

The Italian outstanding dilemma between fossil stocks and renewable resources: two Apulian case studies

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Abstract: After analysing the trends in the Italian production of photovoltaic energy in the last decade, the study focuses on a contradiction inherent in the strategy papers of the Italian energy framework: in order to achieve the coal phase-out by 2025, such papers provide, on one hand, the consistent implementation of renewable energy generation and, on the other hand, a greater use of natural gas, considered an essential “transition energy” for the national energy security over the medium term. The dilemma between the use of traditional or renewable energy sources is particularly evident in Apulia, “homeland” of the Italian photovoltaics and, at the same time, major producer of coal-based thermoelectric power as well as future EU energy hub for natural gas. Within this region, the research study reviews the cases of two municipalities located in the province of Lecce: Melendugno and Melpignano. Only 17 km away from each other, the two municipalities host diametrically opposed energy projects: in Melendugno a top-down unilateral decision of the national government is allowing the landfall of the TAP (Trans Adriatic Pipeline) on one of the Apulian stretches of coast of greatest environmental value, against the will of the local community. Conversely, in Melendugno a Community Cooperative for the self-generation of photovoltaic energy, aiming at promoting a renewables’ culture, fostering the domestic electricity generation and creating new job opportunities, is making a positive contribution to the improvement of the quality of life of the whole local system.

Key words: Melendugno, Melpignano, Trans Adriatic Pipeline, community cooperative, photovoltaic energy, Italian energy strategy.

1. INTRODUCTION

In 2018, Italy was the sixth largest producing country of photovoltaic energy worldwide (20.1 GW of installed capacity, 4.2% of the total), following China, Japan, USA, Germany and India [1] (p. 14). In the same year, the above source represented 7.8% of the national power generation (see Table 1), equal to 289,708.4 GWh, covering 86.3% of the Italian requirement [2]. Traditional thermoelectric power plants still provide 66.5% of the total production, even though such rate is lower compared to 2017 (70.2%). 68.1% of the thermoelectric power generation comes from natural gas, that is gradually replacing existing solid fuel power plants [3] (p. 36).

The significant yearly percentage increase seen in the number of photovoltaic power systems and in the installed capacity during the first five years 2009-2013 (see Table 2) is due to a government incentive mechanism (regulated by the Ministerial Decrees called “*Conto Energia*”- Energy Account), introduced in 2005 and in force until July 2013. Such incentive mechanism was the result of a national trend supportive of an increased use of alternative energies, that allowed the country to comply with the internationally recommended environmental sustainability policies and start reducing the significant reliance on imports

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of fossil fuels that has always characterized Italy, due to the lack of mineral resources [4] and as a consequence of the referendum that banned the use of nuclear power in 1987.

Table 1. Italy: gross electricity production in 2018

Sources	Production (in GWh)	On total production (%)
Hydropower	50,502.8	17.5
Wind power	17,716.4	6.1
Photovoltaic power	22,653.8	7.8
Geothermoelectric power	6,105.4	2.1
Traditional thermoelectric power	192,730	66.5
TOTAL	289,708.4	100.0

(Source: our processing on data provided by TERNA S.p.A., TERNA Group [2])

Table 2. Italy: breakdown of photovoltaic power systems by number, power and annual production from 2009 to 2018

Year	Number of systems	System yearly increase (%)	Installed capacity (in GW)	Installed capacity yearly increase (%)	Annual production (in GWh)
2009	76,593		1.264		677
2010	160,963	+110.2	3.592	+184.2	1,906
2011	335,358	+108.3	13.131	+265.6	10,796
2012	485,406	+44.7	16.785	+27.8	18,862
2013	596,355	+22.9	18.185	+8.3	21,589
2014	648,196	+8.7	18.594	+2.2	22,306
2015	687,759	+6.1	18.901	+1.7	22,942
2016	732,053	+6.4	19.283	+2.0	22,014
2017	774,014	+5.7	19.692	+2.1	24,378
2018	822,301	+6.3	20.120	+2.2	22,654

(Source: our processing on data provided by GSE [5] and Legambiente [1])

By analysing the data in Table 2, it is clear that, notwithstanding the increasing number of systems, the annual production trend from 2014 onwards (except for 2017, a year with particularly favourable radiation conditions) remains stable around 22 thousand GWh, indicating that the new installations are only able to compensate an equal loss of efficiency of older systems. Such production joins self-consumption (that is the photovoltaic electricity production not fed into the national grid but used at the production site), that in 2018 was equal to 5,137 GWh [5].

On the whole, the end of the incentive scheme and the lack of a comprehensive legislation on self-consumption in renewables, aiming at setting out the rights of prosumers and energy communities (user groups – families, SMEs, public bodies – that join together to produce their own “clean” energy), cause an essentially static situation in the photovoltaic sector. A definitely positive fact is that 7,839 Italian municipalities out of 7,914 (99.1%) have in their administrative territory at least one photovoltaic system, showing that such form of energy generation has now spread in the whole country [1] (p. 8).

Among the Italian regions, Apulia holds the record for production (3,438 GWh, or the 15.5% of the national total) as well as for installed capacity (2,652 GW, or 13.2%) and its density (137 kW/sq. km, compared to an Italian average of 67 kW/sq. km), being therefore the leading producer of solar energy in Italy. The province of Lecce leads the ranking of Italian provinces providing 3.9% of the yearly national production [5]. In Apulia, particularly in the province of Lecce, such leadership also led several issues, above all connected to ground-mounted systems and their high rate of agricultural land consumption. For this reason, in the new Regional Energy Environmental Plan (*PEAR, Piano Energetico Ambientale Regionale*), now under approval, Apulia is mainly committed to roof-mounted photovoltaic systems or, alternatively, to installations in post-industrial premises or in areas already impaired by previous manufacturing activities.

At the same time, it is a top-ranking region in terms of thermoelectric power generation from fossil fuels: actually, in 2018, Apulia, with 21,852.7 GWh (11.3% of the Italian total) was the second largest producer after Lombardy (34,253.6 GWh; 17.8%) [2]. Such primacy is due to the giant South Brindisi (Cerano) ENEL thermoelectric power plant (installed power 1,280 MW), that was designed in 1980 and became fully operational after 16 years of disputes with the local territorial system. Since 1964, the territory had already been hosting the North Brindisi coal-fired thermoelectric power plant in Costa Morena (640 MW of gross installed power), idle since December 2012 [6].

The main purpose of the National Energy Strategy (*SEN, Strategia Energetica Nazionale*), launched in 2017 in compliance with the Paris Agreement, is the decarbonisation of the traditional thermoelectric sector by 2025, aiming to reach a production of 184 TWh from renewables by 2030, of which 72 TWh from photovoltaics [7, 8]. A forecast roughly in line with the above document (187 TWh from renewables, of which 74.5 TWh from photovoltaics) is also maintained by the Integrated National Plan for Energy and Climate (*PNIEC, Piano Nazionale Integrato per l'Energia e il Clima*) 2021-2030, a document that all EU Member States need to put in place according to the new EU Clean Energy for All Europeans package (the so-called Winter Package) [8, 9]. As Legambiente points out [1] (p. 13), in order to achieve such production levels Italy would need a significant average yearly increase of photovoltaic energy that is not consistent with the standstill seen in the last five years (see Table 2).

Both the SEN and the PNIEC, besides forecasting the increase of renewables, intend to base the Italian path towards decarbonization on a greater use of natural gas, considered an essential “transition energy” for the national energy security over the medium term [7, 9]: indeed, the SEN states that, if on one hand the growing use of renewables allows to reach the internationally set environmental sustainability targets in terms of CO₂ emission reduction, on the other hand it could create imbalances in the electricity system, such as overgeneration as well as cross-zonal and inter-zone congestion, leading to an increase in the cost of services [7] (p. 119). Such “pro-natural gas” position of the Italian government was highly criticized by the environmental organizations Greenpeace and WWF Italia. The latter, through a study commissioned from the research company REF-E in October 2017, showed that it would be possible to quit coal by 2025 without increasing the gas capacity [10].

On closer inspection, the government intent to transform Italy into an EU energy hub for natural gas, primarily to reduce the dependence on Russia (which provides more than 40% of Italian total imports) was already clear in the SEN of 2013 [11], which discontinued the incentives for photovoltaics [12].

In order to increase Italy's receiving capacity - which in 2013 was composed of a grid with more than 31,000 kilometres of gas pipelines connected to four supranational infrastructures, two regasification plants and two regasification terminals [13] -, the Italian government in the following years granted the final authorization for two new projects:

- 1) the IGI Poseidon gas pipeline (*Greece-Italy interconnection*), also known as EastMed (capacity 10-15 billion m³/year), to connect the offshore fields in Cyprus, Egypt, Lebanon and Israel to Greece and Italy;
- 2) the TAP (Trans Adriatic Pipeline), within the so-called Southern Corridor. The Southern Corridor, with a length of about 3,500 kilometres, is composed of the Southern Caucasus Gas Pipeline (starting from the Azerbaijani field Shah Deniz II in the Caspian Sea and crossing Georgia), the TANAP (Trans Anatolian Gas Pipeline) crossing the Turkish territory and, lastly, the TAP (Greece, Albania, Adriatic Sea, Italy). The latter stretch, whose total estimated cost is approximately EUR 45 billion in private investments, for 50 years will bring to Europe 10-20 billion m³/year of natural gas. The gas pipeline can be regarded as the final result of the intense political and trade relationships between the Azerbaijan, a country with great hydrocarbon production and export potential, and the EU, a significant importer of energy sources [14, 15].

The abovementioned projects involve the landfall of both gas pipelines on the Adriatic Southern coast of Apulia, respectively in the Otranto port and in the seaside of San Foca of Melendugno, only 20 kilometres away from each other. While the authorization procedure of the IGI Poseidon pipeline has been completed without any opposition of the resident population, the national interest in the construction of the TAP was opposed from the beginning by the local administration (Apulian regional authorities, municipality of Melendugno), tour operators and environmental organizations. They contest the national decision of making Apulia the future EU energy hub for natural gas. Actually, in the immediate surroundings of the new pipelines' landfalls there are two “high environmental risk” areas pursuant to

Law n. 384/1986: the Brindisi area, hub of the national thermoelectric generation, and Taranto, with its former Ilva integrated steelworks (now Arcelor Mittal). Both the industrial sites are still involved in judicial investigations and acute conflicts with local population due to severe environmental and health damage, now extensively documented [see, *inter alia*, 16-18].

This paper intends to bring to light two topics not widely discussed by the scientific production: 1) the TAP case, resulting from the unilateral top-down decision of the Italian government imposing a traditional energy infrastructure considered by the Melendugno community dangerous, intrusive and, in any case, contrary to the current local sustainable development; 2) the case of the first Italian Community Cooperative for the self-generation of photovoltaic energy, based in the Municipality of Melpignano (see Table 3). The comparative analysis between the two current energy infrastructure projects, located in the province of Lecce only 17 kilometres away from each other, is conducted through a wide collection of information on the field and a review of new media sources, aiming at identifying, in an exemplary manner, weaknesses and strengths of the present Italian energy policy as well as the outstanding dilemma between the use of fossil fuels and renewable energy.

Table 3. Trans Adriatic Pipeline (TAP) and Melpignano Community Cooperative: an overview

	Trans Adriatic Pipeline (TAP)	Melpignano Community Cooperative
Year	2012	2011
Stakeholders	<p>“PRO TAP” TAP Consortium; UE, Italy, Greece, Albania, Azerbaijan</p> <p>“NO TAP” Municipality of Melendugno and at least 40 municipalities from Salento, Province of Lecce, Apulia Region, No TAP Movement</p>	Mayor, promoting committee (71 members), BAI, Legacoop
Strategies/actions	<p>“PRO TAP” Diversification of national and communitarian import sources of methane; international reputation of Italy as “European Energy Hub”</p> <p>“NO TAP” Local project for sustainable local enhancement</p>	Production and management of photovoltaic panels by local community, new employment opportunities within the local system; construction and maintenance of public water dispensing equipment; promotion of awareness on renewable sources
Resources/tools	<p>“PRO TAP” TAP Consortium: € 4.5 billion UE: investments Italy: international agreements, National Energy Strategy orientation, identification of normative tools to be applied to TAP</p> <p>“NO TAP” Communication campaign (information on institutional and non-institutional websites, auditing, demonstrations, mottos, songs...); legal actions</p>	State aid “ <i>Conto Energia</i> ” (Energy Account) until 2013; regional funds 2018

2. LITERATURE REVIEW

Already in the 1980s, the international literature [see in particular 19, 20, 21] and later the Italian one [see, *inter alia*, 22-26] featured several studies on the conflicts created by the construction of “great disasters” [27], as defined by Hall, also with reference to energy generation and distribution plants [17, 18, 28, 29]. Recently the analysis is focusing on transcalarity of contemporary environmental groups [30]. Such groups, through a proper mix of physical and “virtual” media, tend to evolve from specific episodic protests to stable and lasting opposition able to expand its reach from the local context to a national

and/or global landscape. The structure of the contemporary environmental conflicts can be analysed through the Turco's "staging method" [31] (pp. 177-178), identifying a three-stage dynamic: 1) the *tension stage*, when, during the first random protests, dissonant positions concerning issues at stake and areas of interest more or less clearly defined emerge among actors; 2) the *conflict stage*, during which disputes are specified and defined. After a longer or shorter incubation, the conflict bursts, structuring itself in terms of type and organization; 3) the *reticulation stage*, during which the dispute grows developing new outbreaks, extending to new areas, bringing new stakeholders into play and evolving in a permanent opposition. Of course, within each stage, specific events, actions or behaviours may, from time to time, ease the conflict (bringing it to the previous stage) or contribute to its further implementation (bringing it to the following stage).

Concerning the spread in Italy of pilot sustainable experiences, since 2007 Legambiente has been proposing "*Comuni rinnovabili*" (Renewable Municipalities), an annual report available on a dedicated website [32], presenting an effective and concise overview of the kaleidoscope of promising, environmentally-friendly development paths undertaken locally.

3. WHEN THE LOCAL COMMUNITY TURNS AGAINST FOSSIL FUELS: THE CASE OF MELENDUGNO

In Italy, starting from the 1960s, the construction of economic infrastructure of national significance (major industrial complexes, motorway networks, etc.) deeply changed the relation among form, function and meaning of many rural spaces: previously "marginal" local systems, characterized by the traditional slow pace of an essentially rural life, suddenly crossed a sort of "stargate" that placed them in a scenario in which they took up the role of "disputed" territories [33] among new types of land use and strong exogenous actors that upset their long-standing environmental, social and economic balance. Even if very belated compared to North America [34] (p. 186), the raising environmental awareness of the public has recently led local actors to react to such top-down decisions, heating up conflicts that delayed/stopped the construction of "great disasters", as Hall define them [27].

National governments, despite the many conflicts on the subject featured by the Italian spatial planning and extensively covered by literature, (see § 2), keep underestimating a very important element: in the new millennium, the activists' "no" is not any longer a simply pointless, uncritical, prejudicial, aspatial opposition to general themes such as gas, nuclear energy, incinerators, etc., grounded on the mere evocative power of an alleged danger. On the contrary, the environmental groups' opposition is increasingly steadfast and systematic (documented and supported by wide and relevant technical, economic and legal expertise), targeting specific top-down actions currently in progress in particular territorial areas. Such actions are opposed as believed inconsistent both with local bottom-up enhancement sustainable projects in progress, supported by environmental groups and resident communities, and with planetary balances, as in the case of the TAP in Melendugno. The municipality, with 10,008 inhabitants, located on the Apulian Adriatic coast, after the intense concreting caused by resorts and "holyday home" tourism (that concerned many other locations of the Lecce province during 1980s) [35], in the last decade has been promoting a more balanced relation between recreational enjoyment and local resources. The evolution from "asset territory" to "project territory" [36] (p. 35) is proven by the 400,000 tourists registered on average every year and by the "blue flag" obtained by Melendugno from 2010 to 2018. The municipality, which was awarded national competitions on best practices, is well-known for its policy on sustainable use of water resources, reflected in the creation of a phytodepuration basin for the recovery of wastewater. It is strongly committed to protect: 1) the coastal landscape, with its seven protected areas among which SCI (Sites of Community Importance) and SPZ (Special Protection Zone), in the 20 kilometres from Vernole to Melendugno and Otranto; 2) the archaeological excavations in the Roca Vecchia area, dating to the Bronze Age; 3) the rural landscape, rich in dry-stone constructions (*masserie, pajare, walls*) [37] and dominated by 50,000 monumental olive trees, of which about 1,900 will be uprooted for the construction of the TAP [38].

The above infrastructure will stretch for 860 kilometres across Greece, Albania and the Adriatic Sea to reach San Foca beach in the territory of Melendugno, where it will connect to an 8-kilometre underground section until reaching the decompression station in the municipality inland. It will occupy a 12-hectare plot of land and will be composed of two 3.5 MW gas-fired thermal machines to heat the gas and two 10-metre chimneys for the disposal of combustion smokes. The station will be connected to Snam

national grid through a 55-kilometre link in the countryside of Mesagne (Brindisi). The owner of the gas pipeline, designed by Saipem (Eni's engineering company for the construction of infrastructure) is the TAP Consortium, headquartered in Baar, Switzerland. The shareholding structure is the following: British Petroleum (20%), Socar (Azerbaijani State-owned oil company: 20%), Snam (20%), Fluxys (19%), Enagas (16%), Axpo (5%) [39]. Consortium TAP's private investment amounts to € 4.5 billion.

Since February 2012, the NO TAP Committee (created by the joining of several local environmental groups), the municipality, led by the Mayor Marco Potì, together with a large number of municipalities of the province of Lecce and the Apulian regional authorities, have been constantly opposing the project. For deeper insights please refer to previous studies [40-42], here we wish to highlight the autopoietic capacity of local actors to process the different disruptive inputs "pro TAP" at national level, carrying out a complex set of actions and instruments that, according to Turco's method [31] (pp. 177-178) (see § 2) we can chronologically divide into three stages:

1) *Tension stage*. On February 2012, the announcement of the first public conference organised by the TAP Consortium to communicate the selected landfall led to: a) the birth of the NO TAP Committee; b) the approval of 40 municipal resolutions stating the local communities' opposition to the pipeline; c) the decision to present the rebuttal arguments to the Environmental Impact Assessment (EIA) of the TAP Consortium through a document titled "*Contro-rapporto di VIA*" (EIA Counter-Report" [38]. The Report is the result of the work of an expert team that, for no consideration, prepared an in-depth analysis of all the weaknesses found in the pipeline project. The study, available online and which systemically presents all the environmental pressures associated with the implementation of the works (destruction of the Posidonia meadows, uprooting – with bedding-out and following replanting by the TAP Consortium – of thousands of century-old olive trees, risk of accidents due to the decompression station, etc.), thanks to its expositive clearness, became a milestone of an increasingly wider and informed opposition; d) the organization of several public awareness-raising initiatives, especially in summer, with the participation of many artists from Salento, also writing songs to spread the "resistance" against the gas pipeline.

2) *Conflict stage*. In May 2015, pursuant to the Italian Decree Law no. 133/2014, the so-called "*Sblocca Italia*" (Unlock Italy), the Italian government led by the Prime Minister Renzi approved the single authorisation measure enabling the construction and pursue of the work, replacing any other formal act of consent from the local administrations involved in the procedure; such measure unlocks the project and states the public utility, undeferrability and urgency of the infrastructure. Such decision: a) triggered a complex legal battle through administrative procedure against the Italian State and the TAP Consortium, which ended with unfavourable outcome for the local actors (No TAP Committee, municipality of Melendugno, Apulian regional authorities) and established the lawfulness of the construction site set-up in San Basilio as well as the consequent uprooting of the olive trees, symbol of the Apulian identity; b) gave birth to the *Presidio Permanente di San Basilio* (San Basilio Permanent Stronghold) in March 2017, located near the construction site and aimed at preventing the olive tree uprooting. At the same time, the protesters created the NO TAP Movement (also joined by the Committee), a new insurgent subject which, as most of social movements in their first stages, appeared as a collective, flowing, totally informal initiative. By then, the conflict involved the whole population, was known at national level, mobilised experts, schools and especially a great number of "NO TAP" mothers, that created a Facebook group [43] and led, together with their children, a protest in front of the trucks for the olive tree transport.

3) *Reticulation stage*. From early 2018, the protest movement has reached its full maturity in a legal, informative and transcalar perspective. A number of complaints filed with the judicial authority by the activists and the Mayor of Melendugno led to the initiation of various criminal investigations, still in progress, concerning offences allegedly committed during the gas pipeline construction. The offences of disfigurement of natural beauties, violation of the Italian Cultural Heritage Code and pollution of the aquifer of San Basilio [44] are alleged against several suspects of the TAP Consortium and the companies involved in the construction site set-up.

By now, the NO TAP Movement has reached a wide and complex structure allowing the drawing up of a busy schedule of workshops and conferences, with qualified speakers, information stands (within a more general Infotour, whose stopovers are listed in the portal and in the Facebook page) concurrently with local high-profile events (such as "*La Notte della Taranta*" event in Melpignano – see § 4) and the opening of an Infopoint in Melendugno.

Activists always participate, both physically and virtually, to the demonstrations of other near and far movements (Coordinamento No Hub del gas in Abruzzo, Coordinamento No Triv in Basilicata, NO TAV Movement, Movement against the Tuxpan Tula gas pipeline in Mexico, etc.). The portal www.notap.it offers a systemic view of the Movement commitment, providing its history, goals and actions. The website offers visitors the opportunity of interacting with the Movement on social networks (Facebook, Twitter, Youtube), provides an e-mail address, physical addresses (Infopoint and *Presidio Permanente*) and detailed information on current activities, with constant reminders of the universal identity values of this fight.

4. MELPIGNANO: SOLAR PHOTOVOLTAICS AS DRIVING FORCE OF A SHARED AND SUSTAINABLE LOCAL DEVELOPMENT PATH

An economy depending on an unprofitable agriculture, a poor exploitation of resources and/or potentials, social and economic inactivity, conservative and traditional territorial organization and ways of life: these features are common to a large part of the thick Italian settlement plot, rich in small-sized centres (with less of 5,000 inhabitants). Despite such vulnerability, in recent years many villages have been showing their intention to become sustainable and responsible communities, able to open themselves, include, look with hope beyond the decline and change tack, without shutting off from the rest of the world. To that end, it turned out to be fundamental the action of several local collective subjects that, from below and in aggregated form, were able to launch a kaleidoscope of shared and successful projects of sustainable development. This is the case of the association Borghi Autentici d'Italia (BAI), a network of more than 250 Italian municipalities (mainly small-sized) that, while being aware of their problems, through the collaboration among communities, administrators and economic and cultural actors, aim at enhancing their resources, transforming them into opportunities for the creation of new capitalization paths [45, 46].

Within such network, Melpignano plays a role of unquestionable importance. The municipality, located in the province of Lecce, has 2,211 inhabitants and its Mayor, Ivan Stomeo (in office since 2010 and re-elected in 2015), was the President of the association BAI for two consecutive three-year terms, until April 2019. A real model of "innovating" administrator, with skills similar to those of the entrepreneur described by Schumpeter [47], he was able to bring into Borghi Autentici d'Italia the dynamism of his small community, highly committed for a long time already to a creative and original path of exploitation of local resources. A perfect example is the rediscovery of "*tarantismo*". This cathartic technique using music and dance for mental breakdowns caused, according to peasants' beliefs, by the bite of the "*taranta*" - dialect name of the "*tarantola*" a common species of spider - [48], had been deeply analysed during 1950s by Ernesto de Martino [49] and his group of ethnologists as well as by the ethnomusicologists Diego Carpitella and Alan Lomax [50-52]. After falling into disuse, it has been brought again to the attention of the local and global public starting from 1998, thanks to the event "*La Notte della Taranta*" [53]. The event, that combines the Salento tradition with the general Mediterranean and international music and dance landscape and that has arrived at its 23rd edition in 2019, attracts about 200,000 spectators for its final concert that takes place in the second half of August and is broadcast live by the State television. The recovery of such identity intangible allowed the "*taranta*" to become a symbol of regeneration, rescue, beauty, seduction and grace [54] (p. 26) instead of recalling in collective imagination the local spider, a symbol of poverty, illness and pain as it was considered in the rural society, thus significantly increasing the tourism demand for Apulia and contributing to the "imageability" [55] of Italy's "heel".

It should also be kept in mind that Melpignano was the first Apulian municipality committed to the separate collection of waste and received the Legambiente award for the results achieved in 2008 [32]. Recently, in the Legambiente report "*Comuni rinnovabili 2019*" (Renewable Municipalities 2019) [1] (p. 68), the 100 Italian best practice for the year in the "clean" energy sector include the Melpignano Community Cooperative (CCM).

The project is the result of the commitment of Legacoop and the association BAI that, in February 2011, signed a memorandum of understanding on the testing of the community cooperative model. The model is based on the principle of social and environmental sustainability and its goal is to benefit a well-defined territorial system, promoting autonomy, organisational skills of citizens and the sense of territorial belonging [56]. The community cooperative represents a particular type of cooperative society

for which a national legislative reference is still missing, despite having been introduced in the regional legislation of Apulia in May 2014 and, almost at the same time, in Basilicata, Liguria, Abruzzo and Sicily as well as in Sardinia in 2018 [57]. In particular, Art. 1 of the Apulian Regional Law n. 23/2014 assigns community cooperatives the task to enhance the expertise of resident population, the cultural traditions and territorial resources to meet the needs of the local community, improving their quality of life through the development of environmentally sustainable economic activities for the production of goods and services, the recovery of environmental and cultural heritage, the creation of jobs and the generation of local social capital [58].

The Melpignano Community Cooperative, founded on 28 July 2011, was established from the desire of Mayor Ivan Stomeo to allow local actors the management of profits from renewable energy generation, a sector mainly dominated by a few large-sized actors [59]. Already in 2008-2009, the municipal administration led by Sergio Blasi, in partnership with the Department of Innovation Engineering of the Salento University and with Cooperativa Sociale Officine Creative di Lecce, had prepared a feasibility study, highlighting that 180 resident families owned a terrace suitable for the installation of photovoltaic systems. A public tender had been launched for the installation and operation of the solar systems, but no bids had been submitted, therefore the project had been set aside.

In July 2011 the new Mayor, starting from the results of the above study and in agreement with Legacoop and BAI, founded the Melpignano Cooperative Community through a public subscription held in central square of the town, with 71 out of 880 families joining the cooperative, to test a new form of co-production aimed at promoting also in the neighbouring municipalities the culture of renewables, fostering domestic electricity generation and creating new job opportunities in the local system [60]. Thus, for the first time in Italy, 71 members-citizens-users, with a private investment of EUR 400,000 (thanks to a loan granted by Banca Etica and the support of Legacoop) and some local professionals (5 engineers, 7 electricians, 2 blacksmiths), gave life to a diffused network of small infrastructures for the generation of solar energy on the roofs of houses, companies and public buildings with zero-impact on the soil consumption. The Melpignano Cooperative Community installs the systems, carries out their maintenance and manages energy generation with “net metering” for users’ need, selling the surplus on the market [61].

The local administration, first developer of the project, was financing member in an early start-up stage, closed at the end of 2012. The members-citizens-users installed 34 systems (29 of which owned by the community cooperative) with an installed power of 159.93 kW, managing to almost completely to meet the energy requirements of as many families, with a reduction of CO₂ emissions and nitrogen compounds respectively of 119 kg/year and 336 kg/year [1] (p. 68).

Until 2013, the Melpignano Community Cooperative benefitted of “*Conto Energia*” reliefs, also obtaining at the end of 2018 a regional tranche of financing of EUR 200,000 to strengthen its activity. Over time, members almost doubled, and decided to launch new projects related to socio-environmental sustainability. Among them, the most important concerns the installation and maintenance in 42 municipalities of Lecce province of 54 drinking water supply systems, called “*Case dell’Acqua*” (Water Houses), drawing 0 km water from the public water mains, improving it and making it sustainably good and fresh. The project aims at fostering the consumption of public water and, at the same time, discouraging the use of plastics, the most widely used material for mineral water bottles [61].

According to Legacoop, also in this case it is clear that a community cooperative creates new jobs, strengthens and/or introduces services for collective use, enhances the role of associations in an eco-friendly perspective contributing to the creation of a stable coordination of economic and social activities of citizens [56] (p. 20).

5. DISCUSSION AND CONCLUSIONS

The strategies implemented by endogenous actors operating in the systems considered, spatially near but involved in energy projects diametrically opposed (top-down logic, fossil fuels/bottom-up logic, photovoltaic energy), can be considered two ways of expressing the same will to build an identity path for a new reading and a new writing of the resources, without never forgetting the goals of global sustainability. The decision of “partnering locally” [62] (p. 80) and the desire of «cultivating the *amor loci*» [63] that the municipalities of Melpignano and Melendugno have been showing are prerequisites for

strengthening the qualities of any resilient community: flexibility, inclusiveness, integration and, above all, initiative, that is the ability to achieve objectives of economic, social and environmental viability through new innovating and creative ways [64] (p. 148).

The pending judicial proceedings concerning the TAP construction do not allow predictions on the current energy project development in Melendugno. However, it is clear that the TAP, whose entry into operation was foreseen by May 2020, will certainly need additional extension authorizations from the Italian government since, at present, both offshore and onshore works are still in the construction site set-up stage. Undoubtedly, the national governments from 2012 onwards, all strongly supporting the pipeline, overlooked that such energy infrastructure concerns a region that has already paid a very high price in terms of environmental resources and human health. In particular, a study published by Enea in 2010 on CO₂ emissions at regional level, highlights that in 2006 Apulia ranked second in terms of CO₂ emissions, with 61.017 million tons (13.1% of the Italian total) after Lombardy (78.352 million tons; 16.9%) [65]. The last EU ETS (European Union Emissions Trading Schemes) concerning CO₂ emissions of about 11,000 European companies, showed that the South Brindisi thermoelectric power plant ranks 35th with 5.4 million tons CO₂/year and Taranto Arcelor Mittal ranks 42nd (4.7 million) [66]. The *Atlante Italiano dei Conflitti Ambientali* [16] shows the presence in Apulia of many opposition movements not only against the above two big sites, but also against the reopening of the North Brindisi thermoelectric power plant and the TAP landfall.

The NO TAP activists, the Mayor of Melendugno and the whole local community, like David against the giant Goliath, show no signs of surrender and their point of view is well summarised in an anthology resulting from a collective writing workshop, promoted by the association Re:Common and led by Wu Ming 2 from January to June 2014, that saw the participation of the NO TAP Committee together with several Italian social movements against some of the so-called *GODII, Grandi Opere Dannose, Inutili e Imposte* (Big, harmful, useless and imposed works) found in Italy [67]. In particular, workshop participants declared: «The quitter, who says “they will do it anyway”, thinks that it is impossible to stand up to such an immense power dropping such a big work on him. The bigger the work, the stronger his fatalism. It’s up to us to prove that this is not the case, that the mechanism may jam, that it is really possible to stand up and achieve a result [...] The creation of a stronghold physically resisting [...] helps putting into practice the idea that something can be done and that if we come together we can even win. To overcome resignation we need to show practically that “it can be stopped”, that the big size of the Work is a clear sign of its fragility» [67] (p. 36).

As far as the Melpignano Community Cooperative is concerned, such self-consumption can become an exemplary case to be reproduced as a model of the future Italian energy strategy: actually Art. 21 and Art. 22 of Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, set out the rights of prosumers and energy communities to support the local generation of energy from renewable sources and its direct distribution. Therefore, in the next years, Italy and in general Member States will have to shift quickly to a renewable energy scenario, increasingly widespread and structured in small systems.

We hope that the transposition of the EU Directive into the national law as well as the entry into force of the Ministerial Decree “*FER (Fonti Energia Rinnovabile) 1*” (Renewable energy sources 1) of 4 July 2019 (reintroducing a national incentive scheme in the renewables sector) could help to solve the outstanding dilemma between fossil fuels and “clean” sources within the Italian energy strategy.

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