AgroRES
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Partner self-assessment document
AGRORES project
COD PROG: S3.a.1

Lazio Region

ARSIAL

Renewable energy in agriculture: investment and deployment

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I N D E X

2 INTRODUCTION TO THE REGIONAL SELF-ASSESSMENT DOCUMENT

The following self-assessment document is the result of an elaboration that the individual partners have developed in accordance with the agrores project in semester 3, phase a), point 1.

The general purpose of the document is a self-assessment of the situation in the Lazio Region regarding investments and the use of renewable energy in agriculture and rural communities, as well as photographing the current situation by providing reflections on the existing potential in view of future developments.

The regional self-assessment document tries to provide indications on the opportunities and critical issues that could be encountered in the future in the development and dissemination of renewable energy in agriculture.

To achieve these purposes the self-assessment document is organized in the following paragraphs:

- Introduction to the regional self-assessment document
- Lazio Region: socio-economic framework
- Regional energy consumption, scenarios and role of the agricultural sector
- Role of incentive policies in the evolution of the diffusion of renewable energies
- Local policies for the pursuit of renewable energy deployment
- Risks and opportunities in the deployment of renewable energy in agriculture

3 REGIONAL SOCIO-ECONOMIC FRAMEWORK

As of January 1th of 2019, there are 5,879,082 residents in Lazio, representing 9.7% of the resident population in Italy on the same date. At the sub-regional level, the distribution of residents among the various administrative divisions is very uneven with territorial, provincial and sub-provincial typicalities, well marked.

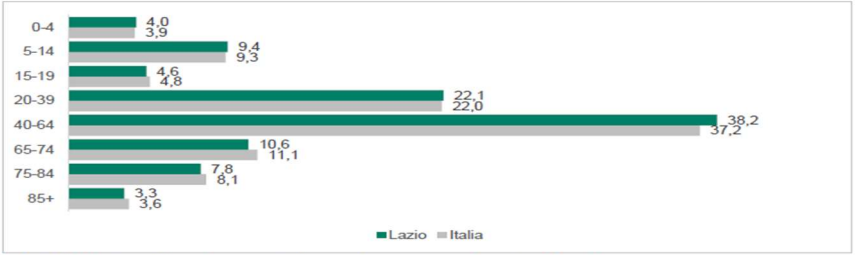
The Metropolitan City of Rome Capital collects 73.9% of the resident population in the region, only in the capital lives 48.6% (2,856,133 residents) of the resident population in Lazio.

Tavola 1. **Popolazione residente per classi di età e provincia al 1° gennaio (a). Lazio e Italia.** Anno 2019 (valori assoluti e composizione percentuale)

Territorio	Totale	CLASSI DI ETÀ							
		0-4	5-14	15-19	20-39	40-64	65-74	75-84	85+	Totale
Viterbo	317.030	3,6	8,5	4,3	21,8	38,0	12,0	8,3	3,6	100,0
Rieti	155.503	3,3	8,0	4,3	21,6	37,3	12,4	8,9	4,3	100,0
Roma	4.342.212	4,0	9,6	4,6	21,9	38,6	10,3	7,8	3,2	100,0
Latina	575.254	4,2	9,4	4,8	23,6	37,0	10,9	7,3	2,9	100,0
Frosinone	489.083	3,8	8,7	4,5	23,3	36,6	11,8	7,7	3,6	100,0
Lazio	5.879.082	4,0	9,4	4,6	22,1	38,2	10,6	7,8	3,3	100,0
Italia	**60.359.546**	**3,9**	**9,3**	**4,8**	**22,0**	**37,2**	**11,1**	**8,1**	**3,6**	**100,0**

Fonte: Istat, Rilevazione sulla popolazione residente comunale per sesso, anno di nascita e stato civile
(a) Dati provvisori.

Figura 1. **Popolazione residente per classi di età al 1° gennaio (a). Lazio e Italia.** Anno 2019 (composizione percentuale)



Fonte: Istat, Rilevazione sulla popolazione residente comunale per sesso, anno di nascita e stato civile
(a) Dati provvisori.

Figure 1 - Data on the population residing in the Lazio region (source ISTAT)

With the **439,869** companies present on the regional territory (in 2017, see figure), Lazio represents 10% of the total consistency on the Italian territory.

All these companies employ 1,891,086 people, or 11.1% of the employees of companies in Italy.

The average size per employees of companies operating in Lazio is, therefore, higher than the similar measure calculated for the entire national territory (4.3 employees in Lazio, 3.9 in Italy).

Tavola 12. **Imprese, addetti e dimensione media per settore di attività economica. Lazio e Italia.** Anno 2017 (valori assoluti)

Attività Economica	IMPRESE		ADDETTI		DIMENSIONE MEDIA	
	Lazio	Italia	Lazio	Italia	Lazio	Italia
B: estrazione di minerali da cave e miniere	165	2.062	14.899	30.226	90,3	14,7
C: attività manifatturiere	20.358	382.298	155.089	3.684.581	7,6	9,6
D: fornitura di energia elettrica, gas, vapore e aria condizionata	801	11.271	39.032	88.222	48,7	7,8
E: fornitura di acqua reti fognarie, attività di gestione dei rifiuti e risanamento	804	9.242	19.739	196.969	24,6	21,3
F: costruzioni	42.447	500.672	119.999	1.309.650	2,8	2,6
G: commercio all'ingrosso e al dettaglio, riparazione di autoveicoli e motocicli	99.849	1.093.664	280.423	3.414.644	2,8	3,1
H: trasporto e magazzinaggio	13.188	122.325	333.926	1.142.144	25,3	9,3
I: attività dei servizi di alloggio e di ristorazione	32.789	328.057	147.781	1.497.423	4,5	4,6
J: servizi di informazione e comunicazione	14.497	103.079	140.912	569.093	9,7	5,5
K: attività finanziarie e assicurative	10.779	99.163	98.840	567.106	9,2	5,7
L: attività immobiliari	23.377	238.457	27.134	299.881	1,2	1,3
M: attività professionali, scientifiche e tecniche	85.355	748.656	145.922	1.280.024	1,7	1,7
N: noleggio, agenzie di viaggio, servizi di supporto alle imprese	21.019	145.347	179.667	1.302.186	8,5	9,0
P: istruzione	3.551	32.857	12.329	110.196	3,5	3,4
Q: sanità e assistenza sociale	40.049	299.738	102.726	904.214	2,6	3,0
R: attività artistiche, sportive, di intrattenimento e divertimento	10.464	71.077	24.443	186.315	2,3	2,6
S: altre attività di servizi	20.377	209.658	48.226	476.606	2,4	2,3
Totale	439.869	**4.397.623**	1.891.086	**17.059.480**	4,3	**3,9**

Fonte: Istat, Registro statistico delle imprese attive (ASIA)

Figure 2 - Data on companies in the Lazio region (source ISTAT)2

Lazio,with a GDP of 198 billion euros (2018 data) and a GDP per capita of 33.600 € (Eurostat) is among the regions with the greatest structural complexity:

1. a large metropolitan area with a predominantly tertiary economy;
2. large energy poles with high fossil production with a power of more than 300 MW (Montalto, Civitavecchia, Rome, Aprilia);
3. industrial areas organized in industrial districts with a specialized vocation;
4. local production systems spread in the territorial areas of the five provinces alongside small and micro productive realities located very often on the edge of peripheral urban territories;
5. vast rural territories with extreme fragmentation of the property, small municipalities, mountain communities, valuable natural areas;

The following table shows the data (expressed in value added and as a percentage) of the distribution of production sectors in the Lazio region, which shows the more than majority weight of the service economy on the total value added and the weight of the agricultural sector lower than the national average

Value added by business unit2016, current euro and composition %	*Latium*		*Italy*	
	Million €	% of total VA	Million €	% of total VA
Agriculture, Forestry, Fisheries	*1.763*	*1,1*	*31.615*	*2,1*
Industry	87	9,7	288.616	19,1
Constructions	6.962	4,2	71.958	4,8

Services	142.023	85,1	1.116.477	74,0
Value added at basic prices	166.921	100,0	1.508.666	100,0

Table 1 – Development of site production over the last three years1

As regards agriculture in Lazio, there are about 104,000 active farms on a total agricultural area of 827,588 hectares and used about 637,000 hectares.
The total agricultural area represents about 48% of the region's area (17,232 km$^{2)}$ and the used area 36%.

In the table it is possible to observe in detail the distribution by type of agricultural enterprises on the Lazio territory and compared with the rest of the country.

Production units and UAA by type of economic unit	*Unit (N)*	*LATER (H)*
Active agricultural holdings	19.680	360.409
Agricultural holdings of active productive units with secondary agricultural activity	5.315	49.600
Agricultural holdings of non-active production units	32.726	162.276
Agricultural holdings of natural persons	46.985	65.000
Total Lazio	**104.686**	**637.286**
Italy	***1.516.135***	***12.777.044***

Table 2 – Detailed data on enterprises in the agricultural sector2

The main cultivation of the UAA in the region is that of arable land, the remaining agricultural area is destined for woody and agricultural crops and meadows and pastures.

UAA for main crops	*Latium*	*Italy*
Arable crops	362.853	7.150.908
Woody and agricultural crops	123.744	2.292.112
Meadows pastures	150.689	3.334.021
Total	637.286	12.777.044

Table 3 – Detailed data on the distribution of regional crops3

Between 2000 and 2010, Lazio was characterized by a substantial structural downsizing both in terms of company number and UAA.

In these ten years we have witnessed the following phenomena:

1. Fragmentation of the business structure;
2. Reduction of livestock holdings and concentration of animals reared;
3. Spread of agritourism;
4. Increase in holdings and areas under organic farming;

The regional agricultural sector remains one of the fundamental sectors for the Lazio economy. the sector is characterized by a strong push towards the implementation of new models of agricultural and rural development based on the protection of the balance of the natural environment, on the development

of typical agricultural productions, on the recovery of internal and residual areas and on the enhancement of territories for tourism purposes.

BOX 1: in-depth analysis of the evolutionary dynamics in the regional agricultural sector:

From 2000 to 2010, the average farm size expanded from 3.80 to 6.50 hectares of average Sau (+70%), configuring a process of land reparcelling particularly evident in the region, where compared with that recorded in the other Italian regions. This process is manifested in the production aggregates linked to arable land and agricultural wood.

Despite this, the average size of regional farms remains below the national figure and in some areas the company structure remains fragmented.

The animal husbandry sectors recorded significant reductions in the number of farms regardless of the type of breeding held. The greatest contractions are recorded in livestock farms with sheep, pigs, poultry farms. The scaling process is not always accompanied by a reduction in the number of garments. In fact, in the sectors linked to buffalo and poultry farms, despite a reduction in the number of farms, there is an increase in the number of animals.

Agritourism is the activity of diversification of the income of farmers most practiced by lazio farms (747, about 0.76% of the total) and also represents the most profitable related activity (of the 747 companies that practice agritourism activity, 698 consider this activity as the most profitable). The number of lazio agritourism farms is constantly growing, also supported by a growing interest in nature tourism (ISTAT, 2014). The agritourism activity is widespread throughout the Lazio area (over 180 companies in the province of Rome; over 90 in the province of Latina; about 140 in Sabina, about 90 in frusinate; over 300 in Viterbo).

The Region allocates 10% of the Sau to organic crops (8% of the national Sau). The data record a number of operators in the organic supply chain equal to 3,001 units with an area destined for cultivation of about 83,664 hectares. In the three-year period 2008-2011, the organic sector recorded an increase of 3.2% in terms of farm size and an increase in the areas intended for cultivation of 21.35% (14,719 hectares).

4 REGIONAL ENERGY CONSUMPTION, SCENARIOS AND ROLE OF THE AGRICULTURAL SECTOR

4.1 GENERAL FRAMEWORK

Since the Kyoto Protocol measures, the European Union and the Member States have committed themselves to a path aimed at fighting change through the adoption of EU and national policies for decarbonizing the economy. Path confirmed during the XXI Conference of the Parties to the Convention for the fight against climate change, which with decision 1/CP21 confirmed the Paris Agreement.

The agreement respects the need to increase the global average temperature rise to well below 2° C and the pursuit of efforts to limit the increase to 1.5° C, at pre-industrial levels. Italy signed the agreement on April 22, 2016 and ratified it on November 11, 2016. The agreement, which is signed into force on November 4, 2016, has been ratified by 184 of the 197 Parties to the Framework Convention.

At EU level, with the European Council in March 2007, for the first time an integrated approach was envisaged between energy policies and for the fight against climate change, with the Climate-Energy Package 2020.

The objectives of the Package, some of which are binding, have been transposed into the national laws of the Member States since 2009. Among the binding objectives, Italy has a target for reducing greenhouse gas emissions for sectors not regulated by the ETS Directive by 13% by 2020 compared to 2005 levels. As regards the promotion of renewable energy sources, Italy aims to reach a share of 17% of energy from renewables

in the Gross Final Energy Consumption in 2020 and a sub-target equal to 10% of energy from renewables in the Gross Final Energy Consumption in transport.

In 2017, the total Gross Final Consumption of energy (i.e. the quantity introduced by Directive 2009/28/EC for the purposes of monitoring the EU targets on Renewable Energy Sources - RES) in Italy amounted to around 120 Mtoe and those of energy from RES around 22 Mtoe: the share of consumption covered by RES therefore stands at 18.3%, a value higher than the target assigned to Italy for 2020 by Directive 2009/28/EC (on the promotion of the use of energy from renewables, amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC).

As for the electricity sector, in 2017 about 35% of the national gross production comes from RES; the renewable source that in 2017 provided the most important contribution to actual electricity production is hydraulics (35% of total electricity production from RES), followed by solar (23%), bioenergy (19%), wind (17%) and geothermal (6%). In the thermal sector, just under 20% of total energy consumption comes from renewable sources. In particular, in 2017 about 11.2 Mtoe of RES energy were consumed, of which about 10.3 Mtoe directly (through individual boilers, stoves, fireplaces, solar panels, heat pumps, geothermal heat exploitation plants) and about 0.9 Mtoe in the form of derived heat consumption (for example through district heating systems powered by biomass). The most used renewable source in 2017 for thermal consumption is solid biomass (about 7.9 Mtoe), mainly used in the domestic sector in the form of firewood and pellets. Heat pumps (2.65 Mtoe) are also of great importance, while the contributions of bioliquids, biogas, geothermal and solar sources are still limited.

4.2 THE INTEGRATED NATIONAL ENERGY AND CLIMATE PLAN 2030 (PNIEC)

The ***PNIEC,*** *approved in 2019,* is a fundamental tool that marks the beginning of an important change in our country's energy and environmental policy towards decarbonization.

The Plan is structured in 5 lines of intervention, which will be developed in an integrated way: from decarbonization to energy efficiency and security, passing through the development of the internal market for energy, research, innovation, and competitiveness.

The goal is to create a new energy policy that ensures the full environmental, social and economic sustainability of the national territory and accompanies this transition.

With the Integrated National Plan for Energy and Climate, the national 2030 goals on energy efficiency, renewable sources and the reduction of CO_2 emissions are established, as well as the objectives in terms of energy security, interconnections, the single energy market and competitiveness, development and sustainable mobility, outlining for each of them the measures that will be implemented to ensure their achievement.

4.3 THE REGIONAL ENERGY PLAN (PER)

Lazio's energy policies are based on the ***PER,*** the Regional Energy Plan, the instrument with which the regional competences in the field of energy planning are implemented, about energy's rational use, energy saving and use of renewable sources.

This Plan, prepared in 2014 and still not approved by the Lazio Region, contains the trend scenarios and the "Objective *Scenario*" of increasing energy efficiency and developing renewable sources, and proposes a substantial package of regional *policies* to be implemented together with competing national measures.

The Plan, at the time of drafting, foresees the following strategic targets*:*

1. bring the regional share of electric and thermal renewables in total consumption to **13.4%,** focusing immediately on energy efficiency.

2. development of renewable energy sources - accompanied by an enhancement of energy transport infrastructures and a massive spread of storage systems *and smart grids* - to reach 21% by 2030 and by 2050, 38**%** of regional share of renewable electricity and thermal energy in total consumption;
3. limit the use of fossil fuels to reduce climate-changing emissions, (to 2050 decarbonization **boosted by 89**% in the civil sector, 84% in electricity production and **67**% in the transportsector)
4. reduce energy consumption in end uses (civil, industry, transport and agriculture), **improving the energy performance of buildings** (public, private, productive, etc.) and promoting sustainable, intermodal, alternative and shared mobility (for people and goods);
5. significantly increase the degree of **electrification** in final consumption by favoring the spread of heat pumps, electrical equipment, storage *systems, smart grids* and sustainable mobility;
6. facilitate the technological evolution of existing structures by favoring more advanced technologies and susceptible to sustainable use from an economic and environmental point of view;
7. support R&D and innovation, including by maintaining forms of direct incentives, to develop low-carbon and competitive technologies;
8. systematically implement strong engagement actions to raise awareness and increase awareness of the efficient use of energy in companies, PA and widespread citizenship.

The new regional and national policies aim to contain the energy consumption of end-use sectors, because of the combined effect of:

1. a smaller increase in the demand for energy services than in the past (production rates, lower population growth and slower spread of energy technologies due to saturation levels in different segments);
2. an improvement in the efficiency of end-use devices, due to technological innovation, market factors and minimum performance standards (product certifications, ecolabeling, energy labelling, minimum performance of buildings).

4.4 ENERGY CONSUMPTION IN THE LAZIO REGION

The analysis of gross domestic consumption (CIL) and final consumption (CF), indicates the growing weight of Lazio on the total consumption of Italy until 2012, a decrease in 2013 and then a recovery in the last year.

Tabella 2.8 – Confronto consumo interno lordo (CIL) e consumi finali (CF) Italia e Lazio, 2009-2013[13] (ktep)

		2009	2010	2011	2012	2013	2014
CIL	Italia	173.731	177.926	172.478	165.683	159.515	151.127
	Lazio	12.449	12.974	13.722	14.921	12.973	13.006
	%	7%	7,3%	8,0%	9,0%	8,1%	8,6%
CF	Italia	126.144	128.459	123.131	121.769	118.504	113.350
	Lazio	11.417	11.345	11.237	11.047	10.057	9.872
	%	9%	8,8%	9,1%	9,1%	8,5%	8.7%

Fonte: Eurostat; Enea

Figure 3 - Data on regional energy consumption 3and comparison with Italian ones (extracted from the PER)

The data updated to 2019 indicate that Italy has a total of CF of 126k Mtoe with an incidence of the Lazio economy estimated at around 9%. (cf. "The national energy situation in 2019", Min. Economic Development).

For an overview, the regional energy balance is reported.

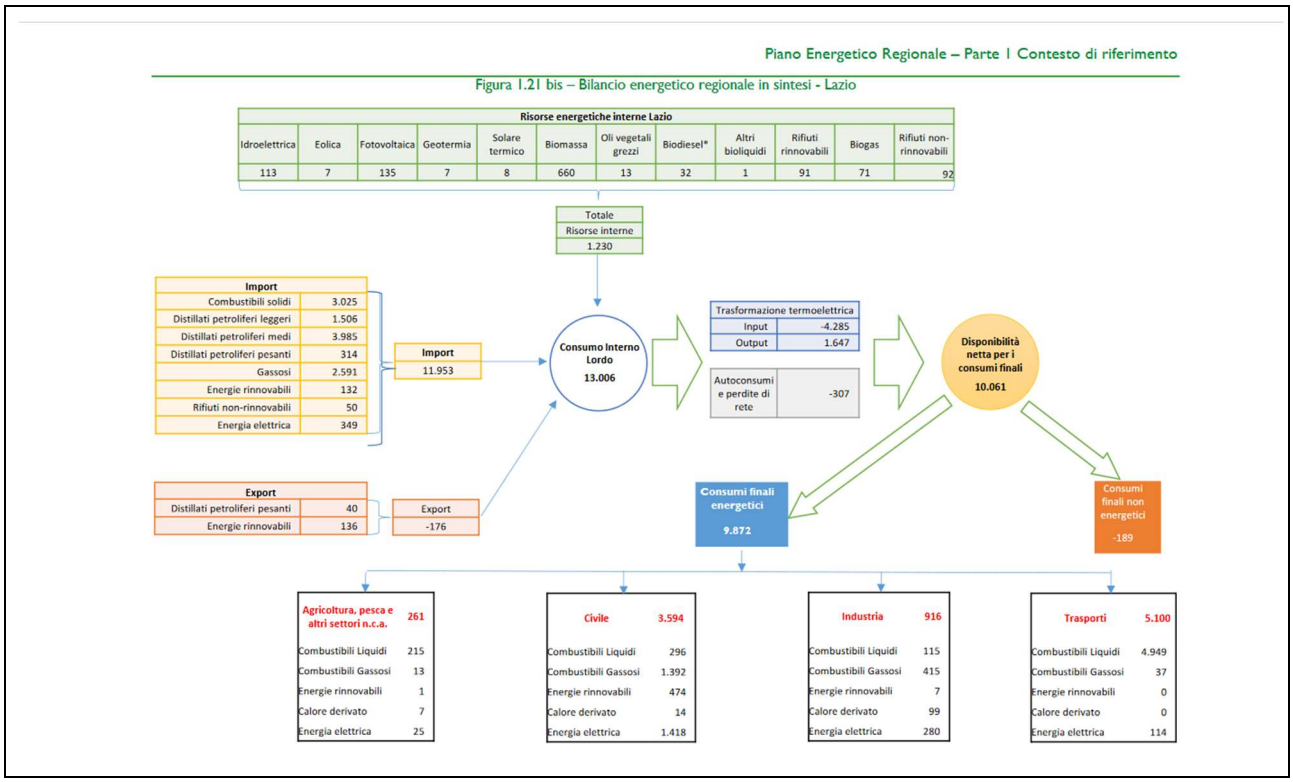


Figure 4 - The regional enegetic balance sheet insynthesis (extracted from the PER)4

Lazio is characterized, compared to Italy, by a greater percentage contribution to the CIL of both oil and derivatives and solid fuels, accompanied by a lower weight of natural gas and renewables. In terms of final energy consumption, there is, finally, a different distribution of intra-sector consumption in Lazio compared to the Italian reality: taking 2014 as a reference, the transport sector alone covers almost half of final consumption (against a third at national level), while the contribution of industry does not reach 10% (against 23% nationally).

Tabella 1.6: Intensità energetica finale per settore di utilizzo (tep/M€$_{2010}$), anni 2009-2014

Settore	2009	2010	2011	2012	2013	2014	Var % 2009-2014
Intensità energetica primaria	67,8	70,3	73,9	83,4	74,0	74,4	9,8
Industria	59,9	57,7	57,7	52,2	52,9	54,2	-9,5
Trasporti	30,2	30,4	31,3	30,6	27,4	29,2	-3,5
Servizi e residenziale	24,2	23,0	21,3	23,8	23,2	20,6	-15,1
Agricoltura e pesca	167,5	199,5	208,7	182,3	138,4	165,7	-1,0
Intensità energetica finale	62,2	61,5	60,5	61,7	57,3	56,5	-9,1

Fonte: Elaborazione ENEA

Figure 4 - Data on the final energy intensity by sector of use in the Region (extracted from the PER)5

The different role of the sectors implies a further different distribution of the use of fossil and renewable sources compared to the Italian situation, but also implies a different capacity and methods of decarbonization of the regional energy system.

From the comparison between the Lazio Region and the country the following peculiarities can be detected:

1. Different current energy mix of Lazio from the national one.
2. Several historical population growth trends between Lazio and Italy.
3. GDP growth rates homogeneous in the last 10 years compared to the national but different composition of the production structure.
4. Electricity generation sector not in line with the national average.
5. % FER-E much lower in Lazio than the national average, linked to different availability sources and presence or not of some types of plants in the area.

4.5 THE OBJECTIVES FOR RES-ELECTRICS (RES-E) IN THE LAZIO REGION

RES-Es are expected to cover 48% of gross electricity final consumption (14% in 2014) from 3,680 GWh (316 ktep) in 2014 to 16,126 GWh (about 1,387 ktep) in 2050. This projection (+338% compared to 2014) is substantially due to an increase in photovoltaic generation and, in a minority, in other renewable sources. Photovoltaics, in terms of the share of electricity produced among renewables, went from 43% in 2014 to 71% in 2050.

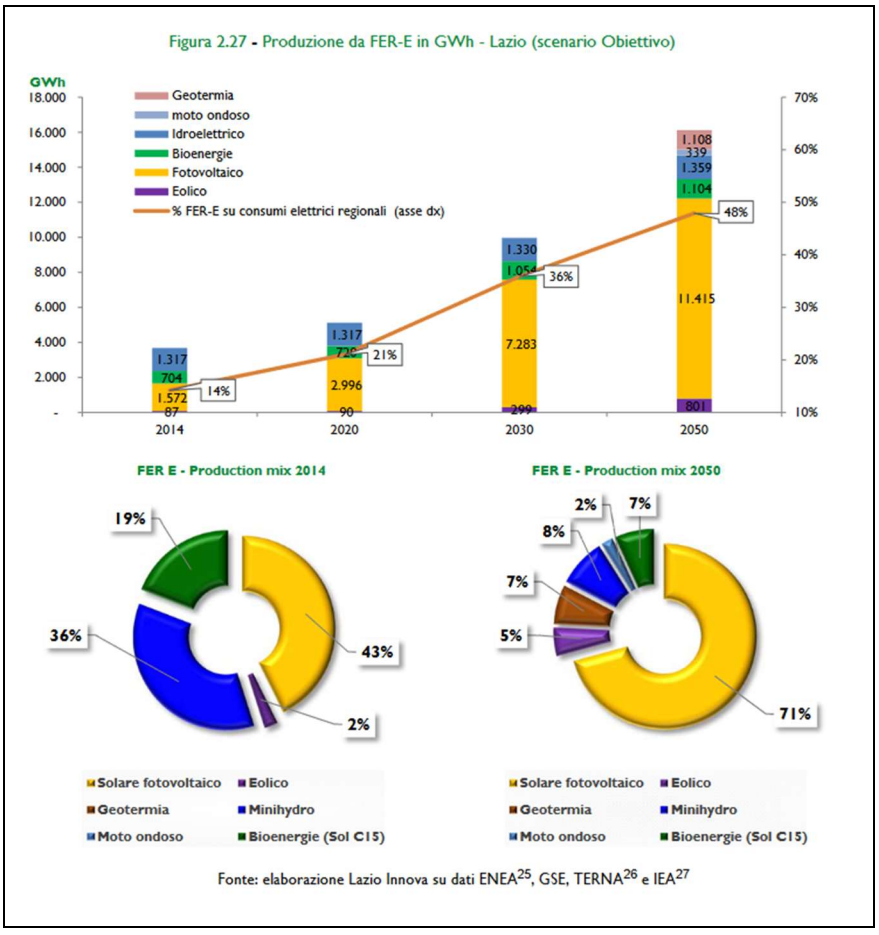


Figure 4 - 6Objective scenario of the spread of RES-E in the Lazio region by 2050 (extracted from the PER)

In view of the progressive competitive development of renewables in this scenario, a massive widespread development of "storage" systems is expected, the latter aimed at both the stabilization of the national electricity transmission grid and the user microgrids and a more consistent level of disposal of thermoelectric power plants powered by fossil sources. The following figure shows the trend in the period of electricity production from RES-E and from fossil sources in Lazio and the relative percentage share of RES-E (right axis) in the hypothesis of import trend proportional to that of final electricity consumption.

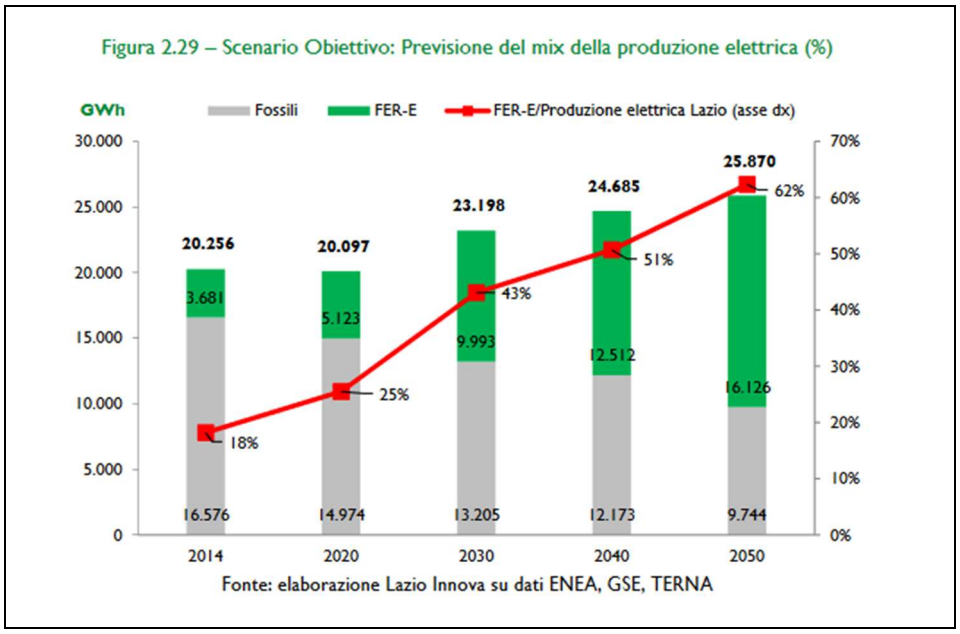


Figure 5 - Forecast of the mix of electricity production in the Lazio region to 2050 (extracted from the PER)7

4.6 THE OBJECTIVES OF THE RES-THERMAL (RES-C) IN THE LAZIO REGION

RES-C is expected to cover about 31% in 2050 (8% in 2014) of final thermal consumption, going from 606 ktep in 2014 to about 1,278 ktep in 2050 (+111% compared to 2014). The expansion to 2050 of FER-C is mainly due to the development of heat pumps, for the exploitation of renewable sources aerothermal and geothermal low enthalpy, solar thermal and heat derived thanks to the recovery of thermal waste in industrial processes.

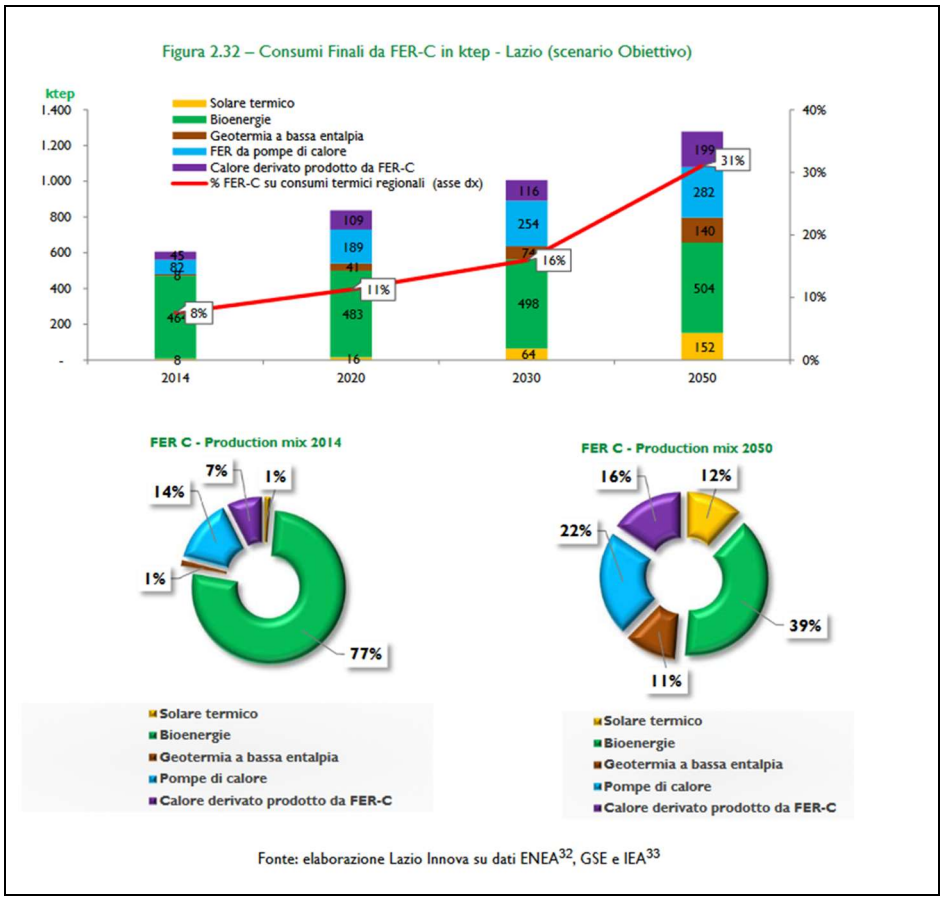


Figure 7 - Trend in the growth of final consumption from RES-C in the Lazio region 2014-2050 (extracted from the PER)8

The achievement of the objectives scenario is subject to the implementation of a series of levers of various kinds (regulatory, facilitation, training, etc.) aimed at removing barriers to the spread of energy efficiency in all areas of end use (civil, industry, transport and agriculture).

In the PER, by way of example and not exhaustive, limiting itself to pointing out the main operational guidelines, the main enabling factors of various types are summarized (depending on the theme of intervention considered).

Active tools include:

Eco-bonus	Tax deduction for energy efficiency expenses in the residential and tertiary sectors (corporate beneficiaries and private subjects) as extended by the "2017 Budget Law" in terms of times and tax-deductible percentages.
New Thermal Account 2.0	in force since 31 May 2016 and established by Ministerial Decree 16/2/2016, which strengthens and simplifies the support mechanism already introduced by Decree 28/12/2012, and encourages interventions to increase energy efficiency and the production of thermal energy from renewable sources. The beneficiaries are Public Administrations, companies and individuals who will be able to access funds for 900 million euros per year, of which 200 for the PA
Plafond house	ABI-Cdp Agreement: On 20/11/2013, the ABI and the Cassa depositi e prestiti (CDP) signed the agreement that defines the guidelines and application rules for the use of a specific funding ceiling made available by the CDP for the granting, by the participating banks, of mortgage loans to natural persons

PREPAC	Energy Requalification Program of the Central Public Administration, relating to the interventions on its buildings, for which in the period 2014 - 2020 355 million euros were allocated
Kyoto Fund	for the improvement of the energy efficiency of buildings used for schools and universities; compared to the initial budget of 350 million, the 2015 call for proposals allowed over 100 million to be finalized, while the remaining allocation of 247 million represents what is available for subsequent calls for proposals
White Certificates (TEE)	are marketable securities that certify the achievement of energy savings in the end uses of energy through interventions and projects to increase energy efficiency carried out in particular civil and industrial sectors. In particular, these are savings in electricity (Type I securities), natural gas distributed by grids (Type II), energy or fuels other than the previous ones (Type III) and forms of energy other than electricity and natural gas in the transport sector (type V)

4.7 THE ROLE OF THE AGRICULTURAL SECTOR IN ENERGY SCENARIOS

The agricultural sector plays a leading role in the national energy sector, contributing to the achievement of the objectives set for final consumption in the electricity, thermal and transport sectors.

On the national scene, the agricultural sector accounts for 6.7% of greenhouse gas emissions and is responsible for 40% of methane emissions and 49% of nitrous oxide (Ispra, 2012).

In line with "Europe 2020" - the strategy for the economic and social growth of EU countries launched by the European Commission (2010) - and with what has been prepared by the National Sector Plan for Bioenergy, the development of the agro-energy supply chain is fundamental.

All regions are called, in fact, to support the so-called "green practices", which make a positive contribution to the fight against climate change and reduce the use of fossil sources, sources with poor environmental sustainability and a heavy economic impact on business costs.

The centrality that the multifunctionality and multi-entrepreneurship of the agricultural sector assumes in the field of environmental sustainability has led to the creation, within the Regional Directorate of Agriculture, Rural Development, Hunting and Fishing of a specific sector. It is intended for the coordination of regional public activities in the field of bioenergy related to the agricultural sector. In fact, many actions have been introduced by the Lazio Region, both within the Community planning (RDP-EAFRD) and through parallel actions.

5 MECHANISMS TO ENCOURAGE THE DEPLOYMENT OF RENEWABLE ENERGY

The first scheme to support the spread of renewable energy sources (RES) was launched in Italy in 1992, including in the incentives all electric RES technologies (FER-E).

That legislation contained, for the purposes of incentives, the equalization of renewable sources proper to those assimilated, or to thermals with the use of wastewater. The latter, characterized by power and plant costs several orders of magnitude higher than the renewables available at the time, quickly exhausted the economic capacity of the capital incentives of these laws, delaying, according to some analysts, the production of real renewable energy.

Currently, the incentive for renewable energy sources in Italy is mainly based on the following mechanisms:

- Green Certificates (CV) and all-inclusive tariff,

- Energy Account,
- Thermal account,
- Community, national and regional contributions.

In 1999, a system was established in Italy to encourage electricity produced from renewable sources, defined as Green Certificates. Technically, these are tradable/marketable securities, corresponding to a certain amount of $CO_{2\ emissions,}$ which are transferred free of charge by the GSE to the operator of a plant (powered by renewable sources) that produces energy, emitting less CO_2 than a plant powered by fossil sources would.

This is a rather complex mechanism with which operators who put more than 100 GWh /year into the grid have been obliged to have at least 2% of the electricity coming from renewable energy plants that have entered operation or are repowered, limited to additional manufactusibility.

In view of these **obligations** on producers from fossil sources, **benefits** have been provided for producers from renewable sources. So,

- Producers from fossil sources who cannot transform a percentage of their production from fossil to renewable every year, must buy Green Certificates in an amount corresponding to the unso processed quota and deliver it to the GSE.
- producers from renewable sources are granted, every year, a Green Certificate for each MWh produced, which they can market, that is, give to producers from fossil sources who have not achieved the required result.

The CV system has been modified over time mainly with the "Connected to the Financial 2008".

The 2008 Budget introduced many changes in the mechanism, applied a year later with the Renewable Dm. The main ones concern the duration of the Green Certificates and the introduction of the All-Inclusive Tariff, and since the new rules apply to plants that came into operation after December 31, 2007, there are plants in Italy supported with different mechanisms and incentive values.

The 2008 decree also seeks to remedy the loss of market value of CVs, and provides, in addition to a reference price on which to calculate the GSE offer, the obligation for the GSE to withdraw "surplus certificates" with respect to the obligations of producers from fossil sources and therefore redundant with respect to market demands.

The law of 23 July 2009 n. 99 (Development, internationalization of companies and energy) established that it was no longer the producers and importers of electricity from fossil sources who were subject to the obligation deriving from the certificate mechanism, but the "subjects who conclude with the company Terna Spa one or more contracts for the dispatching of electricity in withdrawal". This is by transferring obligations from the producers to the energy distributors and thus to all the energy sold.

The following Dl 20 May 2010, n. 72, called "Urgent measures for deferral of terms in environmental matters (...)", contains art. 2 the repeal of the new mechanism provided for by Law 99/2009.

Article 45 of the 2010 financial manoeuvre inserts a limitation on the withdrawal of "redundant certificates" with respect to the obligations.

Finally, Legislative Decree 28/2011 transposing the European directive, and the Ministerial Decree of 6 July 2012 decree the end of the Green Certificates for plants that entered into operation after 31 December 2012 and the transition to new incentive mechanisms.

Alternative to the Green Certificates and reserved for qualified IAFR plants (qualification of plant powered by renewable sources) with an average annual nominal power not exceeding 1 MW, or 0.2 MW for wind farms, there is the so-called All-inclusive Tariff, recognized for a period of 15 years, during which it remains fixed, depending on the share of energy fed into the network, for all plants (excluding photovoltaics), according to values differentiated by source,which entered into operation by 31th December 2012. The all-inclusive tariff was introduced with the 2008 Budget (Lawno. 244 of 24th December 2007),D.M. 18/12/08

and regulated by Law 23/7/09 No. 99, is called "all-encompassing" as its value includes an incentive component and a component of enhancement of the electricity introduced into the network, therefore until the end of the 15 years for the operators who choose it, the tariff is the only source of remuneration for the energy produced. The application of the all-inclusive fixed tariff determines a charge for the system equal to the difference between the costs incurred by the GSE for the withdrawal of electricity, according to the methods and prices defined by law 24th December 2007, n. 244, and the revenues obtained by the GSE for the resale of the same energy on the market.

Starting from 2013, two mechanisms are operational for RES-E (renewable electricity) that power the distribution network (except photovoltaics): a FIT scheme (Feed in Tarif) for plants up to 1 MW of power and a FIP scheme (Feed in Premium) for plants with a power greater than 1 MW.

The set of measures described above has resulted in a differentiated incentive scheme for renewable sources, by size of electricity generation plants, and by date of construction or connection to the distribution network. In a nutshell it can be exemplified as follows:

The production of plants powered by renewable sources that entered operation before 2008, which had obtained the IAFR qualification **(qualification of a plant powered by renewable sources),** is associated with a green certificate (CV) every MWh/year produced (in case of new construction, renovation or reactivation). CVs are issued, for the purposes of the recognitions provided for by the Bersani Decree, for:

- 8 years for plants powered by non-biodegradable waste, qualified and entered into operation by 31 December 2006 and cogeneration plants combined with district heating powered by non-renewable sources.
- 12 years according to article 267 paragraph 4 letter D of Legislative Decree 152/06, for all plants powered by renewable sources, which entered into operation from 1 April 1999 to 31 December 2007;
- 15 years for plants powered by renewable sources that have been in operation since 2008.

A further 4 years are granted at 60% to plants powered by biomass from the supply chain that came into operation before 2008 or by non-biodegradable waste that entered operation from February 2004 and December 2006.

The renewable source plants that have been in operation since 2008 following new construction, renovation or upgrading, will receive for 15 years HP equal to the product of the net production of electricity from renewable sources multiplied by a certain coefficient, referring to the type of source.

Only power plants up to 1MWe, at the request of the manufacturer, can access, as an alternative to CVs, an all-inclusive fixed tariff (which includes both the incentive component and the purchase of electricity) for each kWh produced and fed into the network.

Every 3 years, the multiplicative coefficient and the fixed tariff may be revised by Ministerial Decree.

Plants that came into operation after June 30, 2009 will receive CV or all-inclusive tariff only if they do not benefit from public incentives (national, local or Community) in energy account, capital account or interest account with early capitalization, assigned after December 31, 2007.

Only plants, owned by farms or managed in connection with agricultural, agri-food, livestock and forestry companies, can combine the all-inclusive flat rate of € 0.28 / kWh with other public incentives (national, local or Community) in energy, capital account or interest account with advance capitalization, not exceeding 40% of the investment.

As far as photovoltaics are concerned, two incentive systems have been operational: from 2005 to August 2012 a FIP on gross electricity generation; and since August 2012 a FIT system on the generation sold to the network, accompanied by a premium on the generation used on site (or self-consumption).

As for the Energy Bill, which is the program that encourages electricity produced by photovoltaic systems and thermodynamic solar systems connected to the electricity grid, it has seen five versions since its inception. Introduced in Italy in 2005, with the Ministerial Decree of 28 July 2005 (Primo Conto Energia) it is currently regulated by the Ministerial Decree of 05 July 2012.

In this latest version, natural persons, legal persons, public entities, non-commercial entities and condominiums of residential units and / or buildings that install the following systems are beneficiaries of the Energy Bill.

- photovoltaic systems, divided by installation types (art.7 DM 5 July 2012);
- integrated photovoltaic systems with innovative features (art.8);
- concentrating photovoltaic systems (art.9);

The last energy account redefines the incentive methods for the production of electricity from photovoltaic sources, methods that apply after 45 days from the date of reaching a cumulative annual indicative cost of incentives for photovoltaics equal to 6 billion euros, and up to 30 days after reaching the threshold of 6.7 billion euros per year, after which no further applications for contributions are accepted. This date is communicated by the Authority for Electricity and Gas on the basis of data provided by the GSE through its photovoltaic meter. The threshold was reached on 6 June 2013 and therefore, according to resolution 250/2013/R/efr of the AEEG, the V Energy Bill expired on 6 July 2013.

Then there is a Thermal Account that provides incentives (introduced with Legislative Decree 28/2011 and regulated with ministerial decree 28/12/12) to promote small-scale interventions for the increase and for the production of thermal energy from **renewable sources.** The incentives can be granted to public administrations for a cumulative annual expenditure of 200 million euros and to individuals, condominiums and subjects holding business income or agricultural income, for a cumulative annual expenditure of 700 million euros. Once these spending commitments have been reached, no further applications for support will be accepted during the calendar year. These incentives are configured as contributions to the expenses incurred and will be paid in annual **installments** for a variable duration (between 2 and 5 years) depending on the interventions carried out.

There are also voluntary certification mechanisms called RECS and quality marks. In fact, in addition to the mechanism of green certificates, linked to the obligation introduced by the Bersani decree, in 2003 the RECS (Renewable Energy Certificate System) system was launched, with legislative decree 29 December 2003 n. 387 and law 23 August 2004 n. 239, a system that is characterized by the following aspects:

- voluntary participation and the possible remuneration of the sale of the certificate linked to the principles of green pricing and environmental sensitivity of companies;
- each certificate refers to an annual production of 1 MWh electric, thus also including small applications;
- the market included the 18 countries with the possibility of further extended.

RECS in Italy are issued by the GSE.

6 LOCAL POLICIES FOR THE PURSUIT OF RENEWABLE ENERGY DEPLOYMENT

Reducing the environmental footprint of human activities is one of the 17 priority objectives of sustainable development, as defined in September 2015 by the 2030 Agenda of the United Nations Assembly.

The rationalization of consumption and the optimization of the use of resources, together with an effective penetration of renewable energy sources, represent the key elements to achieve these objectives with the related technological and management implications.

In this perspective and in line with the EU and national energy strategies, the Lazio Region already with the Guidelines for an efficient use of financial resources intended for development 2014-2020 has put in place significant support policies and incentives for:

1. supporting the transition to a low-carbon economy in all sectors
2. promote adaptation to climate change, risk prevention and management
3. preserving and protecting the environment and promoting the efficient use of resources.

Regional development policy for the medium to long term is based on a strategic programme that aims to promote employment, innovation, education, poverty reduction and environmental sustainability and to expand the infrastructure networks of the territory to achieve intelligent, sustainable and inclusive development, in line with the Europe 2020 Strategy.

The program, to be implemented compatibly with the financial constraints and in line with the needs and economic and social specificities of the territory, is divided into seven macro-areas of intervention, each of which is declined in a series of programmatic objectives to be achieved in the coming years:

I. a modern region that helps development;
II. a large European innovation region;
III. right to study and training for development and employment;
IV. a region that cares for and protects;
V. a sustainable region;
VI. investments for a competitive territory;
VII. choices for a more united society.

In this context, 45 "Key Actions" have been identified, within which priority interventions capable of determining structural changes in the territory and in the regional economy are identified.

In the unitary design of integrated programming, both the governance capacity of the various measures, which contribute to the achievement of the programmatic objectives, and the different sources of funding available: European funds, national and regional resources, play a decisive role. The coordination of the necessary and appropriate actions in order to use community, national and regional resources, as well as any other resource destined for economic growth and the improvement of the quality of life in Lazio, according to the principles of effectiveness and efficiency, is entrusted to a "Control Room for the planning and unitary implementation of regional policies for development and economic, social and territorial cohesion financed by the ESGE Funds and other ordinary and/or additional financial resources".

6.1 THE EUROPEAN STRUCTURAL AND INVESTMENT FUNDS

The European Structural and Investment Funds (ESGE Funds) are the main financial instruments of the European Union's regional policy aimed at strengthening economic, social and territorial cohesion by reducing the gap between the most advanced regions and those whose development is lagging behind (Article 174 TFEU).
Specifically:

European Regional Development Fund (ERDF)	it promotes investment and helps to reduce regional imbalances in Europe. The ERDF therefore contributes to the financing of productive investments which contribute to the creation and maintenance of stable jobs, primarily through direct aid for investment, mainly in small and medium-sized enterprises, investment in infrastructure and the development of endogenous potential through measures to support regional and local development.

European Social Fund (ESF)	In line with the guidelines and recommendations made in the framework of the European Employment Strategy, it aims to promote improving employment, quality and productivity, as well as social integration
European Agricultural Fund for Rural Development (EAFRD)	contributes to the promotion of sustainable rural development. It improves the competitiveness of the agricultural and forestry sectors, the environment and the management of rural areas, as well as the quality of life and diversification of activities in rural areas

The efficient use of resources and a model of sustainable development characterize each of the Operational Programmes supported by the ESE Funds, *with particular emphasis on the ERDF,* with respect to which thecentrality of the green economy (and in particular the actions aimed at supporting energy efficiency and the promotion of renewable energysources) has taken on a key role in the two last programming (2007-2013 and 2014-2020) both for the amount of resources finalized and for the project commitment and for the constant effort to give a framework of sustainability to all the planned interventions, even those with only indirect environmental impact.

The theme of green economy is particularly fitting for Lazio:

- ✓ the regional territory is the ideal subject for a massive deployment of green community solutions driven by the demand of the Public Administration;
- ✓ the industrial sector of the Green economy of Lazio has very significant dimensions equal to about 3,300 companies and a turnover of 6.2 billion euros and 39 thousand employees.
- ✓ the metropolitan area of Rome, with its extraordinary urban, landscape and transport complexity, must make the most important cultural and architectural heritage in the world coexist both with the housing needs of 4 million citizens and with the functional ones derived from the presence of the administrative systems of two states with the consequent diplomatic apparatuses. These unique parameters lead to propose solutions that once activated, can be lowered into any other context.
- ✓ Lazio has the highest concentration, at national level, of knowledge, skills and research infrastructures in the field: an asset of excellence with the potential for innovation for all strategic areas of the green economy, from the supply and sustainable use of energy to materials, from agroenergy, to the enhancement of cultural heritage, from environmental issues to those of smart cities and smart grids.

6.1.1 Operational Program POR Lazio

All the objectives are strongly oriented towards "sustainable development" both through direct actions, for an efficient use of resources (energy and mobility), both through risk prevention and management measures (prevention of hydrogeological risk) and through "indirect" actions (research and innovation, broadband and competitiveness) whose expected results are in any case oriented towards economic and social environmental sustainability (management of resources , strengthening employment services and opportunities, etc.). In terms more directly related to energy issues, the contribution to sustainable growth comes substantially from Axis 4 Energy sustainability and mobility, in which the expected results are aimed at reducing energy consumption in buildings and public facilities, reducing climate-altering gas emissions by companies and production systems and increasing the use of renewable sources , increasing sustainable mobility in urban areas, affecting the use of transport systems with low environmental impact. Axis 4 absorbs almost 20% of the overall resources of the POR.

6.1.2 The Rural Development Program (RDP)

It is the main operational programming and financing instrument for interventions in the agricultural, forestry and rural sectors on the regional territory. Through the work of the Regions, in fact, the RDP allows each Member State of the European Union to use the economic resources that the Union itself makes available in the agricultural and rural field.

Three strategic objectives have therefore been set for the 2014-2020 period:

- ✓ improving the competitiveness of agriculture;
- ✓ sustainable management of natural resources and climate action;
- ✓ balanced territorial development for rural areas.

For rural development, these three objectives have been translated into six priorities:

I. promote knowledge transfer in agriculture and forestry and in rural areas;
II. enhancing the competitiveness of agriculture in all its forms and the profitability of farms;
III. encourage the organization of the agri-food chain and risk management in the agricultural sector;
IV. preserve, restore and enhance ecosystems dependent on agriculture and forestry;
V. encourage the efficient use of resources and the transition to a low-carbon and climate-resilient economy in the agri-food and forestry sectors;
VI. promote social inclusion, poverty reduction and economic development in rural areas.

6.2 EFFECTS OF THE RDP ON THE REGIONALAGRICULTURAL ECONOMY AND ON THE DEVELOPMENT OFRENEWABLE ENERGY

The RDP of the Lazio Region, approved by the European Commission in November2015, sets out the priorities for the use of more than € 822 mln of public funds available for the period 2014-2020, to which is added a supplementary regional funding.

Piano finanziario del PSR Lazio (v.9.0)

PSR LAZIO PROGRAMMA DI SVILUPPO RURALE 2014 - 2020

Misura	Descrizione	Dotazione finanziaria	Di cui quota FEASR	Finanziamento integrativo (Top-up)	Dotazione finanziaria totale (con Top-up)
M01	Trasferimento di conoscenze e azioni di informazione	6.644.886 €	2.865.275 €	0 €	6.644.886 €
M02	Servizi di consulenza, di sostituzione e di assistenza alla gestione delle aziende agricole	6.371.649 €	2.747.455 €	0 €	6.371.649 €
M03	Regimi di qualità dei prodotti agricoli e alimentari	5.439.536 €	2.345.528 €	0 €	5.439.536 €
M04	Investimenti in immobilizzazioni materiali	189.562.268 €	81.739.250 €	30.000.000 €	219.562.268 €
M05	Ripristino potenziale produttivo agricolo danneggiato da calamità naturali/eventi catastrofici e prevenzione	10.616.679 €	4.577.912 €	1.000.000 €	11.616.679 €
M06	Sviluppo delle aziende agricole e delle imprese	121.759.854 €	52.502.849 €	21.000.000 €	142.759.854 €
M07	Servizi di base e rinnovamento dei villaggi nelle zone rurali	66.359.114 €	28.614.050 €	0 €	66.359.114 €
M08	Investimenti in sviluppo di aree forestali e miglioramento della redditività delle foreste	15.105.030 €	6.513.289 €	0 €	15.105.030 €
M09	Costituzione di associazioni ed organizzazioni di produttori nei settori agricolo e forestale	818.001 €	352.722 €	0 €	818.001 €
M10	Pagamenti agro-climatico-ambientali	54.778.351 €	23.620.425 €	9.000.000 €	63.778.351 €
M11	Agricoltura biologica	145.648.673 €	62.803.708 €	12.138.793 €	157.787.467 €
M13	Indennità a favore delle zone soggette a vincoli naturali o ad altri vincoli specifici	50.064.534 €	21.587.827 €	0 €	50.064.534 €
M14	Benessere degli animali	48.724.135 €	21.009.847 €	45.000.000 €	93.724.135 €
M16	Cooperazione	23.608.513 €	10.179.991 €	0 €	23.608.513 €
M19	Sostegno allo sviluppo locale - LEADER	50.021.229 €	21.569.154 €	20.203.766 €	70.224.995 €
M20	Assistenza tecnica	18.224.743 €	7.858.509 €	0 €	18.224.743 €
M113	Prepensionamento (PSR 2007-2013)	7.200.000 €	3.104.640 €		7.200.000 €
M341	Acquisizione competenze, animazione e attuazione (PSR 2007-2013)	1.351.041 €	582.569 €		1.351.041 €
TOTALE		822.298.237 €	354.575.000 €	138.342.559 €	960.640.797 €

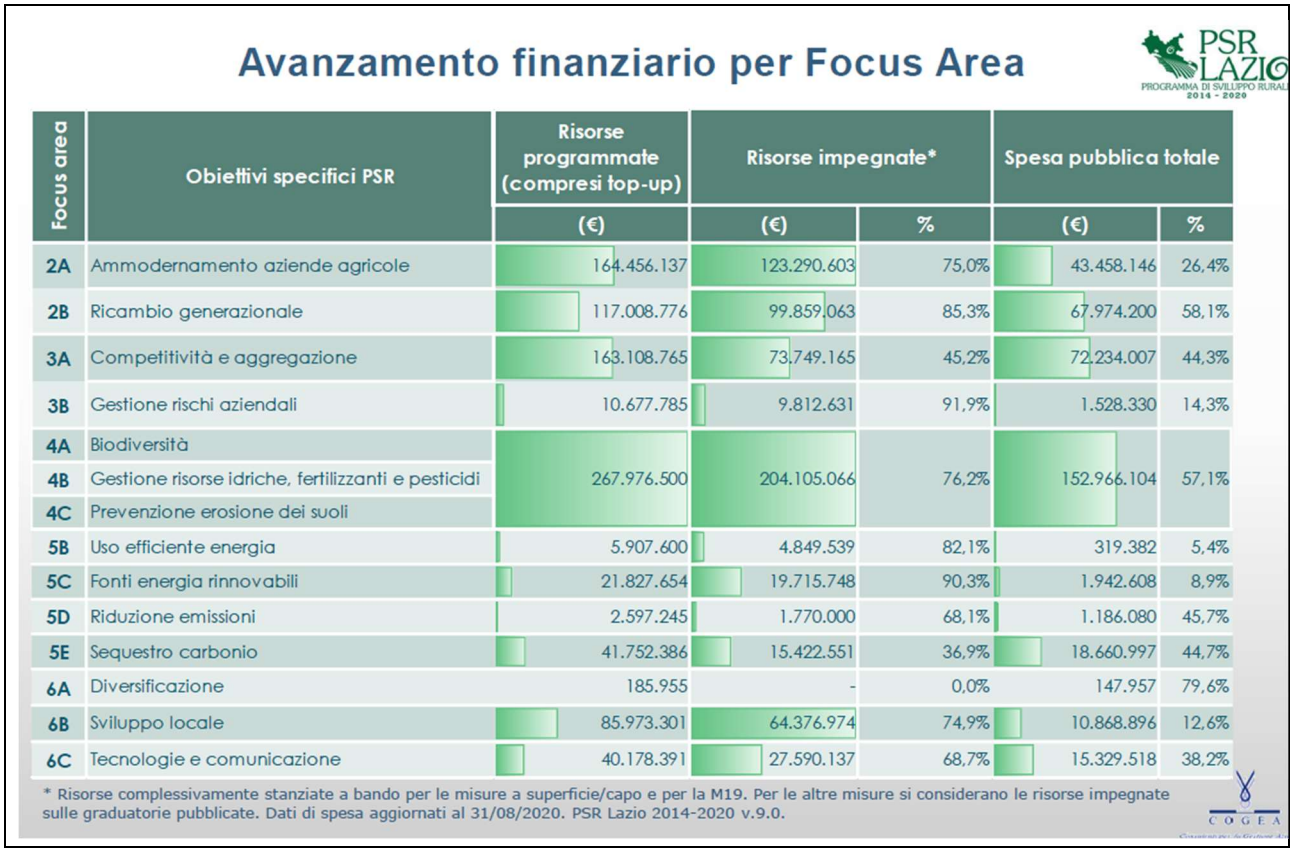
Versione 9.0 del PSR Lazio 2014-2020 da Decisione di esecuzione della Commissione Europea C(2020) 5669 finale del 13/08/2020

COGEA

Figure 9 - Financial plan of the Lazio RDP9

At 31/12/2020, the resources put out to tender are about € 700 million and the total commitments amount to € 679 million, equal to 83% of the financial envelope of the Programme net of supplementary regional funding. Going towards the final part of the programming, the increase in the resources put out to tender and the commitments generated is lower in 2020 than in 2019 (respectively +1.8% and +13% approximately).

Overall, the resources paid in December 2020 make up about 67% of the resources available for tenders. The increase in spending in the last year shows a leap forward of about +44% compared to the previous year with a more evident acceleration in the second half of the year, reaching € 470.4 million.



Avanzamento finanziario per Focus Area

PSR LAZIO PROGRAMMA DI SVILUPPO RURALE 2014 - 2020

Focus area	Obiettivi specifici PSR	Risorse programmate (compresi top-up)	Risorse impegnate*		Spesa pubblica totale	
		(€)	(€)	%	(€)	%
2A	Ammodernamento aziende agricole	164.456.137	123.290.603	75,0%	43.458.146	26,4%
2B	Ricambio generazionale	117.008.776	99.859.063	85,3%	67.974.200	58,1%
3A	Competitività e aggregazione	163.108.765	73.749.165	45,2%	72.234.007	44,3%
3B	Gestione rischi aziendali	10.677.785	9.812.631	91,9%	1.528.330	14,3%
4A	Biodiversità					
4B	Gestione risorse idriche, fertilizzanti e pesticidi	267.976.500	204.105.066	76,2%	152.966.104	57,1%
4C	Prevenzione erosione dei suoli					
5B	Uso efficiente energia	5.907.600	4.849.539	82,1%	319.382	5,4%
5C	Fonti energia rinnovabili	21.827.654	19.715.748	90,3%	1.942.608	8,9%
5D	Riduzione emissioni	2.597.245	1.770.000	68,1%	1.186.080	45,7%
5E	Sequestro carbonio	41.752.386	15.422.551	36,9%	18.660.997	44,7%
6A	Diversificazione	185.955	-	0,0%	147.957	79,6%
6B	Sviluppo locale	85.973.301	64.376.974	74,9%	10.868.896	12,6%
6C	Tecnologie e comunicazione	40.178.391	27.590.137	68,7%	15.329.518	38,2%

* Risorse complessivamente stanziate a bando per le misure a superficie/capo e per la M19. Per le altre misure si considerano le risorse impegnate sulle graduatorie pubblicate. Dati di spesa aggiornati al 31/08/2020. PSR Lazio 2014-2020 v.9.0.

COGEA

Figure 10 - Financial progress for FOCUS AREA (as of 102020)

The RDP of Lazio promotes the processes of aggregation and territorial collaboration to overcome the difficulty of a territory that suffers from the excessive fragmentation of the productive fabric and the difficulty in creating critical mass. The mechanism linking membership of organised supply chain partnerships (measure 16.10) to the bonus for obtaining funding for other measures encourages the participation of producers in aggregated systems.

With the first call for proposals in 2017 for measure 16.10, 34 partnerships were launched whose progress of the investments and operations envisaged by the beneficiaries within the agreements is in many cases appreciable.

In September 2019, a second call for proposals in support of partnerships was opened, linked to calls for operations 4.1.1, 4.2.1 and 3.2 (promotional activities on the internal market). Based on the average amount of the partnerships funded under the first call, about 23 new supply chain agreements could be financed, but the novelty of extending the "token" also to indirect participants could generate a higher average value.

As of 2019, investments by agri-food companies (measure 4.2.1) initiated or completed are more than half of the projects eligible for funding and reflect the regional strategy of approach by organised supply chain,

with 60% of the projects completed. The projects concern in particular the fruit and vegetable sector for conservation and storage activities (9 projects) and preparation of vegetable preserves (7 projects).

The other important asset is the measure in support of animal welfare (measure 14.1). As of 2019, two public notices have been published for the five-year premium: the first in 2016 to which farmers of beef and dairy cattle, sheep and goats and buffaloes with a livestock load of more than ten LU per hectare were able to access and the second notice in 2019 reserved for sheep and goat farmers. The intervention is concentrated in particular in the *Reatino*.

The RDP finances other forms of support as a corollary of aggregation such as support for the development of short supply chains and actions to enhance quality production, which rely on the concentration of specialized production and professional nuclei on the territory, and risk management.

As regards agri-energy measures and sub-measures, an overview of the initial financial allocation and that of the financing granted are given below.

The measures analyzed are:

4.1.3	Investments in individual farms to increase the energy efficiency of production processes
4.1.4	Investments in individual farms to promote the supply and use of renewable sources, by-products, waste materials and residues and other non-food source materials
4.2.2	Investments aimed at agri-food companies functional to improve energy efficiency
4.2.3	Investments in agri-food companies for the production and supply of energy from renewable sources
6.4.2	Energy production from alternative sources
7.2.2	Investments to promote the supply and use of energy from renewable sources for self-consumption

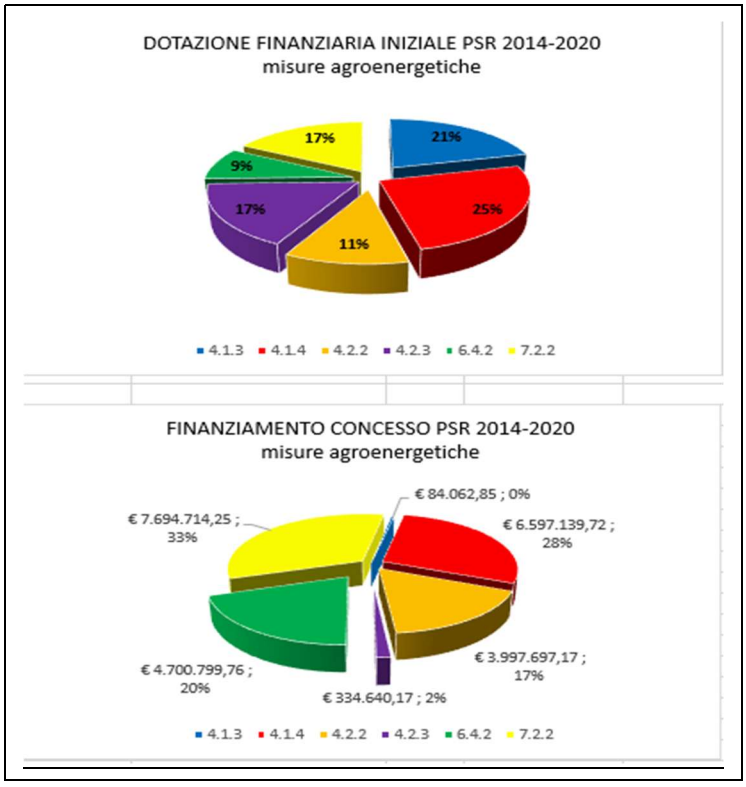


Figure 11 - 11Focus on the state of financing of agri-energy measures

In detail, a summary is reported that for each measure details:

- the description of the operation (submeasure)
- the initial endowment
- the eligible financing
- the admitted on the available (%)
- the investment allowed
- the project target for climate mitigation
- the number of questions
- the number of holdings
- the n. applications per holding
- the average investment per company
- the average financing per holding

MISURA	OPERAZIONE		Dotazione iniziale PSR	Finanziamento ammesso	% ammesso/disponibile	Investimento ammesso	Target del progetto rilevante per la mitigazione climatica (potenza nominale Kwe elettrica)	N. DOMANDE	N. AZIENDE	N.Domande per azienda	Investimento medio per AZIENDA	Finanziamento medio per AZIENDA
4. Investimenti in immobilizzazioni materiali	Investimenti nelle singole aziende agricole per il miglioramento dell'efficienza energetica dei processi produttivi.	4.1.3	€ 10.044.597,45	€ 84.062,85	0,84%	€ 140.104,74	n.d.	2	2	1,00	70.052,37	42.031,43
4. Investimenti in immobilizzazioni materiali	Investimenti nelle singole aziende agricole per favorire l'approvvigionamento e l'utilizzo di fonti di energia rinnovabili, sottoprodotti, materiali di scarto, residui e altre materie grezze non alimentari.	4.1.4	€ 12.136.964,36	€ 6.597.139,72	54,36%	€ 13.313.683,95	6.574,52	119	100	1,19	133.136,84	65.971,40
4. Investimenti in immobilizzazioni materiali	Investimenti rivolti ad imprese agroalimentari funzionali a migliorare l'efficienza energetica.	4.2.2	€ 5.408.629,39	€ 3.997.697,17	73,91%	€ 10.198.091,95	n.d.	29	17	1,71	599.887,76	235.158,66
4. Investimenti in immobilizzazioni materiali	Investimenti nelle imprese agroalimentari per la produzione e l'approvvigionamento di energia da fonti rinnovabili.	4.2.3	€ 8.112.944,09	€ 334.640,17	4,12%	€ 836.600,43	250,00	1	1	1,00	836.600,43	334.640,17
6. Sviluppo delle aziende agricole e delle imprese	Produzione di energia da fonti alternative	6.4.2	€ 4.088.923,82	€ 4.700.799,76	114,96%	€ 9.229.670,38	3.660,37	62	54	1,15	170.919,82	87.051,85
7. Servizi di base e rinnovamento dei villaggi nelle zone rurali	Investimenti per favorire l'approvvigionamento e l'utilizzo di energia da fonti rinnovabili per autoconsumo.	7.2.2	€ 8.112.944,09	€ 7.694.714,25	94,84%	€ 7.054.378,75	n.d.	118	42	2,81	167.961,40	183.207,48
		TOTALI	€ 47.905.003,20	€ 23.409.053,92	48,87%	€ 40.772.530,20						

Figure 12 - Overview of the state of play of agri-energy measures12

The following figure shows a graph showing the difference per measure between the initial budget and the funding granted.

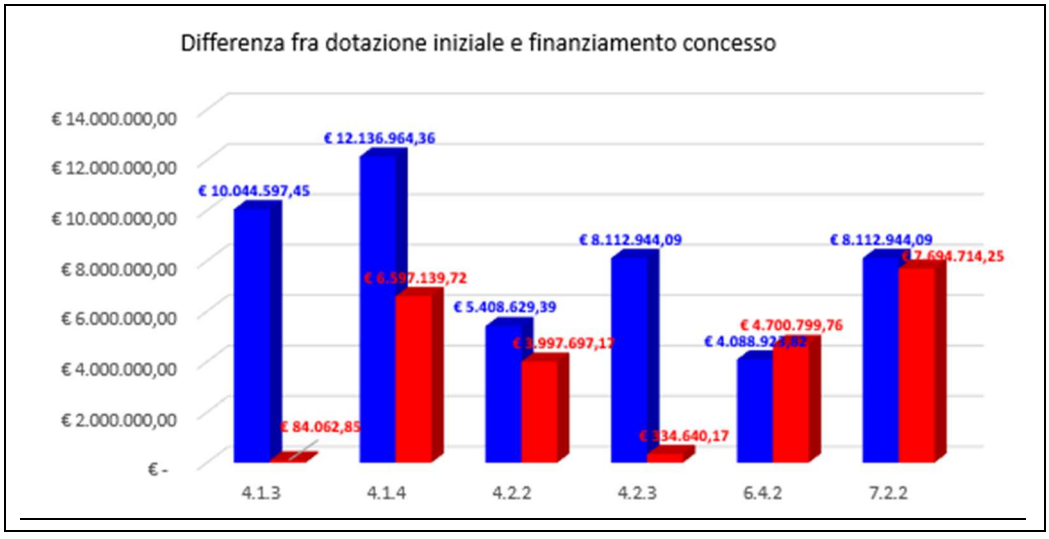


Figure 13 - Focus on the granting of funding compared to the budget for agri-energy measures

7 RISKS AND OPPORTUNITIES IN THE DEPLOYMENT OF RENEWABLE ENERGY IN AGRICULTURE

At the end of the regional evaluation document on the diffusion and potential of renewable energies, this paragraph contains an examination of the risks and opportunities for the development of renewable energy in the Lazio Region.

The drafting of the paragraph was based on the information that was elaborated in the previous paragraphs and the comparison with the stakeholders of the *Agrores*project, gathered in a debate held in December 2020. On the occasion of the meeting, the draft of this document and its purposes were presented and the testimonies of the participants were collected. Thanks to this it has been possible to identify strengths and weaknesses that have characterized the history of the spread of renewable energy in the Lazio region and at the same time to collect the points of view on the risks and opportunities that are looming in the future with respect to the objectives of spreading Alternative Energy Sources, both electrical and thermal, as provided for by the Regional Energy Plan which will probably have to be revised to be aligned with the new objectives of the European and national energy and ecological transition.

Briefly and schematically, the conclusion of the analysis is reported where the titles of the topics addressed distributed in the 4 areas considered (strength, weakness, risks, opportunities) are reported.

Strengths: I. Good practices and positive experiences of farms on the development of renewable energy; II. The collaboration between agricultural companies and the world of research; III. The promotion and experience of agricultural diversity;	**Weaknesses:** in relation to the RDP: IV. The heaviness and complexity of bureaucratic practices; V. Spending capacity; VI. The ability to identify business needs by regional institutions;
Risks: VII. Fragility of beliefs and pessimism; VIII. Ability to collaborate between public and private entities; IX. Complexity and slowness of the authorization procedures;	**Opportunities:** X. National Recovery and ResiliencePlan; XI. The Integrated National Energy and Climate Plan; and the updating of the Energy or Regional Plan; XII. The Regional Agricultural Plan; XIII. Energy communities;

Some considerations on the themes identified:

I. Good practices and positive experiences of farms are a valuable gift to be used for future experiences. Apart from non-corporate ones, thanks to the AGRORES project several good practices have been selected that can represent the beginning of a catalog of good practices that can also serve to promote energy virtuous companies.

II. From the comparisons and dialogue with research institutions present in the Lazio Region (CREA and ENEA for example) it was possible to highlight that the contribution of research in innovative solutions in the field of the use of renewable energy sources is very important and that the collaboration between researchers and companies has given good results in the past.

III. The specific characteristic of regional agriculture of having clearly aimed since 2007 at agricultural diversification represents a strong point of the regional agricultural system, which can count on a willingness of the company to look for new sources of income or cost reduction that also has an eminently environmental character.

IV. Many interlocutors and representatives of the agricultural world have denounced as a structural weakness of the system the complexity of the bureaucratic procedures aimed at requesting financing and/or incentives.

V. The bureaucratic aspect is also partly reflected in the spending capacity of the Rural Development Programme, which initially slows down towards the end of the programming period, leaving a large slice of capital available to invest.

VI. Linked to spending capacity, there is also another aspect that leads to a weakness (to be considered in the next programming): it is the partial lack of ability to measure and distribute optimally the resources on the measures according to the real needs of the companies or on the contrary to promote and justify in the eyes of the companies the measures so that they are appreciated and perceived as convenient.

VII. For the future, especially the near one, it is likely that we are faced with an agricultural production system that has suffered and that may not show the optimism that needs a restart like the one that is looming because of the pandemic.

VIII. In this situation, an important part will also be played by the ability to relate between public entities (institutions) and farms that should seek a compromise between business needs and assumption of public responsibilities.

IX. On the other hand, the slowness and complexity of the authorisation process is still a risk due to the failure of the diffusion of renewable energies in agriculture. Of the three topics treated as risks, this appears to be the priority to be addressed as it could then make it possible to reduce the size of the other two.

X. Turning to the side of opportunities, we could only start with the PNRR, which is the most important tool for the ecological conversion of the economy and for the energy transition. The opportunity is certainly linked to the ability of the country system to put projects in place and to carry them out in the shortest possible time: for this reason, the first government decree that addresses the governance of the Plan goes in the right direction and addresses the issues of bureaucratic simplification and the slowness of the procedures.

XI. The energy transition at national level certainly passes from the PNIEC approved already at the end of 2019. The PNIEC is an opportunity for the region to update and definitively approve the PER that would otherwise be just approved dated and not consistent with current scenarios.

XII. A fundamental role for the implementation of regional energy policies is the coordination between PER and the PAR, Regional Agricultural Plan. Because they are identified, among other things, the areas not suitable for the installation of the different types of plants intended to produce energy from renewable sources. Already in 2019, the Regional Council of Lazio approved the guidelines for the preparation of the proposal for a Regional Agricultural Plan (P.A.R.) and the related approval and revision procedures. The PAR therefore represents an opportunity for the quickest identification of the areas suitable for hosting plants to produce energy from renewable sources.

XIII. Finally, energy communities. According to regional law 1 of 2020 "Measures for economic development, the attractiveness of investments and simplification" energy communities have theaim of encouraging the production, exchange and self-consumption of energy produced mainly from renewable sources, to experiment and promote new forms of efficiency and reduction of energy consumption ..., in implementation of Directive 2018/2001 / EU of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources and pending the approval of the PER. The opportunity arises from the possibility of connecting the PNRR related to Green Communities projects with those responding to the energy communities defined by the LR. 6