



Work Package 5

Task 5.3: “INTEGRATED SUSTAINABLE ENERGY PLAN AND SEAP/SECAP (ONLY MITIGATION PART) DRAFTING AND ADOPTION ACKNOWLEDGEMENT”
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Joint Sustainable Energy and Climate Action Plan

Executive Summary

CIS Municipalities, Italy

May 2019

Patto dei Sindaci per il Clima e l'Energia



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Introduction

The Municipalities of CIS are located in Marche Region (Italy). The Municipalities belonging to the CIS are the following: Castelbellino, Castelplanio, Maiolati Spontini, Mergo, Monte Roberto, Montecarotto, Poggio San Marcello, Rosora, San Marcello, San Paolo di Jesi, Serra San Quirico, Staffolo. The global population is 31.477.

The territory is characterized by small municipalities with different settlement density; only one municipality, Maiolati Spontini, exceeds 6,000 inhabitants. The largest centers by population are Maiolati Spontini and Castelbellino.

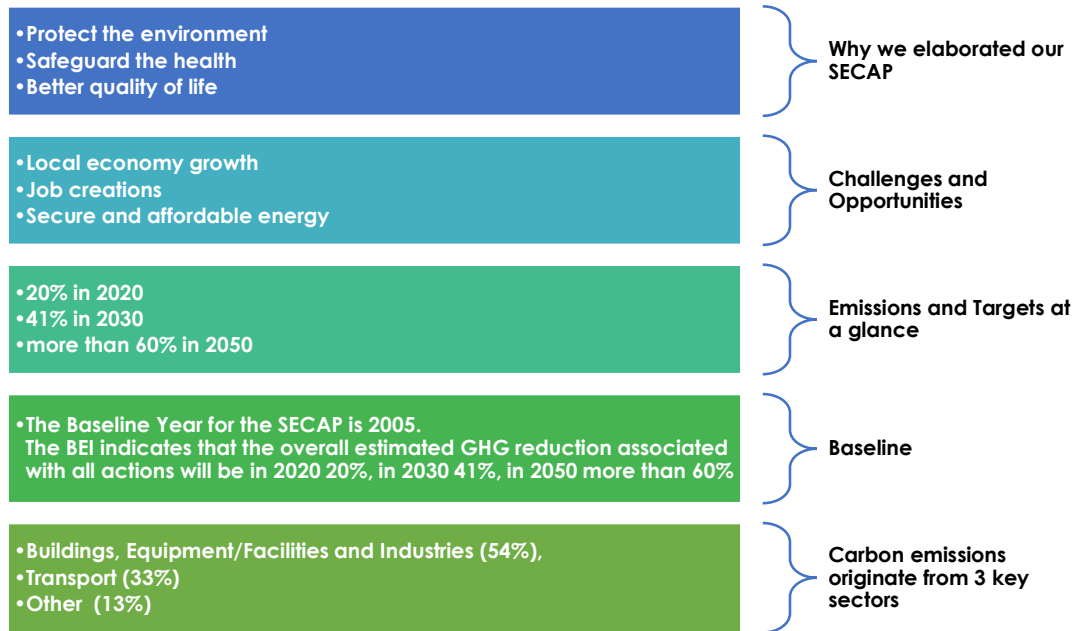
The CIS Municipalities are members of the Covenant of Mayors Initiative (CoM) since:

- Castelbellino: adhesion approved by the City Council on March 28, 2018
- Castelplanio: adhesion approved by the City Council on April 30, 2018
- Maiolati Spontini: adhesion approved by the City Council on April 17, 2018
- Mergo: adhesion approved by the City Council on May 30, 2018
- Montecarotto: adhesion approved by the City Council on May 10, 2018
- Monte Roberto: adhesion approved by the City Council on May 2, 2018
- Poggio San Marcello: adhesion approved by the City Council on July 13, 2018
- Rosora: adhesion approved by the City Council on July 12, 2018
- San Paolo di Jesi: adhesion approved by the City Council on July 31, 2018
- Serra San Quirico: adhesion approved by the City Council on May 30, 2018
- Staffolo: adhesion approved by the City Council on May 19, 2018

The Vision is that CIS municipalities strength their commitment to a policy aimed at protecting the environment and safeguarding the health and quality of the population's life. The local administrations strongly believe that environmental sustainability and economic growth can go together promoting investments and job creations. The strategy for climate change mitigation foresees a progressive reduction of CO₂ emissions with the goal of the 40% GHG-reduction target by 2030. The 2050's long term vision include new targets for the decarbonisation, improvements in the capacity to adapt to unavoidable climate change impacts, and strategies to guarantee secure, sustainable and affordable energy.

With a clear will to build a more sustainable, attractive, liveable, resilient and energy efficient territory, the CIS Municipalities have committed to the following:

- 20% reduction of CO₂ emissions between 2005 and 2020
- 41% reduction of CO₂ emissions between 2005 and 2030



(MITIGATION part)

Emission inventory approach

Baseline Emissions Inventory (BEI)

The baseline Emissions Inventory was elaborated for 2005 (baseline year) and for the calculation of the emissions, the activity-based approach has been adopted, while the reduction target was absolute reduction.

Final Energy Consumption & Corresponding CO₂ Emissions

The methodology adopted in order to calculate the Final Energy Consumption and the corresponding CO₂ emissions in the Municipalities of CIS was a bottom – up approach and the emission factors used are presented in the table below.

Table 1; CO₂ emission factors adopted [t/MWh]

Electricity		Heat/cold	Fossil fuels								Renewable energies				
National	Local		Natural gas	Liquid gas	Heating oil	Diesel	Gasoline	Lignite	Coal	Other fossil	Biofuel	Plant oil	Other biomass	Solar thermal	Geothermal
0,468	0,435		0,202	0,227	0,279	0,267	0,249	0,385	0,341		0,000	0,000	0,000	0,000	0,091

Taking into account the guidelines published by the Covenant of Mayors for Climate and Energy as well as the EC Joint Research Centre on how to develop a SEAP/SECAP, the Final Energy Consumption, the Energy Supply and the corresponding CO₂ emissions per activity sector, in the Municipality's territory are presented in the following tables.

Table 2: Final Energy Consumption per activity sector in Joint CIS

Sector	FINAL ENERGY CONSUMPTION [MWh]															Total	
	Electricity	Heat/cold	Fossil fuels							Renewable energies							
			Natural gas	Liquid gas	Heating oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Plant oil	Biofuel	Other biomass	Solar thermal	Geothermal		
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES																	
Municipal buildings, equipment/facilities	926	0	5083	15	0	0	0	0	0	0	0	0	0	0	0	0	6025
Tertiary (non-municipal) buildings, equipment/facilities	19207	0	21566	3826	0	1534	0	0	0	0	0	0	0	0	0	0	46132
Residential buildings	26787	0	86263	20867	0	8366	0	0	0	0	0	0	0	6079	0	0	148363
Public lighting	4272	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4272
Industry	81701	0	67415	0	0	0	0	0	0	0	0	0	0	0	0	0	149116
Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	132893	0	180327	24708	0	9800	0	0	0	0	0	0	0	6079	0	0	353908
TRANSPORT																	
Municipal fleet	0	0	0	0	0	2027	12	0	0	0	0	0	0	16	0	0	2055
Public transport	0	0	0	0	0	811	0	0	0	0	0	0	0	4	0	0	814
Private and commercial transport	0	0	0	17820	0	84797	69519	0	0	0	0	0	0	682	0	0	172798
Subtotal	0	0	0	17820	0	87635	69531	0	0	0	0	0	0	682	0	0	175667
OTHER																	
Agriculture, Forestry, Fisheries	11631	0	0	0	0	28171	0	0	0	0	0	0	0	0	0	0	39802
TOTAL	144524	0	180327	42528	0	125706	69531	0	0	0	0	0	0	682	6079	0	569376

Table 3: Local/distributed electricity production (Renewable energy only)

Local renewable electricity plants (ETS and large-scale plants > 20 MWe not recommended)	Renewable electricity produced [MWh]	Emission factor [t/MWh produced]	CO ₂ / CO ₂ eq. emissions [t]
Wind			0
Hydroelectric	10634	0,000	0
Photovoltaics			0
Geothermal			0
TOTAL	10634		0

Table 4: Local/distributed electricity production

Local electricity production plants (ETS and large-scale plants > 20 MW not recommended)	Electricity produced [MWh]		Energy carrier input [MWh]										CO ₂ / CO ₂ eq. emissions [t]			
	from renewable sources	from non-renewable sources	Fossil fuels							Waste	Plant oil	Other biomass	Other renewable	Other	Fossil sources	Renewable sources
			Natural gas	Liquid gas	Heating oil	Lignite	Coal									
Combined Heat and Power																
Other																
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 5: B4. Local heat/cold production

Local heat/cold production plants	Heat/cold produced [MWh]		Energy carrier input [MWh]										CO ₂ / CO ₂ eq. emissions [t]			
	from renewable sources	from non-renewable sources	Fossil fuels							Waste	Plant oil	Other biomass	Other renewable	Other	Fossil sources	Renewable sources
			Natural gas	Liquid gas	Heating oil	Lignite	Coal									
Combined Heat and Power																
District heating (heat-only)																
Other																
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 6: Baseline Emissions Inventory

Sector	CO ₂ emissions [t] / CO ₂ eq. emissions [t]															Total	
	Electricity	Heat/cold	Fossil fuels							Renewable energies							
			Natural gas	Liquid gas	Heating Oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Biofuel	Plant oil	Other biomass	Solar thermal	Geothermal		
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES																	
Municipal buildings, equipment/facilities	403	0	1027	3	0	0	0	0	0	0	0	0	0	0	0	0	1433
Tertiary (non-municipal) buildings, equipment/facilities	8348	0	4396	868	0	410	0	0	0	0	0	0	0	0	0	0	13982
Residential buildings	11643	0	17425	4737	0	2234	0	0	0	0	0	0	0	0	0	0	36038
Public lighting	1857	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1857
Industry	Non-ETS	35510	0	13618	0	0	0	0	0	0	0	0	0	0	0	0	49128
	ETS (not recommended)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	57760	0	36426	5609	0	2643	0	0	0	0	0	0	0	0	0	0	102438
TRANSPORT																	
Municipal fleet	0	0	0	0	0	541	3	0	0	0	0	0	0	0	0	0	544
Public transport	0	0	0	0	0	216	0	0	0	0	0	0	0	0	0	0	216
Private and commercial transport	0	0	0	4045	0	22641	17310	0	0	0	0	0	0	0	0	0	43996
Subtotal	0	0	0	4045	0	23398	17313	0	0	0	0	0	0	0	0	0	44757
OTHER																	
Agriculture, Forestry, Fisheries	5055	0	0	0	0	7522	0	0	0	0	0	0	0	0	0	0	12577
OTHER NON-ENERGY RELATED																	
Waste management																	0
Waste water management																	0
Other non-energy related																	0
TOTAL	62815	0	36426	9654	0	33563	17313	0	0	0	0	0	0	0	0	0	159771

The largest emissions are due to electricity, reflecting the high emission factor. They are followed by emissions from natural gas, mainly used for the tertiary, domestic and industrial sectors. The emissions from the diesel fuel, mainly used for transport, are slightly lower. Finally, consumptions of petrol and liquid gas are the lowest.

Key mitigation actions to put the overall strategy into actions

The Municipalities of CIS, through its active participation in the actions of H2020 Empowering Project and with the rigorous support of the SVIM S.r.l., was empowered to identify the energy challenges, set priorities and define actions and measures to be implemented in its territory, in order to accelerate turning its vision reality.

Table 7: Mitigation Action

Key Actions	Responsible body	Implementation timeframe		Estimates in 2030		
				Energy savings	Renewable energy production	CO ₂ reduction
		Start	End	MWh/a	MWh/a	t CO ₂ /a
MUNICIPAL BUILDINGS, EQUIPMENT/FACILITIES				631,54		170,84
<i>PUB 1 - Energy requalification of municipal buildings and schools</i>	Technical Office	2009	2020	303,00		61,21
<i>PUB 2 - Replacement of boilers on municipal buildings and schools</i>	Technical Office	2009	2020	142,82		28,85
<i>PUB 3 - Replacement of lighting systems in public buildings and schools</i>	Technical Office	2006	2030	159,39		69,33
<i>PUB 4 - Replacement of electrical equipment in public buildings</i>	Technical Office	2006	2030	26,33202		11,4544287
TERTIARY BUILDINGS, EQUIPMENT/FACILITIES				13280,30097		4696,582151
<i>TER 1 - Building thermal renovation</i>	Technical Office	2006	2030	2695,75		544,5415
<i>TER 2 - Replacing traditional boilers with new condensing boilers</i>	Technical Office	2006	2030	1940,94		392,06988
<i>TER 3 - Replacement of summer conditioners</i>	Technical Office	2006	2030	310,846088		135,2180483
<i>TER 4 - Replacement of low efficiency lamps in buildings</i>	Technical Office	2006	2030	6117,4295		2661,081833
<i>TER 5 - Reduce electricity consumption with more efficient office equipment</i>	Technical Office	2006	2030	1254,98538		545,9186403
<i>TER 6 - Reduce electricity consumption with stop of the stand by</i>	Technical Office	2006	2030	960,35		417,75225
<i>TER 7 - Information campaign on waste in the tertiary sector and on automatic electrical load management systems</i>	CIS S.r.l.	2020	2030	0		0
RESIDENTIAL BUILDINGS				40712,10775		9861,581515
<i>RES 1 - Energy performance certificate for buildings</i>	Technical Office	2016	2030	0		0
<i>RES 2 - Building envelope - roof renovation</i>	Technical Office	2006	2030	6478,006248		1308,557262
<i>RES 3 - Building envelope - restructuring of vertical walls (thermal insulation)</i>	Technical Office	2006	2030	8997,2309		1817,440642
<i>RES 4 - Building envelope - replacement of doors and windows</i>	Technical Office	2006	2030	11516,45555		2326,324022
<i>RES 5 - Replacing traditional boilers with new condensing boilers</i>	Technical Office	2006	2030	6478,006248		1308,557262
<i>RES 6 - Installation of solar thermal systems</i>	Technical Office	2006	2030	213,5		43,127
<i>RES 7 - Replacement of low-efficiency appliances</i>	Technical Office	2006	2030	4778,8008		2078,778348
<i>RES 8 - Replacement of low efficiency lamps in buildings</i>	Technical Office	2006	2030	2250,108		978,79698
<i>RES 9 - Energy awareness campaign in the home environment</i>	CIS S.r.l.	2020	2025	0		0
<i>RES 10 - "ITACA" protocol for assessing the energy and environmental sustainability of buildings</i>	CIS S.r.l.	2020	2030	0		0
PUBLIC LIGHTING				2656		1155,36
<i>IP 1 - Public lighting interventions - CIS</i>	CIS S.r.l.	2019	2020	2324		1010,94
<i>IP 2 - Public lighting interventions - Mergo</i>	Technical Office	2019	2020	332		144,42
INDUSTRY				50765,93023		17053,0539
<i>IND 1 - Savings achieved with white certificates</i>	CIS S.r.l.	2006	2030	34416,37735		9449,945644
<i>IND 2 - Savings achieved with the "Piano Impresa 4.0"</i>	CIS S.r.l.	2018	2020	6899,59732		1591,136169
<i>IND 3 - Installation of higher efficiency electric motors and inverters for their power factor correction</i>	CIS S.r.l.	2006	2016	1541,257554		670,447036
<i>IND 4 - Efficient lamps and control systems</i>	CIS S.r.l.	2006	2016	7908,698		3440,28363
<i>IND 5 - Refrigeration, boiler replacement, recovery of thermal waste, inverter on the compressors</i>	CIS S.r.l.	2006	2016			1901,241425
TRANSPORT						19752,06948
<i>TRA 1 - Switch to high-efficiency vehicles</i>	Technical Office	2006	2030			18589,23833
<i>TRA 2 - Incentive to purchase electric cars</i>	CIS S.r.l.	2020	2030			
<i>TRA 3 - Sustainable urban mobility plan - cycle paths</i>	CIS S.r.l.	2012	2016			1156,1472
<i>TRA 4 - Redevelopment of the municipal administration vehicle fleet</i>	Technical Office	2006	2020			6,683949789
<i>TRA 5 - Information campaigns on sustainable mobility</i>	CIS S.r.l.	2020	2030			
LOCAL ELECTRICITY PRODUCTION					18325,3844	7971,542214
<i>FER - E 1 - Energy production from private photovoltaic systems</i>	Technical Office	2006	2030		14106,8844	6136,494714
<i>FER - E 2 - Photovoltaic systems on public buildings</i>	Technical Office	2009	2015		318,5	138,5475
<i>FER - E 3 - Energy production from hydroelectric plants</i>	Technical Office	2015	2015		3900	1696,5
OTHERS				0		0
<i>ALT 1 - Recycling - Environment center "Il Quadrifoglio"</i>	CIS S.r.l.	2006	2020	0		0
<i>ALT 2 - ARCA project: agriculture for controlled environmental regeneration</i>	Loccioni - Fieni - Garbini	2018	2030	0		0
TOTAL				108045,8775	18325,3844	60661,03246

The key measures /actions per activity sector are summarized in the following tables.

MUNICIPAL BUILDINGS, EQUIPMENT/FACILITIES

Action/Measure	<i>PUB 3 - Replacement of lighting systems in public buildings and schools</i>		
Area	<i>Energy efficient lighting systems</i>		
Description	<i>The action aims to reduce the electrical consumption of the lighting of buildings and public infrastructures.</i>		
Priority	Medium	Start Year	2006
Status of implementation	<i>Ongoing</i>	Ending Year	2030
Main responsible for the measure	<i>Technical Office</i>		
Stakeholders Involved	-		
Estimated budget	-		
Funding source	-		
Expected results			
Estimated CO₂ reduction tCO₂/a	69,33		
Estimated Energy savings MWh/a	159,39		
Estimated Renewable energy production MWh/a	-		

TERTIARY BUILDINGS, EQUIPMENT/FACILITIES

Action/Measure	<i>TER 4 - Replacement of low efficiency lamps in buildings</i>		
Area	<i>Energy efficient lighting systems</i>		
Description	<i>The action aims to reduce the electrical consumption of the lighting of buildings and infrastructures.</i>		
Priority	Medium	Start Year	2006
Status of implementation	<i>Ongoing</i>	Ending Year	2030
Main responsible for the measure	<i>Technical Office</i>		
Stakeholders Involved	<i>Companies of the tertiary sector</i>		
Estimated budget	-		
Funding source	-		
Expected results			
Estimated CO₂ reduction tCO₂/a	2.661,08		
Estimated Energy savings MWh/a	6.117,43		
Estimated Renewable energy production MWh/a	-		

RESIDENTIAL BUILDINGS

Action/Measure	<i>RES 5 - Replacing traditional boilers with new condensing boilers</i>		
Area	<i>Energy efficiency in space heating and hot water</i>		
Description	<i>The goal of the action is to reduce the consumption of natural gas in residential homes by replacing old heating systems with new high-efficiency ones.</i>		
Priority	High	Start Year	2006
Status of implementation	Ongoing	Ending Year	2030
Main responsible for the measure	<i>Technical Office</i>		
Stakeholders Involved	<i>Citizens</i>		
Estimated budget	-		
Funding source	<i>National incentives (65% and 50% fiscal deduction)</i>		
Expected results			
Estimated CO₂ reduction tCO₂/a	1.308,56		
Estimated Energy savings MWh/a	6.478,01		
Estimated Renewable energy production MWh/a	-		

PUBLIC LIGHTING

Action/Measure	<i>IP 1 - Public lighting interventions</i>		
Area	<i>Energy efficiency</i>		
Description	<i>Progressive replacement of old traditional lamps with new LEDs in public lighting</i>		
Priority	High	Start Year	2019
Status of implementation	Ongoing	Ending Year	2020
Main responsible for the measure	<i>CIS S.r.l.</i>		
Stakeholders Involved	ESCo		
Estimated budget	-		
Funding source	-		
Expected results			
Estimated CO₂ reduction tCO₂/a	1.010,94		
Estimated Energy savings MWh/a	2.324,00		
Estimated Renewable energy production MWh/a	-		

INDUSTRY

Action/Measure	<i>IND 1 - Savings achieved with white certificates</i>		
Area	<i>Energy efficiency in industrial processes</i>		
Description	<i>Energy efficiency certificates (TEE) obtained for energy optimization of production processes</i>		
Priority	Medium	Start Year	2006
Status of implementation	Ongoing	Ending Year	2030
Main responsible for the measure	<i>CIS S.r.l.</i>		
Stakeholders Involved	<i>Companies of the secondary sector</i>		
Estimated budget	-		
Funding source	National incentives		
Expected results			
Estimated CO ₂ reduction tCO ₂ /a	9.449,95		
Estimated Energy savings MWh/a	34.416,38		
Estimated Renewable energy production MWh/a	-		

TRANSPORT

Action/Measure	<i>TRA 1 - Switch to high-efficiency vehicles</i>		
Area	<i>Cleaner/efficient vehicles</i>		
Description	<i>Replacing old vehicles with more efficient new ones</i>		
Priority	High	Start Year	2006
Status of implementation	Ongoing	Ending Year	2030
Main responsible for the measure	<i>Technical Office</i>		
Stakeholders Involved	<i>Citizens</i>		
Estimated budget	-		
Funding source	-		
Expected results			
Estimated CO ₂ reduction tCO ₂ /a	18.589,24		
Estimated Energy savings MWh/a	-		
Estimated Renewable energy production MWh/a	-		

LOCAL ELECTRICITY PRODUCTION

Action/Measure	<i>FER - E 1 - Energy production from private photovoltaic systems</i>		
Area	<i>Photovoltaics</i>		
Description	<i>Installation of new photovoltaic panels on buildings</i>		
Priority	Medium	Start Year	2006
Status of implementation	<i>Ongoing</i>	Ending Year	2030
Main responsible for the measure	<i>Technical Office</i>		
Stakeholders Involved	<i>Citizens</i>		
Estimated budget	-		
Funding source	-		
Expected results			
Estimated CO₂ reduction tCO₂/a	6.136,49		
Estimated Energy savings MWh/a	-		
Estimated Renewable energy production MWh/a	14.106,88		

OTHERS

Action/Measure	<i>ALT 2 - ARCA project: agriculture for controlled environmental regeneration</i>		
Area	<i>Agriculture and forestry related</i>		
Description	<i>The project aims to define and disseminate good bio-regenerative agricultural practices that aim first of all at improving soil fertility</i>		
Priority	Low	Start Year	2018
Status of implementation	<i>Ongoing</i>	Ending Year	2030
Main responsible for the measure	<i>Loccioni - Fileni - Garbini</i>		
Stakeholders Involved	<i>Companies of the primary sector</i>		
Estimated budget	-		
Funding source	-		
Expected results			
Estimated CO₂ reduction tCO₂/a	-		
Estimated Energy savings MWh/a	-		
Estimated Renewable energy production MWh/a	-		

Conclusions

This action plan represents a key document that must demonstrate how the territorial administrations intend to achieve the objectives described above by 2030. The actions concern

both the public and private sectors, with initiatives relating urban environment and infrastructure (public lighting, water networks, etc.), territorial planning, renewable energy sources and urban mobility policies.