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The decision-making steps for the construction of Renewable Energy Plants: an analysis of the conflict factors of the Italian authorisation procedures

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ABSTRACT

The implementation of strategies oriented to the transition towards energy systems characterised by the use of renewable sources, high levels of energy efficiency and good quality landscapes, requires the organisation of effective decision-making processes and authorisation procedures. In Italy, the twenty-year development of these aspects in relation to renewable energy plants highlighted situations of conflict due to two different rationales.
The first type of rationale is resulting from the need to achieve the European targets for energy production from renewable sources. It pays little attention to the territorial and environmental contexts in which the projects are located. The second type of rationale is consequent to a systemic vision of development, whereby the energy factors must be integrated with the landscape characteristics of the sites.
This essay analyses the framework of the legislation related to the above-mentioned topics and identifies conflicts and inconsistencies in the procedural paths. The analysis is conducted highlighting the relevant legislative and juridical background, the characteristics of the current procedures, the actors involved and the main operative tools, particularly regarding design criteria and location choices.
The conclusions will summarise the unresolved issues and provide some considerations on the way forward towards a more balanced and effective approach.

THE GOVERNANCE FOR THE RES PLANTS DIFFUSION

The diffusion of plants that use Renewable Energy Sources (RES) in Italy has had, and will continue to have in the future, unstable trends according to public funding flows, which favour their use and scientific innovation, technological developments, which increase their competitiveness with respect to plants using non-renewable sources, and energy infrastructure, which facilitate their use (Gestore Servizi Energetici, 2020).
The diffusion of these plants has significantly modified some areas of the Italian territory, and their future development is expected to produce even more intense modifications. These transformations have had significant effects on the landscape and the environment, especially with regard to biogas and photovoltaic plants located in agricultural areas and wind farms located on the ridges of hills, which, in several cases, have triggered strong negative reactions from the most sensitive members of the local communities (Cialdea, Maccarone, 2014; Frolova et al., 2015; Leibenath et al., 2015; Roth, 2018).
Furthermore, in the first years of strong diffusion of RES plants, a high demand for stricter rules for their construction emerged and consolidated, in order to avoid their location in sensitive or valuable environmental and landscape contexts. In addition to that, there was a significant process of technological innovation, still in continuous development, which, combined with a substantial increase in energy efficiency, led to an enhancement of the aesthetic-formal qualities of products and projects. As a result of design improvements in the RES plants, together with a greater attention to how the local communities perceive the landscape, the localisation of these plants in different territorial contexts, both urban and extra-urban, has refined. In particular, many Regions and Municipalities initially tried to insert rules and regulations in their landscape-territorial and urban plans. This was done to encourage a broader spread of these plants, which is essential to respond to the energy transition from fossil fuels, in a respectful and harmonious way with the landscape. However, the results achieved were unsatisfactory because these measures were not effective in protecting the areas with high sensitivity and landscape value, as the traditional planning mechanisms are unsuitable for this purpose. Thus, the main outcomes of these early interventions were a significant lengthening of the approval time for projects and a noteworthy increase in the number of the legal disputes.
In order to harmonise the "environmental and landscape protection policies with those for the development and enhancement of renewable energies" (Rossi, 2012) and to facilitate the decision-making process for their implementation, while limiting legal disputes, in 2010 the Ministry for Economic Development issues a decree titled “Linee Guida per l’autorizzazione degli impianti alimentati da fonti rinnovabili” (Guidelines for the authorisation of renewable sources plants). With this, each Region is required

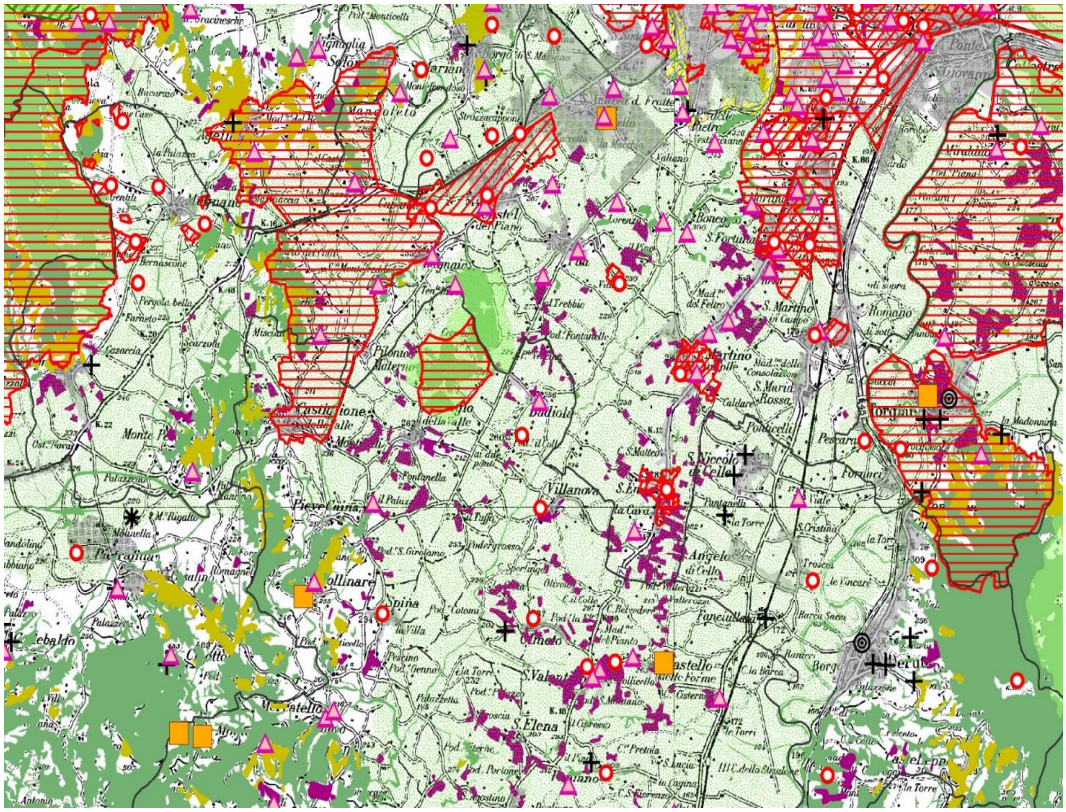
to draw up a specific map[1], called the Map for the Identification of Areas and Sites Unsuitable for the Installation of Renewable Sources Plants (MASU), to indicate to the companies that build RES plants the areas in which their construction involves significant impacts on the landscape, the environment and the territory and therefore where it is recommended not to intervene (see Fig. 1). In case of interest in building a plant in an area not recommended, a company will have to develop an innovative project with particular care, in order to fully respond to the need for a correct insertion of the plant in the territory, and undertake a longer and complex authorisation process. The approach adopted in this decree aims to define the intervention possibilities in a negative way, whereby the plants can be located with ordinary procedure in all areas except those not recommended. With this kind of approach, the criteria and guidelines towards which the proponents of the plants can direct their projects are missing. In order to remedy this shortcoming and to favour a system design immediately oriented towards shared solutions, almost all the Regions have integrated the MASU with guidelines and examples of possible solutions (Ministero dello Sviluppo Economico, 2018). Furthermore, by not aiming to direct the diffusion of RES plants in the most suitable places and to build them in the most suitable ways, this approach makes it difficult to exploit one of the most interesting potentials of these plants, that is a strong integration with the activities and settlements of a territory.

To achieve the energy targets set by the European Union for 2020, in 2012 the national government assigned to each Region the task of producing a minimum share of energy from renewable sources, the so called "burden sharing". Burden sharing will be, most likely, one of the main mechanisms to achieve the ambitious goals set by the European Union for the next three decades. As a result, it is urgent for the Regions to find, within the planning, design and authorisation procedures, suitable modalities to achieve a synthesis between two different and often conflicting needs: (i) the exponential growth of the use of renewable energy sources, to meet the increasingly challenging objectives of renewable energy production targeting the de-carbonisation of the economy by

[1] The criteria for identifying unsuitable areas and sites are contained in "Parte IV (Part IV) - inserimento degli impianti nel paesaggio e sul territorio" (insertion of plants in the landscape and territory) of the annex to the Ministerial Decree 10th of September 2010, in particular in paragraph "17. Aree non idonee" (Unsuitable areas) and related criteria for identifying unsuitable areas (Annex 3 to the aforementioned Ministerial Decree 10th of September 2010). Examples of unsuitable areas or sites are: the ones included in the UNESCO World Heritage List and in the lists of national cultural interest, the areas located within visual cones of historical and tourist interest, the areas near archaeological, cultural, historical and religious sites, the natural areas of international, national and local interest, the agricultural areas for high-quality productions, the areas of hydrogeological instability.

2050, and (ii) the location of RES plants in a harmonious and integrated way with the landscape, the environment and the territory.

Figure 1 - Excerpt from the Map of Unsuitable Areas for Photovoltaic Plants in the Umbria Region



Source: Umbria Regional Regulation of 29th of July 2011, n.7

These conflicting requirements highlight the need to build planning and design processes capable of identifying and using as much as possible the opportunities for locating RES plants, as well as the objective of not degrading, and possibly improving, the landscape and territorial qualities of the areas concerned. With this in mind, the parameters of burden sharing should be considered together with the definition of unsuitable areas, creating a general estimate of the potential energy production from the various RES systems that can be located in an area respecting and enhancing its territorial and landscape characteristics. The quantities of renewable energy that can be produced in a Region would at that point be based on the real potential of the territory. In this regard, the higher the design quality of the interventions and the technological flexibility of the plants, the greater the areas suitable for their location, in the same way that a higher efficiency of the installations involves an increase in the amount of energy that can be produced. Another aspect to be evaluated is that, without considering the infrastructure necessary for the supply of fossil fuels, RES plants

require greater land surfaces (see Fig. 2) in comparison to the traditional plants to produce the same amount of energy, if they are not organically included in the building structures or territorial infrastructure (Fritsche et al., 2017; Landon, 2017).

Figure 2 - White wind turbines on green grass field during daytime

Source: photo by RawFilm on Unsplash

The planning of the construction of RES plants mainly uses national and regional energy strategies, maps of unsuitable location, energy, territorial, landscape and urban planning instruments on regional, provincial and municipal scale, landscape guidelines and building regulations. Unfortunately, the authorisation approach adopted has made it more difficult to conceive a positive relationship between energy and territory and to imagine and build energy landscapes that are representative of shared values (Hastik et al., 2015; Huber et al., 2017). On the other hand, over time the ability to design, evaluate and develop harmonious solutions has increasingly refined, allowing a more productive and agile dialogue between the parties involved in the decision-making process, and also leading to a better quality of approved projects (see Fig. 3). At the same time, the way in which the population and the other stakeholders are informed and involved is becoming increasingly important, in order to share the characters of the new energy landscapes. Therefore, the renewable energies landscapes emerge more and more as the outcomes of approaches in which bottom-up processes play an important role both in a positive sense, see for example the increase in distributed energy production and a strong attention to the contextualisation of RES plants (see Fig. 4), and in a negative sense, see for example the different forms of opposition to the construction of some types of these plants (Ferrario, Castiglioni, 2017; Leibenath et al., 2015; Pasqualetti, 2012; Vecchiato, 2014).

Figure 3 - Wind power plant in mountain area

Source: https://pixabay.com/it/energia-eolica-pinwheel-2244141/.

Figure 4 - Caption: micro hydro plant in agricultural area

Source: http://www.dabitronimpianti.net/green_energy_technology/hydro_power_plant_small_mini_plant_energy_solutions_africa_subsaharan_afrique.htm.

Given the premises described in this introductory paragraph, the essay is aiming at outlining the characteristics of the authorisation procedures in Italy in the light of the conflicting dialogue between the need for spreading the RES plants and the necessity to protect and valorise the landscape. Since this conflict has not been fully resolved

yet, the understanding of the problems that have occurred in the last decades, and of the pending issues, can help to identify lines of intervention to favour feasible and shared solutions. In particular, even if we consider the introduction of both the MASU and the specific contributions given by each territorial body (e.g. the regional guidelines for the location of the plants) as a step forward compared to the previous authorisation procedures, it is not always possible to carry out a widespread and systematic implementation of decision-making processes shared with local communities.

AUTHORITATION PROCEDURES FOR RES PLANTS REALISATION

The first significant intervention by the national government on decision-making processes and authorisation procedures for the construction of RES plants was made in 2003, with the issue of a regulatory framework (Legislative Decree 387/2003) for their promotion (in particular microgeneration in agricultural and mountain areas) and expansion in the energy market.

The implementation of this framework only came in 2010, after a long legislative vacuum, via the above-mentioned Ministerial Decree 10th of September 2010 which included the guidelines for the authorisation of the plants. Between 2003 and 2010, however, the market of renewable sources has evolved faster than the administrative apparatus and the large number of projects for RES plants presented, with the consequent growing landscape, environmental and economic impacts, has pushed the local authorities to issue new regulations autonomously, free from national indications. Systematically, these measures were deemed unconstitutional and many projects, already underway or in the authorisation phase, have been suspended. This highlighted on the one hand the need and urgency with which the Regions decided to legislate on the topic, to avoid possible negative effects on the territory, and on the other hand the discrepancy between the strong expansion of the sector promoted by operators and investors, and the poor institutional capacity to implement and support it considering a correct distribution and contextualisation of the interventions. Finally, to complete the regulatory definition of the authorisation procedures, the Legislative Decree 28/2011 was approved as a result of the transposition of the European directive for the promotion of RES plants issued in 2009 (see Directive 2009/28/EC).

The framework defined by these decrees is the current national reference, assigning a specific authorisation procedure to each RES plant according to its type, size (defined in terms of installed power), and morphological characteristics. On this last topic, the integration of the systems in existing buildings is considered as a positive factor (e.g. photovoltaic panels installed in adherence to a factory roof), because it means placing them in built environments, thus minimizing the consumption of soil and marginally impacting the local landscape.

There are two simplified authorisation procedures of municipal competence, the so-called Communication and the Simplified Authorisation Procedure (SAP), and a more complex tool for interventions characterised by high powers, which is the Single Authorisation (see Table 1).

To start a project with a Communication, the presentation of a notice of commencement will suffice (including the project documentation and description), while for a plant which has to undergo a SAP the developer must submit design documents demonstrating the compatibility of the intervention with the urban planning instruments and building codes, other than indicating the connection to the electricity grid, and wait for 30 days (or official approval) before works can commence. The Single Authorisation entails a longer procedure (theoretically 90 days, not considering the environmental impact assessment proceedings when required) and the implementation of a Conferenza dei Servizi (Conference of Services). For the Italian legislation, the Conferenza dei Servizi is a tool designed to allow the discussion between multiple public entities involved in an administrative procedure, which can be convened to acquire either opinions or authorisations. It is the key moment, during an approval process, to debate and decide on complex projects which can significantly transform the territory, therefore it is the appropriate stage dedicated to the discussion of topics, sometimes conflicting, related to energy production and landscape (See Constitutional Court, Sentence No 44/2011). The evaluations during the Single Authorisation procedure concern the technological characteristics of the intervention (its impact and its compatibility with all the constraints regarding the area concerned), the infrastructure and grid connection works, and the details on the energy source used in terms of both supply and expected production. In addition, they also consider the possible socio-economic impact and the aspects related to the energy plants decommissioning and dismantling, and subsequent environmental recovery of places.

The national legislation gives some discretion to the local authorities for changing the dimensional thresholds described in the summary table above. This fact, combined with the competence attributed to the same authorities for the definition of unsuitable areas for the location of the plants, should lead to considering in the decision-making processes both the territorial effects of the different types of intervention and the potential that each area can offer in terms of energy production. The concept of unsuitable areas, described in the introductory paragraph, aims to create shorter and more successful authorisation procedures, since it leads operators and developers to concentrate their proposals on areas where the localisation of plants is more likely to be accepted. At the same time, it is a general tool that needs, in order to be effective, a strong local characterisation considering the different types of areas with high values or landscape-territorial fragility and their potential integration with the various types of plant.

Table 1 – Authorisation procedures for RES plants (Gestore Servizi Energetici, 2019)

SOURCE	SINGLE AUTHORISATION	SAP	COMMUNICATION
Biomass and biogas	Biomass plants > 200 kW Biogas plants > 250 kW Cogeneration plants > 1 MWe (or 3000 kWt)	Biomass plants ≤ 200 kW Biogas plants ≤ 250 kW Cogeneration plants 50 kWe -1 MWe (o 3000 kWt)	Plants in existing buildings, on-site exchange regime Cogeneration plants ≤ 50 kW
Wind	Wind energy plants ≥ 60 kW	Wind energy plants < 60 kW	Single generator on existing roof (height ≤ 1,5 m, diameter ≤ 1 m) in areas not protected by the Legislative Decree 42/2004 "Code of cultural and landscape heritage"
Solar Photo-voltaic	Photovoltaic plants > 20 kW	Photovoltaic plants ≤ 20 kW Photovoltaic plants on buildings (overall covered surface not exceeding roof surface)	Plants in adherence to existing roofs (not changing the building shape and not exceeding the roof surface) in areas not protected by the Legislative Decree 42/2004 Plants on existing buildings or their adjacent areas, with on-site exchange regime (≤ 200 kW), in areas not indicated as "zone A" by the Ministerial Decree 1444/1968[2]
Geo-thermal	Any power	-	Plants in existing buildings, on-site exchange regime (≤ 200 kW)
Hydro	Hydroelectric plants > 100 kW	Hydroelectric plants ≤ 100 kW	Plants in existing buildings, on-site exchange regime (≤ 200 kW)

Source: Gestore Servizi Energetici (Energy Services Manager), Regional regulation for the electric generation from renewable energy sources (state of the art on the 31st of December 2018) – Translation and formatting by the Authors.

In parallel with the mentioned authorisation procedures, RES plants are sometimes subjected to a "Screening" procedure and an Environmental Impact Assessment (EIA), depending on their characteristics and their potential negative impact on the territory. Also in this case, the thresholds to identify energy plants to be assessed are defined by the national authorities, with the possibility for the local bodies to make changes on the basis of site-specific considerations.

[2] *The Ministerial Decree 1444/1968 identifies "zone A" as the areas of a built environment with historical, artistic or environmental values.*

The most comprehensive Italian regulatory intervention on the matter, the Legislative Decree 152/2006, indicated for the main renewable energy plants with a total nominal power greater than 1 MW, with the exception of hydroelectric plants for which the limit is 100 kW, the need to undergo the Screening procedure and to discuss the related outcomes in the Conferenza dei Servizi. The general criteria indicated by the Decree for the assessment of the projects pertain two aspects. The former refers to the characteristics of the projects in terms of accumulated impacts with other interventions, use of natural resources, waste production and risk of accidents. The latter is related to their location, considering the "environmental sensitivity of the geographical areas that may be affected by the impact of the projects" . However, this first transposition of the European directives was contested by the EU, which indicated that a mainly dimensional approach, linked to the installed power threshold values, was not sufficient. The Ministerial Decree 52/2015 accepted the remarks of the European Union and modified the regulation by indicating a series of additional parameters to be taken into consideration for the Screening. The main goals of these regulatory amendments are to prevent the artificial fragmentation of a project into smaller interventions below limits, and the reduction of the thresholds by 50% in sensitive areas. Nevertheless, some of the indications contained in the decrees still raise doubts about their effectiveness in preventing negative territorial impacts of the plants. For example, concerns are about the accumulated impacts being considered only for projects in the same category, and the lack of clearly defined distances to be respected in relation to areas of historical, cultural and archaeological importance.

The most recent regulatory intervention on the subject is the Legislative Decree 104/2017, which introduced further changes to the regulation of the EIA procedures in accordance with the European Directive 52/2014. Among these, the most significant concern the extension of the project types under the State jurisdiction, the changes to procedures to make them more effective and faster, the compulsoriness of the EIA for projects falling within the natural sites of European interest of the Natura 2000 Network, the modification of the contents of the Environmental Impact Studies, the possibility of requesting a Single Environmental Measure to replace all the authorisations, the variation of the characteristics of the environmental monitoring to make it more effective (Arona, Latour, 2017; Gamba, 2017). A further significant element is the increasing importance attributed to the active participation of stakeholders, with an explicit reference to the opportunity to develop public surveys on projects (see Legislative Decree 104/2017, art. 13).

In most cases, the competence for the authorisation and EIA procedures is under the regional jurisdiction, when not handled directly by the State, and the option to delegate this decisional power to sub-territorial bodies was chosen only in few cases (Gestore Servizi Energetici, 2019). The same local authorities, with regards to the

environmental assessments, often exercise the possibility of reducing or increasing the thresholds for identifying RES projects to be subjected to the procedure (Gestore Servizi Energetici, 2019).
Based on the framework described in this paragraph, the Regions emerge as the territorial body most involved in the diffusion of RES plants in Italy, with decisive authorisation powers (competence on the authorisation and EIA procedures for several RES plant typology) and planning responsibilities (definition of unsuitable areas, strategies and actions to meet burden sharing requirements).

ENERGY RAZIONALITIES AND CONFLICT FACTORS

European energy policies aim at the maximum diffusion of RES plants, also by imposing the implementation of binding targets in terms of energy efficiency and levels of production from renewable sources (see Directive 2009/28/EC, Directive 2012/27/EU and EU Directive 2018-2001). The importance of these supranational commitments can be read, with reference to the authorisation procedures, as an implicit expression of a prevalence which the theme of renewable sources gained at the European level. In this regard, Italian jurisprudence has had different attitudes not always characterised by a balance, based on case-specific evaluations, between the two instances highlighted in the previous paragraphs. In some cases, the need to obtain the maximum diffusion of RES systems prevailed, while at other times the theme of landscape protection was predominant, or at least of equivalent importance[3]. On several occasions, the administrative court of local authorities had to clearly state that the promotion of RES cannot be considered separately from other instances, and that project evaluations should aim at an overall positive environmental balance (See Piemonte Regional Administrative Tribunal, Sentence No. 219/2011).
On the one hand, it is the same definition of environmental assessment given by Italian legislation that indicates its "purpose of protecting human health, contributing with a better environment to the quality of life, providing for the maintenance of species and maintaining the reproductive capacity of ecosystems as essential resources for life" (See legislative Decree 152/2006, art. 4, comma 4, letter b (quote translated by the Authors from the original Italian version)).

[3] See Basilicata Regional Administrative Tribunal, Sentence n. 869/2014. Molise Regional Administrative Tribunal, Sentence No. 985/2006 states that "The fact that at a general level - even at European level - there is a favor with respect to wind energy does not imply that the plants must be authorized sic et simpliciter, even in the presence of a landscape constraint on the area" (quote translated by the Authors from the original Italian version).

On the other hand, landscape protection is one of the fundamental principles of the Italian Constitution (See article 9, Italian Constitution, stating that "The Republic […] protects the landscape and the historical and artistic heritage of the Nation" (quote translated by the Authors from the original Italian version)) and it is important to underline that its protection, considering both geomorphological and socio-cultural aspects, is first and foremost guaranteed by the active participation of all the administrative bodies involved in authorisation and EIA procedures. In addition to the local authorities, these are mainly the Ministry of Cultural Heritage and Activities and its peripherals structures, the Superintendencies.

It has to be mentioned that sentences already stated that landscape conservation must be contextualised in the territory, defining the provisions as not legitimate if, for example, they protect the landscape and the interests of the agricultural market in a generalised and preventive way at the expense of the need to favour the maximum diffusion of renewable energy plants and, therefore, energy systems which are more sustainable from an environmental point of view. Following this reasoning, a recent ruling (March 2017) relating to an authorisation requested for the construction of a photovoltaic roofing system in a landscape protected area is emblematic: the authority in charge of the final decision on the project gave a favourable opinion on the realisation of the plant considering as disproportionate and illogical some of the requests made by the Superintendency. According to the ruling, these requests provided rigid and unfeasible indications of landscape protection, penalising the need to encourage the production of energy from renewable sources.

As a matter of fact, the relevance of the themes just described is explicitly highlighted by the same national regulatory instruments seen previously, and by their transposition and development at regional level (e.g. guidelines, landscape plans, ...) which regulate the diffusion of RES plants. Therefore, notwithstanding the problems already expressed in the first paragraph, the aim is for a distribution of the plants that takes into account the specific local potentialities and criticalities of the territories, and that is concentrated in the areas where the capacity to use the available energy resources is higher. However, the territorial regulatory interventions on the matter have not always managed to obtain a balance between the different rationalities indicated. This is mainly because the provisions on unsuitable areas and burden sharing were issued separately and were only partially complementary, not being able to provide clear and unambiguous indications for the development of the sector. Furthermore, the same application of the concept of unsuitable areas has seen over the years very different interpretations by the parties in charge to decide on the feasibility of the projects, adding uncertainty for operators and investors. However, there seems to be a constant tendency, from a jurisprudential point of view, to automatically reject the requests to build a renewable energy plant in an unsuitable area, without the need for a specific

detailed assessment of the project by the competent body. Therefore, the correct definition of these areas takes on even greater importance.

It is important to note that for some types of plants it is particularly difficult to find a mediation between the different instances and this situation has evident impacts on the market of renewable sources and on their distribution. For example, despite their high efficiency and production potential, most of the offshore wind farms proposed in Italy since the early 2000s have not been built to date, and some of them had to face decennial authorisation procedures. In a number of occasions, the rejection of the project was in contrast with the favourable opinions expressed in the EIA, highlighting a significant difference between the criteria used for the assessment by the various bodies involved in the decision-making process (whether they be technical-scientific or political) (Legambiente, 2015). The result is that, although the energy produced in Europe by wind farms in recent years has increased up to a mean coverage of 15% of the total electricity needs in 2019, Italy stands at 7% (Wind Europe, 2020) in spite of the significant availability of this resource on the national territory (ANEV, 2020). On these topics, also the standpoint of the associations traditionally interested in landscape and environmental issues diverges. To exemplify, among Italia Nostra and Legambiente, two of the most recognised organisations of these sort in the Italian context, the former focuses more on landscape preservation and opposes to several plants proposed next to sensitive areas, meanwhile the latter pushes more towards a rapid and widespread transition to carbon-neutral energy production.

The above-mentioned wind farms are also often cited to underline an additional aspect related to the conflicting relationship between the diffusion of RES and the landscape protection, that is, community acceptance. Outside the areas defined as to be protected for their objective (and/or recognised by law) environmental values, the difficulty of outlining common acceptability standards for the introduction of a RES plant in a given context often emerges (Mejia-Montero et al., 2018). Mejia-Montero states that "the multifunctionality and heterogeneity of landscapes makes it impossible to create a comprehensive institutional system to regulate all areas, or to reach general consensus on visual fit and compatibility between specific REPS with specific types of landscapes. This is also due to perceptions and evaluations varying in geographical, cultural, and socioeconomic contexts, traditions, and personal experiences".

This represents a further factor of uncertainty in the authorisation procedures, linked to the interpretability of the concept of landscape compatibility, which influences the choices also at a political level and which recalls the importance of collective participation in the processes. In addition, it should be noted that the different types and sizes of RES plants raise significantly different reactions by the communities. For example, unlike wind farms, small-medium photovoltaic plants have in recent times gained a commonly shared status of acceptability so that "the presence of photovoltaic

systems on the top of buildings - while innovating the type and morphology of the roof - is no longer perceived as not aesthetically pleasing visual factor, but as an evolution of the constructive style accepted by the system and the collective sensitivity"[4]. Nonetheless, the path towards a wider acceptance of the changes that RES plants will cause in our familiar and consolidated landscape is still long and there will be better chances for the new energy landscapes to be embraced by communities if their key role in achieving a sustainable development is acknowledged (Selman, 2010).

TOWARDS AN ENERGY SYSTEM INTEGRATED WITH THE TERRITORY

The methods of production, distribution and consumption of renewable energy that have consolidated in this first phase of transition towards a de-carbonised economy show an overall unsatisfactory integration with the respective territorial contexts (Hastik et al., 2015; Huber et al., 2017; Leibenath et al., 2015). This aspect becomes even more important considering some of the objectives of the recently drafted Italian proposal for an Integrated Energy and Climate Plan (Ministero dello Sviluppo Economico, 2018), such as promoting the transition of the energy system from a centralised to a distributed one, simplifying authorisation procedures for the revamping, repowering and energy production optimisation of existing plants, integrating the various energy systems (electricity, gas, water) using current infrastructure with effective solutions from both an economic and an environmental point of view. Achieving these objectives requires an upgrade of the tasks of the various public bodies operating on energy and environmental issues, in order to better coordinate their respective activities. Furthermore, this coordination will be increasingly important because a key point indicated by the Plan is to identify the areas which have an energy potential since they cannot be suitable for other functions. So, the new focus will be on finding the suitable areas instead of considering only the unsuitable ones.

In the previous paragraphs we have seen how the unsatisfactory integration between plants and territory is due to the need to achieve the increasingly ambitious European targets for the production of energy from renewable sources and to the difficulties in

[4] See Lombardy Regional Administrative Tribunal, Sentence No. 496/2018, concerning the project of demolition and reconstruction of a roofing in a landscape protection area, stating that "[...] the legislative favor for renewable energy sources requires to concentrate the absolute impediment to the installation of photovoltaic systems [...] only in "unsuitable areas" [...], while in other cases, the compatibility of the photovoltaic system [...] must be examined taking into consideration the fact that these technologies are now considered normal elements of the landscape" (quote translated by the Authors from the original Italian version).

developing solutions that take into account the location factors and the relationships that each RES plant has at different territorial scales.

To improve the quality of these plants, it should be adopted a planning and design approach that integrates the complex of strategic and regulatory measures in the energy sector with paths of co-design solutions and with the assessment and monitoring of the related energy, territorial and landscape results. This approach requires acting on different types of instruments, both on a territorial and urban scale, where they have a planning character, and on a neighbourhood or building scale, where they mainly have a design character.

First of all, the construction of an energy system which is sustainable and integrated with the territory requires the identification and quantification of the current and foreseen energy needs and then a comparison with the potential energy production from renewable sources. With this background it will be possible to appropriately evaluate the RES plants to be built and the relative energy powers, the areas in which to locate the plants, their technical and aesthetic-formal characteristics and their construction and management methods. For example, to build biomass plants in agricultural areas (see Fig. 5), it is necessary to consider factors such as energy demand and supply, energy infrastructure, livestock load, surface and groundwater quality and their availability for irrigation and management of farms, rural landscape and historical-architectural features of the farmhouses.

To facilitate these operations, the MASU and the related guidelines should be integrated with other planning tools of knowledge and intervention, primarily landscape-related, such as Regional Landscape Plans and Landscape Observatories . An example is that it is necessary to verify the indications for plants location with the territorial and urban plans (both general and implementation plans), in order to benefit from a more detailed knowledge of the territory and to improve sharing in the choices of suitability of RES plants at local level. The identification of unsuitable areas can also become an opportunity for a comparison between the requests for the use of common goods such as water, soil and landscape for energy production, and the levels of acceptability expressed by the communities concerned. In this way, MASU could contribute to the realisation of decision-making processes capable of identifying shared solutions through the involvement of the population during their elaboration and application. In this regard, the activation of co-design processes is a very useful tool for building effective and shared decision-making processes, through which the problems affecting a population can be immediately addressed by sharing the solutions.

Figure 5 – Geothermal and Biomass integrated plant in Castelnuovo Val di Cecina (Italy).

Source: *http://www.pisatoday.it/green/energia/castelnuovo-valdicecina-impianto-geotermia-biomassa.html*.

The detailed declination of the location choices can take place according to two complementary paths. The former path aims to indicate in detail, for each type of area referring to the categories established by state regulations, the specificities that determined its protection, the related non-suitability criteria and the types of plant deemed unsuitable. The latter path, on the other hand, aims to identify the typical local elements that need to be protected. Both paths require a high knowledge of the territory and an in-depth definition of the values to be preserved, in order to improve the quality of the project's evaluation making it more comprehensive and rigorous, and therefore less arbitrary.

It is therefore necessary to develop flexible and incremental tools that, in addition to giving indications on the location possibilities of RES plants, specify evaluation, design and technical-management criteria. At the same time, they should produce guidelines on energy landscapes and recall good practices, in order to encourage the construction of these plants in conformity with the characteristics of the places and looking at the possible formation of new social and landscape identities. Finally, these tools must be flexible to review the criteria and location conditions over time, in order to improve their integration with other planning and design instruments, considering the monitoring results of these indications and taking into account the continuous and rapid technological and design advancement of RES plants.

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