

LOCAL ENERGY PRODUCTION: ARE WE HEADING TOWARDS RURAL DISTRICTS OF RENEWABLE ENERGY?

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SUMMARY

The aim of the paper is to get light on the processes of local production of renewable energy sources in Italy. 'Local' means in this case either small scale power plants as under the control of local bodies like municipalities, farmers or cooperatives. From the quantitative point of view (number of cases and quantity of produced energy), it surely deals with a very small phenomenon. Nevertheless, some aspects of local organisation of energy provision deserve great attention: integration with the territory, in environmental and social terms; involvement of the public administrations; attempts to comply with an energy self-sufficiency ideal; the consumers' involvement in the energy production and in initiatives of energy saving. The paper will focus on the organizational models of the local production of energy, identifying different ideal types, that will be confronted with some exemplary cases taken throughout Italy. Particular attention will be given to the 'district' organizational form, thinking it offers good criteria for showing positive and negative aspects of the renewables increasing wave.

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1 INTRODUCTION

Rural territories are undergoing significant changes. The relentless search for competitiveness with regards to productive systems, the numerous functions of rurality, the alternative ways of organizing agricultural activities, conflicts in the use of soil are only some of the issues that have been current in the past few years.

Among the causes at the base of these problems we can see that a fundamental role is played by the energy crisis, characterized by a multi-dimensional nature. The climatic changes, the scarcity of fossil fuels, international conflicts are the issues that surround the energy problem. These issues have global implications since they influence international policies and relations, the stipulation of contracts, agreements, protocols, the supremacy of nations and the changing geopolitical configurations.

These issues have repercussions also on the communities and local territories, where the consequences of the energy crisis can be seen in a concrete manner. Agreements are put into practice, energy supply and distribution systems are deconstructed and then reconstructed, savings and recycling policies are carried out, climatic changes all take place at a territorial level, generating consequences on agriculture and on the availability of water. And moreover, the costs of energy supply, above all for the industrialized sector, have increased more and more.

For all these reasons, in our country we are witnessing the search for ways of producing renewable energy. Despite the fact that it is not a quantitatively important part of the national energy system yet, the production of renewable energy, especially in the rural areas, is carried out in a variety of ways: individual farming entrepreneurs who invest in the photovoltaic sector or in the production of biogas energy production, public/private consortiums active, above all, in the field of biomass cogeneration, individual towns that promote energy savings initiatives and are involved in the generation of electricity through small installations spread out on the territory, citizens and company that self-organize in cooperative forms to create photovoltaic systems or small eolic installations, industrial associations that collaborate with small businesses to realize projects related to investments in energy production.

The purpose of this work is to understand whether an embryonic districtual organization of renewable energy production in rural territories is hidden within the numerous forms synthetically illustrated in the study.

The idea of a rural energy district is becoming more and more popular among local administrators, sector-specific associations, farming industries, and recycling industries. Nonetheless, even if at present there are numerous agreements for the creation of districts, they seem to be aimed more at obtaining public financing through regional laws that offer incentives for the creation or consolidation of these districts, rather than at an actual districtual organization of production.

The idea of a district, in fact, can reflect two different, yet complementary, ideas: the political attempt to artificially recreate the conditions that led to the considerable success of industrial districts, meaning the district as for planning means, at the same level as other units such as territories, metropolitan areas, regions.

The other idea could be a natural process of districtualization starting at the bottom level working upwards, the result of socio-cultural heritage or the intuition of local actors that organize local production systems focusing their action on the anchoring of socio-territorial resources.

In the next section, we will analyze the concordant elements between the energy districts and the industrial districts; in the other section, on the other hand, we will outline the theoretical aspects that are more inherent to the idea of rural energy districts.

2 WHAT CONSONANCE BETWEEN INDUSTRIAL DISTRICTS AND ENERGETIC DISTRICTS?

The study on energy districts cannot be carried out without taking into consideration the tradition of socio-economic research on industrial districts. This type of study, in fact, includes many theoretical elements and empiric findings that are at the base of the idea of energy districts. The typical characters of industrial districts, therefore, should be identified, along with the elements that have made the districtual model a particular form of development that takes shape in certain territories according to localized specificities.

Literature on industrial districts is vast and articulated. Literature was developed during the 70's and 80's, with the pioneering works by Becattini (1979) and Brusco (1982), and since then the district issue has been at the center of theoretic reflections, empiric research and public policies.

The most important character of the districtual model, that is often implied to the others and not clearly expressed, is well described by Seravalli and Guenzi with the expression “functionally unitary complex”. The expression means that the districtual model has interdependent characteristic traits, thus the lack of only one of these traits would make the model unfeasible or uncertain. These inseparable characteristics, as declared by Maccabelli and Sforzi, are “*the productive apparatus in a strict sense; [...] the institutions that connect the productive apparatus in a strict sense and the districtual community as a whole; [...] the formation and the transmission of values that are at the base of districtual behaviour*” (1997, pp. 259 – 262). The factors that characterize the districtual model are settled in the local societies and are difficult to transfer elsewhere: for this reason, those studying the districts interpret the process of economic development above all as a social process, redimensioning the idea of predominance of the technical process. The elements put into light by Maccabelli and Sforzi can be made clear by saying that the districtual model pivots on two dimensions:

one dimension relative to the production system and one socio-cultural dimension. The first dimension regards the organizational modalities relative to how production is carried out, as it is hinged on small, high specialized production companies that rely on the division of their work at a local level and the reduction of transaction costs as the competitive factors at the center of the system's efficiency. The second dimension regards the social and institutional bases that allow for production modes to become concrete. Widespread consent, coherent business strategies at a systemic-territorial level, public policies supporting organizational forms and production-reproduction of knowledge and contextual values (Garofoli, 1994) are the constants of industrial districts.

The territory is an active part of the development process because it includes the socio-cultural factors that are at the base of the process itself and that allows for certain organizational and productive models to reproduce.

One weak element present in the studies on industrial districts regards the static nature of explicative models: in fact, these studies tend to analyze the dynamics that led to the phenomenon after it has occurred, highlighting the already consolidated phenomenon without placing any attention to the on-going processes that show embryonic forms of districtual organization. In accordance with Touraine (1973), we can say that the typical studies on industrial districts bring to light the reproductive and preservative aspects, how the district form reproduces socially and what resilience strategies to use when faced with the turbulence of global markets. These studies do not, however, take into consideration the production of new *historicités*, and do not perceive the processes that constitute the new forms of districtuality.

With regards to this, the French school has dedicated a great deal of attention to the so-called *milieu of innovation* (Aydalot, 1986; Perrin, 1989). The idea of milieu of innovation draws on the studies on districts, introducing dynamic elements of analysis. Attention is focused on innovation processes, on them becoming systems in the development of territories in order to understand how organizational forms or innovative technologies can be established within the areas. The new aspect of this approach is represented by the willingness to go beyond a typical explicative analysis of literature on districts to understand the development and innovation processes underway and identify the potential milieu.

The characteristic elements of the milieu of innovation are the *district economies*, the *proximity economies* and the *synergy elements* (Camagni, 1994). The district economies promote the industrial Marshall atmosphere, capable of generating forms of contamination and emulation inside the system, helping small businesses in the innovative processes. The proximity economies, on the other hand, reduce transaction costs, thanks to the exchange of information within informal contexts characterized by tacit knowledge. The synergy elements increase the local innovation through interaction among the various actors, the public-private partnerships, consortium organizational forms. These three elements reduce the uncertainties

present in the innovation contexts by limiting to a minimum those obstacles to change and by increasing the creativity of the local fabric.

Starting from these considerations, Aydalot (1986, p. XI) defines the milieu of innovation as *“all the relations that take place in a given geographic space and that lead a production system to become a unit; a group of actors, a system of industrial representation and culture that generates a dynamic process of localized group learning and that acts to reduce uncertainty in the innovative processes”*.

If potentially innovative territories need to be identified, Aydalot suggests using the milieu concept in a normative way. The milieu characteristics outlined by the French school are the result of research carried out the field. The research process has followed the traditional formulation of hypotheses, of empiric findings and the return to the theories to reformulate the general theoretic picture. Using the analysis on the milieu in a normative way means returning to the theories and using the constant elements of the milieu to identify the level of advancement of a territorial system.

The characteristic elements of the milieu, interpreted in a consequential manner, can, for example, be used to evaluate the advancement stages of a territorial system. To begin with, a districtual atmosphere could spread within this territory, thanks to the district economies; afterwards, the proximity economies could develop and then, as a form of final consolidation of the local socio-productive fabric, the structured organizational forms of synergy among the actors of the system could be created.

As was noted by Camagni (1994), the milieu of innovation approach does not feature a development model, but a sort of meta-model that indicates the constants of local development processes that must be different from each other. If an innovation process must take place on a territory, it must follow a direction that differs from the other innovation processes, but it will feature some conformities with the meta-processes typical of the milieu: for example, the development of local resources, the synergies between public and private, the ability to internalize responsibilities, knowledge and extra-local practices, the permanent innovative nature of the system. These elements can be more or less present within a territory, but at the same time local policies can be identified to stimulate development.

The identification and evaluation of actual or potential milieu of innovation is not simple. It is difficult to identify the indicators that allow for retroactive reasoning on the structural characteristics of territorial systems. Moreover, it is even more difficult to understand districtual forms related to the renewable energy sector using statistic methods for the novelties represented by the sector, the speed of the diffusion process and the lack of elaborations suitable for the purpose. Surveys carried out on the field are required, along with case studies, since they can help identify the single examples from which generalizable trend lines can be traced. It is not easy at all to manage the countless forms of organization of renewable energy production. In any case, understanding the various organizational

modalities that characterize the territories is useful, because each modality could hide a potential districtual model.

3 THE RURAL DISTRICTS OF RENEWABLE ENERGIES: A THEORETIC TRACE

Starting from the considerations of the previous paragraph, we can now begin to outline the salient features of an energy district. As already said, the term district can reflect either the political attempt to artificially recreate the conditions that allowed industrial districts to be successful, or the districtualization cases starting from the bottom level, the result of socio-cultural heritage or the intuition of local actors.

The idea of milieu of innovation is important in the search for energy districts because we are faced with a process in evolution and we should try to understand the elements of dynamicity and repeatability. The method used to identify a milieu is very useful in the search for actual or potential energy districts. The typical features of an energy district, the constant development characteristics fundamental for recognizing a possible district, will, therefore, be outlined. Afterwards, we will describe the heterogeneity of organizational models in the production of energy that are becoming popular in rural territories and within which the presence or absence of the outlined constant characteristics will be evaluated. The case studies will then be systemized according to the most important characteristics, following the typology reduction method. This last step identifies the general trends in the territorial organization of renewable energy production, apart from the districtualization. There will be cases, in fact, that will go beyond the districtual model, following partially or totally different lines.

The criteria used to identify the rural energy districts can be sorted out according to the following fundamental characteristics:

- Attention to the development of various renewable sources that can be integrated among themselves. The diversification of energy sources and their diffusion on the territory are fundamental elements because they impose organizational choices that follow the logic of a district and that contrast the organization of energy supply founded on monoculture and on centralization; the diversification of the sources, in fact, allows for each territorial resource to be developed and to produce widespread and flexible knowledge.
- The resulting characteristic is the tendency to create innovative processes relative to the combination of technical, entrepreneurial and organizational factors. In this sense, the idea of a technological regime should be recalled to interpret the local innovations as a combination of technical, social and economic factors. The technological regime is intended as being all the production modes, the types of knowledge, the commercial and administrative relations that are within a territorial system put together (Ploeg van der,

2006; Dematteis and Governa, 2005). Technological regimes can change slowly, thanks to the innovations introduced by the actors interacting within the system;

- Attention to the secondary effects of energy production. The complexity of the energy problem makes it possible for solutions found for substituting fossil fuels and reducing atmospheric pollution to generate unexpected negative counter-effects. This is the case of biofuels, the subject of an intense debate regarding their side-effects. In a districtual scheme, the following must be taken into account: the ecological backpack of the system (the energy result, the ecological imprint, the ecological load), the disposal of possible waste, wastewater and fume treatment, visual impact, the control of induced traffic;
- Involvement of energy users in the decision-making processes, in the distribution of energy, in the energy savings measures. Involving citizens is fundamental to increase those social factors that are required for the development of the district. Confidence in the system and solidarity are important factors for the virtuosity of the district: local initiatives for energy savings, for example, must have the approval of and involve local populations if they want to have significant and tangible results;
- Development of collateral activities such as the training of maintenance workers, environmental education, integration with the companies involved in the production of energy goods. In order for the energy districts to have repercussions on the local economy, investments must be made to help young businesspeople and in the innovation of small businesses. The production of components for energy production systems, the training of system installers, maintenance workers and operators working in the energy saving field, along with cultural activities such as increasing awareness within local communities regarding environmental issues are significant factors for the realization of the “multiple dividend of renewable energy” (Lorenzoni, 2005).

The picture that has been traced shows how the rural dimensions and the districtual characteristic with regards to energy recall two important elements: the self-organizational ability of local communities and the principle of self-efficiency in the environmental field. As far as self-organization is concerned, much can be read in literature on endogenous development and the local project (Magnaghi, 2000; Perna, 1998). Self-organization is a typical characteristics also of industrial districts: in generic terms, self-organization means that the communities can be considered as areas capable of implementing an integrated energy policy. This means, therefore, that there is a political scheme aimed at integrating various energy sources and offering them externally in a unitary manner. In our case, there are two significant district aspects: internal integration and the ability to negotiate externally. As far as the ability to negotiate is concerned, reference should be made to the principles of bio-regionalism, of the short chain, of environmental justice, which are all found in literature (Becattini e Omodei Zorini, 2002; Tiezzi et alia, 2007; Bonaiuti, 2005). This aspect brings to light the ability of the territory to organize itself in the production and supply of energy but

also the possibility that the territories start up with policies for the self-containment of energy flows, by activating short energy chains and producing energy according to the local demand. In this case, the energy districts are characterized by the ability to interpret the socio-territorial integration in-depth by creating not only a network between institutions and businesses, but also by involving consumers in the decision-making and productive processes. The result in this case is the idea of proximity between production and consumption.

These criteria are very demanding and trace a horizon that might seem quite utopian. This does not mean, however, that these criteria are useless in the analysis of concrete cases according to the well-known process of ideal type construct; in this case, the rural energy district, whose empirical response is always partial.

The principle of self-organization does not question the global economic structure, but concentrates on giving an economic and political identity to rural territories that then become capable of negotiating externally in a compact manner, without influencing the competition that exists among the various territories. The second option, environmental self-sufficiency, questions the power relations among territories while claiming the non-dependence of rural areas on the economic and political forms of urban areas, and, consequently, a radical change in the dominant ways of production¹. A principle of autonomy begins to take shape (Castoriadis, 1995), in contrast to the typical paradigm of dependency, meaning that the rural territories are able to control the resources required for the reproduction of production processes by themselves.

There are two significant distinctions between industrial districts and energy districts theorized in this way, and both make reference to the concept of co-production.

In literature, co-production indicates two different processes: the first is the re-incorporation of nature in production systems, a typical process used by farms that are able to reach high levels of autonomy in finding reproductive resources. In territorial terms, co-production refers to an idea of autonomy in energy production: by borrowing from the agricultural-farming world we could say of local energy supremacy. Reference is made, therefore, to a tension featured by the rural areas in building economies capable of self-reproducing or being partially autonomous with respect to the market dynamics. (Ploeg van der, 2006).

The second refers to the re-incorporation of consumers in the production systems, consumers that become co-decision makers with regards to how production should be carried out in

¹ The two outlooks are not so utopian, if an energy expert such as Giuseppe Ghepari, Scientific Director of the Department of fusion, technologies and nuclear energy of Enea says how “the vast portion of the Italian territory that is characterized by a low density of inhabitants and by abundant natural resources can come closet o total energy autonomy is such a short time with respect to zones with a high urban concentration and quality of life and productivity [...]. These areas would represent a very important tool for defending the environment and the quality of life, and would be fertile round for experimenting sustainable technologies. They would favour the development of small and medium-size businesses that could export the new sustainable technologies, especially in developing countries, generating resources and creating opportunities. The cost for the communities of these autonomous islands is less than the total cost of large eolic or solar systems, with the problems relative to environmental impact and excessive costs for the system due to intermittent functioning, for which our territory has no significant natural resources” (in *Il Mulino*, year LVI, number 434, 2007, p. 1080).

accordance with their needs. This second type of co-production is possible thanks to organizational innovations, like short chains of production and consumption, the introduction of consumers in company organization, the negotiations between consumer groups and producers (Watson, 2004).

4 ENERGY PRODUCTION IN RURAL AREAS: CASE RECORD

More Than one-hundred experiences regarding the production of renewable energy in rural areas were censused to check for the presence of rural energy districts.

The heterogeneity of the cases that emerged from the census shows how the local dimensions assumes various characteristics even as far as energy is concerned. The wide range of experiences censused is not easy to simplify. The desire to schematize and simplify the distinction among the various experiences implies a certain degree of reductionism that forces certain features to be highlighted to the detriment of others.

First of all, a brief excursus of the case records taken into consideration is given in order to have an initial general outline to use to classify the cases.

4.1 The small towns

There are small towns that are very active with regards to green energy production and energy savings. The cases are well-known at a national level: for example, Varese Ligure, Monsano, Calice Ligure, Specchia, Roncoferraro, Prato allo Stelvio, Provaglio d'Iseo. Provaglio d'Iseo is exemplary and paradigmatic case of how the synergy among local administrations, city-owned enterprises, local banks, citizens and small businesses can be fundamental for the development and diffusion of innovative activities at a local level. The town administration developed the "Easy Photovoltaic" project, creating a company with a public majority share to manage the installation of photovoltaic solar systems on the roofs of 200 homes in the town, taking advantage of the Energy Account incentive.

The agency, thanks to the financing of the Banca di Credito Cooperativo di Pompiano, realizes the systems and handles the bureaucratic and informative activities. Those accepting the installation of panels on their roof will immediately see their electric bill reduced to half of what it was for 20 years, while the realization costs of the system were sustained entirely by the agency. The remaining 50% of the Energy Account earnings goes to the city-owned company, that remains the beneficiary of the financial incentives realized with the produced energy that is then sold to the GSE. After 20 years from installation, the system is repaid and becomes the property of the citizen. As of now, the first 100 systems have been financed and some of the younger people of this town, hired for this purpose, have been informing all the

families of Provaglio d'Iseo about the project in order to get more people to adhere to the project and obtain new installation sites.

The difference in these towns is made by the activism of the mayor or some city administrator. These are small experiences, often not related to surrounding administrations, but very virtuous and inserted in wider networks (Comuni virtuosi, Recosol, Rete del Nuovo Municipio). They are considered as being interesting experiences since they represent laboratories for good practices. The structural defect of these experiences is that they do not come about because of deep-set territorial factors, but are often tied to administrators who have personal charisma, meaning they have technical knowledge, connection with extra-local networks, leadership ability over the local populations, and are often destined to end along with the commitment of the person who acted on their behalf. These experiences are hardly ever able to become a system within a larger territory also for these reasons. Their introduction within extra-local networks is definitely useful for exchanging knowledge and practices, but their punctiform diffusion throughout the national territory makes them isolated experiences at a local level.

4.2 Small-scale districts

The small-scale districts are experiences having a fair dimension, and are tied, above all, to the use of wood biomass, but feature important characteristics of districtual logic (Mendini et al, 2007). The brief description of an exemplary case is useful to outline the characteristic traits of these types of organizations for local energy production.

In Campo Ligure and Rossiglione, in the Ligure Apennine regions, two wood biomass furnaces were built to use for heating public buildings (hospital, schools, town hall, swimming pool) and some private apartment buildings. The wood used for the production of heat comes exclusively from the local woods that had been abandoned until only a few years ago. Thanks to the constitution of a consortium of owners interested in restoring their woods and to the interest by the Mountain Community, recovery began of the wooden resources with the cutting and cleaning of the undergrowth and the construction of environmental engineering works. Quality wood, instead of being transformed into chips to use in the furnaces, is recovered by local craftsmen or purchased by a Genoa-based shipyard that produces boats. As a result, a small district was born with the following workers: woodsmen, craftsmen, technicians that take care of the furnace, local farmers that contribute with their pruning wastes.

The role of institutions is very important, above all, the Liguria Region and the Mountain Community that used this experience as a pilot system for other similar territories. .

4.3 The districts

These are experiences carried out on a sub-provincial and inter-city level that comply with most of the characteristics hypothesized as being typical of energy districts. Perhaps the most significant experiences are the FortoreEnergia company in Lucera and the Heating District Tcvvv company in Tirano. The first experience is located in the Dauno Appenine and in Capitana. This company was created for the installation of eolic blades, almost as a local reaction to the appropriation of the wind resource by multinational companies. Two mountain Communities are parte of this organization along with a series of companies related to the agricultural-food sector. The district philosophy guides the FortoreEnergia company: a small company was founded for the in-loco construction of components for the installation of eolic blades, a consumption consortium is being put together to create a short energy chain, the farmers were involved with the “agri-energetic company” and “wind farms” project. The repercussions were significant from an employment point of view: 80 young college graduates work in FortoreEnergeria and about 200 persons work in the related fields (20 workers for the construction of cement poles, 30 workers in the production of aerogenerators, 30 workers for the installation of aerogenerators, 20 workers for the electrical modules, 30 workers for the maintenance of eolic parks).

The second experience, on the other hand, is related to the use of biomass for the production of thermal hear and electric energy. The Tcvvv company of Tirano has 300 partners: local businesses, a bank, some towns, the Alta Valtellina Mountain Community, a forest consortium, the local lumberyards and some private citizens. By using the scraps from the local lumberyards and the wooden biomass coming from the pruning and cleaning of the woods, the Tevvv company supplies heat to about 700 consumers in Tirano and 400 users (including apartment buildings) in Sondalo. As far as the collection of pruning scraps is concerned, a collection service was organized and is managed by the Onlus Ambiente Valtellina volunteer association. The Tevvv company has installed a 70 KW photovoltaic system and has participated (35%) to the creation of the Bioenergia Villa Srl company for the realization of a biogas production plant, with the participation of the Biovalt cooperative of farmers and breeders, the town of Villa, the AEM company of Milan, Coldiretti of Sondrio and Banca Intesa. Even in this case, the local repercussions as far as employment is concerned were interesting: a network of maintenance workers was created (plumbers and electricians), the forest sector was reinforced with the participation of an Onlus (volunteer), young college graduates were hired for managing the energy stations.

The two experiences were interesting also because of their attempt to integrate energy production and consumption. The Tevvv allowed private consumers to become part of the company. Fortore is the driving force behind the creation of a real consumer consortium.

4.4 The meta-districts

The meta-districts are political-administrative operations led by sector-specific associations or local institutions (at a provincial or sub-regional level). The idea is to put into a network various actors of the production fabric around an innovative idea in which to invest for relaunching entire economical sectors. The Veneto region gives incentives for the creation of meta-districts or chain aggregations, in order to realize networks of businesses working in the same field. The Bio-construction meta-district is a paradigmatic example of this tendency. Founded in accordance with the Venetian law nr. 8 of 2003, its purpose is to place the entire construction chain into a long-term network in order to expand the bio-construction market. The District works in synergy with the objectives of the strategic plan drawn up by the Province of Treviso whose purpose is to reform the economic and social model by enhancing the human capital, innovation and the development of quality systems.

In this outlook, construction is one of the production sectors with the highest environmental impact, using 45% of the produced energy, producing 50% of pollution and 50% of waste.

The Treviso-based district of Bio-construction represents a development possibility for the construction industry, through counting on the innovation of materials, techniques and work. The Veneto Region – with regards to the above mentioned law on districts – has approved and co-financed numerous projects set up by the Bio-construction District, including the one relative to the “Guidelines for sustainable architecture”.

Another example, always in the Veneto region, is the meta-district of renewable energy in Belluno that has taken advantage of the Venetian law on districts to activate financing with local businesses. The Belluno-based district, while still in a planning phase, foresees the synergy between producers of renewable energy and the small-medium local businesses for the diffusion of renewable energy on the territory. The Belluno-based district appears, as of today, as being an attempt to unite local interests to obtain financing from the region. The first steps, in facts, including providing financing to individual businesses that intend on investing in research and addressing their production activities in the field of renewable energy. Moreover, many funds have been set up for the creation of synergies among the businesses adhering to the meta-district, promoting informative meetings, debates and the exchange of reciprocal knowledge.

4.5 Individual experiences

Cases relative to individual businesses are very common, above all, in the agricultural sector. There are companies that integrate their own activity with the installation of a production system for green energy and heat. Often, these systems are represented by photovoltaic system on the roofs of stalls (see the agricultural cooperative “Valli Unite” in Valle Curone

(Carrosio 2007a), province of Alessandria, or the Agricoltura Nuova Social Cooperative in Rome), or the mini-eolic system (for example, the “Il Duchesco” agritourism center in the Tuscany Maremma park, or the Emmaus Community in Foggia) or the wooden biomass and biogas systems. In particular, the production of energy from biogas is becoming more and more popular in intensive breeding farms that use this technology to face the problem of excess nitrogen and nitrates produced by animal dejections. The Lombardia region, in particular, is giving incentives for the construction of these systems through consistent free grants. Interesting cases of biogas production can be found in the Cremona area (for example, the Agrosocietà Eurosia of Alfonso Rinaldi in Formigara and the zootechnical company Lanfredi in Acquaneгра Cremonese). As far as renewable energy is concerned, farmers are often helped by the sector-specific associations that try to offer new opportunities to a sector requiring new productive and functional diversification.

4.6 Group experiences that began from the bottom level

There are several experiences that took place starting from the bottom level, meaning small initiatives that were developed by citizens. These initiatives are often related to the organic agricultural world and local movement networks. An interesting example is represented by the 80 organic farmers of the Gargano area who have come together to form the Biogargano association. Each farmer is going to install one eolic blade on his/her land in order to achieve energy self-sufficiency and create a short energy chain for the distribution of green energy to those living on their territory. The main problems concerning these networks are, above all, access to credit, but also the difficulty tied to obtaining the technical and planning knowledge required and, thus, the difficulty in becoming part of European projects to at least start to create pilot experiences. Other frequent cases are popular shareholding for the installation of photovoltaic panels.

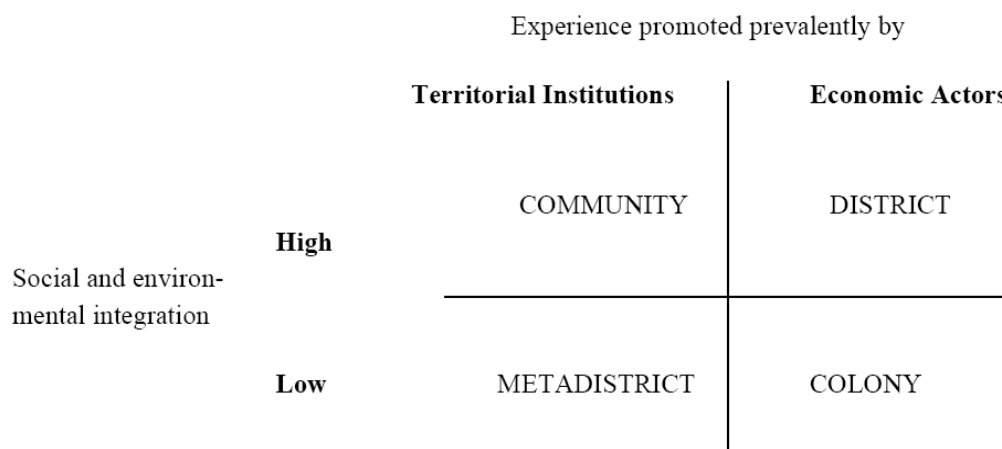
An interesting case exists in the province of Cuneo where a small town has already taken its first few steps by collecting the money required to construct a photovoltaic plant and has given life to various initiatives in the Cuneo area by networking social cooperatives, farms and citizens (for further information, visit the website www.solarecollettivo.it).

5 ENERGY PRODUCTION IN RURAL AREAS: A TYPOLOGY

A first standard of classification regarding the local energy production experiences emerges after reviewing the various cases. This standard is based on the economic, political and administrative nature of the most dynamic actor involved in giving life to the innovative process on the territory in question. A second standard can be added that is tied to the socio-environmental dimensions. The level of socio-environmental integration of the energy

production experience is interesting in order to distinguish those operations that are deeply set in the territory and capable of involving and activating the participation of local communities, from operations that are the result of initiatives coming from local elite groups that are not well integrated or of interest to economic groups that have nothing to do with the local reality. The combination of these two criteria can lead to a typology that can be used to guide the case records: projects and plants promoted by territorial bodies (municipals, mountain communities, province) and projects and plants promoted by economic bodies, combining sector-specific associations, consortiums, public and private utilities, social enterprises, banks. Bodies typical of the second category are definitely present in the first (territorial bodies), but the project leadership belongs to the smallest local body, or to groups of local residents supported by the town administration.

In the same way, we can find public bodies in the second category (economic bodies), but in a complementary or indirect role, for example, as shareholders of the consortium created for the realization of the plant. There is a significant weave of concrete experiences so a discriminant analysis is not easy to carry out. The ideal-typical procedures is justified also a construction factor of a reasoned sample of cases from which the unquestionable features of an energy district can be abstracted and then defined.



Typology of the local experiences of energy production

Figure 1. Type of energy production experience

The above indicated typology clear representative of four ideal-types. This means that the situations have been brought to an extreme to make the scheme diriment. Most of the cases will be halfway, or transversal. In any case, a clear distinction should be made in order to identify, if necessary, the contamination spaces.

5.1 *Community*

The experience of *community* refers to those cases in which the participation driven mainly by local bodies strongly involved the population and created fair interest in the environmental effects of the systems. Often, organizations made up of citizens are the force behind the process, according to the *co-producer*, principle, meaning that the consumer becomes also the producer (photovoltaic roof, biomass systems for tele-heating managed at a local level with collaboration between forestall consortiums and local institutions). Or, it could be that the local institutions count on local energy production and implement participated processes to identify the territorial potentiality. In order for a case to be considered as belonging to this typology production is necessary, but so consumption awareness. Citizens are involved and participate (changes in lifestyles, energy savings also in private homes). Small towns active in the environmental and energy field are part of the logic type, along with the small renewable energy districts that play on the revitalization of local traditions and exploit autochthonous resources, the multifunctional farmers, with a watchful eye on the ecosystemic problems and integrated with the consumers through the short chains and direct sales.

5.2 *Metadistrict*

The *metadistrict* experiences are the result of economic planning by administrative elite, with the consent and support of business organizations. They are created thanks to public financing, with the intent, in this specific case, to make the energy sector the pivot for innovation in the economic fabric and to stimulate economic and employment growth. At the beginning, socio-environmental integration is low, because it deals with operations planned at the higher levels, without any impulse coming from the local communities. Moreover, the attention paid to the energy question is more the result of business convenience than environmental sensitivity. The logic behind this experience is given by the possible business inherent to the ecologic modernization of production and residential structures. The risk is that the renewable energy sector and the environmental issue in general could be exploited to promote new speculation in the construction field or for the construction of new production plants. Nonetheless, these are interesting cases since they put into action knowledge and practices that are sometimes virtuous. The role of citizen organization, of environmental associationism and base movements in these cases can be to create the conditions for the rooting of these experiences to the territory, by promoting the participation of the population to the drawing up and realization of innovative projects and an ecosystemic logic of economic enterprise, with attention paid to those side-effects that are often ignored.

5.3 *District*

A district is configured that local economic actors take action at a tendentially equal level (horizontal network), with strong complementarity at a technical level and a good ideological understanding. There is a local economic fabric ready to take advantage of the opportunities offered by the renewable sources and acts through social and environmental integration, in spite of being able to activate financing and supralocal partnerships. The rooting of business activities within the social fabric and on the territory prevents indiscriminate exploitation of natural resources and avoids profit distribution mechanisms to be implemented (through planned agreements, employment increase at a local level, thanks to raw material producers). The synergy between public and private actors is important, as is action by intermediate institutions, such as local banks and sector-specific associations. Consumers can participate either directly or indirectly. In the first case, through participation in energy production companies or consortiums, in the second thanks to the participation of public companies, democratically legitimized. According to the idea of pronsumer, consumers can actively participate in the district economy by organizing the demand as a group and directing the decisions of the business fabric in this way (Holloway, 2007).

5.4 *Colony/Individual businesses*

In the last box, we can find two different typologies, united by the low degree of socio-environmental integration and by the impulse given primarily by the economic actors. In the case of a *colony* we have external economic actors, the global energy players, (Pichierri, 2002), who identify the new forms of energy as a pure business in which to invest. The local community is detached or hostile; the local bodies are not able to understand the risk of colonization and everything that it involves as far as economic dependency is concerned. A monocultural type of exploitation along with a supralocal technical-commercial integration prevails. The old center-periphery mechanisms can easily be activated for finding the raw materials and labor forces. The marginal areas that in the past were invested by dependency processes (emigration towards the cities, exploitation of raw materials through extraction in caves, areas where large infrastructures stand that have frozen local endogenous development favoring hetero-direct development) are preferred areas for the installation of systems and plants that had not effect on the territory. In areas where the population is very old, there are few persons with working activities on the territory, agriculture has been expelled from the market and the businesses will find little resistance and a low level of intellectual ability from the local bodies in evaluating the risk. The fragile areas are the territories most at risk.

In the case of *individual businesses*, we have individual economic actors that invest in renewable energy to increase their own income, diversify production or comply with

environmental regulations. These actors are not deeply rooted on the territory, they carry out their activities with a business spirit and they autonomously confront themselves with the market: they are businessmen who, according to sociological terms, are said to be little embedded in the social fabric (Granovetter, 1998). This is the case, for example, of farmers who invest individually in biogas, without activating production consortiums. These experiences are sometimes positive, if carried out small-scale and do not have a big impact at a socio-environmental level. Moreover, they activate professionalism and are able to promote constant innovation in a local context. Nonetheless, they are not able to create a local system of energy production and consumption, to network similar experiences and promote the participation of local communities.

5.5 Case studies in the typology

Let us now try to place concrete cases in the typology:

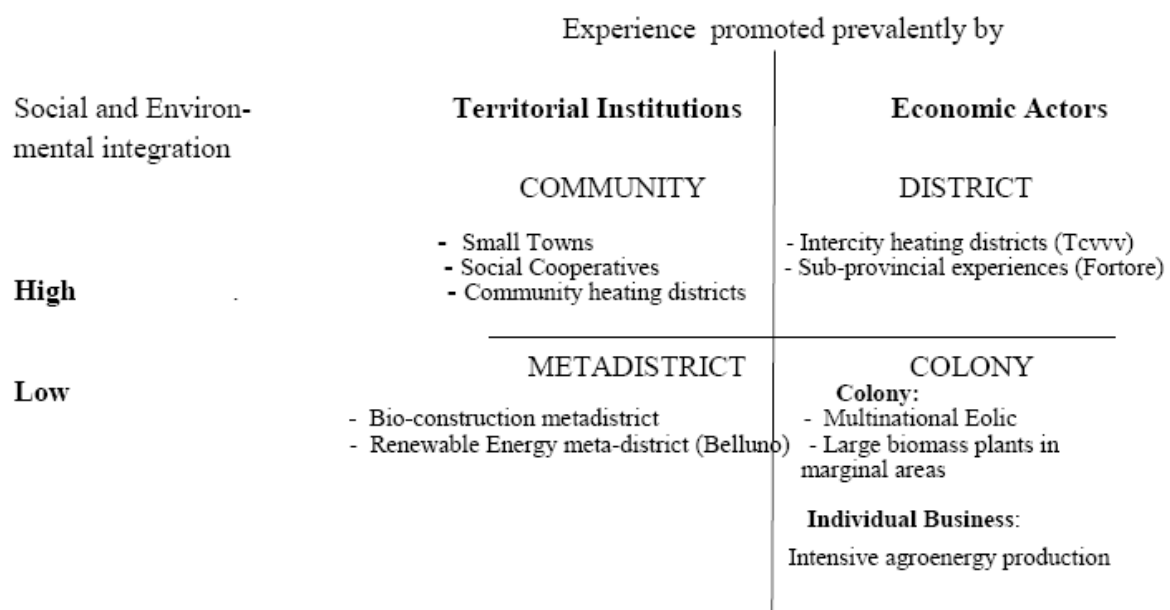


Figure 2. Application of typology to some of the censused experiences

Placing the cases is not simple and may seem to be arbitrary. The real experiences are so articulated that any attempt to schematize them is difficult. It is probable that the censused cases are hybrid forms that can be placed between the various quadrants.

Much of the renewable energy race can be placed in the bottom part of the typology, in particular in the quadrant called Colony/Individual Businesses. The large concentration of eolic systems in Southern Italy, the large biomass plants, the intensive agroenergy production, many of the large photovoltaic installation respond to a centralization logic of energy

production. There is a large split from the local communities and territories and there is no space for social control of production. Consumers are left out of production processes and the territory is reduced to a blank sheet capable of hosting large plants. The experiences promoted by individual businessmen are different, because they are smaller and spread on the territory. Nonetheless, even these experiences lack integration.

The most virtuous formula from a socio-environmental point of view could be in the middle, between community and district. This is the ideal placement for the movement, popular above all in the Lombardia region, active in the promotion of solidarity-based economy districts (Biolghini, 2007). The community experiences are very virtuous and innovative, but they need to be contaminated by/contaminate the outside and include vaster territories. IN this process of expansion it becomes difficult to maintain organizational modalities that are perfectly coherent with the intent to socially control production systems, to promote the direct involvement and participation of the population and to maintain a socio-production system that is highly ecological. The district cases, however, improved by the innovative charge of community experiences, could be a feasible alternative with respect to individualistic or centralized solutions. The dimensional logic becomes important to identify the boundaries of energy production/consumption. Experiences that are too small are difficult to use to reach the primary objective set by many actors, even in an instrumental way, with regards to renewable energy: reduce dependency on fossil energy and start up the post-oil energetic transition (Lorenzoni, 2005; Hess, 2006). Nonetheless, experiences that are too large do not work at a social level and do not allow for action to take place with regards to energy savings. The big concentrations, apart from the environmental justice issue, do not allow for control starting from the bottom level and follow a productional logic that is contrary to consumption containment.

6 CONCLUSIONS: TOWARDS RURAL DISTRICTS OF RENEWABLE ENERGY?

The district form, as described in the second part of the study, is embryonic in some experiences that are moving towards a logic of integration among the various diversified sources on the territory and are placing the greatest attention on public/private partnerships. More than districts in the strict sense of the word, they are innovation paths that are being configured in the form of a district. The path is still long and must be consolidated, but there are many signs that point to this direction. Of course, we must better understand what influence these processes have on all the production modalities of renewable energy at a national level. As already mentioned, the large companies take the lion's share as they move in a logic that is clearly different with respect to the one outlined, exploiting and even speculating on incentives designed for the diffusion of renewable energy. Nonetheless, in

literature we can find many examples of how *global players* are forced, for a series of factors, to become embedded in the territories and work in collaboration with institutions and those representing local interests (Pichierri, 2002). As a result, those experiences that are furthest from the districts, may in the long run, be forced to integrate with local fabric.

The identified district cases, apart from their quantitative importance, are significant experiences: on the one side, because they show the possibility of producing energy through unprecedented forms of organization, and on the other, because they also put into light the utmost importance of maintaining a difficult balance between economic, environmental and social defensibility.

The issue regarding consumption and the involvement of users in the district experiences becomes important for these reasons: local production can be compatible with the proper use of resources available in situ only if we start with the conviction that energy savings is as noble a source of energy. Important measures can be taken with regards to savings only through the involvement of citizens within a territorial transformation project that involves production, social and social organization modalities.

The concrete involvement of consumers is the missing link even in the most innovative experiences. The presence of users in the corporate organization is important, but is not enough to create innovative organizational forms, like consumption consortiums and purchase groups for local energy. In this sense, we feel that institutions must stimulate the active participation of consumers within an innovative path at a territorial level.

The world of social cooperation, probably, could have a role of mediation between production and consumption by providing innovative management models. Social businesses, in fact, are now reflecting on their functions and are trying to identify new professional markets for their partners and users. These business forms are now becoming interesting in the issue of local development (Carrosio, 2007b; Osti, 2007). In fact, due to their social and environmental objectives, they could be guarantors of the systems by giving a socio-solidarity based connotation to the local economic fabric.

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