical institutionalism in contemporary political science." *Political science: The state of the discipline* 3 (2002): 693-721.

Pollack, M. A. (1996), The New Institutionalism and EC Governance: The Promise and Limits of Institutional Analysis. *Governance*, 9: 429-458. doi:10.1111/j.1468-0491.1996.tb00251.x

Pollack, M. A. *The new institutionalisms and European integration*. No. p0031. University of Hamburg, Faculty for Economics and Social Sciences, Department of Social Sciences, Institute of Political Science, 2007.

Polverari, L., Piattoni, S. (2016). Handbook on cohesion policy in the EU. Edward Elgar. ISBN: 9781784715663. <https://doi.org/10.4337/9781784715670.00034>

Regulation (EC) No 1059/2003 of the European Parliament and of the Council of 26 May 2003 on the establishment of a common classification of territorial units for statistics (NUTS)

Regulation (EC) No1085/2006 of the Council of 17 July 2006 on the establishment of instrument of pre accession.

Regulation (EC) No 443/2009 of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles

Regulation (EU) No 1293/2013 of the European Parliament and of the Council of 11 December 2013 on the establishment of a Programme for the Environment and Climate Action (LIFE) and repealing Regulation (EC) No 614/2007 Text with EEA relevance

Report from the Commission to the European Parliament and the Council - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2005 [COM/2006/746 final]

Report from the Commission to the European Parliament and the Council - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2004 [COM(2006) 137 final].

Report from the Commission to the European Parliament and the Council - General Report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2003 [COM/2005/178 final]

- Report from the Commission - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2002 [COM(2003) 844 final].
- Report from the Commission - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2001 [COM(2003) 329 final].
- Report from the Commission - General report on pre-accession assistance (PHARE - ISPA - SAPARD) in 2000 [COM(2002)781 final]
- Regular Report from the Commission on Bulgaria's progress towards accession 2000. COM (2000) 701 final, 8 November 2000. [COM Document]. Available at: <http://aei.pitt.edu/44544/>. (Accessed December 20th 2018).
- Ritchie, Hannah and Max Roser (2018) "CO<sub>2</sub> and other Greenhouse Gas Emissions". Published online at OurWorldInData.org.
- Schimmelfennig, Frank and Ulrich Sedelmeier. 2004. Governance by conditionality: EU rule transfer to the candidate countries of Central and Eastern Europe. *Journal of European Public Policy*, 11 (4): 661-679.
- Schmidt, V. 2006. *Democracy in Europe*, Oxford: Oxford University Press.
- Sellheim, N. (2017), EU Environmental Law and the Internal Market, by Nicolas De Sadeleer, published by Oxford University Press, 2014
- Special Report No 5/2003 concerning PHARE and ISPA funding of environmental projects in the candidate countries together with the Commission's replies Official Journal of the European Union. 2003. C 167, Volume 46 17 July 2003
- Special Report No 6/2003 concerning twinning as the main instrument to support institution-building in candidate countries together with the Commission's replies Official Journal of the European Union. 2003. C 167, Volume 46 17 July 2003
- Skjærseth Jon Birger Æ Jørgen Wettestad. (2007) Is EU enlargement bad for environmental policy? Confronting gloomy expectations with evidence. *Int Environ Agreements* 7:263–280 DOI 10.1007/s10784-007-9033-7
- Stirk, P. (2006) 'Integration and Disintegration before 1945' in D. Dinan (ed.) *Origins and Evolution of the European Union* (Oxford: Oxford University Press), pp. 7-28
- UE E PECO: impatto ambientale dell'allargamento. A cura di Guido Paggi. Cacucci editore – Bari – 2004
- The Regional Environmental Center *For Central And Eastern Europe. Dg Env-Ngo Dialogue Group Summary Of The Seventh Meeting. Brussels, Belgium November 17-19, 2002. Available At: [Http://Documents.Rec.Org/Publications/Dgenv\\_Ngo\\_Dialogue7\\_Nov2002\\_En.Pdf](Http://Documents.Rec.Org/Publications/Dgenv_Ngo_Dialogue7_Nov2002_En.Pdf)* (Accessed December 20th 2018).
- Ürge-Vorsatz, Diana, Gergana Miladinova, and László Paizs. "Energy in transition: From the iron curtain to the European Union." *Energy Policy* 34.15 (2006): 2279-2297.
- Wallace and Wallace (2005) ch. 16 'Eastern Enlargement: Towards a European EU?' in *ibid* pp. 401-428
- Wilting, Harry C., and Kees Vringer. "Carbon and land use accounting from a producer's and a consumer's perspective—an empirical examination covering the world." *Economic Systems Research* 21.3 (2009): 291-310

Zamparutti, Tony, and Brendan Gillespie. "Environment in the transition towards market economies: an overview of trends in Central and Eastern Europe and the New Independent States of the former Soviet Union." *Environment and Planning B: Planning and Design* 27.3 (2000): 331-347.

### Chapter 3

Amerighi O., Cagnoli P., Del Ciello R., Forni A., Regina P., Sansoni M., Vignoli L. “Assessing CO2 emissions of regional policy programmes: an application of CO2MPARE to Emilia Romagna 2007-2013 regional operational program” in: *Environmental Engineering and Management Journal* September 2013, Vol.12, No. 9 Supplement, 237-240. Impact factor 1.117; <http://omicron.ch.tuiasi.ro/EEMJ/index.htm> eISSN 1843-3707.

Arpa Emilia-Romagna, (2011), *Annuario regionale dei dati ambientali*, On line at: <http://www.arpa.emr.it>

Arpa Emilia-Romagna, (2012) *Rapporto ambientale della integrazione al POR 2007-2013 della Regione Emilia-Romagna*. Available at: <http://fesr.regione.emilia-romagna.it/documentazione>

Bachtler, J., & Wren, C. (2006). Evaluation of European Union Cohesion policy: Research questions and policy challenges. *Regional studies*, 40(02), 143-153.

Baltazar, E., Varbova, V., Zhechov R. 2009. Improving the Climate Resilience of Cohesion Policy Funding Programmes . An overview of member states’ measures and tools for climate proofing Cohesion Policy funds. Available at: [http://ec.europa.eu/environment/integration/pdf/enea/climate\\_resilience\\_cfr\\_pr.pdf](http://ec.europa.eu/environment/integration/pdf/enea/climate_resilience_cfr_pr.pdf) (Accessed December 27th 2018).

Bockstaller, C., & Girardin, P. (2003). How to validate environmental indicators. *Agricultural systems*, 76(2), 639-653.

Bonazzi and Sansoni (2012), Development and use of a regional NAMEA in Emilia- Romagna (Italy) in *Hybrid Economic-Environmental Accounts*, edito da V. Costantini, M. Mazzanti e A. Montini. Routledge studies in ecological economics, UK pp.65-79

Cagnoli, P., Vignoli, L., Sansoni, M., Amerighi, O., Del Ciello, R., Forni, A., & Regina, P. (2013). ASSESSING CO2 EMISSIONS OF REGIONAL POLICY PROGRAMMES: AN APPLICATION OF CO2MPARE TO EMILIA-ROMAGNA. *Environmental Engineering and Management Journal*, 12(9 Supplement), 237-240.

Casini C., Santini L. 2007 “Sei anni dalla VAS: le regioni e la valutazione dei piani a scala locale”, XXVIII Conferenza Italiana di Scienze Regionali – AISRe, Bolzano 26-28 settembre 2007; Casini C., Santini L. 2009 “Dal recepimento della Direttiva europea alla legge nazionale: la valutazione ambientale strategica a scala regionale”, XXX Conferenza Italiana di Scienze Regionali – AISRe, Firenze 9-11 settembre 2009

Craglia, M., Pavanello, L., & Smith, R. S. (2010). The use of spatial data for the preparation of environmental reports in Europe. *European Commission Joint Research Centre Institute for Environment and Sustainability, Ispra, Italy*. Available at: [http://ies.jrc.ec.europa.eu/uploads/SDI/publications/JRC\\_technical%20report\\_2009%20EIA-SEA%20survey.pdf](http://ies.jrc.ec.europa.eu/uploads/SDI/publications/JRC_technical%20report_2009%20EIA-SEA%20survey.pdf).

Commission Regulation (EC) No 1828/2006 of 8 December 2006 setting out rules for the implementation of Council Regulation (EC) No 1083/2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and of Regulation (EC) No 1080/2006 of the European Parliament and of the Council on the European Regional Development Fund- *OJ L 371, 27.12.2006*,

Committee of the Regions. Opinion on Improving The Eia And Sea Directives - 84th plenary session 14 and 15 April 2010 - CdR 38/2010

Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions Regional Policy Contributing To Sustainable Growth In Europe 2020 /\* COM/2011/0017 final \*/

Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment. *OJ L 175, 5.7.1985, p. 40–48.*

CO2MPARE, (2013a), *Final Report*: Hekkenberg M. (ECN), Schram J. (Énergies Demain), Amerighi O. (ENEA), Keppo I. (UCL), S. Papagianni (CRES), ten Donkelaar M. (ENVIROS); ECN-O-12-038 – March. CO2MPARE, (2013b), User Tutorial: Hekkenberg M. (ECN), Vincent-Genod C. (Énergies Demain), Regina P. (ENEA), Keppo I. (UCL), Papagianni S. (CRES), Harnych J. (ENVIROS); ECN-O-12-038 – March.

CO2MPARE, (2013b), Technical background and guidance for deployment in EU regions: Hekkenberg M. (ECN), Le Pierrès S. (Énergies Demain), Del Ciello R. (ENEA), I. Keppo (UCL), Harnych J. (Enviros), Papagianni S. (CRES); ECN-O--12-032 -

Dalal-Clayton D.B., Sadler B. 1999 “Strategic Environmental Assessment: A Rapidly Evolving Approach”, Environmental Planning Issues No.18, International Institute for Environment and Development, London;

Dalal-Clayton D.B., Sadler B. 2010 “*Generic SEA Quality Review Methodology Revised Draft*” Proposal to OECD DAC Task Team on SEA. OECD, Paris April 2010

Del Ciello, R. , Forni, A., Scipioni, F., Disi, A., & Salama, A. (2011). The Governance of the SEA in the 2007-2013 EU Programs: the case of Italy

Del Ciello R., Cagnoli P., Sansoni M., Vignoli L., Amerighi O., Forni A., Regina P. “Emissioni, il modello CO2MPARE in Emilia-Romagna”, ECOSCIENZA, Numero 3 - Anno 2014

Del Ciello, R., Camporeale, C. , Forni, A., Olivetti, I., Velardi, M. 2014 .Metodologie Di Stima Della CO2 Nella Programmazione Comunitaria in Mazzola F., Musolino D., Provenzano F. Reti, nuovi settori e sostenibilità. F. Angeli, Collana Scienze Regionali n. 51.

Del Ciello R, Velardi M., Camporeale C., Galli G., Biagio Quattrocchi “Dynamic Input-Output and NAMEA matrices: a tool to assess the overall effects of European programmes” paper presented at IAEE European Energy Conference “Sustainable Energy Policy and Strategies for Europe” October 28-31, 2014 in Rome, Italy LUISS University of Rome

Del Ciello, R. ,Mancuso E., Sanna S. 2018. La Valutazione Della Sostenibilità Ambientale E La Stima Delle Emissioni Climalteranti Dei Programmi Operativi Regionali 2014-2020: Un Esempio Virtuoso Di Collaborazione Istituzionale Tra La Regione Autonoma Della Sardegna E L’enea. Xxxix Conferenza scientifica annuale AISRe, Bolzano, 17-19 Settembre 2018.

Del Ciello, R., Camporeale, C. 2018. "L'impatto dei Fondi Strutturali tra sviluppo economico e mitigazione del cambiamento climatico" in: Energia, Ambiente e Innovazione n.1/2018 "€ECONOMIE".

Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment (EIA Directive). Interpretation of definitions of certain project categories of annex I and II of the EIA Directive . Available at: [http://ec.europa.eu/environment/archives/eia/pdf/interpretation\\_eia.pdf](http://ec.europa.eu/environment/archives/eia/pdf/interpretation_eia.pdf)

Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment. OJ L 197, 21.7.2001, p. 30–37

Directive 2003/35/EC of the European Parliament and of the Council of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC - Statement by the Commission. *OJ L 156, 25.6.2003, p. 17–25*

Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control (Codified version) (Text with EEA relevance ). *OJ L 24, 29.1.2008, p. 8–29*.

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) Text with EEA relevance. *OJ L 334, 17.12.2010, p. 17–119*

Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance. *OJ L 26, 28.1.2012, p. 1–21*

Donnelly, A., Jones, M., O'Mahony, T., & Byrne, G. (2007). Selecting environmental indicator for use in strategic environmental assessment. *Environmental Impact Assessment Review, 27(2)*, 161-175.

Dusik, J., & Sadler, B. (2004). Reforming strategic environmental assessment systems: lessons from Central and Eastern Europe. *Impact Assessment and Project Appraisal, 22(2)*, 89-97.

ENEA (2010) Quadro Strategico Nazionale 2007-2013. Valutazione Dell'impatto Potenziale Dei Programmi Operativi Fesr Sulla Riduzione Delle Emissioni Di Gas Serra. ENEA Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile Lungotevere Tahon di Revel, 76. 00196 Roma. Available at: [http://old.enea.it/produzione\\_scientifica/pdf\\_volumi/V2010\\_QSN.pdf](http://old.enea.it/produzione_scientifica/pdf_volumi/V2010_QSN.pdf) (Accessed December 27th 2018).

Euractiv. The new EU cohesion policy (2007-2013). Available at: <https://www.euractiv.com/section/regional-policy/linksdossier/the-new-eu-cohesion-policy-2007-2013-archived/> (Accessed December 27th 2018).

European Commission, COM/2003/0334, Report from the Commission to the European Parliament and the Council on the Application and Effectiveness of the EIA Directive (Directive 85/337/EEC as amended by Directive 97/11/EC) - How successful are the Member States in implementing the EIA Directive

European Commission. Commission Report: 'The Mid-Term Evaluation in Objective 1 and 2 Regions — Growing Evaluation Capacity' — November 2004

European Commission, COM/2006/0639, Report from the Commission - Relationship between the SEA Directive and community funds {SEC(2006) 1375}

European Commission Directorate-General. Regional Policy, 2006. Thematic Development, Impact, Evaluation And Innovative Actions. Evaluation And Additionality. The New Programming Period 2007-2013. Indicative Guidelines On Evaluation Methods: Monitoring And Evaluation Indicators Working Document No. 2 –Available at: [https://ec.europa.eu/regional\\_policy/sources/docoffic/2007/working/wd2indic\\_082006\\_en.pdf](https://ec.europa.eu/regional_policy/sources/docoffic/2007/working/wd2indic_082006_en.pdf) (Accessed December 27th 2018).

European Commission, 2007, Directorate-General Regio - Directorate-General Employment “*Indicative guidelines on evaluation methods: evaluation during the programming period*” - Working document n°5, April 2007

European Commission, COM/2009/0378, Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the application and effectiveness of the EIA Directive (Directive 85/337/EEC, as amended by Directives 97/11/EC and 2003/35/EC)

European Commission, COM/2009/0469, Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the application and effectiveness of the Directive on Strategic Environmental Assessment (Directive 2001/42/EC)

European Commission (2011) *A resource-efficient Europe—Flagship Initiative under the Europe 2020 Strategy*. Brussels.

European Commission. Directorate-General Regional Policy (2011) N° 2011.CE.160.AT.001 - Model to assess CO2 Emissions of Regional Policy Programmes Invitation & Terms of reference available at European Commission website - Publication of Calls for Tender: [https://ec.europa.eu/regional\\_policy/en/newsroom/funding-opportunities/calls-for-tender/2011/](https://ec.europa.eu/regional_policy/en/newsroom/funding-opportunities/calls-for-tender/2011/) (Accessed December 27th 2018).

European Commission. Regional Policy. France Cohesion Policy 2007-2013. Available at: [https://ec.europa.eu/regional\\_policy/archive/atlas2007/fiche/fr\\_en.pdf](https://ec.europa.eu/regional_policy/archive/atlas2007/fiche/fr_en.pdf) (Accessed December 27th 2018).

European Commission, Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the application and effectiveness of the EIA Directive. COM(2009) 378 final

European Commission. Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the application and effectiveness of the Directive on Strategic Environmental Assessment (SEA). COM(2009) 469 final

European Parliament Website. 2007. Press release. MEPs approve €308bn Structural Funds 2007-13 package Regional policy. Available at: <http://www.europarl.europa.eu/sides/getDoc.do?language=EN&type=IM-PRESS&reference=20060628IPR09333> (Accessed December 27th 2018).

European Union. 2017. Environmental Assessments Of Plans, Programmes And Projects. Rulings Of The Court Of Justice Of The European Union. Available at: [http://ec.europa.eu/environment/eia/pdf/EIA\\_rulings\\_web.pdf](http://ec.europa.eu/environment/eia/pdf/EIA_rulings_web.pdf) (Accessed December 27th 2018).

Gazzola P., Caramaschi M. 2005 “*Implementing SEA in Italy: The Case of the Emilia Romagna Region*” in: Schmidt M., João E., Albrecht M. 2005 (eds.) “*Implementing Strategic Environmental Assessment*” 2005 Springer-Verlag

Gracceva F., Contaldi M. (2004), *Scenari energetici italiani. Valutazione di misure di politica energetica*, ENEA

Handbook on Environmental Assessment of Regional Development Plans and EU Structural Funds Programmes (European Commission DG Environment, 1998). Available at: <http://ec.europa.eu/environment/archives/eia/sea-guidelines/pdf/handbook-full-text-part2.pdf> (Accessed December 27th 2018).

Handbook on SEA for Cohesion Policy 2007-2013- February 2006 Greening Regional Development Programmes Network. Available at: [https://ec.europa.eu/regional\\_policy/sources/docoffic/working/doc/sea\\_handbook\\_final\\_foreword.pdf](https://ec.europa.eu/regional_policy/sources/docoffic/working/doc/sea_handbook_final_foreword.pdf) (Accessed December 27th 2018).

ISTAT <https://www.istat.it/it/archivio/14156> (Accessed December 27th 2018).

Judgment of the Court (Fifth Chamber) of 21 March 2013 (reference for a preliminary ruling from the Verwaltungsgerichtshof — Austria) — Salzburger Flughafen GmbH v Umweltsenat (Assessment of the effects of certain projects on the environment — Directive 85/337/EEC — Articles 2(1) and 4(2) — Projects listed in Annex II — Extension works to the infrastructure of an airport — Examination on the basis of thresholds or criteria — Article 4(3) — Selection criteria — Annex III, point 2(g) — Densely populated areas) Select: 1. OJ C 156, 1.6.2013, p. 15–15

Judgment of the Court of 9 August 1994. Bund Naturschutz in Bayern e.V. and Richard Stahnsdorf and others v Freistaat Bayern, Stadt Vilsbiburg and Landkreis Landshut. Reference for a preliminary ruling: Bayerischer Verwaltungsgerichtshof- Germany. Council Directive 85/337/EEC - National transitional rules. Case C-396/92. *European Court Reports 1994 I-03717*. ECLI identifier: ECLI:EU:C:1994:307

Judgment of the Court of 11 August 1995. Commission of the European Communities v Federal Republic of Germany. Failure to fulfil obligations - Failure by public authorities to apply a directive which has not yet been transposed - Council Directive 85/337/EEC - Assessment of the effects of projects on the environment - Großkrotzenburg thermal power station - Consent for the construction of a new block. Case C-431/92. *European Court Reports 1995 I-02189* ECLI identifier: ECLI:EU:C:1995:260

Judgment of the Court of 11 August 1995. Commission of the European Communities v Federal Republic of Germany. Failure to fulfil obligations - Failure by public authorities to apply a directive which has not yet been transposed - Council Directive 85/337/EEC - Assessment of the effects of projects on the environment - Großkrotzenburg thermal power station - Consent for the construction of a new block. Case C-431/92. *European Court Reports 1995 I-02189* ECLI identifier: ECLI:EU:C:1995:260

Judgment of the Court of 13 April 1994. Commission of the European Communities v Grand Duchy of Luxembourg. Failure to fulfil obligations - Directive 85/337/EEC - Failure to transpose the directive into national law within the prescribed period. Case C-313/93. *European Court Reports 1994 I-01279* ECLI identifier: ECLI:EU:C:1994:132

Judgment of the Court (Sixth Chamber) of 2 May 1996. Commission of the European Communities v Kingdom of Belgium. Assessment of the effects of certain projects on the environment - Council Directive 85/337/EEC. Case C-133/94. *European Court Reports 1996 I-02323* ECLI identifier: ECLI:EU:C:1996:181

Judgment of the Court of 24 October 1996. Aannemersbedrijf P.K. Kraaijeveld BV e.a. v Gedeputeerde Staten van Zuid-Holland. Reference for a preliminary ruling: Raad van State - Netherlands. Environment - Directive 85/337/EEC - Assessment of the effects of certain public and private projects. Case C-72/95. *European Court Reports 1996 I-05403* ECLI identifier: ECLI:EU:C:1996:404

Judgment of the Court (Sixth Chamber) of 22 October 1998. Commission of the European Communities v Federal Republic of Germany. Failure of a Member State to fulfil its obligations - Incorrect transposition of Directive 85/337/EEC. Case C-301/95. *European Court Reports 1998 I-06135* ECLI identifier: ECLI:EU:C:1998:493

Judgment of the Court (Sixth Chamber) of 18 June 1998. Burgemeester en wethouders van Haarlemmerliede en Spaarnwoude and Others v Gedeputeerde Staten van Noord-Holland. Reference for a

preliminary ruling: Raad van State - Netherlands. Council Directive 85/337/EEC - New consent for a zoning plan. Case C-81/96. *European Court Reports 1998 I-03923* ECLI identifier: ECLI:EU:C:1998:305

Judgment of the Court (Fifth Chamber) of 21 September 1999. Commission of the European Communities v Ireland. Environment - Directive 85/337/EEC - Assessment of the effects of certain public or private projects - Setting of thresholds. Case C-392/96. *European Court Reports 1999 I-05901* ECLI identifier: ECLI:EU:C:1999:431

Judgment of the Court (Fifth Chamber) of 21 January 1999. Commission of the European Communities v Portuguese Republic. Failure by a Member State to fulfil its obligations - Directive 85/337/EEC. Case C-150/97. *European Court Reports 1999 I-00259* ECLI identifier: ECLI:EU:C:1999:15

Judgment of the Court (Sixth Chamber) of 16 September 1999. World Wildlife Fund (WWF) and Others v Autonome Provinz Bozen and Others. Reference for a preliminary ruling: Verwaltungsgericht, Autonome Sektion für die Provinz Bozen - Italy. Environment - Directive 85/337/EEC - Assessment of the effects of certain public and private projects. Case C-435/97. *European Court Reports 1999 I-05613* ECLI identifier: ECLI:EU:C:1999:418

Judgment of the Court of 19 September 2000. Grand Duchy of Luxemburg v Berthe Linster, Aloyse Linster and Yvonne Linster. Reference for a preliminary ruling: Tribunal d'arrondissement de Luxembourg - Grand Duchy of Luxemburg. Environment - Directive 85/337/EEC - Assessment of the effects of certain public and private projects - Specific act of national legislation - Effect of the directive. Case C-287/98. *European Court Reports 2000 I-06917* ECLI identifier: ECLI:EU:C:2000:468

Judgment of the Court (Sixth Chamber) of 13 June 2002. Commission of the European Communities v Kingdom of Spain. Failure by a Member State to fulfil its obligations - Directive 85/337/EEC - Assessment of the effects of certain public and private projects on the environment - Incomplete transposition. Case C-474/99. *European Court Reports 2002 I-05293* ECLI identifier: ECLI:EU:C:2002:365

Judgment of the Court (Third Chamber) of 14 June 2001. Commission of the European Communities v Kingdom of Belgium. Failure by a Member State to fulfil its obligations - Failure to implement Directives 75/442/EEC, 76/464/EEC, 80/68/EEC, 84/360/EEC and 85/337/EEC - Pollution and nuisance - Waste - Dangerous substances - Pollution of the aquatic environment - Air pollution. Case C-230/00. *European Court Reports 2001 I-04591* ECLI identifier: ECLI:EU:C:2001:341

Judgment of the Court (Third Chamber) of 19 February 2002. Commission of the European Communities v Grand Duchy of Luxemburg. Failure by a Member State to fulfil obligations - Incomplete transposition of Directive 97/11/EC. Case C-366/00. *European Court Reports 2002 I-01749* ECLI identifier: ECLI:EU:C:2002:101

Judgment of the Court (Second Chamber) of 16 September 2004. Commission of the European Communities v Kingdom of Spain. Failure of a Member State to fulfil obligations - Directive 85/337/EEC - Assessment of the effects of certain public and private projects on the environment - Incorrect implementation - Project for a Valencia-Tarragona railway line, Las Palmas-Oropesa section. Case C-227/01. *European Court Reports 2004 I-08253* ECLI identifier: ECLI:EU:C:2004:528

Judgment of the Court (Sixth Chamber) of 19 November 2002. Commission of the European Communities v Kingdom of Belgium. Failure by a Member State to fulfil its obligations - Assessment of the effects of certain projects on the environment - Directive 97/11/EC. Case C-319/01. *European Court Reports 2002 I-10779* ECLI identifier: ECLI:EU:C:2002:697

Judgment of the Court (Sixth Chamber) of 7 November 2002. Commission of the European Communities v French Republic. Failure of a Member State to fulfil its obligations - Directive 97/11/EC - Environmental

impact assessment of certain public and private projects - Incomplete transposition. Case C-348/01. *European Court Reports 2002 I-10249* ECLI identifier: ECLI:EU:C:2002:647

Judgment of the Court (First Chamber) of 10 June 2004. Commission of the European Communities v Italian Republic. Failure by a Member State to fulfil obligations - Environment - Directive 85/337/EEC - Assessment of the effects of certain public and private projects - Project "Lotto zero". Case C-87/02. *European Court Reports 2004 I-05975* ECLI identifier: ECLI:EU:C:2004:363

Judgment of the Court (Fifth Chamber) of 29 April 2004. Commission of the European Communities v Portuguese Republic. Failure of a Member State to fulfil obligations - Directive 85/337/EEC - Assessment of the effects of certain projects on the environment - Construction of holiday villages and hotel complexes - Failure to make a project to construct a hotel complex subject to such an assessment. Case C-117/02. *European Court Reports 2004 I-05517* ECLI identifier: ECLI:EU:C:2004:266

Judgment of the Court (Grand Chamber) of 7 September 2004. Landelijke Vereniging tot Behoud van de Waddenzee and Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij. Reference for a preliminary ruling: Raad van State - Netherlands. Directive 92/43/EEC - Conservation of natural habitats and of wild flora and fauna - Concept of "plan" or "project" - Assessment of the implications of certain plans or projects for the protected site. Case C-127/02. *European Court Reports 2004 I-07405* .ECLI identifier: ECLI:EU:C:2004:482

Judgment of the Court (Fifth Chamber) of 7 January 2004. The Queen, on the application of Delena Wells v Secretary of State for Transport, Local Government and the Regions. Reference for a preliminary ruling: High Court of Justice (England & Wales), Queen's Bench Division (Administrative Court) - United Kingdom. Directive 85/337/EEC - Assessment of the effects of certain projects on the environment - National measure granting consent for mining operations without an environmental impact assessment being carried out - Direct effect of directives - Triangular situation. Case C-201/02. *European Court Reports 2004 I-00723* ECLI identifier: ECLI:EU:C:2004:12

Judgment of the Court (Sixth Chamber) of 2 June 2005. Commission of the European Communities v Italian Republic. Failure of a Member State to fulfil obligations - Environment - Directive 85/337/EEC - Assessment of the effects of projects on the environment - Construction of a marina at Fossacesia. Case C-83/03. *European Court Reports 2005 I-04747*. ECLI identifier: ECLI:EU:C:2005:339

Judgment of the Court (First Chamber) of 4 May 2006. The Queen, on the application of: Diane Barker v London Borough of Bromley. Reference for a preliminary ruling: House of Lords - United Kingdom. Directive 85/337/EEC - Assessment of the effects of certain projects on the environment - Crystal Palace development project - Projects falling within Annex II to Directive 85/337 - Grant of consent comprising more than one stage. Case C-290/03. *European Court Reports 2006 I-03949*. ECLI identifier: ECLI:EU:C:2006:286

Judgment of the Court (First Chamber) of 4 May 2006. Commission of the European Communities v United Kingdom of Great Britain and Northern Ireland. Failure of a Member State to fulfil obligations - Admissibility - Subject-matter of the case - Jurisdiction of national courts - Action devoid of purpose - Legal certainty and legitimate expectations of developers - Directive 85/337/EEC - Assessment of the effects of certain projects on the environment - White City development project - Crystal Palace development project - Projects falling within Annex II to Directive 85/337 - Obligation to assess projects likely to have significant effects on the environment - Burden of proof - Transposition of Directive 85/337 into national law - Grant of consent comprising more than one stage. Case C-508/03. *European Court Reports 2006 I-03969*. ECLI identifier: ECLI:EU:C:2006:287

Judgment of the Court (Second Chamber) of 4 May 2006. Commission of the European Communities v United Kingdom of Great Britain and Northern Ireland. Failure to fulfil obligations -Directive 85/337/EEC - Assessment of the effects of certain projects on the

environment - Project carried out without prior application for development consent or assessment - Action inadmissible. Case C-98/04. *European Court Reports 2006 I-04003*. ECLI identifier: ECLI:EU:C:2006:288

Judgment of the Court (Third Chamber) of 16 March 2006. Commission of the European Communities v Kingdom of Spain. Failure of a Member State to fulfil its obligations - Directive 85/337/EEC as amended by Directive 97/11/EC - Assessment of the effects of projects on the environment - Inter-action between factors likely to be directly and indirectly affected - Obligation to publish the impact statement - Assessment limited to urban development projects outside urban areas - Construction project for a leisure complex at Paterna. Case C-332/04. *European Court Reports 2006 I-00040*. ECLI identifier: ECLI:EU:C:2006:180

Judgment of the Court (Second Chamber) of 23 November 2006. Commission of the European Communities v Italian Republic. Failure of a Member State to fulfil obligations - Assessment of the effects of certain projects on the environment - Waste recovery - Installation for the production of electricity by the incineration of combustible materials derived from waste and biomass in Massafra (Taranto) - Directives 75/442/EEC and 85/337/EEC. Case C-486/04. *European Court Reports 2006 I-11025*. ECLI identifier: ECLI:EU:C:2006:732.

Judgment of the Court (Second Chamber) of 5 July 2007. Commission of the European Communities v Italian Republic. Failure of a Member State to fulfil obligations - Assessment of the effects of certain projects on the environment - Waste recovery - Implementation of the ‘third line’ of the Brescia waste incinerator - Publicity for the application for a permit - Directives 75/442/EEC, 85/337/EEC and 2000/76/EC. Case C-255/05. *European Court Reports 2007 I-05767*. ECLI identifier: ECLI:EU:C:2007:406

Lamers, G., Platzer-Schneider, U., Prettenthaler, F., et al. (2006). Handbook on SEA for Cohesion Policy 2007-2013.

Marsden, S. (2011), The Espoo Convention and Strategic Environmental Assessment Protocol in the European Union: Implementation, Compliance, Enforcement and Reform. *Review of European Community & International Environmental Law*, 20: 267-276. doi:[10.1111/j.1467-9388.2011.00729.x](https://doi.org/10.1111/j.1467-9388.2011.00729.x)

Mid-programme carbon neutrality analysis for ERDF-funded State-Region Project Contracts and Operational Programmes for 2007-2013. Appendix: Joint Memorandum from Datar/ French Environment and Energy Management Agency (Ademe)/ French Ecology Ministry on the Greenhouse Gas Emission measurement systems used. June 2011 Edition.

Miernyk W. H., 1977, “A projection of technical coefficients for medium-term forecasting”, in W. F. Gosling (ed.) “Medium-Term Dynamic Forecasting: The London Input Output Conference”, Input-Output Publishing Company, London, pp. 29–41; DIETZENBACHER E., LAHR M. L. (ed.), 2004, “Wassily Leontief and Input- Output Economics”, Cambridge University Press.

Morandini G., Norberti S. 2008 “*La Valutazione Ambientale Strategica delle grandi opere: l’arretramento del porto di Genova*”, XXIX Conferenza Italiana di Scienze Regionali – AISRe, Bari 24-26 settembre 2008

National Assessment System 2006, “Indications for the drafting of the report of ex-ante evaluation of Operational Programmes 2007-2013”, mimeo, November 2006.

Nordregio. Final Report to the European Commission, Directorate- General for Regional Policy, Evaluation Unit, No 2007.CE.16.0.AT.041, *The Potential for Regional Policy Instruments, 2007–2013, to contribute to the Lisbon and Gothenburg objectives for growth, jobs and sustainable development*, Stockholm, February 13, 2009

Rega C. 2006 “La Valutazione Ambientale Strategica: proposte metodologiche di ricerca e riflessioni sul quadro normativo nazionale” XXVII Conferenza Italiana di Scienze Regionali – AISRe, Pisa 12-14 ottobre 2006

Regolamento (CE) n. 1828/2006 della Commissione dell'8 dicembre 2006 che stabilisce modalità di applicazione del regolamento (CE) n. 1083/2006 del Consiglio recante disposizioni generali sul Fondo europeo di sviluppo regionale, sul Fondo sociale europeo e sul Fondo di coesione e del regolamento (CE) n. 1080/2006 del Parlamento europeo e del Consiglio relativo al Fondo europeo di sviluppo regionale. ELI: <http://data.europa.eu/eli/reg/2006/1828/2011-12-01> (Accessed December 27th 2018).

Regulation (EC) No 1783/1999 of the European Parliament and of the Council of 12 June 1999 on the European Regional Development Fund *OJ L 213, 13.8.1999, p. 1–4*

Special Report No 7/2003 on the implementation of assistance programming for the period 2000-2006 within the framework of the Structural Funds ([OJ C 174, 23.7.2003](#)).

Special Report No 1/2007 concerning the implementation of the mid-term processes on the Structural Funds 2000-2006 together with the Commission's replies. *OJ C 124, 5.6.2007, p. 1–16*

Sheate, W., Dagg, S., Richardson, J., Aschemann, R., Palerm, J., & Steen, U. (2001). SEA and integration of the environment into strategic decision-making. *ICON: London, UK*.

Sheate, W. R., Dagg, S., Richardson, J., Aschemann, R., Palerm, J. and Steen, U. (2003), Integrating the environment into strategic decision-making: conceptualizing policy SEA. *Eur. Env.*, 13: 1-18. doi:[10.1002/eet.305](https://doi.org/10.1002/eet.305)

Sheate, W. R., Byron, H., Dagg, S., & Cooper, L. (2005). The relationship between the EIA and SEA directives. Final Report to the European Commission DG Environment, Luxembourg. Office for Official Publications of the European Communities, 2005.

## Summary

### **The Role of Cohesion Policy in addressing Carbon Footprint Assessment Strategies, Approaches and Instruments in a Multi-level Perspective**

The present work follows in the stream of investigations that belong to the body of literature on the European Union. Among the various issues that might be addressed in this field, the main factor that determines the research context of this thesis is the relationship between European Union (EU) Cohesion Policy and the environmental aspect. The evolution of climate-related mutations and their connection with the socio-economic objectives promoted by the EU are dynamic and relevant today, but they are also of difficult articulation.

#### **Research Question**

This thesis aims to address and answer the following two questions:

- Which is the role of the EU Cohesion Policy in addressing de-carbonization of the EU territorial system?  
and consequently:
- According to which criteria is it possible to determine whether or not the Cohesion Policy effectively contributes to the reduction of the carbon footprint?

#### **Working Hypotheses**

In order to respond to the above stated research questions, the thesis selectively draws from hypotheses investigated at different levels of analysis by a number of studies, and it re-formulates and adopts the following working hypotheses:

- a) Institutions matter in the environmental issues debate; despite criticisms the institutional theory provides a conceptual framework according to which environmental concerns can be faced thanks to the presence of institutions.
- b) The Eastern Enlargement of 2004-2007 is an intervening variable within the institutional context of the EU and it has influenced the process of environmental concerns inclusion.
- c) The Environmental Policy (EP) of the EU is an on-going process and is influenced by EU-external (i.e. exogenous shock; response to Foreign States actions) and internal factors (i.e. sectorial interests promoted by EU Member States (MS); legislative and administrative thresholds).
- d) The Structural Funds are tools that promote development and the consolidation of specific objectives of the EU – even though not homogeneously across the EU Member States (MS) – through a multi-

level approach pursuing the inclusion of social groups and citizens , and this can be extended also to environmental concerns.

- e) The financial resources provided by the EU support achievements that otherwise would be more difficult to obtain by only relying on national budgets ; they differ in terms of both formal and substantial aspects from funding provided by other types of institutions.

## **Objectives**

The objectives of this study have been set as follows, to:

- Understand the global and regional trends of GHGs and particularly CO<sub>2</sub> emissions;
- Define which type of agency the European Union is in addressing environmental and climate-related negotiations;
- Identify the internal factors that cooperate in outlining the EU environmental and climate policy;
- Verify the extent of the contribution of the Cohesion Policy (CP) in addressing and achieving carbon emission reduction;
- Assess whether there is a strong connection between the Cohesion Policy and the effective implementation of the environmental and climate agenda in relation to the investments made under the Cohesion Financial Scheme.

## **Methodology**

For what concerns the methodology adopted by this thesis, it is inclusive of the following methods: pertinent scholarly literature review, content analysis of documents, and the single case study approach.

More specifically, information on which the analytical work of this thesis is based upon is drawn from: academic literature such as handbooks and research papers; datasets such as of the World Bank, Eurostat, European Environmental Agency, OECD, FAO, NASA Goddard Institute for Space Studies; Institutional online portals such as European Commission, European Court of Justice, European Court of Auditors, EU Member States, European Parliament; legal acts, law cases, materials related to ex ante and ex post funding programme evaluations, and journal articles.

Furthermore, part of the research has been based on primary source information, collected during the interview with expert of environmental account consultant.

## **Chapter 1**

The aim of the first chapter is to discuss the main elements of the Environmental Governance (EG) structure, which is partaken by the European Union (EU) and how such institutions are facing the challenges of environmental transformation. To present a comprehensive picture, an introduction including the state of

the art of the alteration of the environment is first provided, as a preliminary condition for the discussion of the EG principles and dynamics. The discussion concerning the environmental governance - and consequently also the dimension that regards policy formulation and implementation - focuses on the specific case of the GHG emissions raise, paying more attention to the rise of carbon dioxide, since the global market economy is considerably a carbon-based economy. Therefore, the discussion highlighted the reasons why the alteration of the ecosystem and the environmental changes are of particular concern, especially for the social sciences. Secondly, the chapter reports the main trends regarding environmental changes, considering particularly the emissions of GHGs. The specific part on carbon dioxide is explored the most due to the fact that the CO<sub>2</sub> emission level has been historically linked to the economic development of countries and consequently represents a controversial indicator in measuring both economic and environmental changes. Thirdly, there is a focus on the core principles and frame of action to face environmental changes. In this part, elements of the institutional theory framework are highlighted and linked to the environment issue in order to provide the basis for the analysis presented in the following chapters. Analysis of the international context is provided taking into account factors such as:

- 1) the juridical background and the legal implementation to face the environmental issue;
- 2) the action implemented and the tools in place to contain the rise of GHG and CO<sub>2</sub> emissions.
- 3) the role of states, international organizations and other subjects of international law – such as regional organization and therefore the EU;

The final part of the chapter provides observations on the EG and emission concerns in relation to the EU actions in the transition from an intensive carbon-based economy to a more sustainable system, the institutional approach is still valid to address decreasing emission levels, that have such a deep negative impact on society. Nevertheless, the coordination among the EU institutions is essential to foster its agency at international level.

## **Chapter 2**

In the second chapter the analysis is focused on the main features of the EU's environmental policy. The progressive inclusion into policy of environmental concerns by the EU, which has reached transversal and multi-level dimensions, is the result on the one hand of its adherence to international commitments and on the other it represents the EU adjustment to the entrance in 2004 and 2007 of new MS which were characterized by different political, economic and environmental conditions.

The analysis that moves from the general EU institutional framework of action towards the specific case of the Cohesion Policy, considers multi-dimensional factors that have influenced the reforms of this policy within and particularly across (EU15 and EU 12) MS during its 2007-2013 programme cycle.

The first paragraph identifies the structure and the policy subject of the EU. In addition, the process of Enlargement is introduced as an intervening variable in the EU functioning system. The second paragraph

investigates the principles of Environmental Policy in the EU, under the normative and policy perspectives. The third paragraph presents the analysis of the EU Emission trends, by sectors. In the fourth paragraph, the policy responses of the EU are presented with the focus on the Structural and Cohesion funds and their relation to other frames of action.

The last paragraph offers additional observations. The harmonization of environmental safeguard concerns has required the transposition of a large body of environmental provisions, such as Directives on air quality, water quality, waste management, nature protection and industrial pollution control. For the new MS the approximation to the EU objectives has passed through the consolidation of the *acquis*, favoured by the instruments of pre-accession. Whether scholars are accurate in maintaining that Structural and Cohesion funds support significant changes in the poorer CEE regions, and that environmental condition improvements pass significantly through industry and agriculture, it is also true that the parameters according to which policy results are measured respond to considerations that go beyond the traditional sectorial division. The traditional discussion that sees scholars maintaining that Cohesion Policy is the reply to a European lack of social policy and is a form a compensation for worst-off regions and MS and others arguing that it is the policy option to complete the market through the restructuring of the less-developed periphery, may be enriched by a non-conventional interpretation. Which is, that Cohesion Policy could be assessed on the fact that it has progressively absorbed the environmental protection mandate for the purpose to support the shift towards a less carbon oriented economy, thus contributing to foster the emancipation of less developed regions from carbon intensity activity. In turn, the Cohesion Policy might contribute to the decoupling of GDP rise from the carbon emission. The relationship between Cohesion Policy and environmental objectives is then formulated and summarized in the following points:

- 1) Environmental issues can be addressed and consequent action can be undertaken, co- financed under all proposed Objectives – i.e. Convergence, Competitiveness and Employment & Cooperation—included in the MFF;
- 2) The Cohesion Strategy has shifted greater attention towards the Environment, making it a key factor of competitiveness and thus a driver for implementing the relation among environmental safeguards and economic goals as well as for employment and the strategic orientation of investments;
- 3) Compliance with environmental legislation is likely to increase the sustainability of the European system across and within its MS, even though it is strongly influenced by the administrative culture and the relations among levels.

Nevertheless, from the analysis of the passage from the cycle 2000-2006 (in particular after the mid-term evaluation of 2003- 2004) and the cycle 2007-2013 the necessity of fulfilling the gap between compliance and performance has been acknowledged. This management of gap reduction concerns the delivery of the strategic objectives and the way they are selected, planned, measured and evaluated.

Another consistent part of legislative tools, such as environmental impact assessments and access to environmental information, had to be included at the national level. However, in the plan of the Commission, sub-national entities of MS are actors of concerns, able to also implement the EU agenda. The limited resources of the national plans, and the consequent restricted share deriving from the national plans fostered the inclusion of subnational entities in the planning and implementation of EU funds.

In turn, this shift is allowing a more direct relation among regions and the EU level, speeding up the process of assimilation of the new approach formulated in 2007, whereby the Cohesion Policy Funds (ERDF, and CF) have become the major source of finance for instance in environment-related infrastructure projects that are investment-intensive.

### Chapter 3

This structure of the last chapter has been established with the intention to focus on the main issues faced in assessing carbon footprint in relation to the investments made under the EU co-financing mechanism. From what has been emerging in the previous sections, there have been legislative efforts deriving from the EU to progressively include environmental concerns in the political agenda and in the resources consequently allocated in order to support sustainable development in old and new MS. However, in spite of this attempt, there are two main points that have to be highlighted to understand the state of implementation of the environmental policy mandate on MS.

Firstly, the co-financing structure – and in general the implementation of the EU principle framework – faces different national contexts, that are primarily due to the economic situation and the administrative culture within the EU MS. Consequently it is difficult not just to agree with a unitary strategic framework, but also to establish a criteria of evaluation widely accepted.

Secondly, within the specific reference of the Regional Policy and its environmental dimension, the main challenge to face has to deal with the measurement of the EU value added. Indeed, there is the tendency to recognize the difficulties in establishing or measure the entity of this link but simultaneously to assume that it is present and validated.

In order to assess the policy coherence of the EU co-financing instruments under the light of the emerging necessity to evaluate the carbon impact that they have, the research is addressed in the following way.

In the first paragraph, Environmental Impact Assessment and Strategic Environmental Assessment Directives are introduced as elements that favourite the harmonization of the environmental concerns with respect to formulation of projects and plans.

In the second paragraph, the relationship between environmental assessment and Cohesion Funds is analysed in order to verify if there is a mutual consolidation of procedural environmental protection, deriving from the general guidelines and the environmental ex ante evaluation procedure contained in the SEA. In particular,

the focus will highlight the different speed at national level in terms of national implementation of the SEA, reporting methodological differentiation among the accuracy of the quoted Directive applications.

In the third paragraph, the programme cycle 2007-2013 is introduced to test most recent evolutions of the two factors presented in the second part (i.e. the Fund resources and the SEA ex ante evaluation).

In the last paragraph, the best practice of carbon footprint model developed in the 2007-2013 is presented as a possible solution for the problem of accounting emissions in relation to the EU OP investments. This part includes: the origin of the model; functions; application in test regions; evaluation and limits of application.

The importance of the SEA approach and the relative absorption of inclusive process such as spread of communication and fostering participation have been recognized by scholars as an achievement of environmental concern in an extended decision making process at strategic levels.

From the test conducted, the results show that regions can allocate funding in measures that have a negative impact in terms of emission-related levels. At the same time, regions can compensate with the positive measures that reduce the impact of CO<sub>2</sub> or can be emission neutral. Without this kind of model, an informed assessment process is unlikely to be undertaken.

Information is systematized also thanks to the use of indicators that decrease the volume and complexity of those information that is required in the process of decision making. Scholars have studied the typology and the functioning of these. In the context of the SEA, indicators may be used to demonstrate the changes in environmental quality resulting from the implementation of plans and programmes. Indicators must provide appropriate information to enable objectives and targets to be addressed. Hence another aspect that has to characterized indicators is the validity during the use, which is based on the scientifically designed that allows driving information.

Taking into account the previous considerations, the model CO<sub>2</sub>mpare introduces a quantitative measurement that allows:

- a) setting of a model in which the indicator is not for the description of the context but is able to simplify a complex process in relation to its input and output;
- b) improvement of decision making thanks to the increase of reliable environmental information;
- c) improvement of decision making due to the elaboration of alternatives sustainable development actions;
- d) improvement of the monitoring activities and increase of materials available also for on-going and ex-post evaluation checking;
- e) regionalization of ratios and parameters (where possible), which may improve environmental and climate related knowledge, implementing the relative policy at the local level and contributing to the eradication of Business as usual schemes;
- f) increasing awareness on the effective connection among different operations that taken together may contribute to climate mitigation or to its contrary.

Figure 3.10 below shows the representation of the SEA before the introduction of the model, and after it. Even though both of them include the alternative scenarios, only the second allows a comparison less dependent to subjectivity.

However, a compensation of quality aspects has to accompany the indicators presented in the model elaboration. As demonstrated in the ROP Puglia, the CO<sub>2</sub> reductions have to be justified in light of interconnected phenomena. Without an holistic view of the emission factors and their trend, the risk is to shift from an arbitrary interpretation towards a statistical bias.

## **Conclusion**

At this point, sufficient factors are available, and provide a reply to the research questions addressed at the beginning of the work seems to be possible. The conclusions of the work try to answer the question that was articulated in the first part, that is, if the CP addresses a EU action aimed at reducing carbon emissions or the case does not happen in this case. Secondly, it attempts to respond to the question that is implicitly to the first, and consider the modality and the criteria according to which is possible to determine the contribution of CP.

*CP is formally addressing de-carbonization through funding conditionality*

CP has been developing during the process of Enlargement and particularly during the Eastern Enlargement of 2004. From this evolutionary perspective, it can be seen that the policy has become much more than a mere exercise in redistributing funds from rich Member States to the less wealthy ones, although this is still a fair characterisation of some of the financial decisions during the big budgetary deals. Moreover, it has developed into a powerful regional development instrument in its own right with the potential to steer resources towards EU objectives and to improve administrative practices and culture across Europe. Across the interventions formulated for the purpose of including less favoured region in the market mechanisms that animates the process of European making, the environmental concerns have been gaining more spaces. The problem at the base of human proactive action - and so the action in the policy framework - in the Anthropocene consist into face continuously the application of principle of sustainability into practice. It is frequent that the triangle of sustainable development paradigm, in which economic and social development may coexist with the environmental dynamics and mutually support each other, turns into a trilemma of sustainable development, in which the options available seem include just two out of the three poles.

The categorization of what belongs to EP and what is outside the definition provided by the label – in other words, what is processed under formalized norms and what is not - in part persists, in part is on the way to be overcome by a more holistic approach that may support the abatement of the sustainability trilemma.

The answer to the first question find the majority of the elements in the central part of the study, drawing on the experiences of the programming cycles passed in light of the EP principles developed in the EU contest, and the way in which they were developed in the main phases of the evolution of the politics and therefore during the Enlargements. Especially the East Enlargement polarized the attention on economic-environmental dimension of the integration, increasing the attention on what are the gaps that still divide countries. Having considered both the documentation of the Commission and other EU bodies such as the Court of the Auditors, and the way in which the process of Europeanization has been applied in its operational dynamics of the CP introducing horizontal pro-environmental element in the OP, the involvement of the CP in the reduction of emissions in the cycle 2007-2013 has been verified. A better definition of the action framework has then been oriented with EC Communication: “GDP And Beyond. Measuring Progress In A Changing World” Com (2009) 433 and formalized with the Regulation Of The European Parliament And Of The Council On “European Environmental Economic Accounts”.

### *CP carbon impact remains uncertain*

More difficult to define was the analysis to understand and establish the link between the CP contribution and impact. This link has been studied by many authors, and finds the same toughness in determining results in terms of emission reduction. Indeed, different elements took place in order to answer. Undoubtedly, the first has a structural nature and concerned the introduction of indicator systems that, despite being present in reference to the emission condition, is more often than not oriented to give a definition of a contest rather than the relating dynamics in order to measure the policy result. So, on the theoretical point of view, the emission impact of CP rise the issue of causality-effect condition that is difficult to determine when there are heterogeneous dynamics like those that occur in the national or regional OP interventions.

Practical limits are the difficulties in measuring, finding data and the need for personnel who are continuously trained to use their sources. Furthermore, the administrative staffs are engaged objectives considered primarily as employment and social inclusion. The lack of a vision of medium and long-term on issues such as environmental ones is then one of the first barrier that obstacle the implementation of new practice of evaluation. This vacuum increases the distance between economic self-sufficiency and the implementation of environmental safeguards. In part, environmental and national authorities have compensated this lack. Indeed, the role of institutions involved in the development of this type of accounting promotes the dissemination of new accounting methods. Without these institutions, the activity of administrative entities could not be updated in the light of new environmental needs

The technical and statistical limits are intrinsic in the quantitative study. A possible solution for the improvement of the current state of the model lies in the creation and/or reinforcement of the synergy between socio-political and technical-scientific approaches. Their cooperation is often seen as an

irreconcilable binomial, but in reality they are two sides of the same currency whose value must be rediscovered. The Commission itself has expressed the necessity of convergence among these two fields as demonstrated by the call for tenders in 2011.

The methodological approaches for the calculation of carbon impact have been developed to simplify procedural passages required in order to approach these themes. Conversely, scientific development has allowed enlarging the interconnections among concurrent operations, improving the quality of the feasibility of ex-ante assessment processes. Therefore, the expenditure-unit of emission association has brought the environmental and economic dynamics closer together even at level less favourable regions, as demonstrated by the convergence region test in the South of Italy.

There are several perspectives that are reasonable to consider as opportunities to improve the current state of evaluation of the CP carbon impact. In the first place, one opportunity is given by the weak - but at least present – suggestion provided in the Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment by the Commission in 2015. The model is nevertheless useful for identifying the alternatives of development plans and is applicable also in on-going evaluation. Another opportunity is provided by bottom up stimulus that came from some MS that are strengthening the carbon impact approach in cooperation with institutional bodies such as the ENEA in Italy. These signals are the proof that there is the possibility to achieve the strategic integration of the environmental concerns cited in chapter 2.

In addition, during the current cycle (i.e.2014-2020), the orientation towards result achievement has implied a revision of assessment procedure and impact examination, as elements that contribute to policy to change.

Nevertheless, the work has contributed to identify also the weaknesses that affect the institutionalization of carbon footprint assessment. The position taken by the Commission for the indicator adopted for the cycle 2014-2020 do not really correspond to formal statement and practical necessity to have more details on the impact of the resources allocated, that have to be evaluated not just and not only under the perspective of expenditure capacity, but also according to the results achieved. As mentioned in chapter 3, it is the Commission that directs the work for the CP in the interest of the Union. So if the Commission does not act to coordinate the evaluation methods defined in the criteria, thus fulfilling the role that the institutions have to define behaviour of the individual components of the system, such as MS and regions are, it is difficult to think on a spontaneous coordination of indicators.

### *Policy Recommendation*

The work aims to provide a contribution in the field of discussion concerning the EU Funds discipline articulating a suggestion applicable without extreme efforts.

The first step implies a deepening focus on the carbon impact of the CP contributing to explain and not just to describe the emission phenomena. This can be done in occasion of the ex post evaluation at the end of the current programme cycle 2014-2020. During this phase of the evaluation, certain elements have to be discussed as:

- the state of the carbon impact indicators, whereof validity may emerge from mapping the typology of indicators used and analysis the best practices;
- the analysis should be conducted in order to differentiate the field of application, but maintaining for each field the criteria of universal application in the EU context and major level of regional accuracy for the data collection;
- ascertainment on the current condition of environmental network capability to support low-carbon transition in the EU M, evaluation whether or not they may be capable to provide support also through training activities and data acquisition;
- attempt to match the estimation of CO<sub>2</sub> in relation to the areas identified by the Commission and highlighted in chapter 2.

There are not sufficient information to provide a comment concerning the programme cycle 2021-2027. The Brexit and possibility to have a EU at different speed are evident signs of disaggregation. As far as it goes, CP policy contributes to foster harmonized path of development within the EU in spite of diversity occurring at national level. So, the CP is an element that contributes the consolidation of those steps that allows to pass from politics to policy and from policy to politics as Lowi would say. The general EG dynamic occurring at the international level finds threat and opportunities at lower levels, in which practical actions can truly be carried out. A clearer definition of CP impact would help to include less developed regions of the EU in the framework of environmental actions, stimulating harmonization of the interventions whereof otherwise the meaning and overall scope would be missed. Replying to the issue addressed in the last part of chapter 1, being a factor of harmonization CP would so contribute to reinforce the unity of EU and consequently enabling it to better perform in its role of at international level.