



Project of Offshore Wind Energy: Research, Experimentation, Development

WP 3 - TASK 3.2, 3.3, 3.4

Regulatory, Environmental and Energy Policies State of the Art













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1 Introduction

Offshore wind power is still at an early stage of commercialization but it is facing a quick increase. At the end of 2008, there were 1.4 GW of installed capacity, all in European countries around the North Sea, the Baltic Sea and the Irish Sea (IEA World Energy Outlook 2010). Capacity rose to 2.1 GW in 2009: in that year, Germany, Norway and — the first country outside Europe — China installed their first offshore wind farms¹. The quota reached 5 GW at the end of 2012, representing 10% of Europe's annual wind energy installations (EWEA, 2013).

Offshore wind power is still small because of its higher cost and because many technical challenges remain, if compared with onshore wind power. In fact, offshore technology is still further from market than land-based technology. Power generation costs from the latter range from USD 60/MWh to USD 130/MWh at most sites. It can already be competitive where wind resources are strong and financing conditions are favorable, but still requires support in most countries. Offshore wind technology costs leveled off after a decade-long increase, but are still higher than land-based (IEA Wind Energy Roadmap 2013). The potential for offshore wind power is, however, very large. The IEA World Energy Outlook 2010 stated that the offshore wind capacity is projected to increase to 115 GW in 2035 in the Current Policies Scenario, 180 GW in the New Policies Scenario and nearly 340 GW in the 450 Scenario, supplying 1 %, 2 % and 4 % of global electricity. The largest increases are in OECD (Organization for Economic Co-operation and Development) Europe, OECD North America (mostly in the United States) and in China. The IEA Wind Energy Roadmap 2013 states that by 2050, 25% of wind capacity will be located at sea, up from 6% in 2020. According to the European Wind Energy Association (EWEA) scenario the total installed offshore wind capacity will grow up to 40 GW in 2020, equivalent to 4% of European Union (EU) electricity demand or 148 TWh production: approximately one quarter of the European wind energy will be produced offshore. In 2030, the total installed offshore wind capacity

¹ World Energy Outlook 2010, International Energy Agency, p. 328







will be 150 GW producing 562.4 TWh of electricity, half of Europe's wind electricity produced².

Most of the development is expected to continue mainly in Northern Europe, where the potential is very large and partially already exploited. Offshore wind power is expected to be distributed across the region, requiring the construction of a major offshore grid to connect offshore wind farms to the mainland, based on a integrated approach among the countries involved. In this framework, United Kingdom, Germany, France, Belgium, Netherlands, Luxembourg, Denmark, Sweden, Ireland and Norway signed in December 20010 the Memorandum of Understanding (MoU) which launched the North Seas Countries' Offshore Grid initiative (NSCOGI), a regional cooperation to find common and cost-effective solutions to questions related to current and possible future grid infrastructure developments in the North Sea. The results of the first two years of cooperation, during which the countries have worked together to carry out an important grid study and address related technical, legal and regulatory barriers, have been published at the end of 2012. In brief, the analysis "has shown that developing a coordinated infrastructure (intended in a broader sense) requires a high level of cooperation between all the parties involved. National approaches don't necessarily need to be harmonized but they do need to be compatible in order for such an approach to work" (NSCOGI, 2012). Activities continued also along 2013 and 2014 and the outcomes have been collected in a progress report published in August 2014, affirming that "no regulatory arrangements exist to incentivise investment in and facilitate trading across hybrid offshore structures (interconnectors with offshore wind farms connected)". Therefore, the NSCOGI regulatory work stream has been developing such proposals and prepared two papers: one on the arrangements for trading across such hybrid structures bearing in mind the proposed EU-wide target model of market coupling ("market arrangements paper"); the other on how the costs of such structures might be allocated among interconnector and wind farm developers ("cost allocation paper"). The future areas of work will be focused on grid configuration, regulatory and market issues, and planning and authorizations³.

² EWEA, "Pure Power – Wind energy target for 2020 and 2030", 2011

³ http://www.benelux.int/nl/kernthemas/energie/nscogi-2012-report/







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At the end of 2011, a total of 1,371 offshore turbines were installed and grid connected in European waters totaling 3,812.6 MW spread across 53 wind farms in 10 countries. Offshore saw a record growth in 2012, with 1,166 MW of new capacity grid connected, and the trend is expected to continue in the following years. In 2014 Europe reached 128.8 GW of installed wind power capacity, of which approximately 120.6 GW onshore and just over 8 GW offshore (EWEA, 2014). This increasing trend shows that annual installations of wind power have increased over the last 14 years, from 3.2 GW in 2000, to 11.8 GW in 2014 at a compound annual growth rate (CAGR) of 9.8%. Germany remains the EU country with the largest installed capacity followed by Spain, the UK and France. A number of previously large markets such as Denmark, Spain and Italy saw their rates of wind energy installations decrease significantly in 2014, by 90.4%, 84.3% and 75.4% respectively.

Offshore wind saw almost 1.5 GW installed in 2014, 5.3% less than 2013. Offshore wind power installations represent 12.6% of the annual EU wind energy market, down from 14% in 2013. Offshore wind deployment is foreseen to expand dramatically in the years to come, as foreseen by the IEA projections until 2050 (Figure 1.1). The European expansion is strongly driven by EU and national policies that aim to provide a much greater penetration of renewable energy sources.



Figure 1.1: Global Map of Regional Wind Power Capacity Development (IEA, 2013)







Political certainty is key to move from a pioneering phase to large scale offshore wind development. The European Commission, by considering a 2030 renewable energy target as an intermediate target towards 2050, should provide the wind industry with the certainty it deserves.

Beside the technical requirements, financing offshore wind farms is at present problematic, because financial institutions perceive the technology as risky and require a higher share of equity, compared with other renewables, notably onshore wind projects and photovoltaic (PV): this issue limits the exploitation of this type of source. As the technology improves and bankers become more comfortable with it, lending should become easier. Until then, governments may have to play a role to facilitate investment in offshore wind power by, for example, increasing the role of multilateral lending institutions. The European Commission is playing a fundamental role in this sense, as it is proposing €9.1 billion to accelerate planning and finance new energy infrastructure⁴, beside the several initiatives to foster the development of this sector and guarantee the European leadership in the market. The launch in December 2013 of Horizon 20201, the new R&D research framework programme of the European Commission allocates €158 million and €169 million for renewables in 2014 and 2015 respectively. This budget will help onshore wind energy to become competitive compared to conventional power generation by 2020 and offshore wind energy to become competitive by 2030. In addition, 2011 has been a largely positive year for offshore wind financing and 2012 installations accounted for € 3.4bn to € 4.7bn of investments

Since 1998 the EU has funded more than 40 projects on wind energy with a total contribution of more than \notin 60 million since 2002 (EC data, 2013). In addition it also set up the necessary regulatory and institutional framework to achieve the growth. An example is given by the Wind Technology Platform (TPWind), which gather up the different actors active in the sector with the aim to join forces and develop a common vision that can jointly be implemented. The Platform develops coherent recommendations, detailing specific tasks,

⁴ The European offshore wind industry key 2011 trends and statistics – January 2012, EWEA, p.4







approaches, participants and the necessary infrastructure, in the context of private R&D, as well as EU and Member State Programmes, such as Horizon 2020. TPWind also assesses the overall funding available to carry out this work, from public and private sources. A common "**Vision Paper**" has been published in 2006, representing the basis for the following issue of the "**Strategic Research Agenda and Market Deployment Strategy – From 2008 to 2030**", defining important milestones to be achieved until 2030. The "Strategic Research Agenda" wants to achieve the following goals in the offshore wind power sector:

- more than 10% of Europe's electricity demand to be covered by offshore wind;
- offshore generating costs that are competitive with other sources of electricity generation;
- commercially mature technology for sites with a water depth of up to 50 m, at any distance from shore;
- technology for sites in deeper water, proven through full-scale demonstration.

Milestones for achieving the TPWind 2030 vision are:

- enabling market deployment;
- cost reduction;
- adapting policies;
- optimising administrative procedures;
- integrating wind into the natural environment;
- ensuring public support.

A new version of the Agenda has been published in March 2014. The Agenda is divided into four research priorities aimed at reducing the social, environmental and technological costs of wind energy. The priorities are:

- External conditions: climate, waves, and soil
- Wind turbine systems
- Grid integration
- offshore technology

For each topic, short, medium and long-term research priorities are defined and actions are identified, to meet these priorities.







TPWind developed in 2009, in collaboration with the European Commission and EU Member States, the **European Wind Initiative (EWI)**, a wind energy research and development program covering the 2010 - 2020 period, to be realized through the EWI 2010 -2012 and 2013 – 2015 Implementation Plans. The EWI is rooted in the EU Strategic Energy Technology Plan (SET-Plan) and is now being implemented by EU Institutions, Member States, TPWind and the European Energy Research Alliance (EERA). The budget of the EWI for the 2010 -2020 period is 6 billion Euros (public and private resources).

Based on the EWI, the European Commission published the **Wind Energy Roadmap**, a long term program for increasing and coordinating the funding of wind energy R&D, so as to ensure its quick development and deployment in the EU. It focuses on new turbines and components, offshore technology, grid Integration and resource assessment and spatial planning. A detailed analysis of the regulatory instruments adopted by the EU to booster the production of wind power is given in Paragraph 2.1.

In general, continued support from the early players, including multilaterals like the European Investment Bank (EIB) and the Danish export credit agency Eksport Kredit Fonden (EKF), is coupled with the arrivals of new players both on the equity and lending side. Fortunately, the offshore wind sector is now increasingly seen as a core activity for project finance banks. Investors and banks are beginning to see the sector as becoming established and more mature, as well as better understanding the risks.

Regarding the Adriatic Sea, despite the positive European framework regarding offshore wind energy, a more general approach is needed to facilitate the development of offshore farms, as this potential still needs to be investigated, both from a technical and economical point of view. As formerly affirmed, governments' role plays a fundamental role in paving the way for the installation of this kind of plants, in particular through proper regulatory approach and energy policies. This Report is therefore aimed at giving an overview of the current regulations and energy policies of the Adriatic Countries involved in the POWERED project, with a critical comparison to the European Regulations in the same field. The final goal is to define the regulatory and environmental roadmap for the exploitation at Adriatic level of the existing offshore wind potential. In fact, this Report represents a fundamental step in the achievement of the POWERED objective, which is drafting guidelines for the







realization of off-shore wind parks in the Adriatic Sea compatible with the planning and conservation policy shared among the project partners. In fact, POWERED aims to define a set of strategies and shared methods for the development of the off-shore wind energy in all the Countries overlooking the Adriatic Sea.

This document is part of the final deliverable of the Work Package 3, which defines the technological and regulatory state of the art of energy and environmental policies in the Adriatic Sea. The technical analysis of the technical state of the art of offshore wind farms in Europe is given in the final report of WP 3.1.This report gives first an overview of the offshore wind farm regulatory framework at European level and at country level: in fact, while the European Union, through its policies and regulations, sets up the framework for the increase of the renewable energy quota in the energy production of the Member countries and for the protection of the environment, European Union law. This process must be accomplished also by candidate countries, as requirement for their accession. A special focus is given to the Italian case, the biggest country involved in the project, where Regions have the power to enact regulations in the energy field. Each Region has in fact adopted specific legislation to support the development of wind power.

The second part of the report presents an overview of the main environmental policies in force in the Adriatic Sea: the main instruments in this field derive from the international legislation, consisting in protocols and conventions for the protection of the sea and natural resources. The European Union is also in this case an important source of legislation, in particular through its "Habitat" and "Birds" Directives, setting up the Natura 2000 network: these directives foresee specific protection measures for these areas, including restrictions for human activities. For the extra European countries, this level of protection is guaranteed through the Emerald Network: before joining the European Union, Albania, Bosnia-Herzegovina, Croatia, Montenegro have implemented Emerald pilot projects as preparatory work to setting up the Natura 2000 network.

Finally, the report presents the key elements of the energy development strategies of the Adriatic Sea countries: having a clear picture of their energy resources and market allows the assessment of the potential future development of the wind energy sector. The reported







data derive from the current main existing literature in this field and, for their consultation, it is recommended a periodic update.

The first issue of this report dates back to May 2012. A second issue in February 2015 has been considered a necessary step in order to present by the end of the POWERED project (February 2015) the most updated version of the information contained. This release has to be considered as replacing the former one.







2 Offshore Wind Farm Regulatory State of the Art

2.1 The European approach to wind power

In 2001 the European Union, aware of the fundamental role that renewable energies could play in reducing fossil fuel dependency and GHG emissions, set up a specific legal framework to promote renewable energies within its territories. In fact, the former White Paper on Renewable Energy Sources (1997) recognized the promotion of electricity produced from renewable energy sources a high Community priority, for reasons of security and diversification of energy supply, environmental protection, social and economic cohesion. The main cornerstone of this approach for a new energy policy was **Directive 2001/77/EC**, through which the European Commission decided to give a strong impulse to the production of energy from renewable sources into the EU internal electricity market. The objective of the Directive is therefore to raise the level of electricity production using renewable energy sources (RES) by imposing production targets for each member state. For Italy, the only European Union country included in the POWERED project together with Slovenia, the target for electricity produced from RES by 2010 was fixed at 22 % and of the Gross Domestic Consumption (GDC), but it has not been reached. Slovenia did not have any target yet, as it entered into the European Union only three years later.

In 2007 the European Commission published the **Renewable Energy Road Map**, setting out the Commission's long-term strategy for promoting and deploying renewable energy in the EU. The Road Map proposed to set a mandatory target of 20 % for renewables' share of energy consumption in the EU by 2020 and a mandatory minimum target of 10 % for biofuels. It also proposed creating a new legislative framework to enhance the promotion and use of renewable energy.

In the same year the EU leaders endorsed an integrated approach to combat climate change and increase the EU's energy security while strengthening its competitiveness, the so called **"20-20-20" target**. To reach this target the European Commission proposed in 2008 binding legislation and enacted the **'climate and energy package'**, which became law in June 2009. In the field of clean energy, the package set binding national targets to lift the average of renewable share across the EU to 20 % by 2020.







To underline the fundamental role of offshore wind energy in the European energy market, the European Commission published in 2008 a communication addressed to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions of 13 November 2008 from the title 'Offshore Wind Energy: Action needed to deliver on the Energy Policy Objectives for 2020 and beyond': aware of the potential of the offshore wind energy in contributing to the achievement of the European Energy Policy (reduction of GHG emissions, security of supply and improvement of the competiveness of the Union), the Communication identifies the main criticalities in the development of offshore wind plants, mainly:

- industrial and technological challenges;
- lack of integrated strategic planning and cross-border coordination;
- lack of knowledge and information sharing hampers a smooth application of EU environmental legislation;
- bottlenecks and power balancing in the onshore electricity grids.

The Commission indicates also the way forward for the development of offshore wind energy, through three key elements:

- investing in the future competitiveness of the EU wind energy industry;
- adopting a more strategic, coordinated approach to offshore developments;
- maximizing the environmental benefits of offshore wind, as a clean source of electricity with no emissions of greenhouse gases or local air pollution.

In line with the "20-20-20" target, the European Parliament issued **Directive 2009/28/EC** on the promotion of the use of energy from renewable sources, which set for each Member State a target for the production of renewable energy in gross final consumption of energy by 2020.

The Directive required Member States to adopt action plans showing how to achieve the objectives (art. 19). With the action plan, each State sets the proportion of energy from renewable sources by 2020, taking into account the effects of other policy measures for energy efficiency on final energy consumption. These plans also establish procedures for the reform of planning and pricing schemes and access to electricity networks, promoting







energy from renewable sources. Progress towards national targets is measured every two years when EU countries publish national renewable energy progress reports. Another relevant step fixed by the new directive is the possibility for each Member States to "exchange" with an amount of energy from renewable sources using statistical transfers, joint projects for the production of electricity and renewable heating, both with other Member Countries as well as Third Countries. Additionally, Member States must be able to guarantee the origin of electricity, heating and cooling produced from renewable energy sources. The information contained in these guarantees of origin is normalized and should be recognized in all Member States.

2.2 Infrastructural, Environmental and Energy National Regulations

The analysis of the infrastructural, environmental and energy regulations of the Adriatic Sea countries is a fundamental step for building the general regulatory framework of the area, whose comprehension is necessary for the identification of the best locations where to install offshore wind farms. Besides the technological, geographical and climatic constraints, a restrictive legislation can also represent an obstacle for the realization of offshore wind plants. In most of the countries considered in this analysis, the energy and environmental legislation derives from European framework, including the candidate countries through the so called *acquis communautaire*.

In some cases the legislation is quite general; referring to the development of renewable energy plants, while in others there is a specific reference to wind plants. The following sections presents an overview of each country, but it should not be considered as an exhaustive list of all the acts to be compliant with in case of installation of offshore wind plants. In fact, in that case a site-specific analysis should be carried out in order to assess the effective availability of the area.

2.2.1 Italian Regulations

In general, Italian legislation on energy sector falls under the competence of both central Government and Regions: specifically the State defines the general guidelines and the Regions apply and tune them to their territorial contexts. In recent years Italy has experienced a rapid devolution of legislative and regulatory powers to the Regions, which







have now legislative powers for any matter not expressly reserved for the exclusive competence of the national Parliament, such as retail trade, agriculture, tourism, transport and vocational education, while the protection of the environment and cultural resources is listed among the competences of the State.

Furthermore, in the case of energy infrastructures, such as power plants, natural gas and electricity networks, and LNG regasification facilities, authorization must be granted by the competent ministries in agreement with the region⁵.

In the following is therefore presented an overview of the national energy regulative framework and a description of the laws currently in force in Adriatic regions of Italy.

2.2.1.1 National Regulations

One of the main Italian laws regulating the energy market is the Legislative Decree No. 387 of 29th December 2003 (Official Gazette No. 25 of 31st January 2004), which transposes into the Italian legislation the European Directive 2001/77/EC, laying down guidelines on the promotion of electricity production from renewable sources in the internal electricity market of the European Union. The Legislative Decree defines important milestones for the Italian energy market: it defines the concept of renewable energy source, the national objectives in terms of promotion of RES and the measures to achieve these goals. Additionally, it introduces measures aimed at improving the mechanism of green certificates, in order to adjust it on the basis of the European goals in the field of production and consumption of clean energy. In compliance with the European Directive, the Decree contains specific measures for the different energy sources (but not for wind power), simplified measures for the authorization processes, the prevision of information and communication campaigns on RES and the inclusion of waste among the renewable.

The general goals of the Decree are promoting the contribution of renewable energy within the Italian and European energy market and supporting the development of renewable energy micro generation plants, in particular in the agricultural sector and in mountain areas.

In this framework, the Decree envisages the following:

⁵ Energy Policies of IEA Countries – Italy Review 2009, p.20







- a minimum quota of renewable energy to be put into the national electricity grid;
- the origin of electricity produced from renewable sources for annual production higher than 100 MWh shall be guaranteed through specific "guarantees of origin";
- the authorization process for renewable energy plants are simplified: specifically, the Region shall issue within 180 days (later further shortened) the single authorization for the construction and functioning of renewable energy plants;
- the construction works for renewable energy plants are classified as "urgent and undeferrable".

The Legislative Decree No. 387/2003 represents the formal basis of the Ministerial Decree of 10 September 2010 (Official Gazette No. 219 of 18th September 2010), defining guidelines for the authorization for the construction of renewable energy plants. In particular, it complements its contents, affirming that construction, retrofit works of renewable energy plants, and their ancillary infrastructures are subject to single authorization by the Region or delegated Province or merely to the declaration of beginning of activity (Denuncia di Inizio Attività, DIA) to the municipal administration (if installed on the roof of existing buildings and with dimensions not exceeding the high of 1.5 m and diameter of 1 m and if not installed in public areas with archeological, historical, artistic and environmental value, Legislative Decree No. 42 of 22nd January 2004). The same communication is requested also for temporary anemometers (maximum 36 months), if installed on removable structures, not located in protected areas and with the permission of the land owner and only if removed within one month from the end of the measurement, with the consequent restoring of the area.

Moreover, the Decree foresees that the installation of wind plants with total rated capacity higher than 1 MW is subjected to the EIA and defines criteria for the proper placement of the farms in the landscape, as well as the criteria for the identification of areas unsuitable for their installation (which is within the scope of Regions) and for defining compensation measures.

These guidelines do not apply to offshore plants, for which authorization is delivered by the Ministry of Infrastructures and Transport in accordance with the Ministry of Economic







Development and Ministry of the Environment, Land and Sea, as foreseen by the Legislative Decree 387/2003 (as modified by art. 2 of the Financial Law of 2008 No. 244 of the 24th December 2007) and prior to the concession for the use of the maritime domain by the competent maritime Authority.

Legislative Decree No. 28 of 3rd March 2011 (Official Gazette No. 71 of 28th March 2011) transposes into the Italian legislation the European Directive 2009/28/EC on the promotion of energy from renewable sources, and subsequent repeal of amending Directives 2001/77/EC and 2003/30/EC: it introduced important changes with regard to the Italian energy sector. The main purpose of the law is defining instruments, mechanism, incentives and setting the institutional, financial and legal framework for reaching the goal of 17 % of renewable energies in the total final energy consumption and of 10 % for the transport sector by 2020. The Decree reduced the duration of the administrative procedure for the obtainment of the single authorization for installing renewable energy plants from 180 to 90 days. Particular important is article 5, paragraph 2, introducing the prior completion of the verification of subjection to the Environmental Impact Assessment (EIA) of the draft permit. From the standpoint of purely economic (incentives) is important to point out the will of the legislature to eliminate the current system of incentives (green certificates) by 2016, providing for the type of system that now benefits from this incentive system an all-inclusive tariff (art. 3 c). The Decree foresees the definition of a new incentive scheme for renewable energy plants which will start operating from the 1st January 2013, with differentiations among sizes.

Since the adoption of the Legislative Decree 387/2003, Italy is experiencing a progress increase of the installation of renewable energy plants, in particular for the so called "non programmable" sources (mainly wind and photovoltaic). The "non programmability" of these plants, together with the week energy demand of the areas where they are located, the rigidity of the thermal power plants and the difficulties of the main energy distribution company to adapt the transmission grid to the increase of the electric power, has brought the Authority for Electricity and Gas to enact specific decisions to manage the situation. One of these is the **Decision No. 330/07** "Conditions for the management of the dispatching priorities regarding renewable energy plants in critical situations of the national electric







system", which recognizes the need to modify the Grid Code to allow greater penetration of wind energy into the national grid. This Code has been established by the Prime Minister Decree 11 May 2004 and is aimed at defining the technical rules for the access and use of the Italian electricity transmission grid.

The Decision asks the Transmission System Operator (TSO) to integrate the Grid Code specifying the technical and safety conditions (with specific equipments) for the connection of high voltage power units to the transmission grid, in particular wind plants. In this way TSO will be able to modulate the transmission of electricity from the plants into the grid during critical situations and especially in some areas (particularly islands) where the production is less flexible.

Italy, line with the provisions of Directive 2009/28/EC and Commission Decision of 30 June 2009, has submitted its National Renewable Energy Action Plan (NREAP) in June 2010.

The Italian legislation on energy is continuously evolving and several acts have entered into force in the last years. A very controversial law is the recent Legislative Decree no. 154/2013, which regulates, among others, incentives for renewable energies and minimum guaranteed prices. According to many stakeholders, the modification of the incentive tariffs will cause a reduction in the investments for renewable energies and in particular in the wind sector.

2.2.1.2 Italian Adriatic Regions Regulations

As already mentioned, the 2001 Reform of the Constitutional Law modified part of the provisions regarding Local Authorities and their relation with the Central State. Energy production and consumption at local level has become a topic under the jurisdiction of Regions, while the promotion of environmental resources is under the common jurisdiction of Regions and Government. This amendment created the conditions for the enactment of a set of regional regulations regarding these two topics, as shown in the following paragraphs, in particular aimed at regulating the entry into force of European and national laws.

Apulia Regional Regulations

In 2007 Apulia Region adopted its Regional Energy and Environmental Plan (Piano Energetico Ambientale Regionale, PEAR), currently being updated.







Apulia's two main regulations concerning renewable energy are **Regional Law n. 31 – 21/10/2008 - "Regulations governing the production of energy from renewable sources, the reduction of pollutant emissions and environmental matters"** (Apulia Region, Official Bulletin no.167, 24th October 2008), and **Regional Law n.25 – 24/09/2012 - "Regulating the use of energy from renewable sources**" (Apulia Region, Official Bulletin no. 138, 25th September 2012). These laws regulate the two main procedures for the granting of permits for the construction and operation of renewable energy plants: the single authorization and the simplified authorization procedure.

In particular, the **Regional Law n. 31** forbids the construction of renewable energy plants on:

- valuable agricultural areas, as recognized by the main urban regulatory instruments;
- Natura 2000 sites;
- national protected areas established under the Act No. 394 of 6th December 1991 (Framework Law on Protected Areas);
- regional protected areas established under the Regional Act No. 19 of 24th July 1997 (Regulations for the establishment and management of protected natural areas within the Apulia Region) and natural reserves established under the Regional Act No. 27 of 13th August 1998;
- wetlands protected by the Ramsar Convention, enforceable by Decree of the President of the Republic No. 448 of 13th March 1976.

This prohibition does not apply to the following plants:

- plant exclusively for self consumption;
- with rated power up to 40 kW;
- Installed on building roofs, agricultural, civil, industrial buildings or on adjacent areas pertaining thereto;
- disused industrial areas.

As foreseen by the Legislative Decree 387/2003, the law requires the notification of beginning of activity for the installation of specific renewable energy plants (including on-







shore wind plants) with maximum installed capacity of 1MW and lists a set of procedures to be fulfilled for the installations of all renewable energy plants.

The **Regional Regulation No. 24 "Guidelines for the authorization of plants fed by renewable sources"** (Official Bulletin Apulia Region No. 195, 31/12/2010) has a twofold objective: streamlining the authorization procedures and defining rules for the identification of areas and sites unsuitable for the installation of specific renewable energy plants in compliance with the Decree of the Ministry for Economic Development of 10th September 2010, "Guidelines for the authorization of power plants from renewable sources "(Official Gazette No. 219 of 18th September 2010), Part IV, paragraph 17 "unsuitable areas ".

The **Regional Law No. 11 "Regulations on Environmental Impact Assessment**" (Official Bulletin Apulia Region No. 57, supp. of 12th April 2001) defines the procedures for Environmental Impact Assessment (EIA); the projects for which the EIA is required and distributes the jurisdiction between Region and Provinces. In particular, according to the law, the realization of wind plants requires the verification of subjectability to the EIA, namely the prior verification mentioned above.

The Regional Declaration D.G.R. No. 3029 **"Regulations concerning the single process of authorization for the construction and operation of plants for the production of electricity** " (Official Bulletin Apulia Region No. 14 of 26th January 2010) includes provisions regulating renewable energy plants with rated power higher than 100 kW: it highlights the requirements that applicants must be compliant with and lists the documentation to be submitted to the responsible authorities for issuing the single authorization.

For the specific case of wind plants, Apulia Region enacted also the Regional Declaration D.G.R. No. 131 **"Guidelines for the construction of wind plants in Apulia Region"** (Official Bulletin Apulia Region No. 3 of 18th March2004): this document outlines the key aspects and procedures for the integration of wind plants into the environment, which are the basis of the EIA Report for those projects for which the EIA is required (Article 16 of the Regional Law No. 11/2001), as well as the procedures to carry out an Environmental Impact Analysis for projects located within Natura 2000 sites (SCI and SPA).







As regards these sites, Apulia Region enforced the Regional Regulation No. 28 "Amendments and additions to the Regional Regulation No. 15 of 18th July 2008, transposition of "Minimum criteria for the definition of uniform conservation measures related to Special Areas Conservation (ZCS) and Protected Areas Special (SPA) introduced by the Ministerial Decree of 17th October 2007." The regulation includes a set of conservation and restoration measures related to Special Areas of Conservation (SAC) and Special Protection Areas (SPA). In particular, it lists all the activities not allowed within these sites, among which the realization of new wind plants not for self-consumption (with more than 20 kW rated capacity) in a buffer area of 200 meters. Within a buffer area of 5 km from SPAs and IBAs (Important Bird Areas) and for the replacement or modernization of existing plants already an Environmental Incidence Assessments is required.

In 2012 the Apulia issues the Regional Law no. 25 of 24 September "Regulation on the use of energy from renewable sources", which enforces the European Directive 2009/28/CE. The law modifies and integrates the former existing legislation on renewable energy.

A Thematic Territorial Urban Plan for the Landscape (PUTT/P), approved by Regional government resolution No. 1748 of 15th December 2000, is currently in force.

Legislative Decree no. 42 of 22nd January 2004, ("Code of cultural heritage and landscape"), alongside with Regional Law no. 20 of 7 October 2009, "Rules for landscape planning" have changed the landscape legislation with reference to the content, structure and procedure for the official approval of the landscape plan. Those laws have also changed the procedure for the granting of the landscape authorization. The new Regional Territorial Landscape Plan (PPTR) was adopted by the Regional Government Resolution no. 1435, August 2, 2013 in compliance with the Code of cultural heritage and landscape. Pending final approval of the new PPTR, PUTT/P remains in force, together with the safeguard measures set out in Article 105 of the PPTR Technical Regulations for Implementation (NTA).

Abruzzo Regional Regulations

With the purpose of transposing and implementing the EU provisions for the promotion of RES and Rational Use of Energy (RUE), the Abruzzo Region has issued several acts and decisions to adopt simplification and incentive measures.







In particular, the Region is pursuing ambitious targets for the development of RES and RUE, as stated by the **Regional Energy Plan** (REP) (D.G.R. No. 470 / c of 31st August 2009 and Regional Council Deliberation D.C.R. No. 27/ 6 of 15th December 2009), that seeks to conciliate economic development with the need to protect the landscape and the territorial peculiarities of the Region.

Specifically, the REP, based on the data of the Regional Energy Balance (2005), defines the actions needed to achieve by 2015 a scenario where the energy production from renewable energy sources is equal to 51 % of the total energy consumption for the same year, passing through an intermediate goal of 31 % in 2010.

Based on this goal, Abruzzo Region adopted the decision **D.G.R. 775/04** (Official Bulletin Abruzzo Region – B.U.R.A. No. 41 of 24th October 2004), in accordance with the provisions of Legislative Decree 387/03, which:

- reserves a single procedure provided for in paragraph 4 of art. 12 of the Legislative Decree 387/03 to the jurisdiction of the Region;
- identifies the Service "Energy Policy, Air Quality, Noise Pollution, Electromagnetic, Environmental Risk, SINA", within the Directorate "Environment Energy Tourism" in charge of the investigation and any other procedural compliance, as well as the adoption of the final authorization measures.

The **Regional Law No. 27 of 9th August 2006** (B.U.R.A. No. 46 of 30th August 2006) reconfirmed the regional competence on authorization issuance, renewal and review, referring to Article 12, paragraph 3, of Legislative Decree 387/03. The Regional Council is responsible to identify the competent authority which defines the conditions for approval, sets time limits for issuing permits, approve application forms, determine rates to be applied in relation to expenses necessary to carry out technical and administrative appraisal and related controls and defines payment methods; it approves specific criteria for the exercise of administrative functions within the authorization procedure, aimed, in particular, to simplify and unify the various authorization procedures involved. The Principle of Environmental Compensation has also been introduced, in agreement with the competent







Commission Board, which provides compensation and environmental rebalance in order to ensure adequate regional balance in energy infrastructure location (Article 5, paragraph 2). With the D.G.R. No. 351 of 12th April 2007 (B.U.R.A. No. 26 of 9th May 2007) criteria and guidelines to issue "Single Authorization⁶" were approved as a result of further streamlining and standardizing authorization procedures.

This act specifically:

- identifies as a Competent Authority and the department in charge of the proceedings and the adoption of the final measure Service "Energy Policy, Air Quality, Noise Pollution, Electromagnetic, Environmental Risk, SINA";
- establishes the Regional Energy Office at the Competent Authority;
- approves the "Criteria and guidelines for the granting of a single: art. 12 of Legislative Decree 387/03 "and Annex B" Reference Forms ", with which regulates the Unique Procedure.

The Regional Law No. 11 of 5 May 2010 provides that, within the simplified procedure referred to Legislative Decree 387/03 and subsequent amendments, associated works and infrastructure essential to the construction and operation of renewable energy plants are authorized in the framework of the Single Authorization (art. 12 of the Legislative Decree 387/03).

Finally, Abruzzo Region has adopted the National Guidelines for plants powered by renewable sources, the Ministry of Economic Development Decree of 10th September 2010 (Official Journal, O.J., of 18th September 2010).

Besides all the aforementioned regulations, the main document to take into consideration for the installation of wind plants is **"Guidelines aimed at regulating the realization and assessment of wind farms in Abruzzo Region" approved by D.G.R. No. 754/07** and subsequent amendments, which provides for rules governing the inclusion of industrial plants for the production of wind energy.

⁶ Locution "Single Authorization" is used as the English locution for "Autorizzazione Unica" as indicated in the WRITTEN QUESTION E-1181/01 by Glyn Ford (PSE) to the Commission. The Single European Authorisation Project. Official Journal 340 E , 04/12/2001 P. 0190 – 0191.







The **D.G.R. No. 148 of 12th May 2012** (Regional Government Act) updated the document "Guidelines for the creation and evaluation of wind farms in Regione Abruzzo" in line with the new national legislation. It states that all the following areas are "not suitable areas" for the construction and operation of wind farms with an installed power higher than 200 KWe:

- Zones A and B of the Abruzzo National Parks;
- natural reserves;
- protection oasis;
- wetlands of international interest;
- Macro Areas A and Bfor the safeguard of Marsican Brown Bear
- areas including migratory routes;
- archaeological sites with security area of 150 m from site boundaries;
- areas classified as "high hydraulic hazard" by the hydrogeological plans;
- a security area of at least 500 m from the border of the urban building areas as defined by planning instruments in force.

The guidelines recognize as "critical areas", classified as "not suitable areas" for the construction and operation of wind farms with a power over 200 KWe (nesting and hunting areas of raptors, areas close to caves, mountain passes, IBA Areas, SCI and SPA areas, Areas A of the Regional Landscape Plan, the adjacent areas of Macro-area B - Marsican Brown Bear preservation) for which specific procedures have to be carried out in order to obtain the authorization for installation.

Beside the territorial constraints, the document lists in detail a set of anemological, energy, environmental and safety requirements to be fulfilled for the realization of wind plants in the Region. It also includes specific requirements for off-shore wind farms:

- security area of at list 1 km from marine areas and parks;
- piles are required to have intermittent top lights in order to avoid interactions with the migratory routes;
- no wind farms are allowed on migratory routes,
- wind towers have to be installed maintaining broad corridors allowing the fish passage.







D.G.R. no. 148 has been modified by D.G.R. no. 931 of 28 December 2012, which introduces some important changes to the Simplified Authorisation Procedure (PAS) for the authorization of renewable energy plants. The most significant changes refer, among other, to:

- the documentation to be attached to the PAS, which is equal to that prescribed for the Autorizzazione Unica procedure (see section 13.1 of National Guidelines -Dm September 10, 2010););
- only wind turbines up to 60 kW are exempt from the requirement to submit to the City Council, attached to the PAS, the "anemometer features of the site, the type and duration of the surveys, which may not be less than one year, and findings on the annual equivalent hours of operation";
- the PAS fees are the same of Autorizzazione Unica as of established at the regional level with Dgr n. 351/2007.

Through D.G.R. No. 294 of 2 May 2011, incorporating the provisions of Article 6 of Legislative Decree 28/2011, the regional government has extended to municipalities the responsibility for issuing permits for the installation of renewable energy plants up to 1 MWe, recalling the same procedures already in force and adapted with the provisions of the National guidelines occurred.

The abovementioned **D.G.R. No. 119/2002** (B.U.R.A. No. 73 Special of 14th June 2002) and its further amendments (D.G.R. No. 209 of 17th March 2008, D.G.R. No. 479 of 7th September 2009, D.G.R. No. 317 of 26th April 2010) are the reference regulation in Abruzzo regarding the procedures for EIA. The Deliberation identifies the local competent authority for EIA and screening for EIA and all the procedures to carry out the assessment. Circulars of 2nd September 2008 (Prot. No. 21136) and 18th December 2008 (Prot. No. 30766) enter further in detail into the regulation of this topic.

Finally, the **Opinion on EIA No. 1792 of 26th July 2011** defines the interpretative criteria for the categories of works subject to EIA and, regarding the protection of the landscape, **D.G.R. No. 60 of 29th January 2008** establishes the need to prepare also a Landscape Report in addition to the EIS, for the realization of projects within areas under landscape protection restriction.







Molise Regional Regulations

Through the **Regional Operative Plan (ROP) 2007/2013**, Molise Region aims at rationalizing energy consumption and fostering the adoption of technological solutions for the production of renewable energies, in compliance with the Kyoto Protocol, and at supporting the local development by combining, in an optimal mix, availability of natural resources, technology and new job opportunities. The Molise Region through the ROP has therefore provided incentives for investments in energy saving technologies and for the production of energy from renewable sources for both public institutions and SMEs.

The most recent law issued by Molise in the energy field is the **Regional Law no. 23 "Urgent measures referring to renewable energies"**: it commits the Region to update its 2006 PEAR within six months from the entry into force of this law and introduces the requirement to carry out, as part of the procedure for the authorization for the installation of renewable energy plants, the assessment of the compatibility between windmills (with power capacity similar or higher than 300 Kw) and the features of the local territory (i.e., important bird areas, SCI and SPA buffer areas, areas with archeological or high quality agricultural value, natural protected areas, areas characterized by hydrogeological instability).

Fee years before, Molise Region enacted **Resolution No. 621 of 4th August 2011** (Official Bulletin Molise Region - B.U.R.M. No. 25 of 16th September 2011) containing Guidelines for conducting the single procedure for the authorization for construction and operation of renewable energy plants within the region, in compliance with art. 12 of the Legislative Decree 387/03.

The administrative procedures and technical criteria foreseen by the guidelines apply to the procedures for the construction and operation of renewable energy plants, as well as for any intervention of modification, extension, supply and total or partial reactivation of same facilities and associated works and related infrastructures. These guidelines do not apply to off-shore installations for which the license is issued by the Ministry of Infrastructure and Transport felt the Ministry of Economic Development and the Ministry of Environment, Land and Sea.







In regard to the legal regime of permits, the local legislation envisages that, except as provided in relation to the interventions and activities subject to the Declaration of beginning of activity, construction, operation and substantial modification of renewable energy plants, and related infrastructures are subject to authorizations issued only by the Region or the Province, if delegated. The act defines also minimum distances and setback lines for the installation of wind and photovoltaic plants.

In 2010 the Region enacted **Regional Law No. 23 of 23rd December 2010** defining modifications and integrations to the **Regional Law No. 22 of 7th August 2009** (New discipline for the installation of renewable energy plants within the Molise Region). The 2009 Law established the areas where the installation of renewable energy plants is not allowed (excluding micro wind turbines):

- national and regional parks and adjacent areas;
- areas with cultural interest;
- integrated protection and conservation areas as recognized by Landscape Plans;
- SPAs and IBAs;
- areas of high public interest.

The installation of plants within SCIs is admitted only after a specific Environmental Implication Study.

In 2006 the Region adopted its **PEAR** (B.U.R.M. No. 13 of 16th August 2006), defining measures for the development of renewable energy plants; nevertheless specific guidelines for the inclusion of wind plants into the territory have not yet been developed.

Marche Regional Regulations

Following the European Directives on Renewable Energy Resources and Energy Efficiency, Marche Region approved in 2005 its PEAR (Deliberation No. 175 of 16th February 2005), which is currently under revision.

The plan defines the guidelines of the environmental and energy policies addressed to public and private entities and it is focused on three main axis: energy saving promotion, increase in the exploitation of renewable energies, distributed energy generation and cogeneration (CHP).







Once set up the energy legislative framework, the Region adopted specific guidelines with the aim of supporting the correct application and simplification of administrative policy steps.

Regarding the regulation and simplification of administrative procedures, Region Marche approved its regional guidelines with D.G.R. No. 255/2011, according to the national Legislative Decree 387/2003 and Ministerial Decree of 10th September 2010, introducing elements of administrative simplification: the act in fact transposes at local level the national guidelines for the renewable sources electricity production authorization.

Marche Region, with the support of European funds, POR FESR Marche CRO 2007/2013- Axis III – "Energy Efficiency and promotion of renewable Energies" has promoted the use of renewable energy sources and energy efficiency; it issued public notices for financing energy efficiency on public buildings and for the realization of photovoltaic and solar systems, geothermal power systems, mini-wind power systems, CHP and trigeneration systems, biomass and public lightning.

More specifically, the Region enacted in 2002 the Guidelines for the inclusion in the territory of wind plants, the so called "Procedures for the Environmental Impact Assessment of wind plants - Criteria and addresses for their evaluation" (D.G.R. 1324 of 16th July 2002). The document included specific provisions for the installation of off-shore plants but it is no longer in force.

Marche Region through the **Regional Laws No. 7/2004 and No. 6/2007** (containing some changes to the No. 7/2004, B.U.R.M. No. 55 of 21st June 2007) approved the discipline regarding the Environmental Impact Assessment. The latter introduces changes to the discipline of environmental impact assessment, delegating some competences to the Provinces, such as authorizations for the installation of renewable plants and defining also the main functions of the Regional Council concerning the individuation of the Natura 2000 sites, according to the national act n. 357/1997 (art. 3, paragraph 1). However, the Constitutional Court, with the judgment n. 93 /2013, modified Marche region legislative framework on EIA declaring the constitutional illegitimacy of the above indicated regional laws for what concerns the selection criteria for the identification of the projects for which







the EIA is necessary: in fact, the law was not compliant with the European and national legislations, as the list of criteria selected for the identification of projects subject to the EIA did not included all the criteria identified by Directive no. 2011/92/UE.

The Region also adopted in 1989 the **Regional Environmental Landscape Plan (PPAR)**, to define the main protection actions for landscape and cultural and historical heritage. The Plan is currently under revision.

Emilia Romagna Regional Regulations

Within the division of tasks in the field of energy between State and Regions, the Emilia Romagna Region has identified the tasks to be delegated to the Provinces. The Regional Law No. 26/2004 "Discipline of regional energy planning and other provisions in the energy field" (O.J. No. 175 of 28th December 2004) includes into the jurisdiction of Provinces:

- approval and implementation plans for the promotion of energy conservation and energy efficiency;
- promotion of renewable sources;
- orderly development of systems and networks of local interest, through the adjustment and upgrading of existing systems;
- authorization for the installation and functioning of renewable energy plants, which are not under the exclusive jurisdiction of State and Regions;
- authorization for the installation and functioning of energy distribution networks.

A relevant act in the field of wind plant installation is the **Regional Council Resolution No. 51, 26th July 2011** (O.J. - part 2 - n. 123 of 5th August 2011) which transposes at regional level the national guidelines introduced by the Ministerial Decree of 10 September 2010 (Guidelines for the authorization of renewable energy plants) and by the Legislative Decree 387/2003 on the promotion of renewable energies. In particular, the resolution defines in detail the areas suitable and unsuitable for the installation of renewable energy plants, with specific reference to wind power. More specifically, Annex I of the Resolution lists the following territories as inappropriate to host wind plants:







- all the areas under special landscape protection, as recognized by the local Regional Territorial/Landscape Plan, namely: natural protected areas, forest areas, coastal areas and beaches, lakes, basins and water flows, mountain ridges, calanques, archeological sites and properties and areas of public interest;
- burned areas in the past 10 years,
- landslip areas, as identified by the maps of the Territorial Plans for Province Coordination;
- areas A (under total protection) and B (under general protection) of national, interregional and regional parks;
- areas within natural reserves.

As on the whole Italian territory, EIA is required for the installation of wind plants: this topic is regulated in Emilia Romagna by the Regional Law No. 9/1999 "Rules of Procedure of Environmental Impact Assessment" as further modified by the laws No. 35 of 2000, No. 6 of 2009, law No. 3 of 2012 and No.15 of 2013. Beside the provisions on EIA, the law sets out the jurisdiction of EIA to the Emilia Romagna Region.

Veneto Regional Regulations

The legislative basis for the Veneto commitment in the promotion of renewable energies is represented by **the Regional law No. 25 of December 27, 2000** "Rules for regional energy planning, promotion of energy-saving and development of renewable energy sources" (Official Bulletin of Veneto Region – B.U.R.V. No. 114/2000).

To reach the goals of the European Community and national energy policy, within the competences given to the Region by State laws, the Veneto Region promotes:

- the rational use of energy;
- the reduction of the energy consumption;
- the reduction of greenhouse gasses by supporting and incentivizing the use of renewable energy sources.

Through this act the Region commits itself in preparing and adopting a Renewable Energy Plan, containing the actions for the achievement of the aforementioned goals.







The Regional undertaking towards the promotion of renewable energies is strengthened by the **Decision of the Regional Council No. 591 of 18th March 2008 "Institution of the Steering committee for the fight against climate changes and for sustainable development"** (O.J. of the Veneto Region No. 32 of 15th April 2008). The achievement of the European and national objectives in the energy, climate change and environmental fields is supported by the set up of a specific Steering Committee in charge of the management and coordination of all the measures aimed at raising the energy production from renewable sources and the energy efficiency. Specifically, the Steering Committee is responsible for:

- evaluating the measures to be adopted at regional level in order to reach the national objectives in terms of production of clean energy efficiency in end use;
- processing the proposals for a standard application in the regional territory of the provisions that require operative and functional cooperation among the offices belonging to various regional secretariats and public administrations, with particular reference to authorizations for plants and the granting of financial benefits;
- arrange initiatives to coordinate information to citizens on the topics of sustainable development.

The Steering Committee is composed by:

- Department for the Policies for Economic Development;
- Department for Environmental Policies;
- Department for Agricultural Policies;
- Department for Infrastructure Policies;
- Department for Land Use Policies
- Regional Secretary for Production Activities;
- Regional Secretary for the Environment and Land use;
- Regional Secretary for Infrastructures.

One of the main laws regulating the energy sector at regional level is the **Regional law No. 24 of 6th September 1991** (O.J. of Veneto Region No. 81/1991), which transfers to the Region the competence of issuing authorizations for the construction and running of works for the







transmission, sorting, transformation, and distribution of electric energy with a nominal voltage no higher than 150,000 volt.

This law is followed for importance by the **D.G.R. No. 2204 of 8th August 2008 (BUR n. 77 del 16/09/2008) "Provisions for the authorization, installation and operation of renewable energy plants"**. The decision defines the plants under the regional jurisdiction and identifies the regional authorities responsible for the issue of the Single Authorization. The authorization procedure of wind plants with a capacity below 60 kW (as well as of other renewable energy plants under a specific capacity limit) involves only the Municipal administration interested by the project, unless other administrative authorizations are required (i.e., EIA, concessions for the connection to the water system, etc.). The decision refers also to the Legislative Decree No. 387/2003 as amended in 2007, which defines that the authorization for offshore wind plants is issued by the Ministry of Transportation, in accordance with the Ministry of the Environment, Land and Sea.

D.G.R. No. 2204 has been amended by the D.G.R. No. 1192 of 5th May 2009, which updated the procedures under regional jurisdiction in order to speed up the entire administrative process.

The **D.G.R. No. 1610 of 9th June 2009, Art. 83 bis Lr 11/2001** (BUR No. 51 of the 23rd June 2009) defines the procedures to enforce the Legislative Decree 387/2003, which introduced the Single Authorization to be issued by the Region for renewable energy plants. Through this Decision, the Regional Council defines that the issue of the Single Authorization is under the responsibility of the local Municipality if the plants have a rated capacity below 100 kW. In fact, the jurisdiction for issuing the authorization of renewable energy plants depends on their capacity: as regards wind plants, Municipalities issue the authorizations (i.e. EIA). **D.G.R. No. 2373 of 4th August 2009** (O.J. of Veneto Region No. 72 of 1st September 2009) regulates the procedures for issuing the authorization for the installation and operating wind and photovoltaic plants (art. 12, Legislative Decree 387/2003). In particular, it introduces the issuance of the single authorization by the Region or delegated Provinces for wind plants with a maximum rated capacity equal or higher than 60 kW or 20 kW if other municipal authorization is requested. However, the installation of wind and PV plants in sensitive areas







under a landscape, environmental and naturalistic point of view (for example areas under Natura 2000 network, protected areas, Unesco sites) follows the obtainment of the EIA.

The recent **Regional Law No. 5 of 2011** (BUR No. 14 of 15th February 2011) "Rules for the production of energy form biomass or biogas plants as well as other renewable energy plants" establishes that interconnected renewable energy plants whose generation capacity is below the limit identified by Table A of the Legislative Decree 387/2003 (60 kW for wind plants) must be considered as one single plant as concerns the calculation of the maximum electric power necessary to start the activity with the Declaration of beginning of activity. This is valid only if the plants are located in an agricultural area on adjacent lots of land belonging to one or more owners or where a single grid connection can be identified. If the capacity of the plant might exceed the limits defined in Table A of the Law, the jurisdiction of the authorization procedure passes to the Regional Assembly.

The D.G.R. No. 253 of the 22nd February 2012 (BUR No. 20 of 13th March 2012) foresees that the owner of the wind plant is obliged to restore the affected land, as part of the decommissioning phase. Finally, before the beginning of the construction works, the investor has to provide to the Veneto Region a bank deposit of the same value of the approved technical-economic budget, in order to safeguard the Regional Administration in case of breach by the authorized investor.

The installation of wind farms, but in general the development of renewable energy plants, must comply with a set of laws for the protection of the environment:

- Regional law No. 11 of 23rd April 2004, "Rules for the governance of the territory and on landscape" (O.J. of the Veneto Region No. 45 of 27th April 2004), which set the standards for the management of the territory and landscape, defining the competences of each territorial body, the rules for using the ground according to criteria on the prevention and reduction or removal of risks, environmental efficiency and territorial development;
- Regional law No. 15 of 12th July 2007, "Interventions for the protection, promotion and development of the coastal area in Veneto and for the creation of marine protected areas" (O.J. of the Veneto Region No. 63 of 17th July 2007):







bearing in mind the purpose of protecting and restocking of fish resource, Veneto Region has implemented a set of interventions and measures aimed to set up areas of biological protection and to diversify, enhance and reconvert fishing activities in shellfish farming, mariculture and to develop coastal tourism.

2.2.2 Montenegrin Regulations

The objectives of Montenegro regarding the energy sector are in line with the objectives of the European Community, which are: increased safety in energy supply, attraction of investments, increased use of renewable energy sources, improved energy efficiency and development of market competition, together with improved environmental situation.

In accordance with the undertaken obligations, Montenegro has been implementing reform in the energy sector, from the legal and regulatory, as well as from the institutional and organizational aspect. In fact, in 2010 the country adopted its **Energy Law** (O.J. of Montenegro, No. 28/10, 06/13), which introduced significant changes in the energy sector, especially regarding renewable energy sources. It defines energy related activities, the conditions for and method of carrying out energy activities, aiming to provide quality and efficient supply of energy to final consumers. The law was harmonized with Directive 2001/77/EC which was an obligation for Montenegro by the Energy Community Treaty. However, even though not obliged, Montenegro used this as an opportunity to promote use of renewable energy sources and implemented Directive 2009/28/EC in electricity and heating and cooling sectors. The part dedicated to transport will be harmonized through separate regulations.

Moreover, the Energy Law is fully compliant with Directive 2005/89/EC concerning measures to safeguard security of electricity supply and infrastructure investment and Directive 2004/67/EC concerning measures to safeguard security of national gas supply and it is partially compliant with Directive 2006/67/EC imposing an obligation to maintain minimum stocks of crude oil and/or petroleum products.

The Law in particular regulates the following:

 energy activities and public services in the energy sector, as well as activities of general interest;






- organization and functioning of the electricity market;
- transition from regulated pricing of coal for electricity generation to market pricing;
- distribution, storage, wholesale and retail business and supply of petroleum products, reserves and transport of oil and oil derivates, in the part not regulated by other regulations;
- exceptions from the application of regulations, conditions and deadlines for the use of the systems, for new infrastructure for transmission of electricity and gas, storage of gas or liquefied natural gas;
- energy development, use of renewable energy sources and cogeneration, incentives to use renewable energy sources and cogeneration during the construction and operational phase;
- policies, standards and rules for organizing and regulating markets for electricity and gas, including the rights and obligations of market participants;
- energy efficiency in the sector of generation, transmission and distribution of energy.

Based on the Energy Law, Montenegro issued in 2010 the "**Rulebook on criteria for issuing energy permits, content of a request and registry of energy permits**" (O.J. of Montenegro No. 49/10) and later amended amendment (O.J. of Montenegro No. 38/2013), which defines the criteria for and the process of issuing energy permits for construction and reconstruction of energy facilities.

The energy permit is a new concept introduced by the Energy Law: it makes possible for power plants using State owned resources and having installed capacity below 1 MW, as well as power plants that do not use public resources, to be directly authorized without long public tendering procedures. The permit is issued by the Ministry of Economy.

The realization of wind farms and the procedure for their authorization was regulated in 2009 by the **Decree on wind farms** (O.J. of Montenegro No. 27/10), which was based on the old Energy Law of 2003. However, since Montenegro adopted the new Energy Law and has additional decrees that will be defining the procedure, the Decree has been abandoned.

The price for electricity from wind was defined by the Rulebook on Methodology for calculation of purchase price/ feed-in tariff of electricity produced from wind farms of







2010 (O.J. of Montenegro No. 27/10), which is no longer in force. It defined the method of calculating purchase price of electricity generated from wind power plants, as determined on the basis of the actual costs including investment costs and costs of maintaining and operating wind power plants. The Rulebook has been replaced by the "Decree on tariff system for determining the incentive prices for electricity produced from renewable energy sources and high efficient cogeneration (O.J. of Montenegro nr. 52/11)". This Decree regulates the tariff system for incentive prices for electricity produced in power plants using renewable energy sources and high efficiency cogeneration power plants. Tariffs depend on type of facilities, their capacities, annual generation and other factors.

In 2011 Montenegro issued a number of regulations necessary for implementation of the 2010 Energy Law in the area of renewable energy sources (RES). First of all, Montenegro issued in 2011 the **Rulebook on types and classification of the power plants for electricity generation from renewable sources of energy and high efficiency cogeneration** (O.J. of Montenegro No. 28/11). It defines renewable energy sources and classifies them into groups. The law defines also the methodology for calculation of saving for primary energy of the plant for high efficiency cogeneration. The same law includes also the **Rulebook on detailed on more detailed requirements legal entity should meet in order to perform measurement and survey of renewable energy sources potential**: it prescribes more detailed criteria in terms of professional staff and equipment the legal entity conducting the measurements needs to fulfil in order to perform measurement and survey potential aimed at building a wind farm must be grounded on measurement and survey over a period exceeding one year.

In pursuance of the Energy Law, the Montenegrin Government enacted in 2011 also the **Decree on acquiring the status and accomplishing entitlements of the privileged producers of electricity** (O.J. of Montenegro No. 37/11): this document defines the groups of renewable energy sources that could apply for acquiring the status of privileged producer and which are therefore entitled to incentive price. The decree regulates also the documentation needed to apply, rights of privileged producer and expiration of status. The same instrument includes also the **Decree on manner of issuance, transfer and cancellation**







of guarantees of origin for energy produced from renewable energy sources and high efficiency cogeneration, defining the main actors and procedures for issuance, transfer, cancellation and content of guarantees of origin. Since they will be issued by Regulatory Energy Agency, this body is obliged to adopt a regulation which will closely define the functioning of Register of guarantees of origin.

Recently, Montenegro has issued the following instruments:

- Decree on incentive fees for promoting electricity production from renewable energy sources and cogeneration (Official Gazette of Montenegro no 08/14). This Decree governs the method of determining the level of fee required to encourage the production of electricity from renewable energy sources and cogeneration. It also stipulates the method of distribution of funds collected from fees, as well as the detailed method of calculation of the proportional share of electricity that suppliers and qualified buyers (self-suppliers) have to take over from privileged producers.
- Rulebook on the amount of the incentive fee for promoting electricity production from renewable energy sources and cogeneration (Official Gazette of Montenegro no 18/14). This Rulebook determines the amount of the incentive fee for promoting electricity production from renewable energy sources and cogeneration in 2014;
- National Renewable Energy Action Plan to 2020 of Montenegro (pursuant to the template envisaged by the Renewable Energy Directive 2009/28/EC- Decision 2009/548/EC), December 2015.

Regarding the specific case of the installation of wind farms, there is currently no specific territorial prohibition for their construction. However, an ecological permit is required in Montenegro in order to receive a construction permit, based on the environmental impact assessment, which includes 12 month study of birds population.

The country has already prepared an onshore atlas, based on computational models with resolution of 1 km on the height of 80 m; measurements of wind potential have been done also on micro locations by specific investors. Meteorological data for wind potential are collected by the National Hydro Meteorological Institution, at the height of 10 m. The







Ministry of Economy issued in 2012 the permit for measuring wind potential on 60 m height in the Municipality of Ulcinj, locality Briska Gora.

2.2.3 Albanian Regulations

In December 1994 Albania signed the Energy Charter Treaty, a legally binding multilateral agreement aimed at promoting energy security through the operation of more open and competitive energy markets, and as a member of the Energy Community, is legally bound to implement substantial parts of the energy *acquis communautaire*.

The promotion of renewable energy and energy efficiency in Albaia includes requirements to transpose *acquis* on renewable energy, high efficiency cogeneration based on useful heat demand, the improvement of energy efficiency of buildings, energy services and various other initiatives.

The main legislative instrument regulating the Albanian energy market is the **Law on Power Sector No. 9072/2003**, enacted in May 2003 and further amended, which establishes the main principles for the development of the power sector, including RES power plants and transmission and distribution networks. This law also contains the requirements and criteria for granting a license to carry out an activity in power sector.

The Power Sector Law gives to the Council of Ministers the right to issue the authorization permits for the construction of the new generation capacities, RES included, that are not subject to the Concession law, followed by the CDM no. 1701, date 17.12.2008 on "Regulation on Procedures for granting of the authorization for concession of Power Plants not subject of concession", that establish the procedures and documents necessary for application, evaluation and granting of an authorization.

Actually, the Government is under process of developing a new power sector law with the goal to reflect the EU Electricity Directive.

In 2013 Albania has issued the **Law on Renewable Energy Sources No. 138/2013** (Official Gazette No. 83 on 20 May 2013), aimed at promoting and supporting the renewable energy sources utilization, to produce electricity and heat, in compliance with Directive 2009/28/EC. The law gives priority dispatch to producers of electricity from renewable sources and it guarantees transmission and distribution of the electricity they generate if they benefit from







the Feed-in Tariff mechanism and have signed a power purchase agreement (PPA) with the utility company which is obliged to purchase the electricity generated from renewable energy sources.

Albania has also taken measures to support development of electricity from renewable sources, particularly in the hydropower sector. Albania's regulatory framework needs further development to meet the requirements of the Renewable Energy Directive in all sectors. All contracting parties in the Energy Community will have to set a target for the minimum national share of renewable energy for 2020 based on the method applicable to EU Member States. One of the main challenges facing Albania is to establish a reliable value for the share of renewable energy in 2005, which is the base year for the calculation⁷. A positive step undertaken for the promotion of RES project is the adoption of Law No. 8987, of 24th December 2002 "On the creation of facilitating conditions for the construction of new sources of the electricity generation", which constitutes a key element for investments in the energy generation sector. Pursuant to this law, "each legal person, native or foreigner, that shall build sources of production of energy with installed power not less than 5 MW per source and that use liquid or solid fuels, without restriction for other renewable sources of production, is excluded from customs taxes for the machinery and equipment that are part of the object of the production of energy".

On April 27th, 2005 the Albanian Parliament passed an **Energy Efficiency Law** (currently under revision) that:

- creates the legal framework required for the promotion and improvement of the efficient use of energy, in whole its energy cycle;
- establishes the economical use of energy sources, the establishment of more reliable energy supply conditions, as well as the minimization of impact on the environment;
- establishes an Energy Efficiency Fund and Financing of the Fund;

⁷ Analytical Report accompanying the Communication from the Commission to the European Parliament and the Council Commission Opinion on Albania 's application for membership of the European Union, 2010.







- delegates the National Agency of Energy to administer the fund that seeks to implement the increase of energy efficiency and renewable energy systems in all regions;
- delegates the Minister to approve the implementation of energy efficiency and renewable energy system programs prepared by the National Agency of Energy;
- carries out energy efficiency and renewable energy awareness campaign.

A National Energy Efficiency Action Plan (NEEAP) has been approved in 2011.

Finally, it is worth to mention the **Law on Concessions** (Law No. 9663of 18th December 2006), which defines the legal basis for private sector participation in public services and infrastructure: the law specifically includes an energy sector section.

Regarding the protection of the environment, the Constitution of Albania considers sustainable development and environmental protection one of the fundamental goals of the State. Law No. 8897 of 16th May 2002 "On Environmental Protection" (O.J. Nr 26, page 825; of 18th June 2002), amended in 2011 in compliance with the EU Directive, provides a basis for specific legal acts regulating different components of environmental protection. Specific laws are in place to regulate air and water quality, waste management, chemicals, biodiversity, etc. It lays down the basic principles of the procedure upon which the Law No. 8990 of 23rd January 2003 "On Environmental Impact Assessment" (O.J. No. 5/2003 of 19th February 2003, page 135) elaborated in more detail, backed by a secondary legislation. It defines all the procedures for the preparation and submission for approval of EIAs in Albania. This law has been repealed by the new law No. 10440, date 07.07.2011, which states that prior to the approval of any construction permit for generation, transmission or distribution facilities a process of EIA has to be carried out. A National Renewable Energy Action Plan providing a target for the share of RES in final energy consumption by 2020 has not yet been published.

With specific regard to wild birds, an assessment of the presence of bird species listed in the Directive and of suitable sites for designation of special protection areas has been initiated as well as an evolution of possible conservation measures.







Albania has further designated protection sites under Ramsar Convention (The Convention on Wetlands of International Importance, especially as Waterfowl Habitat).

The country has enacted several laws and bylaws on costal and marine biodiversity conservation, such as:

The administration and management of protected areas is based on **Law for Protected Areas No. 8906** of 6th June 2002, later amended. It defines the legislative framework concerning the establishment, management and use of protected areas and their natural and biological resources. Important or endangered parts of the territory shall be declared protected areas, according to the following categories: Strictly Natural/scientific Reserves, National Parks; National Monuments; Protected Landscape; Protected Area of Managed Resources. A particular level corresponds to each category of protected area and the preparation of management plans is required for each area (art. 15). The regulation of protected areas is based on six IUCN (International Union for the Conservation of Nature) categories. The law also includes coastal areas (mainly lagoons and estuaries) together with the adjacent marine area. However, the existing legislation does not explicitly cover marine protected areas or off-shore marine areas. While the current definition of 'protected area' the Albanian legislation suggests that protected areas can be declared in marine areas, there are some ambiguities in the definition and in the definition of the level of protection afforded by the different categories of Protected Areas vis-à-vis MPAs.

Law No. 9868 amended and supplemente Law No. 8906 of 2002 "On protected areas", as regards categories of protected areas. It introduced (i) the conditions to be met by a territory in order to be designated as protected area, (ii) the requirements for determining its boundaries and (iii) the procedure for the designation of special protected areas and regional natural parks.

The management of coastal and marine protected areas can be complemented by existing legislation regulating fisheries activities, in particular **Law on Fishery and Aquaculture No. 7908** of 5th April 1995) and some specific relevant regulations such as Regulation Number 1, dated 29th March 2005 "For the implementation of the legislation on Fishery and Aquaculture"). The Law on Fishery and Aquaculture outlines the basic principles of







management and conservation in the sectors of fisheries and aquaculture in all waters of Albania. Of direct relevance for the protection of the marine environment is the description of the tasks of the Directorate of fisheries policies as 'to determine periods of biological cessation, to determine the forbidden fishing zones, the technical restrictions for ships and fishing tools in order to establish a legal fishing and to protect the environment'. The Law has been amended in 2002 by the Law No. 8870 on amendments to Law No. 7908 of 1995 on Fishery and Aquaculture, which strengthens the role of fisheries management organizations by envisaging their participation in the decision-making and co-management of fishery resources.

Law No. 9587 on Biodiversity Protection of 20th July 2006, which establishes the legal basis for the conservation and sustainable use of biodiversity and for achieving the objectives of the Convention on Biological Diversity and other biodiversity-related conventions to which Albania is a Party, as well on related EU directives (e.g. Habitat and Wild Bird Directive). The law identifies the instruments for biodiversity planning (Biodiversity Strategy and Action Plan, biodiversity inventorying and monitoring network, emergency plans and transboundary impact assessments), as well as three protection categories: protected, specially protected and degraded ecosystems, habitats and landscapes. The scope of the law includes aquatic and marine areas.

Finally, two other relevant laws regarding the protection of the environment are **Law No. 10006 on wild fauna protection** of 23rd October 2008), whose purpose is to protect, manage and control wild fauna with a view to ensuring the conservation of species, populations and their habitats and **Law No. 4 on Hunting** of 23rd December 2009.

Even if these laws provide a good foundation for establishing and managing coastal and marine protected areas, there are certain areas where laws should be strengthened to facilitate their implementation in support of coastal and marine biodiversity conservation. Some examples of this include the use of the term 'territories' in the Protected Areas law could be made clearer so that it applies to "marine territories', the description of the PA categories (territories) and the activities that are prohibited could be described in more general terms that applies to marine areas too (e.g., "extraction of natural resources" versus "hunting or fishing").







Regarding the transposition of IPPC Directive a draft law has been prepared and expected to be adopted in 2010, but it has not entered into force yet.

The LCP Directive (Directive 2001/80/EC of the European Parliament and of the Council of 23rd October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants) is still awaiting direct transposition, with Albania having passed laws on air quality in January 2009 for the accession to the Helsinki Protocol and Sofia Protocol to the 1979 Convention "On long-range Transboundary air pollution".

2.2.4 Croatian Regulations

Major energy reform legislation was passed by the Croatian parliament in July 2001 but a new legal frame has been set up between 2012 and 2013 in view of its entrance in the European Union (July 2013). The **Energy Law** (amended in 2004 and 2007, O.J. 68/01, 177/04 and 76/07)regulated measures to ensure a secure and reliable energy supply, efficient power generation and its use, the enforcement of regulations in the energy sector, and regulated carrying out of energy activities based on market principles or pursuant to public service obligation, and other key issues relevant for the energy sector. As part of the Country's obligation before its accession to the European Union, the Parliament passed the **Energy Act** (Official Gazette 120/12). In accordance with the transposition provisions of EU Directives 2009/72/EC and 2009/73/EC, the Energy Act incorporates the respective directives of EU law (Article 2). Separate acts regulate the gas, electricity, oil, heat and renewables markets.

The Country adopted in 2009 its **National Energy Strategy 2009-2020** as part of its international obligations outlined in Kyoto Protocol as well as from preparation process of entering into the European Union in mid 2013. Croatian National Energy Strategy 2009-2020 has three basic objectives: 1) increase security of energy supply, 2) develop competitive energy system and 3) ensure sustainable energy sector development. These objectives are particularly important due to Croatia's heavy dependence on energy imports which results in country's vulnerability to energy prices volatilities.

Other important laws include:







- Law on Electricity Market, (O.J. 177/04, 76/07, amended by the new law No. 22/13), which defines the organization of the electricity market, including tariffs and eligible customers. It defines the status of eligible producers and sets the legal obligation to purchase electricity produced by eligible producers, which can obtain and incentive price defined in Tariff system for electricity produced from renewable energy sources and cogeneration;
- Act on the Regulation of Energy Activities (O.J. 177/04 and 76/07, amended by the new law No. 120/12), which regulates the establishment and implementation of the system for the regulation of energy activities, the procedure for establishing the energy regulatory body and other matters of importance for the regulation of energy activities;
- Law on Oil and Oil Derivatives Market (O.J. 57/06, amended by the new law No 19/14), providing access to oil and gas pipelines;
- Law on Gas Market (O.J. 40/07, amended by the new law No 14/14), providing access to imported gas by buyers who will consume large quantities of gas themselves or use it for cogeneration;
- the Act on Production, Distribution and Supply of Thermal Energy (O.J. 42/05, amended by the new law No. 14/14) states that cogeneration plants have the priority in selection of solutions for new production objects. Energy subject that uses cogeneration and waste, bio-waste or renewable energy sources for heat production can gain the status of eligible heat producer.

Croatia has now a target for 20 % of energy from RES by 2020 and has submitted in October 2013 its NREAP. Most of Croatia's policies and measures for stimulating RES, as well as for boosting energy efficiency, are already in place. In 2013, Croatia set new Feed-in Tariffs for all RES technologies (Official Gazette 63/12).

2.2.5 Slovenian Regulations

Basic legal grounds for defining and organising the energy sector were laid in 1999 when the new Energy Act was passed and it introduced the opening of the energy market, in compliance with Directive 96/92/EC. It introduced the energy market in Slovenia with the purpose of organizing the power sector in a modern way, taking into account new







developments in this sector. At the same time, it also represented an important step in the process of harmonization of the Slovenian legislation with the legislation of the European Union in the energy sector. The process of liberalization and deregulation of the energy sector set the foundations for the new image of the Slovenian energy market. For the supervision of functioning of the electricity and natural gas market, the Energy Agency of the Republic of Slovenia was established according to the provisions of the Energy Law as an independent organization, carrying out the duties, specified by the law.

The latest amendments to the Energy Act (O.J. of the Republic of Slovenia, No. 70/08) were adopted by the Slovenian National Assembly to ensure harmonization of Slovenia's legal order with EU regulations. According to the European Directive 2009/28/EC, Slovenia has to increase its share of energy from renewable sources from 16 % to 25 %. As required by the Law, the country adopted in 2010 the NREAP 2010-2020, representing a detailed roadmap of how Slovenia will reach its legally binding 2020 target for the share of renewable energy in its final energy consumption. The objectives of Slovenia's energy policy for renewable energy sources are:

- ensuring a 25 % share of renewable energy sources in final energy consumption and a 10 % share of renewables in transport by 2020, which under current predictions will involve a doubling of energy generated from renewable sources relative to the baseline year of 2005;
- halting the growth of final energy consumption,
- implementing efficient energy use and renewable energy sources as economic development priorities,
- in the long term, increasing the share of renewable energy sources in final energy consumption up to 2030 and beyond.

A range of measures to promote renewable energy sources has been implemented as part of the adopted program documents, especially under the Operational Program for Developing Environmental and Transport Infrastructure 2007-2013, the Action Plan for Green Public Procurement and the Operational Program for Reducing Greenhouse Gas Emissions up to 2012 (a revised Operational Program, defining the measures required to meet the







obligations assumed by ratifying the Kyoto Protocol In July 2009, has been adopted in July 2009). The draft of the Climate Change Act and of the long-term low-carbon strategy of Slovenia to determine the national policy of climate change mitigation and adaptation till 2050 are still in the process of approval.

Amendments to the Energy Act were needed partly in order to regulate support for power stations generating electricity from renewable energy sources, in accordance with the Community Guidelines on State Aid for Environmental Protection⁸.

The amendments focused also on renewable energy and energy efficiency promotion, including provisions improving the process for supporting renewable energy facilities and creating the framework for new regulations for guarantees of origin and procedures for support of qualified producers, meaning those producers who receive state support in various incentive forms for renewable energy production. In fact, in Slovenia, electricity generated from renewable energy is promoted mainly through a feed-in tariff and a premium tariff. Certain producers ("qualified producers") of electricity from renewable sources may choose between a guaranteed feed-in tariff, and a bonus ("premium") on top of the electricity price achieved in the fee market. Furthermore, national public calls for grant applications are organized and loans are provided for projects in the field of renewable energy. The amendments introduced with the Law No. 70/08 gave provision for the distribution of financial aid to renewable energy systems where production costs exceed the open-market price for electricity. This aid takes the form of a guaranteed purchase price dependant on the energy source, as well as operational support.

Renewable energy systems shall be connected to the grid according to the general legislation on energy: the Energy Law includes provisions for the connection of power generation systems (including renewable energy systems) to the grid. Renewable energy shall not be given priority connection. The use and expansion of the grid is also subject to the general legislation on energy and shall be granted according to non-discriminatory principles. The Energy Law establishes that grid operators are obliged to import and transmit all electricity from renewable sources generated by systems that have a capacity of no more

⁸ http://www.enercee.net/slovenia/energy-policy.html







than 5 MW. Moreover, electricity from renewable sources must be granted access to the grid according to the general legislation on energy and without any users being discriminated against.

Beside the Energy Law, provisions regarding the grid access are also contained within the **Order on Access to the Grid** (No. 117/2002) and **Conditions for Access to the Grid** (No. 126/2007).

Other Slovenian relevant regulations in the field of renewable energies are:

- Resolution on the prices and premiums for the purchase of electricity from renewable sources by qualified producers No. 65/2008, which sets the uniform annual premium and price for electricity and in particular the reference rates for the feed-in tariff and the premium tariff for electricity generated from renewable energy sources;
- Regulation on Energy Efficiency and the Use of Renewable Energy No. 89/2008, which sets out rules for the subsidies provided by the Ministry of the Environment and Spatial Planning for energy efficiency and the use of renewable energy;
- Regulation on the Use of Electricity Grids No. 134/2003, which establishes provisions on the calculation and distribution of the costs for the use of electricity grids, in particular the surcharge on the price of renewable electricity.

With regard to the environment, the legal basis of nature conservation and protection of the natural heritage of Slovenia is the **Nature Conservation Act (No. 96/2004)**.

The Nature Conservation Act regulates the following environmental matters:

- the environmental permits (relating to environmental pollution, waste management etc.);
- an environmental impact assessment for individual interventions;
- the environmental taxes on pollution of air with carbon dioxide emissions, the use of lubricating oils and fluids, landfilling and environmental pollution due to the use of volatile organic compounds;







 tradable emission permits (regulatory scheme for the sources of pollutants): trading the entitlements to release substances in water, the air or the land (emission coupons).

2.2.6 Bosnian Regulations

When referring to Bosnia and Herzegovina, it is necessary to specify which part of the country is involved in the discussion as it comprises, since the Dayton Agreement, two entities: the joint Federation of Bosnia and Herzegovina (FBiH) and the Republika Srpska (RS), each presiding over roughly one half of the state's territory and each with its own constitution. The city of Brčko in northeastern Bosnia is a seat of the Brčko district, a self-governing administrative unit under the sovereignty of Bosnia and Herzegovina; it is part of both the Federation and Republika Srpska although it remains under international supervision.

Each of the two entities composing the country has developed specific legislation regulating the energy issue.

The legislative background of Bosnia and Herzegovina (BiH) in the energy sector is based on the following regulatory instruments:

- Act on Transmission, Regulator and Electricity System Operator (O.J. of BiH 07/02, 13/03), which regulates establishment and work of a State Electricity Regulatory Commission, an Independent System Operator and a company for transmission of electric energy, and defines the functions and authorities of these bodies. The objective of this Act is to lay the basis for unlimited and free trade and a continuous supply of electricity at defined quality standards for the enjoyment of the citizens of BiH. The Act is guided by prevailing international practices and applicable Directives of the European Union;
- Law on Establishing an Independent System Operator for the Transmission System of BiH (O.J. of BiH 35/04): this Law establishes a non-profit Independent System Operator to direct the operation of the transmission system in the entire territory of BiH and defines its functions, powers, governance and ownership. The objective of the Law is to establish an independent system operator and







ensure a continuous supply of electricity at defined quality standards for the enjoyment of the citizens of BiH. The Law is intended to facilitate the creation of a competitive electric energy market in BiH and its integration in regional energy markets and regional energy development activities. The Law is based on existing international practices and applicable Directives of the European Union (and their implementation in EU Member States);

• Law on Establishing the Company for the Transmission of Electric Power in BiH (O.J. of BiH 35/04): this Law establishes a joint stock company for the transmission of electric energy, "Elektroprenos Bosne i Hercegovine", and defines its functions, powers, governance, and ownership. The objective of the Law is to establish a single transmission company and to ensure a continuous supply of electricity at defined quality standards for the enjoyment of the citizens of BiH. The Law is intended to facilitate the creation of an electric energy market in BiH and its integration into regional energy markets and regional energy development activities. The Law is based on existing international practices and applicable Directives of the European Union (and their implementation in European Union Member States.)

The energy market of the Federation of BIH is based on the following acts:

- Electricity Law (O.J. of FBiH 41/02) and further amendments (O.J. of FBiH 61/09, O.J. of FBiH 38/05). The aims of these laws are:
- electricity sector stimulation,
- stimulation for private domestic and foreign investments,
- more reliable supply of electricity,
- inclusion in international electricity market via unitary electricity market in BiH,
- economical and rational use of electricity,
- energy efficiency,
- implementing the transparency and competition excluding monopoly effects,
- environmental protection,
- protect the interests of system users,
- renewable energy use;







- Law on Application of Tariff System (O.J. of FBiH 06/04);
- Regulation on using renewable energy resources and cogeneration (O.J. of FBiH 36/2010). This law is very relevant as it lays down: how to use RES and cogeneration facilities, the minimum share of electricity produced from plants using RES in total energy consumption, encouraging the production of electricity from RES, testing the potential of RES, establishing the Register of RES projects, RES plant construction, purchase and compensation, RES plants access on the grid, the certification of origin of electricity produced from RES, the establishment of institutional structures for the operationalization of the system for supporting the electricity production from RES, as well as other issues of importance for RES utilization.

The use of RES is of general interest for the FBiH. The aim of this Regulation is in fact to stimulate greater production and consumption of electricity from RES in the internal electricity market and the development of regulatory and technical infrastructure for the RES.

The energy market of the Republika Srpska (RS) is based on the following laws:

- Law on Energy (O.J. of RS 49/09), which regulates the performance of energy activities to ensure the legal requirements for safe and reliable energy supply by the principle of competitive energy markets and sustainable development, with efficient use of energy and environmental protection;
- Law on Electricity (O.J. of RS 34/09, 92/09), which establishes the conditions necessary for a rational and economical development of production and distribution of electricity in the RS;
- Law on Gas (O.J. of RS 86/07), which provides the method of organization, regulation and functioning of the natural gas sector, terms and conditions for regular, proper and reliable supply of customers with natural gas, the method of generation, transport, distribution, supply and storage of the natural gas on the RS territory.







In 2010 the Regulatory Commission (RERS) stimulated the production of electricity from renewable sources and combined heat and power and decision-making procedure on the level premium and guaranteed purchase prices for electricity generated by qualified and efficient cogeneration power plants (Decision about a Methodology for the Determination of Purchase Prices for Electricity from Renewable Sources with Installed Power up to 5 MW, O.J. of RS 71/2003).

2.2.7 Greek Regulations

In 2010 the Greek Government enacted the **Renewable Energy Law No. 3851** (Bulletin of Government Gazette A85 of 4th June 2010) which established an ambitious national renewable energy targets that should reach 20 % of total national energy consumption and 40 % of total electricity consumption by 2020. Moreover, 20 % of energy used in heating and cooling and 10 % of energy used in transportation have to come from renewable sources.

The legislation foresees the creation of a Special Renewable Energy Investment Service that acts as an interface between public institutions and investors, annually assess the main challenges to renewable energy deployment and manage the support funding allocation process.

Existing remuneration of individual residents in areas where renewable energy projects are running have been amended and replaced by a credit on electricity bills. In fact, the law establishes that a share of the RE concession taxes paid by RE producers to regional and local authorities is allocated to local households as a credit on their electricity bill as a way to share the benefits of living nearby a renewable energy generation plant.

The renewable energy generation licensing process has also been very much fasten and eased by the regulation that entitles the Regulatory Authority for Energy (RAE) with the assessment and issuance of licenses, under the authority of the ministry of Environment, Energy and Climate Change. The whole licensing process cannot last over a 30-month period. The law also tackles the grid infrastructure challenge and implements a timely limited target for the grid utility to connect non-interconnected islands to the main grid. Still, RE projects are not granted grid priority access as grid connection will be established on a first-come







first served basis until the network is saturated. The grid utility is compelled to provide grid access within four months after the connection demand has been released.

The Law 3851 also establishes a whole new set of feed-in tariffs for electricity from renewable sources, to be found in the Greek FIT article (Feed-in tariffs included in the 3851 Re Law). This latter applies for wind plants the following tariffs:

- for installations with capacity no larger than 50 kW: EUR 250/MWh.
- for onshore installations with a capacity over 50kW: EUR 87.85/MWh for interconnected systems and EUR 99.45/MWh for Non interconnected islands.

Law No. 3468/2006 ("Generation of Electricity using Renewable Energy Sources and High-Efficiency Cogeneration of Electricity and Heat", (Bulletin of Government Gazette A129 of 27th June 2006, last amendment 2010), whose goal was transposing Directive 2001/77/EC into the Greek legislation and promoting the generation of electricity from renewable sources in the Greek single market, set standards for the guaranteed feed-in tariff. This law has been overstepped by the more recent Feed-in tariffs included in the 3851 RE Law.

More recently, the Government enacted Law 4001/2011 (Bulleting of Government Gazette A179 of 22nd August 2011), which revised the framework of the Greek energy market (electricity, gas, hydrocarbons, gas & oil pipelines, renewables, mining, etc.).

Following a process of public consultation, the revised Regulation of electricity generation licenses for plants producing energy from RES and combined production of heat and power (CHP) (Ministerial Decision YAPE/F1/14810) was approved by the Regulatory Authority for Energy (RAE) and signed by the competent deputy Minister of Environment & Energy on 4 October 2011. The revised Regulation aims at implementing the provisions and guidelines set forth in Laws 3851/2010 and 4001/2011 and introducing new procedures for certain types of RES.

Other relevant Laws regulating the Greek energy market are:

 Law No. 2773/1999 Law on the liberalization of the energy market: this law regulates the liberalization of the Greek electricity market and authorizes the tax for renewable energy to finance the feed-in tariff. It also includes provisions for grid connection and grid development with regard to RES systems;







- Ministerial resolution FEK 2095/2010 to set the coefficients for the tax calculation, which determines the factors on which the extraordinary tax for renewable energy is based;
- Ministerial Resolution/F1/oik.17149 Procedure for the issuing of planning and operation permissions for RES, which applies to the construction and the operation of renewable energy systems.







3 Offshore wind farm state of the art of Environmental policies

The international community and the public opinion are still divided on the environmental impact of wind plants: it is not undeniable that, although this impact is very limited, particularly if compared to fossil fuel power plants, concerns have been raised over the noise produced by the rotor blades, visual impacts, and effects on flora and fauna (mainly on air and marine migratory routes). To reduce these problems and protect the landscape, Governments have prepared specific legislation, at international, national and local level, aimed at regulating the installation of on-shore and off-shore wind farms, among which the requirement for EIA for these kind of projects, as already analyzed in the previous sections. As regards Adriatic Sea, the regulation of the installation of off-shore wind plants is still under the jurisdiction of each coastal State (also through its Regions) within its competence borders (internal and territorial waters, contiguous and Exclusive Economic Zones). International waters are under the jurisdiction of several international conventions, particularly the United Nations Convention on the Law of the Sea (UNCLOS, 1982). As already highlighted before, the Adriatic Sea countries do not have specific legislation for the installation of off-shore wind plants, but provisions are included within general acts on the exploitation of wind plants. Additionally, the European Union does not offer a common legislative framework in this sense, as the six Adriatic states (Albania, Bosnia and Herzegovina, Croatia, Italy, Greece, Slovenia, and Montenegro) are European Union member states, EU acceding, candidate and potential candidate countries and extra European states in process to start the adhesion procedure.

The Adriatic Sea is a highly sensitive marine area, and the region is economically significant for tourism, a major transport hub for energy resources, and one of Europe's most highly developed industrial areas: therefore the Adriatic countries have begun to make specific commitments for protection and management of the Adriatic Sea region, beside the more international protocol and conventions for the protection of the environment and seas. These include:

- the Contingency Plan for the Adriatic;
- the Ballast Waters Management Plan;







- the Integrated Coastal Zone Management; and
- action under the EU Marine Strategy and the EC Water Framework Directive.

Moreover, Italy, Slovenia, Greece and Croatia, as EU member states, have obligations towards the whole EU with respect to the Adriatic under the EU Marine Strategy Framework Directive (Directive 2008/56/EC), which establishes a common framework and objectives for the protection and conservation of the marine environment

A fundamental effective protection instrument for the area is offered by Natura 2000 Network and the set up of Marine Protected Areas, as explained in the following sections.

Finally, it is important to mention the **Environmental Impact Assessment (EIA) Directive (85/337/EEC)**, which since 1985 has been requiring Member Countries to carry out the EIA for a wide range of public and private projects, which are defined in its Annexes I and II. The EIA shall identify, describe and assess in an appropriate manner the direct and indirect effects of a project on human beings, fauna and flora, soil, water, air, climate and the landscape, material assets and the cultural heritage and all their interactions. The Directive distinguishes:

- mandatory EIA: all projects listed in Annex I are considered as having significant effects on the environment and require an EIA (e.g. long-distance railway lines, motorways and express roads, airports with a basic runway length ≥ 2100 m, installations for the disposal of hazardous waste, installations for the disposal of non-hazardous waste > 100 tons/day, waste water treatment plants > 150.000 p.e.);
- discretion of Member States (screening): for projects listed in Annex II, the national authorities have to decide whether an EIA is needed. This is done by the "screening procedure", which determines the effects of projects on the basis of thresholds/criteria or a case by case examination. However, the national authorities must take into account the criteria laid down in Annex III. The projects listed in Annex II are in general those not included in Annex I (railways, roads waste disposal installations, waste water treatment plants), but also other types such as urban development projects, flood-relief works, changes of Annex I and II existing projects).







The EIA Directive of 1985 has been amended three times, in 1997, in 2003 and in 2009, including further projects to the EIA obligation: the initial Directive of 1985 and its three amendments have been codified by Directive 2011/92/EC of 2011. The new Directive allowed Member States to exempt specific projects in whole or in part from the provisions it laid down (the aforementioned "discretion of Member States"), among which installations for the harnessing of wind power for energy production (wind farms), without any differentiation for onshore and offshore plants. This means that each European country has the power to decide if wind plants projects require or not the EIA. On May 2014 a newly amended EIA Directive (2014/52/EU) entered into force with the aim to simplify the rules for assessing the potential effects of projects on the environment. The main amendments are as follows:

- Member States now have a mandate to simplify their different environmental assessment procedures;
- timeframes are introduced for the different stages of environmental assessments: screening decisions should be taken within 90 days (although extensions are possible) and public consultations should last at least 30 days. Members States also need to ensure that final decisions are taken within a "reasonable period of time";
- the screening procedure, determining whether an EIA is required, is simplified. Decisions must be duly motivated in the light of the updated screening criteria;
- EIA reports are to be made more understandable for the public, especially as regards assessments of the current state of the environment and alternatives to the proposal in question;
- the quality and the content of the reports will be improved. Competent authorities will also need to prove their objectivity to avoid conflicts of interest;
- the grounds for development consent decisions must be clear and more transparent for the public. Member States may also set timeframes for the validity of any reasoned conclusions or opinions issued as part of the EIA procedure;
- If projects do entail significant adverse effects on the environment, developers will be obliged to do the necessary to avoid, prevent or reduce such effects. These projects will need to be monitored using procedures determined by the Member







States. Existing monitoring arrangements may be used to avoid duplication of monitoring and unnecessary costs.

Member States have to apply these rules as from 16 May 2017 at the latest. They also need to communicate to the Commission the national legislation adopted in order to comply with the Directive.

It should be anyway considered that seabirds constitute one major environmental risk for the development, in particular in the shallow seas where offshore wind farms are being constructed. Often, seabirds migrate and feed at sites which are technically attractive for wind farms, and conflicts may arise. Also, fish spawning areas and marine mammals are significant environmental elements and candidates for potential conflicts when locating and establishing wind farms. Therefore a mapping of environmental sensitivity is essential as part of securing a complete environmental baseline, both if legally required or not.

3.1 Sites of Community Importance (SCI)

Natura 2000 is the main instrument of the EU policy aimed at biodiversity conservation. This is an ecological network of sites spread across the Union, designate and established under the Habitats Directive (92/43/EEC) and the Birds Directive (79/409/EC) to ensure long-term maintenance of natural habitats and species of flora and fauna threatened or rare in Community.

The Natura 2000 network consists of:

- Sites of Community Importance (SCIs) and Special Areas of Conservation (SACs), established by the Member States in accordance with the Habitats Directive;
- Special Protection Areas (SPAs), established under the Birds Directive.

The areas included in Natura 2000 are not strictly protected reserves where human activities are excluded. The Habitat Directive aims to ensure the protection of nature, taking into account "economic, social and cultural requirements and regional and local peculiarity". Privates can own Natura 2000 sites, ensuring their sustainable management both ecologically and economically.

The process leading to the identification of SAC is divided into three phases:







- according to the criteria set out in Annex III of the Habitats Directive (phase 1), each Member State shall identify sites - called proposed Sites of Community Importance (pSCI) - which host habitat and species listed in Annexes I and II of the Directive;
- based on national SCI lists, the Commission, according to the criteria set out in Annex III (Stage 1) and after a consultation process with Member States, shall adopt the list of SCI. To analyze the proposals of the States, the Commission before publishing the initial list of SCI has organized scientific seminars for each biogeographical region;
- once adopted the SCI list, Member States must designate all sites as "Special Areas of Conservation" as soon as possible and within the maximum term of six years, giving priority to the most threatened sites and/or most relevant for conservation purposes.

Natura 2000 Network is a dynamic process therefore SCI lists are periodically updated by the Commission with database sent from Member States once a year.

The enlargement of the European Union with Croatia in 2013 has brought the most recent amendments of the EU Birds Directive and the Habitats Directive. The changes concerned only the annexes of the directive: new typical and endangered species and habitats in Croatia have been added to the annexes. In addition, a small number of earlier typographical errors were corrected.

The total number of SCI in the EU is 23,608, of which 2,292 are marine, while SPAs are 5,491 of which 987 are marine sites. Within the network sites of Natura 2000 (with 27,208 sites currently existing)⁹ are protected in total: 132 habitats, 87 flora species and 98 fauna species (21 of mammal, 9 reptiles, 14 amphibians, 24 fishes, 30 invertebrates) according to the Directive "Habitat"; and around 380 bird species according to Directive "Birds".

In **Italy**, SCI and SPA in total cover approximately 21 % of the national territory; the detection of SCI is the responsibility of the Regions and Autonomous Provinces, which convey data to the Italian Ministry for the Environment, Land and Sea (IMELS) according to a European

⁹ Data up to December 2013, http://ec.europa.eu/environment/nature/natura2000/barometer/index_en.htm







standard format, including maps. The Ministry, after a verification of completeness and consistency of the data, conveys the database and the maps to the Commission, and, after the publication of SCI lists by the Commission, IMELS designates the SCI as SAC, adopted by decree in agreement with each region and autonomous province concerned. Up to now 2,314 SCI and 610 SPA have been identified in Italy, among which 335 are "type C" sites which means that are both SCI and SPAs. 319 are the marine SCI.



Source: Geoportale Nazionale 2014

Figure 3.1: Italian SCIs and SPAs

Apulia Region has set up 73 SCI, including marine SCI for a total area of 65,527 hectares (see Annex A). Among these SCI, three types of habitats have been identified: meadows of *Posidonia oceanica* (habitat code 1120), coastal lagoons (habitat code 1150) and submerged or partially submerged caves (habitat code 8330), to which must be added Reefs (habitat







code 1170), currently not reported. The current scientific knowledge should be considered reliable up to the depth range of 30 meters, below this depth the information are extremely limited. The meadow of *P. oceanica* is largely protected within in the SCI. It is present in almost all SCI established at sea (103.6 km² of 154.1 km² – 67 % of the total area protected). The reefs habitat is very important at regional level because is feature of continental platform. It occupies 430 km² and approximately 48 % is protected within the SCI, although not reported in the Natura 2000 maps. The Region hosts six SPAs of which only 313 hectares are located in the sea.

Currently, Abruzzo hosts four land SPA sites (as shown in Annex A) with a total area of 288,112 hectares, and 53 SCI, with a total area of 236,117 hectares, of which 3,410 are located at sea.

Molise records only three SPA (33,876 hectares) and 76 SCI (65,607 hectares) but no one is located at sea .

Marche Region includes within its territory 95 Natura 2000 Network sites, of which 19 are SPA and 68 SCIs, covering respectively 141,142,687 hectares.

Emilia Romagna hosts 158 Natura 2000 sites, which cover a total area of 266,250 hectares on land and 3,556 at sea, as shown in Annex A. The Region has just one maritime SCI, "Relitto del Paguro".

In the Veneto Region, currently, there are a total of 130 sites in the Natura 2000 network, with 67 SPAs and 104 SCIs variously overlapped. The total surface area is equal to 418,019 hectares (22.7 % of the regional territory) with the extension of the Special protection Areas equal to 359,882 hectares and that of the Sites of Community Importance equal to 373,144 hectares.

It is very useful to underline that the Veneto Region inserted in the SCI two areas outside the harbors of Chioggia and Falconeria, which are characterized by the presence of rocky substrata a few meters in height (traditionally known to local fishermen as "tegnue" or "trezze" (Venetian dialect for "held onto") because fishing nets tend to get entangled and for the tapered shape of the substrata themselves) and by a typical sessile population of algae and animals, as well as various fish fauna.







The two new SCIs proposed by the Veneto Region are at the same time also Biological Protection Areas for the MiPAF (since 2002). There is another Veneto Biological Protection Area, which includes the 4 "Tegnùe of Chioggia" sub-areas indicated above, for a total surface area of about 160 square km, which, however, is only "on paper", in that it is subject to different interpretations of the standards, which undermine recognition on behalf of the fishing categories (and also by some local institutions).

Although in Italian seas only very modest surface areas are currently subject to some form of protection, in the near future it can be assumed that the number and magnitude of these areas will increase, in compliance with the 2008/56/EC Directive (so-called "Framework directive on the strategy for marine environments" or "GES Directive"), which sets forth that the other member states activate, by 2016, proper measures to reduce the majority of impact from various human activities (chemical pollution, fishing, mineral or sediment extraction, destruction or isolation of coastal habitats, etc.) until reaching a "Good Environmental Status", ergo the acronym GES) for sea waters pertaining to the states themselves. In fact, among the measures required there is specifically the creation of networks consistent with and representative of protected areas (art. 13). Moreover, during the 10th conference of the States drawing up the "Convention on Biological Diversity" (or "CBD", which 194 States belong to), held in Nagoya (Japan), it was decided that by 2020 10 % of the surface area of all the marine and coastal eco-regions must be protected. This objective, however, had already been set for 2012, but delays in the initiative required its postponement to the indicated date, which is considered ultimate according to the CBD of 2004. In particular, the northern and central parts of the Adriatic Sea have been recently inserted (UNEC-RAC/SPA, 2010, cited in Tunesi, 2011) in a list of 12 large areas of the Mediterranean deserving protection.

Montenegro, candidate country, is not part of the Natura 2000 Network: however, the National Institute for the protection of Nature and the Environmental Protection Agency are working to extend the network also to the country but it does not include the sea area.

Currently there are two lists of protected areas. The first one is the list of areas protected by the Law. The map of these areas is given in the Figure 3.2.









Figure 3.2: Map of the Montenegrin areas protected by law

The second list of protected areas refers to EMERALD protected areas, as shown in Figure 3.3. The Emerald Network is an ecological network made up of "areas of special conservation interest", which was launched in 1999 by the Council of Europe as part of its work under the Bern Convention, of which it is a contracting party. The Emerald Network of protected areas aims to supplement the Natura 2000 Network, on a similar basis, in non-EU countries on the basis of the 1992 Habitats Directive .









Figure 3.3: Montenegrin EMERALD protected areas

Montenegro NATURA 2000 map is currently being developed and is expected to be completed within next two years, based on these two lists of protected areas.

Albania is advancing on transposition of the nature protection legislation. There are currently about 797 Protected Areas (PA) and all together, the PAs cover 12.57 % of the total land surface of the country. A large number of these (750) are Natural Monuments, which includes bio-monuments, geo-monuments and nature monuments. The remaining 47 PAs are categorized as Strict Nature Reserves (2), National Parks (15), Managed Nature Reserves (22), Protected Landscape Areas (5), and Protected Areas of Managed Resources (4). Of these 47 PAs, 10 PAs can be considered coastal PAs. In April 2010 the Council of Ministers of







Albania proclaimed the first marine PA in Albania: Sazani Island – Karaburuni Peninsula. This area was given the status of National Marine Park, including a total surface of 12,570 ha.

Initial preparations are being made for establishment of the Natura 2000 network and accession to the key multilateral agreements in this field. The Emerald Network in Albania has been identified and completed during the implementation of three projects: the first pilot project in 2002, the second project in 2005-2006 and the third in 2007-2008. In the course of these projects, 25 potential sites have been selected and studied and distribution maps for 12 animal species and eight habitat species have been produced¹⁰.

Current status of the candidate Emerald sites in Albania is that they are at Phase II of the designation process having been formally submitted to the Council of Europe Standing Committee (although consultation undertaken in January 2011 has identified that the Tomorri candidate Emerald Site boundary is currently incorrect). As part of Phase II the committee will undertake an evaluation of the efficiency of the proposed sites which has to be done on a species by species and habitat by habitat base. Ideally the evaluation would only start if a complete inventory of proposed sites exists for a certain area. Realistically, this would mean that over 80 % of the finally proposed sites would already be available for the evaluation. This exercise is to be conducted in cooperation with the European Environment Agency.

¹⁰ http://www.eea.europa.eu/soer/countries/al/soertopic_view?topic=biodiversity









Figure 3.4: Albanian Emerald Network Proposed Sites

A National Biodiversity Strategy and Action Plan is being implemented and the fifth National Report of Albania to the CBD has been presented in May 2014, to identify the Progress towards the implementation of Action Plan for biodiversity for the period 2011-2020. However, further monitoring is needed, targeted on adjustments to strategy related to the new EU biodiversity target. Albania is progressing well on establishment of the Emerald network however, implementation, enforcement and, in particular, management of the protected areas need considerable improvement. Illegal logging and hunting and *POWERED – Deliverable – WP 3 – Task 3.2, 3.3, 3.4 – Rev. 1 – February 2015* Page 66







unauthorized construction in nature reserves remain significant concerns. Inspections and sanctions have to be implemented. An effective monitoring and information system has yet to be developed.

Regarding Croatia, a State with a very rich flora and fauna, at the time of its accession to the EU, it will need to implement the Birds and Habitats Directives on its territory. Already, many of the provisions of these two EU Directives have been transposed into the Nature Protection Act (O.J. 70/05). Like other EU countries, Croatia will also have to propose sites for the NATURA 2000 Network for over 250 species and 70 habitat types that occur in Croatia and that are considered to be of EU importance. In anticipation of this, the State Institute for Nature Protection (SINP) has coordinated a detailed inventory of the distribution of these species and habitats in Croatia. From this extensive baseline information, a total of 404 sites have been proposed as Emerald/NATURA sites to date¹¹. The selection is based on standard scientific criteria that apply in the same way to all EU countries. These possible sites have now been put out to public consultation. Once the public consultation exercise is finished, a final revised list of possible NATURA 2000 sites will be sent for final government approval before being submitted to the European Commission in Brussels¹². Croatia will submit to the Commission a substantial list of marine Natura 2000 sites by the date of accession on the basis of scientific knowledge available at that moment¹³.

¹¹ http://www.cro-nen.hr/content.php?id=55

¹² http://www.natura2000.hr/PageTemplates/PageContent.aspx?pageId=38&langID=2

¹³ European Commission Accession Document, AD 50/10 Limite, CONF-HR 41, 2010









Figure 3.5: The Emerald Network in Croatia

Also **Bosnia and Herzegovina** is working towards the establishment of a Natura 2000 network. The mapping of all species and some of the habitats from Annexes I and II of the EU Habitat Directive which are present in the country has been already carried out and the data collection by field mapping is in place.

In April 2004, **Slovenia** designated the Natura 2000 sites and undertook to suitably protect them. It defined 31 sites for bird conservation and 323 sites for the conservation of habitat types and species. Thus there are 354 Natura 2000 sites in total, encompassing approximately 37 percent of the country (including marine sites counting for 6 km²). A

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particular characteristic of Slovenia is its great diversity of animal and plant species in a small area, and its well-preserved nature. The sites are home to 114 threatened plant and animal species and 60 habitat types protected by the Habitats Directive and 118 species protected by the Wild Birds Directive ¹⁴.

In December 2011, the Standing Committee to the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) officially nominated as "Candidate Emerald sites" a number of sites proposed by six West Balkan countries, Switzerland, Norway and Morocco, to join the Network¹⁵, as shown in the following table:

Country	No. of Sites	Total Area (ha)
Albania	25	522,430
Bosnia-Herzegovina	29	250,455
Croatia	957	2,666,762
Montenegro	32	240,077

Table 3.1: Officially nominated Candidate Emerald sites 2011

Source: Council of Europe, 2011

Finally, **Greece**, as EU member country included at its National List 241 SCI according to the EU Directive 92/43 and has declared 202 SPAs according to EU Directive 79/409. The boundaries of each site have been defined and displayed in maps on topographic background (scale 1:100000) and Standard Data Form has been completed with data on natural habitats and species of community importance¹⁶.

¹⁴ http://www.natura2000.gov.si/?L=1

¹⁵ Convention on the Conservation of European Wildlife and Natural Habitats, Standing Committee, 2011 ¹⁶ http://www.ekby.gr/ekby/en/Natura2000 main en.html









Figure 3.6: Natura 2000 sites in Greece

3.2 Marine Protected Areas (MPAs)

Protected areas are locations which receive protection because of their environmental, cultural or similar value. Countries often have extensive systems of protected areas developed over many years. These systems vary considerably country to country, depending on national needs and priorities, and on differences in legislative, institutional and financial support. Protected areas transcend different environments from the highest mountains to the deepest sea, across forests, deserts, lakes and even national boundaries (territories).

IUCN (International Union for Conservation of Nature) defines Marine Protected Areas (MPAs) as "any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment".

The first key point of this definition is that the primary objective of the protected area is conservation of biological diversity. The second key point is that the protection is 'effective'.







This will generally mean that the area is protected by an Act of Parliament, in the case of public land, or by a covenant or conservation agreement, in the case of privately owned, or indigenous land¹⁷.

Typically many protected areas are established (or designated) within a countries national territory (including any maritime claims) using the appropriate legislation or agreement.

However there are locations of significant environmental, cultural or natural value that should be protected irrespective of the territory on which they are located. These locations are often recognized, preserved and protected under an international treaty or convention.

Protected areas can be both nationally designated and internationally recognized. In some cases an internationally recognized site can be composed of multiple national designated protected areas from different countries.

There are a number of globally and regionally recognized international treaties, conventions and agreements referring to protected areas. The most common global conventions are:

Convention for the Protection of the Mediterranean Sea Against Pollution, the so called Barcelona Convention, together with its seven Protocol, adopted in 1976 by 16 Mediterranean countries based on the Mediterranean Action Plan (MAP, 1975). Although MAP's initial focus was aimed at marine pollution control, over the years, its mandate gradually widened to include integrated coastal zone planning and management. In 1995 the MAP was replaced by the Action Plan for the Protection of the Marine Environment and the Sustainable Development of the Coastal Areas of the Mediterranean (MAP Phase II)

At the same time, the Contracting Parties (nowadays 22) adopted also an amended version of the Barcelona Convention, renamed Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean;

 United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Sites: UNESCO seeks to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity. This is embodied in an international treaty called the

¹⁷ World database of protected areas, 2009






Convention concerning the Protection of the World Cultural and Natural Heritage, adopted by UNESCO in 1972;

- UNESCO Man and the Biosphere Programme (MAB): it proposes an interdisciplinary
 research agenda and capacity building aiming to improve the relationship of people
 with their environment globally. Since its launch in 1970 MAB has concentrated on
 the development of the World Network of Biosphere Reserves (WNBR). The
 biosphere reserve concept was developed initially in 1974 and was substantially
 revised in 1995 with the adoption by the UNESCO General Conference of the
 Statutory Framework and the Seville Strategy for Biosphere Reserves.
- The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention): this Convention is an intergovernmental treaty adopted in 1971 (it entered into force only four years later) in the Iranian city of Ramsar, with currently 160 Contracting Parties all over the world. Its mission is "the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world".

Beside the already mentioned Birds Directive (79/409/EEC) and Habitats Directive (92/43/EEC) there are also a number of regional international conventions, as the ASEAN (Association of Southeast Asian Nations) Declaration on Heritage Parks of 1984.

In **Italy** there are various areas subject to protection due to their importance for some animal or plant species or for the biological communities present. There are different methods of protection and therefore the legislative framework is different as well, which can be based on national standards or on a lower territorial order, as those set forth by the European Union or deriving from international conventions or agreements involving non-Member States.

The Framework Law 394/91 defines the classification of protected natural areas and sets up the official list of protected areas, in which all areas complying with criteria stated by the National Committee for Protected Areas are registered.

The system of the protected natural areas is classified as follows:







- National Parks, consisting of land, river, lake or sea areas containing one or more intact or even partially altered by anthropic intervention ecosystems, one or more physical, geological, geomorphologic, biological formations, internationally or nationally relevant for naturalistic, scientific, aesthetical, cultural, educational and entertainment reasons, which can require the State intervention to be preserved for the present and future generations;
- Regional and Interregional Natural Parks, consisting of land, river, lake, and coastal sea parts, of naturalistic or environmental value, making up, within one or more neighboring regions, a homogeneous system, individuated by place naturalistic assets, landscape and artistic values and by cultural traditions of the local populations;
- Natural Reserves, consisting of land, river, lake or sea areas containing one or more plant or faun species, which are relevant from the naturalistic point of view, i.e. include one or more ecosystems, which are important for biological diversity or perseveration of genetic resources. Natural reserves can be state or regional according to the importance of the naturalistic elements they contain;
- International Interest Humid Zones, consisting of boggy areas, marshes, turbaries or water natural or artificial zones, permanent and transitory, included in seawater zones, whose depth, with low tide, does not exceed ix meters and which, because of their characteristics, can be considered important at international level, according to Ramsar convention;
- Other protected Natural Areas, areas (oasis of environmental associations, suburban parks, etc.), which are not included in the previous classes. They can be divided into public management areas, i.e. set up with regional laws or equivalent provisions, and private management areas, set up with public formal provisions or contractual acts such as concessions or equivalent forms;
- Landscape and Seascapes specified by Law 394/91 and Law 979/82, making up areas, whose preservation through the set up of protected areas is considered a priority.

For the protected areas based on national, regional or provincial standards the most updated information are reported in the "VI Official list of protected areas" developed by







IMELS (Ministerial Decree of 27th April 2010), which for the areas in question synthetically reports the name, typology, the region it belongs to and the charter. Based on the related decree in Italy, 3,163,590.71 hectares of land, 2,853,033.93 hectares of sea and coast lines for a total length of 658.02 km are subject to protection, by means of the standards set forth by national territorial bodies.

Italy has 27 MPAs and two submerged parks, as shown in Figure 3.7, which protect about 228,000 hectares of sea and about 700 km of coasts. Each area is usually divided into three marine environments with different protection levels, which include water, seabed and the coastal areas next to it.



Figure 3.7: Italian existing Marine Protected Areas

In Italy there is a scant number of sea areas and mainly with a limited extension because 90 % of the 2,853 Km² indicated in the decree refer to a large area of the Liguria Sea in which in 1999 the "Pelagos Sanctuary" for the conservation of marine mammals in the Mediterranean was set up following an international agreement among Italy, France and the







Principality of Monaco. In the western Adriatic there are four of the 27 protected sea areas localized on a national level by the Law No. 979 of 1982 and subsequently founded according to Law No. 394 of 1991 (so-called "Park Law") or other subsequent ones (among them the laws No. 344/1997, 426/1998, 93/2001, 179/2002; cf. Donati, 2011), or: AMP of Miramare (TS), AMP of Torre del Cerrano (TE), AMP of the Tremiti Islands (FG), AMP of Torre Guaceto (BR); in all the underwater areas protected add up to 7,153 hectares, of which only 289 hectares are in the strictest form (Donati, 2011). In the north Adriatic there is only the historic AMP of Miramare (the first chartered in Italy in 1986), which covers a sea surface areas of only 30 hectares.

Other underwater areas are subjected to protection as they are part of the Regional natural Reserves (in realty often founded by Provinces), although the list reported in the cited decree of IMELS does not permit precisely localizing the involved areas. Considering that the whole of the 365 Regional Natural Reserves reported in the list has a total surface area of 1,284 hectares, it is in any case clear that their importance is modest on a national level and for the individual coasts. The retrieval of the charters or scientific works involving the Regional natural Reserves (ex. present along the coasts of the North Adriatic Regions) can permit quite precisely estimating the extension of the marine surface areas involved. In any case, the adjacency to protected areas of coast implies that all or the majority of these underwater areas are located at a very modest depth and at a short distance from the shoreline.

Figure 3.3 shows the 17 Italian MPAs which are being set up (11 of them with ongoing procedure and 6 with procedures at the start up phase). Further five areas, four of which located in Sicily and one in Sardinia, are defined as worthy of protection but are not yet classified as MPA, either have started the process for classification.









Figure 3.8: Italian MPA in the set up phase

Concerning marine protected areas in the Adriatic regions of Italy, the situation can be summarized as follows (see Annex A):

the Apulian Region has also submitted the several coastal areas for protection in addition to SCIs (National Parks, Regional Parks, SPAs, Oriented Nature Reserves, MPAs and State Nature Reserves), as listed in Annex A. From the analysis of the existing regional ecological network, it is clear that most of the local coastal marine areas are protected, with the exception of sea areas of Gargano's headland and the coastal area Otranto - Santa Maria di Leuca, certainly part of a future new SCI. In these protected areas it is required to submit an EIA and VI for the installation of renewable energy plants. Studies conducted by various partners of the Apulia Region will increase the knowledge of the territory of Apulia Region and will allow the identification of new areas to be protected;







- only one MPA exists in Abruzzo: Torre del Cerrano (DM. July 28, 2009 No 218). Annex A contains a list of Abruzzo SPAs and of all the Abruzzo Municipalities included within SCIs. The Region is in the process of transforming the current Park of the Teatina Coast into a national protected area. The Park, which covers the Municipalities of Vasto, Torino di Sangro, San Vito Chietino and Rocca San Giovanni, will include the following nature reserves: Marina di Vasto, Lecceta di Torino di Sangro, Grotte delle Farfalle e Punta Aderci;
- Molise Region does not have any MPA while the existing SPA are not located on the coast;
- two MPAs are undergoing the process for establishment in Marche Region: Costa del Monte Conero and Costa del Piceno;
- no MPA has been established in the maritime area in front of Emilia Romagna's coast.

Regarding **Montenegro**, at the moment the country does not recognize any MPA, but sea and coastal areas worthy of protection are currently being researched and expected to be completed within the next two or three years. The potential MPAs are located close to the coast of Ulcinj municipality, Boka Kotorska Bay and area Katic, municipality Budva.

In **Albania** the National Biodiversity Strategy and Action Plan (1999) has proposed 8 areas along the Albanian coast as potential Marine Protected Areas. National experts have undertaken a comprehensive analysis of each of these areas, with the objective of identifying and proposing one single area as the most suitable for being declared as the first MPA in Albania. This assessment has taken place under the aegis of the ongoing PoPWA project (September 2010- April 2016): "PA Gap assessment and MPA development in Albania". The analysis is based on the best available data and covers the following aspects: natural and landscape values; importance of habitats, communities and species, especially those of special importance due to their rare and/ or endangered status at the national and international level; feeding and/ or hatching grounds; as well as on cultural, historical and socio-economic values. Based on the existing data, the area Sazani Island–Western side of Karaburuni Peninsula has been distinguished from the other areas for declaration as Albania's first MPA. The coastal part (terrestrial) of Sazani Island and western side of







Karaburuni Peninsula is aimed to be included together with the proposed marine protected area, due to its high biodiversity values and natural habitats.

According to the Protected Areas Register of the Ministry of Environmental and Nature Protection (as of 14 October 2013), a total of 419 areas have been protected in the Republic of **Croatia** in various categories, with 1 areas under preventive protection for no longer than 3 years since the date of proclamation. Today, protected areas account for 8,19% of the total area of the Republic of Croatia, which makes 11,61% of the terrestrial territory and 1,97% of the territorial sea¹⁸. The country recognized the following MPAs: Brijuni National Park, Kornati National Park, Lastovo Nature Park, the Special Marine Reserves of Limski Zaljev, Losinj and Malostonski Zaljev, Mljet National Park and Telascica Nature Park.

While **Bosnia and Herzegovina** did not set up any MPA, **Slovenia** has three: Cape Madona and Debeli rtic Natural Monuments, two SPAs and the green bay of Strunjan.

Finally, also **Greece** has set up four MPAs, namely: the National Marine Park Alonissos-Vories Sporades, an Archaeological Protection Area, the National Park of Messolonghi - Aetoliko lagoons, estuaries of Acheloos and Evinos and Echinades islands, Schinia- Marathona National Park and Zakynthos National Marine Park.

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¹⁸ http://www.dzzp.hr/eng/protected-areas/protected-areas-in-croatia/protected-areas-in-croatia-%E2%80%93national-categories-1137.html







4 Offshore wind farm state of the art of Energetic policies: Present Situation and Future Development Strategies

4.1 Italian energy outlook

Italy has made substantial progresses in the last decades regarding its energy balance, which has progressively moved towards the production of clean energy. The government has gone a large way towards addressing some of the country's energy challenges, thus strengthening Italy energy security. It has also developed a framework to implement an energy market policy that is consistent with the European requirements.

Notwithstanding the success of many incentive instruments and policies adopted, Italy still needs to increase its energy efficiency and the use of renewable energy, in order to reduce its heavy dependence on imports of fossil fuels and electricity and its emission levels.

Italy is among Europe's largest energy consumers, with its total primary energy supply (TPES) standing at around 159 million tonnes of oil-equivalent (Mtoe) in 2012¹⁹. The supply mix remains dominated by oil and natural gas, which – although now declining – together have accounted for well over 70% of Italy's TPES since 1973.

Italian oil demand is increasingly concentrated in the transportation sector. The progressive dieselisation of the vehicle fleet has significantly altered the demand structure. Diesel increased from 18% of total oil consumption in 1998 to 33% in 2012, while the share of gasoline declined from 23% to 16% during the same period.

The shift away from oil to natural gas, reducing oil's share from over 76% in 1973 to 36% of the TPES in 2012, is mainly owing to the increased use of natural gas in power generation.

Italy produces small volumes of natural gas and oil but most fossil fuels are imported and augmented by local production of energy from renewable resources. **Error! Reference source not found.** shows the country energy production by source in the period between 1973 and 2030.

Figure 4.2 shows the total primary energy source (TPES) trend referred to the period 1973-2012.

¹⁹ Energy Supply Security 2014, Chapter 4: Emergency response systems of individual IEA countries. http://www.iea.org/media/freepublications/security/EnergySupplySecurity2014_Italy.pdf









Source: Energy Policies of IEA Countries – Italy 2009 Review, 2009, International Energy Agency

Figure 4.1: Italian energy production by source, 1973 to 2030



1973 1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011

Source: Energy Supply Security 2014, Chapter 4: Emergency response systems of individual IEA countries

Figure 4.2: Total primary energy source (TPES) trend, 1973-2012







4.1.1 Renewable Resources

Renewable energies provided 18.1 Mtoe of Italy's TPES in 2012. Production from renewable energies has increased since 1995 when it represented 7.5 Mtoe.²⁰. This growth has been poor especially compared with countries like Spain, Portugal and Austria.

Most of renewable energy in Italy comes from biomass & waste, geothermal and hydropower sources, which respectively accounted for 36.7 %, 27.7% and 19.2% of total renewable energy in 2012²¹.

Figure 4.3 shows the Renewable energy as a percentage of total primary energy supply from 1973 to 2008.



Source: Energy Policies of IEA Countries – Italy 2009 Review, 2009, International Energy Agency

Figure 4.3: Renewable Energy as a Percentage of total primary Energy supply, 1973 to 2008

Traditionally, **hydropower** has been the dominant form of renewable electricity in Italy. At the end of 2012, it represented 21.9 GW 22 of installed capacity.. In 2010, about 53.770

²⁰ EU Energy in Figures- Statistical Pocketbook 2014, Energy, European Commission

²¹EUROSTAT, Primary production of renewable energy by type.

http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=ten00081&plugin=1 ²² EU Energy in Figures- Statistical Pocketbook 2014, Energy, European Commission







GWh have been produced by hydroelectric sources, with a growing trend in the last three years. Thanks to the incentives, many new plants are under development, in particular in the northern regions (Trentino, Piedmont, Lombardy).

Italy has a long history of **geothermal** electricity production. In 2012 total installed geothermal capacity was 700 MW, The Italian geothermal capacity is concentrated around three sites, at Larderello-Travale, Radicondoli and Mount Amiata.

Italy registered also a strong growth in its installed **wind** power capacity in the recent past, from 400 MW in 2000 to 8.1 GW in 2012. During 2010, 63 new wind plants have been installed with a total capacity of 950 MW, so that the Italian electricity production capacity reached 5.797 MW and the trend is growing. Most of the wind plants are located in South Italy and in the islands, which are the windiest areas (**Error! Reference source not found.**): Sicily is the leading region (producing one firth of the Italian wind power), followed by Apulia and Campania²³.



Figure 4.3: Regional distribution of the wind power

²³ Rapporto Rinnovabili 2010-2011 - Situazione e prospettive delle rinnovabili in Italia, APER, 2011







Biomass plants, including CHP and non-CHP plants, generated 827 GWh in 2000 and reached 3,810 MWh in 2007.

Installed **photovoltaic** (PV) capacity grew by nearly 250 % in the period from 1995 to 2007, producing 38 GWh of electricity in 2007. In 2010 new plants with a total 6000 MW capacity have been installed. Apulia, Marche and Trentino are the most virtuous regions in terms of installed Watt per habitant (Apulia: 231.86 W/h, Marche 199.95 W/h, Trentino 198.20 W/h)²⁴.

Apulia is one of the regions with the highest level of solar irradiation in Europe, because of the extensive irradiation that it receives during the year, and with high levels of wind in some sub-regional zones.

In 2013 electricity production from photovoltaic plants reached 21,589 GWh²⁵ with a growth of 14.4% compared to the previous year (electricity production during year 2012: 18,862 GWh). In 2013 electricity production from Photovoltaic covered 19% of 112 TWh produced by renewable sources in Italy.

Regarding **solar thermodynamic**, Italy has just one plant of this type, in Priolo Gargallo (Sicily), the so called "Archimede", a 5 MW system managed by ENEL.

4.1.2 Non Renewable Resources

Besides renewable energy, Italy produces its energy using the following resources: coal, oil, natural gas and nuclear power. The Italian energy supply is dominated by oil and gas.

In 2008, **natural gas** provided 37 %, or 69.5 Mtoe, of the Italian TPES, mainly imported (91 % of total supplies, mainly from Algeria, Russia, Libya, Norway and Netherlands)^{26.} In recent years, a small number of new natural gas discoveries were made in northern, central and southern Italy and offshore in the northern Adriatic Sea and in the Tyrrhenian Sea, west of Sicily but the domestic production remains still very limited. One-third of total gas demand comes from power generation. Gas demand in the industrial sector accounts for around one-

²⁴ Rapporto Rinnovabili 2010-2011 - Situazione e prospettive delle rinnovabili in Italia, APER, 2011

²⁵ Rapporto Statistico 2013, Solare Fotovoltaico, GSE Gestore Servizi Energetici

²⁶ Energy Policies of IEA Countries – Italy 2009 Review, 2009, International Energy Agency, p. 99







quarter of the total demand. A well-developed distribution grid takes natural gas to the home of almost 90 % of the population.

Almost all of Italy's energy supply is derived from fossil fuels: in 2008, **oil** (net of exports of petroleum products) provided 70.5 Mtoe, of which 92.8 % was imported. Imports from Libya and the former Soviet Union are the dominant sources of oil, each accounting for almost a quarter of all crude oil imports, followed by Saudi Arabia, Iraq and Iran²⁷. The domestic production is very limited, especially if compared to the national demand, but give the country the role of third-largest producer in the EU after traditional oil-producing countries Denmark and the United Kingdom. The bulk of reserves in concentrated in the Basilicata fields, where some of the largest European onshore reservoirs exist.

As natural gas has replaced oil in electricity generation, the use of oil is becoming more concentrated in the transport sector and this is an increasing trend.

Italy has also an important role in as Europe's largest refining centre (with 16 operating refineries), and is a net exporter of refined products.

In 2008, **coal** provided 16.9 Mtoe, which represents almost 9.6 % of TPES. The demand for coal in Italy is almost completely met by imports, mainly from Indonesia, South Africa, Colombia, Australia and the United States^{28.} In fact, the Italian reserves are very limited as well as the production capacity (small amounts are produced in Sardinia). It is mainly used for power generation although, due to the environmental concerns, its exploitation has to face persistent oppositions. Coal use is expected to increase rapidly at Italian level, owing to an ongoing program of power station conversion at Enel, the main Italian energy provider and the largest coal-fired Italian utility. Older open-cycle oil/gas turbine plants are being converted into high-efficiency coal plants, to increase efficiency of the system and fuel diversification.

Italy currently does not exploit **nuclear energy**: this technology has been used between 1964 and 1987 when, after a referendum following the Chernobyl accident, it has been abandoned and the 4 nuclear plants decommissioned. Despite this referendum the

²⁷ Energy Policies of IEA Countries – Italy 2009 Review, 2009, International Energy Agency, p.123

²⁸ Energy Policies of IEA Countries – Italy 2009 Review, 2009, International Energy Agency, p.141







Government announced its intention to commence a new nuclear power program within five years. In 2009, the Government introduced a package of nuclear legislation in order to generate 25 % of its electricity from nuclear power by 2030. Notwithstanding a new referendum in 2011 rejected for the second time the adoption of this technology.

4.1.3 Energy Sector Strategic Objectives

Since several years Italy has set the development of the renewable energy sector as priority of its energy policy, together with the promotion of energy efficiency.

The objectives of its energy strategy are the followings:

- security of the energy supply;
- reduction of the energy costs for companies and citizens;
- promotion of energy technology;
- protection of the environment (reduction of polluting and GHG emissions);
- sustainable development.

The country is aimed at balancing, in the medium and short term, its energy mix which is mostly dependent on fossil fuel imports.

The Italian National Allocation Plan for Renewable Energy of 2010 set the following national goals referring to the gross final consumption of energy in 2005 and 2020:

Table 4.1: National goals for RES referring to the gross final consumption of energy in 2005and 2020, as set by the Italian National Allocation Plan for Renewable Energy of 2010

A. Energy amount from RES (Renewable Energy Sources) in the final gross energy consumption in 2005 (S2005) (%)								
B. Goal of energy from RES in the final gross energy consumption in 2020 (S2020) (%)								
C. Expected total energy consumption in 2020 (Ktoe)								
D. Expected quantity of energy from RES corresponding to the goal for 2020 (B x C) (Ktoe)								

As foreseen by the European Directive 2009/28/EC, Member States have to set specific national objectives for the amount of energy from RES to be achieved by 2020 in the sectors of heating and cooling, electricity and transport.

The following table shows the 2020 national goals and trend regarding the amount of energy from RES to be used in the aforementioned sectors.







	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Heating and cooling (%)	2.80	6.53	7.09	7.71	8.41	9.20	10.09	11.11	12.28	13.64	15.22	17.09
Electricity (%)	16.29	18.71	19.57	20.25	20.99	21.69	23.39	23.11	23.85	24.63	25.46	26.39
Transport (%)	0.87	3.50	4.12	4.72	5.35	5.98	6.63	7.30	7.98	8.68	9.40	10.14

Table 4.2: 2020 sectorial goals and trend regarding the amount of energy from RES

4.1.4 Incentives and Penalties

In relation to electricity from renewable energies, the main supporting tool is the obligation, imposed on large electricity generators and importers, to produce, or buy the rights to, a certain amount of electricity from renewable by plants that entered into operation after 1999 (for electricity traders starting from 2011).

More generally, Italy adopted the following schemes for the promotion of renewable energy:

- priority access to the grid system is granted to electricity from renewable sources and CHP plants;
- an obligation for large electricity generators and importers (more than 100 GWh) to feed into the power system a given proportion deriving from renewable. Since 2008 this quota has annually increased and reached in 2012 the amounts of 7.55 %. To fulfill this obligation the electricity generators and importers have three solutions: buy Green Certificates attesting the production of energy from renewable energy systems; install new energy plants (which will than obtain the Green Certificates); import renewable energy from countries which have similar incentive schemes. Specific sanctions are foreseen in case of non-compliance;
- tradable Green Certificates: each Green Certificate attests the production of 1 MWh
 of electricity from renewable energy systems officially identified. The goal is to
 promote in a cost-effective way the production of energy from renewable energy;
- production from small plants (wind up to 200 kW and other sources, except solar, up to 1 MW) benefits for 15 years from fixed feed-in tariffs or premium tariffs;







- the market-based mechanism of the White Certificates (or energy efficiency certificates-EECs) attesting that a certain amount of energy has been saved by a third party via energy saving actions on final consumers;
- the Energy Account ("Conto energia"), aimed at promoting the installation of photovoltaic plants through the incentivation of the kWh of energy produced by this systems. The financial cover of this mechanism is endorsed by a compulsory withdrawal from the energy bill of all the Italian power utilities earmark for renewable energy. The incentives are paid for 20 years and the value of the tariff is stable for all the period long;
- incentive scheme for renewable energy plants ("tariffa omnicomprensiva"): incentive tariffs are foreseen for electricity produced by small size renewable plants and for a period of 15 years. They are related to renewable energy systems having annual average rated capacity within 1 kW and 1 MW. Different tariffs are foreseen for the different renewable energy sources, in order to financially support the development of those technologies which are more expensive and therefore less popular;
- tax relief for energy performance improvement interventions on existing buildings²⁹.

A number of regional and local governments have also introduced some measures to promote heating from renewable. These have taken the form of incentives for solar thermal heating and compulsory installation of solar panels in new or renovated buildings.

Additional tools are available to support innovation, technology capability development and innovative infrastructures such as smart grids.

4.2 Montenegrin energy outlook

Montenegro is a country with a fast-changing energy sector. Currently Montenegro's energy system consists of three large electric power production units (a 210 MW coal fired Thermal Power and two hydro power plants with total installed capacity of 650 MW) and seven small

²⁹ Le fonti rinnovabili in Italia, Ministry of the Environment, Land and Sea and University of Sapienza, Rome, pp. 5-41.







HPPs (total installed capacity approximately 10 MW) for a total installed capacity equal to 868 MW. Along with large producers, Montenegro energy sector is characterized by two large industrial consumers, the Aluminum Plant Podgorica (KAP) and the Steel Works Plant in Niksić that consume about 45 % of the total final energy consumption or 91 % of the final energy consumption in industry. With continuous growing consumption and lack of new energy producers over the last three decades, Montenegro has became a significant importer of electricity, with average import of 30 % of electricity consumed and all petroleum products consumed; imports of electricity in 2010 were equal to 732 million kWh³⁰.

In order to lower import and improve energy independence, Montenegro has started processes and is working on improving the environment for investment in energy sector, so domestic resources could be used for generation of electricity as well as heating from renewable energy sources.

Montenegro, as one of the signing parties of Energy Community Treaty, is currently preparing its National Renewable Energy Action Plan, which follows the EU countries template used for NREAPs. At the same time, the Ministry of Economy is currently working on the revision of the Energy Development Strategy, in order to adjust it on the basis of the new more demanding targets of the EU energy policy.

4.2.1 Renewable Resources

Montenegro is rich in renewable energy potential, including hydro, wind, biomass, solar and waste.

The **hydro** potential is estimated in the Montenegrin Water Management study of 2001, which is under revision. Beside the large hydro potential, Montenegro has also a high potential regarding the construction of small hydro power plants. Two different projects estimated the hydro potential through one year measurements on 35 water streams, while measurements on additional 8 are currently ongoing. Moreover, Montenegro, supported by

³⁰The World Factbook, Central Intelligence Agency (CIA), Montenegro https://www.cia.gov/library/publications/the-world-factbook/geos/mj.html







EBRD, is currently developing a cadastre of water streams of 13 of the total 21 municipalities for the construction of small hydro power plants with installed capacity up to 1 MW.

The country **wind** potential was first estimated through a computational model by the Italian Center Planning, Design and Technology of Material (CETMA) study realized in 2007. Based on this study, few general on-shore areas were identified and the Ministry which has charge of energy issued licenses for the measurement of wind potential. Based on these licenses, two companies submitted their measurements and preliminary studies and are currently in the process of receiving the construction permit. In the meantime, another wind atlas of Montenegro has been realized by Vestas (year 2010) with resolution of 1 km at 80 m height; however for precise estimations, additional measurements for micro locations are needed.

The **biomass** potential in Montenegro has been initially estimated by the CETMA study in 2007, followed by two other studies prepared in 2010. The first one, realized by CRES on all types of biomass, represents the theoretical potential, while the second one, realized through the FODEMO project of the Luxemburg Government indicates the technical potential for using forestry residues for energy generation.

Regarding **solar** potential, Montenegro has high solar radiation, as detailed explained in the CETMA study of 2007. Solar energy in Montenegro can be produced by thermal systems in southern and central parts of the country and by PV systems.

Finally, **waste** management is a sector under strong development in Montenegro, especially in the last years: many municipalities and regions are in the process of planning and building waste collection systems, wastewater and agricultural waste systems, with the secondary goal of producing energy for heating purposes.

4.2.2 Non renewable Resources

Montenegro primary non renewable energy sources are brown coal, oil and gas. Based on the Energy Development Strategy until 2025, Montenegro has coal reserves in the Pljevlja area in the amount of 184.5 million tons and in Berane area around 158 million tons, of which 18.5 million tons are estimated to be exploitable. Regarding the oil and gas potential, as affirmed in the Strategy, Montenegro has oil in two submarine areas around 12.5 x 109







tons; potential oil reserves amount approx 7 billion barrels.Natural gas reserves are estimated to be 425 billion m^3 .

4.2.3 Energy sector Strategic Objectives

Montenegro, with the current projects for small hydro power and wind farms, passed the expected amount from the existing Energy Development Strategy. This Strategy took into account only keeping up with 20 % renewable energy until 2025. In the meantime, the new national target has been calculated for Montenegro, which amounts to 30 % share of renewable energy sources in gross final energy consumption, which includes electricity, heating and transport. Montenegro is currently working on its NREAP, which will define the necessary development dynamics of RES in Montenegro in order to meet this target.

Finally, several technical assistance activities supporting the development of the energy sector are presently ongoing under the financial support of international donors with the aim of fostering the efforts of Montenegro in reaching the EC progress goals.

4.2.4 Incentives and Penalties

The Energy Law of 2010 implements the Directive 2009/28/EC and gives the right to privileged producers to have feed-in tariff for 12 years. A decree defining these incentives for electricity has been prepared by the Ministry of Economy and it is under approval. Incentives for heating and cooling are covered by a separate decree which is also ready for adoption. Regarding incentives for the transport sector, the Ministry planned to prepare a legislative framework for energy use in transport during this year and will continue with regulations and detailed studies during 2012-2013, through IPA 2011 project.

4.3 Albanian energy outlook

In Albania the biggest challenge regarding the energy sector is represented by the lack of domestic capacity for thermal electricity generation (currently about 200 GWh per year) compared to the country's hydropower output (which has increased from 2.8 TWh in 1990 to between 4.0 and 4.5 TWh over the 1999-2005 period). Figure 4.4 shows the Albanian primary energy Production (1980-2012).







ERED

Source: IEA Energy Statistics 2011

Figure 4.4: Albania Primary energy production 1980-2012 (ktoe)

The country Total Primary Energy Production for the year 2012 has been assessed at 1,675 ktoe³¹, of which hydrocarbons contributed for 1030 ktoe or 62 %, the electricity for 406 ktoe or 24 %, wood fire for 215 ktoe, or 13%, and the rest consists of the other energy sources such as coal, natural gas and solar energy.

Figure 4.5 shows the Import of energy products for the period 1995-2012.

³¹InternationalEnergyStatistics - http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=44&pid=44&aid=1









Figure 4.5: Import of energy products 1995-2012 (ktoe)

The total energy consumption reached in 2012 the rate of 1,817 ktoe, and was increased by 5 % compared with 2011, as a result of the increase of energy supply due to the increase of the annual flow of vehicles.

Respectively, the transport sector holds 42.3 %, the residential sector 23.6 %, the industry 13 %, the service 10.8 % and others 10.3. %.

The final electricity consumption by sectors of the economy for 2012 shows that the residential sector has consumed 53 %, the industry 20.7%, the services 23%, the "others" 9 % and agriculture 2%.

The final consumption of oil products, by sectors of economy for 2012, shows that the transport sector has consumed about 72.7% of oil products, the industry 11.2 %, the agriculture and fishery 7.6 %, services 4 % and the residential 4 %.

Oil products have increased their contribution to the final consumption of energy from 57.2 % in 1999, to 64 % in 2012, followed by electricity 23 %, fuel wood 12 %, and coal 1 %.

Over the last decade Albania has adopted electricity laws and regulations, and established an independent electricity regulator with broad powers. It has also made progresses towards cost-reflective electricity prices and an EU-model tax system. The restructuring of the state-







owned energy companies has enhanced their technical, economic and corporate performance.

Public production of electricity is carried out by the shareholder company KESH-Gen with 100% of shares state-owned and the company "TEC-Vlora" also with 100% of shares state-owned, which is part of KESH holding.

Hydro power plants dominate the power generation sector of Albania.

The total installed capacity is 1,531 MW, from which the installed capacity for HPP's is 1,433 MW and for TPP's is 98 MW. Considering also the total installed capacity of private producers of electricity of 42 MW, the total installed capacity in the country is 1,573 MW.

The three main hydro plants are Komani, Fierza and Vau i Dejes of 600 MW, 500 MW and 250 MW capacities respectively. Included is also the new Vlora Thermal Power Plant which is foreseen to be in operation in June 2010. There is also one diesel thermal power plant (TPP Fier) but it has been out of operation since 2007. Not mentioned here are the small hydro power plants in operation that have a total installed capacities of around 9 MW. Average output of domestic production is 4,162 GWh. The domestic generation capacities based on HPPs makes its production vulnerable by hydrologic conditions.

Lack of primary energy resources, no network and gas resources, limited production and interconnection capacities and full dependence of its power production on hydro resources, are the challenges that power sector is facing.

In 1998 Albania became a net electricity importer and by the second half of 2000, a serious electricity shortage had set in, partly as a result of a fall in hydroelectricity production caused by reduced river flows. This shortage involved frequent and prolonged load shedding. The country was unable to get all the electricity it needed primarily because of transmission interconnection constraints and financial constraints, which are gradually being addressed. The need for electricity imports continued to grow for some years, even under average or better hydrological conditions, because of insufficient committed new power generating capacity.

From 2001-2008, the country net demand grew by not more than 3 % per year and in 2006, 2007 and 2008 it reached respectively the amounts of 6,760 GWh, 6,900 GWh and 7,045 GWh and the net supply were around 6,056 GWh, 5,728 GWh and 6,297 GWh.







Domestic generation under average hydrological condition is about 4,200 GWh (the maximum net production has reached the value of 5,450 GWh).

The minimum domestic generation during last 15 years was realized in 2007 with 2,900 GWh.

The supply in oil, gas and petroleum products to the economy derives from importing and local production. Although the local production of oil, gas and petroleum products fulfill 64 % of economy's needs, it is getting to play an important role in the local market year after year, due to the increase of the domestic production and it will help to establish fair equilibrium in the sectors supply.

4.3.1 Renewable Resources

Renewable energy sources account for a significant share of the energy mix in Albania. Albania's main energy resource is hydro.

Albania is referred to in Europe as a country with considerable water reserves proportional to the population, with a hydrographical outspread to almost the entire territory. Although 100 % of this electricity is produced by hydro power stations, so far only 35 % of the hydro power potential of the country has been used. The existing installed hydro energy capacity is round 1,450 MW. The total reserves of the hydro power make possible the installation of a capacity of about 4,500 MW and the annual potential of production may amount to 16-18 TWh.

In 2012 the Albanian energy production from hydro amounted for 365 ktoe32., Beyond the need for rehabilitation and new investments, hydropower remains highly dependent on hydrology and has, in some years, been affected by drought/dry periods.

Fuel wood and biomass have a large potential provided that forests are adequately managed and agriculture waste used locally. Forests cover a large part of Albania's territory (23.5 percent) with proven reserves of fuel wood estimated at 125 to 250 million m3 or 6 Mtoe.

³²International Energy Statistics

http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=6&pid=33&aid=12&cid=regions&syid=2008&eyid=2 012&unit=BKWH







The lack of forestry management and extensive cuts (estimated at 1.8-2.5 million m3 or 250-350 ktoe for domestic and neighbouring markets), especially illegal ones, have endangered the resources in some parts of the country and generated a process of deforestation. Biofuels could be a new potential for the sector, based on a law adopted in 2008, envisaging the use of 5 percent of bio-diesel by 2010. However, few concrete projects are in place to meet this target.

Agricultural waste (e.g. vegetal and animal) is little exploited in Albania. Municipal waste incineration has not been considered due to its high cost and environmental impacts, but the recovery of biogas and use in CHP from existing landfills may be feasible.

Wind

In 2009 was developed The Wind Energy Resources Assessment (WERA) of the Republic of Albania as a part of the activities carried out by the Italian Ministry for the Environment, Land and Sea (IMELS) within the framework of the following Memorandum of Understandings.

The WERA shows an excellent wind potential, with wind speed values exceeding 8-9 m/s in many areas. An evaluation of the potential of exploitation of wind energy in Albania was performed. A number of interesting areas, especially along the coast and on the ridges of the mountains, with particularly strong winds in the southern part of the Country, have been identified. The selected areas would allow a total installed wind power ranging between 980 and 11,700 MW, which correspond to an overall annual energy production between 3,000 and 25,800 GWh/year.

Wind energy is used for water pumping, windmills and last decades the attention is concentrated on the power generation. Aggregates operating with wind energy have an installed capacity from few [kW] to 2 [MW], and are being used successfully in isolated areas. Wind energy is a considerable potential as energy source, uniformly widespread in every corner of the earth. Windmills can be installed quickly and they need a small area of land. In most of the countries, installment of windmills have a common concern, that of not having continuous measurement of the wind speed and long-lasting along several years.

Wind plant availability or load factor - the percentage of time that the wind turbines are available to operate provided the wind is blowing – is universally considered the biggest







issue for wind energy. Uncertainty about what a wind farm is actually going to produce is challenging. Prediction methodology and wind resource assessments are specialist tasks. The annual average wind measurements of between 5.8 m/s to 7.0 m/s at the investigated sites are promising. From the table below it can be seen that the load factors typically are in the range of 22% to 25%.

Geothermal potential is quite limited.

Solar water heaters are proven technologies to supply domestic hot water to the service sector (e.g. hospitals, hotels), industry and households. However, low electricity prices and non-payments are obstacles.

In 2005, a total of 6,700 m² were installed (60 percent by services, 40 percent by households), three times more than 2002 figure, bringing total installations to 32,000 m² (equivalent to around 50 GWh/y or 1 percent of electricity consumed by households in 2005). The total potential is estimated at 125 MW or 1.8 million m².

Finally, **biofuels** could deliver new potential for the energy sector. Municipal waste incineration has not been considered due to its high cost and environmental impacts³³.

4.3.2 Non renewable Resources

Oil Sector

For petroleum products, the Albanian market has orientated itself to imports, since indigenous refinery capacities are no more able to serve the requirements of a demand-side oriented market. The market for fuel products is opened and about 70-80% of the products are imported. Due to the considerable increase in petroleum products and the restrictions of existing refinery capacities, the import portion will further increase. So far, Albania is connected to the international railway network via capable rail links. Therefore, fuel products are transported into the country largely via sea transport.

The production level of crude oil in total (Albpetrol, Bankers Petroleum Albania Ltd and Steam Oil & Gas) for 2012 was 1,030 ktoe.

It should be noted that, for a better use of crude oil reserves in existing oil fields, in order to increase the coefficient of the oil-extraction through the use of different new technologies

³³ Energy in the Western Balkans, IEA, 2008, pp. 121-151







and for exploration and discovering new oil and gas fields, there have been signed and adopted petroleum agreements with some foreign companies such as Bankers Petroleum Albania Ltd. and Oil & Gas Steam in existing oil and gas fields and Island International Exploration BV, MedOil and DWM Petroleum AG in the new blocks of exploration.

The refinery sector is privatized in 85 % of its shares since 2008. As a result of an ambitious program of investments by the company Albania Refinery Marketing Oil ARMO sh.a will improve the processing and production technology of petroleum products as in terms of investment for existing equipment improvement, which were extremely depreciated, heading to the renewal with new modern technology. In accordance with the investment program defined in the contract of sale, ARMO sh.a is improving significantly the products and especially gasoline and diesel products, moving from the diesel production standard SSH 31: 1997 into diesel standard EN 590 SSH, as determined by the Decision nr. 147, dated 21/03/2007, and gasoline with SH EN 228 standard.



Figure 4.6: Historical Crude Oil Production and Consumption (Ktoe)

The geographical distribution of the installations, deposits, service stations and retail stores cover the entire territory of Albania, guaranteeing a normal supply to consumers all over the country.

Related to the emergency oil stock, the total quantity is increased continuously every year, from 13,442 ton in 2001, to 105,670 ton in 2009. However, in terms of legal and managerial







aspects related to this reserve, in 2010, it is foreseen the realization of a study in order to improve procedures taking in consideration the best practices of the European Union States, according, as well as the EU directive.

Natural gas sector

Currently, Albania has a minimum production of natural gas, about 10 million Nm³, almost a negligible amount, and it only serves to supply the refineries and technological processes of oil industry. Albania is not linked with international network of gas: linking Albania with gas network will have a positive impact on improving the energy situation in the country, significantly influencing the energy consumption, currently deriving from oil products and electricity.

Liquefied Petroleum Gas (LPG) in Albania has significantly grown and it is playing an increasingly role in the domestic market as an alternative energy source. It is likely that it will replace electricity in the housing sector and services (for heating and cooking), while its consumption is growing also in sectors like food industry and construction. In 2012 it reached a total consumption of 83 ktoe.

Coal sector

Actually, the capacities of coal mines are at their minimum, producing around 7,000-9,000 tons from 2 million tons produced in '90s. In Tirana-Durres basin is found 70 % of total reserves, Korce-Pogradec 10 % and Memaliaj 4 %. According to the abovementioned analysis, it results that existing reserves in this coal basin are around 114.96 Mtoe.

Coal characteristics in our country are of poor quality, the sulfur contents is around 3-5 %, ashes content is 40-60 % and humidity goes up to 60 %. Albanian coals have a calorific power from 2,000 kcal/kg up to 3,000 kcal/kg and they are extracted from up to 300 m depth, with layer width of 0.7-1 m.

Coal use should not increase in the near future due to the high extraction costs and its unfavorable physical-chemical qualities. However, given the limited reserves of hydrocarbons in the world, the option of using imported coal for energy shall remain open. Obviously, its use shall be allowed only within strict environmental regulation.







4.3.3 Energy Sector Strategic Objectives

Improving energy efficiency is a policy priority of the Albanian government. The National Energy Sector Strategy (2007) estimates economic energy saving potential at 22 % of TPES by 2015. The Strategy identified energy efficiency measures (e.g. building insulation and appliance performance) as critical to overcoming the current electricity crisis, along with increasing the availability of heating alternatives (e.g. LPG and solar thermal) in industrial and residential sectors.

The scope of the National Energy Strategy is to develop an effective energy sector that:

- guarantees the security of energy supply in general, and electricity in particular;
- enhances an efficient and economic use of energy, with minimal environmental impacts, in order to support the sustainable development of all economic sectors.
- The primary objective of the National Energy Strategy is to restructure the energy sector based on market economy principles and develop a modern energy policy. Specific objectives of the National Energy Strategy are:
- establish an efficient energy sector concerning both financial and technical aspects;
- establish an effective institutional and regulatory framework;
- increase the security and reliability of the energy supply in general, and electricity in particular, on national and regional levels;
- increase the energy efficiency in the generation and use of energy sources, aiming at minimal environmental pollution;
- optimization of the supply system with energy resources based on the least cost planning principle and minimal environmental pollution;
- completion of restructuring process of energy companies;
- considerably increase the investments in the energy sector through capital enhancement by International Financial Institutions and private capital;

Moreover, another specific objective it the establishment of a competitive electricity market according to EU requirements for the electricity sector reforms (Directive 2003/54/EC) and Albania obligations under the Energy Community Treaty (2005) to support the energy sector







integration into the Southeast Europe Regional Electricity Market and the interconnection with UCTE network³⁴.

4.3.4 Incentives and Penalties

The National Energy Efficiency Action Plan (NEEAP) of Albania contains a description of measures to improve the energy efficiency in the country, which are planned in order to achieve the indicative targets for 2010–2018.

It also provides a package of measures for the most important final energy consumption sectors: Residential, Services, Industry and Transport and some estimation for energy savings in Agricultural. These measures are supposed to be implemented the coming three-year period and will, for the most part, continue to be implemented until 2018.

A specific law on renewables has been in a drafting stage since November 2009. The new law should address the barriers arising from existing legislation, including the creation of a more stable climate for private investors, and modify the tariff structure and pricing system for renewable energy plants.

4.4 Croatian energy outlook

The total installed capacity in Croatia consists of 4,200 MW³⁵ in 2012. Croatia's domestic hydrocarbon and large hydropower production (accounting for 51 % of electricity supply) keep energy and import dependence at levels well below other countries in the region. The total primary energy production in 2012 is about 3,730 ktoe³⁶.

4.4.1 Renewable Resources

Croatia is thus among the leading countries in energy production from renewable sources. It has a long tradition of using hydroelectric power with an estimated potential of

³⁴ http://www.enercee.net/albania/energy-policy.html

³⁵ EU Energy in Figures- Statistical Pocketbook 2014, Energy, European Commission

³⁶InternationalEnergy Statistics, http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=44&pid=44&aid=1







approximately 2,100 MW³⁷ in year 2012. Hydro net generation is about 395 ktoe³⁸ (year 2012).

Hydro power plants account for more than a half of the generating sources in the power system. There are 26 hydro power plants in operation today. They are of two types: reservoir and run-of-river. Organizationally, they are divided into 15 operative areas territorially grouped in three generation area and the independent operative area of Dubrovnik hydro power plant.

Biomass is an important resource: 44 % of the country is covered by forests. The most important biomass resources are fuel-wood and wood waste from the wood industry. A further source of biomass for energy is the agricultural sector. According to the National Energy Program BIOEN, the total energy potential of biomass is 39 PJ³⁹.

In May 2006, the first **biodiesel** production plant in Croatia – Modibit, located near the city of Ozalj – started its operation. The plant's capacity amounts to 20,000 tonnes per year. Regarding **solar** power, a study of the Energy Institute Hrvoje Pozar (EIHP) estimated that 12-15.000 m² solar thermal collectors are in operation. Most of the PV systems in place are off-grid. There are two factories producing monocrystalline and amorphous solar cells in Novigrad, and Split. The solar thermal market is dominated by imports from Germany and Turkey. According to National Energy Program SUNEN, the total energy potential of sun energy in Croatia is 100 PJ.

Croatia has also **geothermal** reservoirs in the northern part of the country, characterized by high value geothermal gradients. At present, thermal water is used for space heating, heating of swimming pools, and in balneology. According to the National Energy Program GEOEN, the total potential is estimated at 839 MWt.

³⁷ EU Energy in Figures- Statistical Pocketbook 2014, Energy, European Commission

³⁸InternationalEnergyStatistics,http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=6&pid=33&aid=12&ci d=regions&syid=2008&eyid=2012&unit=BKWH

³⁹ http://www.enercee.net/croatia/energy-supply.html







Finally, the installed capacity for **wind** is approx 0.2 GW⁴⁰ (year 2012); the wind electricity net generation is about 28.3 ktoe in year 2012⁴¹

The country's first wind farm was installed on the island of Pag in August 2004 by Adria Wind Power, and construction for another wind farm in Trtar-Krtolin near Sibenik by EnerSys started in December 2005 and entered operation. New wind power generators are scheduled to be installed.

4.4.2 Non Renewable Resources

Croatia has limited **oil** (10.7 Mt) and **gas** (29 bcm) resources. Crude oil is produced from 35 oil fields and gas condensation products are obtained from 10 gas-condensation fields. This covers about 35 percent of total domestic demand. Croatia's oil reserves, are located southeast of Zagreb, along the Hungarian border, and along the Adriatic Sea.

The reserves of gas in Croatia, like those for crude oil, are located mainly in three parts of the country: southeast of Zagreb, along the Hungarian border, and along the Adriatic Sea. Most of Croatia's natural gas is imported from Slovenia via a pipeline.

Regarding **coal**, the reserves are very scarce (6 Mt). Total consumption of coal in Croatia is covered by the import. Brown coal and lignite are imported mainly from Bosnia and Herzegovina and only a small portion from the Czech Republic; coke is mainly imported from the neighboring countries while hard coal is purchased on the international market from the major hard coal exporters.

Finally, Croatia does not operate a **nuclear** power plant on its own territory, but it is 50 % coowner of the Krško NPP (675 MW) in Slovenia. The co-ownership includes the partial responsibility for the nuclear waste produced.

4.4.3 Energy Sector Strategic Objectives

Croatia's Energy Sector Development Strategy 2002 (ESDS 2002) establishes a goal to have renewable energy account for 12 % of TPES by 2020⁴².

⁴⁰ EU Energy in Figures- Statistical Pocketbook 2014, Energy, European Commission

⁴¹InternationalEnergyStatistics,http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=6&pid=37&aid=12&ci d=regions&syid=2008&eyid=2012&unit=BKWH

⁴² Energy in the Western Balkans, IEA, 2008, p. 194







Moreover, Croatia set a 2010 target for electricity production from renewable energy sources covered by incentives, but it has not been met. The lengthy administrative procedure is a disincentive to increasing investment in RES technologies. Therefore, substantial efforts are required to achieve the country's target of meeting 20 % of final energy demand from renewable sources by 2020.

Despite various incentive-based policies and measures, Croatia has not yet attracted significant private investments in renewable resources.

4.4.4 Incentives and Penalties

The Energy Law and Electricity Market Act, along with specific regulation passed in 2007, provide regulatory incentives for renewable energy sources and co-generation supplied by small units (below 10 MW capacity). The three main incentives include:

- guaranteed incentive purchase tariffs ("feed-in tariffs") for the production of electricity from renewable energy sources and co-generation;
- a minimum share (5.8 %) of electricity produced from renewable energy sources and
 2 % high efficiency co-generation to be purchased by electricity distributors;
- the status of privileged producer for those plants generating electricity or heat from renewable energy or through co-generation, enabling access to the grid at a regulated tariff⁴³.

The feed-in tariffs for electricity from RES are set according to the energy source it is generated from. Green electricity producers which have signed a contract with the market regulator are eligible for these tariffs.

Since 1997, Croatia launched a series of National Energy Programs (NEPs) that focus on energy efficiency and renewable energy. To date, there are approximately 12 implementation program (both vertical and horizontal) that reflect the successive ESDS. The key programs for renewable energy sources are:

⁴³ Energy in the Western Balkans, IEA, 2008, p. 230







- BIOEN: to foster use of biomass and waste for energy. BIOEN program includes subprogram BIODIZEL, the goal of which is to develop steady biodiesel production and to spread use of biodiesel in Croatian transport and energy sector;
- **SUNEN**: to develop the use of solar energy;
- **KOGEN**: to promote and develop cogeneration;
- **KUEN** (Energy efficiency in building construction): to improve energy efficiency in District Heating systems;
- **CROTOK**: to develop integrated sustainable energy projects (including zero-energy houses) on the islands of the Adriatic Sea;
- MIEE (Industrial energy efficiency network): to promote energy efficiency within consumers in industry and service sectors, as well as in the public sector, through an organized structure;
- TRANCRO (Transport energy program): Energy efficiency in the transportation sector is tried to be increased through different measurements, like "cost - benefit analysis" of various measures (projects) for sustainable transport system development, necessary legislation, measures, subsidies, action plan, etc;
- ENWIND (Wind energy use program): the program includes the assumptions for an economical wind energy use. Preliminary wind resource in Croatia estimates 1300 MW and 3 TWh/a, notably on the coast. There doesn't exist a wind atlas of Croatia but within the program a number of projects are in progress to overcome the lack of data: Program of continuous wind monitoring in Croatia; development of Precommercial Wind Turbine; assessment of Wind and Solar Energy Resource in Pilot Croatian Region (EC CARDS Program);
- MAHE (Small hydro plant construction program): the basic goal of the MAHE is
 planning the construction of small power plants, removing all barriers and obtaining
 conditions for a rapid construction of small power plants in Croatia. The
 environmental and planning constraints significantly reduce the potential. Some pilot
 projects were implemented through the cooperation with country authorities;







- GEOEN (Geothermal energy use program): the program has shown the need for the creation of conditions for increasing geothermal energy utilization in existing installations;
- **PLINCRO** (Gas Network Development Program): the objective is to establish necessary preconditions for the expansion of the natural gas network⁴⁴.

4.5 Slovenian Energy Outlook

As most of the other European countries, the Slovenian energy sector is mainly dependant from imports of oil and natural gas, even if the country produces nuclear energy, solid fuels and renewable energy, all of which are also used in electricity generation. As shown in the section below, the share of renewable sources in primary energy supply is steadily increasing⁴⁵.

4.5.1 Renewable Resources

The hydroelectric power has an estimated potential of approximately 1,300 MW⁴⁶ in year 2012 and the hydro net generation is about 331 ktoe⁴⁷ (year 2012).

Hydropower supplies about one-third of Slovenia's electricity generating capacity. The Drava River is the major source of hydroelectric power and has a technical potential of 2,896 GWh (of which 97,8 % are already developed).

The Sava River has the second largest technical potential of the national rivers (usable potential of 2,794 GWh) and about 18 % of the Sava is being utilized currently. The rest of the rivers have 3,455 GWh of potential with about 22 % of the potential being utilized⁴⁸.

According to a publication by the Thematic Network of Small Hydropower, the remaining technically and economically feasible potential for small hydro is estimated at another 40

⁴⁴ http://www.enercee.net/croatia/energy-policy.html

⁴⁵ SLOVENIA – Energy Mix Fact Sheet, European Commission, 2007

⁴⁶ EU Energy in Figures- Statistical Pocketbook 2014, Energy, European Commission

⁴⁷InternationalEnergyStatistics,http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=6&pid=33&aid=12&ci d=regions&syid=2008&eyid=2012&unit=BKWH

⁴⁸ http://www.enercee.net/slovenia/energy-sources.html

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MW (taking into account environmental constraints). The National Energy Plan states an existing capacity of 60 MW with a potential to increase this to 110 MW until 2020, whereas ApE estimated the (cumulative) potential at up to 200 MW until 2020.

Over half of Slovenia is covered with forests and wooded areas. Wood is an important fuel for space heating, particularly in the residential sector. In fact, according to a review about Slovenia's energy policy in regard to RES, the highest potential for development is given in the areas of forest **biomass** – in particular for utilization in district heating systems (wind energy is mentioned next). Within 10 years, energy consumption from biomass could be increased from currently 12 PJ by another 5 PJ. According to the national forest institute, 600,000 metric tons of wood biomass would be available for district heating systems. The installed capacity of combined heat and power plants fuelled by solid biomass was 6 MW in 2004. The National Energy Program states a potential to increase this to 11 MW by 2020.

Biogas has an even higher potential. In 2009 in Slovenia existed 8 installed systems for biogas production at waste water purifying plants. Only 4 of them were using biogas for production of heat and electricity (CHP). In others biogas is burned on torches. Total installed electricity power on sewage gas is less than 1 MW⁴⁹.

In 2005, 8,000 tons of **biodiesel** were produced in Slovenia. According to a separate study by ApE for the National Energy Program, a capacity of 10,000 – 20,000 could be reached by 2010 – 2020.

There is currently little use of **wind** energy in Slovenia, except for minor installations for recording purposes, or minor remote locations for water pumping and feed grinding. Potential for wind energy utilization is primarily given in the Primorska region. However, most of the potential sites are situated in ecologically sensitive mountain regions which are under consideration for national parks.

Regarding **solar** power, Slovenia has good conditions for both solar thermal and photovoltaic energy use. The total installed capacity of photovoltaic installations is 100 MW in 2012⁵⁰.

⁴⁹ Biogas production in Slovenia, APE - Energy Restructuring Agency,

http://www.4biomass.eu/document/file/SL_Biogas.pdf

⁵⁰ EU Energy in Figures- Statistical Pocketbook 2014, Energy, European Commission







Solar Thermal installations amounted to 106,300 square meters in 2005, equivalent to a capacity of 74.4 MWth⁵¹. The potential for increasing the utilization of photovoltaic systems is estimated at 1 to 10 MW until 2020 by the National Energy Program and the related study by ApE, respectively.

The North-eastern portion of the country has the greatest geothermal resource (80-150 MW/m^2). Installed capacity amounted to 49 MWt in 2005. Geothermal energy is not currently used for electricity generation, however, the potential for the country could be increased to 500 MWt by 2020. The use of closed-loop geothermal systems in the country has also increased, with 2.3 MWt of installed capacity as of 2009⁶¹.

4.5.2 Non Renewable Resources

Slovenia is heavily depending on imports of **oil** or oil products respectively. The country's only refinery (Lendava) ceased its activity in October 2000. Prices were liberalized in 1998; the state controls the prices of gasoline and LPG.

The geographical situation of Slovenia enables the country to have a **gas** network connected to the most important international networks, coming from Russia and since 1992 from Algeria. In 2008 Slovenia imported 1.1 Gm³ of natural gas (50 % from Russia, 30 % from Algeria, 14 % from Austria and 6 % from Italy).

The country has brown **coal** resources, which account for 95 % of coal consumption. Two sub bituminous coal and brown-coal mines of a total capacity of 5 Mt/y are in operation. But these products are of very low quality, with a low calorific value and a high sulfur rate and ashes. Therefore, for environmental reasons, the cogeneration plant of Ljubljana is obliged to consume imported coal. Coal is of major importance to Slovenia both for heating and electricity generation.

The domestic production of Slovenia is based primarily on **nuclear** energy and solid fuels: Slovenia operates a nuclear power plant located at Krško.

⁵¹ http://www.reegle.info/policy-and-regulatory-overviews/SI






4.5.3 Energy Sector Strategic Objectives

Slovenia set itself a range of targets for increasing the share of RES in energy consumption back in 2004 in the Resolution on the National Energy Program (ReNEP).

As part of the EU climate and energy package, new targets have been agreed upon to promote renewable energy sources. Slovenia's target for 2020, as stated in the National Renewable Energy Action Plan 2010-2020 (NREAP, 2010), is a 25 % share of RES in final energy consumption and at least a 10 % share of RES in transport.

In accordance with Directive 2009/28/EC, the measures in the NREAP are formulated on the basis of targets regarding the share of energy from renewable sources for 2020 in the following sectors: heating and cooling, electricity, and transport.

The total value of all three sectoral targets, including the planned use of flexibility mechanisms, must be at least equal to the expected quantity of energy from renewable sources, the share of which for Slovenia in 2020 is equal to 25 %⁵².

4.5.4 Incentives and Penalties

In Slovenia, the RES-E policy includes the following measures:

- RES-E producers can choose to receive either fixed feed-in tariffs or premium feed-in tariffs from the network operators. A Purchase Agreement is concluded, valid for 10 years. According to the Law on Energy, the uniform annual prices and premiums are set at least once a year. Between 2004 and 2006, these prices have stayed the same.
- subsidies or loans with interest-rate subsidies are available. Most of the subsidies cover up to 40 % of the investment cost. Investments in rural areas with no possibility of connection to the electricity network are eligible to apply for an additional 20 % subsidy.

Since 2004, pure biofuels used as motor fuels have been exempt from the excise inspection and payment system. When blended with fossil fuels, a maximum 5 % exemption from the payment of excise duty can be claimed. Slovenia applies a system whereby distributors are

⁵² Slovenia National Renewable Action Plan 2010-2020, 2010







obliged to place on the market a percentage of biofuels that corresponds to the national target. This measure was introduced in 2005.

Since 2004, Slovenia has supported the growth of RES-H through subsidies (up to 40 % of the investment), and through loans with interest-rate subsidies⁵³.

4.6 Bosnia and Herzegovina Energy Outlook

Total Primary Energy production is about 6146 ktoe⁵⁴ in 2012.

The electrical energy, produced in Bosnia and Herzegovina, comes from the conventional sources (approximately 60 % from thermal and 40 % from hydro power plants). Although there is great potential in wind, solar and biomass energy, there is no such generation facility in Bosnia and Herzegovina, so far. Bosnia and Herzegovina's energy import dependency is low at 38 %, reflecting significant domestic production of coal, wood and hydropower. However, the country is 100 % import dependent for oil and gas, and import volumes are increasing. In 2009, 41.8% of the Total Primary Energy Supply (TPES) was imported⁵⁵.

The country has no formal national or regional energy policy or reform plans and this is at the crux of many of its energy problems.

4.6.1 Renewable Resources

There are two major renewable energy sources in Bosnia and Herzegovina: hydropower for electricity production and biomass for heat production

With an installed capacity of 2052 MW (53 % of electricity generation), **hydropower** is highly significant in Bosnia and Herzegovina, although its potential is far from being fully exploited yet (37 % of economic potential). The majority of the installations are more than 30 years old. Five existing hydro plants (total 1060 MW) are part of multi-purpose developments. There are 13 hydro plants with a capacity greater than 10 MW. The country has also a small

⁵³ Slovenia – Renewable Energy Fact Sheet, DG for Energy and Transport, 2008

⁵⁴InternationalEnergyStatistics,http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=6&pid=116&aid=12& cid=regions&syid=2008&eyid=2012&unit=BKWH

⁵⁵ http://www.reegle.info/policy-and-regulatory-overviews/BA







hydro power potential of 2500 GWh/yr. There are ten small, mini or micro hydro plants in operation, with a total capacity of 31 MW and others are under construction or planned.

Apart from the traditional use of firewood and the recycling of wood waste in the woodprocessing industry, there is no reliable data on the exploitation of **biomass** in Bosnia and Herzegovina. It can be assumed, however, that there is considerable potential for the use of biomass for energy generation in the forestry sector (roughly 50 % of the land area of Bosnia and Herzegovina is wooded) and in agriculture.

One field where wood is already used in Bosnia and Herzegovina is where wood waste is converted into electrical energy in steam power plants, such as in the state-owned Krivaja factory in Zavidovici, manufacturing furniture and timber houses. With a maximum thermal output of 15 MW, peak electricity outputs of 4.5 MW are generated for the factory's on-site power needs. Near Sarajevo a landfill gas plant has been built with Austrian support. The electricity is fed into the urban grid.

At the moment **wind** energy is not used in Bosnia and Herzegovina, no commercial wind power plant has been constructed yet. Total wind potential in the country is estimated at 2,000 MW, of which approximately 900 MW is exploitable. The greatest potential in wind energy is in the southern part of the country, in Herzegovina

There are promising wind values shown by measurements taken before the war for the region of Trebinje through Mostar to Bugojno, and more up-to-date measurements from meteorological stations and airports which reveal large areas of the country with wind velocities of over 10 m/s at a height of 10 m on 150 days in the year. The wind potential measurement was performed and the wind atlas, as the result, was made for the entire country⁵⁶.

The capacities will depend mainly on wind (and other renewable) energy policies. In other words, the increase of wind power will depend on the willingness and capability to prepare and apply support mechanisms, to establish needed energy entities, to consolidate institutions and to launch real entrepreneurship activities in the energy sector.

⁵⁶ Restrictions in Power System for Renewable Production in Bosnia and Herzegovina, Jovan Todorovic, Workshop March 22nd-23rd 2011







In a preliminary study carried out on behalf of the GTZ (Deutsche Gesselschaft für Technische Zusammenarbeit) it was established that there is an economic potential that could be developed, on the assumption that an appropriate incentive system to build wind power installations is set up. Sufficiently suitable geographical locations appear to be available.

With regard to **solar** irradiation, Bosnia and Herzegovina can be counted among the more favorable locations in Europe with solar irradiation figures of 1240 kWh/m²/yr in the north of the country and up to 1600 kWh/m²/yr in the south. Despite this, the use of solar energy can only be described as insignificant. The thermal exploitation of solar energy with flat-plate collectors is also practiced to only a limited extent.

In view of the relatively high cost involved, the introduction of photovoltaic on the market beyond very small-scale consumers far from the utility grid is dependent on promotion programs and international projects.

According to available studies, Bosnia and Herzegovina has a **geothermal** potential of 33 MWth. Current activities relating to geothermal energy continue to be limited to exploitation for thermal use, because the temperature at three known locations in Bosanski Samac (85°C), Kakanj (54°C), and Sarajevo (58°C) is too low for electricity generation⁵⁷.

4.6.2 Non Renewable Resources

Lignite and brown coal provide the bulk of the country's energy supply and electricity generation, accounting for 54 % of both. Bosnia and Herzegovina is in fact rich in **coal** deposits: brown coal deposits occur in various parts of the country, as well as lignite deposits, which occur in river (Gacko, Bugojno, Livno, Duvno, and others) and marine basins (Kreka and Stanari).

Total geological reserves of coal are estimated at 5,763 billion tons, of which balance reserves account for 2,625 billion tons; 1,437 billion tons of lignite and 1,187 billion tones of brown coal. Balance reserves account for only 45.5 %, out-of-balance 10.8 %, and potential 43.7 %, thus showing a low degree of exploration. The major reserves of brown coal are

⁵⁷ http://www.enercee.net/bosnia-herzegovina/energy-sources.html







situated in the following basins: Central Bosnia (deposits: Kakanj, Zenica, Breza, Bila), Banovii (Seona, Central Basin, durnevik), Ugljevik (Bogutovo Selo, Ugljevik-Istok, Glinje, Mezgraja, Tobut-Peljave), Miljevina and Kamengrad, while lignite occurs in basins: Kreka, Gacko, Stanari, Bugojno, Livno and Duvno. These basins present future potentials able to meet thermal energy requirements. All other basins (Mostar, Miljevina, Tušnica, Kotor-Varoš, Lješljani, Teslic, Žepce-Šeher, Mesii, Drvar, Cazin, and others) possess only 5 % of balance reserves, i.e. participate with only 6.3 % in total reserves, therefore they are of low significance as for construction of new power plant units.

Brown coal deposits are of relatively good quality, with an average heating value of 16,750 kJ/kg (clear coal). Lignite is of high quality, pure, with heating value averaging between 7,500-12,600 kJ/kg. Such a quality determines a broad range of application, while production costs enable transport to longer distances.

Significant explorations of **oil** and gas reserves were carried out since the 1960s until the early 1990s by the Sarajevo-based company Energoinvest, Zagreb-based INA-Naftaplin, foreign companies such as AMOCO, EXLOG, GECO, ECL, and others. Extensive geochemical, geomagnetic, geo-electric explorations were conducted as well as reflective seismic studies and magnetic telluric probing.

Based on the explorations carried out in the last years, it has been estimated that Bosnia and Herzegovina have 50 million tons of crude oil in four priority areas:

- the area south of Bosanski Šamac with estimated reserves of 9.2 million tons;
- the area southwest of Orašje with estimated reserves of 6.1-15.5 million tons;
- the River Tinja area in the Tuzla region with estimated reserves of 14.3 million tons;
- the area around Lopar of around 21 square km with estimated reserves of 11.9 million tons.

Regarding **natural gas**, Bosnia and Herzegovina does not have its own sources so its supply is exclusively based on import. For the time being, it comes only from one source and uses only one transport direction, which is Beregovo - Horgos - Zvornik. All of the natural gas for the country is imported from the Russian Federation. Gas is transported along the gas pipeline systems of Ukraine, Hungary and Serbia. Natural gas was introduced to Sarajevo in 1975 as a







means of limiting air pollution and is now the most widely used fuel for heating in residential areas connected by gas.

4.6.3 Energy Sector Strategic Objectives

On March 2009 the Federal Ministry of Energy, Mining and Industry (FMEMI) issued the Strategic Plan and Program of the Energy Sector Development of Federation of Bosnia and Herzegovina (SPP). The purpose of developing the SPP was to make a professional analysis of the existing situation, define the requirements and possibilities of the development of energy sector in FBiH and in each subsector in whole taking into account energy sector development intensity in BiH, region, Europe and the world. The aim is unblock of investing in this sector in FBiH and in the country, in general, and achieving the modern and sustainable development of the energy sector. The document contains the priority activities (until year 2010), activities of the mid-term development (until year 2020), and indicate the projection of the development in the third decade of this century (until year 2030).

4.6.4 Incentives and Penalties

The country lacks any comprehensive or coherent policy for existing renewable energy sources (e.g. refurbishment of existing HPPs, management and use of wood resources) or for tapping the economic potential of renewable energy). At present, the only support measure is the adoption of purchase tariffs for electricity generated using renewable sources at installations of up to 5 MW of installed capacity.

According to the "Decision about a Methodology for the Determination of Purchase Prices for Electricity from Renewable Sources with Installed Power up to 5 MW" ("OG of FBiH" 32/2002, "OG of RS" 71/2003) the three federal power utility companies, "Elektroprivreda BiH", "Elektroprivreda HZ Herceg-Bosna" and "Elektroprivreda Republika Srpska" have the obligation to buy electricity from renewable sources.

The country does not have a comprehensive and clear regulatory framework to support licensing, investment and operation in renewable energy sources. Overall, project economics for renewable sources are generally not as attractive as for other energy sources, owing to higher initial investment costs.







4.7 Greek Energy Outlook

As stated within the last Energy Outlook of Greece⁵⁸, the Country is characterized by high levels of energy consumption, mainly deriving from the transportation and tertiary sectors, and by limited domestic production, which does not allow covering the energy demand. This implies a strong dependency from energy imports, with all the related implications regarding the country economy. Renewable energy is not especially developed, in spite of the great potential and energy needs: notwithstanding the domestic production of energy from renewable sources is slowly increasing and, if properly exploited, represents a good country development opportunity.

4.7.1 Renewable Resources

The total primary energy production is about 10290 ktoe⁵⁹ in 2012.

Renewables such as wind, solar, small hydro, and biomass have increased rapidly in recent years: in the first semester of 2011, the total installed capacity of RES stood at 2022.2 MW, 75 % of which came from wind energy production, 11.5 % from solar, and the remaining 13.5 % from biomass and hydro-electric production units⁶⁰.

Greece has considerable wind and solar energy potential, which has already attracted investment interest, as well as a promising biomass and geothermal potential, which, however, still remain untapped.

In 2012 the wind electricity net generation was about 3,850 Gwh, solar electricity generation about 1,690 GWh and hydroelectricity net generation approximately 4,360 Gwh⁶¹.

Greece has significant **wind** power potential and the government foresees wind power capacity to increase from around 1.3 GW in 2010 to 7.5 GW in 2020, far more than other renewable energy technologies combined.

⁵⁸ Ministry of Development, Energy Outlook of Greece 2011

⁵⁹InternationalEnergyStatistics,http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=6&pid=116&aid=12& cid=regions&syid=2008&eyid=2012&unit=BKWH

⁶⁰ http://www.investingreece.gov.gr/default.asp?pid=36§orID=38&la=1

⁶¹InternationalEnergyStatistics,http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=6&pid=116&aid=12& cid=regions&syid=2008&eyid=2012&unit=BKWH







Regarding **solar** power, solar PV installed capacity is 1.5 GW⁶², while no production is registered for solar thermal.

4.7.2 Non Renewable Resources

Greece imports practically all the **oil** and **gas** it needs, and security of supply is one of the key objectives of the Greek energy policy. Regarding oil, the country has a negligible domestic production, which covers less than 1 % of the oil needs. Natural gas was introduced into the Greek energy balance since the late 90s after the construction of a gas pipeline of 8 bcm capacity which goes from the North to the South of Greece and a LNG gasification terminal in the Attiki region. The supply sources are already diversified, as Russian gas is imported through the Greek-Bulgarian entry point, while the Greek-Turkish entry point allows Greece to import gas from the Middle East and the Caspian region. Greece also receives LNG, mostly from Algeria on long-term contracts as well as additional volumes from the spot market⁶³.

Lignite is the main domestic energy source which is used almost exclusively for electricity production. Small amounts of coal are imported for industrial use. Reserves are estimated to last another 50 years at current consumption levels.

The quality of Greek lignite in terms of energy yield is low.

4.7.3 Energy Sector Strategic Objectives

The government has adopted ambitious targets, policies and measures for increasing the use of renewable energy. The Renewable Energy Law 3851/2010 set the country target of raising the share of renewable energy in gross total final consumption to 20 % by 2020, which is 2 % higher than its EU obligation and almost triple the 6.9 % share in 2005. It has also set a specific target for renewable sources to provide 40 % of electricity generation by the same year (the share in 2010 was 15 %) and to provide 20 % of primary energy for heating and cooling in 2020.

 $^{^{\}rm 62}$ EU Energy in Figures- Statistical Pocketbook 2014, Energy, European Commission

⁶³ Energy Policies of IEA Countries - Greece- 2011 Review, IEA, Executive Summary







4.7.4 Incentives and Penalties

The Renewable Energy Law 3851/2010 has introduced a complete set of feed-in tariffs set up for electricity generated from various renewable energy sources. Such tariffs modify the 2009 tariffs established for electricity from solar photovoltaic plants and implemented tariffs for other sources (wind, geothermal, biomass, landfill gases, biogas).

It has also shortened the former long licensing process for renewable energy projects by several years, and to just a few months in some cases. The Law also increases the public acceptance of renewable energy projects by channeling the local communities more money from the generators – a simple and effective measure.

In 2010 the Ministry for Environment, Energy and Climate Change launched the "National Operational Program for Competitiveness II" aimed at stimulating the renewable energy technology investment. The Program provides grants to private investments in renewables, the rational use of energy and small-scale (< 50 MW) co-generation. The main policy targets are: geothermal (heat, heat store, power), hydropower, solar thermal (concentrating solar thermal and water heating), wind (offshore and onshore).

The 2008 Special Spatial Framework, in turn, has facilitated siting procedures for renewable energy projects.

The Law on Generation of Electricity using Renewable Energy Sources, which came into force in 2006 and amended in 2009, transposes the EU Directive 2001/77/EC regarding the promotion of electricity produced from RES in the internal electricity market. It also seeks to promote, by granting priority to the generation of electrical power from RES and high efficiency cogeneration of electricity and heat plants in the internal electricity market. In the act, RES are listed as: wind energy, solar energy, wave energy, tidal energy, biomass, gases released in sanitary landfills and biological treatment plants, biogases, geothermal energy, and hydraulic energy utilized in hydroelectric stations. The act:

 regulates the production of electricity using RES and high efficiency cogeneration; regulates the installation and operation of power generation facilities using RES and high efficiency cogeneration;







- provides for the promotion of power production from photovoltaic stations via the establishment of a photovoltaic deployment program;
- establishes the institutional framework for the promotion of RES and high efficiency cogeneration, including the publication of a national report on the topic, under the authority of the Minister of Development.

The Law 3423/2005 on the Introduction of biofuels and other Renewable fuels in the Greek market implemented the EU biofuels directive in the national law and dispenses biofuels with the fossil fuel tax⁶⁴.

Finally, the Centre for Renewable Energy Sources and Saving (CRES) was founded in 1987: this institution is the Greek national entity for the promotion of renewable energy sources, rational use of energy and energy conservation.

⁶⁴ IEA/IRENA Global Renewable Energy Policies and Measures Database







5 Conclusion

Very high growth rates are expected in the offshore wind sector over the next decades, this will results in the increase of investments, political and regulative initiatives, technological improvements, numbers of actors and stakeholders.

The approach to the deployment of offshore renewable energy and in particular of offshore wind power, especially in the areas such Adriatic, will therefore need to move towards a cross-border dimension, where a more coordinated transnational approach and an improved decision making process will expand opportunities for deployment and cost savings from cooperation on shared infrastructure.

Under this perspective the analysis carried out in this Work Package highlighted several common areas in terms of regulation, technology and market which will be possible to use as basis and will represent a cornerstone to build up an appropriate framework for promoting cross-border cooperation which could create an enabling environment for the deployment of offshore renewables beyond 2020.







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ANNEX A

ITALIAN REGIONAL SCIS AND SPAs









Source: Geoportale Nazionale Febbr. 2015

Figure 1: Abruzzo, Apulia, Molice Region SCIs and SPAs











Figure 2: Marche, Emilia Romagna, Veneto SCI and SPAs





