Oil Free Zones and Renewable Energy Communities in Italy

The Pinerolese Energy Community (To)

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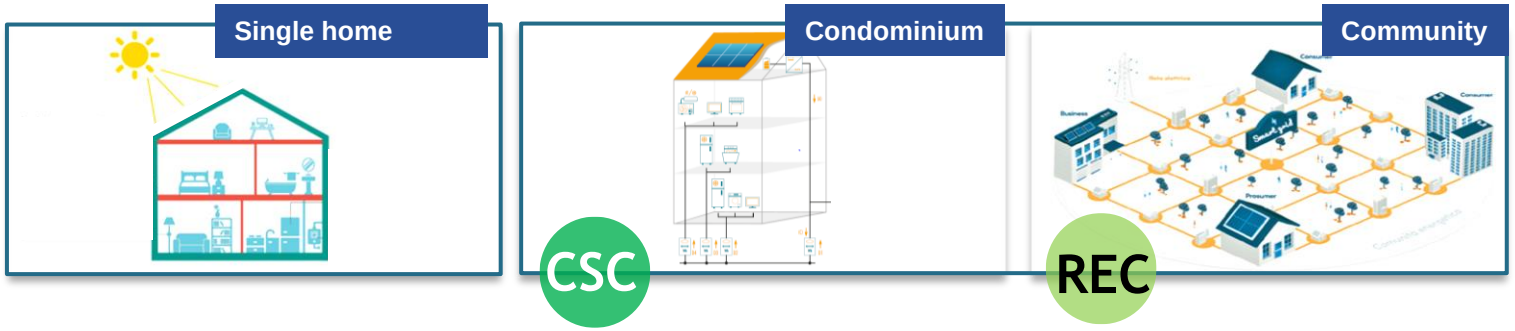
June 9th , 2022

Index

1. The energy transition in Pinerolese territory
2. The Oil Free Zone Pinerolese «*Territorio sostenibile*»
3. Europeand and Regional projects: ENER.COM and EC^2
4. The Temporary Association of Purpose (ATS) «Pinerolese Energy Community»
5. NextGenerationWE fund by Fondazione Compagnia di San Paolo
6. The energy planning and REC desing at territorial and municipal scale

Energy Communities

A Renewable Energy Community (REC) is an aggregation of users who, through voluntary adhesion to a contract, cooperate with the goal of **producing, distributing, consuming, and managing energy** through one or more local facilities: the goal is to produce energy from renewable energy sources (RES) intended for their own self-consumption and self-sufficiency.

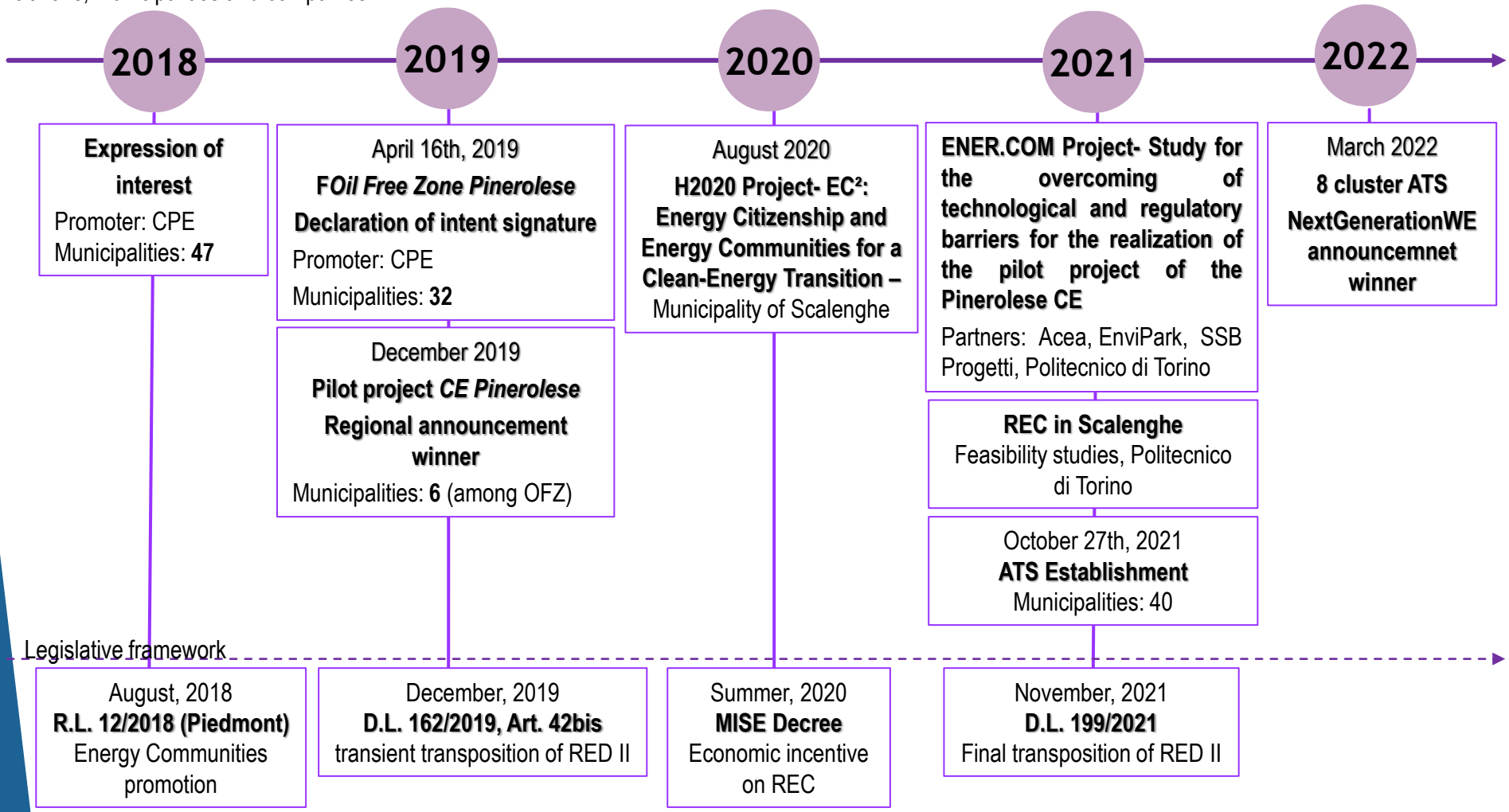


The transposition of the RED and **RED II** Directives (2018/2001/EU) initiated a phase of national experimentation (DL 162/2019 Art.42bis), recognizing two possible configurations (CSC and REC) beneficiaries of dedicated economic incentives in compliance with minimum requirements. The new DL 199/2021 updated the requirements, and the new economic incentives are pending.

"An Energy Community for Territorial Resilience. The Measurement of the Risk of Energy Supply Blackout", Mutani G., Santantonio S, Brunetta G., Caldarice O., Demichela M., Energy and Buildings, Vol. 240 (110906), 2021, DOI: 10.1016/j.enbuild.2021.110906.

The energy transition in Pinerolese territory

Starting from 2018, the Pinerolese territory has been committed to implement at the local level an energy transition process that involves all stakeholders: citizens, municipalities and companies.



"Energy communities. A new energy policy at territorial scale", G. Mutani, V. Todeschi, S. Santantonio, M. Bazzino, Energy for Sustainability International Conference 2019. Designing a Sustainable Future, Turin, July 24-26th 2019, ISBN 9789895449903, Ed. Itecons (https://www.efs2019.uc.pt/projectos/efs2019/; https://www.efs2019.uc.pt/projectos/efs2019/atas/pdfs/camready138.pdf).

Pinerolese territory: first steps

2018

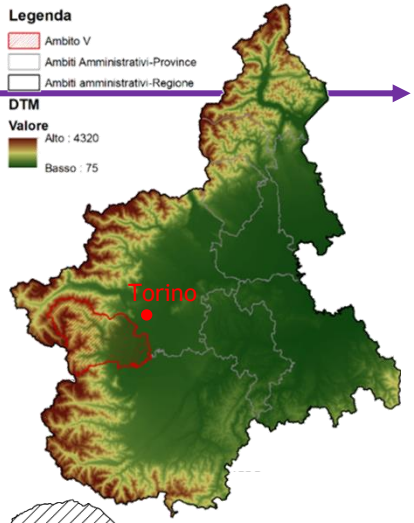
Expression of interest
Promoter: CPE
Municipalities: **47**

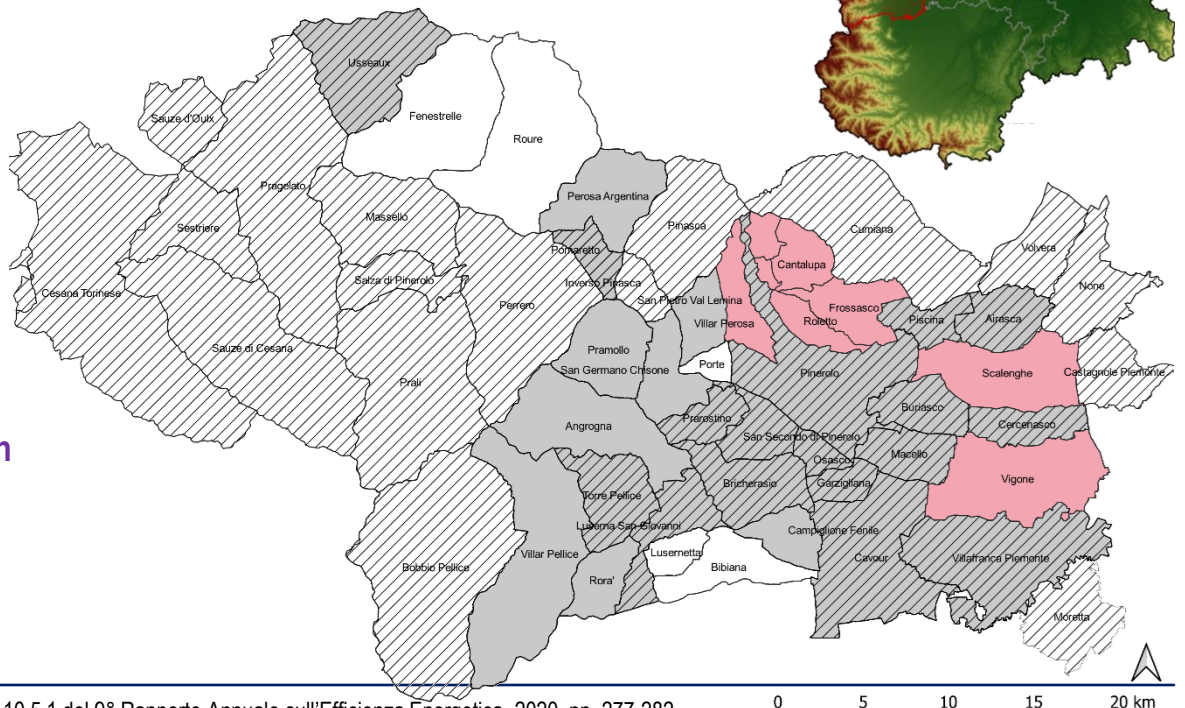
Techno-economic feasibility study
Data from municipalities and companies - Politecnico di Torino

R.L. 12/2018 – Piedmont Region

❖ **Homogeneus zone (V) in the Metropolitan Area of Turin**

53 municipalities benefits from the service of the multy-utility company Acea Pinerolese, leader of the consortium Consorzio Pinerolo Energia (CPE).





Minimum requirement for EC:

- Annual electric consumption > **0,5 GWh**
- Annual self-consumption > **70 %**
- of which **50% from RES**
- Plurality of end users

"La comunità energetica del Pinerolese", Guglielmina Mutani, paragrafo 10.5.1 del 9° Rapporto Annuale sull'Efficienza Energetica, 2020, pp. 277-282, ENEA (https://www.efficienzaenergetica.enea.it/pubblicazioni/rapporto-annuale-sull-efficienza-energetica-2020.html).

Pinerolese territory: the Oil Free Zone «Territorio Sostenibile»

- L.N n. 221/2015 - Art. 71 → *Territory in which, within a certain time frame and on the basis of a specific policy act adopted by the municipalities of the reference area,* ***the progressive replacement of oil and its derivatives with energy produced from renewable sources is envisaged.***

2019

April 16th, 2019

F*Oil Free Zone Pinerolese*

Declaration of intent signature

Promoter: CPE

Municipalities: **32**

November 2019

1^ meeting

December 2019

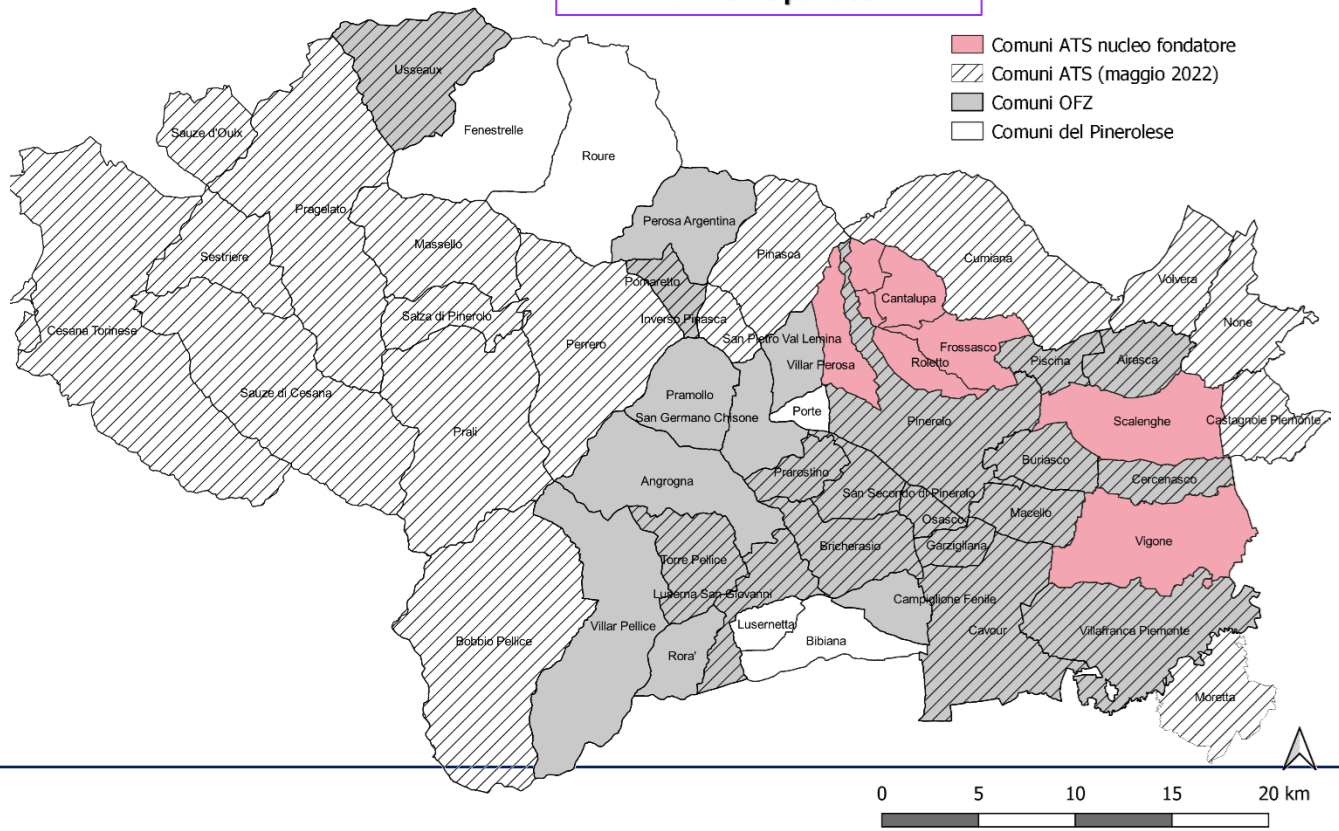
Pilot project *CE Pinerolese*

Candidate at Regional Announcement

6 Municipalities

May 2022

31 Municipalities



Pinerolese territory: the Piedmont Region Law on Energy Communities

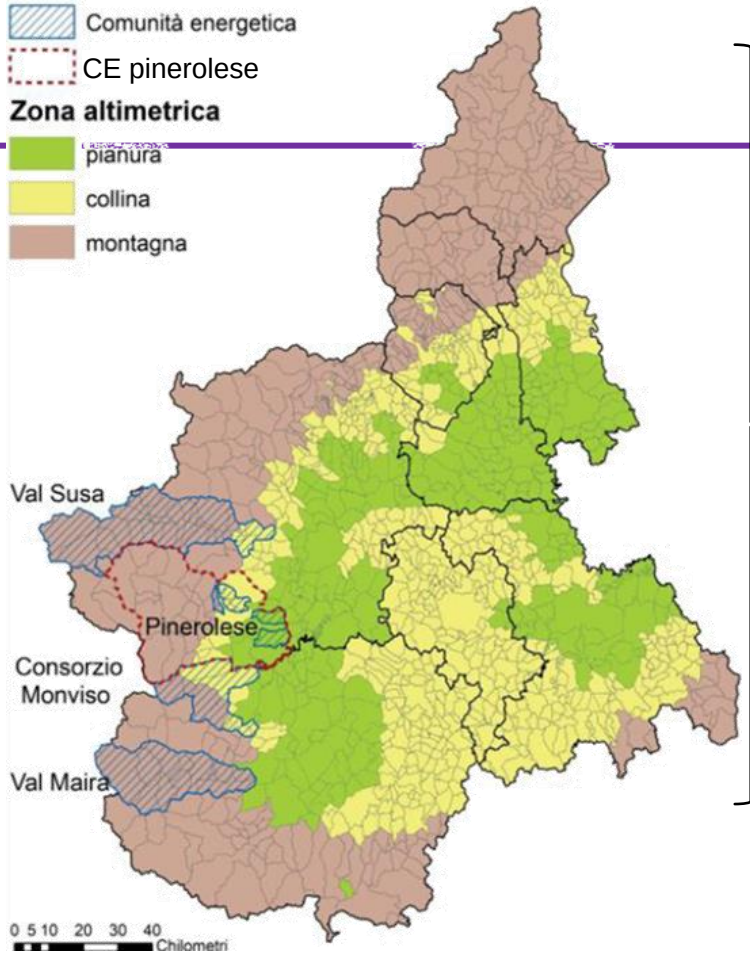
2020

February 2020

Pilot project EC Pinerolese winner of the regioal announcement

August 2020

EU H2020 Project- EC²: Energy Citizenship and Energy Communities for a Clean-Energy Transition – Scalenghe municipality (2021-2024)



- **Pinerolese EC (To)**
  Pilot project: 6 municipalities among The Oil Free Zone Pinerolese (32 municipalities)
  Partners: Polito, CPE-Acea Pinerolese
- **Valle di Susa EC (To)**
  Unione montana Alta e Bassa Valle, 31 municipalities
  Supported by EU H2020 Project SCORE
  Partners: Polito, Cooperativa sociale Amico
- **Valli Maira e Grana EC (Cn)**
  Unioni montane (Maira e Grana), 21 municipalities
  Temporary Association of Purpose (ATS)
- **Consorzio Monviso EC (Cn)**
  Unione montana Monviso, 10 Municipalities
  Supported by LIFE GreenChainSAW4Life project
  Partners: Iris, Walden

"Energy Communities in Piedmont Region (IT). The case study in Pinerolo territory", G. Mutani, V. Todeschi, A. Tartaglia, G. Nuvoli, INTELEC® 2018 - International Telecommunications Energy Conference Proceedings, ISBN 978-1-5386-5370-8, ISSN: 0275-0473, Torino (IT), October 7-11th 2018, DOI 10.1109/INTLEC.2018.8612427 (https://ieeexplore.ieee.org/document/8612427).

Pinerolese territory: the Temporary Association of Purpose (ATS in Italian)

2021

ENER.COM Project- Study for the overcoming of technological and regulatory barriers for the realization of the pilot project of the Pinerolese CE

Partners: Acea, EnviPark, SSB Progetti, Politecnico di Torino

Energy planning of REC

Politecnico di Torino:

- Energy planning at territorial scale
- REC design and pre-feasibility study

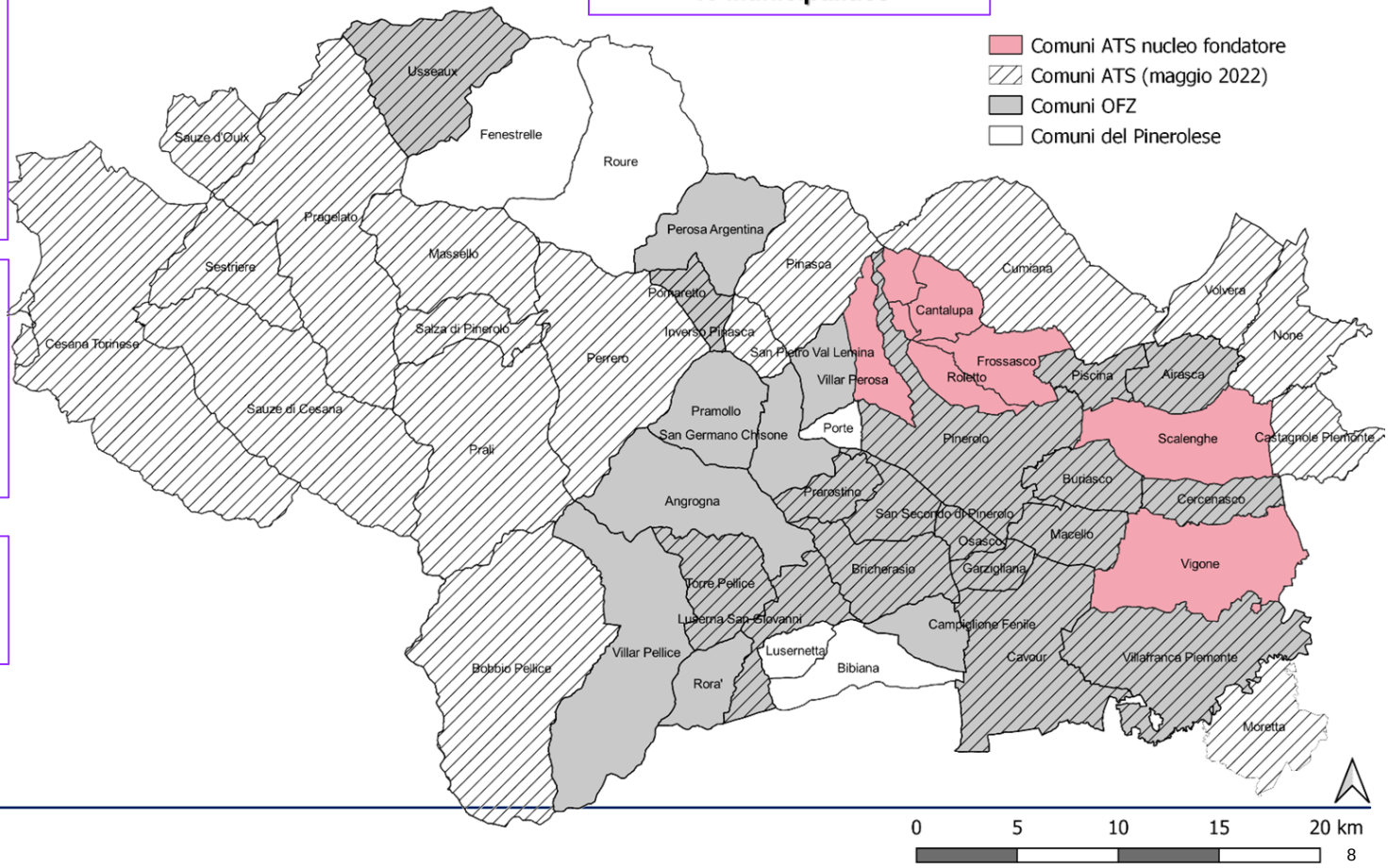
October 27th, 2021

ATS Establishment

Municipalities: 6 founder

May 2022

40 Municipalities



ATS: a short-term strategy for energy planning in the Pinerolo territory

Common objectives of public utility have been outlined for the Pinerolo territory, the purpose of the ATS is the promotion and coordinated implementation of energy communities in the area, through the sharing of tools and resources.

5 strategic axes identified:

1. Energy and environmental sustainability;
2. Aggregation activities;
3. Information and consultancy activities;
4. Dissemination, training and technical-administrative support activities;
5. Participation in EU, national, Piedmont Reg. And private entities calls

Participation at "NOTTE EUROPEA DEI RICERCATORI 2021" at 2021-09-25, stand Isola E "Economy and Society", Community for energy and energy for communities: citizens at the center of the transition to renewable sources. A flyer on energy communities and three posters on energy communities in mountains, islands and agricultural territories were presented: (http://www.r3c.polito.it/news/r3c-presenting-event-comunit%C3%A0-l%E2%80%99energia-e-energia-le-comunit%C3%A0-european-researcher-night-turin; https://www.politocomunica.polito.it/events/appuntamenti/notte_europea_dei_ricercatori_2021).

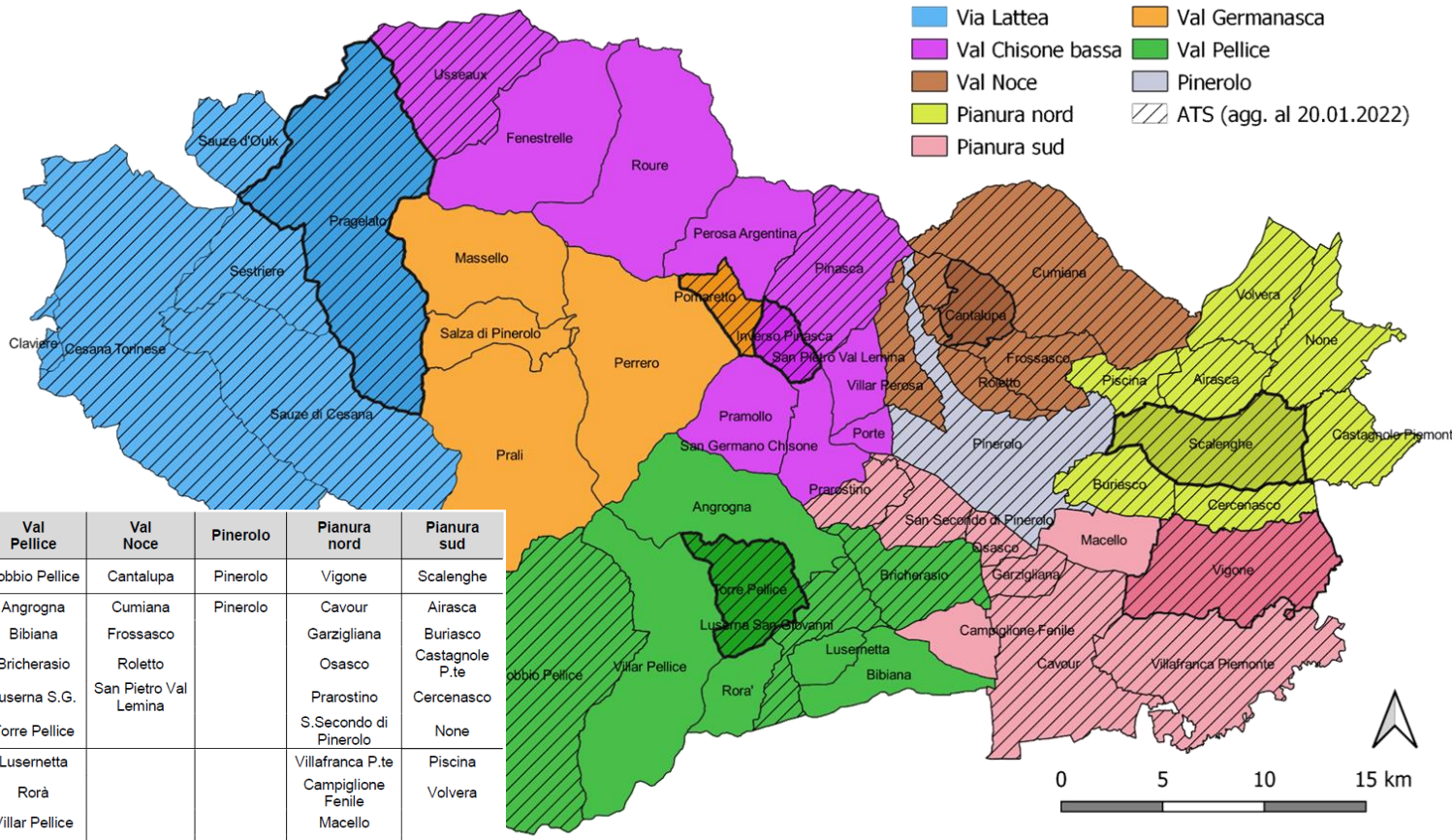
Pinerolese territory: from NextGenWE to PNRR funds

2022

March 2022

8 cluster ATS

Winner of the NextGenerationWE announcement



Cluster	Via Lattea	Val Chisone bassa	Val Germanasca	Val Pellice	Val Noce	Pinerolo	Pianura nord	Pianura sud
Referente	Pragelato	Inverso Pinasca	Pomaretto	Bobbio Pellice	Cantalupa	Pinerolo	Vigone	Scalenghe
Comuni membri ATS	Cesana T.se Claviere Sauze di Cesana Sauze d'Oulx Sestriere	Pinasca Usseaux		Angrogna Bibiana Bricherasio Luserna S.G. Torre Pellice	Cumiana Frossasco Roletto San Pietro Val Lemina	Pinerolo	Cavour Garzigliana Osasco Prarostino S.Secondo di Pinerolo	Airasca Buriasco Castagnole P.te Cercenasco None
Altri comuni del cluster non membri ATS		Fenestrelle Perosa Argentina Porte Pramollo Roure S. Germano Chisone Villar Perosa	Massello Perrero Prali Salza di Pinerolo	Lusernetta Rorà Villar Pellice			Villafranca P.te Campiglione Fenile Macello	Piscina Volvera
Tot comuni	6	10	5	9	4	2	9	8

Energy planning and REC feasibility at territorial and municipal scale

Silvia Santantonio – DENERG Politecnico di Torino

Simone Beltramino – DIST Politecnico di Torino

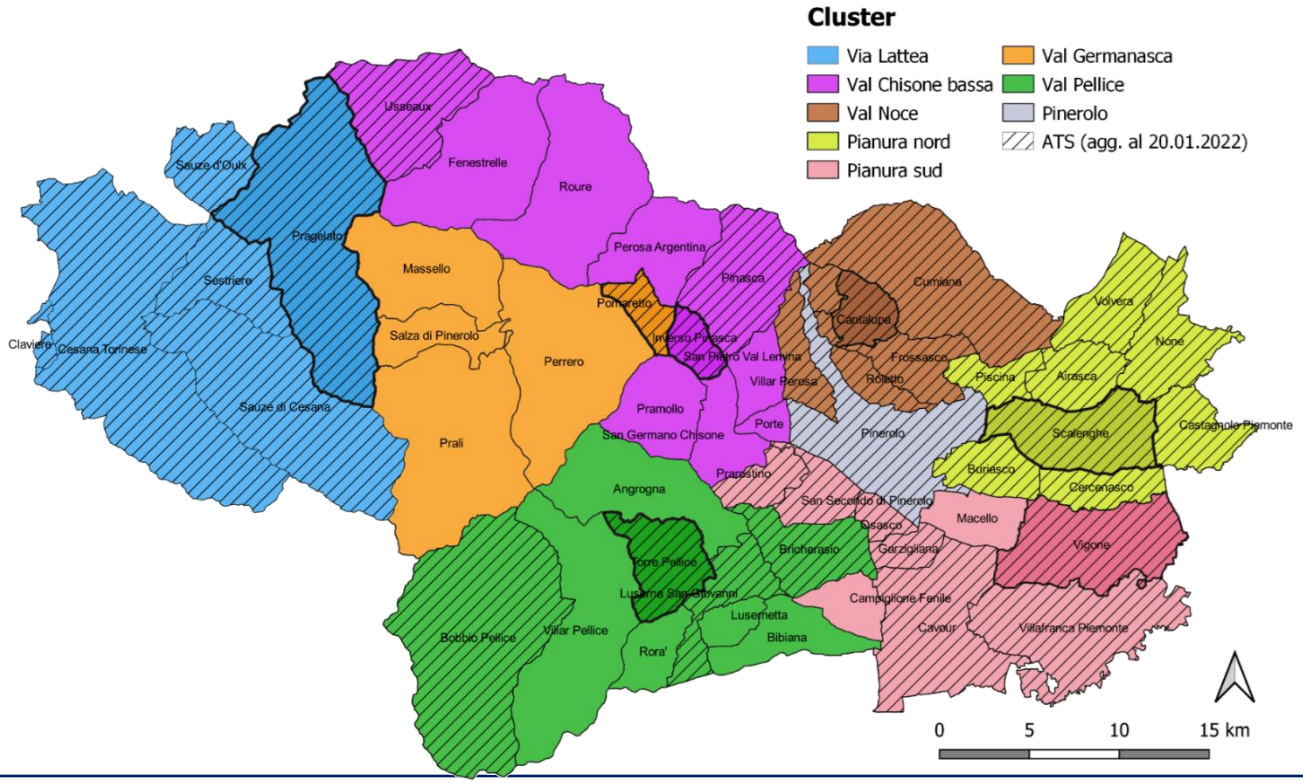
Pinerolese territory: energy, environmental and economic analysis

Territorial energy planning

Scale: territory, municipality (cluster of)
Energy data detail: annual
Objective: optimal renewable local energy mix to ensure **energy self-sufficiency**

REC technical-economic pre-feasibility study

Scale: Municipality (transformer electrical substation LV-MV)
Energy data detail: hourly
Objective: optimal end users and RES technologies aggregation to maximize **collective self-consumption of REC**



«Una nuova prospettiva per lo sviluppo sostenibile. Dalle comunità energetiche agli nZEB", conference organized at Politecnico di Torino, Energy Center, Torino, September 21st 2018 (in Italian) (https://www.fondazioneperlarchitettura.it/wp-content/uploads/2018/07/locandina-A3_Def4.pdf; https://didattica.polito.it/zxd/cms_data/attachment/15/programma%20seminario%2021092018.pdf).

Energy analysis at territorial scale: input database

Tipology	Input data	Note	Source
GENERAL TERRITORIAL FRAMEWORK (natural and antropic environment)			
Built environment	CTR		BDTRE – Geoportale Piemonte
	DEM/DSM/DTM		ISPRA BDTRE – Geoportale Piemonte
	Uso del suolo		CORINE Land Cover
Socio-economic characteristics	Censimento degli edifici e della popolazione	By census sections	ISTAT 2011
Climatic characteristics	Dati climatici (T, UR, vento, irradiazione solare, GG)		Arpa Piemonte PVGIS UNI 10349-1,2,3:2016
ENERGY CONSUMPTION			
Regional energy consumption	Consumi regionali di energia per settori		Banche Dati Regione Piemonte
ENERGY PRODUCTION BY RES			
Geographic and energy data	Portale ATLAIMPIANTI e Rapporto Statistico GSE	RES type, installed power, site, annual hours of utilization	Atlaimpianti – GSE e Rapporto Statistico GSE (2021)
ENERGY PRODUCIBILITY BY RES			
RES sources	Irradiazione solare	Energy producibility calculation (yearly-monthly-hourly)	GIS-Area solar radiation, Meteonorm & PVGIS website (JRC) & Atlante Italiano della Radiazione Solare ENEA
	Biomassa forestale		Carta SIFOR Piemonte
	Biomassa agricola		ISPRA
	Reflui zootecnici		Banche dati ASL To3
	Rifiuti		ISPRA
Constraints for RES withdrawal/ plants installation	Tutela ambiente	Actual energy producibility	DGR Piemonte PPTR Piemonte
	Tutela paesaggio		
	Rischio idrogeologico		
	Tutela suolo		

"Place-based Atlas for Energy Communities using Energy Performance Certificates Database", G. Mutani, S. Beltramino, M. Schiavone, IEEE Cando Conference 2020, pp. 179-184, doi: 10.1109/CANDO-EPE51100.2020.9337766.

Energy analysis at municipal scale: input database

The pre-feasibility study of a REC can suggest the optimal aggregation of members, in compliance with the requirements for accessing the economic incentive dedicated Furthermore, it is useful for evaluating the energy, economic and environmental benefits of the initiative, as well as a support tool in the choice of multiple hypothesized scenarios of intervention. Some phases of the work require fundamental collaboration from the public administration, which can benefit from the support of the Politecnico di Torino for each of the following actions:

Data Acquisition

Public buildings and public lighting services energy data:

- List of public building and main characteristics (address, use, time-schedule)
- Monthly bills of energy consumption of the municipal end users (technical office)

Energy data of end user citizens:

- Data downloading from dedicated online platform*

(Guided procedure from Politecnico, sensible data)

Citizens involvment

At least two end users (POD) to create a REC:

- Inform citizens about the possibility of accessing the MISE incentive and selecting interested users
- Acquisition of energy data of private users, technical verification and economic convenience
- Selection of appropriate legal form for aggregation and start of procedure with GSE (via portal)

LV-MV electric substation

Official request from the interested municipality:

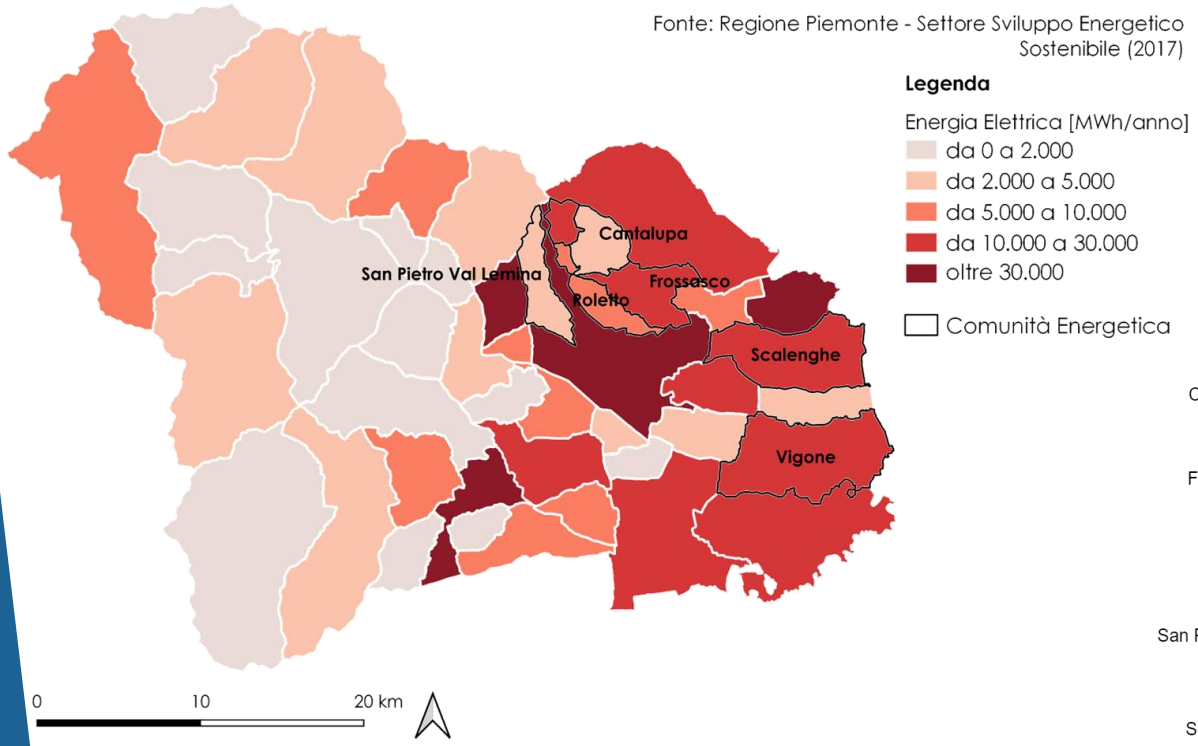
- Simple procedure from the distributor's website (reply from E-distribution in 10 days)
- Sending the POD list of municipal and private users to find out about the reference MV-LV substations

"Energy resilient systems for a new housing model. The experiences of energy communities", participation at ReHab Housing Strategies International Seminar, at Politecnico di Torino, Castello del Valentino, Sala della Caccia, December 6th-7th 2019, https://lucareale.weebly.com/uploads/6/0/5/2/6052828/rehab_programma.pdf.

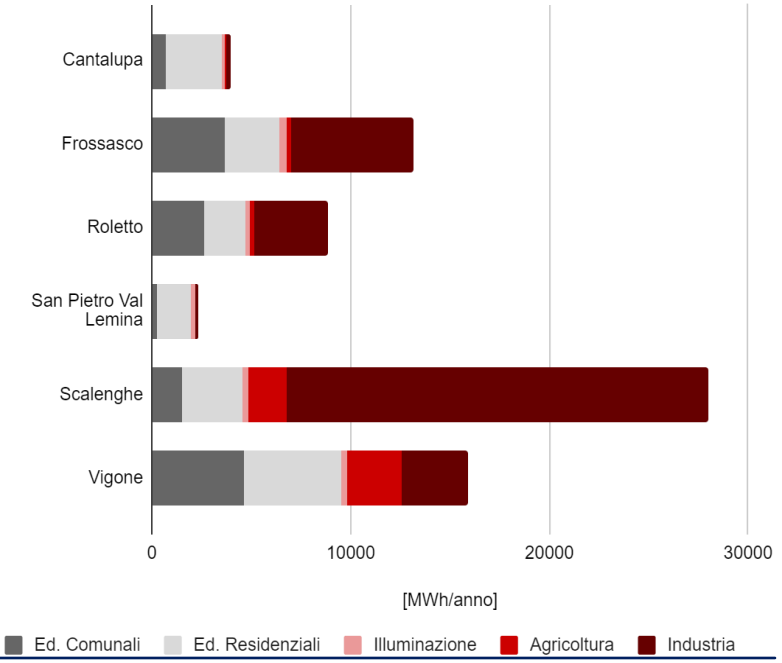
Energy territorial planning: ENERGY CONSUMPTION

TOTAL ANNUAL ENERGY CONSUMPTION BY MUNICIPALITY

Fonte: Regione Piemonte - Settore Sviluppo Energetico Sostenibile (2017)



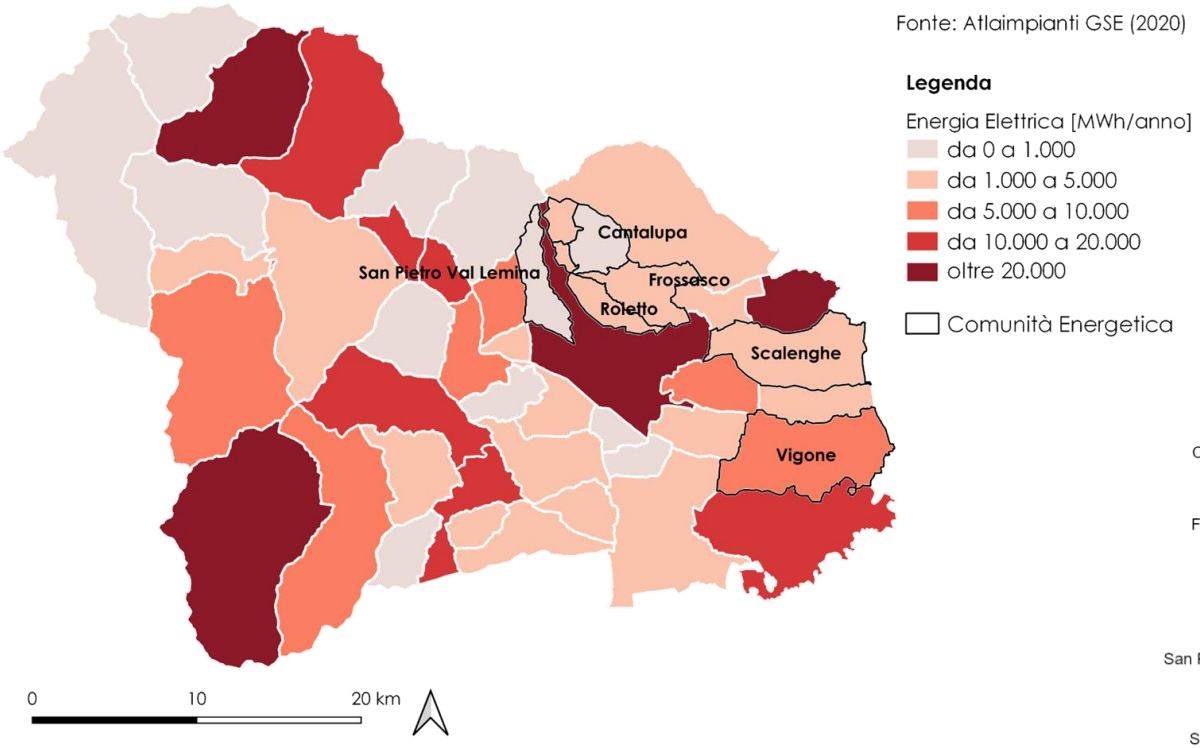
TOTAL ANNUAL ENERGY CONSUMPTION BY MUNICIPALITY AND SECTOR



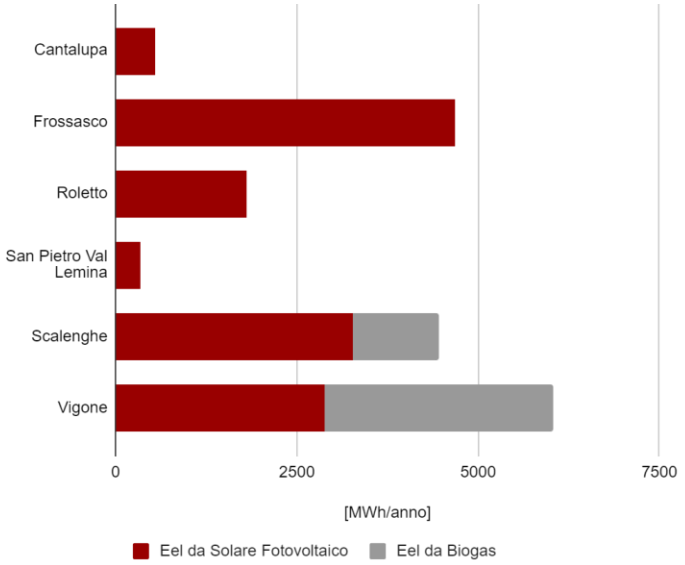
"Statistical data analysis for energy communities", Guglielmina Mutani, Silvia Santantonio, Angelo Tartaglia, TI-Italian Journal of Engineering Science, Volume 64, issue 2-4, June 2020, pp. 385-397, DOI 10.18280/ti-ijes.642-438 (http://www.iieta.org/journals/ti-ijes/paper/10.18280/ti-ijes.642-438).

Energy territorial planning: EXISTING ENERGY PRODUCTION BY RES

TOTAL ANNUAL ENERGY RES PRODUCTION BY MUNICIPALITY

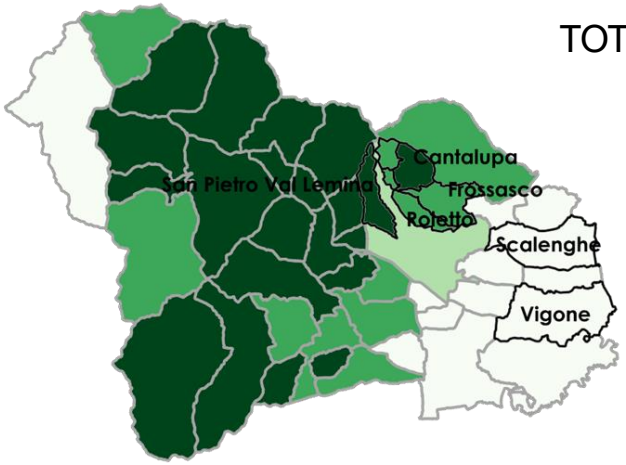


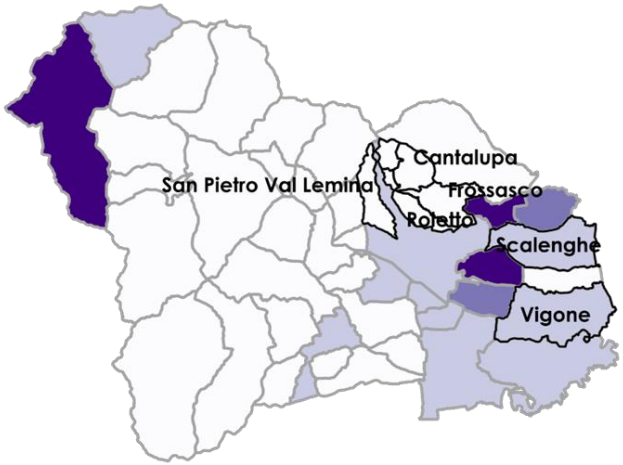
TOTAL ANNUAL ENERGY PRODUCTION BY MUNICIPALITY AND TYPE OF RES



Energy territorial planning: ENERGY PRODUCIBILITY BY RES

TOTAL ANNUAL ENERGY RES PRODUCIBILITY BY MUNICIPALITY

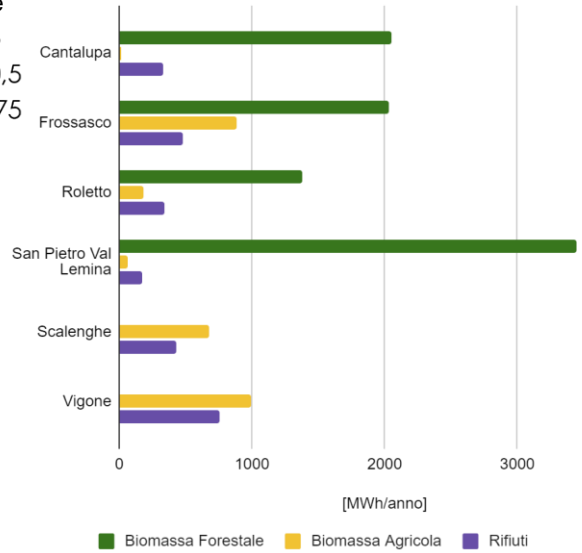




Legenda

Forestry Biomass	Agricoltural Biomass	Urban waste
0 - 0,25	0 - 0,25	0 - 0,25
0,25 - 0,5	0,25 - 0,5	0,25 - 0,5
0,5 - 0,75	0,5 - 0,75	0,5 - 0,75
0,75 - 1	0,75 - 1	0,75 - 1

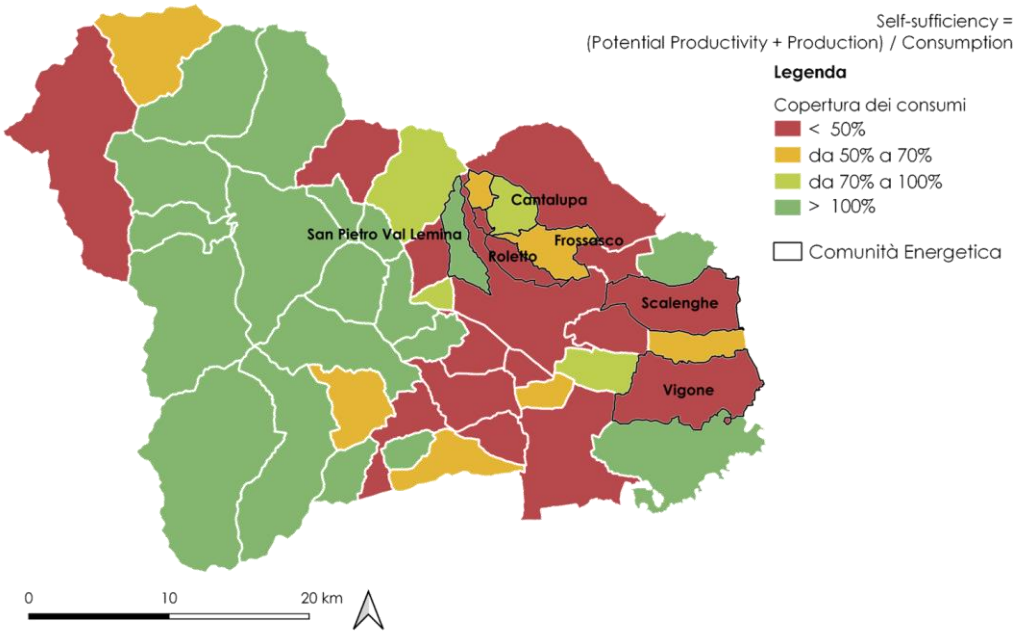
TOTAL ANNUAL ENERGY PRODUCIBILITY BY MUNICIPALITY AND TYPE OF RES



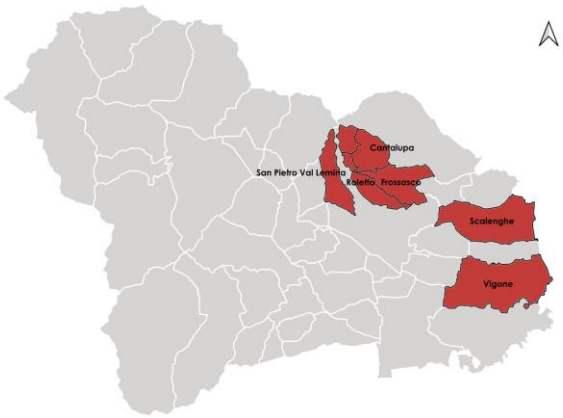
"A Clean Energy Atlas for Energy Communities in Piedmont Region (Italy)", G. Mutani, S. Beltramino, A. Forte, International Journal of Design & Nature and Ecodynamics, Vol. 15, No. 3, 2020, pp. 343-353, DOI 10.18280/ijdne.150308 (http://www.iieta.org/journals/ijdne/paper/10.18280/ijdne.150308).

Energy territorial planning: ANNUAL ENERGY SELF-SUFFICIENCY

TOTAL ANNUAL ENERGY SELF-SUFFICIENCY AT MUNICIPAL SCALE



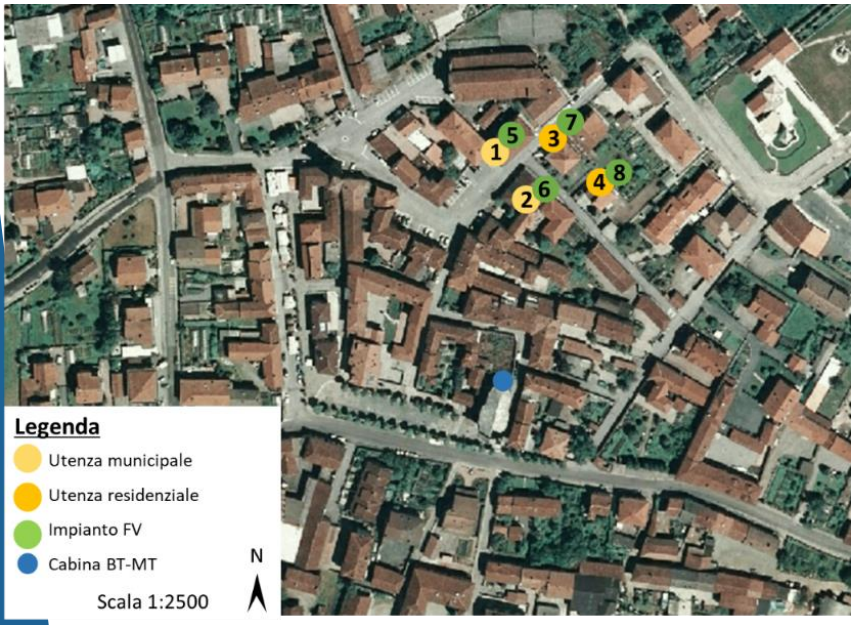
ANNUAL SELF-SUFFICIENCY	
Cantalupa	75%
Frossasco	61%
Roletto	42%
San Pietro Val Lemina	173%
Scalenghe	20%
Vigone	49%



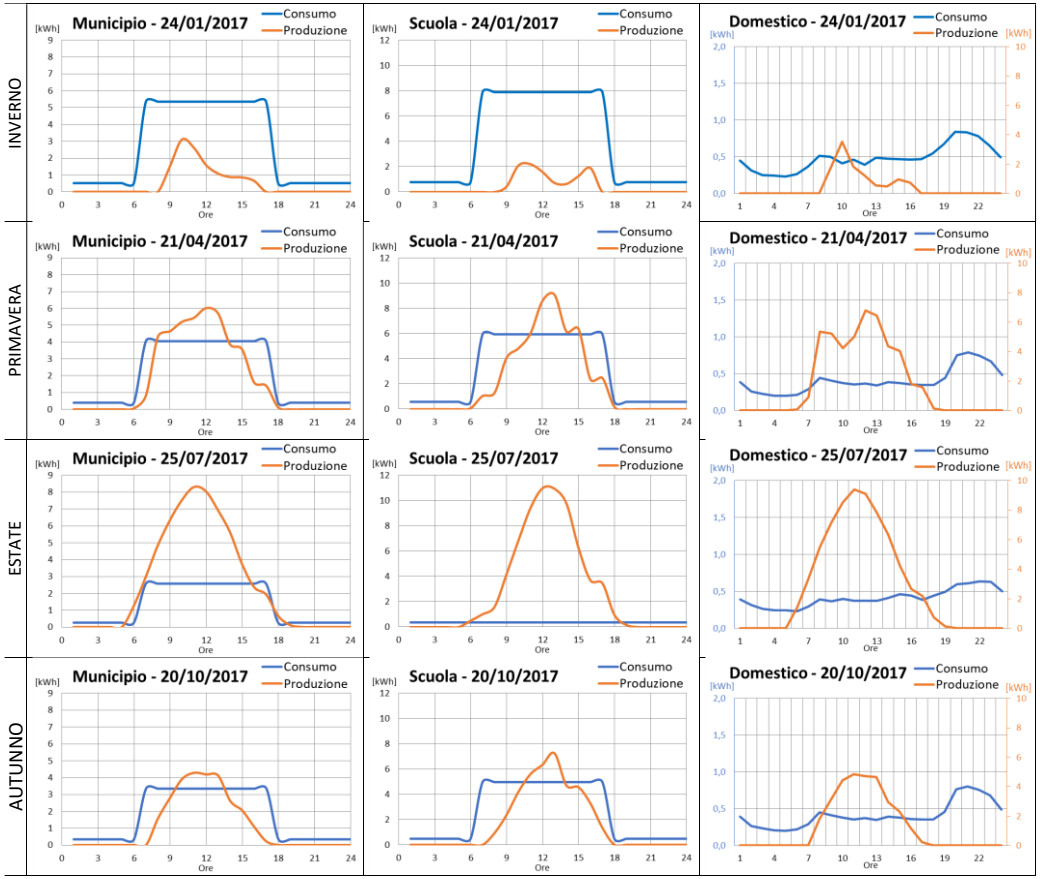
Technical-economic pre-feasibility analysis: REC configuration in Scalenghe (To)

REC members selection according to type of end users and RES plants

Consumo			Produzione		
Tipo utenza	Nome	Rif. Mappa	Name	Pot.nom. [kW]	Map ref.
MUNICIPALE	Municipio	1	PV	7,98	5
	Scuola dell'infanzia	2	PV	12,04	6
DOMESTICA	2 unità residenziali	3	PV	3,95	7
		4	PV	5,07	8



Hourly profile of energy consumption (in blue) and production (in orange) for typical seasonal days in 2017

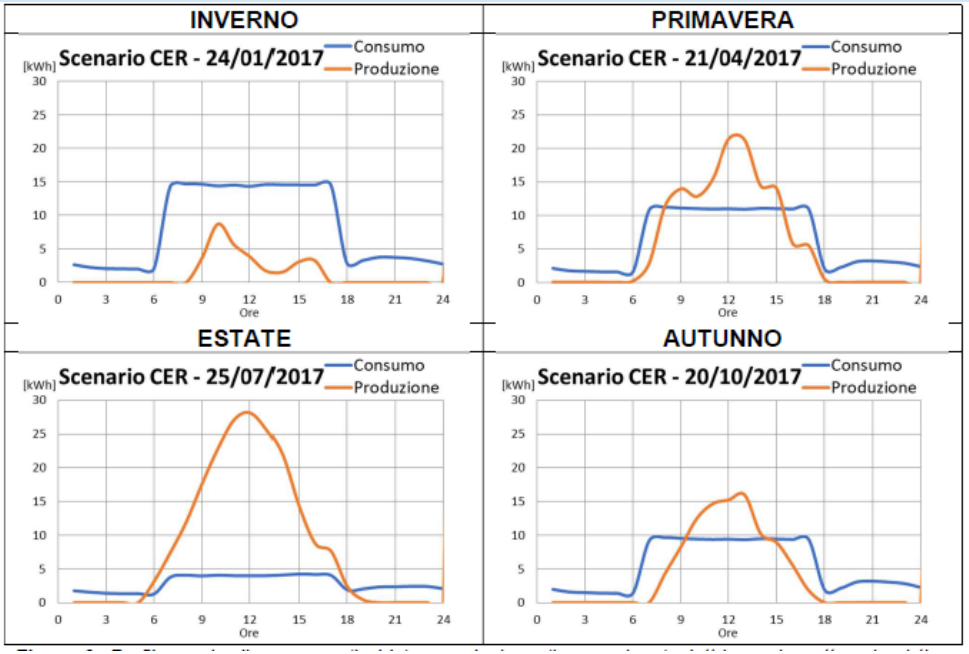


"An Energy Community for Territorial Resilience. The Measurement of the Risk of Energy Supply Blackout", Mutani G., Santantonio S, Brunetta G., Caldarice O., Demichela M., Energy and Buildings, Vol. 240 (110906), 2021, DOI: 10.1016/j.enbuild.2021.110906.

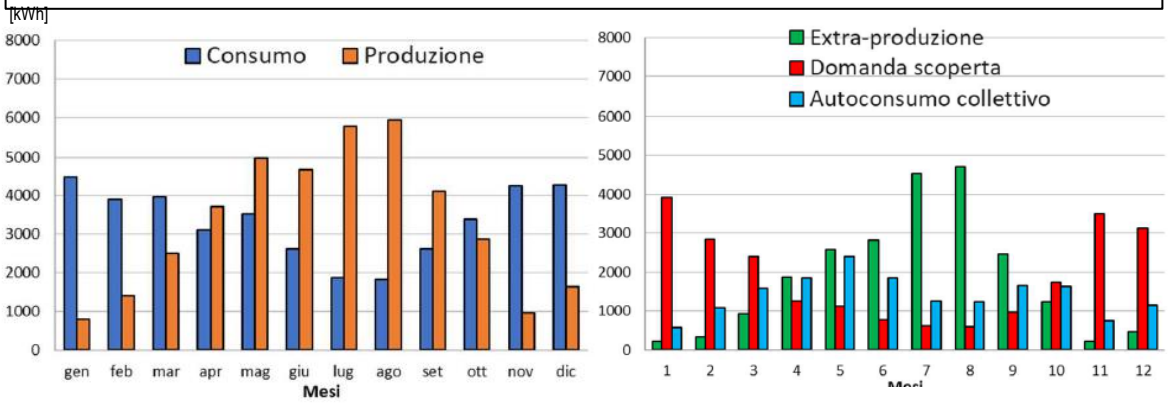
Technical-economic pre-feasibility analysis: REC configuration in Scalenghe (To)

REC as an AGGREGATED END USER

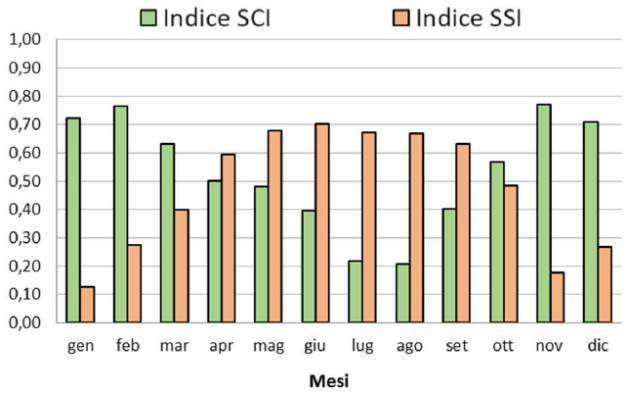
aggregation of the hourly profiles of consumption (in blue) and production (in orange) in the four typical seasonal days (year 2017)



ENERGY ANALYSIS

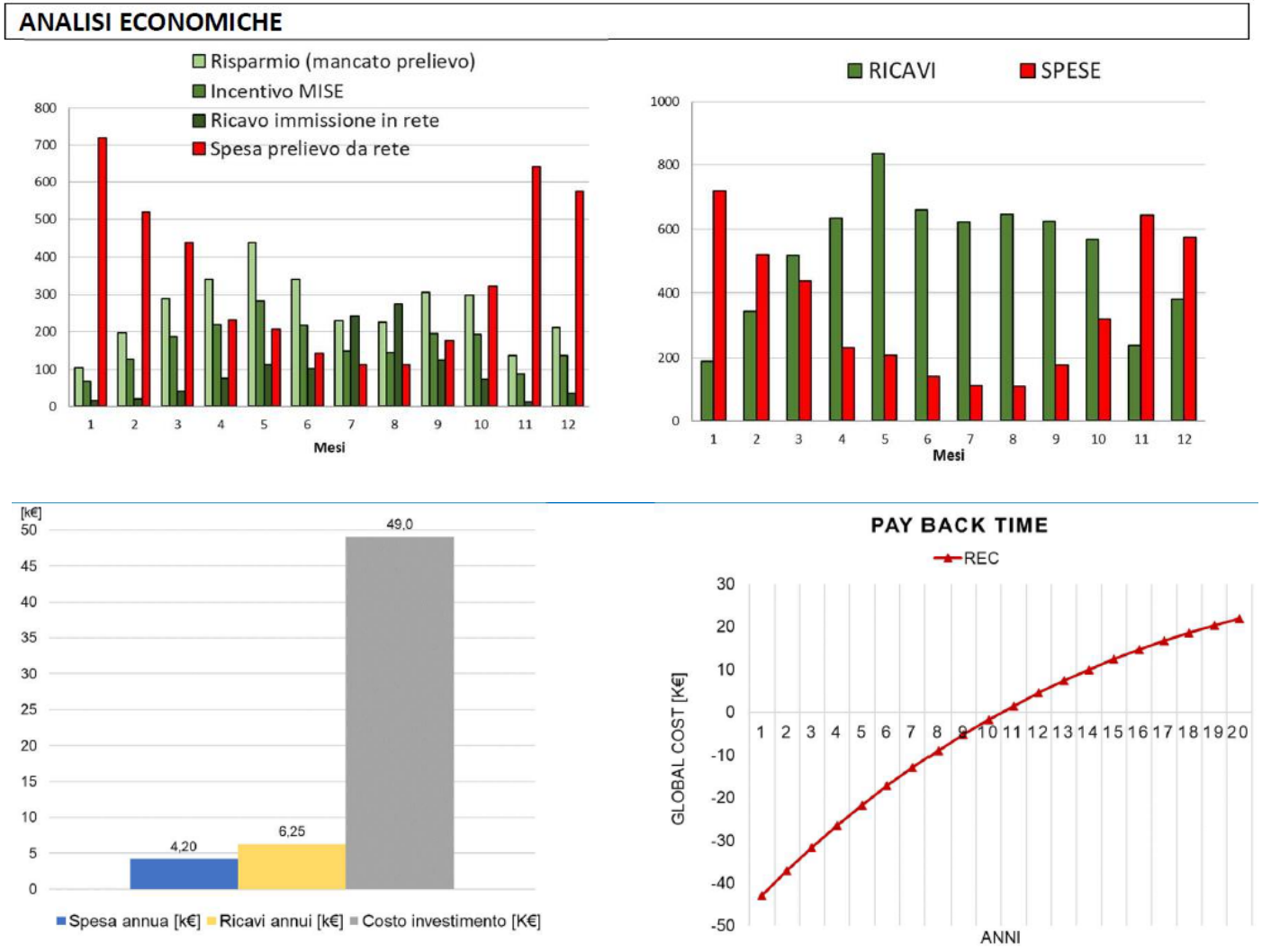


SELF-CONSUMPTION E SELF-SUFFICIENCY



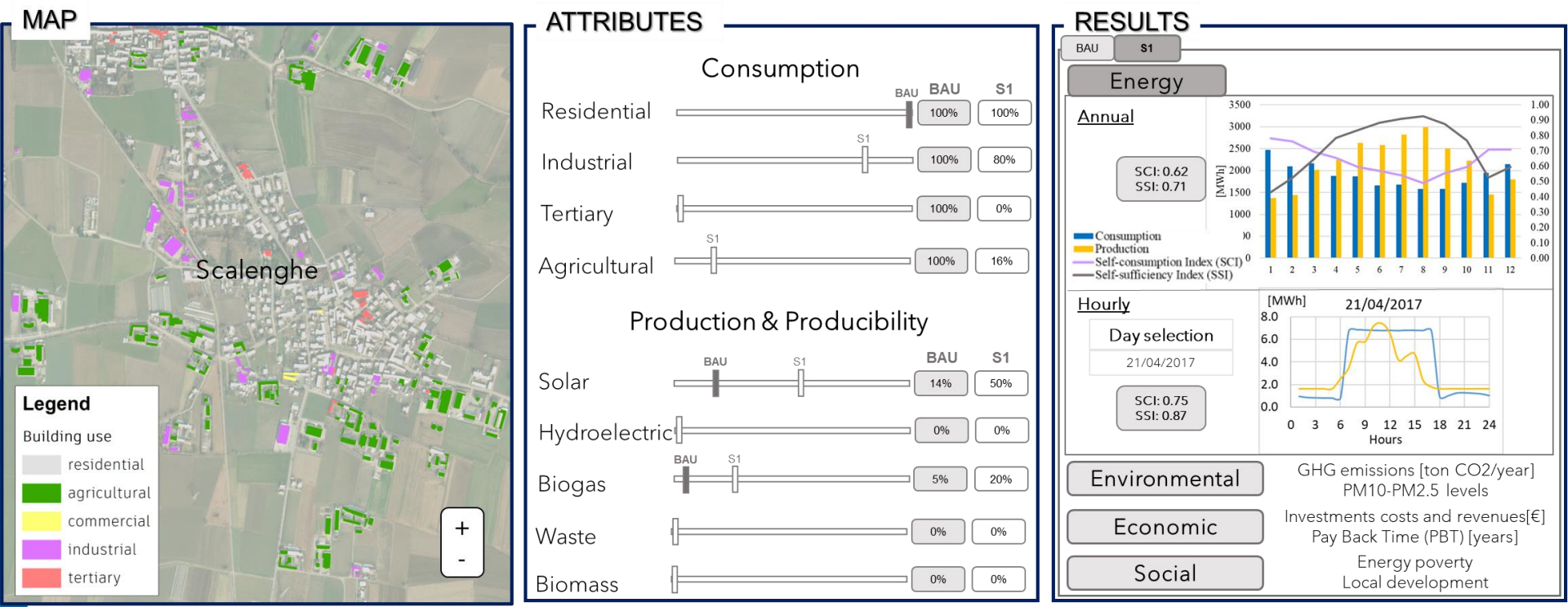
"Towards energy self-consumption and self-sufficiency in urban energy communities", Todeschi V., Marocco P., Mutani G., Lanzini A., Santarelli M., International Journal of Heat and Technology 39:1(2021), pp. 1-11, DOI: 10.18280/ijht.390101 (http://www.iieta.org/journals/ijht/paper/10.18280/ijht.390101).

Technical-economic pre-feasibility analysis: REC configuration in Scalenghe (To)



"Indicators and representation tools to measure the technical-economic feasibility of a Renewable Energy Community. The case study of Villar Pellice (Italy)", Mutani G., Santantonio S., Beltramino S., International Journal of Sustainable Development and Planning, Vol. 16, No. 1, February, 2021, pp. 1-11, DOI: 10.18280/ijsdp.160101 (http://www.iieta.org/journals/ijsdp/paper/10.18280/ijsdp.160101).

Supporting tool for the territorial energy planning: a Web-GIS platform



"Design and Modeling Renewable Energy Communities", G. Mutani, Y. Usta, International Journal of Sustainable Development and Planning, in press.
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