INDIVIDUAL REGIONAL BASELINE REPORT ON LOW CARBON INVESTMENTS FUNDING

[FRIULI-VENEZIA GIULIA]

Preface

Present Individual Regional Baseline Reports on Low Carbon Investments Funding is a strategic document to be delivered for seven Partner Regions under the Project entitled "PROmoting regional Sustainable Policies on Energy and Climate change mitigation Towards 2030" funded by the Interreg CENTRAL EUROPE Programme.

Partner Region: [Friuli-Venezia Giulia]

Programme priority:	2. Cooperating on low-carbon strategies in CENTRAL EUROPE
Specific objective:	2.2 To improve territorial based low-carbon energy planning strategies and policies supporting climate change mitigation
Project acronym:	Prospect2030
Project index number:	CE1373
Lead partner:	Piemonte Region
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Date:	[30.11.2019]

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1. Background

The Data Collection and Reporting Guide (D.T1.1.1) is the initial task foreseen under the Work Package "T1 Assessment of availability and use of public funds supporting climate change mitigation". The aim of T1 is to assess the use of public funds dedicated to climate change mitigation in the 2014-20 period with particular focus on development of RES. The overall objective of T1 is to deliver policy recommendations targeting mainly the macro-regional strategies (EUSDR, EUSAIR, EUSBSR, EUSALP) developed in CE.

The starting point of T1 is a baseline assessment of the use of available funding for low-carbon investments in the participating regions from 2014 onwards. The funding schemes to oversee include the followings in particular:

- Decentralised funds made available from the ESI Funds through the Partnership Agreements (national, sectoral or regional operative programmes);
- EU low-carbon initiatives (H2020, LIFE, EFSI, ELENA, Jessica, SEFF schemes);
- National/federal funding schemes (grants, subsidized loans, feed in tariffs, building integrated RES schemes); and
- Cooperation with private stakeholders (EPC, ESCO schemes, crowdfunding, venture capital, etc.).

The analysis, carried out by all Project Partners (PP) under the coordination of PP8, will assess the appropriateness of funding policies, administrative procedures, planning and implementation structures, dedicated resources and impacts in environmental and economic terms. Where relevant, the environmental impacts will address the whole lifecycle of the supported RES projects. The economic analysis should particularly focus on the cost-effectiveness of the use grants and exploring best practices concerning innovative low-carbon financing solution leveraging to maximum extent private financial resources.

The participating regions and the PP responsible for the elaboration of the reports are given in the table below.

Table 1 Project Partners and linked reports

Region	PP	Abbreviated name of PP	Deliverable ID
Piemonte Region	LP	REGPIE	D.T2.2.1
Friuli-Venezia Giulia Region	PP6	RAFVG	D.T2.2.2
EcoEnergyland	PP7	EEE	D.T2.2.3
Saxony-Anhalt	PP9	HSDM	D.T2.2.4
Split and Dalmatia County	PP4	EIHP	D.T2.2.5
Mazovia Region	PP3	MAE	D.T2.2.6
Southern Great Plain Region	PP8	AACM	D.T2.2.7

The data collection for the individual regional baseline reports will base on publicly available data and interviews. Compliance with the GDPR rules will remain the responsibility of each Project Partner (PP) involved.

2. Presentation of the target region

2.1. General presentation of the target region

Friuli Venezia Giulia is a region of Italy reaching from the Alps in the North to the Adriatic Sea in the south. It is part of Northeast Italy, as one of the five official statistical regions of Italy, bounded by Austria to the north, Slovenia to the east and Veneto to the west.

The morphology of the region includes coasts, lagoons, flatlands, hills and mountains. The moisture brought by south winds coming from the sea becomes rain in proximity of the mountains and consequently the region is rich in rain and water, especially in the mountain and hilly parts which account for 63% of the entire territory.
The climate ranges from Mediterranean along the coast (2235 dd) to Alpine in the mountain valleys (4736 dd). Rain is significantly present in proximity and over the mountain part of the region, giving an oceanic flavour to the regional climate.
Mountains are predominantly rural, vineyards are well spread, especially along the eastern border whereas flatlands are dedicated to intensive agriculture (corn, wheat, soya beans, etc.).

Friuli Venezia Giulia is an autonomous region with special statute. Namely, it can develop its own laws in specific fields of activity like urban planning, agriculture and forestry, industry and trade among the others. Energy is a shared competence with the State, thus new laws are subject to an agreement between the Regional Authority and the Central Government.

The region includes 215 municipalities and is currently divided into 18 *Unioni Territoriali Intercomunali - UTI* (inter-municipality unions) but it was previously divided into four provinces (Trieste, Udine, Pordenone and Gorizia) like most of the rest of Italy. The administrative system has been recently modified meaning that local administrations have now the possibility to choose whether to join the reference UTI or not. It is likely that in the upcoming years the system will be reorganized and that UTIs will no longer exist. It is Italy's fourth-smallest region with an area of 7.932 km^2 and its population is a little more than 1.2 million.
The city of Trieste is the capital of the region and has a population of 204.267 inhabitants. Other major cities with a population over 20.000 inhabitants are Udine, Pordenone, Gorizia and Monfalcone.

Figure 1 Friuli Venezia Giulia - location on Italy map

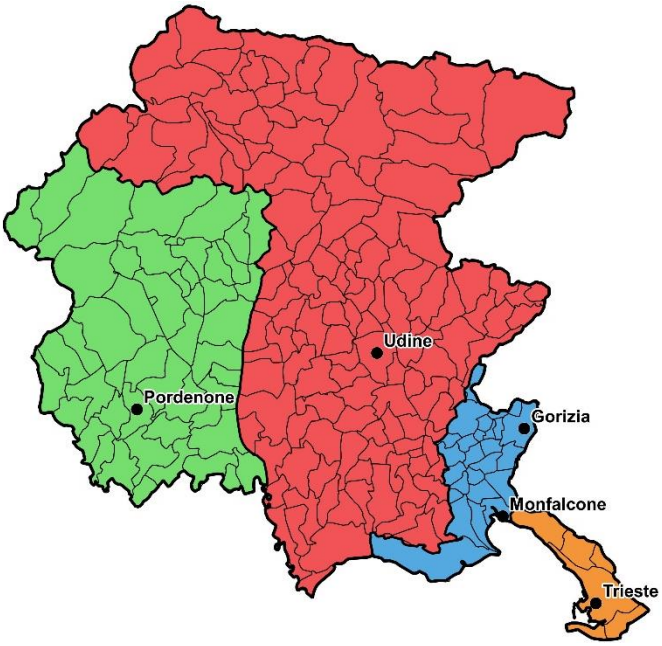


Figure 2 Friuli Venezia Giulia - Main cities, provincial and municipal boundaries

Friuli Venezia Giulia's industrial development has been driven, since late 1960s, by industrial clusters of SMEs working in traditional sectors. This development pattern is a hallmark of Northeastern Italy. Key sectors in the regional economy include wood-furniture, manufacture of metal products, manufacture of machinery and equipment, manufacture of electrical and non-electric household appliances, food and beverage industry, manufacture of other non-metallic mineral processing products, metallurgy and shipbuilding.
Some of these sectors converge in supply chains and sectors with a high capacity for growth and innovation: the agri-food chain, the supply chain of the home system, metalworking, the chemical-pharmaceutical supply chain, shipbuilding and the bio-sector.

Friuli Venezia Giulia ranks seventh in the list of Italian regions by exports with 3% share of the total national value. Thus, exports play a significant role in the regional economy. Value exported in 2018, which amounted to € 15.610 million, increased by 5,9% compared to 2017. It accounts for a trade surplus of € 6.915 million.
Over the past 20 years (1997-2019, export composition has shifted from home furniture (from 21,5% to 9,2%) to metallurgy (from 3,8% to 14,1%), nautical and shipbuilding industry (from 4,5% to 14,3%).

In 2017, the regional GDP amounted to € 37.641 million contributing to about 2,2% of the national GDP (Eurostat 2019).

2.2. Potentials for low-carbon sector development

2.2.1. Energy efficiency

In Friuli Venezia Giulia, the greatest potential for energy efficiency lies within retrofitting residential buildings at district level triggering reduction in the heating demand in buildings. Some detailed scenarios are available and account for 31% of total energy

consumption. A basic and economic level of residential building renovation would lead to a 20% reduction of energy needs. Whereas a more incisive retrofit scenarios would lead to a reduction of more than 35%. Much more could be achieved with a deep renovation approach which addresses also interventions with longer payback periods.

The residential use of wood energy for heating purposes can be rationalized through the renewal of heating systems. This would reduce the specific demand (tons/dwelling*year) of wood fuels and improve the air quality, making them available to other end users, with the final aim not to increase production.

Switching to heat pumps is another complementary way to reduce the specific demand of fossil fuels (natural gas) for heat generation in the flatland and along the coast. However, this is compensated by an increasing demand of electricity in the summer due to new cooling needs (heat waves, i.e. number of subsequent days with average temperature over 30°C greater than five, are becoming more and more frequent).

The service and industry sectors require specific analyses and overall data is not available.

Efficiency in transport implies the spreading of electric mobility, which is an ongoing and long process. However, this objective will also require an enhancement of the e-mobility charging infrastructure connected to the electricity grid, which currently needs to be further developed.

2.2.2. Renewables

As of 2017, the percentage of gross final renewable energy consumption for Friuli Venezia Giulia was 19,7%, well above the 2012 burden-sharing measure forecast of 9,6% for 2016 and of 12,7% for 2020.
By 2017, there has been an increase of 73 ktoe in the overall contribution of RES since 2013.
Hydropower is the largest renewable energy source for electricity in the region, followed by solar energy as it can be seen in the table below (source: GSE - Monitoraggio Regionale Allegato - 2017 - https://www.gse.it/dati-e-scenari/monitoraggio-fer/monitoraggio-regionale).

FINAL RENEWABLE ENERGY CONSUMPTION - ELECTRICITY

	2013	2014	2015	2016	2017
Hydropower	145	151	149	150	148
Wind	0	0	0	0	0
Solar PV	42	44	49	45	48
Geothermal	0	0	0	0	0
Solid biomass	6	6	7	8	8
Biogas	28	31	32	34	35
Bioliquids	14	23	25	22	21
TOT	235	255	262	259	260

Unit ktoe

Figure 3 Final RES electric power consumption in FVG 2013-2017

Most of the heat from RES comes from solid biomass which is widely used in the residential sector.

FINAL RENEWABLE ENERGY CONSUMPTION - HEAT						Unit ktoe
	2013	2014	2015	2016	2017	
Geothermal	4	0	3	3	3	
Solar thermal	8	10	10	11	11	
Bio waste	21	34	33	39	40	
Solid biomass (residential)	212	181	210	213	223	
Solid biomass (non-residential)	0	2	3	3	2	
Biogas and biomethane (injected into the grid)	1	1	1	1	1	
Heat pumps	100	102	103	104	105	
Derived heat	8	9	15	15	17	
TOT	354	339	378	389	402	

Figure 4 Final RES heat consumption in FVG 2013-2017

Cogeneration (CHP) and tri-generation (CCHP) represent interesting technologies to improve energy transformation that can take advantages also from the use of local biomass. There is an interesting potential for this renewable energy vector since it is wide available in the mountain areas and in their proximity. Moreover, these technologies can be exploited both with fossil and renewable energy sources and in combination with district heating networks. This is especially true for urban areas where heat demand per square kilometre is sufficiently high to guarantee economic sustainability to the investment projects. However, rural areas not connected to the natural gas grid and with adequate and stable density of population are potentially interesting for the development of small district heating networks supplied with biomass. Moreover, in sparsely populated areas, the role of biomass will be central to covering the thermal needs of the residential sector, through a renovation of the existing park towards appliances and boilers with greater production efficiency and less pollutant emissions (PM10).

Heat pumps are another key technology that allows significant improvement in heat generation efficiency provided that some conditions exist, as it is the case for the flatland - almost half of the regional territory - where the winter climate is mild and the summer is hot. This technology is reversible: the same machine can be used to produce heat in the winter and cool in the summer, a requirement that is becoming ever more important with respect to climate change trends.

Solar energy will be key for future development in the residential sector. Solar PV can spread over all roofs in combination with energy storage systems: this could allow to cover around 60% of final power demand in the civil sector. Large-sized photovoltaic plants should be limited to marginal lands, those ones under-used or not-used for pollution, low agricultural fertility, land use conversion from industrial sites, etc. Solar thermal is already well spread over domestic buildings and can still increase especially in combination with other domestic technologies such as hybrid systems (puffers and heat pumps or condensing boilers) or with integrated heat systems such as district heating networks and seasonal thermal storages.

Revamping of existing large hydroelectrical power plants with higher performance turbines and construction of new small hydroelectrical power plants based on innovative turbines and screw turbines will represent other key technologies interesting for local energy communities.
With respect to the transport system, we deem that the first step in switching to a more sustainable way of moving will rely on hybrid technologies for the car sector and on natural gas (bio-methane) engines for the road transport sector. A complete electrification of this sector can be foreseen only in the very long run, since very important upgrades in local power infrastructures are required with respect to both power capacity and power transportation and distribution.

Results of an analysis carried out by APE FVG within the Interreg Central Europe ENTRAIN project about the RES potential in Friuli Venezia Giulia show that forest biomass is the most interesting energy source to foster the development and diffusion of small RES DH networks at regional level. Wood waste resources from the total forest area amount potentially to nearly 72.600 tons yearly. Based on the extension and the conditions of the road system in the area, it is estimated that about 74% of those resources (equivalent to a little less than 54.000 tons/year or 2.230 TJ/year) are actually available for woodchip energy production. Overall, it is estimated that over 37.000 tons of class A and 16.700 tons of class B wood chips are obtainable from the regional mountain areas.

Demand of wood chips currently amounts to little less than 16.500 tons/year for 18 DH networks located in Carnia. These plants mainly run on class B wood chips (about 12.800 tons/year which is more than 70% of the total potential) that are produced, stocked and distributed by about 20 logistics platforms that could potentially be employed also in the western areas of the region. As for the production and distribution of class A wood chips, results show that the most interesting forest cover is located in areas which are off the gas grid. Nevertheless, these areas can count on a good quality road network and on the presence of several logistics platforms. These are mainly mountainous areas, sparsely urbanized, with cold winters and low population density that have low specific heat demand.
Diesel fuel and LPG are the most common heating fuels but wood biomass is also widely used for domestic heating mainly in small plants with manual loading or in combination with boilers and traditional plants. These systems are generally characterized by low efficiency both from an energy and environmental point of view especially in relation to dust emissions which can be quite high in case of poor or inadequate maintenance and therefore bad combustion. In these areas all the operational requirements are met for the start-up and diffusion of "short energy chains" based on a local forest biomass supply system and aimed at small to medium scale heat production combined with small DH networks serving small urban areas or groups of buildings.

Another analysis was carried out within the Interreg Central Europe CE-HEAT project on waste heat potential in Friuli Venezia Giulia. This potential is estimated in 5.550 GWh of primary energy: this figure includes all production activities of the industrial sector. Several interventions can be taken into account in the following order:

- reduce waste heat production improving the energy efficiency of the specific process;
- re-use waste heat in the specific process;

- transform waste heat in other useful energy within the same company (e.g. power through an ORC turbine);
- supply waste heat to external clients for a range of different purposes.

A wide range of technologies are potentially interesting to convert waste heat in other useful energy like heat exchangers for pre-heating, heat exchangers for district heating systems, heat pumps, absorption chillers, steam and ORC turbines, other thermoelectrical generators.

District heating is another potential option for an efficient renewable heat supply for both urban and rural areas thus enabling the transition to higher RES share in energy generation and consumption. A further expansion of DH networks is already part of the regional energy strategy: beside extended use of biomass, the strategy can focus on enhanced integration of solar thermal and waste heat to improve air quality as well as foster more efficient use of biomass. As well, thermal storages solutions and seasonal storages are at stake.

Concerning the exploitation of low enthalpy geothermal energy source in the residential sector, it could be achieved through geothermal pumps or hybrid thermal heat pump-condensing boilers. The use of this technology would allow an integration of renewable energy sources in buildings equipped with autonomous boilers, currently installed in all non-metropolitan areas of the region. However, from the economic point of view, the investment is sustainable in the short term only for large buildings, terraced houses or blocks.

The production of bio-methane from urban and agricultural waste is a technological perspective of great interest for Friuli Venezia Giulia. Small existing plants are trying to aggregate in few value chains in order to reach critical sizes to produce and distribute bio-methane while waste management utilities are building new biogas plants to produce power for internal use and heat for local district heating networks.

2.3. Regional low-carbon policies, institutional framework and policy

The Regional Energy Plan of Friuli Venezia Giulia (Piano Energetico Regionale – PER) is the main strategic planning tool to steer energy priorities and policies at regional level. It highlights key objectives and prioritize the set of interventions to be implemented in the energy sector (infrastructures, renewables & share of RES in energy production and consumption, energy efficiency, energy saving, etc.). The ultimate goal is to promote the long-term uptake of a sustainable economic model which integrates environmental protection and pollution / GHG emissions' reduction.
The Plan was adopted in 2015 and will be reviewed in 2020.
In line with the objectives of Europe 2020 Strategy and EU 2030 climate and energy framework, the Plan pursues seven general objectives:

- Promote distributed energy generation and energy production from RES;
- Promote reduction of climate-heating emissions;
- Promote innovation and cutting-edge technology in the energy sector through strategic cross-sector fertilization;
- Ensure availability and continuity of high-quality energy supply to all end-users across the region;

- Reduce energy costs and foster competition among operators, energy diversification, rational development of interconnected infrastructure systems;
- Increase the efficiency of the regional energy system to promote energy saving and rational use of energy;
- Achieve an average energy savings' level in relation to regional patterns of energy consumption.

and builds on 6 key actions:

- Green region and green belt: a cross-border carbon sink to mitigate climate change (countries and regions to involve: Slovenia, Austria and Veneto);
- Renewable energy sources: consumption and production;
- Energy retrofit: efficiency and optimization;
- Environmental sustainability (residential buildings, industry, agriculture, tourism and transport);
- Infrastructure and plant interventions, smart grid: eco-compatibility criteria;
- Boost of technological and computer applications and cross-fertilization with energy and environmental sector.

The Plan is structured in 57 measures which are embedded within the overall EU and regional visions and directly linked to the general and specific objectives listed in the Plan.

The Regional Energy Plan of Friuli Venezia Giulia is available at:
http://www.regione.fvg.it/rafvg/cms/RAFVG/ambiente-territorio/energia/FOGLIA111/#

The e-mobility regional plan for Friuli Venezia Giulia is the main regional policy instruments to promote the uptake of e-mobility. The plan calls for the roll-out of an efficient e-vehicle charging infrastructure integrating public and private charging points.

The green cities' regional strategy for a sustainable urban development in Friuli Venezia Giulia (Strategia Regionale per le green city per lo sviluppo sostenibile urbano della regione Friuli-Venezia Giulia) will be officially presented and launched in the first months of 2020. The strategy has been developed on the basis of a public consultation process which involved more than 30 local municipalities. The strategy integrates already existing and applicable tools and interventions as well as ongoing and planned best practices. The priority sectors that have been identified are: environmental quality of cities, efficient use of resources based on circular economy principles, climate change. It also provides a plan for fostering the uptake of the green city approach in the region.

The regional law on the general framework for waste management and circular economy principles (Legge regionale 20 ottobre 2017, n°34) is the reference instrument for planning waste management and the development and implementation of the regional model on circular economy. The plan sets a 70% recycling target and 20% reduction target in municipal waste generation per capita by 2024.

3. Decentralised funds made available from the ESI Funds through the Partnership Agreements

This Chapter is dedicated to the assessment of the relevant decentralized components of EU funding between 2014 and 2020 that is committed and disbursed within the competence of the Member States.

The programming and implementation of the EU Structural and Investment Funds (ESIFs) is conducted within a multi-annual framework covering the period of 2014-2020. Regulation (EU) N°1303/2013 lays down common provisions applicable to the European Regional Development Fund (ERDF), the European Social Fund (ESF), the Cohesion Fund (CF), the European Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF). These Funds operate under a common framework known as the European Structural and Investment Funds. The Regulation also sets out the provisions necessary to ensure the effectiveness of the ESIF and their coordination with one another and with other EU instruments.

ESIFs include both program elements decentralised on to the EU Member States and program elements managed centrally by the European Commission or its executive bodies in accordance with the principle of subsidiary. However, the major part of ESIFs (approximately 75%) is utilised by the Member States within a decentralised implementation system.

Each Member State has concluded a Partnership Agreements with the European Commission. The Partnership Agreements uniformly provide funding for eleven Thematic Objectives defined by the European Commission. The Thematic Objectives include:

- TO1 - Strengthening research, technological development and innovation;
- TO2 - Enhancing access to, and use and quality of ICT;
- TO3 - Enhancing the competitiveness of SMEs, of the agricultural sector (for EAFRD), and of the fishery and aquaculture sector (for EMFF);
- **TO4 - Supporting the shift towards a low-carbon economy in all sectors**;
- TO5 - Promoting climate change adaptation, risk prevention and management;
- TO6 - Preserving and protecting the environment and promoting resource efficiency;
- TO7 - Promoting sustainable transport and removing bottlenecks in key network infrastructures;
- TO8 - Promoting sustainable and quality employment and supporting labour mobility;
- TO9 - Promoting social inclusion, combating poverty and any discrimination;
- TO10 - Investing in education, training and vocational training for skills and lifelong learning;
- TO11 - Enhancing institutional capacity of public authorities and stakeholders and efficient public administration

All Partnership Agreements provide a matrix of the above Thematic Objectives (TOs) versus the structural instruments (ERDF, ESF, CF, EAFRD, EMFF; regional development, social inclusion, cohesion, agricultural & rural development and fishery funds).

The Member States are responsible to define national, sectoral or regional Operational Programmes (OPs) and ensure the translation of the Thematic Objectives onto OPs. TOs are translated into Operational Programmes (OPs) by each country in a different way. The low-carbon sector related activities may be addressed through several OPs. The OPs are typically broken down into Priority Axes (PAs) and measures within the specific PAs.

The 2014-2020 Partnership Agreement with Italy is the document approved by the European Commission and prepared by Italy in collaboration with central and local government bodies and economic and social partners that sets out the strategies, methods and expenditure priorities for the resources co-financed by the European Structural and Investment Funds (ESI Funds) for the 2014-2020 programming cycle.
As provided for by Regulation (EU) 1303/2013 (Regulation laying down common provisions on the ESI Funds), the Agreement delineates the strategic orientation around 11 thematic objectives, specifying expected results and actions, with a strong focus on results that can be measured through indicators designed to capture the main changes expected in the territory

involved. Italy has chosen to finance investment under all 11 thematic objectives defined in the Regulation.
The Agreement, which was initially approved by the European Commission on 29 October 2014, was amended on 8 February 2018 following the programming of the resources allocated to Italy with the technical adjustment of the Multiannual Financial Framework 2014-2020, as provided for in Article 92, paragraph 3, of the EU Regulation.
The main expected results for ESI Funds interventions in Italy are in line with the EU 2020 targets set for Italy.
In relation to energy objectives, ESI Funds will provide a significant contribution to reducing energy consumption in buildings and enterprises and facilitate achieving the target of 20% reduction in primary energy consumption by 2020.
Thematic concentration, meaning the level of ERDF expenditure, aimed at low-carbon economy (TO 4) in relation to total allocation accounts for 15,2% *(source:* Accordo di Partenariato Italia 2014-2020*)*.

Table 2 EU funds allocation under TO4 for Italy

Allocation of EU resources for TO4 for each ESI fund (million EUR)				
ERDF	ESF	EAFRD	EMFF	TOT
3.378,3	/	439,3	12,7	3.830,3

3.1. National/federal horizontal (sectoral) operative programmes

The EU 2014-2020 programming cycle calls for the execution in Italy of a combination of national and regional mono-fund and multi-fund operational programmes (OPs):

- **12 National Operational Programmes co-financed by ERDF and/or ESF - (PON)**

OP *Research and innovation*, OP *Active policies for employment*, OP *Inclusion*, OP *Education*, OP *Businesses & Competitiveness*, OP *Networks & mobility*, OP *YEI*, OP *Metropolitan cities*, OP *Culture*, OP *Legality* and OP *Governance*

The National Operational Programmes that touch upon low-carbon priorities provide funding to less developed and transition regions. Friuli Venezia Giulia, being a developed region, is out of the scope of these funding priorities. Moreover, there are no metropolitan cities within the regional territory.

- **39 Regional Programmes – (POR)**

21 for regions and autonomous provinces, mostly separate for the two funds ERDF and ESF, with the exception of the regions Calabria, Molise and Puglia which have a multi-fund programme each

- **23 Rural Development Programmes co-financed by EAFRD**

21 at regional level and 2 at national level

- **1 Maritime and Fisheries programme co-financed by EMFF**

The charts below show (1) the total budget from each ESI fund allocated to each Thematic Objective and (2) the current percentage of spent resources by fund for Italy. Funds dedicated to financing the low-carbon economy amount to over 6 billion € of which 5,2 billion € from ERDF, a little less of 1 billion € from EAFRD and some 18 M € from EMFF.

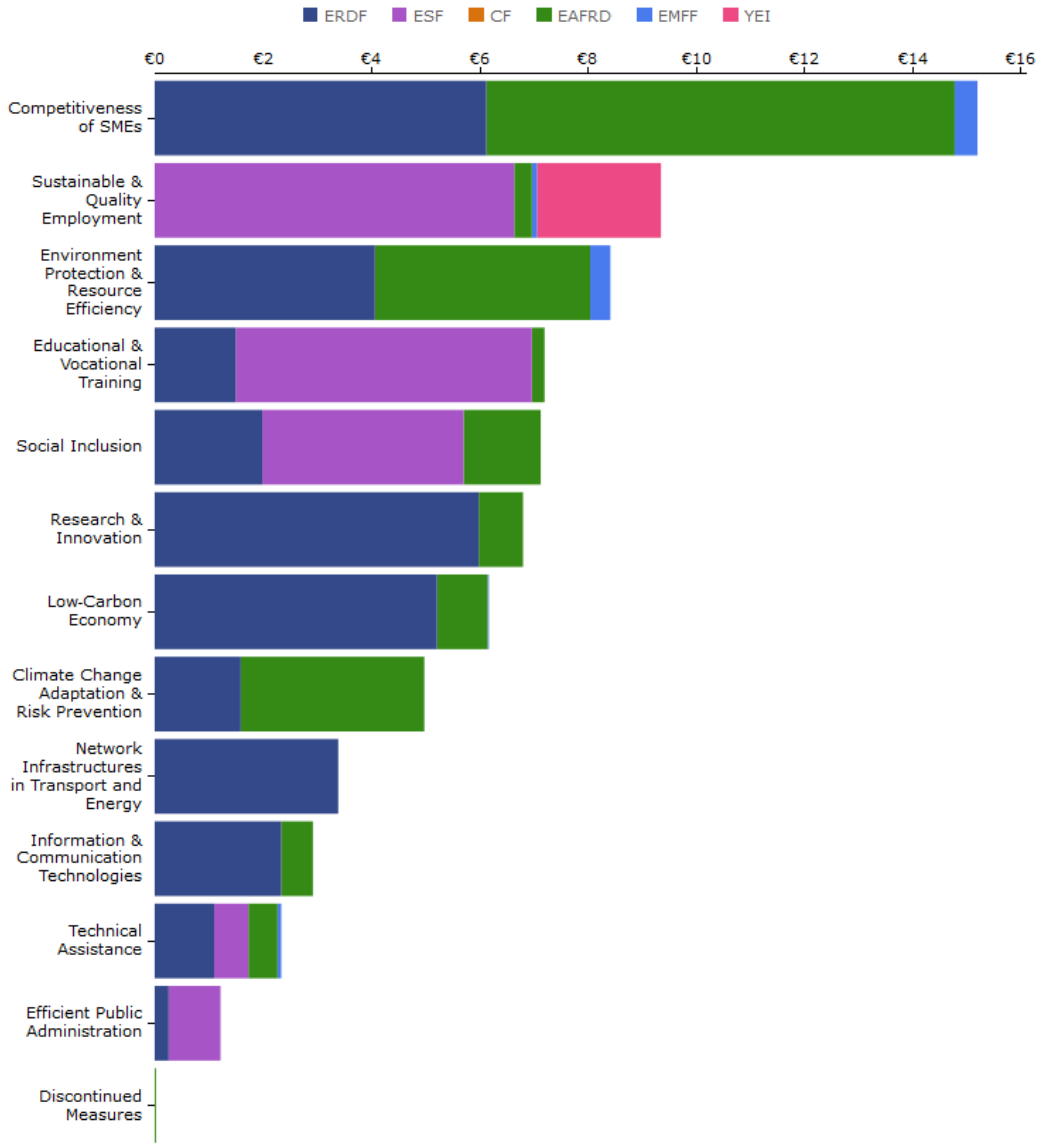


Figure 5 Allocation of ESI funds to Thematic Objectives (https://cohesiondata.ec.europa.eu/countries/IT#)

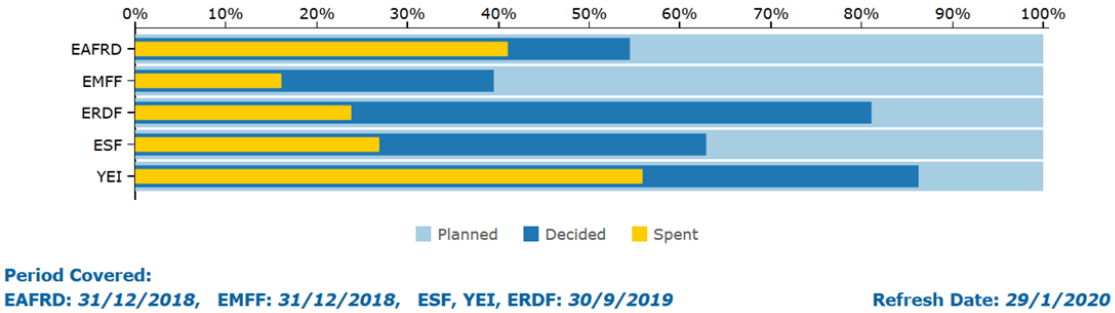


Figure 6 Implementation by fund for Italy, (Total cost) % of planned resources (https://cohesiondata.ec.europa.eu/countries/IT#)

The status of certified costs over the total amount of ERDF planned resources under TO4 as of December 31st 2019 is portrayed in the figure below.

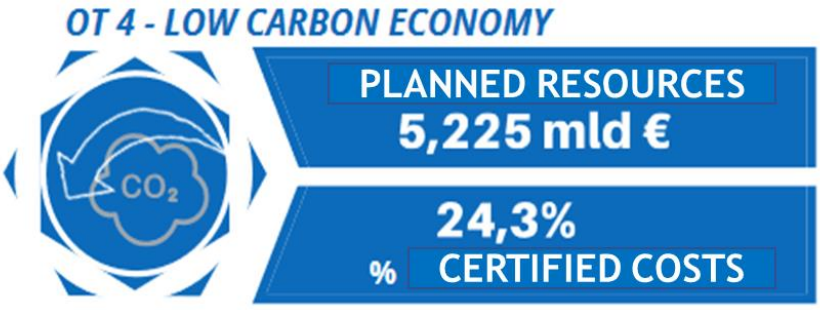


Figure 7 Percentage of certified costs / Planned ERDF resources under OT4 (http://www.agenziacoesione.gov.it/wp-content/uploads/2020/01/Fondi-UE_a-che-punto-siamo.pdf)

In terms of performance, by 2017 Italy had achieved a 19,6 % reduction in GHG emissions in Effort Sharing Decision - ESD sectors compared with the ESD base year, exceeding its national target by 6,6 percentage points. In 2017, the country also surpassed its national targets on renewable energy and primary energy consumption for the fourth and sixth consecutive year, respectively (https://ec.europa.eu/eurostat/statistics-explained).

Funding under TO4 is available to Friuli Venezia Giulia through the Regional Operational Programmes 2014-2020 for ERDF and EAFRD. As a general remark, at European and national level EU funds act in an integrated manner, while in Friuli Venezia Giulia the funds are more specialised on different topics: while the ERDF covers primarily energy issues, EAFRD works on different topics allocating 40% of its resources on the environmental prevention, a theme almost not covered by the ERDF (*Unitary Evaluation Service of the 2014-2020 European Union co-financed Operational Programmes, Ismeri Europa, February 2019*).

3.2. Decentralised regional operative programmes

The **Regional Operational Programme (ROP) ERDF** for Friuli-Venezia Giulia aims to create growth and jobs by boosting innovation and competitiveness, and improving the regional system of R&D. It shares the objectives defined by the Europe 2020 strategy for a smart, sustainable and inclusive growth. Overall, the programme aims to increase SMEs competitiveness and strengthen research and innovation. It also foresees actions to improve the energy efficiency in the region as well as the development of urban areas.

The ROP ERDF supports environmental sustainability in two manners: (i) directly, through interventions for energy efficiency funded by axis III; (ii) indirectly, through the application of specific selection criteria in the calls for the enterprises under Axes I and II, aimed at facilitating investments towards the development of "green technologies" and the adoption of sustainable production processes (*Unitary Evaluation Service of the 2014-2020 European Union co-financed Operational Programmes, Ismeri Europa, February 2019*).

The total available budget amounts to € 230.779.184 including ERDF, national and regional funding. The Programme is structured across five priority axes corresponding to related thematic objectives (OT):

Axis I – OT1 → strengthen research, technological development and innovation 77 M €

Axis II – OT3 → promote competitiveness of SMEs 76 M €

Axis III – OT4 → support the shift towards a low-carbon economy in all sectors 57 M €

Axis IV – Urban development 11 M €

Axis V – Technical assistance 9,2 M €

Under **Priority Axis III** - Supporting the shift towards a low-carbon economy in all sectors - it is foreseen a specific objective addressing energy conversion of public buildings and RES integration. Relevant details are reported in the table below.

Specific objective		
Reduction of energy consumption in public buldings, residential and non-residential, and RES integration		
Investment priority		
Support energy efficiency, rational use of energy and RES integration in public infrastructures, including public buildings, and in the residential sector.		
Performance framework		
Surface to be retrofitted ***as of 31.12.2018***		
unit	milestone	target actually reached
mq	18.450	25.541,76
Forecast ***until 2023***		
unit	final target	ex ante forecast
mq	319.000	586.517,46

The latest analysis carried out to evaluate the implementation progress of the ROP ERDF in Friuli Venezia Giulia shows that measures targeted at the energy efficiency of school buildings and social and health infrastructures are consistent with the needs of the territory and with the regional strategies in the energy sector. Furthermore, there was a strong thematic concentration in the areas selected. The strong focus placed on energy efficiency of public buildings, in proportion to the total resources, has no equal in Italy within the regional programmes funded by ERDF. There is no significant difference in how energy efficiency policies were actually designed compared to other Italian Regions with one exception. Namely, in Friuli Venezia Giulia it is not mandatory for the proposing entities to already have a design of the building at the moment of the application. The result is that, on one hand, applicants are more diverse and it is easier even for smaller institutions to apply. On the other, it requires a higher effort by the Region itself and by implementing authorities (*Unitary Evaluation Service of the 2014-2020 European Union co-financed Operational Programmes, Ismeri Europa, February 2019*).

Some elements hampering the implementation of projects, in fact, occurred. According to the project leaders' answers, only one fourth of the projects is in line with what was initially planned, while another fourth experience considerable delays. A first analysis based on procedural data, albeit partial, identifies the phase of preparing the preliminary project as the most critical one. The delays are mostly recovered at a later stage of project implementation but a constant monitoring and supporting effort by the Regional Authority is strongly required. The most critical factors were the lack of technical expertise for many social and healthcare institutions, especially true for the smaller ones, and the need to comply with anti-seismic regulations in the case of school buildings. Another big drawback is represented by the stringent requirements set by lower value tenders (*Unitary Evaluation Service of the 2014-2020 European Union co-financed Operational Programmes, Ismeri Europa, February 2019*).

This interim analysis shows that direct effects of interventions are quite positive. There was a reduction in primary energy consumption of 22%, higher than the 15% target set by the ROP.

Other positive effects include: cost-effectiveness (1,3 €/kWh) is in line with the national trend for similar interventions; cut of 10.000 tons of CO_2 emissions, which will guarantee a reduction of EUR 5 to 8 million of social costs caused by climate change in the next 25 years that could be used for other purposes by the Region. Moreover, energy savings accounting for about EUR 4 million per year, which will allow for a shorter payback of investments enabling public bodies to use these savings for further investments or the improvement of public services; and reduce fossil fuel reliance with a share of energy consumption from RES increasing from 2% to 8% (*Unitary Evaluation Service of the 2014-2020 European Union co-financed Operational Programmes, Ismeri Europa, February 2019*[MM1]).

4. Other EU low-carbon initiatives

The purpose of this Chapter is to identify and assess individual EE and/or RES projects in which at least one project partner is from Friuli Venezia Giulia and/or the implementation is partly or wholly carried out in Friuli Venezia Giulia. Projects of interest are those that have been funded from 2014 onwards. The projects listed in the following section as well as in Appendix 3 have been identified from public sources available online and thanks to direct contributions from the Autonomous Region Friuli Venezia Giulia – EU funds management service.

4.1. EU initiatives managed by the European Commission

4.1.1. Horizon 2020 Programme

Horizon 2020 is the biggest research and innovation programme with nearly €80 billion funding available over 7 years (2014 to 2020). **Work Programme 10 Secure, clean and efficient energy** addresses:

- **Energy efficiency** focusing on buildings, industry, heating and cooling, SMEs and energy-related products and services, integration of ICT and cooperation with the telecom sector;
- **Low-carbon technologies** covering: photovoltaics, concentrated solar power, wind energy, ocean energy, hydro power, geothermal energy, renewable heating and cooling, energy storage, biofuels and alternative fuels, carbon capture and storage;
- **Smart cities and communities** supporting the sustainable development of urban areas in particular in the areas of energy, transport and ICT.

Figures on the participation in the H2020 programme under the „secure, clean and efficient energy" thematic priority by stakeholders from Friuli Venezia Giulia are reported in the table below. The table is organized by provinces of origin of the stakeholders.

Table 3 Participation and net EU contribution in H2020 Work Programme 10 for stakeholders from FVG

PROVINCE	H2020 PARTICIPATION	%	H2020 NET EU CONTRIBUTION	%
Pordenone	3	15%	501.349 €	9,8%
Udine	5	25%	1.260.609 €	24,6%
Trieste	12	60%	3.370.000 €	65,7%
TOTALS	**20**	**100%**	**5.131.958 €**	**100%**

Source: www.webgate.ec.europa.eu/dashboard

If we take a look at the broader picture at national level, data shows that Friuli-Venezia Giulia does not attract that much funding under the „secure, clean and efficient energy" thematic priority compared to similar-size regions like Liguria and Trentino-Alto Adige, see figure below.

Figure 9 Regional share of H2020 net EU contribution under "secure, cleand and efficient energy" priority

There are 11 signed grants under the „secure, clean and efficient energy" thematic priority for which at least one stakeholder comes from Friuli-Venezia Giulia amounting to a total H2020 net EU funding of a little more than € 4 M.

ACRONYM	TITLE	PARTNER FROM FVG	H2020 NET EU FUNDING	CALL
NeMo	Noemix - New Mobility in Friuli Venezia Giulia	Regione Autonoma FVG Area Science Park Università degli Studi di Trieste Promoscience Srl	€ 759.438,75	H2020-EE-2016-CSA Project Development Assistance
Ren-on-Bill	Residential building energy renovations with on-bill financing	BLUENERGY GROUP SPA	€ 118.087,50	H2020-LC-SC3-EE-2018 Innovative financing for energy efficiency investments
EfORfUEL	Fuels from electricity: de novo metabolic conversion of electrochemically produced formate into hydrocarbons	IN Srl	€ 226.375,00	H2020-LCE-2017-RES-RIA-TwoStage New knowledge and technologies
SPARCs	Sustainable energy Positive & zero cARbon CommunitieS	CIVIESCO Srl	€ 575.750,00	H2020-LC-SC3-2019-ES-SCC Smart cities and communities

ATELIER	Smart City project to turn Amsterdam and Bilbao into citizen-driven Positive Energy Districts	CIVIESCO Srl	€ 146.125,00	H2020-LC-SC3-2019-ES-SCC Smart cities and communities
SIMPLA	Sustainable Integrated Multi-sector PLAnning	Area Science Park Regione Autonoma FVG Promoscience Srl	€ 407.757,50	H2020-EE-07-2015 - Enhancing the capacity of public authorities to plan and implement sustainable energy policies and measures
ENOS	ENabling Onshore CO2 Storage in Europe	ISTITUTO NAZIONALE DI OCEANOGRAFIA E DI GEOFISICA SPERIMENTALE	€ 1.018.206,25	H2020-LCE-2015-1-two-stage Enabling decarbonisation of the fossil fuel-based power sector and energy intensive industry through CCS
ETIP Bioenergy-SABS		INCE INIZIATIVA CENTRO EUROPEA - SEGRETARIATO ESECUTIVO	€ 95.062,50	H2020-LCE-36-2016-2017 - Support to the energy stakeholders to contribute to the SET-Plan
ETIP Bioenergy-SABS 2		INCE INIZIATIVA CENTRO EUROPEA - SEGRETARIATO ESECUTIVO	€ 93.750,00	H2020-LCE-36-2016-2017 - Support to the energy stakeholders to contribute to the SET-Plan
BIORELOAD	Innovative biological pretreatment	BIOVALENE SRL	€ 50.000,00	H2020-SMEINST-1-2016-2017 Stimulating the innovation potential of SMEs for a low carbon and efficient energy system
CPVMatch	Concentrating photovoltaic modules using advanced	ASSE SRL	€ 696.410,00	H2020-LCE-2014-1 Developing the next generation technologies of renewable electricity and heating/cooling
		TOTALS	**€ 4.186.962,50**	

We provide here below a sample list of project factsheets financed under H2020 that are linked to low-carbon and energy efficiency topics and that include stakeholders from Friuli-Venezia Giulia.

CALL TITLE: H2020 – Energy Efficiency – 2016/2017
CALL ID: H2020-EE-2017-CSA-PPI
CALL OBJECTIVES: to build technical, economic and legal expertise needed for project development and leading to the launch of concrete investments

ACRONYM	NEMO	TITLE	Noemix by NeMo FVG - New Mobility in Friuli Venezia Giulia
OBJECTIVES			
GENERAL	To support the transition towards e-mobility in public fleets by building integrated technical, economic and legal expertise for the launch of concrete investments		
SPECIFIC	- to develop an innovative, standardized and easily replicable methodology based on the transition from a 'fully public-owned fleet' model to a 'public-private mobility service partnership' exploiting regional demand aggregation; - to replace a significant share (around 30%) of vehicles owned by public institutions through a mix of rationalization in use and a mobility-as-a-service scheme based on long-term lease and car-sharing of e-vehicles; - to trigger e-mobility and RES-plants investments for € 13,7 M with a 1:15,2 leverage factor; - to build technical economic, legal capacity within public authorities; - to support the uptake of the methodology, tools and outcomes developed in NOEMIX by regional authorities in new areas and countries		
FUNDING	€ 903 671, 25	website	www.noemix.eu
STATUS	ongoing	TARGET GROUPS	public authorities
EXPECTED RESULTS	✓ introduce at least **560 electric vehicles** in the fleet of regional public authorities ✓ **660 charging stations** and power plants using renewable energy sources - it will supply 50% of the needed electric energy, while the remaining 50% will be provided by purchasing electric energy also certified as 'green' (i.e. generated using renewable energy sources) ✓ expected primary energy savings amount to **4,261 GWh/year** ✓ expected production of electric energy from renewable energy sources amounts to **0,659 GWh/year**		
EXPLOITABLE RESULTS	NOEMIX model can be replicated in other regions in Italy and Europe		

CALL TITLE: Innovative financing for energy efficiency investments
CALL ID: H2020-LC-SC3-EE-2018
FOCUS AREA: Building a low-carbon, climate resilient future

ACRONYM	Ren-on-Bill	TITLE	Residential building energy renovations with on-bill financing

OBJECTIVES			
GENERAL	To scale-up investments towards deep energy renovations (ER) of residential buildings by promoting the development and implementation of On-Bill Financing schemes, based on the cooperation between energy utilities and financial institutions		
SPECIFIC	- analyse and define the residential building market context to enable replication of suitable OBS across Europe; - engage key stakeholders through national stakeholder platforms; - develop tools to address the residential sector's energy renovation financing demand and assess and bundle investments based on a transparent methodology; - develop and implement business models in the three RenOnBill partner utilities through the development of pilot on-bill schemes. - utilise RenOnBill takeaway messages and the insights gained to support and disseminate EU-wide knowledge on OBS		
FUNDING	€ 1 661 872,50	**website**	www.renonbill.eu
STATUS	ongoing	**TARGET GROUPS**	energy utilities, financial institutions
EXPECTED RESULTS	✓ National stakeholder platforms in four focus countries involving a multitude of stakeholders, namely energy utilities, financial institutions, energy equipment and service companies, homeowners and tenants and policy makers; ✓ Pilot on-bill schemes enabling RenOnBill utilities to set up market-ready building renovation solutions by testing them with their residential customer base; ✓ National roadmaps to propose a set of policy, regulatory and market improvement measures; ✓ Highly standardised and innovative on-bill schemes and tools representing a valuable business opportunity for European utilities and other actors, potentially unlocking a substantial pipeline of energy efficiency investments and reaching a large number of customers; ✓ A substantial contribution to reach the European Union's energy and CO_2 targets.		

CALL TITLE: Enhancing the capacity of public authorities to plan and implement sustainable energy policies and measures
CALL ID: H2020-EE-07-2015

ACRONYM	**SIMPLA**	**TITLE**	**Sustainable Integrated Multi-sector PLAnning**
OBJECTIVES			
GENERAL	To enhance the capacity of public authorities to plan and implement sustainable energy policies and measures		
SPECIFIC	To empower public authorities to develop, implement and finance sustainable energy policies and actions by creating the conditions for a smart integration between SEAPs (Sustainable Energy Action Plans) and SUMPs (Sustainable Urban Mobility Plans) - or similar plans		

FUNDING	€ 1 481 335	**website**	www.simpla-project.eu/
STATUS	closed	**TARGET GROUPS**	small and medium-sized municipalities with a population between 50.000 and 350.000 inhabitants
EXPLOITABLE RESULTS	A practical, step-by-step tool to guide the harmonisation process. Local authorities are offered tailored in-class training and webinars to enhance their strategic planning capacity. Dedicated experts' support to develop harmonised plans (for local authorities benefitting from in-class training). SIMPLA cities developed harmonised greener and smarter SEAPs and SUMPs.		

4.1.2. LIFE Programme

The **LIFE Programme** is the EU's funding instrument for the environment and climate action created in 1992. The current funding period 2014-2020 has a budget of €3.4 billion. The LIFE programme is divided in two sub-programmes, one for environment (representing 75% of the overall financial envelope) and one for climate change (representing 25% of the envelope).

Even though it does not really fall under the climate mitigation strand but rather under the area labelled as *air - air quality plans required under the Air Quality Directive*, it is worth mentioning the LIFE IP-prepAIR project. The Friuli Venezia Giulia Autonomous Region is partner in the project which aims to constitute a new permanent network of competent authorities and private operators working on the improvement of air quality in four sectors: biomass burning, **energy efficiency**, transport and agriculture.

Here below we provide all relevant information regarding the project.

CALL TITLE: 2015 CALL FOR PROPOSALS FOR LIFE ACTION GRANTS – INTEGRATED PROJECTS / Environment
CALL ID: LIFE15 IPE
CALL OBJECTIVES: to enable statutory authorities in EU Member States to implement environmental and climate legislation to the fullest extent; to implement on a large territorial scale (regional, multi-regional, national or trans-national scale) environmental plans or strategies required by specific Union environmental legislation, developed pursuant to other Union acts or developed by Member States' authorities, primarily in the areas of nature (including Natura 2000 network management), water, waste and air.

ACRONYM	**prepAIR**	**TITLE**	**Po Regions Engaged to Policies of AIR**
OBJECTIVES			
GENERAL	To comply with the Air Quality Directive, National Emissions Ceiling Reduction Commitments and the EU's Clean Air for Europe strategy		
SPECIFIC	- to build capacity and strengthen coordination among public authorities and private operators; - to create a permanent networking structure that involves relevant environmental agencies		

FUNDING	€ 9 974, 624	**website**	www.lifeprepair.eu
STATUS	ongoing	**TARGET GROUPS**	public authorities, environmental agencies, SMEs
EXPECTED RESULTS	✓ pilot actions to improve air quality and assess the effectiveness and transferability of developed measures (main sectors: biomass burning, energy efficiency, transport and agriculture) ✓ near-real time web-based system for sharing air quality and emissions data and air quality models ✓ development of decision support system		

4.2. Indirect EU funding: INTERREG and other EU initiatives

INTERREG is one of the two goals of the EU Cohesion Policy in the 2014-2020 period and it is funded by the European Regional Development Fund (ERDF). It has a budget of EUR 10.1 billion invested in several cooperation programmes responsible for managing project funding.
Friuli Venezia Giulia is involved in several cross-border, transnational and interregional INTERREG programmes that are listed here below:

- Interreg A
  Interreg Italy – Slovenia V-A 2014-2020 (www.ita-slo.eu/)
  Interreg Italy – Croatia CBC Programme (www.italy-croatia.eu/)
  Interreg Italy – Austria V-A 2014-2020 (www.interreg.net/it/default.asp)

- Interreg B
  Alpine Space (www.alpine-space.eu/)
  Interreg MED Programme (https://interreg-med.eu/)
  Interreg CENTRAL EUROPE (www.interreg-central.eu/)
  Interreg ADRION Programme (www.adrioninterreg.eu/)

- Interreg C
  Interreg Europe (www.interregeurope.eu/)
  URBACT III (https://urbact.eu/)
  ESPON 2020 (www.espon.eu/)

An analysis was carried out on the number of projects addressing the low-carbon priority under each programme in which there is a beneficiary from Friuli Venezia Giulia out of the total number of projects funded so far.
Other data taken into consideration is the total amount of EU funding allocated to beneficiaries from FVG out of the overall budget earmarked for the low-carbon priority.

Interreg Italy - Slovenia

CALL TITLE: Cooperate for the implementation of low-carbon strategies and action plans
CALL ID: Call for standard project proposals n°2/2016 4e - CCI 2014TC16RFCB036
CALL OBJECTIVES: promotion of implementation of strategies and action plans to promote energy efficiency and to improve territorial capacities for joint low-carbon mobility planning

ACRONYM	ENERGY CARE	TITLE	Energy efficiency in public buildings and sustainable mobility with the support of local communities
OBJECTIVES			
GENERAL	to reduce production of CO_2, energy consumption and the spread and impact of energy poverty in the program area		
SPECIFIC	to contribute to local development through the implementation of low-carbon and efficient measures		
FUNDING	€ 1 195 737, 5	website	www.ita-slo.eu/it/ENERGYCARE
STATUS	ongoing	TARGET GROUPS	citizens, public authorities
EXPECTED RESULTS	- territorial planning actions with the participation of the population to define the characteristics of the investments and change lifestyle in terms of energy consumption and mobility; - energy efficiency measures in public buildings and incentives for soft mobility; - training, especially on field, to increase the capacity of public authorities to manage energy and sustainable mobility		
EXPLOITABLE RESULTS	**cross-border model** of participatory territorial planning and social innovatic for reducing energy consumption and for sustainable and smart multimodal mobility		

ACRONYM	LightingSolutions	TITLE	Innovative solutions for energy-efficient lighting in public buildings
OBJECTIVES			
GENERAL	to reduce CO_2 emissions and improve energy efficiency		
SPECIFIC	to improve the efficiency and energy management of public lighting using the measures envisaged by the municipal SEAPs		
FUNDING	€ 1 063 837, 83	website	www.ita-slo.eu/sl/lightingsolutions
STATUS	ongoing	TARGET GROUPS	municipalities, building managers, students, citizens
EXPECTED RESULTS	✓ a common tool for analysing the energy savings status and potential within the lighting systems of public buildings; ✓ a comparative study on energy efficiency and energy saving potential within the area of PPs' municipalities; ✓ the implementation of innovative pilot measures to increase the energy efficiency of lighting within public buildings; ✓ the adoption of educational programs to promote management and behaviour change geared towards energy savings		
EXPLOITABLE RESULTS	✓ common methodology for the analysis of lighting in the public sector is a viable tool for creating the professional basis for monitoring energy saving projects and measures and ensure sustainability and replicability beyond project end		

	✓ comparative study on lighting will provide the data necessary to carry out pilot projects and other measures that the municipalities will have to implement, in accordance with the strategic plans, even after the project has been completed

ACRONYM	CROSSMOBY	TITLE	**Mobility planning and sustainable /cross-border passenger transportation services towards intermodality**
OBJECTIVES			
GENERAL	to make mobility in the cross-border area more sustainable by investing in more environmentally friendly services and modes of transport and in new approaches to mobility planning		
SPECIFIC	- to elaborate an action plan for fostering sustainable mobility in the target area; - to improve the capacity of public regional and local authorities to adopt, develop and coordinate PUMS (Urban Sustainable Mobility Plans)		
FUNDING	€ 3 499 779,57	website	www.ita-slo.eu/sl/crossmoby
STATUS	ongoing	TARGET GROUPS	regional authorities, local authorities
EXPECTED RESULTS	✓ increased supply of connections between Italy and Slovenia, made possible by the new cross-border rail service planned along the Venice - Trieste - Ljubljana axis ✓ enhanced cooperation among the most relevant actors of the two countries, at regional and local level, towards a cross-border planning of sustainable mobility, made possible by the expected innovative approach in the adoption, development and coordination of SUMPs (Sustainable Urban Mobility Plans)		
EXPLOITABLE RESULTS	A **methodology** will be defined to monitor and evaluate the results of a number of pilot project activities, as well as to ensure their transferability in a wider context to use it for the definition of a cross-border action plan		

ACRONYM	MobiTour	TITLE	**Sustainable mobility of cross-border coastal and hinterland tourist areas**
OBJECTIVES			
GENERAL	to promote the joint models for sustainable multimodal urban mobility in the tourist areas of the cross-border area		
SPECIFIC	- to encourage the use of alternative means of transport; - to stimulate tourist attractiveness of the area, decreasing pollution; - to improve accessibility between the coastal area and the hinterland		
FUNDING	€ 1 078 578,38	website	www.ita-slo.eu/sl/mobitour
STATUS	ongoing	TARGET GROUPS	local public authorities, citizens, tourists
EXPECTED RESULTS	✓ increased use of low emission vehicles at tourist destinations along the coast, and connecting to the hinterland, thanks to the adoption		

	of new mobility plans ✓ adoption of 3 Sustainable Urban Mobility Plans (SUMPs) and 2 Sustainable Mobility Plans

ACRONYM	MUSE	TITLE	**Cross-border collaboration for Energy efficient Sustainable University Mobility**
OBJECTIVES			
GENERAL	to integrate energy efficiency and reduction of CO_2 emissions within the urban and extra-urban mobility strategies of cross-border local authorities by testing innovative electric mobility services and by increasing the responsibility of LPAs themselves		
SPECIFIC	to increase LPAs' responsibility for integrating energy efficiency within their sustainable mobility planning processes		
FUNDING	€ 1 196 063,54	website	www.ita-slo.eu/sl/muse
STATUS	ongoing	TARGET GROUPS	local public authorities, universities and research centres
EXPECTED RESULTS	✓ development of guidelines and an action plan for LPAs regarding the integration of energy efficiency elements within the urban, extra-urban and cross-border mobility context; ✓ implement and test energy-efficient mobility solutions involving the use of electric vehicles inserted within a micro-grid logic, the production of energy using renewable sources, and the use of smart systems for monitoring and managing the mobility services themselves; ✓ establishment of a cross-border community targeting sustainable mobility ✓ implementation of pilot actions on e-mobility charging stations based on RES; ✓ development of a management and monitoring system on charging stations and mobility services		
EXPLOITABLE RESULTS	**Innovative pilot actions** can be taken as best practice examples and applied in other contexts		

CALL TITLE: Cooperate for the implementation of low-carbon strategies and action plans
CALL ID: Targeted call for strategic project proposals n°5/2018 4e – 7.3.10.3
CALL OBJECTIVES: provide support to local administrations in Italy and Slovenia within the programme area in the implementation of sustainable energy policies and adaptation actions to climate change. It is reflected in the transition from SEAPs to SECAPs with the final goal of reducing CO_2 emissions.

ACRONYM	SECAP	TITLE	**Supporting energy and climate adaptation policies**
OBJECTIVES			

GENERAL	to foster the sustainable development of the cross-border territory by promoting low-carbon strategies for all types of territory, in particular urban areas, creating relevant adaptation and mitigation measures		
SPECIFIC	- to improve energy planning by local operators, focusing on energy saving, renewable energy, reduction of CO_2 emissions and mitigation measures related to climate change - to develop a unified cross-border strategy supporting the transition to a green economy		
FUNDING	€ 2 499 298,58	**website**	www.ita-slo.eu/sl/secap
STATUS	ongoing	**TARGET GROUPS**	regional authorities, LPAs,
EXPECTED RESULTS	✓ improved approach to the assessment of climate change impacts in the Programme Area; ✓ increased urban resilience		
EXPLOITABLE RESULTS	A **common methodology** will be tested and then provided to PAs for the effective and cost-effective **definition of EIB and MEIs** (inventory & monitoring of emissions). Creation of an **inventory of strategies** (measures and projects already established). Set up of a **bilingual online database** of statistics and data on energy/climate/environment and an Italo-Slovenian **atlas** of territorial vulnerability with in-depth studies at urban scale.		

Interreg Italy - Austria

Under the Interreg Italy – Austria Programme there is not a specific priority in support to low-carbon measures. It is, therefore, quite hard to identify projects relevant to PROSPECT2030 scope. Here below we provide details about two projects addressing energy efficiency and mobility issues.

CALL ID: First call/2016 1a
CALL OBJECTIVES: strengthen research and innovation capacities in key sectors of regional economies through cross-border collaboration of research centres

ACRONYM	**IDEE**	**TITLE**	**Network of research institutions for planning efficient energy systems in urban areas**
OBJECTIVES			
GENERAL	to improve energy efficiency in buildings, the use of new technologies (such as low-temperature district heating and heat pumps), the recovery of waste heat and energy from industry, the exploitation of biomass potential		
SPECIFIC	to establish a cross-border research network for an integrated analysis of urban energy systems		
FUNDING	€ 698 021,16	**website**	www.interreg-idee.eu
STATUS	closed	**TARGET GROUPS**	universities, research institutes, local public

			authorities
EXPECTED RESULTS	✓ integrated interpretation of geo-referenced energy, environmental, building and economic data ✓ generate a new basis for decision-making which local authorities can use to plan efficient investment		
EXPLOITABLE RESULTS	Innovative and integrated modelling framework which enables to elaborate energy, environmental, construction, economic and geographic data jointly and that support public authorities and other local stakeholders in planning energy investment in urban areas.		

CALL ID: Second call/2017 11CTE
CALL OBJECTIVES: strengthen cross-border institutional collaboration in key sectors of the programme area

ACRONYM	SMARTLOGI	TITLE	**Cross-border sustainable and smart logistics**
OBJECTIVES			
GENERAL	to strengthen the operative and institutional cooperation in the programme area increasing the modal split of goods transport from road to railway reducing the environmental impact.		
SPECIFIC	- to enhance planning competencies in cross-border multimodal transport - to provide a long-term cross-border strategy for multimodal transportation of goods in line with EUSALP macroregional strategy		
FUNDING	€ 954 671,45	website	www.smartlogi.eu
STATUS	ongoing	TARGET GROUPS	local public authorities
EXPECTED RESULTS	✓ strategy for enhanced multimodal and cross-border transportation		

Interreg Italy - Croatia

The Interreg Italy – Croatia Programme under Priority Axis 2 – Safety & Resilience addresses the Specific Objective 2.1 namely, to improve the climate change monitoring and planning of adaptation measures tackling specific effects, in the cooperation area. Under this Programme, the focus is therefore on adaptation rather than on mitigation.

Interreg Central Europe

CALL TITLE: First call of proposals
CALL OBJECTIVES: to improve territorial-based low-carbon energy planning strategies and policies supporting climate change mitigation

ACRONYM	CE-HEAT	TITLE	**Comprehensive model of waste heat utilization in CE regions**
OBJECTIVES			
GENERAL	to improve the governance of energy efficiency by focusing on field of waste heat utilization in Central Europe area and through increased		

	exploitation of endogenous RES – waste heat		
SPECIFIC	- to establish the waste heat potential / develop regional cadastres of waste heat using a unified methodology - to provide waste heat utilization model and tools - to incorporate waste heat utilization tool into local, regional and national energy management practices		
FUNDING	€ 1 759 254,59	**website**	www.interreg-central.eu/CE-HEAT
STATUS	closed	**TARGET GROUPS**	local and regional public authorities, sectoral agencies, large enterprises, SMEs
EXPECTED RESULTS	✓ provide an innovative analytical and monitoring platform through establishment of GIS-based regional waste heat cadastres with waste heat sources classification and a monitoring tool; ✓ provide a comprehensive solution for managing waste heat utilization projects and strategies based on the development of a waste heat utilization toolbox (leading stakeholders participation process, establishing feasibility etc.); ✓ incorporate a new approach into local, regional and national strategies by integrating a novel cadastres and toolbox into existing spatial planning and energy management systems and spreading it throughout central Europe and beyond		
EXPLOITABLE RESULTS	Comprehensive model of waste heat utilization in CE regions. Transnational waste heat platform. Waste heat cadastre.		

CALL TITLE: Second call of proposals
CALL OBJECTIVES: to increase the use of renewable energies and improving energy efficiency while exploiting the economic growth potential of the low-carbon sector

ACRONYM	**FEEDSCHOOLS**		
OBJECTIVES			
GENERAL	to provide local authorities with new solutions, both technical and financial, which will help them to implement 'Nearly Zero Energy Building' (NZEB) renovation activities in schools		
SPECIFIC	to develop a transnational and holistic support toolkit and a web database of innovative best practices for NZEB renovation		
FUNDING	€ 1 650 000	**website**	www.interreg-central.eu/FEEDSCHOOLS
STATUS	ongoing	**TARGET GROUPS**	LPAs
EXPECTED RESULTS	✓ open lessons focused on behavioural change in schools ✓ at least 48 energy audits will be implemented and preliminary plans for NZEB renovation of existing schools will become reference models for the target region		

EXPLOITABLE RESULTS	Analysis and design of optimal energy efficiency financing models. Carbon footprint and energy efficiency toolkit.

CALL TITLE: Third call for proposals – Low-carbon cities and regions
CALL OBJECTIVES: to improve territorially based low-carbon energy planning strategies and policies supporting climate change mitigation

ACRONYM	**ENTRAIN**	**TITLE**	**Enhancing renewable heaT planning for improving the aiR quAlity of commuNities**
OBJECTIVES			
GENERAL	to improve the knowledge and capacities of public authorities to develop low-carbon energy strategies and to implement local action plans leading to an enhanced share of endogenous renewable energy sources, with a specific focus on district heating (DH)		
SPECIFIC	Improved energy planning skills of local and regional authorities Coherent regional energy strategies for renewable district heating Implementation of local actions for renewable district heating		
FUNDING	€ 1 996 805	**website**	www.interreg-central.eu/ENTRAIN
STATUS	ongoing	**TARGET GROUPS**	LPAs, RPAs, sectoral agencies, infrastructure and (public) service providers, interest groups, higher education & research, business support organisations
EXPECTED RESULTS	✓ Regional Stakeholder Advisory Groups set up in 5 target regions ✓ 21 specific training sessions in 6 regions ✓ 4 transnational coaching sessions ✓ 5 Regional action plans fostering the diffusion of small renewable DH networks ✓ detailed spatial and heat plans in 9 pilot municipalities ✓ 3 innovative financing schemes ✓ adoption of the improved quality management system for RES DH by 3 regions		

ACRONYM	**PROSPECT2030**	**TITLE**	**PROmoting regional Sustainable Policies on Energy and Climate change mitigation Towards 2030**
OBJECTIVES			
GENERAL	to boost the capacity of Regional public authorities in Central Europe in mobilising investment for low-carbon measures at territorial level through public funding with an increased cost-effectiveness than in the past		
SPECIFIC	Increased capacity of involved regions in using public funds in a more innovative and effective way Define development scenarios to 2030 for strategic key energy technologies that can drive the transition towards low carbon economy for involved Regions To widely spread the project lessons learnt and policy recommendations in		

	Central Europe		
FUNDING	€ 1 561 563	**website**	www.interreg-central.eu/PROSPECT2030
STATUS	ongoing	**TARGET GROUPS**	LPAs, RPAs, national PAs, sectoral agencies, interest groups, higher education & research, business support organisations, international organisations, SMEs, infrastructure and (public) service providers, large enterprises
EXPECTED RESULTS	✓ Policy recommendations ✓ Online training package ✓ Regional energy action plans (7)		

Interreg Alpine Space

Ongoing and closed projects funded under Low-carbon Priority 2 are listed here below.

ACRONYM	**MELINDA**		
OBJECTIVES			
GENERAL	to increase sustainable mobility in the Alpine Space through citizen participative processes		
SPECIFIC	Improved knowledge on demand for mobility Uptake of citizen participatory processes New mobility business models		
FUNDING	€ 1 558 522	**website**	www.alpine-space.eu/projects/melinda
STATUS	ongoing	**TARGET GROUPS**	national, regional and local authorities, sectoral agencies, universities, transport companies, and service providers
EXPECTED RESULTS	✓ new innovative and multidisciplinary model to promote sustainable mobility based on the analysis of the variables that affect mobility demand and supply ✓ sustainable mobility policy recommendations		

ACRONYM	**AlpInnoCT**
OBJECTIVES	
GENERAL	to promote more efficient Alpine freight transport with focus on CT
SPECIFIC	Improved processes and cooperation in CT networks

	Integration of innovative approaches fostering modal shift from road to rail Enhancement of knowledge and reinforcement of participation possibilities for each stakeholder in freight transport		
FUNDING	€ 2 548 531	**website**	www.alpine-space.eu/projects/alpinnoct
STATUS	closed	**TARGET GROUPS**	
EXPLOITABLE RESULTS	✓ Description of the state of the art of the European transport system with focus on CT ✓ Recommendations for an ideal CT-model concept by transfer of production industry knowhow ✓ Guideline for the integration of innovative intermodal approaches into daily CT business ✓ Alpine wide dialogue platform with dialogue events as information exchange brings together all stakeholders & target groups ✓ Toolbox of Action (Handbook) with Action Sheets describing methods & processes ready for implementation to disseminate project findings		

Interreg Mediterranean

ACRONYM	**SISMA**	**TITLE**	**Supporting Innovative Schemes in the MED Area**
OBJECTIVES			
GENERAL	to raise capacity for better management of energy in public buildings at transnational level		
SPECIFIC	Improved support to EPC Improved knowledge of EPC Increased use of EPC		
FUNDING	ERDF € 467 840 IPA € 42 160	**website**	www.sisma.interreg-med.eu/
STATUS	closed	**TARGET GROUPS**	LPAs, SMEs, general public, professionals
EXPLOITABLE RESULTS	SET – Subsidy Evaluation Tool: it determines the minimum amount of public subsidy needed to make an investment bankable, it carries out an energy and economic-financial evaluation of ECMs (Energy Conservation Measures) and can be used for the following four types of public buildings: schools, gyms, office buildings and health care structures (nursing homes/rest homes) User Manual Online training kit		

ACRONYM	**CESBA MED**	**TITLE**	**ForSustainableMED Cities**
OBJECTIVES			
GENERAL	to develop a common method for assessing the sustainable development of the built environment in the Mediterranean region		

FUNDING	€ 2 700 000	**website**	www.cesba-med.interreg-med.eu
STATUS	closed	**TARGET GROUPS**	LPAs, SMEs, general public, professionals
EXPLOITABLE RESULTS	CESBA SNTools: tools to support decision makers and the managers of public building stocks in the implementation of more efficient energy retrofitting plans combining the building and the urban scale CESBA MED Passport: set of common criteria, indicators and metrics to allow the comparison of the performance reached by public buildings and urban areas CESBA MED Training System CESBA MED Network		

Interreg ADRION

No specific measures are foreseen to tackle low-carbon topics.

URBACT

No URBACT network is active in Friuli Venezia Giulia under the carbon neutrality and energy efficiency topics.

ESPON

Not applicable

INTERACT

Not applicable

Interreg Europe

ACRONYM	**S3UNICA**		
OBJECTIVES			
GENERAL	to emphasize the role of Universities in regional innovation policies, by providing specialist research and technical expertise in the field of energy sustainable buildings and by offering campuses as a hands-on lab where to implement these innovative solutions		
SPECIFIC	✓ improve the energy efficiency of University Campus buildings and infrastructures ✓ develop innovative solutions throughout the value chain associated to energy saving and smart grid developments ✓ define a common methodology, using the new Energy Performance of Buildings directive and its Smart Readiness Indicator		
FUNDING	€ 1 538 662	**website**	www.interregeurope.eu/s3unica
STATUS	ongoing	**TARGET GROUPS**	LPAs, industrial sector, civil society

EXPECTED RESULTS	✓ ”entrepreneurial discovery” process to influence regional policy

ACRONYM	**SMOOTHPORTS**		
OBJECTIVES			
GENERAL	to reduce CO_2 emissions from port-related road traffic by improving regional policy instruments in a holistic manner		
SPECIFIC	✓ NA		
FUNDING	€ 1 139 601	**website**	www.interregeurope.eu/smoothports
STATUS	ongoing	**TARGET GROUPS**	LPAs, industrial sector, civil society
EXPECTED RESULTS	✓ NA		

4.3. Joint initiatives of the EU with International Financial Institutions

4.3.1. European Fund for Strategic Investments (EFSI)

EFSI is one of the three pillars of the Investment Plan for Europe, the so-called Juncker Plan, and aims to overcome current market failures by addressing market gaps and mobilising private investment. It helps to finance strategic investments with higher risk profile in key areas such as infrastructure, research and innovation, education, renewable energy and energy efficiency as well as risk finance for small and medium-sized enterprises (SMEs).

4.3.2. European Local Energy Assistance (ELENA)

ELENA is a joint initiative by the European Investment Fund and the European Commission under the Horizon 2020 programme. ELENA provides grants for technical assistance focused on the preparation and implementation of bankable energy efficiency, distributed renewable energy and urban transport programmes. ELENA typically supports projects above EUR 30 million investments cost with a 3-year implementation period for energy efficiency and 4-year for urban transport and mobility.

The grant may be used to finance costs related to feasibility and market studies, programme structuring, business plans, energy audits and financial structuring, as well as to the preparation of tendering procedures, contractual arrangements and project implementation units.

No ELENA projects have been implemented in Friuli Venezia Giulia so far.

4.3.3. Joint European Support for Sustainable Investment in City Areas (Jessica)

JESSICA is a policy initiative of the European Commission (EC) developed jointly with the EIB and in collaboration with the Council of Europe Development Bank (CEB). It supports integrated, sustainable urban-renewal projects. A range of sophisticated financial tools are used including equity investments, loans and guarantees, offering new opportunities for the use of EU Structural Funds.

No Jessica projects have been implemented in Friuli Venezia Giulia so far.

4.3.4. Sustainable Energy Finance Facility (SEFF) of EBRD

The EBRD SEFF operates in EBRD's countries of operation. It partners with local financial institutions such as commercial banks, to establish sustainable energy financing channels. These partnerships help direct more finance towards investment opportunities where energy and other resources are used more rationally. Finance for sustainable energy projects is provided for two key areas: energy efficiency and small-scale renewable energy. Local financial institutions on-lend the funds which they have received from the EBRD to their clients, including small and medium-sized businesses, corporate and residential borrowers, and renewable energy project developers.

5. National funding schemes

Schemes, incentives, grants, tax reduction measures at national (or regional) level need to refer to specific interventions and technologies. The starting point is to have a general overview of the main RES (Renewable Energy Source) and ECM (Energy Conservation Measure) projects implemented in Friuli Venezia Giulia as summarised in the table that follows.

General structure of major **RES** (Renewable Energy Source) & **ECM** (Energy Conservation Measure) projects in FVG Region.

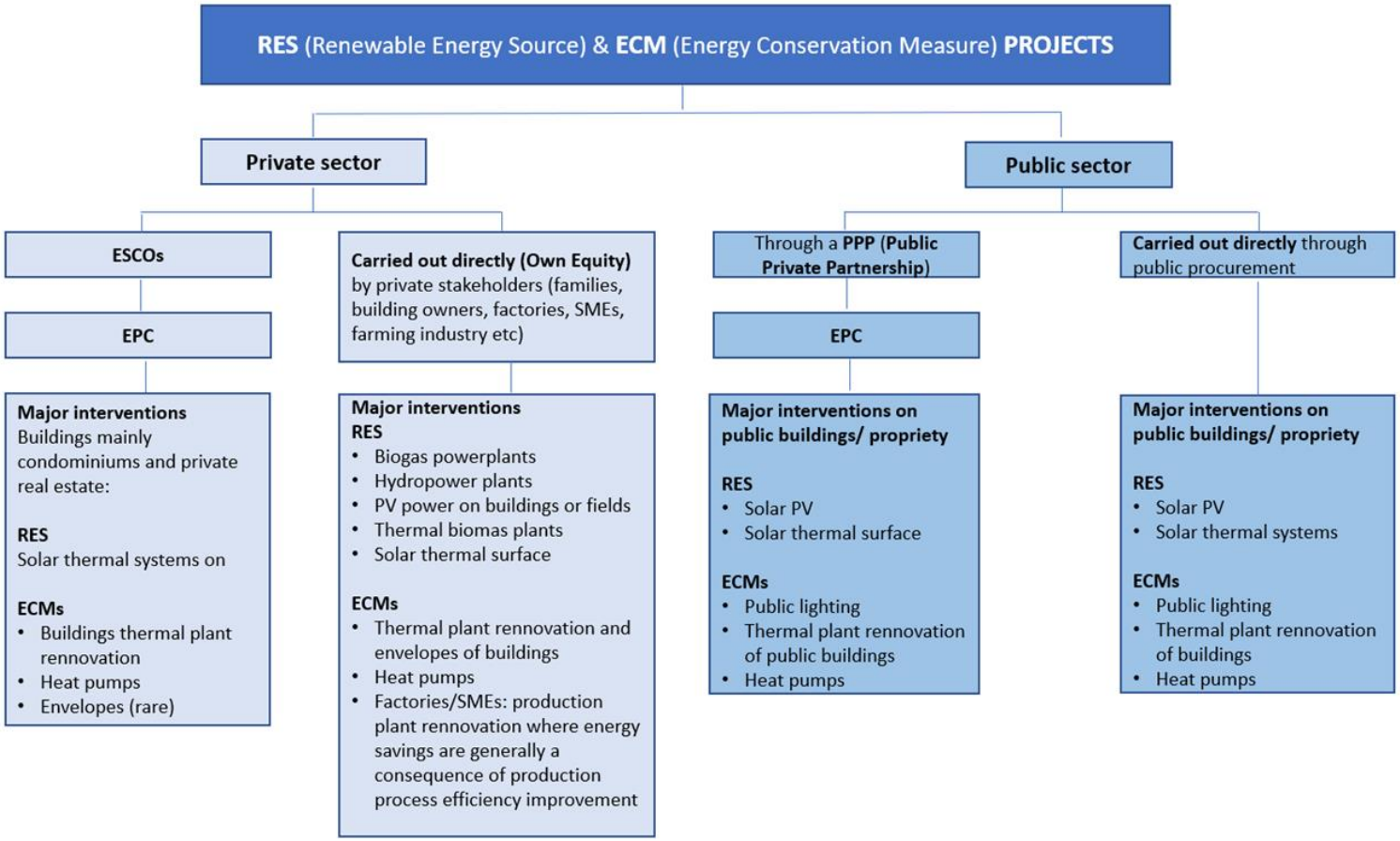


Figure 10 General structure of RES and ECM projects in FVG

The following step is to link different supporting schemes to the type of carbon reduction field in terms of RES or ECMs.

	MANAGED BY GSE		GOVERNMENTAL LEVEL	
	INCENTIVE MECHANISMS	SUPPORTING SCHEMES FOR ENERGY EFFICIENCY	THE TAX DEDUCTIONS SYSTEM	NATIONAL FUND FOR ENERGY EFFICIENCY
RES	- Feed-in scheme - GRIN: The Green Certificate mechanism - All-inclusive feed-in tariff - CIP 6 - Simplified purchase and resell arrangements - Net metering	- Biofuels – sustainable biofuel blending certificate - thermal energy from renewables (CT Conto Termico for renewables)	/	/
ECMs	/	- White certificates - Energy efficiency heating and cooling support scheme (CT Conto Termico for energy efficiency) - High performance cogeneration	- Energy retrofit of buildings - Thermal plant renovation and heat pumps	Revolving fund for: - reduction of energy consumption in industrial processes - construction and expansion of district heating networks - improvement of public services and infrastructures, including public lighting energy upgrading of public buildings.

National funding schemes apply in the same way to all Italian project partners hence much of this chapter's contents are the ones already reported by the Piemonte region.

5.1. SUPPORTING SCHEMES FOR RENEWABLE ENERGY SOURCES by GSE

QUALIFICATION OF PLANTS AND ELECTRICITY

One of the most important activities implemented by GSE is the qualification of plants where precise requirements foreseen by the law, in order to have access to incentive mechanisms, are verified. This is performed in the following way:

- QUALIFICATION OF PLANTS POWERED BY RENEWABLE SOURCES (RES-E): The RES-E qualification, issued by GSE, is a technical pre-requisite necessary to be admitted to green certificates (afterwards described) or the all-inclusive feed-in tariff, depending on the net electricity produced and fed into the grid.
- QUALIFICATION OF ELECTRICITY – GUARANTEE OF ORIGIN (GO): upon request of the producer, GSE verifies and issues the Guarantee of Origin (GO) of power plants that certifies that the electricity is generated from renewable sources. The operators that sell "renewable" electricity energy in the final market are then obliged to an equal amount of GO energy type.

INCENTIVE MECHANISMS

GSE supports the production of electricity from renewable sources through various incentive mechanisms, at disposal of private stakeholders, companies and public administrations. They are briefly described in the following bullet points:

- FEED-IN SCHEME: This mechanism used to allocate incentives to private stakeholders, companies and public administrations that install a photovoltaic solar plant connected to the electricity grid, proportioned to the electricity produced. As of 6 July 2013 the reductions provided for by the Feed-in scheme are no longer accessible.
- GRIN: The Green Certificate mechanism, foreseen in the Ministerial Decree of 6 July 2012, has been substituted by a new form of incentive scheme from 2016. Entities that already have Green Certificates (owners of plants with RES-E qualification) will maintain the benefit for the remaining concessional period, but with a new incentive scheme based on the electricity production.
- ALL-INCLUSIVE FEED-IN TARIFF: This mechanism represents an alternative to the green certificates. It consists in tariffs for the electricity fed into the grid whose value includes both the incentive component and the increase in value component of the electricity fed into the grid.
- CIP 6: This incentive mechanism for electricity produced by renewable sources and similar was introduced by the Inter-ministerial Committee's resolution 6/92. It was a form of remuneration through a tariff whose value was periodically updated. Currently, it is no longer possible to access this incentive mechanism.
- INCENTIVES AS FORESEEN BY M.D. OF 23 JUNE 2016 AND M.D. OF 6 JULY 2012: These are incentives for electricity generation from RES-E plants, other than photovoltaic solar ones, with a capacity of at least 1 kW.
- SIMPLIFIED PURCHASE AND RESELL ARRANGEMENTS: This tool allows GSE to purchase and resell the electricity to be fed into the grid paying producers a minimum guaranteed price for every kWh purchased. Producers with small-sized plants and a nominal electrical capacity up to 1 MW, benefit from GSE's guaranteed minimum prices for the first 2 million kWh per year fed into the grid, without blocking the possibility to receive more if the hourly zonal prices prove to be more advantageous.

- NET-METERING: Through this mechanism, consumers who generate some or all of their own electricity may also purchase electricity from the grid when needed, in this case an economic compensation system compensates (net metering) the economic value of the energy fed into to grid with the energy taken from the grid in different periods

5.2. SUPPORTING SCHEMES FOR ENERGY EFFICIENCY BY GSE

In addition to promoting renewable sources through incentives, GSE also manages the following incentive schemes that promote ECMs - Energy Conservation Measures and non-electrical RES.

- WHITE CERTIFICATES: White certificates, also known as "Energy Efficiency Certificates", refer to end-use energy savings achieved through projects aimed at increasing energy efficiency in the final use of energy.
- RENEWABLE ENERGY FOR HEATING AND COOLING SUPPORT SCHEME (CT): The scheme aims at supporting the production of thermal energy from renewables and small-scale ECMs for private organizations and the Public Administrations. The CT covers up to 65% of costs for energy retrofitting of buildings and thermal plants. For the transformation of existing buildings into almost zero energy buildings (nZeb), the contribution reaches 65%
- Another measure covered by CT regards demolitions and solutions for static improvements and anti-seismic adjustments. In any case, the mechanism covers 100% of the costs of the energy diagnosis performed to determine the interventions to be performed and can be combined with other public (including state) support, provided that the sum of the public contributions does not exceed 100% of the cost of the interventions.
- BIOFUELS – SUSTAINABLE BIOFUEL BLENDING CERTIFICATE: Italy has established that within 2020 the renewable biofuels used in transport must be equal to 10%. In 2015 fossil fuel suppliers blended a 5% share of biofuels, complying with the minimum goal envisaged for that same year. This obligation is useful for a greater diffusion of biofuels in the sector and for a reduced impact of CO_2 emissions. GSE verifies and releases sustainable biofuel blending certificates.
- HIGH PERFORMANCE COGENERATION: GSE is in charge of issuing high performance cogeneration certificates that allow access to the Energy Efficiency Certificates (EEC) or white certificates, depending on the conditions and procedures foreseen by Ministerial Decree of 5 September 2011.

An assessment of the whole package of incentives managed by GSE can be downloaded from the IT platform "Atlaimpianti" (https://bit.ly/2gFcI9F), where all main information on plants and interventions is provided as open data.

A benchmarking assessment has been performed whith a ranking of all the Italian Regions, so that it was possible to calculate for each techology (or supported action), the following data:

- position of Friuli Venezia Giulia region in the ranking list of Regions
- market share (generally defined in terms of power installed) of the FVG Region in comparison to the other Italian Regions.

In the following charts, the results are provided with a focus on the different types of technologies that receive national funding (managed by the GSE). The chart regarding the funding for RES-based heating and cooling defines the funding amount in euros per capita.

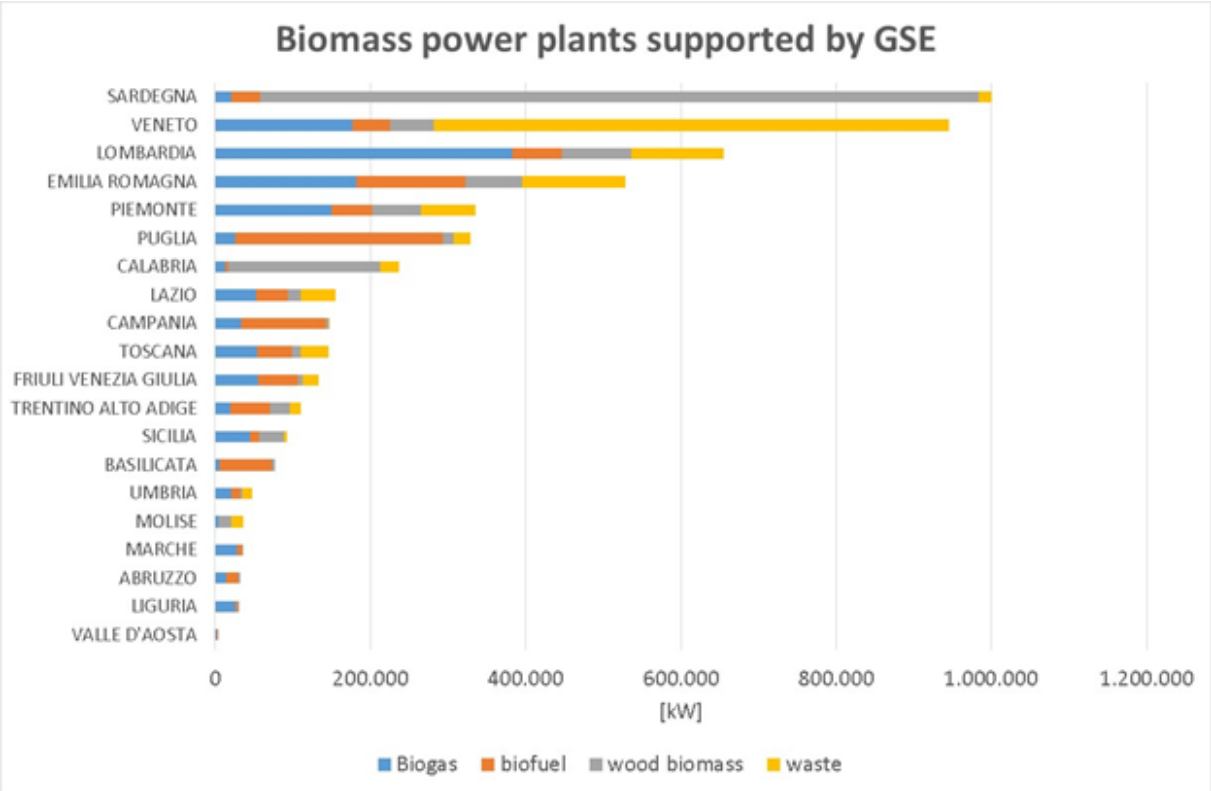


Figure 11 Biomass power plants supported by GSE in Italy

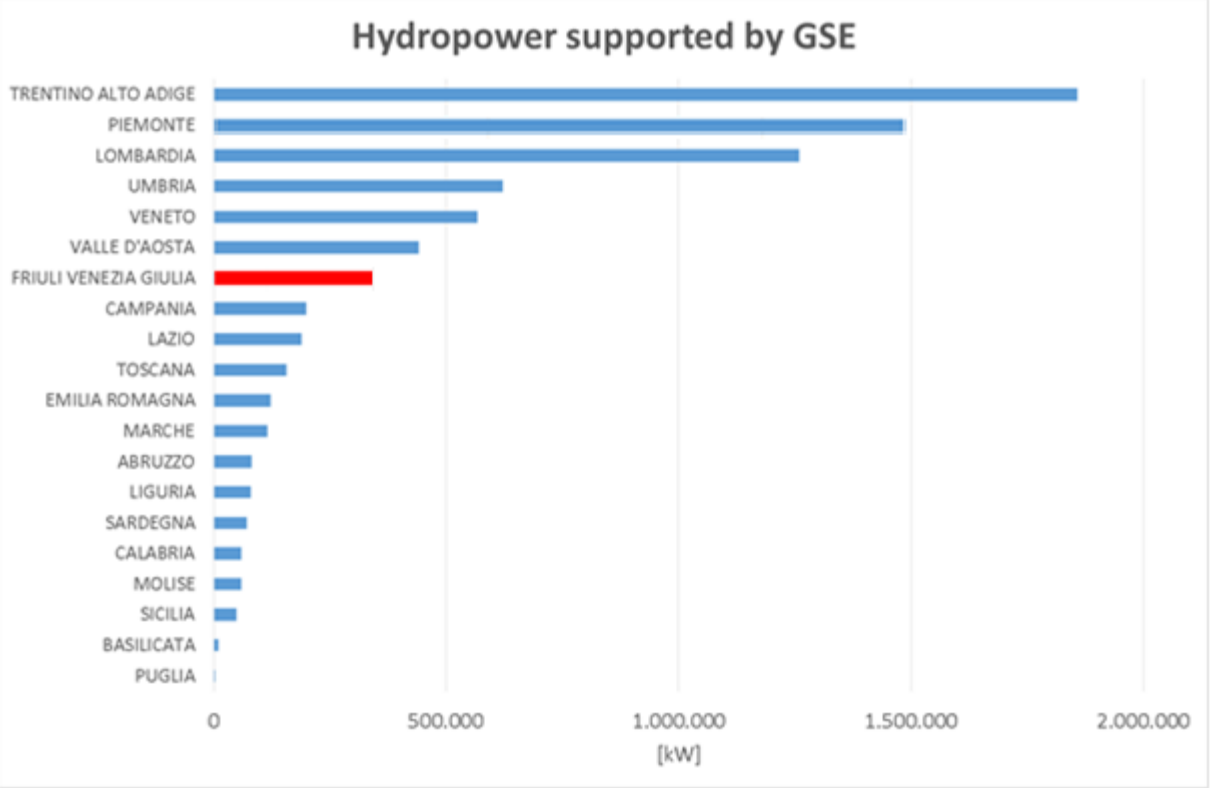


Figure 12 Hydropower plants supported by GSE in Italy

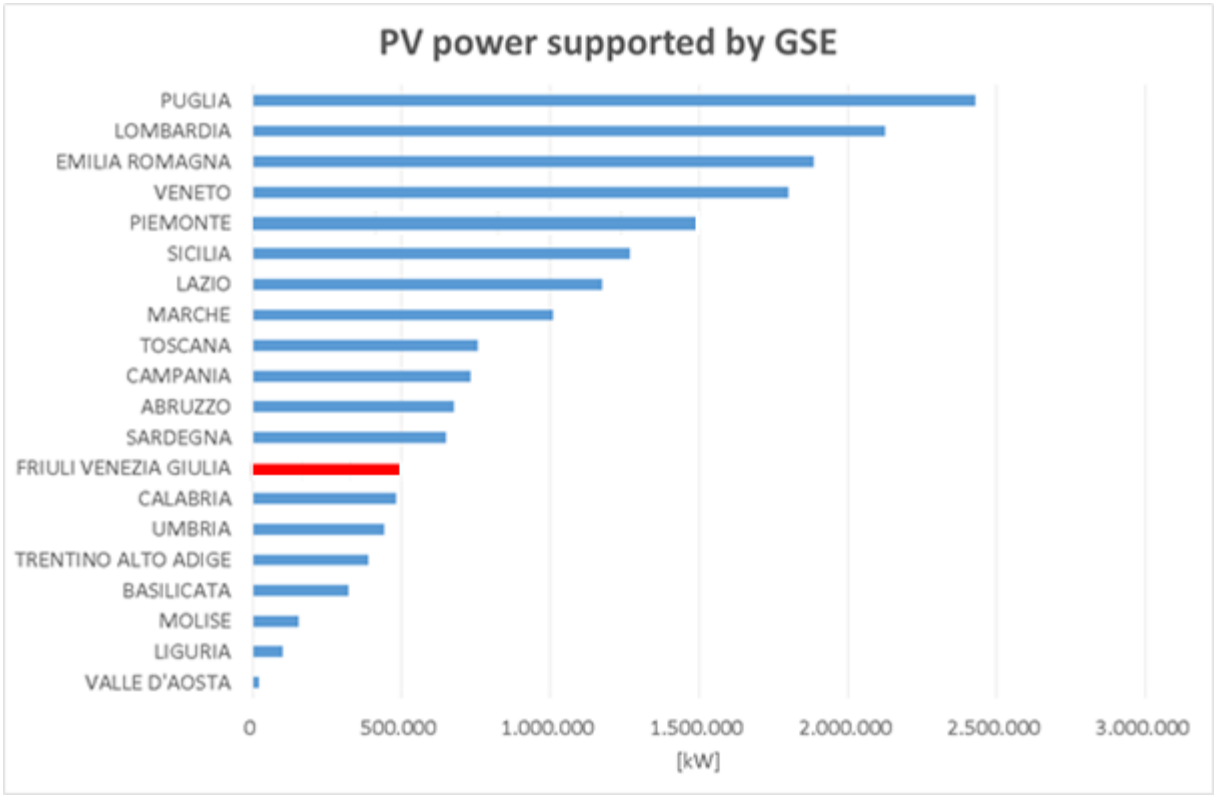


Figure 13 PV power supported by GSE in Italy

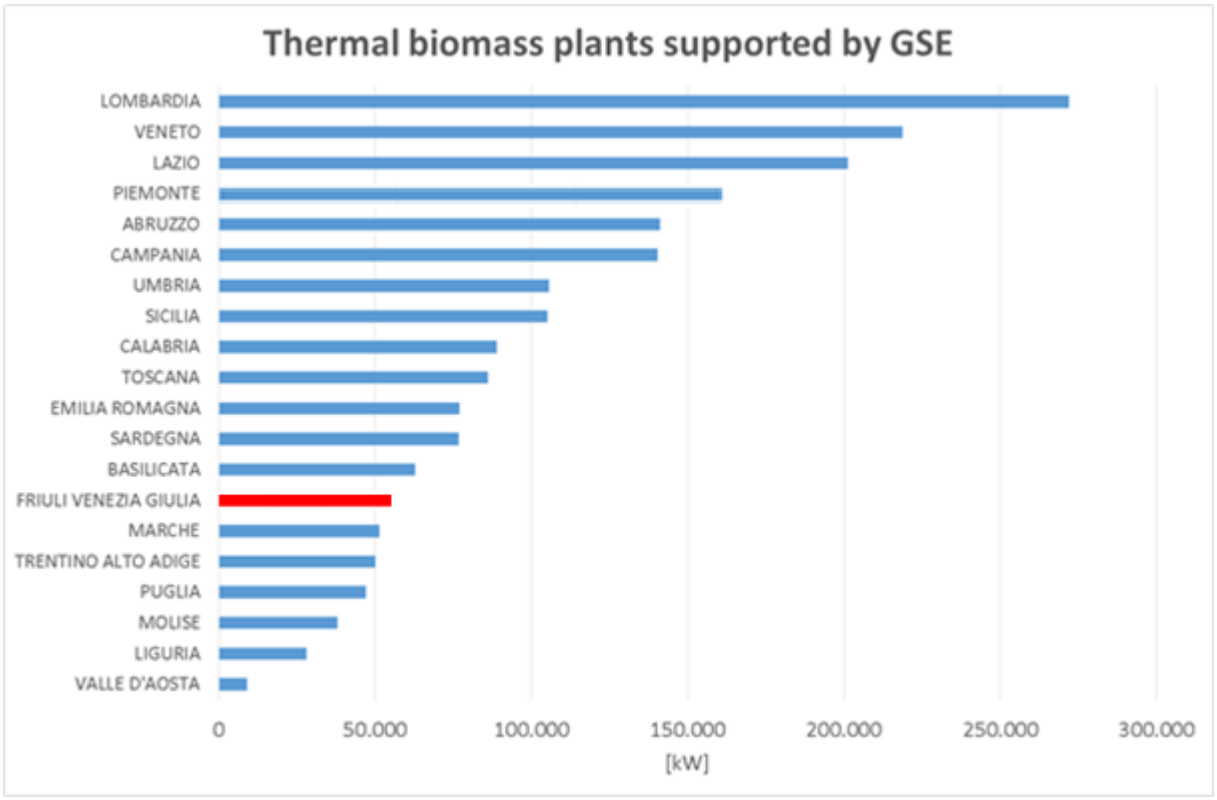


Figure 14 Thermal biomass plants supported by GSE in Italy

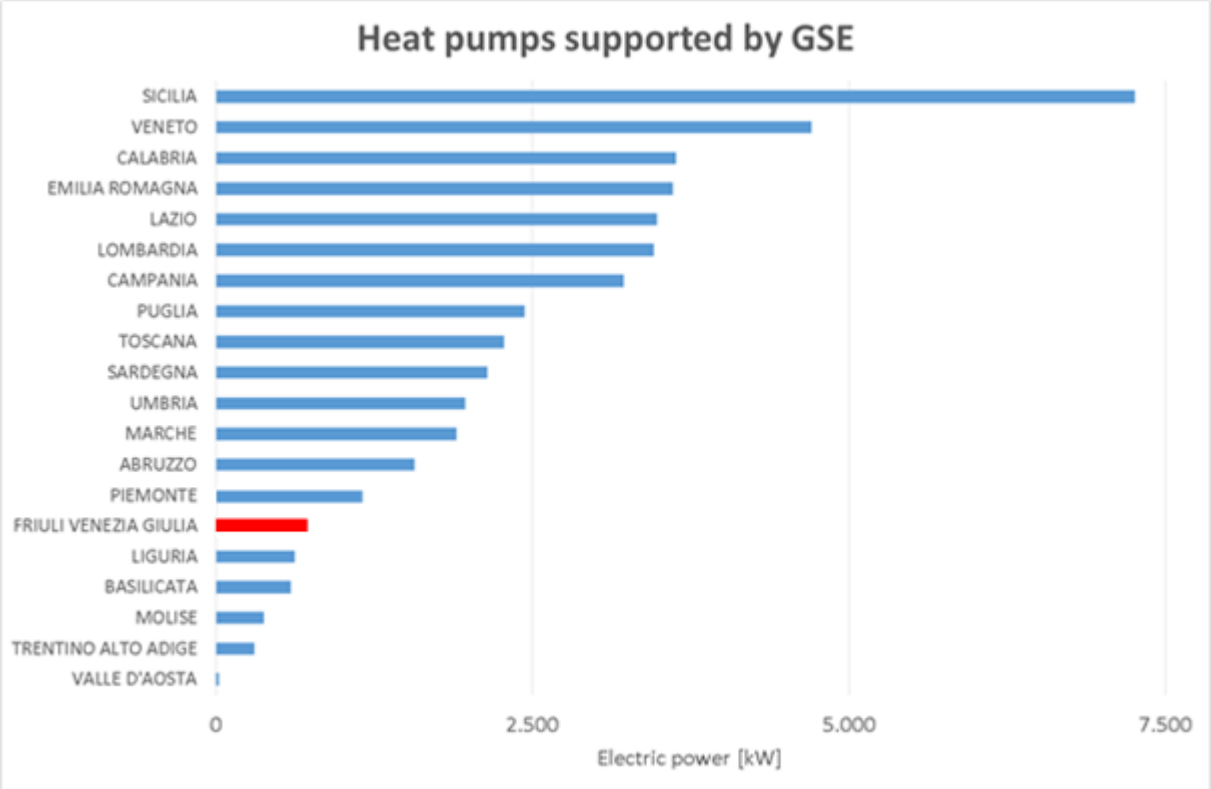


Figure 15 Heat pumps supported by GSE in Italy

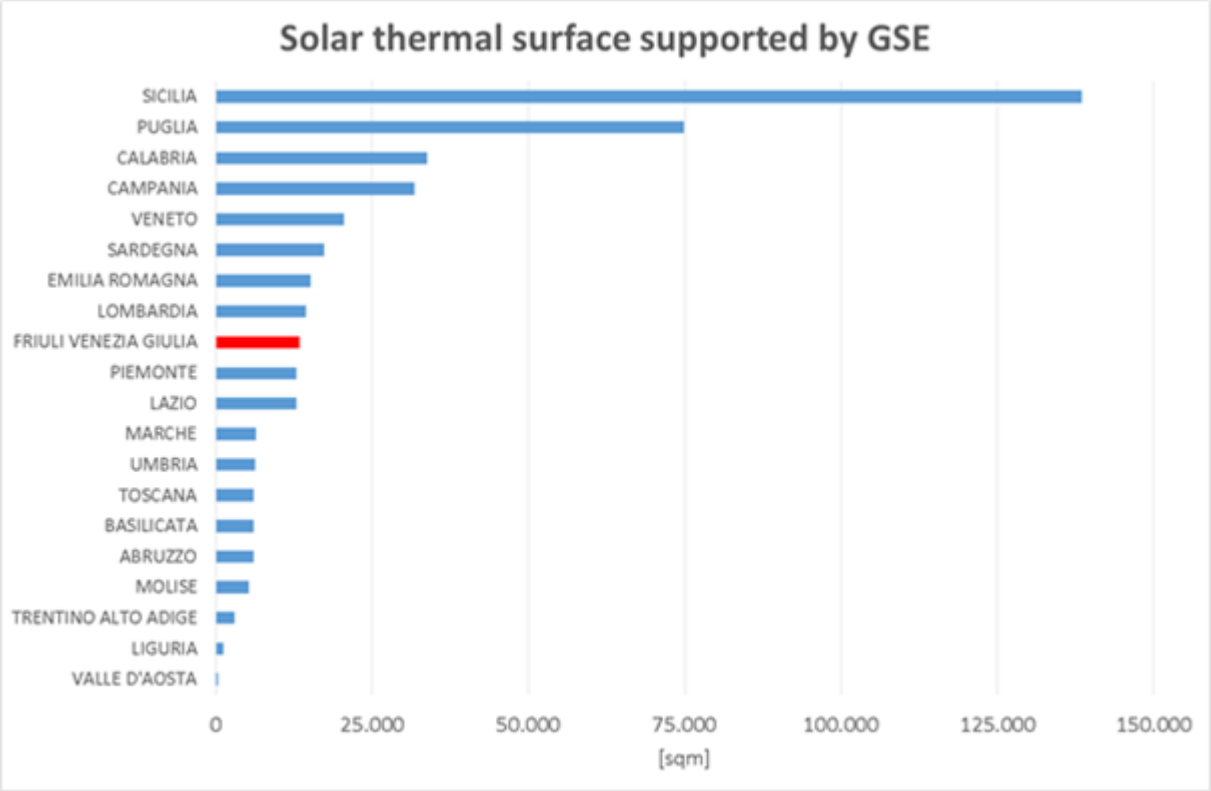


Figure 16 Solar thermal surface supported by GSE in Italy

Even more interesting is the specific assessment of the supporting scheme for RES for heating and cooling (CT) as reported in the table that follows.

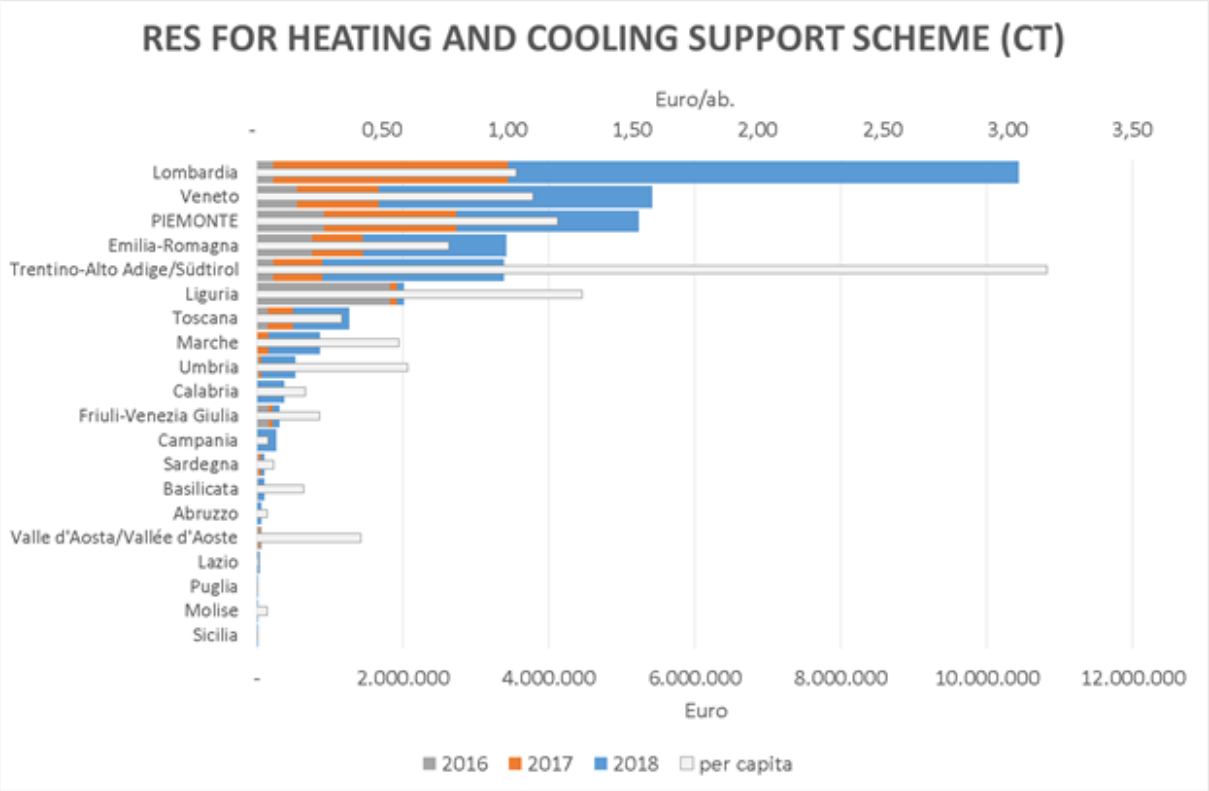


Figure 17 RES for heating and cooling support scheme

National supporting schemes: summary table on public funding in Friuli Venezia Giulia Region

Type of scheme	Indicators	Public funding
White certificates, also known as "Energy Efficiency Certificates"	**Energy saved:** 573.059 Toe	1.2 M€
Renewable energy for Heating and Cooling Support Scheme CT, known as "Conto Termico" 2018	**Nr. of interventions:** public buildings: 16 private buildings: 1.626	4.9 M€
	Total	**6.1 M€**

5.3. THE TAX DEDUCTION SYSTEM

Tax deduction shemes have proved to be the main driver for ECMs, especially on buildings, carried out by families and other private stakeholders. Key measures defined for 2020 are:

Ecobonus 2020 - 2021: provides a 65% or 50% deduction for all those who carry out energy requalification interventions on buildings for a maximum expenditure of 100.000 € with tax deductions in 10 yearly rates.

The 2020 building renovation bonus: provides a 50% deduction for all those who carry out renovations of buildings for a maximum expenditure of 96.000 € with tax deductions in 10 yearly rates, building retrofitting measures may have (envelope, glazing etc.) or may not have

an impact in terms of energy saving, the difference with the afore-mentioned Ecobonus is that it is not specifically targeted only for ECMs, nonetheless it can be interesting because of less binding paperwork and when ECMs are combined with structural or other non-energy saving interventions.

In the following table, the results of the investments implemented thanks to the Ecobonus tax deduction scheme between 2014 and 2018, is provided. In terms of typology of measures, the replacement of windows and the installation of condensing boilers with thermostatic valves are the main measures implemented, followed by envelope insulations.

REGIONE	Investments	Savings
	(M€)	(GWh/y)
LOMBARDIA	4.009,0	1.440,0
PIEMONTE	**2.185,0**	**846,9**
VENETO	2.070,2	740,3
EMILIA ROMAGNA	1.937,5	726,1
TOSCANA	929,7	304,1
LAZIO	888,0	276,1
TRENTINO	745,4	237,7
FRIULI VENEZIA GIULIA	**566,8**	**192,3**
LIGURIA	639,3	178,1
MARCHE	413,9	138,6
PUGLIA	429,6	123,2
CAMPANIA	391,3	111,7
SICILIA	327,0	95,6
ABRUZZO	216,2	72,8
SARDEGNA	198,9	61,7
UMBRIA	163,4	57,9
CALABRIA	133,7	44,3
VALLE D'AOSTA	85,7	34,6
BASILICATA	92,0	32,8
MOLISE	43,4	15,3
Italy	**16.466,0**	**5.730,1**

Periods	2014-2017			2018		
Typology	N. of measures	Investments (M€)	Savings (GWh/y)	N. of measures	Investments (M€)	Savings (GWh/y)
Envelope walls insulation	6.393	137,8	52,4	1.354	57	20,7
Insulation of ceilings and floor	8.269	266,7	106,7	1.429	57,6	21,4
Windows	118.734	858,1	351	23.308	179,9	75,1
Solar Thermal	5.477	38,1	24,6	782	4,5	3,2
Solar shading	24.191	52	7	9.062	15,5	1,6
Condensing Boilers	33.848	335,5	111	9.167	98,4	42,8
Heat Pumps	3.262	29	12,3	1.036	20,6	4,2
Biomass boilers	1.284	12,3	3,8	630	6,5	3,8
Building Automation	239	3,4	1,8	203	2,9	1,3
Other	1.029	4,9	1,4	284	4,3	0,8
Total	**202.791**	**1.739,70**	**672,6**	**47.255**	**447,2**	**174,9**

5.4. NATIONAL FUND FOR ENERGY EFFICIENCY

In 2019 a National Fund for energy efficiency has been established at the Ministry of Economic Development. It supports energy efficiency measures implemented by companies, including ESCOs, and by public bodies, on buildings, plants and production processes. Specifically, the interventions supported must concern the reduction of energy consumption in industrial processes, the construction and expansion of district heating networks, the improvement of public services and infrastructures, including public lighting and energy upgrading of buildings.

The Fund has a revolving nature and provides financial guarantees for value up to 30% of annual capital contributions and soft loans for the remaining 70%; 20% of financial guarantees are reserved for public bodies.

More information on: https://bit.ly/35DkGoC

6. Cooperation with private stakeholders

Equity contributions by private stakeholders (families, building owners, factories, SMEs, farming industry etc.) take place when projects yield an interest rate equal to the minimum interest rate generally required by the market for projects with a similar risk reward profile.

Major interventions carried out directly by private stakeholders in our region - see quantitative assessments above in chapter 5 for details - are:

1) RES
   a) Biogas powerplants (companies, farming industry)
   b) Hydropower plants (companies)
   c) PV power on buildings or fields (families, SMEs, farming industry, real estate)
   d) Thermal biomass plants (farming industry, SMEs)
   e) Solar thermal surface (families, SMEs, farming industry)

2) ECMs
   a) Thermal plant renovation/updating (families, SMEs, farming industry, real estate)
   b) Heat pumps (families, SMEs, farming industry, real estate).

Coming to financial instuments, private sector initiatives in low-carbon investments in our region revolve around Energy Performance Contracts (EPCs) which can be the contractual form chosen within a PPP (Private Public Partnership) or generally used by an ESCo - Energy Service Company.

EPC - Energy Performance Contracts have been implemented in several different projects in the last few years in Friuli Venezia Giulia Region. A significant number of EPC proposals have been directly analysed by APE FVG as an independent external technical/financial adviser, on request of the municipalities. None of these EPCs were implemented within the framework or with the support of EU programmes. All investments foreseen by EPCs concluded in our region, including the ones we did not survey, were entirely financed by private funds simply beacuse they were deemed financially sustainable and yielded a convenient IRR-Internal Rate of Return in comparison to the average risk (low) that these kind of projects have.

EPCs for efficiency improvement measures in the field of public lighting and thermal plants, where the beneficiaries are public bodies, are implemented even without the support of incentive mechanisms. A critical factor in this case is the risk reward profile of the investment. In the table that follows, there are two types of interventions where there is no public support (in the case of public lighting) or where, regardless of existing supporting mechanisms (in the case of thermal plant renovations), EPCs are carried out the same.

Type of action	Type of public authorities involved	Indicators	Investments	Status	Type of contract
Improvement of thermal plants and other energy efficiency interventions	9 Municipalities	Nr. of buildings: 67	2.7 M€	in progress	EPC

on public buildings					
Public lighting	13 Municipalities	Nr. of lighting points: 20.772	8.8 M€	4 complete and 9 in progress	EPC
Totals	**22 Municipalities**		**11.5 M€**		

Renewable energy projects in the field of electricity production (solar PV, biogas for electricty generation, hydroelectric) depend entirely on incentive mechanisms for their financial sustainability; in this case the type and amount of each incentive scheme is obviously a critical factor.

Sound energy efficiency interventions on building envelopes (where an envelope includes the foundation, roof, walls, doors, windows, ceiling) generally require long payback times and yield low IRRs (Internal Rate of Return) thus financial indicators of EPCs for the energy refurbishment of buildings are on average far below the minimum levels required by the market.
This is the reason why long-term investments in building envelopes through EPCs, especially in non particulary cold Europen countries, are not being implemented on a large scale.

7. Evaluation

Setting priorities and objectives for low-carbon funding:

- *To what extent do EU priorities and objectives respond to the demands of your regions? Please consider all relevant initiatives described above!*
- The latest analysis carried out to evaluate the implementation progress of the ROP (Regional Operational Programme) ERDF in Friuli Venezia Giulia shows that measures targeted at the energy efficiency of school buildings and social and health infrastructures are consistent with the needs of the territory and with the regional strategies in the energy sector.
- *To what extent do national priorities and objectives respond to the demands of your specific region?*
- The charts above summarise, for each Italian region, the different types of technologies that receive national funding and Friuli-Venezia Giulia, with regard to the number of inhabitants (per capita), is generally slightly above the national average
- *If there are regional priorities and objectives, do they appropriately meet actual needs?*
- With reference to decentralised regional operative programmes, as pointed out above at point 3.2, there was a reduction in primary energy consumption of 22%, higher than the 15% target set by the ROP (Regional Operational Programme). Other positive effects include: cost-effectiveness (1,3 €/kWh) is in line with the national trend for similar interventions; cut of 10.000 tons of CO_2 emissions, which will guarantee a reduction of EUR 5 to 8 million of social costs caused by climate change in the next 25 years that could be used for other purposes by the Region. Moreover, energy savings accounting for about EUR 4 million per year, which will allow for a shorter payback of investments enabling public bodies to use these savings for

further investments or the improvement of public services; and reduce fossil fuel reliance with a share of energy consumption from RES increasing from 2% to 8%.

- *To what extent setting priorities is based on public consultation?*
- When setting priorities on topics such as low-carbon measures and sustainability, public consultation is highly considered, in fact a specific public consultation was launched by our Region through an online questionnaire on 17 SDGs (Sustainable Development Goals) that shall be included in the Regional Strategy for sustainable development within the 2030 Agenda.
- *In what low-carbon areas innovative financial schemes can be instrumental?*
- Please refer completely to point 8. Conclusions and recommendations

Institutional framework:

- *Is/are the regional programming and implementation structure(s) appropriate? Any space for improvement?*
- The region is actively involved in two sustainable development projects (the regional strategy for sustainable development plus another one with a specific focus on the green cities and urban development). Furthermore, the New Green Deal shall certainly require a vigorous extra effort on behalf of all European regions this new scenario certainly calls for strong programming and implementation structures.
- *Is the programming and related decision-making based on appropriate public consultation?*
- Hearing of stakeholders always takes place and in some casese is compulsaory (e.g. authorisation process of energy plants etc.) even though for non istitutional stakeholders such as NGOs, associations etc. their considerations/remarks are not legally binding with the result that the final decision process can sometimes be rather hierarchical prevalently based on legal procedure grounds.
- *Are stakeholders comprehensively identified?*
- Our territory is rather small with a low number of inahitants which makes stakeholder identification not that difficult.

Eligibility and application conditions:

- *Are beneficiaries appropriately identified?*
- In general, yes.
- *Is the financing (grants or loans) adequately sized?*
- Not always, even if this depends on limited available funding on one hand and on the fact that a strong focus on maximising public funding efficiency is missing as pointed out in point 8. Conclusions and recommendations
- *Are there application conditions that substantially limit the target beneficiaries or the project scope?*
- Not that we are aware of.

Administrative procedures:

- *Are the application procedures transparent? Is sufficient information available?*
- In general, yes.
- *Is the application process easy? Do the beneficiaries need external assistance to complete the application process?*
- It is, in general. Although in the field of incentives and ECMs often technical documentation is required at a certain point so that the need of external assistance may be needed.
- *Is the required financial administration transparent and smooth?*
- In general, yes.
- *Are there significant delays in payments?*

- In our experience they are aligned with the procedures of Italian bureaucracy.

Financial burdens:

- *Are there financial burdens to apply for funding (e.g. lack of preparatory resources, own contribution, cash-flow issues concern pre-financing)? Can you pls. differentiate according to types of beneficiaries (e.g. local authorities, private individuals, SMEs)*
- Local authorities, especially municipalities: the first burden is making sure that these interventions are off-balance according to Eurostat requirements. The second, for small municipalities is the lack of preparatory resources (staff) and financial capacity when designing and audits are required in the application;
- Private individuals: the major burden in general depends on the high number of applications in relation to the maximum number of possible beneficiaries;
- SMEs: financial support and incentives are mostly managed by GSE which is a national public body.

Efficiency of use of funding dedicated to sustainable energies:

- *Is the dedicated EU grant funding efficiently used?*
- *Are there areas where grant funding can (partially) be replaced by more market-oriented instruments?*
- *Is the blending of grants and commercial financing a usual praxis in the public sector?*
- *Are there aggregated projects with a critical size that attract the interest of the financial market actors?*
- *Are there mechanisms to leverage private financial resources?*
- For all these questions please refer to the following paragraph.

8. Conclusions and recommendations

All the numerous programmes, financial instruments and specific measures we have assessed and reported above miss the focus on maximising public funding efficiency.

In general, to maximise leverage, subsidies (public support provided in the form of grants, feed-in tariffs etc.) must make an ECM or RES project:

1. financially sustainable
2. capable of yielding a minimum interest rate that equals the one required by the market for projects with a similar risk reward profile.

Maximum leverage means that public support is optimised since grants, feed-in tariffs etc. are calculated in order to make contributions the minimum amount needed and not based on a fixed percentage or other empirical method.

More precisely, as pointed out previously, investments by private stakeholders take place when their projects yield an Internal Rate of Return **IRR** equal to the minimum Internal Rate of Return **IRR*** generally required by the market for projects with a similar risk reward profile. When defining a subsidy (in the form of a scheme, incentive, grant, tax reduction measure etc.) one of the major problems is calibrating its amount. In other words, if a subsidy is needed then it should be optimised providing the minimum amount to make an investment financially feasible (**IRR** = **IRR***) and NOT based, like in the case of ECMs, on a fixed percentage of the investment cost or related to standardised measures/certificates, in

the case of RES, as a fixed incentive (e.g. feed-in tariff) is generally defined empirically and as the result of a sound and complete optimisation problem.

Minimising subsidies, that make projects financially feasible (**IRR** = **IRR***) implies that the leverage through subsidies is maximum. On the other hand, if a subsidy makes a RES/ECM project yield an **IRR** > **IRR*** then the project is gaining an extra-profit and public funds are not being minimised.

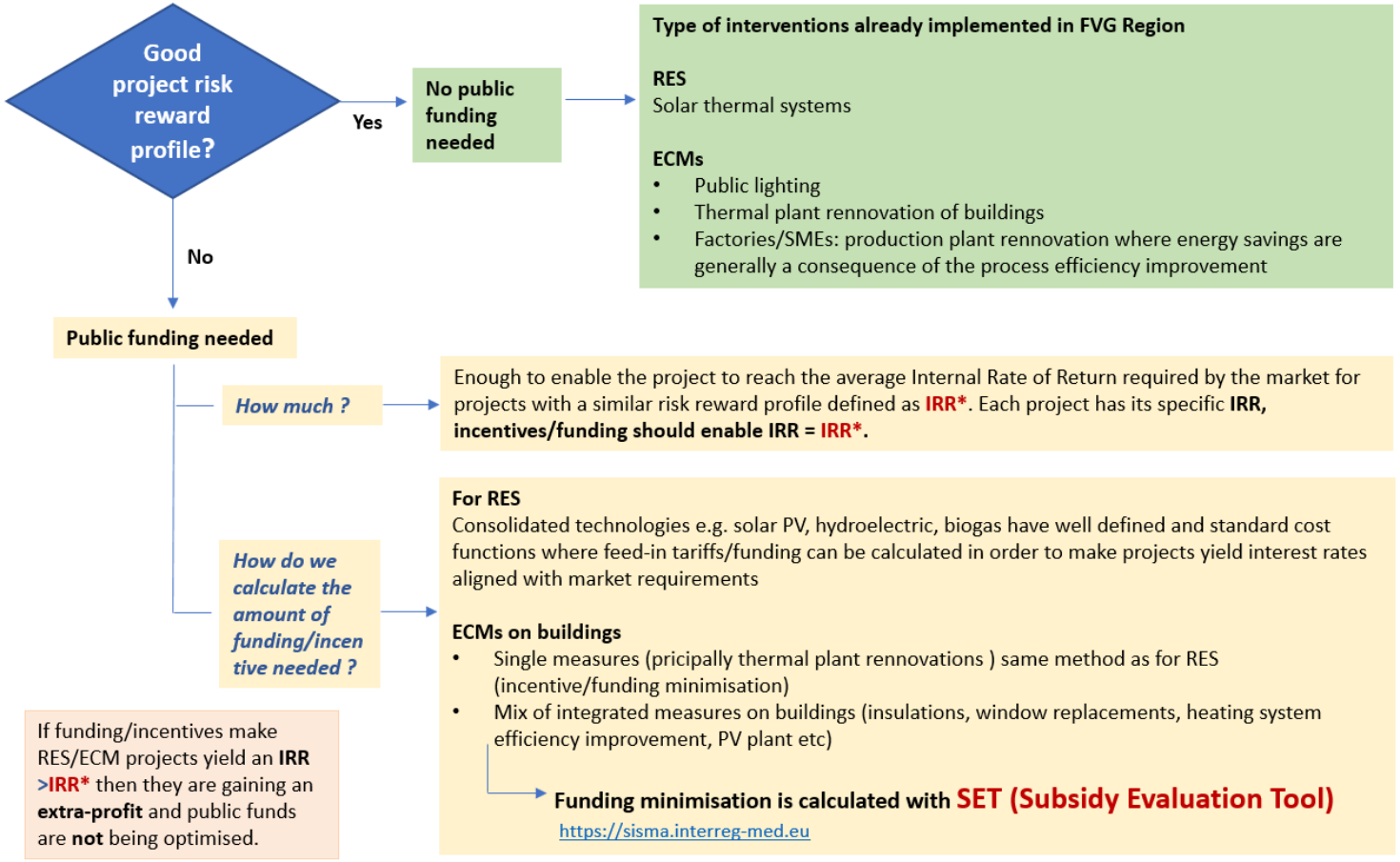
For **RES**: consolidated technologies e.g. solar PV, hydroelectric, biogas have well defined and standard cost functions where feed-in tariffs/funding can be calculated in order to make projects yield interest rates aligned with market requirements (incentive minimisation), since cost functions change over time, incentives as a consequence, should also vary over time (e.g. new incentive amounts for new projects could be defined every 4 months).

For **ECMs** on buildings for single measures (principally thermal plant renovations) same method as for RES (incentive/funding minimisation) for more complex integrated measures on buildings (insulations, window replacements, heating system efficiency improvement, PV plant etc.) funding minimisation may be calculated with **SET (Subsidy Evaluation Tool)** developed within the SISMA project (https://sisma.interreg-med.eu).

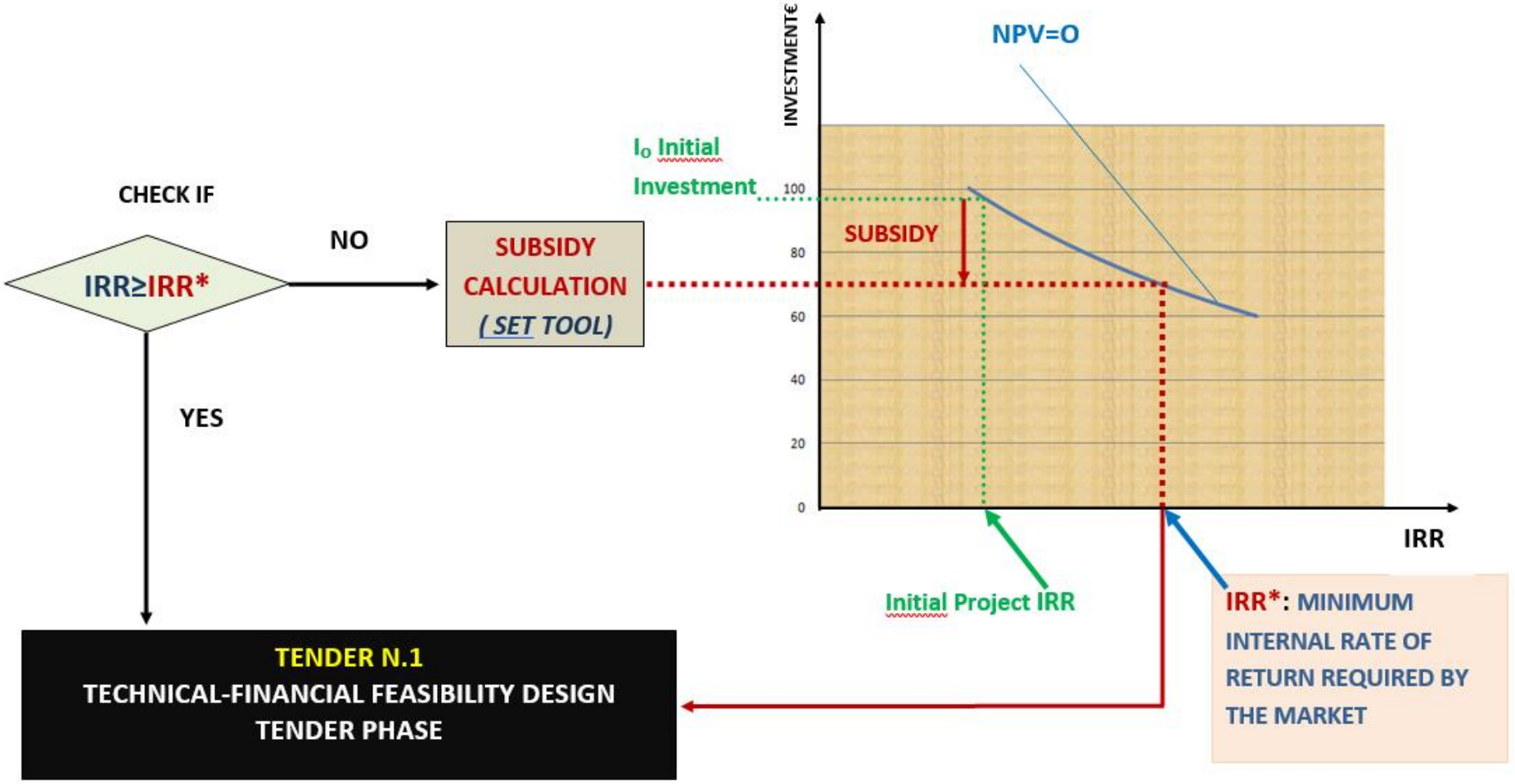
The recommendation is to change the approach of public funding bearing higher initial costs and efforts in order to define reliable costs curves for RES and complete reliable data entry on the **SET (Subsidy Evaluation Tool)** in case of ECMs especially when carried out on public buildings. Appropriate funding minimisation requires a sounder overall knowledge of technologies, processes and costs but it is the only way we can maximise total leverage of RES and ECM projects and get private stakeholders, generally ESCOs and financial operators on board.

The logical framework regarding the whole process follows.

Private stakeholder RES/ECM basic investment decision scheme and public funding efficiency maximisation



The SET (Subsidy Evaluation Tool) logical scheme



Appendix 1.

Regional Operational Programme for Friuli-Venezia Giulia - Factsheet

<table>
<tr><th>Title of OP</th><th colspan="3">Regional Operational Programme for Friuli-Venezia Giulia</th></tr>
<tr><td colspan="4">Priority axis 3: Support the shift to a low-carbon economy in all sectors</td></tr>
<tr><td colspan="4">Thematic objective 4: Support the shift to a low-carbon economy in all sectors</td></tr>
<tr><td>Specific objective:</td><td colspan="3">Energy conversion of public buildings and public infrastructures or available for use by the public, residential and non-residential, and RES integration</td></tr>
<tr><td>Competent implementation body/bodies:</td><td colspan="3">Central Director of productive activities, trade, cooperation, agricultural and forest resources and manufacturing area</td></tr>
<tr><td>Final beneficiaries:</td><td colspan="3">Regional public health authorities
Regional public authorities managing assisted living residences for the elderly</td></tr>
<tr><td rowspan="3">Available budget:</td><td>Total budget:</td><td>56.945.512 €</td><td rowspan="3"></td></tr>
<tr><td>EU funding:</td><td>28.472.756 €</td></tr>
<tr><td>Ratio of national contribution:</td><td>50%
National: 35%
Regional:15%</td></tr>
<tr><td>Description of measures (with budget breakdown):</td><td colspan="3">
Action 3.1 – Promotion of eco-efficiency and reduction of primary energy consumption in public buildings and infrastructures

Activity 3.1.a – Reduction of primary energy consumption in school buildings
Total available budget: ERDF 25,2 M € plus 9,7 M € additional Regional resources

Energy savings: 63.9% reduction in annual primary energy consumption of public buildings

3 calls under the title: Allocation of funding for the reduction of primary energy consumption in school buildings

• Call 1
<table>
<tr><th>TOT available budget</th><th>ERDF</th><th>National co-financing</th></tr>
<tr><td>9.104.268,28</td><td>4.552.134,15</td><td>4.552.134,13</td></tr>
<tr><th colspan="3">Additional resources</th></tr>
<tr><td>9.651.821,92</td><td>4.825.910,96</td><td>4.825.910,96</td></tr>
</table>
Number of projects funded: 15

• Call 2
<table>
<tr><th>TOT available budget</th><th>ERDF</th><th>National co-financing</th></tr>
<tr><td>14.163.138,72</td><td>7.081.569,85</td><td>7.081.569,87</td></tr>
</table>
Number of projects funded: 24

• Call 3
<table>
<tr><th>TOT available budget</th><th>ERDF</th><th>National co-financing</th></tr>
<tr><td>2.020.000,00</td><td>1.010.000,00</td><td>1.010.000,00</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td>
Number of projects funded: 3

Activity 3.1.b – Reduction of primary energy consumption in hospitals and nursing homes
Total available budget: ERDF 28 M € plus 11,8 M € additional Regional resources
Energy savings: no projects have been finished yet so no data is currently available with regard to consumption reduction

3.1b.1 Energy efficiency in health care facility – Pordenone
Call 1
<table>
<tr><th>TOT available budget</th><th>ERDF</th><th>National co-financing</th></tr>
<tr><td>7.583.457</td><td>3.791.737,51</td><td>3.791.737,49</td></tr>
</table>
Call 2
<table>
<tr><th>TOT available budget</th><th>ERDF</th><th>National co-financing</th></tr>
<tr><td>1.416.525,00</td><td>708.262,49</td><td>708.262,51</td></tr>
</table>

3.1b.1 Energy efficiency in health care facility – Trieste
<table>
<tr><th>TOT available budget</th><th>ERDF</th><th>National co-financing</th></tr>
<tr><td>6.000.000</td><td>3.000.000</td><td>3.000.000</td></tr>
</table>

3.1b.2 – Reduction of primary energy consumption in assisted living residences for the elderly
Call 1
<table>
<tr><th>TOT available budget</th><th>ERDF</th><th>National co-financing</th></tr>
<tr><td>7.991.313,28</td><td>3.995.656,64</td><td>3.995.656,64</td></tr>
</table>
Number of projects funded: 8

Call 2
<table>
<tr><th>TOT available budget</th><th>ERDF</th><th>National co-financing</th></tr>
<tr><td>5.107.697,72</td><td>2.553.848,36</td><td>2.553.849,36</td></tr>
<tr><th colspan="3">Regional additional resources</th></tr>
<tr><td>11.804.115,12</td><td>5.902.057,56</td><td>5.902.057,56</td></tr>
</table>
Number of projects funded: 18
</td></tr>
<tr><td>Main expected results:</td><td>Result indicators:
Electricity consumption of public service building stock, i.e. school buildings, hospitals and nursing homes</td></tr>
<tr><td>Implementation status:</td><td>
Activated resources: 74,8 M€
Approved contribution: 71,3 M€
Certified expenses: 11,4 M€

Allocation of certified expenses per year:
<table>
<tr><td>2016</td><td>266.389,51</td></tr>
<tr><td>2017</td><td>1.597.847,88</td></tr>
<tr><td>2018</td><td>8.176.068,21</td></tr>
<tr><td>2019</td><td>1.345.261,49</td></tr>
<tr><td>TOT</td><td>11.385.567,09</td></tr>
</table>
</td></tr>
</table>