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MID-TERM EVALUATION

OF THE EUROPEAN REGIONAL DEVELOPMENT FUND, THE COHESION FUND AND THE JUST TRANSITION FUND

2021 2027

POLICY OBJECTIVE 2

A GREENER AND LOW CARBON EUROPE

EUROPEAN COMMISSION

Directorate-General for Regional and Urban Policy
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Annex 6.5
Fiche Policy Objective 2
‘A Greener and low carbon Europe’

Directorate-General for Regional and Urban Policy

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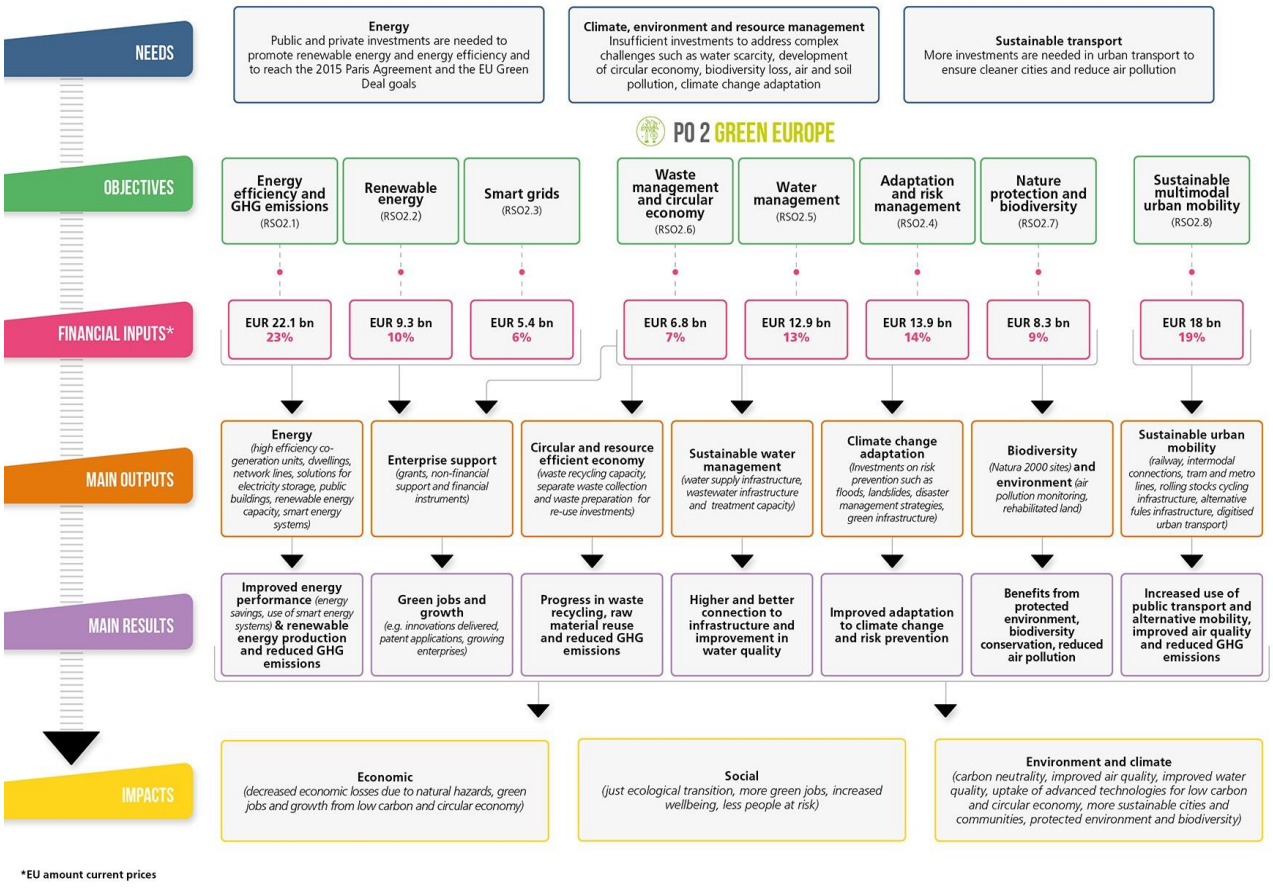
Policy objective 2: ‘A Greener and low carbon Europe’

This fiche describes the intervention logic of PO2 and summarises evaluation findings and lessons learnt. The intervention logic covers needs, objectives, financial planned resources, administrative and organisational aspects, planned actions, enabling conditions, outputs, results and impacts.

1. Part 1: Intervention logic

This infographic summarises the main components of the PO 2 intervention logic which is presented below.

Figure 1 - PO2 Intervention logic illustration



Source: Consortium elaboration

1.1. Needs

As frequently documented, environmental issues and climate changes pose worldwide challenges, with particular emphasis on mitigation and adaptation to climate change, natural resources management, pollution reduction and nature restoration. To address this global 'polycrisis' and ensure a smooth transition toward a more sustainable society huge investments in low carbon economy, as well as in clean technologies and biodiversity conservation are needed over the next decade.

This includes investment in reducing GHGs emissions by 55% by 2030, promoting renewable energy and energy efficiency as well as ecological transition in the most impacting industries, supporting EU regions to adapt to climate change and related risks, addressing biodiversity loss and the degradation of ecosystem services, improving access to water, water quality and wastewater treatment, boosting waste management and promoting a circular economy, through re-use and recycling, as well as reducing air pollution in urban areas and promoting green infrastructure and sustainable urban mobility, based on a multimodal approach, including public transport, cycling and walking.

However, needs vary and disparities in risks, costs and opportunities for the green transition are high between the 27 Member States as well as between developed, in transition and less developed regions. This is why Cohesion policy assumes a key role in supporting regions to design and implement environmental and climate territorial policies tailored to their needs.

1.2. Objectives

In 2018 the EU adopted the Green Deal, with the ambition to make Europe a greener and low carbon development area by 2030. The Green Deal contributes to 2015 Paris Agreement objectives and the UN 2030 Agenda. The Green Deal provides overarching objectives for cohesion policy intervention over the period 2021-2027.

PO2 is one of the five policy objectives established by Article 5 CPR. EU Regulation 1058/2021 identifies eight specific objectives under PO2, addressing the environmental and climate territorial needs, which can be supported by ERDF and CF:

- RSO 2.1 promoting energy efficiency and reducing GHG emissions.
- RSO 2.2 promoting renewable energy in accordance with Directive (EU) 2018/2001.
- RSO 2.3 developing smart energy systems, grids and storage outside the Trans-European Energy Network (TEN-E).
- RSO 2.4 promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system-based approaches.
- RSO 2.5 promoting access to water and sustainable water management.
- RSO 2.6 promoting the transition to a circular and resource efficient economy.
- RSO 2.7 enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.

- RSO 2.8 promoting sustainable multimodal urban mobility, as part of transition to a net zero carbon economy.

1.3. Programme inputs

1.3.1. Financial planned resources

The first part of this section provides an overview, with the ERDF and CF planned amount (total EU amount), its distribution across Member States, specific objectives and categories of regions defined by Article 108 CPR as less developed, transition, and more developed regions.

The second part assesses territorial distribution of the planned financial resources using intervention fields which primarily refer to the PO according to the Cohesion data platform correspondence table. This second part shows how much of the planned financial resources per capita EU funding is aligned with existing territorial environmental and climate needs.

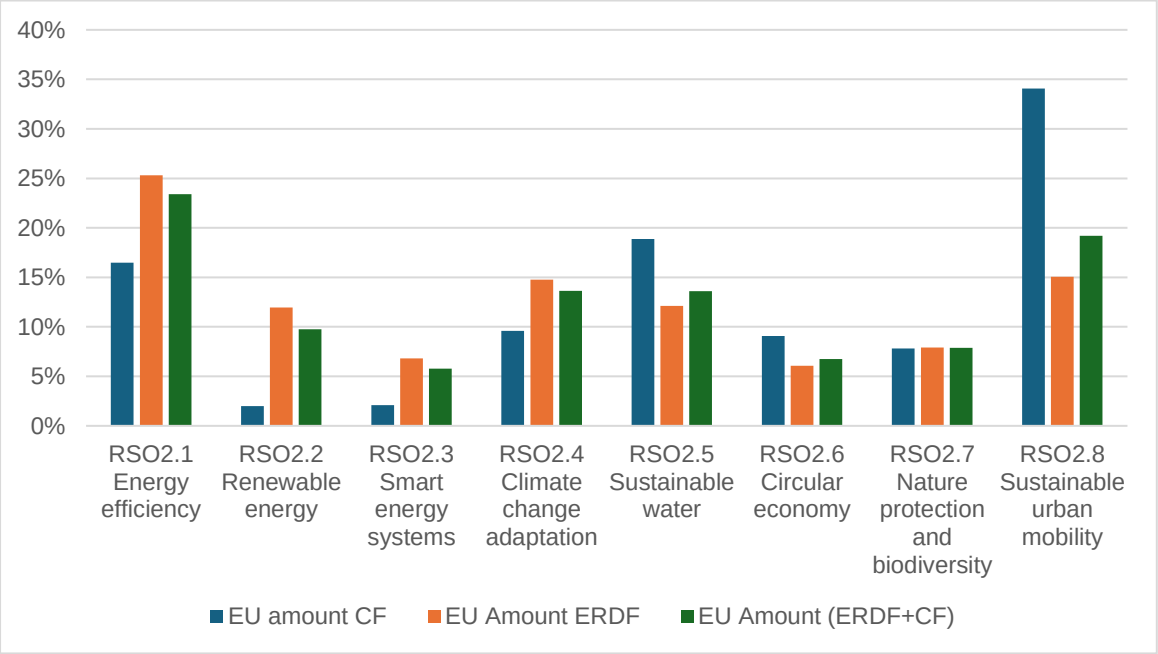
General Overview

The EU amount planned resources for PO2 Greener Europe is currently EUR 93.3 bn of ERDF and CF amount and EUR 3.4 bn under Interreg. The IJG resources are used by ERDF (EUR 73 bn.) and CF (EUR 20.4 bn), making this PO second by financial allocation of the five POs across all Member States. This is due to regulatory thematic concentration. At national level, there are diverse allocations for PO2. This ranges between 10% in Netherlands to up to 40% in Malta of all the cohesion policy fund allocations. For ERDF:

- More developed regions allocate approximately 35% of their funding under PO2, ranging from 0% in Lithuania to 51% in Slovakia.
- Transition regions allocate approximately 35% of funding under PO2, ranging from 19% in Bulgaria to 55% in Portugal.
- Less developed regions allocate approximately 35% of funding under PO2, ranging from 30% in Portugal to 44% in France.

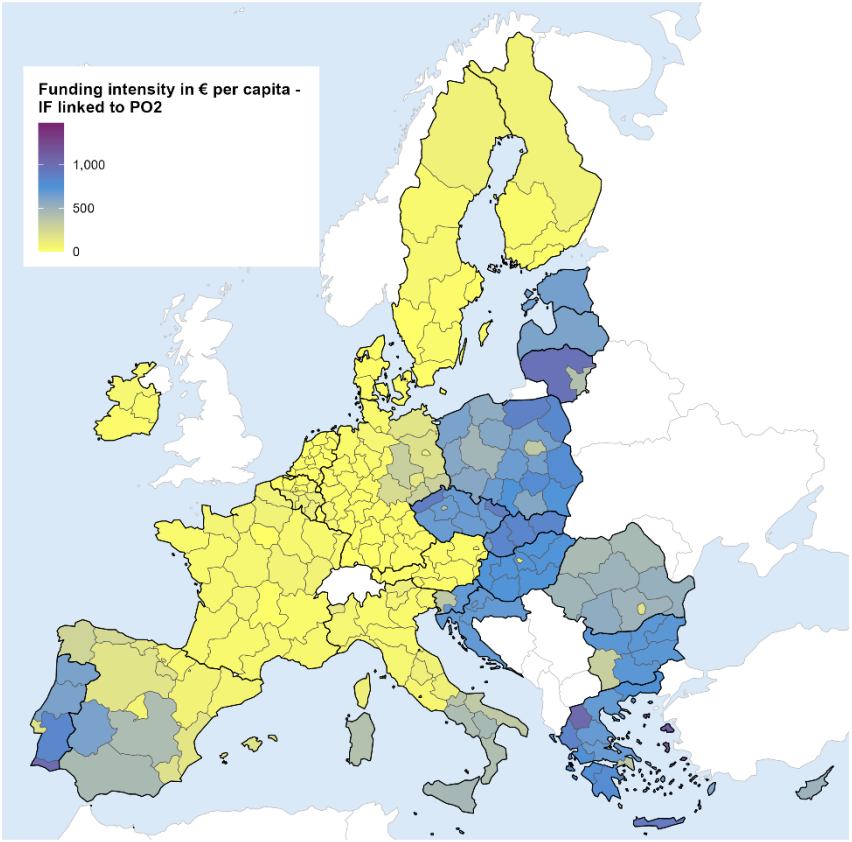
Analysis of the IJG programme resources breakdown per specific objective shows their relative importance. Most of the ERDF EU amount is concentrated in RSO 2.1 (energy efficiency) and RSO 2.8 (sustainable urban mobility), followed by RSO 2.4 (climate change adaptation). CF financed mostly RSO 2.1, RSO 2.5 (sustainable water). CF investments are limited in RSOs 2.2 and 2.3, while ERDF has a limited contribution to RSO 2.3 and RSO 2.6.

Figure 2 – Distribution of PO2 EU amount per RSO



Source: Consortium elaboration, based on February 2024 data

Figure 3 – Funding PO2 intensity at Nuts-2 level



Source: Consortium elaboration, based on February 2024 data

Territorial patterns of planned financial resources

Analysis of intervention fields associated with each RSO according to the indicative correspondence table in Cohesion Data platform enables estimates of population coverage and per capita funding. In addition to the EUR 93.3 bn under PO2, around EUR 12.8 bn of PO2 related intervention fields are implemented under other POs. In total EUR 106.1 bn is allocated for PO2 related fields of intervention.

For the funding intensity per capita for PO2, there are considerable differences across European regions. On average EUR 237 per capita are spent in PO2 related funding, diverging significantly by category of region:

- Less developed regions average of EUR 617 per capita for a total of EUR 75.9 bn
- Transition regions average of EUR 182 per capita for a total of EUR 20.6 bn
- More developed regions average of EUR 46 per capita for a total of EUR 9.7 bn

Beyond types of regions there is a clear divide in funding intensity between eastern and southern regions vis-à-vis central- and northern regions.

Intervention fields linked to RSO 2.1 (energy efficiency) total EUR 26.2 bn, around 28% of all funding for PO2 related intervention fields. The funding is implemented across most European regions which host 439 million people. In less developed regions the funding per capita amounts to EUR 143, in transitional regions EUR 53, while in more developed regions it is around EUR 14. Interventions fields linked to RSO2.1 cover 130.2 million people in rural areas (some 30% of the total population covered).

The EU funding allocated to intervention fields associated with RSO 2.2 (renewable energy) totals EUR 10,2 bn or around 10% of the overall PO2 related budget. RSO 2.2 covers regions with a combined number of 347 million inhabitants, who are vaguely equally split between more and less developed regions as well as transition regions. The funding per capita is EUR 60 for less developed regions, EUR 20 for transition regions and EUR 7 for more developed regions. In particular, the interventions fields linked to RSO2.2 cover 105.5 million people living in rural areas (approx. 30.4% of the total population covered).

Intervention fields associated with the specific objective RSO 2.3 (development of smart energy systems) make up a total of EUR 5.8 bn, which is a bit over 5% of the funding for PO2. The intervention fields cover regions with 347 million people. The funding per capita is highest in less developed regions at EUR 36. Funding for transition regions is EUR 11 per person and EUR 3 for more developed regions. In particular, interventions fields linked to RSO2.3 cover 100.8 million people in rural areas (approx. 29% of the population covered).

Intervention fields for RSO 2.4 (climate adaptation) have a budget of EUR 13.1 bn, 12% of the funding for PO2 related intervention fields. Around 391 million people live in regions that are covered by the specific objective. Funding per capita is around EUR 78 for less developed regions, EUR 24 for transition regions and EUR 6 for more developed regions. In particular, interventions fields linked to RSO2.4 cover 119 million people in rural areas (some 30% of the population covered).

Funding for the intervention fields associated with RSO 2.5 (water management) make up around 12% of the budget for PO2 related interventions. Around EUR 12.9 bn are planned to be spent on intervention fields related to the specific objective. The measures will be relevant to 267 million people, about 60% of all EU-citizens. A majority of these live in less developed regions, where funding per capita is EUR 87. In transition regions the funding per capita is EUR 20 and for more developed regions it is EUR 10. In particular, interventions fields linked to RSO 2.5 cover 83.4 million people in rural areas (some 31% of the population covered).

The intervention fields associated with RSO 2.6 (promotion of a circular economy) have a budget of EUR 8.2 bn, around 8% of available funding for PO2 related interventions. Over 401 million citizens can benefit from the funding. Per capita the funding for less developed regions is EUR 44, for transition regions EUR 18 and for more developed regions EUR 5. In particular, interventions fields linked to RSO 2.6 cover 121.6 million people in rural areas (about 30% of the population covered).

EU funding allocated to intervention fields associated with RSO 2.7 (biodiversity conservation and pollution control) totals EUR 11.2 bn or around 11% of all funding for PO2 related interventions. The goal for RSO 2.7 is phrased as ‘Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution’. Regions implementing funding have a combined population of 386 million. Per capita funding is the highest in less developed regions (EUR 65), followed by transition regions (EUR 20) and more developed regions (EUR 7). Interventions fields linked to RSO 2.7 cover 118.9 million people in rural areas (some 31% of the population covered).

The intervention fields associated with RSO 2.8 (Promoting sustainable multi-modal urban mobility, as part of transition to a net zero car-bon economy), have a budget of EUR 17.8 bn. This is 17% of all funds reserved for PO2 related interventions. The specific objective reaches large parts of the EU, home to about 376 million people. Less developed regions have funding of EUR 106 per capita, while transition regions have EUR 35 per capita and more developed region EUR 12. Interventions fields linked to RSO 2.8 cover 115.8 million people in rural areas (about 31% of the population covered). The transport investments help cities to make urban mobility smarter and more sustainable, tackling issues of congestion, air quality, safety and accessibility.

The analysis regarding territorial patterns of planned financial resources focuses on renewable energy production (RSO 2.2), climate change adaptation (RSO 2.4) and sustainable water (RSO 2.5). The main conclusions are:

- In general, regions with higher renewable energy demand tend to see low funding per capita, but with some specificities. Particularly Baltic, Croatian, as

well as some Portuguese, Italian and Nordic regions receive higher funding per capita and have more demand for renewable energy. Alternatively, regions with lower energy demand per capita have higher funding per capita ([1]), many regions of these are in eastern Eastern Europe.

- The relationship between funding intensity of RSO2.4 and vulnerability to natural hazards show that some regions with higher risk profiles also receive more funding per capita. Many are in Southern Italy, Greece, Spain and Portugal, as well as along eastern border regions in Poland, Bulgaria and Romania. On the other hand, there are regions with high risk profiles which receive comparatively less funding, such as in Northern Italy. However, overall, there is a largely positive relationship between higher risk profile and more funding per capita.
- This pattern of relatively robust targeting of RSO 2.5 funding at regions with more needs is also highlighted. Regions with more needs, such as a lower share of collected wastewater, receive more RSO 2.5 funding per capita. These regions are mostly in South-East Europe and some parts of Central Europe, as well as selected regions in Italy and Portugal.

1.3.2. Administrative and organisational aspects

Several Member States have selected fund co-implementation within multi-funds. This ensures vertical coordination across sectors and themes and contributes to synergies between funds and investments, notably between CF and ERDF. 20 programmes combine ERDF and CF funding defining synergy and complementarity between funds with the same objectives. Under RSO 2.3 on Smart energy systems, the Romanian Sustainable Development programme offers an interesting example. ERDF finances smart grids and smart networks, while CF finances the conversion, modernisation and expansion of gas transmission and distribution networks to add gas from renewables and low-carbon gases to the system.

As indicated below under output indicators, the use of financial instruments (see RCO03) shows that programmes had to organise especially to manage these by involving local financial agencies, ad hoc procurement, or involving EU institutions. This is relevant in the energy and circular economy sectors.

PO2 activities in some cases support public authorities and / or organisations to deliver public services. For instance, the Romanian Sustainable Development programme under PO2.7 supports the national agency for protection of biodiversity and the Ministry of Environment in several domains. Measures to improve air quality and polluted sites monitoring are foreseen exclusively for the Ministry of Environment. This

([1]) Funding is needed to boost renewable electricity consumption in regions where consumption is usually based on fossil fuel (e.g. for heating and cooling)

can help the organisations reinforce their institutional role by providing additional financial resources.

Under 2.4 (climate change adaptation), interventions of the French regional programme Île-de-France et bassin de la Seine have an interregional dimension, potentially covering the entire region of Seine Basin. The regional and interdepartmental Directorate of the Environment, Planning and Transport is identified as a privileged partner for the selection of operations, linked to its competence for implementation of the Seine Plan at national level.

Mitigating implementation and capacity-related risks

Some PO2 interventions have been designed based on lessons learnt on administrative capacity. For instance, the Bulgarian Competitiveness and Innovation in Enterprises programme foresees technical assistance to strengthen administrative capacity. This programme refers to training plans for successful project preparation, implementation, monitoring and reporting in line with 'Roadmap for Building Administrative Capacity 2021-2027'. The Romanian Sustainable Development programme mentions decentralised implementation and proximity to beneficiaries, with an ad hoc evaluation on the feasibility of monitoring 2021-2027 programme common and specific indicators. Capacity building measures are foreseen according to 2021-2027 Action Plan for Strengthening Administrative Capacity. Likewise, the Romanian Transport programme will reinforce and strengthen the administrative capacity of beneficiaries to increasing their implementation capacity.

The Czech Environmental and Energy programme has used recommendations from the evaluation activities, for example with air protection, the circular economy or environmental education and programme implementation rules. The Polish programme Śląskie takes into account conclusions from the 2014-2020 experience for investments in adaptation to climate change, in particular the modernisation and expansion of sustainable stormwater management systems, development of blue-green infrastructure in cities. The Romanian Central Region programme has introduced simplifications, reducing the number of required documents to speed up selection and support to applicants to make the submission process smoother and more efficient. The Italian Sardegna Programme emphasises in RSO 2.3 the importance of continuity to 2014-2020 for micro-grids and smart grids and supporting improved skills for local administration.

1.3.3. Enabling conditions

Several thematic enabling conditions cover PO2, all RSOs are involved except RSO 2.8. The thematic enabling conditions are illustrated in the table below.

Policy field and specific objective	Enabling condition
Energy and energy efficiency (RSO 2.1, 2.2, 2.3)	Strategic policy framework to support energy efficiency renovation of residential and non-residential buildings
	Integrated national and energy and climate plan to clarify governance of the energy sector, including promotion of renewable energy
Adaptation to climate change (RSO 2.4)	Design of a disaster risk management framework, at national or regional level.
Water management (RSO 2.5)	Updated planning for investments in water and wastewater sectors
Waste management (RSO 2.6)	Updated waste management plan
Biodiversity conservation (RSO 2.7)	A priority action framework for biodiversity conservation is in place

These enabling conditions represent the common ground to set up investments in the fields of PO2 support and are necessary to ensure the coherence, value added and relevance of EU investments.

Examples of the important changes and developments implemented in Member States to comply with the enabling conditions are the relatively new adopted strategic frameworks related to energy efficiency renovation of buildings. These include the policy framework to support energy efficiency renovation of residential and non-residential buildings in Ireland. Other examples are reform projects such as the '*Spending review on climate change policies and assessment of the economic impact of climate change-related risks* in Spain.

1.4. Planned activities under PO2

Planned actions are different across the eight specific objectives under PO2. Analysis of sub-themes and Annex I CPR intervention fields enables mapping of the types of planned actions under each RSO of PO2. The logic of intervention of PO2 shows many types of actions. However, for each RSO, only few actions concentrate more than 90% of the resource allocated.

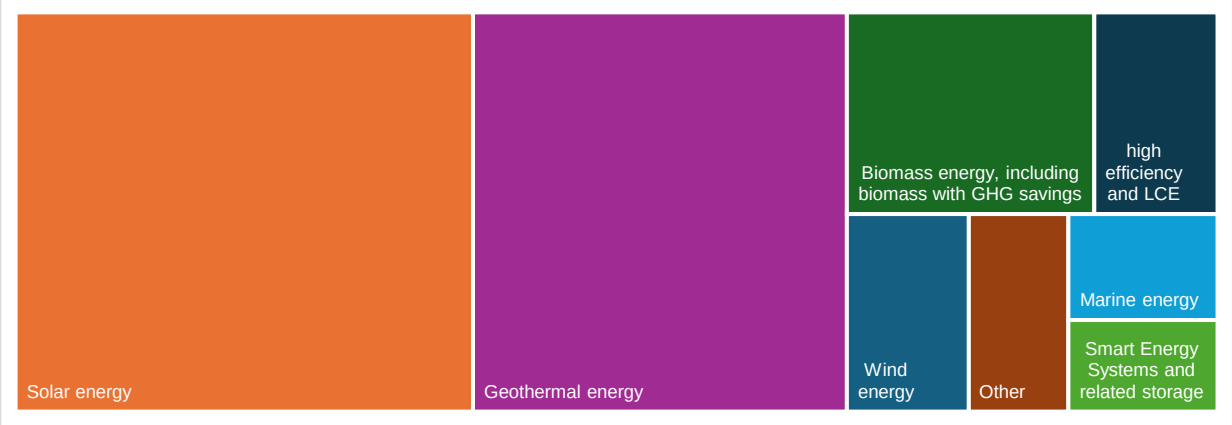
RSO 2.1 actions are mainly for energy efficiency in public infrastructure (38%), energy efficiency in housing (28%), energy efficiency in enterprises (17%), and high efficiency and low-carbon economy (10%). In this regard, the National Croatian programme 'Competitiveness and Cohesion' supports energy and comprehensive renovation programmes in the public sector to reduce energy consumption.

Figure 4 - RSO 2.1 'Energy efficiency' planned actions

Source: Consortium elaboration, based on February 2024 data

The main RSO 2.2 planned actions refer to solar energy (38%), other renewable energy, including geothermal energy (31%), biomass (10%), wind energy (5%), high energy efficiency and low-carbon economy including cogeneration and heating systems (5%), marine renewable energy (3%), and other investments. The National Croatian programme 'Competitiveness and Cohesion' also covers renewable energy production by supporting investments in ad hoc solutions for end users (citizens and institutions, investment in small renewable energy supply projects). Likewise, the French Programme in Ile-de-France covers structuring of the geothermal and green hydrogen sectors by supporting distribution and production facilities.

Figure 5 - RSO 2.2 'Renewable energy' planned actions



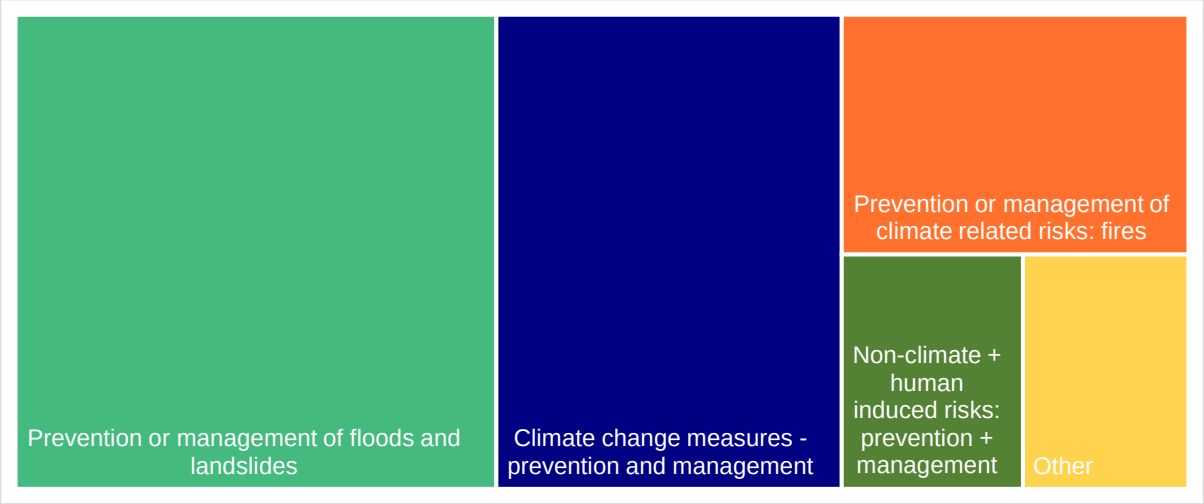
Source: Consortium elaboration, based on February 2024 data

RSO 2.3 planned actions refer mainly to smart energy systems and energy storage (72%) and the distribution and transport of natural gas substituting coal transport and distribution (18%). The Malta programme includes two potential interventions to develop a second electricity interconnector and investments in energy storage along with awareness-raising campaigns to enhance energy security, supply and storage, increase energy efficiency and reduce GHG emissions.

RSO 2.4 refers mainly to adaptation to climate change, with a split between interventions addressing floods, landslides, fires and other human risks. In this regard, the Romanian Sustainable Development Programme covers several types of risk such as floods, costal erosion, wildfires and other risks. It has two main types of action to

improve the management of the main risks identified at national level with the national risk response system.

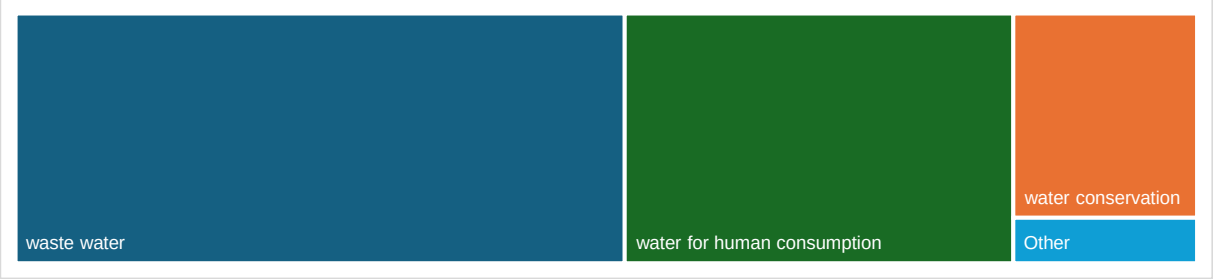
Figure 6 - RSO 2.4 'Climate change adaptation and risk prevention planned actions



Source: Consortium elaboration, based on February 2024 data

The main RSO 2.5 actions refer to wastewater management (51%), water for human consumption (32%) and water conservation (13%). The Romanian Sustainable Development Programme invests with both ERDF and CF in modernisation of the national network of monitoring water quality, new investments and capacity building for operators in continuation and completion of the 2014-2020 programming period.

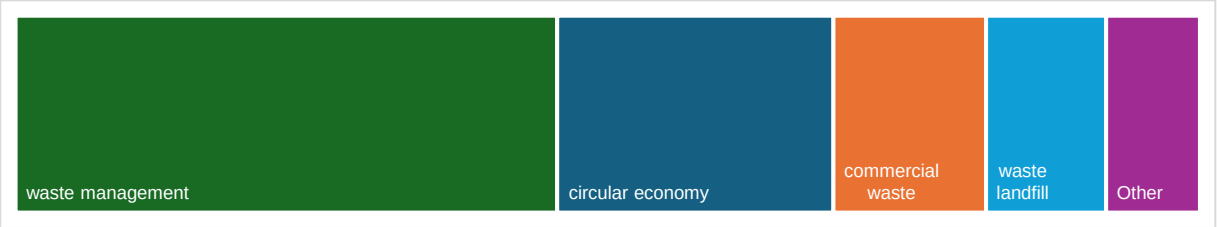
Figure 7 - RSO 2.5 'Sustainable water' planned actions



Source: Consortium elaboration, based on February 2024 data

The main actions under RSO 2.6 cover waste management and circular economy, followed by actions related to commercial waste and waste landfill. Several programmes cover RSO 2.6. For instance, the Italian programme of Sicily region supports integrated strategies of reducing waste production and enhancing reuse and composting, infrastructure and equipment, digital waste management and strengthening governance and implementation capacity.

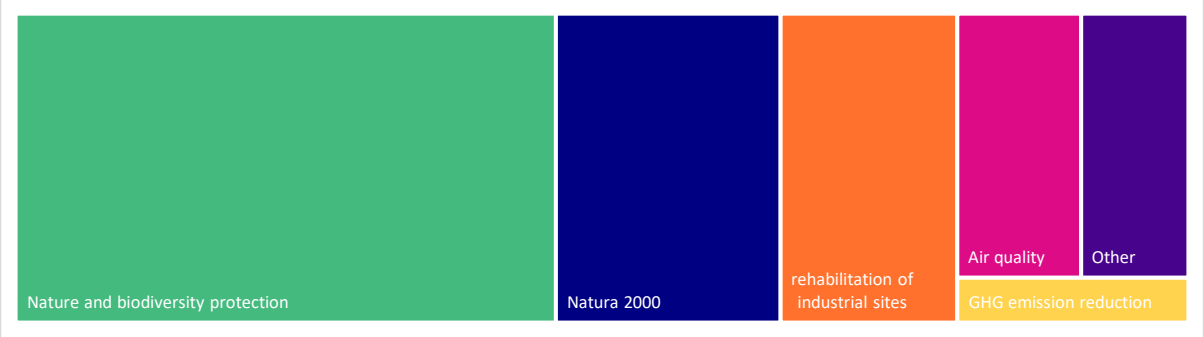
Figure 8 - RSO 2.6 'Circular and resource efficient economy' planned actions



Source: Consortium elaboration, based on February 2024 data

Analysis shows that RSO 2.7 actions refer to nature and biodiversity protection (46%), Natura 2000 sites (20%), rehabilitation of industrial sites (15%), Air quality (9%) and carbon sequestration in natural areas (3%). The Belgian programme of Wallonie supports the decontamination of wasteland with significant pollution. The Spanish pluri-regional programme supports conservation, protection and monitoring of terrestrial and marine biodiversity, conservation and green infrastructure.

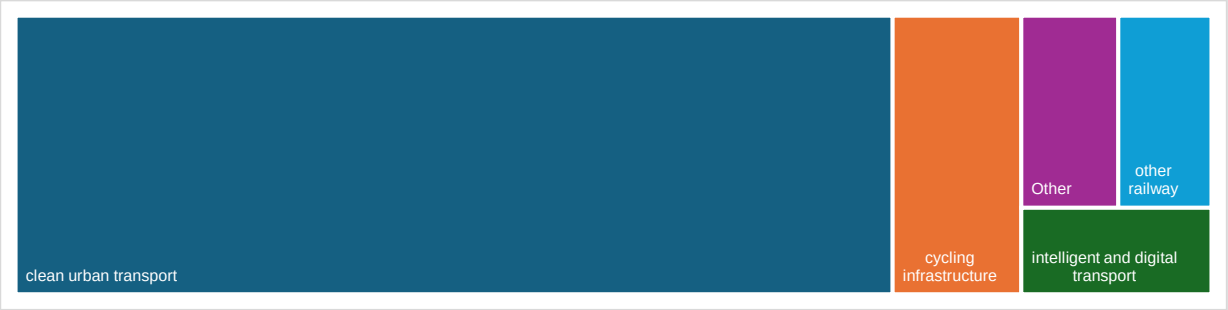
Figure 9 - RSO 2.7 'Biodiversity, green infrastructure and pollution' planned actions



Source: Consortium elaboration, based on February 2024 data

RSO 2.8 actions include clean urban transport (73%), cycling infrastructure (11%), railway (5%) as well as intelligent and digital transport (5%). About 2/3 of investments are in clean urban transport infrastructure and 1/3 in rolling stock. For most of the RSOs a chart shows the variety of the planned actions. The Portuguese thematic programme for climate action and sustainability invests in the expansion of high-capacity passenger transport networks in urban and suburban areas, increasing capacity of the metropolitan railway networks and new railway rolling stock. The Lithuanian Programme for European Union fund investments in 2021–2027 will support new bicycle infrastructure in 18 urban areas taking advantage of preparatory activities funded in the 2014-2020 programming period.

Figure 10 - RSO 2.8 'Sustainable urban mobility' planned actions



Source: Consortium elaboration, based on February 2024 data

BOX 1 - Investments in local mobility and transport, RSO2.8 and PO3

RSO2.8, within PO2, is also part of a wider strategy for transport at local and regional level also financed by PO3 investments. RSO2.8 supports light rail, metro and tramlines, walking and cycling friendly infrastructure, multimodal terminals/hubs, non-fossil fuel rolling-stock buses, and digital traffic management solutions. These investments are made on the basis of local strategies such as sustainable urban mobility plans. PO 3, and in particular RSO3.2, covers investments in climate resilient, intelligent and intermodal national, regional and local mobility. This RSO also promotes improvement in access for local and regional transport networks to TEN-T and cross-border mobility.

Complementary activities supported, as indicated by the Intervention fields selected by the programmes, are RSO3.2 supporting sustainable transport and RSO2.8 for sustainable urban mobility. While most of financial resources for RSO2.8 are planned under 'clean urban transport' (intervention fields 081, 082, 086), this represents only round 1% of investments in RSO3.2. Conversely, RSO3.2 investments are predominantly in road and railways infrastructure as illustrated in the PO3 fiche, while RSO2.8 only partially covers the category 'other railways' (not part of the TEN-T network).

1.5. Outputs

The complex logic of intervention is also reflected in the number of indicators.

The brief overview of the indicator framework relevant for the PO 2 outputs is based on a categorisation taking into account the main deliverables and realisations expected from each specific objective.

Enterprise support – All RSOs contribute to enterprise support but investments in energy efficiency (RSO 2.1) and the circular economy are the two most important for the business sector. Financial instruments for enterprise support are concentrated on the energy and circular economy sectors, while investments in nature protection and biodiversity (RSO 2.7) and sustainable urban mobility (RSO 2.8) essentially provide enterprises with advice.

Energy – Energy-related indicators refer to RSOs 2.1 (energy efficiency), 2.2 (renewable energy) and smart energy systems (RSO 2.3).

Climate change adaptation- RSO 2.4 has the most significant contribution to climate change adaptation with ad hoc common indicators on flood, green infrastructure, disaster management, strategies, areas protected and landslide protection.

Sustainable water - RSO 2.5 delivers public water supply infrastructure, as well infrastructure to collect wastewater and upgrade wastewater treatment capacity.

Circular and resource efficient economy – Circular economy indicators concern RSO 2.6 measuring additional capacity for waste recycling, investments in separate waste collection and waste prepared for re-use, in addition to enterprise indicators.

Biodiversity, green infrastructure and pollution – The common indicators used for RSO 2.7 are mainly related to climate change (disaster management, green infrastructure and strategies) and environment (Natura 2000, rehabilitated land, monitoring air pollution, green infrastructure).

Sustainable urban mobility – Indicators on sustainable mobility essentially refer to RSO 2.8. Indicators refer to new or modernised railway stations and stops, new or modernised intermodal connections, new or improved tram and metro lines, rolling stock for public transport, dedicated cycling infrastructure supported, alternative fuels infrastructure and digitised urban transport systems.

Territorial development – The PO2 contribution goes beyond output indicators associated with the ERDF regulation. All RSOs contribute to territorial development and the energy sector (RSOs 2.1, 2.2, 2.3), while RSO 2.6 and RSO 2.7 invest in CLLD.

The following table shows common output indicators across specific objectives and their targets for 2029 by RSO. This analysis focuses only on common output indicators. For RSOs 2.3, 2.4 and 2.6 common output indicators make up 70-80% of the common and programme-specific indicators, for RSOs 2.1, 2.2, 2.7 and 2.8 common output indicators make up 80-90% of the common and programme-specific indicators, in RSOs 2.3, 2.4 and 2.6, 70-80%, and for RSO 2.5 more than 90%.

Table 1 - Specific objectives and common output indicators

Indicator	RSO2.1 Energy efficiency	RSO2.2 Renewable energy	RSO2.3 Smart energy systems	RSO2.4 Climate change adaptation	RSO2.5 Sustainable water	RSO2.6 Circular economy	RSO2.7 Nature protection / biodiversity	RSO2.8 Sustainable urban mobility	Total
RCO01 Firms: All firms (enterprises)	24 729	3 594	2 207	339	56	24 088	550	65	55 628
RCO02 Firms: Grant aided (enterprises)	14 223	2 207	849	296	40	8 014		0	25 629
RCO03 Firms: Non grant aided (enterprises)	4 768	1 199	11			1 958		0	7 936
RCO04 Firms: Advised (enterprises)	7 336	658	1 347	43		15 323	550	65	25 322
RCO05 Firms: New Enterprises (enterprises)						56			56
RCO104 Energy: Number of high efficiency co-generation units (co-generation units)	430								430
RCO105 Energy: Solutions for electricity storage (number)			4 906						4 906
RCO106 Climate: Landslide protection (hectare)				2 440					2 440
RCO107 Circular: Investments in separate waste collection (value)						1 524 528 701			1 524 528 701
RCO119 Circular: Waste prepared for re-use (tonnes/year)						850 196			850 196
RCO121 Climate: Area covered by protection measures (other) (hectares)				11 127 938					11 127 938

Indicator	RSO2.1 Energy efficiency	RSO2.2 Renewable energy	RSO2.3 Smart energy systems	RSO2.4 Climate change adaptation	RSO2.5 Sustainable water	RSO2.6 Circular economy	RSO2.7 Nature protection / biodiversity	RSO2.8 Sustainable urban mobility	Total
RCO122 Investments in disaster management (non climate) (value)				404 140 390					404 140 390
RCO123 Energy: Dwellings with replacement gas-fired boilers (number)	220 000								220 000
RCO124 Energy: Gas transmission and distribution network lines (km)			2 482						2 482
RCO13 Digital: Value of digital services, products and processes (euro)						5 000 000			5 000 000
RCO14 Digital: Public institutions supported for Digital (public institutions)	1				2	1	1	4	9
RCO18 Energy: Dwellings with improved energy performance (dwellings)	693 842								693 842
RCO19 Energy: Public buildings with improved energy performance (square metres)	3 0157 211								301 511
RCO20 Energy: District heating and cooling network lines (km)	2 278								2 278
RCO22 Energy: Renewable energy capacity (MW)	106	9 331	54			4	9		9 504
RCO23 Energy: Digital management for smart energy systems (number)			38 263						38 263
RCO24 Climate: Investments in disaster management (value)				1 919 064 626			13 819 308		1 932 883 934

Indicator	RSO2.1 Energy efficiency	RSO2.2 Renewable energy	RSO2.3 Smart energy systems	RSO2.4 Climate change adaptation	RSO2.5 Sustainable water	RSO2.6 Circular economy	RSO2.7 Nature protection / biodiversity	RSO2.8 Sustainable urban mobility	Total
RCO25 Climate: Flood protection newly built or consolidated (km)				3 326					3326
RCO26 Climate: Green infrastructure adapted to climate change (hectares)				201 551			27 373		228 924
RCO27 Climate: Strategies addressing climate change adaptation (number)	2			745	25		4		776
RCO28 Climate: Area covered by protection against wildfires (hectares)				85 893 692					85 893 692
RCO30 Water: Length of pipes for public water supply (km)					36441.6				36 442
RCO31 Water: Length of pipes for collection of waste water (km)					15295.87				15 296
RCO32 Water: New or upgraded capacity for waste water treatment (population equivalent)					13174219.1				13 174 219
RCO34 Circular: Additional capacity for waste recycling (tonnes/year)						11 350 529			11 350 529
RCO36 Env: Green infrastructure (not related to climate change) (hectares)							228 664		228 664
RCO37 Env: Surface of Natura 2000 sites (hectares)							3 845 928		3 845 928
RCO38 Env: Surface area of rehabilitated land supported (hectares)							9 145		9 145

Indicator	RSO2.1 Energy efficiency	RSO2.2 Renewable energy	RSO2.3 Smart energy systems	RSO2.4 Climate change adaptation	RSO2.5 Sustainable water	RSO2.6 Circular economy	RSO2.7 Nature protection / biodiversity	RSO2.8 Sustainable urban mobility	Total
RCO39 Env: Area covered by systems for monitoring air pollution (air quality zones)							170 487		170 487
RCO53 Rail: New or modernised railway stations and stops (number)								178	178
RCO54 Multimodal: New or modernised intermodal connections (number)								465	465
RCO55 Urban Trans: Length of new tram and metro lines (km)								335	335
RCO56 Urban Trans: Length of tram and metro lines (km)								898	898
RCO57 Urban Trans: rolling stock for public transport (passengers)								622 332	622 332
RCO58 Urban Trans: Dedicated cycling infrastructure supported (km)								9 094	9 094
RCO59 Urban Trans: Alternative fuels infrastructure (number)		40					2	27 345	27 387
RCO60 Urban Trans: Digitised urban transport systems (cities) (cities and towns)								896	896
RCO65 Social Infra: Capacity of new or modernised social housing (persons)	4 666								4 666
RCO74 Population covered in integrated territorial development (persons)	57 703 438	37 146 654	429 766	40 434 889	9015310	39- 136 827	49 598 163	68569590	302 034 637

Indicator	RSO2.1 Energy efficiency	RSO2.2 Renewable energy	RSO2.3 Smart energy systems	RSO2.4 Climate change adaptation	RSO2.5 Sustainable water	RSO2.6 Circular economy	RSO2.7 Nature protection / biodiversity	RSO2.8 Sustainable urban mobility	Total
RCO75 Strategies for integrated territorial development (number)	359	100	13	213	82	141	264	425	1 597
RCO77 Number of cultural and tourism sites supported (cultural and tourism sites)				14			4		18
RCO80 Community-led local development strategies supported (contributions to strategies)	15	29	1			2	15		62
RCO97 Energy: Renewable energy communities supported (renewable energy communities)		1 016							1 016

Source: Consortium elaboration, based on February 2024 data

1.6. Results

The complex logic of intervention is also reflected in the number of indicators. An overview of the PO2 results is given below, taking into account the main types of outcome / change expected from each RSO. This analysis focuses on common result indicators. In RSOs 2.1, 2.2, 2.4, 2.8 common output indicators make up 80-90% of the total common and programme-specific indicators, in RSOs 2.3, 2.4, 2.6 and 2.7, and 70-80%, in RSO 2.5 more than 90% of the total.

Enterprise support and private investments – All RSOs mobilise private investments but for outputs the investments in energy efficiency (RSO 2.1) and circular economy are the two most important. It is interesting to see that for most innovations, growing enterprises and patents are again in the energy sector and the circular economy.

Job creation – Most of the job opportunities come from RSO 2.1 and RSO 2.6 where enterprise support is more important but also in the case of RSO 2.3 and RSO 2.4.

Energy – Energy-related indicators refer to RSOs 2.1 (energy efficiency), 2.2 (renewable energy) and smart energy systems (RSO 2.3). Moreover, total renewable energy produced (RCR31) or connected to the grid (RCR32) is also expected for circular economy interventions (RSO 2.6) and RSO 2.7.

Climate change - RSO 2.4 has the most significant contribution to climate change adaptation with ad hoc common indicators on population benefiting from flood protection, wildfire protection, natural disaster and risk management interventions.

Sustainable water - RSO 2.5 contributes to increasing the population with better connection to improved water supply and secondary wastewater treatment as well as to reducing losses in public water supply distribution.

Circular and resource efficient economy – Circular economy indicators cover RSO 2.6 and indicate that the most relevant results are recycled waste and waste used as raw materials.

Biodiversity, green infrastructure and pollution – The common indicators used for RSO 2.7 mainly relate to the environment (population benefiting from air pollution and rehabilitated land. population with access to green infrastructure, population protected against natural risks) but also to visitors.

Sustainable urban mobility – The indicators on sustainable mobility essentially refer to RSO 2.8. Results regard the increased users of public transport, tram and metro lines and cycling infrastructure.

The following table indicates common result indicators across specific objectives and their targets for 2029 by RSO. This analysis focuses on common result indicators.

Table 2 - Specific objectives and common result indicators

Indicator	RSO2.1 Energy efficiency	RSO2.2 Renewable energy	RSO2.3 Smart energy systems	RSO2.4 Climate change adaptation	RSO2.5 Sustainable water	RSO2.6 Circular economy	RSO2.7 Nature protection and biodiversity	RSO2.8 Sustainable urban mobility	otal
RCR01 Jobs created in supported entities (annual FTEs)	2 192		330	489		582	70	25	3 688
RCR02 Firms: Private investments (value)	2 643 340 224	189 767 605	574 745 173		51 410 000	953 582 668		-	4 412 845 670
RCR03 RTDI: SMEs introducing product or process innovation (number)	643	273	154			1134	533	7	2 744
RCR04 RTDI: SMEs introducing marketing/organisation innovation (number)		4	1			147			152
RCR05 RTDI: SMEs innovating in-house (number)		59	49			406			514
RCR06 RTDI: Patent applications submitted (applications)	95					122			217
RCR103 Circular: Waste collected separately (tonnes/year)						4 969 790			4 969 790
RCR105 Estimated GHG emissions by boilers converted to gas (tonnes of CO2eq/year)	18 522								18 522

Indicator	RSO2.1 Energy efficiency	RSO2.2 Renewable energy	RSO2.3 Smart energy systems	RSO2.4 Climate change adaptation	RSO2.5 Sustainable water	RSO2.6 Circular economy	RSO2.7 Nature protection and biodiversity	RSO2.8 Sustainable urban mobility	Total
RCR11 Digital: Users of new and upgraded public digital services (annual users)				1 412 659			340 000	98 215	1 850 874
RCR19 Firms: Enterprises with higher turnover (number)	264					1 161			1 425
RCR26 Energy: Annual primary energy consumption (MWh/year)	310 131 224								310 131 224
RCR29 Climate: Estimated GHG emissions (tonnes CO2/year)	271 417 882	83 465 243	266 208	1		393 327		9700867.37	365 243 529
RCR31 Energy: Total renewable energy produced (MWh/year)	81 038	11 305 646	2 095 000			20 800	9323.21		13 511 807
RCR32 Energy: Renewable energy capacity (MW)	26	3 523				14			3 563
RCR33 Energy: Users connected to smart energy systems (end users/year)			12 469 373						12 469 373
RCR34 Energy: Roll-out of projects for smart energy systems (number)			1 608						1 608
RCR35 Climate: Population benefiting from flood protection (persons)				37 461 403					37 461 403
RCR36 Climate: Pop. benefiting from wildfire protection (persons)				119 332 457					119 332 457

Indicator	RSO2.1 Energy efficiency	RSO2.2 Renewable energy	RSO2.3 Smart energy systems	RSO2.4 Climate change adaptation	RSO2.5 Sustainable water	RSO2.6 Circular economy	RSO2.7 Nature protection and biodiversity	RSO2.8 Sustainable urban mobility	Total
RCR37 Climate: Pop protected from natural disaster (climate) (persons)				107 642 864					107 642 864
RCR41 Water: Population with improved water supply (persons)					13 470 476				13 470 476
RCR42 Water: Pop. connected to secondary waste water treatment (persons)					7 252 745				7 252 745
RCR43 Water: Losses in public water supply distribution (m3/year)					202 193 569				20 219 357
RCR47 Circular: Waste recycled (tonnes/year)						7 200 382			7 200 382
RCR48 Circular: Waste used as raw materials (tonnes/year)						2 370 521			2 370 521
RCR50 Env: Population benefiting from measures for air quality (persons)	6 628 575						40 461 261	27 406 421	74 496 257
RCR52 Env: Rehabilitated land (hectares)							9 681		9 681
RCR62 Urban Trans: Annual users of public transport (users/year)								1 843 733 196	1 843 733 196
RCR63 Urban Trans: Annual users of tram and metro lines (users/year)								951 038 466	951 038 466

Indicator	RSO2.1 Energy efficiency	RSO2.2 Renewable energy	RSO2.3 Smart energy systems	RSO2.4 Climate change adaptation	RSO2.5 Sustainable water	RSO2.6 Circular economy	RSO2.7 Nature protection and biodiversity	RSO2.8 Sustainable urban mobility	Total
RCR64 Urban Trans: Annual users of cycling infrastructure (users/year)								147 028 233	147 028 233
RCR77 Visitors of cultural and tourism sites (visitors/year)				810 600			201 000		1 011 600
RCR95 Env: Pop. with access to green infrastructure (persons)				5 389 720			28 131 736		33 521 456
RCR96 Env: Pop protected against natural risks (non climate) (persons)				62 597 652			3 066 827		65 664 479

Source: Consortium elaboration, based on February 2024 data

1.7. Impacts

Given the early implementation stage at the time of writing, information gathered for this study only examines expected impact rather than actual achievements. Article 6, CPR indicates that policy objectives are expected to mobilise funding for environmental and climate objectives based on tracking using Annex I CPR intervention fields. Article 9, CPR indicates that investments must respect fundamental rights and comply with the Charter of Fundamental Rights of the European Union in implementation of the Funds, equality between men and women, gender mainstreaming, integration of a gender perspective and take appropriate steps to prevent discrimination. The policy objectives of the Funds are pursued in line with promoting sustainable development as set out in Article 11 TFEU, taking into account the SDGs, the Paris Agreement and DNSH. Therefore, this paragraph:

- Uses tracking of financial planned data to show to what extent PO2 and its related RSOs and planned actions are expected to contribute to climate change and environmental objectives, biodiversity, gender mainstreaming, clean air and the digital transition,
- Examines the contribution to SDGs.

Analysis of financial tracking - 3% of the PO2 EU resources contribute to the digital transition, 66% of the PO2 EU budget to climate change objectives, 57% to environmental objectives, 31% to clean air, 12% to biodiversity and 2.6% to gender.

The most relevant, from a financial perspective, planned actions contributing to climate change objectives are:

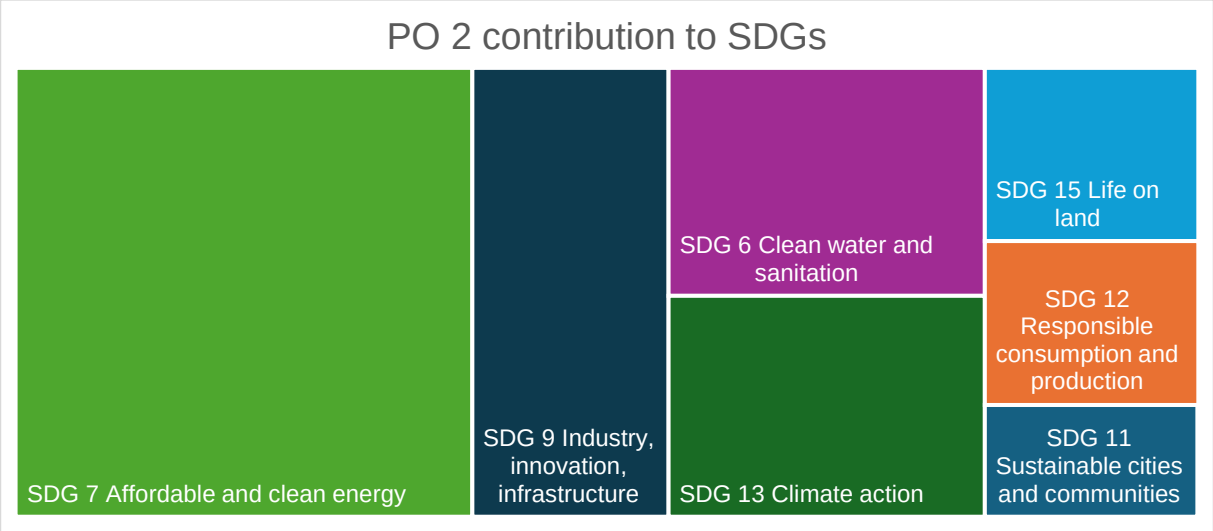
- RSO 2.1 energy efficiency actions,
- RSO 2.4 climate change adaptation actions,
- Clean urban transport actions within RSO 2.8.

For environmental objectives, the most financially relevant actions are from RSO 2.4 on climate change adaptation, waste water and water for human consumption under RSO 2.6 and clean urban transport under RSO 2.8 as well as energy efficiency measures under RSO 2.1. About 80% of PO2 investments in biodiversity come from RSO 2.4 and RSO 2.7, while the top contributors to clean air are RSO 2.1 energy efficiency actions and RSO 2.8 with cycling infrastructure and clean urban transport.

Contribution to SDGs - The expected impact of PO2 on SDGs is mainly on SDG 6 Clean water and sanitation, SDG 7 Affordable and clean energy, SDG 9 Industry, innovation, infrastructure, 11 Sustainable cities and communities, SDG 12 Responsible consumption and production, SDG 13 climate action, and SDG 15 Life on land. In several cases one RSO represents most of the PO2 contribution to an

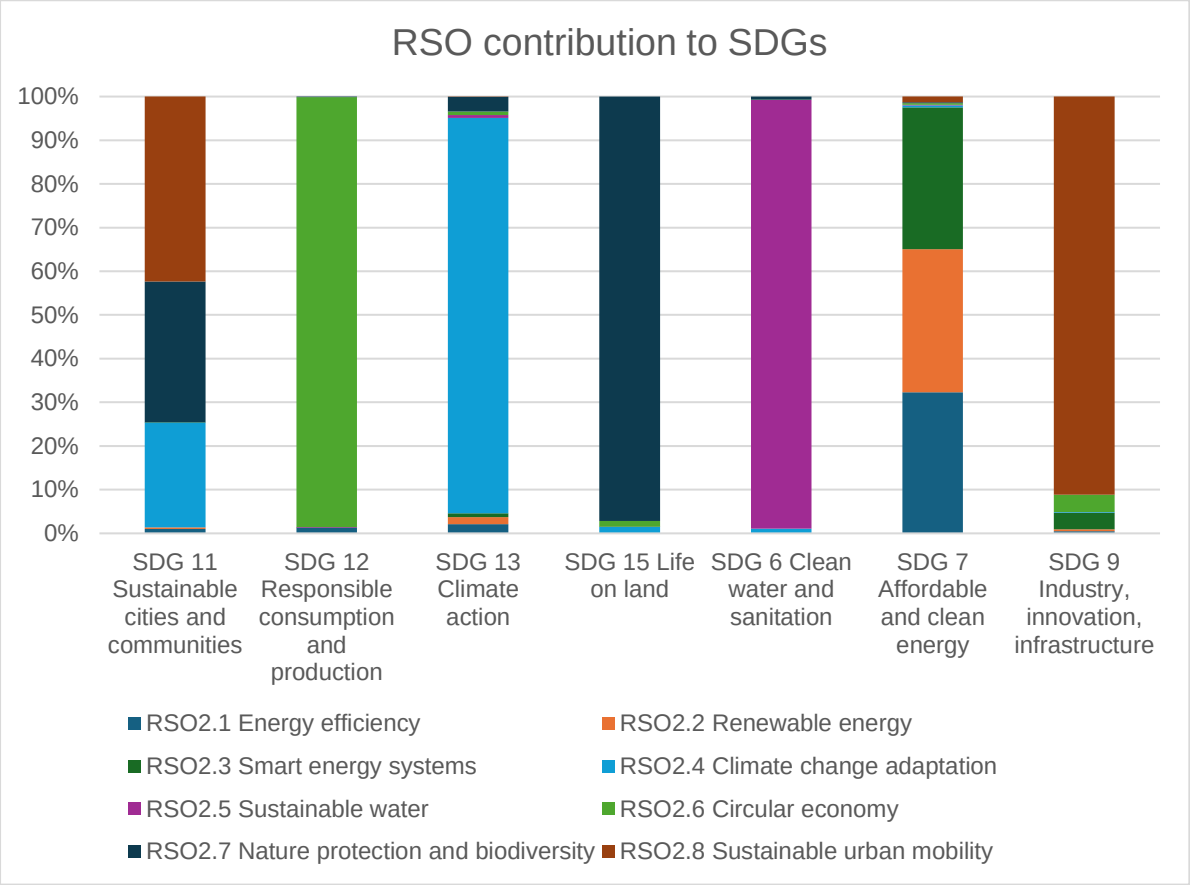
SDG. RSO 2.7 is the biggest contributor to SDG 15 Life on Land, RSO 2.4 to SDG 13 about climate action, RSO 2.5 to SDG 6 Clean water and sanitation, RSO 2.6 to SDG 12 about responsible consumption and production and RSO 2.8 on SDG 9 for industry, innovation and infrastructure. However, there are two other SDGs, to which several RSOs contribute. RSO 2.4, RSO 2.7 and RSO 2.8 all contribute to sustainable cities and communities, indicating the multi-faceted perspective of PO2 investments. Likewise, the three 'energy-related' RSOs (2.1, 2.2, 2.3) contribute to SDG 7 'Affordable and clean energy'.

Figure 11 - PO2 contribution to SDGs (based on the distribution of the EU planned amount)



Source: Consortium elaboration, based on February 2024 data

Figure 12 - RSO contribution to each SDG (based on the distribution of the EU planned amount)



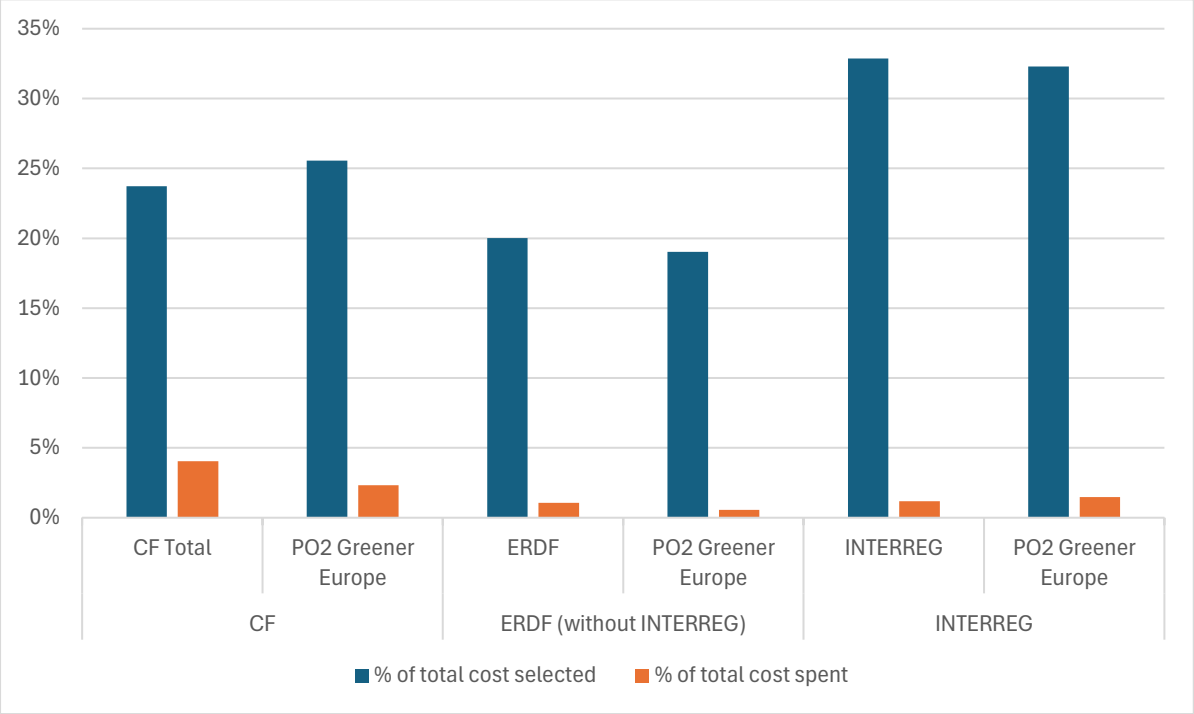
Source: Consortium elaboration, based on February 2024 data

2. Part 2: Key findings from implementation and lessons learnt

2.1. Current implementation progress

The figure below illustrates the financial progress of programmes in the first half of 2024. ([2]) PO2 decided resources for ERDF were EUR 13.88 billion and for Interreg, EUR 1.1 billion. The share of financial resources already spent is marginal for total fund allocation and for PO2. Under PO2, only EUR 417.5 million of ERDF (without Interreg) was spent at the end of June of 2024, 0.6% of the total.

Figure 13 - Decided and spent value by fund (PO2 and total), share of total allocation



Source: Consortium elaborations based on June 2024 data

Very limited progress is recorded for milestone achievements, mainly for indicators on rolling stock for public transport (RCO57), additional production capacity for renewable energy (RCO22) and enterprises receiving non-financial support (RCO04). Analysis of the decided amount and milestone ratio show variations between indicator groups.

([2]) 30 June 2024

Common indicators for enterprise support perform well. Their decided values are close to or surpass the milestone.

For energy efficiency (RSO 2.1), though the indicator for replacing gas-fired boilers (RCO123) does not show any implementation, its decided value surpasses the 2024 milestone. Others for public buildings and dwellings with improved energy performance (RCO18, RCO19) are advanced, at least in terms of decided operations.

In contrast to operations for additional renewable energy capacity (RCO22), investments in renewable energy (RSO 2.2) show very limited milestone achievement according to RCO97 (Renewable energy communities supported). Indicators (RCO23, RCO105, RCO124) which mainly relate to RSO 2.3, show no or very limited progress in decided and achieved values.

For climate change adaptation (mainly related to RSO 2.4), there is no progress in achieving the milestone for 2024 except for indicators RCO106 Climate: Landslide protection and indicator RCO27 Climate: Strategies addressing climate change adaptation. Nonetheless, analysis of decided operations indicates progress for several indicators related to climate.

For sustainable water (mainly used under RSO 2.5), while progress towards the milestones is very limited, the decided value is much more advanced for pipes collecting wastewater (RCO31) than public water supply and infrastructure for wastewater treatment.

For the circular economy, which mainly refers to RSO 2.6, implementation progress essentially refers to RCO107. Indicators on waste prepared for re-use and additional capacity for waste recycling are less advanced. This also reflects the type and complexity of investments the indicators refer to.

Indicators measuring environmental investment realisation and deliverables mainly refer to RSO 2.7 and show no progress towards achieving milestones. However, analysis of decided operations indicates that green infrastructure and interventions in polluted areas are progressing (indicators RCO36 and RCO38), while interventions for Natura 2000 sites and systems for monitoring air pollution are lagging behind as indicated by RCO37 and RCO39.

For urban transport (RSO 2.8), decided operations show progress towards (or even surpassing) milestones for digitised transport, intermodal connections, metro and tram lines, cycling infrastructure and rolling stock. However, there is limited progress for alternative fuel infrastructure, and no progress for railway stations and stops.

Indicators RCO74 and RCO75 on integrated territorial development strategies and initiatives show some progress in terms of decided operations, these strategies are usually promoted and designed in the initial phase of programme implementation.

Overall, target achievement at this point of the programming period can only be assessed using the decided amount. This shows very limited progress on indicators such as reduced annual primary energy consumption, GHG emissions, water losses on public water supply distribution and users of new or upgraded public digital services.

Table 3 - Implementation of common output indicators

Indicators	Measurement unit	Target for 2029 (A)	Milestone 2024 (B)	Decided value (C)	Implemented value (D)	Progress (C/B)	Progress (D/B)
RCO01 Firms: All firms	enterprises	58 234	6 423	14 939	1 097	232.6%	17.1%
RCO02 Firms: Grant aided	enterprises	27 107	3 475	4 148	310	119.4%	8.9%
RCO03 Firms: Non grant aided	enterprises	7 936	1 012	3 163	103	312.5%	10.2%
RCO04 Firms: Advised	enterprises	26 666	2 334	8 654	650	370.8%	27.8%
RCO05 Firms: New Enterprises	enterprises	56	17	56	0	329.4%	0.0%
RCO104 Energy: Number of high efficiency co-generation units	co-generation units	430	13	0	0	0.0%	0.0%
RCO105 Energy: Solutions for electricity storage	MWh	4 906	53	8	1	14.9%	1.8%
RCO106 Climate: Landslide protection	hectares	2 271	211	23	7	11.1%	3.3%
RCO107 Circular: Investments in separate waste collection	euro	1 527 028 701	112 630 586	120 767 111	13 020 936	107.2%	11.6%
RCO119 Circular: Waste prepared for re-use	tonnes/year	450 196	76 844	25	0	0.0%	0.0%
RCO121 Climate: Area covered by protection measures (other)	enterprises	11 196 665	1 133 096	11 368	0	1.0%	0.0%
RCO122 Investments in disaster management (non climate)	euro	385 716 320	29 900 548	40 759 249	0	136.3%	0.0%
RCO123 Energy: Dwellings with replacement gas-fired boilers	dwellings	220 000	550.00	6 700	0	1218.2%	0.0%
RCO124 Energy: Gas transmission and distribution network lines	km	2 499	252	17	0	6.6%	0.0%
RCO13 Digital: Value of digital services, products and processes	euro	5 000 000	1 000 000	0	0	0.0%	0.0%
RCO14 Digital: Public institutions supported for Digital	public institutions	9	1	1	0	100.0%	0.0%
RCO18 Energy: Dwellings with improved energy performance	dwellings	686 746	61 955	159 437	1 008	257.3%	1.6%
RCO19 Energy: Public buildings with improved energy performance	square metres	30 386 181	2 485 883	4 380 249	4 510	176.2%	0.2%
RCO20 Energy: District heating and cooling network lines	km	2 253	111	27	0	24.7%	0.0%

Indicators	Measurement unit	Target for 2029 (A)	Milestone 2024 (B)	Decided value (C)	Implemented value (D)	Progress (C/B)	Progress (D/B)
RCO22 Energy: Renewable energy capacity	MW	9 432	662	1 925	232	290.9%	35.1%
RCO23 Energy: Digital management for smart energy systems	System components	38 252	3 228	32	2	1.0%	0.1%
RCO24 Climate: Investments in disaster management	euro	2 053 956 522	247 010 973	141 540 578	209 426	57.3%	0.1%
RCO25 Climate: Flood protection newly built or consolidated	km	3 693	241	223	1	92.7%	0.5%
RCO26 Climate: Green infrastructure adapted to climate change	hectares	231 823	5 446	6 978	10	128.1%	0.2%
RCO27 Climate: Strategies addressing climate change adaptation	strategies	777	130	242	9	186.2%	6.9%
RCO28 Climate: Area covered by protection against wildfires	hectares	84 144 121	4 147 863	8 760 573	0	211.2%	0.0%
RCO30 Water: Length of pipes for public water supply	km	32 100	2 058	978	0	47.5%	0.0%
RCO31 Water: Length of pipes for collection of waste water	km	12 028	508	1 469	14	289.1%	2.7%
RCO32 Water: New or upgraded capacity for waste water treatment	population equivalent	12 507 028	950 535	474 335	0	49.9%	0.0%
RCO34 Circular: Additional capacity for waste recycling	tonnes/year	11 254 515	1203 680	114 064	965	9.5%	0.1%
RCO36 Env: Green infrastructure (not related to climate change)	hectares	233 690	36 936	8 726	44	23.6%	0.1%
RCO37 Env: Surface of Natura 2000 sites	hectares	4 042 944	314 909	1 928	138	0.6%	0.0%
RCO38 Env: Surface area of rehabilitated land supported	hectares	9 205	444	39	0	8.7%	0.0%
RCO39 Env: Area covered by systems for monitoring air pollution	air quality zones	170 489	85 009	4	0	0.0%	0.0%
RCO53 Rail: New or modernised railway stations and stops	stations and stops	178	26	0	0	0.0%	0.0%
RCO54 Multimodal: New or modernised intermodal connections	intermodal connections	464	59	147	0	249.2%	0.0%
RCO55 Urban Trans: Length of new tram and metro lines	km	360	15	26	0	171.7%	0.0%
RCO56 Urban Trans: Length of tram and metro lines	km	895	26	8	1	29.5%	2.3%

Indicators	Measurement unit	Target for 2029 (A)	Milestone 2024 (B)	Decided value (C)	Implemented value (D)	Progress (C/B)	Progress (D/B)
RCO57 Urban Trans: rolling stock for public transport	passengers	625 328	81 857	64 735	14 164	79.1%	17.3%
RCO58 Urban Trans: Dedicated cycling infrastructure supported	km	9 090	767	370	19	48.24%	2.5%
RCO59 Urban Trans : Alternative fuels infrastructure	refuelling/recharging points	27 433	1 804	200	0	11.09%	0.00%
RCO60 Urban Trans: Digitised urban transport systems (cities)	cities and towns	837	111	131	0	118.02%	0.00%
RCO65 Social Infra: Capacity of new or modernised social housing	persons	4 666	175	0	0	0.00%	0.00%
RCO74 Population covered in integrated territorial development	persons	297 816 186	26 631 635	22 814 212	3 431 005	85.7%	12.9%
RCO75 Strategies for integrated territorial development	contributions to strategies	1 597	340	98	4	28.8%	1.2%
RCO77 Number of cultural and tourism sites supported	cultural and tourism sites	18	2	0	0	0.0%	0.0%
RCO80 Community-led local development strategies supported	contributions to strategies	62	16	0	0	0.0%	0.0%
RCO97 Energy: Renewable energy communities supported	renewable energy communities	1 012	103	57	1	55.34%	0.97%

Source: Consortium elaborations based on June 2024 data

Table 4 - Implementation of common result indicators

Indicators	Measurement unit	Target for 2029	Decided value / target
RCR01 Jobs created in supported entities	annual FTEs	3 709	46.6%
RCR02 Firms: Private investments	euro	4 420 598 647	26.5%
RCR03 RTDI: SMEs introducing product or process innovation	enterprises	3 101	42.4%
RCR04 RTDI: SMEs introducing marketing/organisation innovation	enterprises	152	8.6%
RCR05 RTDI: SMEs innovating in-house	enterprises	514	3.9%

RCR06 RTDI: Patent applications submitted	patent applications	236	24.6%
RCR103 Circular: Waste collected separately	tonnes/year	7 131 989	4.6%
RCR11 Digital: Users of new and upgraded public digital services	annual users	1 850 874	0.0%
RCR19 Firms: Enterprises with higher turnover	enterprises	1 425	5.6%
RCR26 Energy: Annual primary energy consumption	MWh/year	340 905 815	3.3%
RCR29 Climate: Estimated GHG emissions	tonnes CO2 eq./year	436 259 501	0.6%
RCR31 Energy: Total renewable energy produced	MWh/year	14 244 755	13.9%
RCR32 Energy: Renewable energy capacity	MW	3 563	8.5%
RCR33 Energy: Users connected to smart energy systems	end users/year	12 777 642	0.7%
RCR34 Energy: Roll-out of projects for smart energy systems	projects	1 615	1.1%
RCR35 Climate: Population benefiting from flood protection	persons	42 711 020	17.7%
RCR36 Climate: Pop. benefiting from wildfire protection	persons	134 729 237	8.7%
RCR37 Climate: Pop protected from natural disaster (climate)	persons	119 696 950	13.4%
RCR41 Water: Population with improved water supply	persons	15 421 445	6.1%
RCR42 Water: Pop. connected to secondary waste water treatment	persons	7 866 469	7.0%
RCR43 Water: Losses in public water supply distribution	cubic metres per year	202 090 371	0.3%
RCR47 Circular: Waste recycled	tonnes/year	9 983 525	3.1%
RCR48 Circular: Waste used as raw materials	tonnes/year	3 393 444	4.1%
RCR50 Env: Population benefiting from measures for air quality	persons	73 716 706	4.2%
RCR52 Env: Rehabilitated land	hectares	9 878	0.1%
RCR62 Urban Trans: Annual users of public transport	users/year	2 739 899 631	9.5%
RCR63 Urban Trans: Annual users of tram and metro lines	users/year	1 315 542 701	2.1%
RCR64 Urban Trans: Annual users of cycling infrastructure	users/year	145 935 497	7.9%
RCR77 Visitors of cultural and tourism sites	visitors/ year	1 011 600	0.0%
RCR95 Env: Pop. with access to green infrastructure	persons	39 430 074	4.8%
RCR96 Env: Pop protected against natural risks (non climate)	persons	68 233 323	7.3%
RCR105 Estimated GHG emissions by boilers converted to gas	tonnes of CO2eq/year	2 414 085	1.2%

Source: Consortium elaboration, based on February 2024 data

2.2. Emerging challenges and EU citizen needs

This fiche examines how sample programmes cover emerging challenges and basic needs of EU citizens and consider partnership and multi-level governance during implementation.

Few programmes have addressed demographic challenges such population growth and depopulation. The Berlin programme invests in RSO 2.8 to promote sustainable mobility as a solution to Berlin population growth and ensure lower GHG emissions. The Romanian Southeast region programme mentions the sharp decrease of urban population caused by migration to rural and peri-urban areas, mainly due to severe environmental problems. The programme through RSO 2.7 intends to increase and improve green infrastructure and areas available to the local population. The Malta programme refers to managing population fluctuations from both perspectives to ensure sustainable waste management and contribute to halting the loss of biodiversity and degradation of ecosystem services. In addition to demographic challenges, programmes cover other emerging challenges related to PO2 such as the biodiversity crisis and energy transition,

PO2 investments address EU citizen needs, as classified by the EU Regional Social Progress Index in three categories: basic needs, wellbeing and opportunity. The Polish Infrastructure, Climate, Environment programme addresses these needs with several specific objectives. Energy efficiency investments (RSO 2.1) contribute to basic needs (shelter burden), environmental quality and personal freedom and choice. RSOs 2.5 and 2.6 to water and sanitation and environmental quality.

Interviews with stakeholders show that, despite challenges, programmes are still very relevant to addressing regional disparities and fostering economic development. They address many emerging challenges, such as environmental sustainability and regional transformation and continue to be highly relevant to addressing current needs within territories.

The survey of managing authorities indicates that most address regional disparities for access to public services (education, health, transport and digital services and infrastructure) by concentrating on areas with specific territorial needs. They use specific selection criteria, rather than territorial instruments and directly involve local partners, even though almost 1/5 of the managing authorities do not apply a territorial perspective to PO2.

2.3. Coherence with other funds and alignment with the European Semester process

There are common trends across Member States and funds. Among the specific objectives of PO2, CAP, LIFE and, partially, EMFAF funds are consistently cited by the programmes. The majority of programme design clear criteria of demarcation

between ERDF and CAP interventions, as the. two funds need to prevent double funding as they both finance interventions in rural areas. The same pattern can be found in the interaction with EMFAF, where programmes financed by ERDF often delineate which actions should be supported by EMFAF regarding the blue economy. HE and LIFE Programme often acknowledge phased synergies with ERDF. This can be partially attributed to the inclusion of the 'Seal of Excellence'.

The analysis of partnership agreements shows that RRF and EMFAF plan to support interventions in combination with ERDF for the green transition. For example, the Ireland partnership agreement mentions that EMFAF will support increased energy efficiency and the use of renewables across the seafood sector, in synergy with ERDF. Moreover, the partnership agreement mentions that the fund will support modernisation of the business environment and employment opportunities particularly in renewable energy and low-carbon sectors by expanding support for enterprise development.

Regarding PO2, TSI, CAP, HE, InvestEU and LIFE have the greatest interplay with ERDF, CF and JTF. Interactions are mainly in policy areas related to sustainable mobility and mitigation measures for climate change, particularly for environmental protection, the circular economy and transition to a low-carbon economy.

RRPs plan interventions to support the green transition and climate change adaptation, including sustainable multimodal urban mobility. The plans identify an array of recipients for financial resources, many of whom will also benefit from the Cohesion Policy fund framework. Moreover, since the forms of support identified by the RRP mirror those of cohesion policy funds, there can be a significant policy overlay. Such interactions are addressed for ERDF interventions, but less for CF.

At EU level, programme analysis shows PO2 is the second PO where CSRs and Country Reports are most cited. Some programmes detail the alignment between the European Semester documents and programme interventions in the description of the type of actions at RSO level. The Croatian programme ‘Competitiveness and cohesion’ mentions either the 2019 or 2020 Council recommendations in the description of the type of actions planned for each specific objective.

Partnership agreement analysis highlights that all Member States were recommended to invest in policy areas connected to PO2. While 2019 Country Report Annex D and 2019-2020 CSRs are widely cited by the partnership agreements analysed, coherence between these documents and policy decisions for PO2 is not always detailed. For example, some documents make general reference to the European Semester documents, while others, such as the Bulgarian partnership agreement, detail recommendations they intend to address with ERDF investments in PO2.

Analysis of Annex D of the 2019 Country Report underlines that programmes cover 93% of these investment needs, frequently with a lower priority (38%), but also many with the same or greater prioritisation (33% and 22% respectively). The least covered investment needs refer to RSO 2.6 and regard mainly the circular economy

and commercial waste, while there is more alignment on waste management interventions.

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