Work Package 5 Policy Brief Series: Italy

***e**stablishing **C**ommunity **R**enewable **E**nergy **W**ebs*

- Rolling out a business model and operational tool creating webs of households that jointly manage energy to improve efficiency and renewables uptake

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1 Introduction

This is the first of the six eCREW Policy briefs analysing the regulatory and administrative setups in Italy, Austria, Greece, Turkey, Spain and Germany, with emphasis on how well the existing regulatory and administrative infrastructures can be expected to enhance the implementation of the eCREW approach in the European Union and Turkey.

These policy briefs aim at specific topics relevant for member states in enabling an appropriate framework for energy communities in the sense of the Renewable Energy Directive (RED II) 2018/2001/EU (Renewable Energy Community) and Internal Electricity Market Directive (ED 2019) 2019/944 (Citizen Energy Community) and the wider goals of the Clean Energy for All Europeans Package.

This Policy Brief delivers the country profile from the eCrew perspective and identifies regulatory and administrative barriers as well as potentials for the development of eCREWs in Italy.

The research reported in this Policy Brief was undertaken as a part of eCREW's Work Package 5, coordinated by Izmir University of Economics, Turkey.

2 eCrew approach

The eCREW project aims at activating and fostering the inherent, and so far, underused forces of community-driven collective actions initiatives (CAI). Empowering citizens and giving them the tools needed to produce, store and consume energy for a) their own benefits, b) the prosperity of the (local) economy, and for c) tackling climate change is an important and indispensable step on our road to a stable, secure, energy-efficient and climate-neutral future energy system. Recent European legislation has paved the way for unleashing the potentials of such initiatives by granting them a certain degree of support and has set the scene for the establishment of Citizen Energy Communities (CECs) and Renewable Energy Communities (RECs). Unleashing the potentials of such CAIs requires new business models, financially viable solutions, reliable ICT tools and low, or no, entry barriers, in order to engage as many citizens as possible. We define a CREW (Community Renewable Energy Web) as a group of citizens jointly utilizing household level renewable electricity generation and storage capacities and establish CREWs as the third pillar of citizens' energy-related cooperation, complementing CECs and RECs. Joining requires simply signing a CREW contract, and no up-front investment or need to establish a legal entity, and minimal or no, opportunity costs. CREWs can come in sizes, from small neighbourhood groups to whole city districts. For this purpose, the project considers the legal, administrative and other relevant operational and infrastructural requirements for eCREW. The administration of the CREWs, including the billing of participants and provision of the smart phone app as the operational tool of the households' cooperation, is provided by local energy retailing companies (the Community Administering Entity – CAE), who implement the eCREW approach as a new business model. Hence, eCREW provides an impactful way to cooperation for those households that have no access to CECs and RECs. The core assumption of a CREW (most participants are households, but a CREW is generally open also to other entities, e.g. industrial companies with PV) is that some entities/households with PV have excess electricity generation. Usually, this excess is sold to a retailer/grid (depending on national legislation) for a fixed low feed-in tariff (e.g. 3 cent/kWh), while each kWh purchased from the grid costs at least double (e.g. 6 cent/kWh, energy only costs). The CREW approach is facilitated through a "CREW contract" that participants establish with their CAE. In this contract, participants (e.g. prosumers, households owning storage capacities, and households only consuming electricity) have some standard electricity tariff for consumption and production (e.g. a flat tariff; or a spot-market tariff). In addition, the CREW contract stipulates that whenever CREWs members, have excess electricity, others who need electricity at this time (i.e. households without PV) are first offered the excess electricity at lower than grid prices (e.g. 5 cents/kWh) and only when this supply is entirely absorbed by the community members, further quantities are purchased from the grid as required. The energy sharing in the eCREW is facilitated through the public grid. Thereby, customers' electricity costs in this tariff are lower than buying from the grid only. At the same time, those with excess electricity (i.e. households with PV) obtain a higher rate than they would by

selling to the grid (e.g. 4 cent/kWh). The margin between these two prices are the revenue of the CAE (in this example 1 cent/kWh). The cooperation within a CREW is enabled through a software system that is hosted by GreenPocket, and a smartphone app serves as the easy-to-use interface for the CREW members. Data of the customers are transmitted from the pre-system of the CAEs and processed at GreenPocket, in order to finally display them in the eCREW app. The data records are stored on the database server of GreenPocket according to DSGVO guidelines. The CREW monitor is the central information hub within the smartphone app, which provides CREW members different aggregates of e.g. electricity flows from/to the CREW as total of all participants' individual flows, and monetary savings achieved by high community-level share of self-consumption. The CREW monitor requires the members' electricity load profiles as an input for the provision of these aggregates. The CAE serves as the regular electricity supplier for the CREW members, and as such, it either already has access to the members' electricity load profiles in the granularity (e.g. hourly figures from smart meters) required for billing of the electricity supply contract, or, if not, guarantees to the collection of this data in the CREW contract. No additional data is required by the CAE for executing its special role of providing the CREW members with information regarding the members' individual electricity consumption, the CREW's performance in consuming shares of electricity produced within the CREW, or the members' individual monetary benefits through their participation.

3 Country profile

3.1 Social and Economic

Based on EUROSTAT (2019) data, Italy is a country characterized by considerable territorial and socio-economic heterogeneity, so that a territorial breakdown is needed to provide a meaningful description of its main characteristics. In the following, we consider three macroareas[1]: North, Center and South (+ Islands). Next sections clearly show that while the North – Center areas are characterized by values of socio-economic indicators always in line (and often above) the average of the EU27, the South is still affected by a historical delay in socio-economic development .

3.1.1 Demographic structure

Italy's population density doubles the EU average, and almost half of the population is concentrated in the North (Table 1).

Table 1 – Population by macroarea, 2019

Macroarea	Surface (km²)	Surface (%)	Population	Population (%)	Density
North	123.664	40,9	27.746.113	46,0	224,4
Center	75.227	24,9	12.016.009	19,9	159,7
South & Islands	103.180	34,2	20.597.424	34,1	199,6
ITALY	302.072	100,0	60.359.546	100,0	199,8
EU27	4.233.262	-	447.706.209		105,8

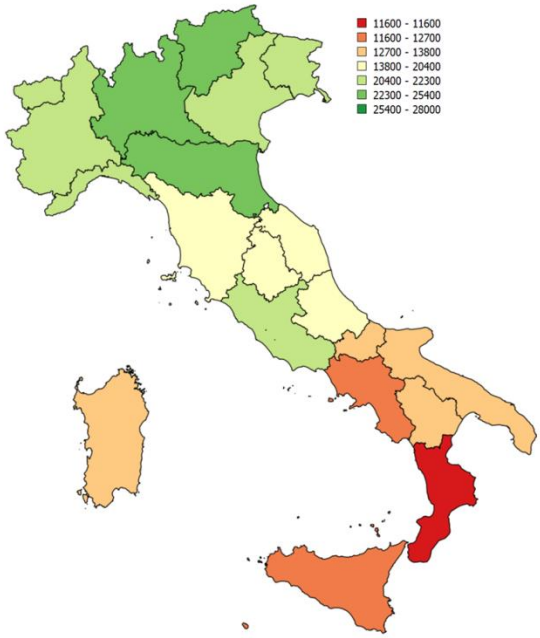
3.1.2 Income and education

Although the average income is in line with the rest of EU, this a statistical effect hides enormous differences among regions and macroareas (Eurostat, 2019a). People in the 'richest' region (Lombardia, 25.400€) account for an average income more than double (+218%) than the 'poorest' region (Calabria, 11.300€). See Figure 1 for details.

Figure 1 – Households income by macroarea and region, 2019

[1] Statistically speaking' Italian NUTS 1 regions are 5 : North West, North East, Center, South and Islands. Here we decided to simplify by aggregating (for reasonable historical and socio-economics trajectories) the 5 into 3 macroareas: North = Piemonte, Valle d'Aosta, Liguria, Lombardia, Trentino Alto Adige, Veneto, Friuli-Venezia Giulia, Emilia-Romagna; Center = Toscana, Umbria, Marche, Lazio; South & Islands = Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria, Sicilia, Sardegna

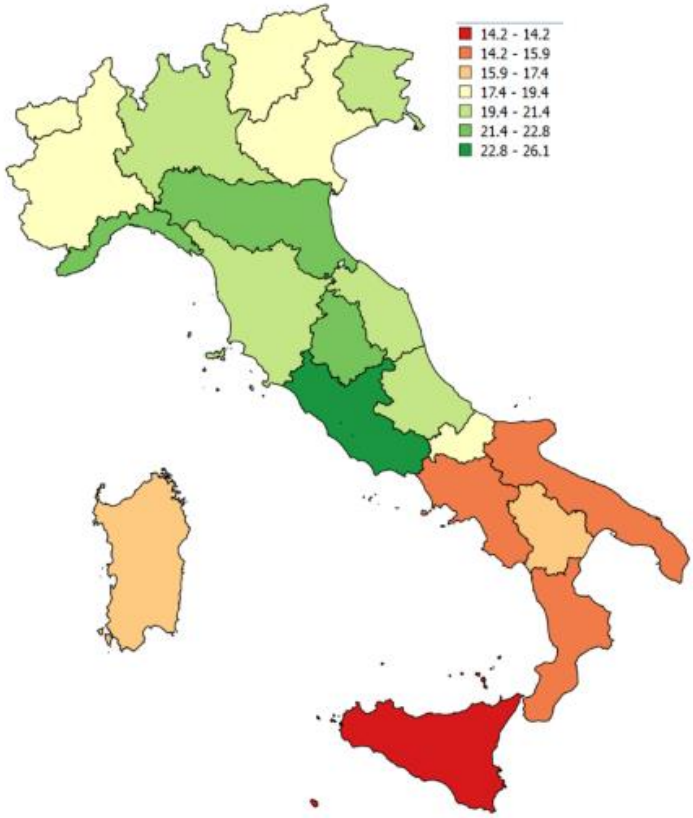
Macroarea	Average income (€)
North	23501
Center	20168
South & Islands	12895
ITALY	19218
EU27	19300



Source: Eurostat. 2017

Excluding the outliers, a dramatic educational gap is shown by overall the percentage points that separate Italy from the EU27 average for primary and tertiary education (respectively 37.8% vs 21.6% and 19.6% vs 31.6%).

Figure 2 – Tertiary education attainment by region (age 25-64), 2019



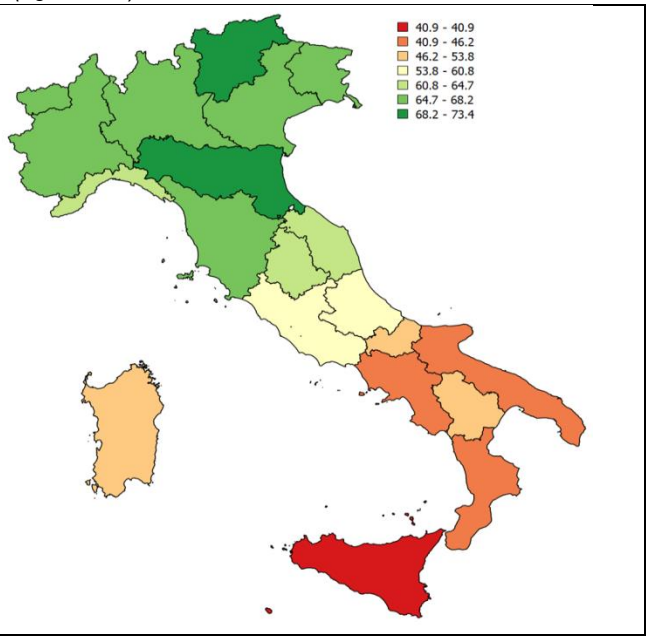
Source: Eurostat, 2019b

3.1.3 Labour market and economic structure

The situation of the labour market, and the territorial gap is illustrated by the decreasing employment rate moving away from the industrial North towards the agricultural south. The territorial gap is made even wider by the gender gap, with an employment rate for males in the north (75%) that is more than double (i.e., 2.3 times) that of women in the south (33%) (see Figure 3).

Figure 3 – Employment rate by macroarea and region (age 15-64), 2019

Macroarea	Employment rate		
	Total	Males	Females
North	67,7	74,9	60,3
Center	63,3	70,4	56,3
South & Islands	44,6	56,2	33,1
ITALY	58,8	67,5	50,0
EU27	67,6	72,7	62,4



Source: Eurostat, 2019c

The North is home to half of the enterprises, and almost the 60% of the entire workforce (3 times the number of employees in the South, that accounts for the 23.4% of the entire population). When it comes to the most strategic economic sectors for the innovation and competitiveness of the socio-economic system, there are even wider regional gaps, in particular, for manufacture (ISTAT, 2018).

3.2 Energy

3.2.1 Energy profile

In this section, firstly, data are reported about the Italian energy balance and its evolution over the past 6 years (from 2014 to 2019), before focusing on electricity production and consumption.

Table 2 reports the Italian energy balance in 2019 and 2014. Between 2014 and 2019, the Gross Available Energy increased from 165.97 to 169.08 (+ 1.9%) and the energy mix has evolved with a noticeable increase of the share of gas from 30.5% to 36.1%. Small decreases characterized the consumption of electricity (from 5.8% to 4.97%) and solid fuels (from 8.25% to 3.91%), while consumption of oil (from 34.51% to 34,.19%) and renewables (from 20.89% to 20.86%) remained stable.

National production decreased from 44.58 Mtoe to 42.59 Mtoe (-4,46%), with important decreases in the share of solid (-34.3%), gases (-32.25%) and oil (-25.82%) and a slight increase in the share of renewables (+ 4.6%). Net Imports have slightly increased from 121.28 Mtoe to 126.94 Mtoe (+4.7%), rising from 73.07% in 2014 to 75.07% in 2019 of the Gross Available Energy, a proxy of the overseas dependence of the national energy system. This increase is particularly relevant for gases (+ 27.4%), while oil imports have remained relatively stable (+ 3.6%) and renewables showed an important decrease (-38.5%).

In terms of final consumption, the distribution among the final uses has remained stable, with a slight increase for transport and households (rising respectively from 31.8% to 32.1%, and from 36,3% to 37.7%), and a slight reduction of the industrial sector (from 23.3% to 21.4%).

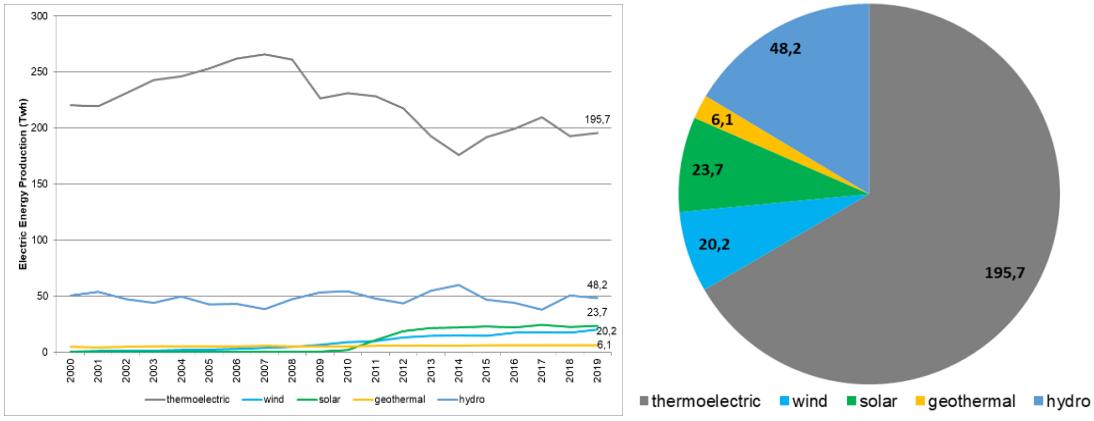
Table 2 – Italian energy balance, 2014 – 2019 (MToe)

	2014						**2019**					
	solid	**gases**	**oil**	**renewables**	**electricity**	**total**	**solid**	**gases**	**oil**	**renewables**	**electricity**	**total**
1.Production	0,35	5,86	5,77	32,61		44,58	0,23	3,97	4,28	34,11	0	42,59
2.Import	13,46	45,67	71,19	2,22	10,28	142,83	6,84	58,2	80,62	1,55	9,68	156,89
3.Export	0,24	0,19	20,31	0,14	0,67	21,55	0,23	0,27	27,9	0,27	1,28	29,95
4.Stocks	-0,12	0,62	-0,63	0,02		-0,11	0,23	0,92	-0,82	0,12	0	0,45
5. Gross Available energy (1+2-3-4)	13,69	50,71	57,27	34,67	9,62	165,97	6,61	60,99	57,81	35,27	8,4	169,08
6.Losses	-0,12	-1,68	-3,55	-0,01	-40,84	-46,2	-0,1	-1,97	-3,7	0	-37,52	-43,29
7.Transformation in Electricity	-10,65	-14,65	-2,34	-27,79	55,43		-4,26	-21,85	-1,63	-26,42	54,15	0
8. Available for final consumption (5+6+7)	2,93	34,39	51,38	6,87	24,21	119,7	2,25	37,18	52,48	8,85	25,03	125,7
- *industry*	2,85	11,87	3,98	0,03	9,2	27,93	2,2	12,44	2,92	0,11	9,23	26,9
- *transport*	-	0,86	35,33	1,03	0,9	38,12	-	0,96	37,16	1,28	1,02	40,42
- *private households*	0,00	21,02	2,94	5,8	13,65	43,42	0	22,99	2,7	7,42	14,28	47,39
- *agricolture*		0,12	2,13	0,01	0,46	2,72	0	0,14	2,21	0,04	0,49	2,89
- *others*	0,08	0,51	7,0	0	-	7,6	0,06	0,64	7,5	0	-	8,19

Source: Ministry of Economic Development (2020)

As for electricity, in 2019, the gross domestic production of electrical energy was equal to 289.9 TWh. The production of the latter has represented, for over 10 years, the largest share of thermoelectric energy production, favoured over time also by the replacement of outdated oil conventional cycles with innovative natural gas combined cycles plants, Figure 4.

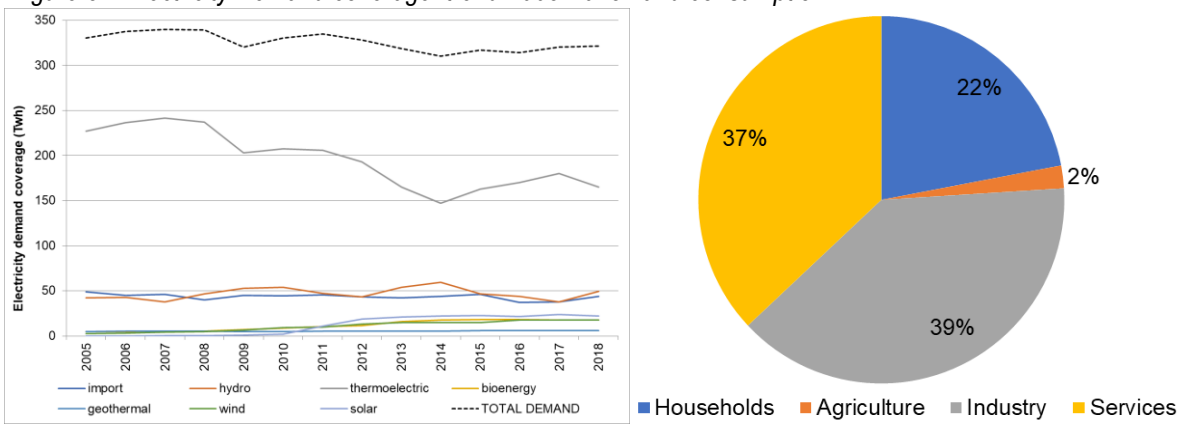
Figure 4 – Electricity Production by sources: trend 2000-2019 (left) and the share in 2019 (right)



(Source : TERNA, 2020)

The demand for electricity in 2019 was of 318.6 TWh (provisional data). In 2019, 88.0% of the electricity demand was met by domestic production, which equalled to 280.4 TWh.

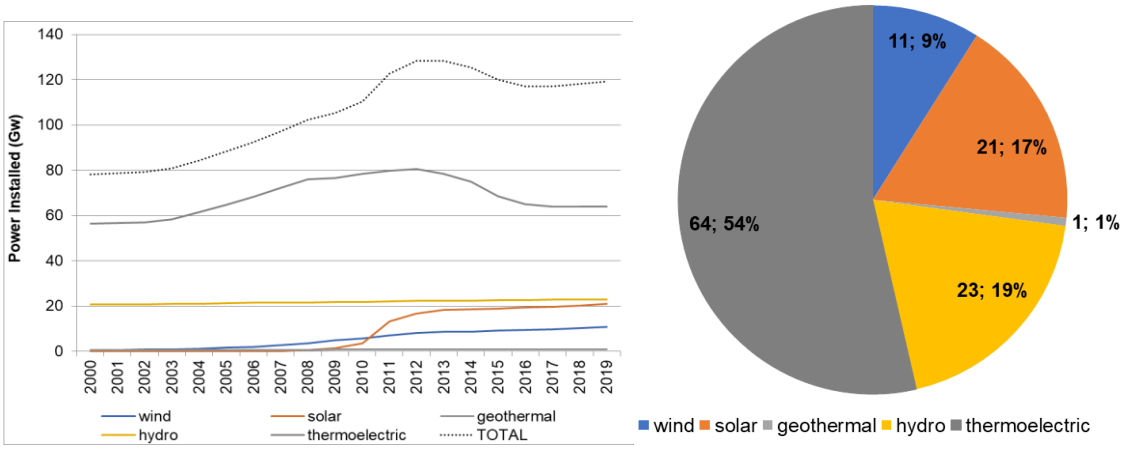
Figure 5 – Electricity Demand coverage: trend 2005-2018 and consumption



3.2.2 Energy infrastructure

In terms of capacity, the gross generation power installed in Italy, as of 2020, was 119.3 million kW. 53.6% of this capacity is represented by thermoelectric plants (64 GW), 19.2% by hydroelectric plants (23.0 GW), and finally, 27.2% by wind, photovoltaics and geothermal plants (around 32,4 GW). (MISE p. 19)

Figure 6 – Power installed by technology: trend 2000-2019 (left) and the share at 2019 (right)



(Source: TERNA, 2020)

According to the Ministry of Economic Development (2019), the transmission grid in Italy in 2017 is composed of 861 stations for total 66000 km of cables and lines.

The overload of the network in the north-west of the country is related to the lines that import energy from Switzerland and France and to the hydroelectric power plants in Liguria and Lombardy. In the North-East this risk has been moderated by the construction of the new power line between Redipuglia and Udine.

As for the central Italy, structural problems are detected in particular on the Adriatic Coast that plays a crucial role for the transmission of power from the south. Recently, more capacity has been installed from conventional and renewables sources whose further increase is at the centre of future policy in the energy field. The concentration of production from renewable sources in the areas of Avellino, Foggia and Benevento and from traditional sources in Apulia and Calabria show greater energy transference in the direction south – central southern region, predominantly on the Adriatic coast, and along the high-voltage lines extending northwards from Calabria.

In the south, the production from renewable sources is particularly relevant in the areas of Avellino, Benevento and Foggia while traditional sources while in Calabria and Apulia traditional sources are still the most relevant basis of the transference of energy along the direction south- central south with a crucial role played by high-voltage infrastructures that from Calabria extend towards the North.

Transmission criticalities can be detected for Sardinia for some problems with the 150 Kv network in Gallura and fro the structural lack of plants able to guarantee more flexible services. In Sicily also the situation is critical due to the reduced transfer capacity between the west and east sides and the inability of properly exploiting the potential of the submarine connections with Calabria.

As for the distribution (264,000 GWh in 2016), Italian network is made up of 391,000 km of medium-voltage network (MV) and 865,000 km of low-voltage (LV) network, with 154 distributors, supplying more than 29 million domestic users and 7.4 million non-domestic users.

Likewise, 743,000 plants were connected to the distribution networks, including 731,000 PV, with a total of 30.6 GW and gross production of 62.9 TWh, including 78.2% RES, and an average self-consumption share of 22.4%.

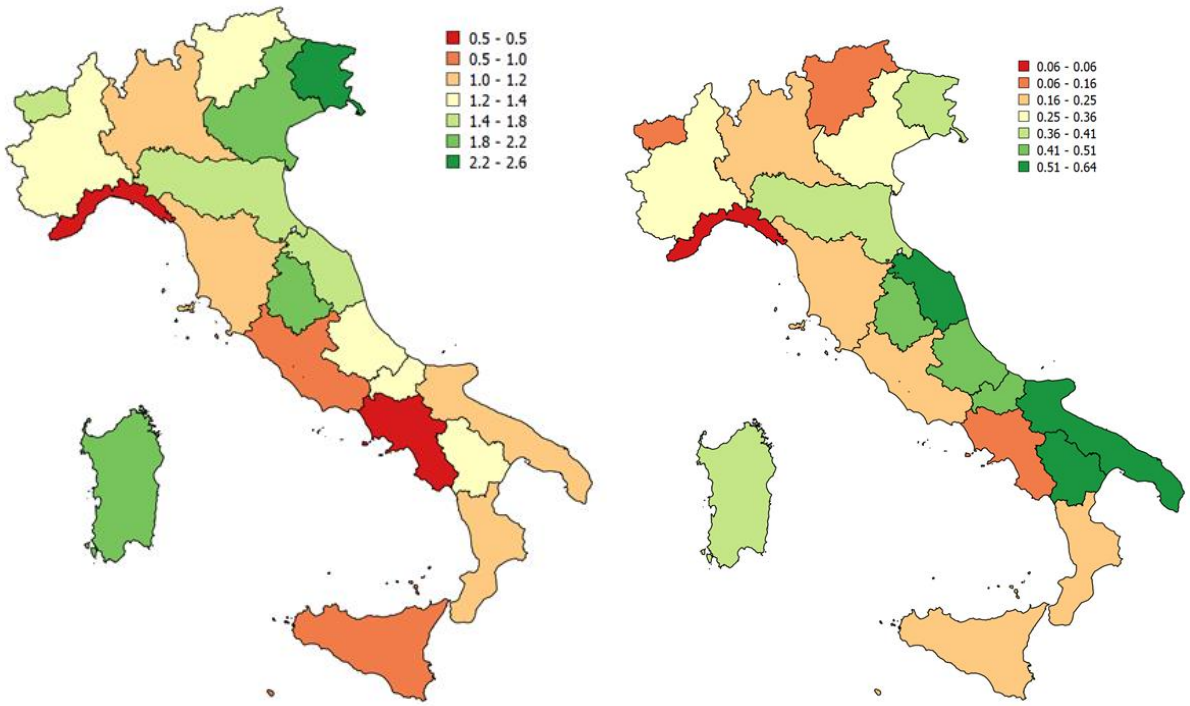
As for the production of electricity from renewables plants, Table 3 shows an overview of the Italian endowment.

Table 3 – Renewables plant in Italy by macroarea, 2020

	Number of Plants									**Power installed (MW)**								
Values	**bio gas**	**bio mass**	**wind**	**geo thermal**	**hydro**	**solar**	**waste**	**other**	**total**	**bio gas**	**bio mass**	**wind**	**geo thermal**	**hydro**	**solar**	**waste**	**other**	**total**
North	1477	565	124	0	2903	431380	34	1177	437660	994	733	107	0	6173	8320	1021	3296	20643
Center	204	162	197	24	442	135485	10	224	136748	157	134	216	729	1082	3383	92	224	6017
South & Islands	240	105	4484	0	192	211433	11	94	216559	161	1708	9095	0	530	6716	82	479	18770
ITALY	1921	832	4805	24	3537	778298	55	1495	790967	1312	2575	9417	729	7785	18419	1195	3999	45431
IT %	0,24	0,11	0,61	0,00	0,45	98,40	0,01	0,19	100	2,9	5,7	20,7	1,6	17,1	40,5	2,6	8,8	100
%	bio gas	bio mass	wind	geo thermal	hydro	solar	waste	other	total	bio gas	biomass	wind	geo thermal	hydro	solar	waste	other	total
North	77	68	3	0	82	55	62	79	55	76	28	1	0	79	45	85	82	45
Center	11	19	4	100	12	17	18	15	17	12	5	2	100	14	18	8	6	13
South & Islands	12	13	93	0	5	27	20	6	27	12	66	97	0	7	36	7	12	41
ITALIA	100									100								

(Source: GSE, 2020)

Figure 7 – Regional distribution of PV plants: number of plants per 100 inhabitants (left) and Power installed (Kw per capita), right.



(Source: Agrillo et al., 2019; GSE, 2020)

In 2017, 9,600 km of national natural gas network and 22,900 km of regional natural gas network was in operation. Natural gas is distributed by 261,000 km of network, 57.5% at low pressure, 41.8% at medium pressure and 0.67% at high pressure, 21% of which is owned by the municipalities.

According to ARERA, there are 21.7 million domestic users, 219,000 landlords, 97,000 public service activities and 1.5 million other uses with total consumption of 31.8 billion m3. Total net consumption was 75.2 billion m3 (Ministry of Economic Development, 2019)

4 Analysis of the legislative and administrative framework

4.1 A review of Revised Renewable Energy Directive (RRED) 2018/2001/EU (defining "renewable energy communities")

4.1.1 Current progress

There is an experimental and transitory regulation in view of the complete transposition of Articles 21 and 22 of the Directive EU 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources. Notably, the Italian legislator adopted Article 42-bis of Legislative Decree December 30, 2019, n. 162, converted with Law February 28, 2020, n. 8, that allows small-scale collective self-consumption of renewable energy plants below 200 kW for customers linked to the same low voltage distribution sub-grid. The current definition by Italian regulatory context is the same as Renewable Energy Community introduced by Directive EU 2018/2001.

To date, this directive has not yet been completely transposed by the Italian legislator.

4.1.2 Evidence from implementations

The aforementioned Article 42-bis defines the methods and conditions for activating collective self-consumption from renewable sources and for the creation of renewable energy communities.

In addition, some regions adopted a specific discipline on the subject. For instance, Piedmont

adopted the L.R. August 3, 2018, n. 12 in order to promote the establishment of energy communities.

4.1.3 Barriers & Motivators

With reference to "motivators", the aforementioned Article 42-bis provides for a support mechanism for energy communities, defined by the Ministry of Economic Development through the adoption of a specific act.

Furthermore, the Regional Law Piedmont n. 12/2018 provides for public funding aimed at promoting the establishment of the energy communities, which are granted by the Region following an evaluation of the proposal.

Also envisaged are tax incentives linked to the nature of an innovative start-up company if the energy community takes this form, then the investment entitles you to a 30% tax credit if participation is continued for at least three years in compliance with Article 29 of Law Decree n. 179/2012, converted by Law n. 221/2012, and Article 1, comma 218 of Law n. 145/2018. Moreover, Article 16-bis of Decree of President of the Republic n. 917/1986 provides for tax deductions for construction of plants instrumental to energy communities.

Regarding to "barriers", under the Italian law there is no possibility for ordinary citizens to distribute the energy produced to other citizens without the intermediation of a professional retailer.

4.1.4 Other national legislation related with RRED

The matter of renewable energy is governed by Legislative Decree n. 28/2011, which establishes the objectives and purposes of the energy policy. This decree also provides for the administrative paths for the issue of permits to produce renewable energy, and it establishes certain economic incentives.

4.1.5 Conformity to existing legislative framework

As well as the reference to the aforementioned Article 42-bis, the regulations on start-up companies and on the production of renewable energy can be cited. Indeed, both are compliant with the regulatory changes to be introduced as a result of the implementation of the RRE Directive.

4.1.6 Practical issues with legislation and adaption

The support mechanism for energy communities defined by the Ministry of Economic Development under the aforementioned Article 42-bis are notably different from the support envisaged in general for renewable energy. These incentives must not be an additional cost for the State because they will replace an existing facilitation, the so-called "scambio sul posto". As an alternative to the "scambio sul posto" mechanism, the intention explained by the Energy Independent Autority (ARERA) through the Deliberation n. 318/2020/R/eel is to define an incentive rate for the remuneration of the plants, which will be provided by a public company called GSE.

4.2 A review of Revised Energy Market Directive (REMD) 2019/944 (defining "citizen energy communities")

4.2.1 Current progress

To date, the Directive EU 2019/944 has not yet been implemented by the Italian legislator.

Therefore, the Italian Parliament has set up the procedure for the transposal of the REM Directive at the beginning of 2020 and, at the present time, the Draft Law of European Delegation for the years 2019-2020 was approved by

the Senate Chamber on 29 October 2020 and has been under examination by the Chamber of Deputies since 11 November 2020.

The Draft Law contains the delegation to the Government for the implementation of the Directives EU 2018/2001, 2019/944 and 2019/943. In particular, Article 12 of the Draft Law provides for principles and guiding criteria for the implementation of the Directive EU 2019/944.

4.2.2 Evidence from implementations

According to the version approved by the Senate Chamber (Draft Law n. 1721), the Government is required to:

a. define the discipline regarding the Citizen Energy Community;

b. update and simplify the legislative framework concerning the final self-consumption and the distribution systems;

c. define the legislative framework for the development and the diffusion of storage systems;

d. establish harmonized and simplified authorization procedures for the construction and the exercise of energy build-ups;

e. define the mechanisms for long-term market solutions in order to provide stability to investments;

f. define a single discipline for energy communities, collective self-consumption, energy build-ups and forecast the beginning of experimentation for a gradual shift to a self-dispatching system designed to promote a more active role of the operators;

g. update and reorganize the legislative framework of the measures designed for the protection of vulnerable costumers and those suffering of energy poverty;

h. reorganize the discipline regarding the national transmission network development plan and coordinate it with the authorization procedures;

i. introduce administrative pecuniary sanctions in case of non-respect of the obligations under the Directive EU 2019/944 by the electricity companies.

4.2.3 Barriers & Motivators

It is uncertain whether the Italian Government, through the decrees issued mostly by the Ministry of Economic Development, will be able to put into effect the content of the three aforementioned Directives.

One of the most significant barriers is represented by the extensive reorganization that these measures will require; in particular, it will be necessary to widely revise the legislation concerning the production, transmission, distribution and sale of electricity.

Furthermore, as explained below, the implementation of all these measures will necessarily imply the availability of economic resources.

4.2.4 Other national legislations related with REMD

The Italian regulatory framework provides for the involvement of various public authorities in accordance with the principles of subsidiarity and adequacy.

The Ministry of Economic Development (MISE) is tasked with adopting the Italian National Energy Strategy (SEN), a ten–year plan drawn up by the Italian government to anticipate and manage the shift in the national energy system.

On 21 January 2020, the Ministry of Economic Development announced the submission of the final version of the Integrated National Energy and Climate Plan (NCEP) for the years 2021-2030 to the European Commission. The

Plan was drafted by the Ministry of the Economic Development in accordance with the Ministry of Environment and protection of the Territory and Sea (MATTM) and the Ministry of Infrastructure and Transport (MIT).

The most important objectives of the Italian NCEP (Chamber of Deputy, 2020b) are:

- a 30% percentage of renewable energy sources in the Final Gross Consumption of energy, in accordance with the objectives established for Italy by the European Commission;

- a 22% share of renewable energy sources in the Final Gross Consumption of energy in transports, compared to the 14% established by the European Commission;

- a 43% reduction of primary energy consumption compared to the PRIMES 2007 scenario;

- a 33% reduction of "greenhouse gases" by compared to 2005, for all the non-ETS (buildings, transport, agriculture and industry) sectors.

Moreover, within the framework of a low-carbon economy, the NCEP prospects carbon "phase out" in electric generation by around 2025.

In addition to the NECP, the Legislative Decree n. 47 of 9 June 2020, in accordance to the delegation contained in art. 23 of the European Delegation Law 2018, the Law n. 117/2019, was transposed into national law the Directive EU 2018/410, which establishes the functioning of the European Emissions Trading System during the phase IV of the System (2012-2030).

The following Legislative Decree, n. 48 of 10 June 2020, also adopted in accordance with the delegation contained in Law n. 117/2019, was transposed into national law the Directive 2018/844 regarding the energy performance of buildings.

Lastly, the Legislative Decree n. 73 of 14 July 2020, in accordance to the delegation contained in Law n. 117/2019, was transposed the Directive EU 2018/2002 regarding the energy-efficiency.

4.2.5 Conformity to existing legislative framework

The Legislative Decree n. 102 of 14 July 2014 was transposed into national law the former Directive concerning energy-efficiency, the Directive EU 2012/27, which was repealed by the Directive EU 2019/944.

The Legislative Decree n. 102/2014 points out that the national energy savings target consists in the reduction, before 2020, of primary energy consumption by 20 million tons of oil equivalent.

One of the most important provisions of the aforementioned Legislative Decree is provided in the art. 9, which is dedicated to "Metering and billing the energy consumption" and establishes that the individual counting of heat must become mandatory on the whole national territory from 1 January 2017 onwards.

4.2.6 Practical issues with legislation

In the Reading Notes drawn up for the Budgetary Service of the Senate Chamber in April 2020, it is underlined that the transposition of the Directive EU 2019/944 was not expected to have direct effects on the national budget. Nevertheless, it is pointed out that currently it is not possible to exclude economic indirect effects which could derive from the complexity of the delegated subjects.

However, it is also said that the uncertainty related to the possible indirect effects will not weigh exclusively on the tariff system, hence on taxpayers.

4.3 General overview of how the legislative and administrative framework conforms with the eCrew approach

Beginning in 2009, Brondi et al. (2014 argued that "the significant rise in installed capacity of renewable energy was driven by the rapid growth of photovoltaic production. This was the result of the introduction in 2005 of a very generous feed-in tariff (FiT) scheme, together with a net-metering system, for solar electricity (called Conto energia)".

This ended in June 2013, nevertheless a remaining quota of plants admitted to the fifth FiT scheme was installed from July 2013 to 2016. With Conto Energia, annual installations raised from 6.5 MW (0.0065 GW) in 2006 to 3.64 GW in 2012, with a compound annual growth rate (CAGR) of 120%. This continued market placement was accompanied by a noteworthy discount in PV system prices, especially from 2008 onwards (Politecnico di Milano, 2014).

Unsurprisingly, most Italian energy communities developed between 2008 and 2013, when FiT were implemented to support deployment and cost reduction of photovoltaic systems. The strong policy support, combined with remarkable reductions in costs of photovoltaic modules and installation since 2010, has increased the profitability and reduced the risks of photovoltaic investments in the wider context of the Italian energy sector. With the reduction of FiT support in 2013 the Italian PV market has shrunk (moving from 3.5 GW/year of installed PV between 2008 and 2013 to 385 MW/year in the period between 2013 and 2018) and the Italian CE sector with it (Candelise and Ruggieri, 2020).

5 Practical framework

5.1 Energy behaviours of citizens and how they would associate with the eCrew approach, barriers, motivators

This section is divided into two parts.

In the first, there is an assessment of the attitudes of Italians towards environmental issues, climate change and energy transition using results from Eurobarometer special surveys (490– Climate Change, 492- European attitudes on Energy Policy and 501 - Attitudes of European citizens towards the environment)..

In the second, data from the Italian Statistical Institute are provided to describe various aspects of electricity use and consumption.

5.1.1 Attitudes towards environmental issues and energy[2]

As for the concerns about environmental issues (Eurobarometer, 2019c), Italians seem to be aware of the relevance, but slightly less concerned than other EU citizens. 94% of Italian respondents to the Special 501 declared that protecting environment (QA1) is important, very important for 43% (Vs 53% of EU citizens) and fairly important for 51% (vs 41% of EU citizens). Asked to identify the most effective solutions for environmental problems (QA10) Italians seem to feel less confident in the role that citizens can directly play in driving changes (28% Vs EU 33% identify changing the way we consume as an option), while, in comparison with EU citizens, they are more prone to rely on public interventions in demanding more information, stricter legislation and related fines and stronger enforcement of legislation

When it comes to energy policy (Eurobarometer, 2019b), in line with EU citizens, Italians consider it mainly as a tool to shift from fossil fuels to renewables (QB1, the highest share among the available modalities with a 37% of respondents, in any case less than 41% of other EU citizens), but a substantial proportion consider it also as a way to contribute to economic growth and innovation (QB4, 34%, a share consistently higher than the EU 24%).

[2] For each of the question considered the code is reported in brackets.

In terms of the prioritizing of energy issues by the EU (QB9), Italians are in line with the EU citizens identifying the development of clean energy technologies as the main driver (42% Vs EU 47%), followed by energy costs (34% vs EU 37%). Quite surprisingly, they are more in favor of better information to increase awareness in energy choices (providers, savings, etc.) (30% vs EU 26%).

Regarding energy consumption, if we take the knowledge about the energy efficiency EU label (A to G classes) as a proxy of awareness, Italians are less consumer aware than the rest of EU citizens (QB6). Only 67% of the Italian respondents declare that they understand labels and meanings (vs EU 79%) while 19% declare that they understand labels but ignore meanings (vs EU 14%) and 13% (vs EU 7%) do not understand it. Surprisingly, but it sounds as an additional evidence of a relative low level of awareness, the EU label seems to affect purchasing choices of Italians, 85% of who (vs EU 79%) declare to take into consideration the label when i choosing electric appliances.

Finally, regarding Climate Change (Eurobarometer, 2019a) more than eight in ten of those surveyed in Italy consider climate change to be a 'very serious' problem (QB2, 84%, above the EU average of 79%). Almost one in five believe it is the single most serious problem facing the world (19%, under the EU average of 23%), an increase of 12 percentage points (pp) since the last survey in 2017. Just over half say that they have taken personal action to fight climate change in the past six months (QB5, 52% vs the EU average of 60%), a significant increase of 18 pp since 2017. The proportion increases to 88% (QB6, vs the EU average of 93%) when given specific examples of climate actions. There has been an increase in the number of respondents who take lower energy consumption into account when buying new household appliances (an increase of four pp since 2017 to 39%, though less than the EU average of 48%), and that regularly use environmentally-friendly alternatives to private cars (an increase of six pp to 19%, though this remains below the EU average of 37%). The proportion who agree that adapting to the adverse impacts of climate change can have positive outcomes for citizens is 62%, lower than the EU average of 70%. Those surveyed in Italy are more likely now than they were in 2017 to agree with the importance of their national government supporting improved energy efficiency by 2030 (up five pp to 91% vs the EU average of 89%). Most importantly, 92% of respondents (equal to the EU average) support the aim of a climate-neutral EU by 2050.

5.1.2 Energy consumption and use

In comparison with the EU average (Euro Area and EU27) Italian households overall consume less energy, they have a relatively higher share of consumption for space heating and cooking and a relatively lower share of consumption for water heating and lighting, Table 4.

Table 4 – Households energy consumption by final use, (2018)

Area	Total (TJ)	Uses (% of total)						
	Total consumption	per 100 people	space heating	space cooling	water heating	cooking	lighting and electrical appliances	other end use
Italy	1.342.115	2,224	66,55	0,67	12,35	6,56	12,49	1,38
Euro area	7.900.556	2,305	63,48	0,43	14,52	6,01	14,75	0,81
EU27	10.281.989	2,297	63,61	0,37	14,77	6,10	14,15	1,00

(Source: Eurostat, 2018)

Here in the following and in Table 5 and Table 6 are reported the main results of the survey carried out by the Italian National Institute of Statistics in 2014

- Almost all families reside in homes equipped with heating systems, while cooling systems are less widespread (only 3 out of 10 families)

- There are wide territorial differences in the diffusion of air conditioning equipment: only 1.5% of families residing in the Aosta Valley, and nearly 50% of those residing in Sardinia

- The main energy source for the home heating systems is methane, used by over 70% of families.

- In 2013, households spent a total of over 42 billion euros on energy consumption, with an average expenditure per family of 1,635 euros.

- Household energy consumption expenditure is higher in the North and more contained in the South, with a differential exceeding 400 euros (30% more than the expenses incurred in the South).

- Average annual expenditure grows with the number of family members and with age. A young single-member family spends on average around 650 euros less than a couple with 3 or more children.

- The heating systems in the home is in use almost every day during the winter season for 87% of families, with significant territorial differences (98% in Bolzano and 62% in Sicily).

- Several years after the retirement of traditional light bulbs from the market, energy saving light bulbs already represent almost three quarters of the light bulbs used.

- Families declare that they have made investments in energy saving in the last 5 years: over half of all families, to reduce electricity costs, 21%, for home heating costs, 15% for home water costs, and, finally, 10% for air conditioning (ISTAT, 2014).

Table 5 – Households yearly expenditure for energy consumption, by source (%) (2014)

Area	Electricity	Methan	Diesel	LPG	Wood	Total (€)
North	30,25	57,1	5	3,9	3,7	1831
Center	36,8	48,4	3,3	5,9	5,5	1527
South & Islands	45,5	35,3	2,6	9,6	7	1387
ITALY	35,5	49,8	4	5,8	4,9	1635

(Source: ISTAT,2014)

Table 6 – Households endowment with electrical appliances (% of total households) (2014)

Area	Air conditioning					Light bulbs		Other appliances		
	% of households	of which…			Hours per day in summer	Energy saving bulbs	traditional bulbs	Freezer	Dishwasher	Dryer
		Heating & Cooling	Almost every day	Only if needed						
North	31,3	61,3	28,5	38,8	4,9	69,90	30,1	28,7	46,65	5,3
Center	24,0	68,6	27,7	39,4	4,2	74,60	25,4	26	43,5	3,4
South & Islands	32,2	77,6	31,0	35,0	4,3	73,1	26,9	21	25,5	1,3
ITALY	29,4	68,1	29,2	37,6	4,5	71,8	28,2	25,3	39,3	3,3

(Source : ISTAT ,2014)

5.2 Current status of communities in terms of energy-related endeavours

In Italy, self-consumption in 2019 amounted to 4,718 GWh, equal to 19.9% of the total production of photovoltaic systems and 38.6% of the production of only systems that self-consume. The highest level of self-consumption is registered in July, while the highest self-consumption rates are found in the winter months (Ministry of Economic Development, 2020). Table 7 shows the heterogeneity of self-consumption in Italy by region and macroarea. In absolute value, the highest self-consumption is in Lombardy and the lowest in the Aosta Valley while the ratio between self-consumption and the net production of self-consuming plants was highest in the provinces of Trento and Bolzano, and is generally higher in Northern Italy.

Table 7 – Electricity self-consumption by macroarea and region, 2019 (GwH).

Macroarea	Gwh	Macroarea	Region	Gwh	Macroarea	Region	Gwh
North	2622,7	North	Piemonte	376,5	Center	Marche	190,8
Center	781,5	North	Valle d'Aosta	7,8	Center	Lazio	251,7
South & Islands	1313,7	North	Lombardia	785,6	S&I	Abruzzo	121,4
ITALY	4717,9	North	Trentino A.A.	161,3	S&I	Molise	19,4
		North	Veneto	584,3	S&I	Campania	235
		North	Friuli Venezia Giulia	141,9	S&I	Puglia	295,1
		North	Liguria	39,6	S&I	Basilicata	42,3
		North	Emilia Romagna	525,7	S&I	Calabria	124,4
		Center	Toscana	243,4	S&I	Sicilia	268,3
		Center	Umbria	95,6	S&I	Sardegna	207,8

Although all the households owning photovoltaic systems are self-consuming, the highest percentages of self-consumption are found in the tertiary and industrial sectors. Out of the 23,689 GWh produced in Italy in 2019, 52% is generated by the industrial sector (which also includes photovoltaic power plants), 20% by the tertiary sector, 15% by the domestic sector and 13% by the agricultural sector. The industrial sector is characterized by the highest self-consumption (34% of the 4,718 GWh self-consumed in Italy in 2019), followed by the tertiary sector (30%), the domestic sector (26%) and the agricultural sector (10%) (Ministry of Economic Development, 2020).

Regarding the community endeavour projects in the energy fields, Magnani and Osti (2016) provided a wide study about the involvement of civil society in the production and management of renewable energy that dates back to the first half of the 20th century, although in a limited area of the country in Trentino Alto Adige, a small region in the northern-east alps. The so called "historic hydroelectric cooperatives" were established at that time in that area to support the social and economic development of the alpine region through the provision of electricity produced from hydroelectric plants. The regulatory framework favoured this process since the nationalization of the electricity grid allow these cooperatives to retain ownership of the local grid. Today thirty cooperatives still exist in this area after decades of development they have become big organizations selling energy to thousands of customers. In addition to hydroelectric production, in this area can be found also many communities built upon the use of wood biomass for producing heat that sometimes developed towards the construction of district heating systems. Behind the success of the community based model in this area (an exception in Italy) there is a long tradition of local cooperation that took advantage of a contingent regulatory framework, a combination of enabling factors that is not easily replicable elsewhere (Magnani and Osti, 2016).

In more recent years, Candelise and Ruggeri (2020) noticed that following quite a while of inaction, the CE sector in Italy has encountered another wave of development around 2010 with the improvement of activities focused on people engagement in the energy field. Small local energy communities were the main actors of this development, mostly focused on production of electricity from PV plants below 100kW while wider initiatives able to develop megawatt size plants were very few. The pivotal leverage for this new wave was the Feed in Tariffs scheme, implemented in Italy in the first decade of 2000 that made investments in PV development at the same time profitable and low risk, thus paving the way for people to share ownership of small local projects. But the discontinuity of incentive mechanisms such as the Feed in Tariff and the reintroduction of more market-oriented and auction-based mechanisms, affected the possibility of the sector to scaling-up to the development of large plants or the replication of the smaller projects and showed that new approaches were needed.

At present, in Italy there are around 35 Ecovillages (https://ecovillaggi.it/), around 60 Alpine Coops (a heritage of the historic hydroelectric cooperatives, see www.sev.bz.it) and around 20 2nd wave Energy communities described by Candelise and Ruggeri (2020), the most relevant of which are reported in Table 8.

Table 8 - Energy Communities in Italy, 2020

Initiatives	Start Date	Primary Activtiy	Technology	Geographical scope
Retenergie	2008	Electricity Production & Services	PV	National
Dosso Energia	2010	Elctricity Production	PV	Local
Società LEDRO	2007	Electricity Production & Services	PV	Local
èNostra	2014	Electricity Supply		National
Melpignano	2011	Electricity Production & Services	PV	Local
Kennedy Energia	2013	Elctricity Production	PV	Local
Sole per tutti	2011	Elctricity Production	PV	Local
Comunità Energetica San Lazzaro	2011	Elctricity Production	PV	Local
Comunità Solare Locale	2011	Electricity Production & Services	PV	Local
Un ettaro di cielo	2008	Elctricity Production	PV	Local
Impianto Eolico Monte Mesa	2014	Elctricity Production	Wind	Local
Energyland	2011	Elctricity Production	PV	Local
Masseria del Sole	2013	Elctricity Production	PV	National
Fattoria del Sole	2015	Elctricity Production	PV	National
Fattorie del Salento 1	2017	Elctricity Production	PV	National
Fattorie del Salento 2	2017	Elctricity Production	PV	National
Energia Positiva	2016	Elctricity Production	PV, wind, hydro, energy saving	National

Source: Candelise and Ruggeri (2020)

5.3 Role of central government in energy transition – with special emphasis on their positions with respect to the eCrew approach

As widely described in section 4, due to the combination of the Decreto Milleproroghe (art42. L.8/2020), the scheme of incentives approved by the Ministry of Economic Development (DM 16/09/2020) and the regulation provided by the national authority ARERA (318/2020), at present, in Italy is permissible to launch a citizen or renewables energy community .

A negative effect was caused by the interruption of Feed in Tariffs scheme. After the cancellation in 2013, only a few CE initiatives have developed renewable energy plants, those that were larger and with a national scope in their activities, or those promoted by commercial actors. In addition, very few of those still operating after 2013 developed new renewable energy plants, and have mostly focused their activity on acquiring operating PV plants on the secondary market, which are still benefiting from the FiT support (Candelise and Ruggieri, 2020).

5.4 Role of local administrations (e.g. regional, municipalities) in energy transition – with special emphasis on their positions with respect to the eCrew approach, barriers, motivators

Presently only few regions adopted a specific discipline on the subject.

For instance, Piedmont adopted the L.R. August 3, 2018, n. 12 in order to promote the establishment of energy communities. From the point of view of the administrative bodies involved, some functions are assigned to the

Regional Council and others to a permanent technical table for the coordination between the Region and the Energy Communities.

Shortly after, Puglia adopted the L.R. August 9, 2019, n. 45 and Liguria the L.R. July 6, 2020, n. 13.

6 Conclusion

6.1 Country Profile (based on inference from previous sections, aspects to be considered with respect to the eCrew approach)

Italy is a considerably heterogeneous country, therefore, to ensure eCREW success, the implementation strategy should take into account:

-age and education of population (eCREW is a high-tech project)

- income and energy consumption and use (eCREW requires awareness about energy)

- economic profile of the target area (as a proxy of technological readiness of the area)

For instance, implementation in Emilia Romagna, with its highly paid well-educated employees in manufacture is different than in Calabria or Sicily.

Renewables have gained relevance in recent years, but Italy is still a fossil-based energy system with a strong dependence on gas imports, which, jointly with oil, feed the thermoelectric power production that continues to provide around 65% of the total power installed.

6.2 A quick SWOT analysis of the legislative and administrative framework with respect to the eCrew approach

6.2.1 Pointers from legislation

Strengths: the implementation of RRED and REMD into Italian law is being examined by the Italian Parliament and should be concluded by the end of 2020.

Weaknesses: both national and regional law (e.g. Piedmont law n. 12/2018) concerning energy communities have strict boundaries regarding the provision of economic incentives.

Opportunities: The Ministry of Economic Development could take inspiration from other European legislations of those countries that have already adopted measures to promote the creation and development of energy communities.

Threats: presently only four regions (Calabria, Liguria, Piedmont, Puglia,) out of twenty have adopted a specific regional law concerning energy communities.

6.2.2 Pointers from administrative framework

Strengths: the cooperation between the Ministry of Economic Development and ARERA (Italian authority responsible for the regulation of energy) in the definition of measures and strategies designed to establish favourable administrative, economic and social conditions to develop energy communities.

Weaknesses: presently, the dispositions to implement energy communities do not sufficiently take the stakeholders' role into consideration.

Opportunities: the European resources that will be given to implement projects aiming to increase the use of renewable energies within the Next Generation EU Program.

Threats: the absence of a clear and specific administrative path to obtain the requested authorizations to create and manage an energy community with power exceeding 200kW.

6.3 A quick SWOT analysis for the practical framework with respect to the eCrew approach

Strengths: long-established tradition of energy cooperatives, especially in marginal areas (alpine coops) of the country, where the central administration encountered difficulties in distributing electricity produced by conventional plants;

Weakness: a still limited awareness of the relevance of individual engagement for addressing energy and environmental issues;

Opportunities, it will be possible to introduce an organic discipline of the energy community matter from scratch;

Threats: the incumbent retailers could resist this market liberalization process.

Table 9 –SWOT analysis: the legislative, administrative and practical frameworks

	Helpful	**Harmful**
Internal perspective	Strengths Legislative Framework the implementation of RRED and REMD into Italian law is being examined by the Italian Parliament, and should be concluded by the end of 2020 Administrative Framework the cooperation between the Ministry of Economic Development and ARERA (Italian authority responsible for the regulation of energy) in the definition of measures and strategies designed to establish favourable administrative, economic and social conditions to develop energy communities Practical Framework long-established tradition of energy cooperatives, especially in marginal areas (alpine coops) of the country, where the central administration encountered difficulties in distributing electricity produced by conventional plants;	Weaknesses Legislative Framework both national and regional law (e.g. Piedmont law n. 12/2018) concerning energy communities have strict boundaries regarding the provision of economic incentives Administrative Framework presently, the dispositions to implement energy communities do not sufficiently take the stakeholders' role into consideration Practical Framework a still limited awareness of the relevance of individual engagement for addressing energy and environmental issues
xternal Perspective	Opportunities Legislative Framework the Ministry of Economic Development could take inspiration from other European legislations of those countries that have already adopted measures to promote the creation and development of energy communities. Administrative Framework the European resources that will be given to implement projects aiming to increase the use of renewable energies within the Next Generation EU Program Practical Framework it will be possible to introduce an organic discipline of the energy community matter from scratch;	Threats Legislative Framework presently only four regions (Calabria, Liguria, Piedmont, Puglia,) out of twenty have adopted a specific regional law concerning energy communities. Administrative Framework the absence of a clear and specific administrative path to obtain the requested authorizations to create and manage an energy community with power exceeding 200kW Practical Framework the incumbent retailers could resist this market liberalization

6.4 Suggestions for the wider uptake and further development of the eCrew approach

There are a number of policies that could stimulate the emergence and development of the eCrew approach; divided into direct and indirect support instruments. Direct instruments include, for example, specific loans or guarantees schemes, technical assistance and capacity building, partnerships with government agencies and small or medium-sized enterprises.

About specific loans and guarantees schemes the recent Decree of the Ministry of Economic Development September 16, 2020, in application of paragraph 9, Article 42-bis of Legislative Decree n. 162/2019, allows to cumulate the PV economic incentive with tax credit derived from energy efficiency works on buildings.

Indirect instruments include the promotion of renewable energy, the eco-social requisites in public tenders, etc.

Concerning law and administrative path it would be important to provide different measures and strategies in accordance with legislative and administrative regional specific characteristics.

The RSE (Research Energetic System) – an Italian public society owned by the GSE (Manager of Energy Services) is conducting a study on 9 pilot projects analysing the energetic, economic, environmental and social costs and benefits for both the subjects involved into the pilot projects and the entire system (RSE Magazine, Dossier 17/2020).

Given that in those pilot projects RSE is playing a role of coordination, study (also from a regulatory and technological point of view) monitoring and evaluation of results, it would be useful for eCREW to analyse the results of RSE project which is expected to be published in 2021.

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