Preface

In current literature scholars, depending upon their field, do not always take a systemic, regional and comparative look at the energy and the natural environment issue. Doing this from a triple perspective framework can help different disciplines communicate and be helpful for managers, politicians, and stakeholders involved in the energy and the natural environment systems.

The aim of this book is to highlight how systems in different areas of the world manage multiple relationships between the energy and the environment and the following political, economic, technological, social and communication implications.

This book adopts a comparative and regional perspective to develop an understanding of how the energy and the environment interact and what kind of impacts and effects they have on different sectors and actors. Three areas and their possible connections will be presented: the regulation system, the facilitation policies, and the communication field.

Therefore, this book sets out to explore the concept of sustainable systems with the aim to discuss, rather than to answer, the overall question of how it is possible, in a global world, for a system, to be environmental sustainable and energy efficient in a long term and how this impacts on the choices, strategies and behaviors of policy makers, decisions makers and citizens. The aim of this book is to suggest readers to investigate the subject of energy issues, environmental protection and community’s knowledge basing the analysis on a holistic, systemic, regional, and multi-disciplinary approach. It follows it becomes necessary and fundamental to study the relationships between all the components of each system, that means the political and management sides; the supply, sources and final consumption of energy; the existing relationships between all these components and the protection of the environment; technological implications; the role of and how knowledge is shared among all the actors of the system to create a more efficient and effective sustainable environment.

THEMES AND CHALLENGES

The development of a society can be defined as sustainable if it can reach the goal of an economic growth associated with social cohesion and protection of the environment. But how do different actors, from national states to firms, behave and change their strategies according to different regional policies in the energy and environment field? How is it possible to manage and coordinate different efforts which are expression of various instances at different scale? Finally, why the regional scale? To understand the complexity of unresolved problems, unanswered questions and richness of complexities in the area of energy and the natural environment, there is the need for a point of observation that gives observers the right angle to ponder all the different possibilities and complex relationships between variables.
The region is a level of knowledge and a state of mind that allows people to observe reality from a holistic and multiscale point of view. A region is a tool to connect the local and the global while analyzing the horizontal and vertical relationships that evolve and develop in any condition.

The region is also a system in the way it was defined many decades ago and it is used today in various fields of knowledge. A system is an open organic group of connected elements that evolve over time and that is determined by its goals. Openess, dynamism, goal-oriented and relations are the main key words that define, at least, a system.

The complexity of the world in which we live in, composed of many sub-systems, leads observers to adopt a holistic approach to understand at least all the different relationships among variables.

Sustainability itself is a systems concept because it requires to look at the relationships between different areas (social, economic, environmental) inside the main world-system and to analyze these in a dynamic perspective (future generations).

Energy and its management require complex and multidimensional tools in their analysis in order to reduce the risks for populations and the costs for firms and countries.

The main idea at the base of this book is to adopt a holistic approach under the sustainability paradigm to show that different experiences in the energy sector require a regional approach to put together local levels and instances with global forces and constraints.

The region is the key not only in geographical terms, where a region can be defined in many ways, but in theoretical and conceptual terms because it allows to read together local and global forces.

The proposed way is to adopt the regional level as the only one with the capacity to catalyze different international, national and local instances. The demand for a ‘green revolution’ (i.e. Green Economy) is present in many different areas of the world and this demand is as stronger as closer the level of governance is to local entities and individuals. More than a national exceptionalism that it is still present in the field of international relations and leads to unsystemic views and visions of the world, it is possible to see that at the right level of analysis, the regional level, different places and actors try to adopt the best local solutions as reactions to to the same global issues and challenges. It follows that it should be useful to compare these different solutions and their economic, political, environmental, social, and managerial implications in order to improve the global knowledge on global systemic issues at different scales and for different actors.

**STRUCTURE OF THE BOOK**

The book was initially intended to have three main sections. Thanks to the interest in this project and the many manuscripts received the structure has four sections: impacts of regulations, facilitation policies; experiences, actions, and models; communication policies. Because of the quality, richness and multidisciplinarity (explicit and implicit) of the chapters, I suggest the reader to find its own path and experience its knowledge adopting a holistic and systemic approach.

The framework here proposed is only one of the possible ways to matching these papers. Whatever the path the reader decides to go through this text, the proposed framework is based on the following sections.

The first theme, the impact of regulation systems, analyzes the economic effects determined by the differentials of rules existing at different scales. In more details this part refers to the composition of the system of rules; the incentive or deterrent effects of rules in relation to modes and times of application.
in single national states; costs and benefits of rules and their distribution among different actors; the effectiveness of regulation systems; the efficiency of regulation systems. On the same level it is important to comprehend the potentialities of an effective governance especially for a regulation system that is organized and realized at different levels and in different areas necessarily interacting. For instance, in the case of a regional market this means to consider the supranational, national, regional and local laws, and its dependance from external forces and markets.

Here, Eun-Hee Kim recognizes that in the United States various types of renewable electricity policies exist both at the federal and state levels. These policies are designed to directly or indirectly incentivize producers and consumers of renewable electricity. After explaining the existence of renewable policies by the market failure theory, and recognizing the role of positive externalities in the environmental pollution and energy independence areas, she reviews the primary functions of various policy instruments at the federal level and at the state level for seven selected states to propose a discussion on their effectiveness.

Next, David Browne aims to analyze the connections between four themes in an energivorous sector like the transports system: the purpose of fiscal measures, potential fiscal measures and their application; potential barriers to the introduction of more efficient pricing and ecological tax reform (ETR). After a comprehensive analysis, he concludes that, although vehicle and fuel taxation measures vary between jurisdictions, ultimately policy-makers should consider calibrating vehicle and fuel taxation to ensure that externalities are internalised, costs are shifted from vehicle ownership to use and that marginal variable costs are transparent to the network user. He also states that however he recognizes the threats to the political action because of the existence of concerns over the potential impact on lower socio-economic groups and rural communities as well as commercial concerns over the competitiveness of the freight sector and macroeconomic impacts.

In the third chapter Anatoly Zhuplev and Dmitry A. Shtykhno focus on the relationship between two important neighbours, one the largest country of the world and on the of the leading energy exporter, the other the most connected regional market in the world characterized by a growing demand of foreign energy sources. Europe’s economic wellbeing and growth are highly energy dependent and heavily reliant on Russian imports of oil and gas. They focus on this asymmetric mutual political-economic interdependency and its impact on competition and sustainability in energy solutions for both areas such as in new investments in green technologies and resources (the EU) and in serious improvements in technology, investment, and management (Russia).

Finally, Stefano Fanetti follows the previous authors on the path of sustainability and dependency analyzing in detail a European country, Italy, that is characterized to be a country where the energy supply depends largely on imported raw materials (such as oil and natural gas). The favorable geographic location could encourage the development of renewable energy sources; nevertheless, the growth of alternative energy sources is slow. On these basis, he tries first to find the main reasons considering three different aspects of the issue: the economic incentives for renewable energies, the problematic process of authorization of the facilities and the local communities’ opposition to new plants, and then to identify possible solutions taking into account the relevant legislative and regulatory changes at the national and Community levels.

The second theme is about facilitation policies. It is interesting to put in comparison the different models that ease the development sustainable processes and in particular the development of renewable resources and energy efficiency as such the rules that discipline the protection of the environment. For the reader a comparative analysis of market mechanisms and environmental taxation might seem useful to understand the potential opportunities and defects of each option, taking into account the effects
to international, regional and national markets too. This approach will present the best practices where there has been an innovative approach of the political manager; on the same level there is the need to verify if and what tools have been developed to reach the goals. A special attention must be put on the different and unique aspects of each market and on the role of other policies (e.g. commercial policies) that favor the regulated integration of markets of energy sources. For all the facilitation mechanisms the reader can verify the reached grade of homogeneity, the respect of transparency expectations, competition between sources based on costs and results obtained in terms of international trade.

Here, the first chapter by Tugrul U Daim, Terry Oliver and Ibrahim Iskin deals with the role of technology for the development of a new energy efficiency technology roadmap in a macro region of the United States. From the recognition of the role played by technology in the Northwest’s development, the existence of exceptional resources (businesses, educational system, job market, etc.) the region has met half of its load growth through cost-effective investments in energy efficiency for more than thirty years. Nowadays there is the need for more efficient-effective goals, such as those planned by the Northwest Power and Conservation Council’s Sixth Power Plan that calls for roughly 85 percent of the region’s power needs to be met with energy efficiency by 2030. The authors report the experience and the result of the Northwest Energy Efficiency Technology Roadmap that has been developed to meet these goals.

In the second chapter Filippo Randelli focuses on biofuels as a possible alternative to nonrenewable resources in the European area. In doing so, he recognizes the need for an economic assessment of biofuels to take into account total production costs and the energy balance of first generation alternative fuels (biodiesel, bioethanol and biogas). From the analysis carried out, it emerges that first generation biofuels don’t seem to be the best solution because of high production cost, limited land availability and low net energy balance. He sustains that a valuable and valuable alternative should be found in biogas that can be a good opportunity in terms of net energy balance, in particular if we consider also targets within the EU on reducing the amounts of biodegradable waste going to landfills and/or incineration. Only second generation biofuels could be a possible solution, although they still require much supplementary research and analysis.

Bruno Soares Moreira Cesar Borba, Régis Rathmann, David Alves Castelo Branco go on making a regional comparison between the United States and Brazil. Their objective is to identify the possible tax revenue losses due to improved fuel efficiency of light-duty vehicles in these two countries. To do this, they project the evolution of fuel consumption in the light vehicle segment over a horizon to 2035 through the creation of a baseline and an alternative scenario, the latter including increased efficiency of light vehicles. This projection shows different results that lead to different solutions for these two different economies and impact on local communities and citizens.

Then Ibrahim Abdel Gelil puts the light on the macro Arab region to look at the applied responses to environmental issues. The proliferation of multilateral environmental agreements has put extra burdens on the institutional setup in the Arab countries, which already suffers from weak capacity, lack of resources, and power struggle in the national policy arena. For these reasons he aims to portray interconnected evolutions of the global environmental governance system and of the development of a parallel legislative and institutional framework in the region. He finds that actual challenges faced by Arab countries while meeting its obligation in the MEAs include inadequate financing; low public awareness; limited negotiation capacity; and marginal involvement of civil society and the private sector. So the effects of these barriers on the level of implementation by Arab countries of different MEAs are reviewed in detail.
Not so far from the Arab region, Africa is another continent that is extremely interesting from our point of view. Divine Odame Appiah, Francis Kemausuor and Kwame Nkrumah analyze the triple challenge and options for the African socio-economic development based on energy and the environment. Energy is the main driver of development, but in Africa low access to energy hampered the socio-economic development of the continent. The analysis is on the dynamics of energy, socio-economic development and environmental sustainability in a nexus of the triple challenges facing Africa, at a regional scale from different African scenarios.

The third section, Experiences, actions and models, has the aim to present to the reader different paths and frameworks of regional development to show that there is not a unique and top-down solution, but that multidimensional and multisectorial solutions have to be implemented in order to consider the needs of localized communities.

The American continent is rich of interesting examples that should be used to compare with for many policy makers from every part of the world. After the USA, another leading country in the energy sector is Canada. Nancy Higginson and Harrie Vredenburg focus on Canada and its role in the global energy industry. Because Canada is home to a major oil sands hydrocarbon reserve, which is of strategic importance in global energy security, the country needs to improve the use of this resource and to pass from the take-off to the growth phase. Since in the last years many efforts to fully exploit it have been hampered by a range of factors, they provide a framework for a systems-based approach to managing the oil sands that integrates stakeholder management and domain-based collaboration theory.

Different local conditions lead to the development of different actions and plans. In Finland Esa Stenberg analyzes the development of a business model for exploiting geothermal energy. Although the amount of firms operating in these markets, still the main challenge facing renewable energy is its commercialization. Developing new types of business models would help in meeting such challenges. Stenberg focuses on the Finnish national development project for exploiting geothermal energy, first discussing the geo-energy business in general, then describing empirically the business models of various operators in this field, based on Osterwalder’s (2007) business-model configuration. The product concepts, partnership networks, added value, target groups, customer relationships and costs and revenues are analyzed through these pilot case study.

From the South-East Asian region, readers can find an interesting experience about the use of policy instruments to promote sustainable energy practices and implications for the environment. Leo Tan Wee Hin and R. Subramaniam analyze the use of policy instruments in the environmental framework to promote sustainable energy practices in Singapore. They cover four interrelated areas that are waste production, water consumption, transportation and atmospheric emission to show why sustainable energy practices are well ensconced in Singapore and the rate of increase of the carbon footprint on the environment has been lessened significantly.

In the same area Jeju Island in South Korea is a good case for an integrated regional energy policy and planning framework used to evaluate the application of the local Carbon Free Renewable Roadmap. Young-Doo Wang, Wei-Ming Chen, Yong-Kyu Park propose the idea that there is still room for improvement in the planning process. For this reason they introduce an Integrated Regional Energy Policy and Planning Framework (IREPP) to contain important concepts of sustainable energy planning (i.e. integrated resource planning, soft energy path, distributed generation using decentralized energy technologies, and energy-environment-economy-equity balance (E4)). After discussing the advantages of the IREPP, they apply this framework to the case of Jeju to evaluate the local Roadmap and assess the rational and feasibility of achieving its individual renewable target.
At the same level of analysis, Lara Lázaro Touza and Elena López-Gunn propose a different framework to focus on cities and their relationships with energy uses and climate change effects. For them cities are key in dealing with climate change as they account for two thirds of global energy consumption, three fourths of CO2 emissions and their mitigation potential is significant. Their research is conducted on the city of Madrid, Spain, and it is based on a qualitative (interviews) and quantitative (data) analysis based on the Environmental Policy Integration (EPI) framework used for the first time at the local level and valued as a pre-requisite for the sustainable development of a city.

The last framework is proposed by Haris Doukas, Ioanna Makarouni, Charikleia Karakosta, Vangelis Marinakis, John Psarras who analyze the Arab States of the Gulf region focusing on the relationship between energy and renewable resources under the light of cooperation with external regional players. Because Arab countries value highly the sustainability’s priorities, they are involved in an energy cooperation program with the European Union (EU) to support them in addressing and successfully tackling clean energy issues. Basing on this experience, the authors present a methodological framework for the identification and comparative evaluation of appropriate renewable and energy efficiency solutions towards EU-GCC “clean” energy cooperation program in order to give emphasis on the formulation of a collective interactive process, comprising different rationales for intervention, to elaborate more realistic and transparent outcomes.

Communications policies is the fourth theme. The strategic importance of knowledge in a changing process of life styles and behaviors of citizens is out of discussion: that means the dissemination of correct and exhaustive knowledge about energy and environment becomes a strategic factor to promote a real sustainable development. The growth of knowledge and the know-how favors the necessary grade of scientific and technological innovation to consolidate the virtuous practices in the field of energy and environment. The development of a specialized training, the sustainment to middle-term study projects, the realization of training and education programs directed to all institutional actors, the creation of communications campaigns that are popular and informative, all are main tools necessary to grow and disseminate a energy-environmental knowledge among citizens.

Matthew Cotton focuses on the relationship between the public sector and local communities in the area of renewable energy sources in the United Kingdom. Since wind energy is an important component of a national renewable energy strategy designed to mitigate climate change and secure long term electricity supply. However, wind developments are exceedingly controversial amongst locally affected citizens. For this reason the author focuses upon the socio-political aspects of wind farm siting in the UK, examining the issues of Not In My Back Yard (NIMBY) protest, the attitudes of developers towards ‘the public’ and the policy and practice of public engagement in wind siting decisions in light of recent changes to the domestic planning legislation for Nationally Significant Infrastructure Projects.

The role of stakeholders and their involvement in environmental and energy issues is analyzed by Eleftheria Vasileiadou. Recognizing that policy-makers today face increasingly complex and non-linear problems and require flexible modes of governance, she analyzes the role of formalized stakeholder consultations in EU energy policy and their potential of integrating climate change issues. More specifically, she empirically investigates how stakeholder consultation processes influenced the formation of the EU Energy Communication of 2007. The analysis shows that there was limited diversity of participation in consultations, as actors from civil society or NGOs were not included. Moreover, the role of scientific knowledge in the consultations was minimal. Actors at the regional and sub-national level are generally ignored in such formalized consultation processes. Recommendations for policymakers and organizers of consultations are provided.
The work of Clara Pusceddu is still on Europe but at a lower scale of analysis. She focuses on a French national project to show how it is possible to develop a multilevel collaboration and involvement of local communities in order to have national collaborative environmental policies. In fact the case of the Grenelle Environment Project is unique and highly valuable. Introduced to define the strategic and key points of government policy on ecological and sustainable development issues in a participative process at the national level, the Grenelle Environment Project put all the stakeholders together around a discussion table to set deliberately efficient national measures to deal with the environmental problems. This case describes the development of the project in details, and illustrates the benefits of a collaborative and participative decision-making process to support institutional actors to face environmental, ecological and sustainable development questions.

Finally, Tim Cadman and Margee Hume from Australia adopt an approach more business-oriented focusing on the sustainable governance systems and business ‘green’ practices at the regional level. They examine the current implementation of a number of governance systems that relate to regional sustainability programmes and green firm’s practices. In their analysis they find that from a regional perspective innovative primary producers and resource stewards often take up green initiatives with little or no knowledge of the governance quality and legitimacy of the schemes they are seeking to implement. So they look at market-based sustainability initiatives, investigates the strengths and weaknesses of two timber certification programmes, and identifies some key governance requirements to improve green practice at the global, regional and local levels.

**TARGET AUDIENCE**

This book proposes to adopt a multi-scale and -dimensional approach with a focus on the regional level to reveal and understand the complexity of relationships between energy and the environment. The proposed approach should help the reader go through the complex relations there are between different actors, sectors, and levels. In doing so, the book aims to shed a light on such a complex field and to be helpful to stakeholders thanks to its multidisciplinary approach and to its organization that crosses the three pillars of sustainability (the environment, economy, society): from the regulation of markets to communication to citizens/consumers. For this reason my hope is that this book might be beneficial to scholars, policy makers, professionals, managers, citizens and all those stakeholders working in organizations, corporations, firms, institutions and associations interested in a deeper understanding of the area of energy and environment and their environmental, economic and social implications.

**FINALLY …**

The recent global events have shown once more the importance of the idea no one is a island. The financial, economic, technological and environmental problems stress the idea of complexity till the point communities all around the world need to cooperate and share information to improve their common knowledge. The tragic and recent events from Japan should be a reminder for all of us to study more, make more research and communicate better in order to leave future generations a better place to live in.