Framework Contract: Implementation of an integrated evaluation approach within the framework of a robust North-West Europe evaluation system (Reference 16B007)

TASK 3: Final Impact Evaluation

FINAL REPORT 2023

30 November 2023

This report was prepared for the
Interreg North-West EUROPE MANAGING AUTHORITY
c/o GEIE GECOTTI-PE – Interreg NWE
45/D, rue de Tournai
1° étage
59000 Lille
France

by
Spatial Foresight GmbH
7, rue de Luxembourg
L-7330 Heisdorf
LUXEMBOURG
www.spatialforesight.eu

in collaboration with
t33, Italy,
a contribution by EureConsult
and editing by
Tim Wills

NWE Final Impact Evaluation
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CoA	Contribution Analysis
CLT	Community Land Trust
CP	Cooperation Programme
cVPP	community-based Virtual Power Plant
DG REGIO	Directorate-General for Regional Policy and Urban Policy
DHC	District Heat and Cooling
eMH	e-Mental-Health
eMS	Electronic Monitoring System
ERDF	European Regional Development Fund
ESIF	European Structural and Investment Funds
EU	European Union
EU2020	Europe 2020 Strategy
GHG	Greenhouse Gas
IPM	Intellectual Property Management
JS	Joint Secretariat
NUTS	Nomenclature des unités territoriales statistiques
NWE	North-West Europe
SO	Specific Objective
TRL	Technology Readiness Level
VR	Virtual Reality

EXECUTIVE SUMMARY

This document covers the impact evaluation of the Interreg NWE 2014-2020 Programme. The objective was to analyse and evaluate the contribution of the Programme and its projects to changes in the area. Many projects were still running and this report analyses the situation as of July/August 2023 through a sample of 36 (closed) projects.

A total of 102 projects have been supported by the Interreg NWE Programme 2014-2020, with 1 168 partners involved. Many of the projects (43%) belong to Priority Axis 1 on Innovation, 35% to Priority Axis 2 (Low Carbon) and the remaining 22% to Priority Axis 3 (Resource and materials efficiency). The financial absorption of the Programme is very positive. Based on data from the Joint Secretariat (JS) in September 2023, EUR 396 607 536 from the European Regional Development Fund (ERDF) was allocated to projects. This is 106.5% of the Programme's ERDF budget, though spending is expected to be 96% to 98% at programme closure.

Programme outputs and target achievement

The projects have generated remarkable outputs. Specific Objective (SO) 1 projects, for example, developed and tested 506 technologies, products, services and processes in real life conditions and implemented 73 social innovation pilot actions. SO2 project outputs include 7 444 households with improved energy classification and an annual decrease of more than 95 900 tonnes of CO_2 equivalent - Greenhouse gas (GHG) emissions. SO3 projects adopted or applied 72 new low-carbon technologies. SO4 projects implemented 31 low-carbon transport solutions, while SO5 projects implemented and tested 104 innovative waste material products/services.

In addition to substantial SO-specific outputs, the projects have generated a notable aggregated output, including more than EUR 456 million of additional funding leveraged by projects, over 1 140 new jobs and more than 1 640 jobs maintained. In addition, 3 957 enterprises have received support, 1 184 enterprises have co-operated with research institutions and 1 115 enterprises have introduced new to the market products as a result of NWE projects.

Achievement of the output indicator target is very high for all SOs, widely exceeding expectations, especially SOs 1 and 2. The targets for most output indicators have already been vastly exceeded. Only SO4 falls short of several output indicator targets, due to a low number of projects.

Results, benefits and impact

SO 1 projects increased innovative capacity by connecting regions, territories, networks and clusters. Projects have developed and tested new technologies, processes and products under real life conditions. Projects to improve the competitiveness of SMEs brought together automotive and consumer goods production, metal and machine construction, as well as agri-food and medical products with new technologies and innovative processes such as digitalisation, advanced materials, sensor techniques, robotics and digital administration. Most of the analysed projects have cross-cutting elements that link different technologies (e.g. digitalisation, sensors, robotics) with innovation stages (e.g. SME growth, demonstration, proof-of-concept) in sectors such as healthcare, energy, agri-food, metal and machine

construction and retail. They have contributed to new tools and products, for example by investing in a pre-pilot facility for new technology and pilot testing. Voucher schemes have supported multiple SMEs and entrepreneurs with advice and guidance. The six social innovation projects brought interesting results especially in addressing vulnerable or excluded groups. Important unintended and secondary benefits include transnational networks for the bioeconomy, life sciences and ocean energy. These projects created concrete benefits including company growth, employment and rural/peripheral region attractiveness for jobs and workers. SO2 projects facilitated low-carbon energy strategies to reduce GHG emissions. These focus on renewables and energy efficiency, with addressing climate change as an indirect effect. One project increased the supply of renewable energy and low carbon heat, including waste heat, to residential and commercial buildings. Two projects addressed bottom-up energy communities and decentralised energy production. These increased the number of local energy community co-operatives and their effectiveness. Two projects introduced industrialised, efficient energy solutions in refurbishments. SO2 projects addressed 'soft' aspects of renewable energy development such as feasibility studies, increasing public acceptance and speeding up infrastructure deployment. SO3 projects contributed to the uptake of low carbon technology, products, processes and services. The projects have improved the match of technology supply and service provision in innovative low-carbon fields for the private and public sectors. The projects matched the need for renewable and efficient energy technology with possibilities for businesses to use new technology. Other projects helped to establish more efficient and smart energy management and public lighting. SO4 projects facilitated transnational low-carbon transport solutions to reduce GHG emissions in NWE. Long-term contributions might decrease emissions through smart and low emission mobility, improved CO_2 transformation, facilitate hydrogen powered heavy-duty transport as well as develop and promote cycle highways. Projects focused on research and innovation, supporting the development and implementation of new technologies, products and services. SO5 projects contributed to the (re)use of material and natural resources in NWE and were targeted at resource-intensive sectors. The projects started at different points in the value chain to make them more circular. Four projects valorised by-products or waste material, one project contributed to reusing (waste) products, one aimed at reducing waste and losses during production and one project contributed by developing alternative, less harmful products.

All the projects addressed transnational development needs, as defined in the Cooperation Programme. Understanding different conditions while developing joint and valid solutions for stakeholders in different countries is an important added value of transnational projects. Results are usually more transferable if they have been tested and applied in different countries and territories. Specific emerging and innovative sectors are often too small in individual NWE Member States to receive funding or test under real-world conditions. Thus, cooperation across borders is necessary for the expertise available and for a critical mass of demand.

The impact has increased with the involvement of sector-specific and European associations who can widen and extend dissemination and even build new products and services on top of NWE project results, as well as demonstration sites for visitors and for explaining impact mechanisms.

Capitalisation extends the uptake of project results and has brought an important added value to the Programme. A review of intended outputs and results shows important contributions from the capitalisation activities. In most cases, these add to existing outputs and results. In some cases, qualitative advances are also foreseen, such as new or extended innovation networks or clusters, new

focus on products or markets, new pilots or improved technology. Capitalisation also considerably extends partnerships and transnational cooperation within the Programme.

Contribution to territorial development, cohesion and competitiveness

Projects across all SOs have increased the **enabling conditions for cohesion**: governance, cooperation and coordination of policies and stakeholders. Important examples from projects show the Programme has enhanced capacity and supported cooperation and coordination.

- The Programme has **contributed significantly to better aligned national and transnational priorities and to better coordination of agendas**. This especially concerns business and technological innovation in emerging fields such as health digitalisation, life sciences, bioeconomy, agri-food innovation, low carbon district heating, energy efficient buildings and retrofitting building stock, energy communities, construction, ocean energy, urban mobility, hydrogen-powered freight transport, the circular economy for agri-food, textiles and waste reduction.
- The Programme has contributed to **better conditions for social, organisational and technological innovation** in many policy fields and economic sectors.
- The Programme has **increased capacity of decision makers to solve challenges**, especially through guidance, training, advice and pilot demonstrations.
- The Programme has contributed to **more efficient and effective processes and workflows** in public and private sectors. New tools, guidance material, libraries, methodologies and blueprints created in projects have helped to improve the efficiency of processes.
- The Programme has **raised topics up the political agenda**, especially in local and regional administrations in NWE, but also national and EU policy agendas.
- The Programme has helped **make regions more attractive** with economic, ecological, social and structural improvements. The effects have been mostly indirect, for example addressing disadvantaged groups or territories such as peripheral or less populated areas, creating opportunities for business and employment and improving access to services.

The Programme contributed significantly **to competitiveness and balanced territorial development and cohesion** in many categories. The highest contribution across all SOs is under ‘More competitive companies and SMEs’. There are major contributions also for ‘More and better technologies, products and services’ and ‘Increased attractiveness and quality of life’. These contributions are meaningful and systematic across at least three SOs with diverse themes and geographical areas.

Several projects under different SOs also contributed to ‘Increased capacity level of the public authorities in NWE in implementing low carbon measures’, ‘Enhancing public acceptance and removing barriers to the adoption of low carbon technology deployment’ and ‘Generation and/or maintenance of jobs’.

Territorial impact

Almost all NUTS2 regions in North-West Europe have benefitted from the Programme. Those without lead, project or associate partners are Bourgogne in France, Oberfranken in Germany and Cumbria in

the UK. Rural and intermediate regions benefited slightly less than urban ones. Exceptions are Highlands and Islands in the UK and Southern Ireland. Urban regions tend to have more Programme participation in line with their population, knowledge-based organisations, researchers and innovative SMEs.

The analysis per SO shows that many projects have a territorial focus, actively addressing disparities between types of territories, or implicitly focusing on a challenge for an urban, rural or coastal region. Many projects tested tools and methodologies in specific types of territory. Sometimes the central topic addressed a specific type of territory or territorial development challenge, for example islands and coastal regions, or opportunities for farmers and agri-food SMEs. Many projects considered transferring knowledge to similar or different regions, adopting a territorial perspective. Stimulating a territorial focus for projects during application and selection helps to make the results and effects of projects easier to transfer to different territories.

The analysis has identified diverse territorial effects from projects. Many that dealt with new technology and innovation in fields such as health, housing and circular approaches produced social and environmental benefits. For example, phosphorus recovery benefits rural areas where it is used as a fertiliser or feed additive, however there are also positive effects on urban areas where it is recovered from municipal sewage, including better water quality. Some projects addressing territorial challenges in rural areas or coastal regions with less business diversification and few employment opportunities paved the way for new business opportunities, increasing the competitiveness of companies in certain sectors (e.g. agri-food, textile) or creating new job and business profiles within existing or emerging value chains. Some projects especially under SO5 have unintended ecological long-term benefits by increasing resource efficiency and using by-products previously considered as waste. This reduces the amount of municipal, industrial, food or farm waste and pollution of natural resources. Other projects improve the attractiveness of territories, for example by reducing limitations and everyday challenges in peripheral and remote areas. Some projects contribute to testing and implementing better access to healthcare and medical services in remote areas.

Contribution to Europe 2020

The smart and sustainable growth contributions to Europe 2020 are significant, though less so for inclusive growth. There are consistently high and medium thematic contributions for smart growth (SO1). These are reinforced by cross-thematic contributions from SOs 3, 4 and 5. For sustainable growth, the biggest contribution is to reducing greenhouse gas emissions (SOs 2, 3 and 4) and a big contribution to improving energy efficiency (SO2). There are medium contributions to inclusive growth, increasing the employment rate of people aged 20-64 (SO1, SO3) and high contributions for promoting social innovation and improving access to affordable, sustainable and quality services in NWE (SO1).

Lessons learnt

The following lessons on implementation of the NWE Programme are relevant:

- The leader-follower approach in many projects, especially under SO1 and SO2, actively brought together stronger and weaker regions to stimulate knowledge transfer and learning. This approach was actively accepted and integrated by projects under all SOs. This added to the learning effect for follower regions and reduced disparities between regions in NWE. This approach is recommended.

- Capitalisation calls helped to multiply impact in many ways and for several projects. Capitalisation strengthened impacts, extended them beyond the initial partnership and approaches, and helped to widen the outreach of projects. Projects successful within the normal project lifespan (36 months) tend to be highly effective and efficient during capitalisation, with more results in less time and less felt burden from project management.
- Capitalisation increased the geographical extension and territorial impact of the Programme. New partners, regions and countries as well as the requirement to develop a more detailed or extended territorial focus were especially useful for projects and led to more differentiated territorial impact.
- Another good practice within capitalisation is the positive synergy from increased cooperation (a) with other Interreg NWE projects, or (b) with projects and partners outside NWE working on the same topic. This is expected to lead to positive synergies between pilot actions and new solutions as well as better knowledge transfer between NWE and other European regions.
- A positive aspect was the NWE Programme's contribution to Europe 2020 smart growth with cross-thematic contributions from SOs focussing on sustainable growth (SOs 3, 4 and 5). This was foreseen by the NWE Programme from the outset. Future programming processes should foresee cross-thematic contributions, for example between SOs of different priority axes and / or between SOs of the same priority axis. This not only strengthens the internal coherence of a Programme strategy, but also increases the potential for outputs.
- Output indicators have been a valuable tool for monitoring project implementation and effectiveness. Despite using a methodology to define them, not all output indicators had adequate and realistic targets. This hampered analysis of the effectiveness. However, there is no easy solution as not all projects and outputs can be predicted from the outset and there will always be uncertainties for project implementation and output estimates.
- Result indicators in line with European Commission requirements for the 2014-2020 funding period (for context indicators) have not been useful to measure and analyse programme results. They could only be used for a general idea of socio-economic conditions in the area, but not to define the programme contribution to certain impacts or categories relevant for transnational projects.
- The early reflection (in the 2014 ex-ante evaluation) and 2016-2017 definition of impact pathways, intermediate impact dimensions, indicators and baselines for impact categories as well as storylines for impact have proven to be highly valuable to the impact evaluation at the end of the Programme. This reflection about expectations for projects and Programme impact should be carried out at the beginning of a funding period. This enables tools for monitoring and reporting to be developed and adjusted (e.g. project reports, final appraisal reports, indicators, baseline values, realistic target values, etc.).
- ‘Final Appraisal’ reports have been extremely useful for reflections within the project and the JS, for monitoring results, benefits and short-term effects, as well as realistic estimates of long-term contributions. The reports provide valuable information on projects especially territorial relevance, contributions to Programme results, indicators per SO and cohesion indicators.
- Discussion and knowledge about Programme impacts in current and future funding periods can be stimulated by the impact evaluation and by the publication ‘NWE making an impact - Cooperation in action’, the ‘NWE Making-an-impact’ website and success stories. This helps increase understanding of short- and long-term benefits and contributions to change of a territorial cooperation programme.

1 Context and Methodology

This document reflects the impact evaluation of the Interreg NWE 2014-2020 Programme. As many projects are still running, this report builds on the analysis of the situation as at July/August 2023. The results and contribution to impact of 36 closed projects has been analysed in-depth.

The impact evaluation corresponds to Task 3 of the 2016 Framework Contract 'Implementation of an integrated evaluation approach within the framework of a robust North-West Europe evaluation system. (Reference 16B007)'. The impact evaluation analyses and evaluates the contribution of the Programme and its projects to changes in the territory. It reconstructs and verifies the mechanisms and factors that brought the change, following the programme intervention logic. Furthermore, it analyses how NWE projects have produced an impact on the Programme territory. The evaluation verifies and provides evidence for added value, as well as additional and qualitative benefits, such as improved governance.

Methodology

For the impact evaluation of the NWE Programme, a theory-based approach builds on the intervention logic of the Programme, considering casual links between inputs, activities, outcomes and impacts. Two elements are key to this evaluation:

1) The programme theory and intervention logic applied to the SOs. The theory-based approach is based on the existing programme theory and a general intervention logic that tries to reconstruct and verify the role of the programme and other external factors as causal attributes of the changes.

2) Methodological tools such as Contribution Analysis (CoA). For territorial cooperation policies an experimental or quantitative data-based evaluation design is not feasible or would not detect all Programme contributions. A theory-based evaluation approach helps estimate a qualitative counterfactual. CoA develops robust and evidence-based logic frameworks that better demonstrate contributions to impact. CoA establishes logical links and evidence-based likeliness between projects, results and contributions to territorial development. To identify the Programme contribution it is also paramount to identify and estimate the contribution of external factors that might have influenced the changes in the territory.

For the impact evaluation, the evaluation team applied desk research and statistical analyses. Statistical data for territorial cohesion indicators has been analysed for the NWE area, updating a comparable analysis in 2017 to establish a baseline to analyse development in NWE over time (Annex 1).

For each SO, projects closed before 30 June 2023 have been analysed in detail. For each SO two case studies deepen the understanding of certain qualitative aspects (Annex 3). Impact stories illustrate exemplary impacts and contributions to socio-economic change (Annex 4).

Result Indicators from 2023 have been compared with those in 2014 (Annex 2).

The CoA was used to draw conclusions on the effects, impacts and benefits of the Programme. Through the CoA, the evaluation team has confirmed and verified (or not) the hypothesis regarding benefits and impact. The team assessed the Programme contribution to changes by developing a logical link between

project results and other Programme activities (e.g. capitalisation) to changes in the territory. The CoA considered the results and outcomes of all projects as well as additional information from case studies. The conceptual core to CoA is examining and testing the theory of change and the SOs against logic and evidence.

The CoA followed five steps:

1) Defining the cause-effect issue. This was already included in the Cooperation Programme.

2) Developing the theory of change. This was prepared in the 2016 evaluation with the storylines of 'competitiveness' and 'balanced development' along with corresponding territorial cohesion indicators. In this impact evaluation the complete theory of change of each SO was rebuilt to see the logical link between project outputs, project results, contributions to cohesion enabling conditions, territorial cohesion, competitiveness and balanced development.

3) Evidence on the theory of change was gathered during the evaluation.

4) Assembling and assessing the contribution, identifying external factors and challenges was done during the evaluation.

5) Drafting the contribution story with evidence was done during the evaluation. First for each SO and then for the Programme as a whole.

Structure of the Report

This report shows the findings and assessment of the Programme's contribution to expected changes.

Chapter 2 presents Programme implementation, financial execution and output indicator achievements per SO. Chapter 3 includes analysis of the projects, their results and achievements per SO, as well as examples of project results and impacts. Chapter 4 presents the likely contribution of the Programme to enabling conditions and to territorial development, cohesion and competitiveness. Chapter 5 analyses the territorial impact for specific territorial aspects of distribution, regional coverage, types of territories and territorial specificities of projects. Chapter 6 assesses the contribution of the Programme to the Europe 2020 strategy (for 2014-2020).

Annex 1 details the evolution of territorial cohesion indicators from 2014 until recent years in NWE.

Annex 2 presents the latest Result Indicators of the NWE Interreg Programme 2014-2020 including detailed methodological information.

Annex 3 presents findings of the ten case studies under the Final Impact Evaluation.

Annex 4 presents Impact Stories to illustrate the Impact of projects and the Programme.

2 Programme and project implementation

This chapter analyses and evaluates the types of project outputs and results as well as the effectiveness of projects in achieving their results. The following section gives an overview of the projects.

2.1 Programme outputs and target achievement

The NWE Interreg Programme 2014-2020 builds on three Priority Axes and five SOs.

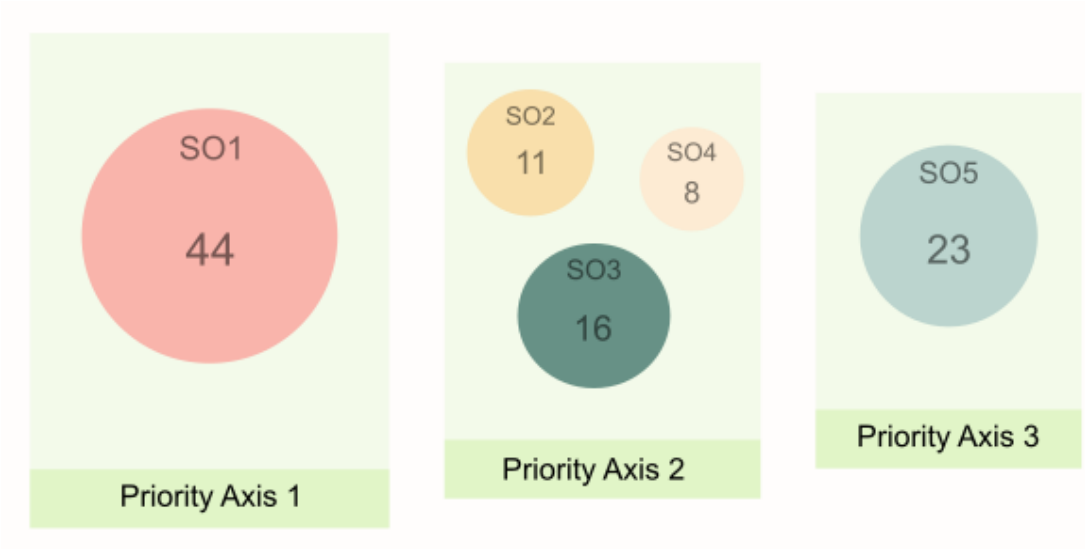
Table 2.1 NWE Interreg Programme 2014-2020

Priority Axis	SO
1: Innovation	**SO1:** To enhance innovation performance in NWE through international cooperation
2: Low Carbon	**SO2:** To reduce GHG emissions in NWE through international cooperation on implementing low carbon, energy or climate protection strategies
	SO3: To reduce GHG emissions in NWE through international cooperation on the uptake of low carbon technologies, products, processes and services
	SO4: To reduce GHG emissions in NWE through international cooperation on transnational low carbon solutions in transport systems
3: Resource and materials efficiency	**SO5**: To optimise (re)use of material and natural resources in NWE through international cooperation

Source: NWE Cooperation Programme

The analysis of project outputs and results builds on figures provided by the Programme as of August 2023 (if not indicated otherwise). The 102 approved projects involved 1,168 partners, 43% belong to SO1 (see Figure 2.1). It is the only SO of Priority Axis 1 (Innovation). 35% of the projects were approved under Priority Axis 2 (Low carbon), of which 11 belong to SO2, 16 to SO3 and 8 are under SO4. The remaining 22% were approved under SO5 of Priority Axis 3 (Resource and materials efficiency).

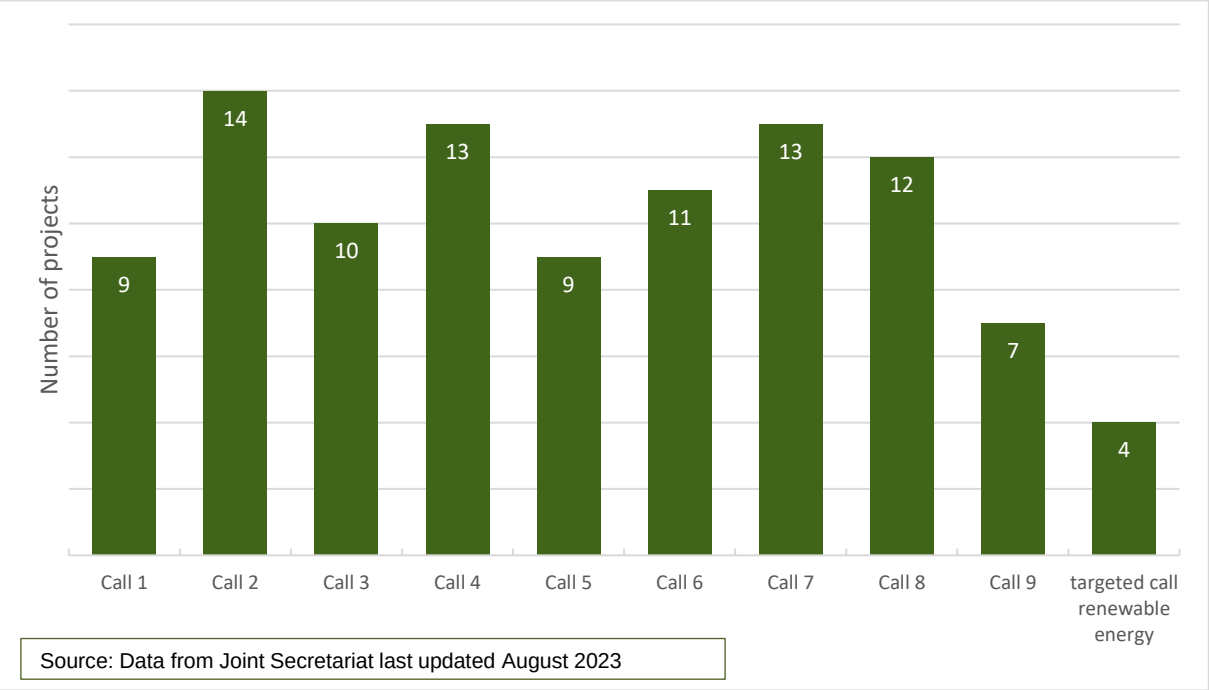
Figure 2.1 Number of projects per SO



Source: Data from Joint Secretariat. August 2023.

Figure 2.2 depicts the temporal dimension of the Programme, showing how many projects were approved under each of the nine calls. Four projects were authorised in an additional call targeting renewable energy.

Figure 2.2 Approved projects per call



Source: Data from Joint Secretariat last updated August 2023

The last three years have been a demanding period for the NWE Programme Authorities. In addition to work on the new Programme for 2021-2027 external factors hampered final implementation and coordination of the 2014-2020 Programme. 2020 and 2021 were dominated by the Covid-19 pandemic, challenging not only administrative work but also projects. Delays in work, manufacturing, testing, supply chains and investments endangered the delivery of meaningful results. Many projects received a time extension until the end of 2023 including the administrative closure as well as additional ERDF funding, which was required by five projects in 2021. As of July 2023, 32 projects were closed, 27 finished their activities and were in the process of closing, 42 were still running.

2.1.1 Key findings

Evaluation questions	**Key findings**
To what extent has the Programme achieved its SOs?	The effectiveness of the output indicators is very high for all SOs. SO1 has the second-highest effectiveness ranking at some 2300%, with almost all indicators surpassing their initial targets, except for long-term impact indicators such as job creation and funding leverage. SO2 ranks the highest in overall effectiveness at over 2900%, but some indicators have unrealistically high or low targets, possibly due to a lack of Programme experience. Some indicators related to long-term developments have lower achievements.

Evaluation questions	Key findings
	SO3 has an effectiveness of 278%, with some indicators having unrealistically low targets, while others did not reach their initial targets, but these are not seen as a risk to overall Programme results. SO4's effectiveness has increased to 309%, but only a few indicators have been reached, two related to job creation show no progress. This suggests that some projects under SO4 may not impact certain indicators. SO5 has the lowest effectiveness at 165%, with several indicators below 50%. Most of these relate to long-term impacts, but the excess of a few indicators offsets the lower progress.

2.1.2 Analysis and evaluation

The analysis examines financial allocation and spending, as well as output indicator achievements under each SO.

Financial absorption at Programme level

The financial absorption is very positive. Based on data from the JS in September 2023[1], 102 projects had been allocated EUR 396 607 536 from the ERDF. This amounts to 107% of the planned ERDF budget of EUR 372 million. Therefore, EUR 24.2 million is overcommitted. In May 2021, the Monitoring Committee approved a possible overcommitment of EUR 34 million ERDF. Experience shows that not all projects will spend their entire budget. At this stage, the JS expects the spending to be between 96% and 98% at closure.

Table 2.2 Financial progress per SO (allocated to selected operations)

		In EUR		In %
PA	**SO**	**Programmed ERDF budget**	**Allocated ERDF support to selected operations**	**Share of allocation covered with selected operations**
1	SO1	114 724 334	135 191 858	118%
2	SO2	53 536 121	58 585 050	109%
	SO3	83 497 464	84 450 059	101%
	SO4	41 536 121	30 946 542	75%
3	SO5	79 072 242	87 434 170	111%
Total Programme		**372 366 282**	**396 607 679**	**107%**

Source: Based on data from the JS in August 2023.

The overcommitment is unequal across the SOs. While SO1 shows the highest allocation (117%), SO2 and SO5 have some 110%, followed by SO3 with 101%. SO4 has the lowest allocation with 75%.

Analysis of project spending at Programme level

The financial progress of the Programme is positive. The projects had spent EUR 310 636 339 by September 2023, 83% of the planned ERDF budget. Certified expenditure is highest in SO2 with almost

[1] Data in this sub-chapter was provided by the JS and reflects the situation in September 2023 (with 102 projects approved).

101%, followed by SO5 and SO1 with 88 and 85%. SO3 and SO4 follow with almost 76% and 63%. The share of certified spending usually is delayed due to administrative processes and ongoing invoicing.

Table 2.3 Financial progress of the projects per SO (certified expenditure by projects)

		In EUR	In EUR	In %
PA	SO	Programmed ERDF budget	Eligible expenditure (reported and certified by CA)	Share of allocated ERDF spent
1	SO1	114 724 334	97 543 050	85%
2	SO2	53 536 121	54 055 887	101%
	SO3	83 497 464	63 671 252	76%
	SO4	41 536 121	26 000 292	63%
3	SO5	79 072 242	69 365 858	88%
	Total	**372 366 282**	**310 636 339**	**83%**

Source: Based on data from the JS received in September 2023.

Project contributions to output indicators per SO

The achievements of output indicators is very high for all SOs, greatly exceeding expectations especially SOs 1 and 2. Table 2.4 presents expected (by approved projects) achievements per SO (left column) and actual achievements (right column). The targets for all SOs have already been vastly exceeded, except SO4 with an expected effectiveness of approximately 78%, although actual achievements are at 309%. Project achievements (right column) for the other SOs are very positive, as they have all extensively exceeded the initial targets. SO2 is leading this list with almost 3,000%, followed by SO1, SO4, SO3 and SO5. This order complies with most of the trends indicated in the 2022 Interim Report, although significant progress was achieved in every SO and SO4 caught up drastically.

Table 2.4 Average output indicator effectiveness per SO

SO	Effectiveness in % (expected compared to Programme targets for 2023)	Effectiveness in % (achieved compared to Programme targets for 2023)
1	1 137%	2 298%
2	3 500%	2 969%
3	398%	278%
4	78%	309%
5	173%	165%

Source: JS data as of August 2023 and own calculations

The effectiveness of SO1 is very high. Apart from two indicators, all have exceeded the initial targets, and 1.04 for jobs created one is close to full achievement. The underperforming indicators concern long-term impacts such as jobs and leveraged funding. It seems that expectations, even if based on experience from the previous programme, were too ambitious. One project (COTEMACO) could not fulfil its own expectation of many maintained jobs. However, most other indicators exceed the expectations by far. Most outstanding are indicator '1.7 Number of end-users benefitting from social innovation', surpassed by 22 700%. This is mainly due to the high contribution by project eMEN.

Table 2.5 Achievement and effectiveness of output indicators in SO1

Output indicator	Expected by selected operations	Achieved with selected operations	Effectiveness* (of achieved) in %	Programme Target for 2023
1.01 Number of new enhanced **transnational clusters or innovation networks**	81	77	285	27
1.02 Number of **technologies, products, services and processes** developed and tested in real life conditions	491	506	744	68
1.03 Number of **pilot actions** implemented focusing on social innovation	207	73	243	30
1.04 Number of **jobs** created in all economic sectors	637	801	93	860
1.05 Number of **jobs** maintained in all economic sectors	1 448	377	44	860
1.06 Amount of funding leveraged by the project (**in EUR)**	41 732 000	53 073 461	24	222 000 000
1.07 Number of **end-users** benefitting from social innovation	55 480	136 496	22 749	600
CO01 Number of **enterprises** receiving support	2 909	2 603	482	540
CO26 Number of **enterprises** cooperating with research institutions	493	488	144	340
CO28 Number of **enterprises** supported to introduce new to the market products	801	831	244	340
CO29 Number of **enterprises** support to introduce new to the firm products	731	451	226	200

Source: JS data as of August 2023 and own calculations. *Effectiveness means here 'Achieved values by selected operations' in relation to 'Programme targets for 2023'.

The overall effectiveness of indicators in SO2 is very high. The targets for two indicators seem to be unrealistically high or low: 'CO32 Decrease of annual primary energy consumption of public buildings' and 'CO34 Estimated annual decrease of GHG'. This might be due to a lack of Programme experience with these indicators. Three other indicators have lower achievements, which are again related to long-term developments regarding jobs and leveraged funding, but also the 'number of combined mitigation-relevant adaptation solutions implemented' (2.02).

Table 2.6 Achievement and effectiveness of output indicators in SO2

Output indicator	Expected by selected operations	Achieved with selected operations	Effectiveness* (of achieved) in %	Programme Target for 2023
2.01 Number of **solutions** facilitating the delivery of existing or emerging low-carbon, energy or climate-protection strategies	97	88	489	18
2.02 Number of combined mitigation-relevant adaptation **solutions** implemented	21	8	53	15
2.03 Number of **jobs** created in all economic sectors	48	62	31	200
2.04 Number of **jobs** maintained in all economic sectors	125	118.4	59	200
2.05 Amount of funding leveraged by the project (**in EUR)**	67 450 000	115 372 552	143	80 811 405
CO31 Number of **households** with improved energy classification	7,679	7,444	1,654	450

Output indicator	Expected by selected operations	Achieved with selected operations	Effectiveness* (of achieved) in %	Programme Target for 2023
CO32 Decrease of annual primary energy consumption of public buildings (**kWh/year**)	23 328	30 809	10	300 000
CO34 Estimated annual decrease of GHG (**tonnes of CO_2eq**)	114 450	95 918	21 315	450

Source: JS data as of August 2023 and own calculations. *Effectiveness means here 'Achieved values by selected operations' in relationship to 'Programme targets for 2023'.

For SO3, the effectiveness is high. For three indicators the targets seemed unrealistically low in the last report (2018): 'CO30 Additional capacity or renewable energy production (MW)' has now only been reached by approximately 25%. However, 'CO34 Estimated annual decrease of GHG (tonnes of CO_2eq) has been exceeded significantly. Three further indicators have not reached the initial goals (3.04, CO28, CO29). Indicator CO29, relates to indirect project outputs within this SO. It is not considered a risk for the overall achievement of Programme results.

Table 2.7 Achievement and effectiveness of output indicators in SO3

Output indicator	Expected by selected operations	Achieved with selected operations	Effectiveness* (of achieved) in %	Programme Target for 2023
3.01 Number of adopted or applied low carbon **technologies**	84	72	164	44
3.02 Number of **jobs** created in all economic sectors	242	232	105	220
3.03 Number of **jobs** maintained in all economic sectors	565	1 061	482	220
3.04 Amount of funding leveraged by the project (**in EUR**)	132 020 000	77 875 878	89	87 545 688
CO26 Number of **enterprises** cooperating with research institutions	304	381	173	220
CO28 Number of **enterprises** supported to introduce new to the market products	140	142	65	220
CO29 Number of **enterprises** support to introduce new to the firm products	54	10	5	220
CO30 Additional capacity or renewable energy production **(MW)**	27	30	24	120
CO34 Estimated annual decrease of GHG (**tonnes of CO_2eq**)	13 619	7 526	1 672	450

Source: JS data as of August 2023 and own calculations. *Effectiveness means here 'Achieved values by selected operations' in relationship to 'Programme targets for 2023'.

Effectiveness with regard to SO4 has increased since the 2022 Interim Report However, only three indicator targets have been reached so far and these raise the average ('4.01 Number of implemented low carbon solutions in transport', '4.06 Amount of funding leveraged by the project' and 'CO34 Estimated annual decrease of GHG'). Two indicators relate to the creation and maintenance of jobs in all economic sectors and show no progress at all. Apart from '4.02 Number of new or improved transport management systems leading to GHG reduction' and 'CO26 Number of enterprises cooperating with research institutions' with an effectiveness of 80% and 73% respectively, all other indicators show little progress. This could indicate that projects implemented under SO4 do not contribute to some indicators and hence have no impact on them.

Table 2.8 Achievement and effectiveness of output indicators in SO4

Output indicator	Expected by selected operations	Achieved with selected operations	Effectiveness* (of achieved) in %	Programme Target for 2023
4.01 Number of implemented low carbon **solutions** in transport	26	31	155	20
4.02 Number of new or improved transport management **systems** leading to GHG reduction	7	8	80	10
4.03 Number of **transport operators** supported implementing low carbon solutions	13	19	10	200
4.06 Amount of funding leveraged by the project (**in EUR)**	59 700	205 000 000	254	80 811 405
CO26 Number of **enterprises** cooperating with research institutions	123	146	73	200
CO28 Number of **enterprises** supported to introduce new to the market products	37	41	21	200
CO29 Number of **enterprises** support to introduce new to the firm products	50	53	27	200
CO34 Estimated annual decrease of GHG (**tonnes of CO_2eq**)	2 316	12 351	2 470	500

Source: JS data as of August 2023 and own calculations. *Effectiveness means here 'Achieved values by selected operations' in relationship to 'Programme targets for 2023'.

For SO5, the effectiveness per output indicator is generally high with the lowest at 165%. Five indicators show less than 50% effectiveness until now, though most relate to long-term impacts concerning created or maintained jobs, funding leverage or the decrease in material used and increased material recovery. The excess for indicators 5.01, 5.02 and CO01 outweigh this low contribution. However, the indicators may not best reflect some outputs of SO5 projects.

Table 2.9 Achievement and effectiveness of output indicators in SO5

Output indicator	Expected by selected operations	Achieved with selected operations	Effectiveness* (of achieved) in %	Programme Target for 2023
5.01 Number of efficient natural and material **solutions** implemented and tested	126	104	248	42
5.02 Number of innovative uses of waste processes/products/services from waste materials (**solutions**)	106	104	578	18
5.03 Amount of funding leveraged by the project (**in EUR)**	2 000 000	5 000 000	3	161 622 811
5.04 Amount of decreased raw material use (**tonnes**)	263 204	311 438	31	1 000 000
5.05 Amount of increased material recovery, re-use and recycling (**tonnes**)	337 443	446 242	45	1 000 000
5.06 Number of **jobs** created in all economic sectors	88	56	14	400
5.07 Number of **jobs** maintained in all economic sectors	100	92	23	400
CO01 Number of **enterprises** receiving support	1 451	1 354	677	200
CO26 Number of **enterprises** cooperating with research institutions	187	169	85	200

Output indicator	Expected by selected operations	Achieved with selected operations	Effectiveness* (of achieved) in %	Programme Target for 2023
CO28 Number of **enterprises** supported to introduce new to the market products	110	101	51	200
CO29 Number of **enterprises** support to introduce new to the firm products	53	121	61	200

Source: JS data as of August 2023 and own calculations. *Effectiveness means here 'Achieved values by selected operations' in relationship to 'Programme targets for 2023'.

There are many contributions to programme output indicators under all SOs which is highly positive. Most targets have been exceeded by far. Those that have not been achieved yet still show a good performance and valuable contributions from projects. Exact target values are difficult to establish, as the number and type of projects varies by programming period. Experience shows that targets for long-term results and action from project partners and beneficiaries such as jobs and leveraged funding are difficult to estimate. There was less experience to establish realistic targets for indicators related to energy consumption and GHG emissions, as well as for SO 5 projects on resource efficiency. The 2014-2020 programme has contributed relevant values of performance to establish more realistic targets for the 2021-2027 period.

Evolution of Programme result indicators

In response to the requirements of the European Commission for the 2014-2020funding period, Interreg NWE Programme defined result indicators to show which areas of socio-economic development in the Programme area the activities would contribute to. Five result indicators corresponding to the five SOs were defined. A methodology was developed to establish a baseline for 2014.

Based on guidance from the European Commission[2] result indicators present the situation in the territory before and after Programme intervention.

However, it should be clear that not only Programme interventions but many other external factors also influence the values of the selected indicators.

The table below shows the links between SOs, Programme results and result indicators, which should show final achievements of the Programme.

Table 2.10 Links between Programme SOs and Result Indicators

Priority	SO	Programme result	Result Indicator
1: Innovation	**SO1:** To enhance innovation performance in NWE through international cooperation	Increased SME innovation levels	1. Degree of SME involvement in collaboration with other institutions

[2] European Commission, DG REGIO (2018): The Programming Period 2014-2020. Guidance Document on Monitoring and Evaluation – ERDF and CF. Concepts and Recommendations. Last Revision 2018. To be found at: https://ec.europa.eu/regional_policy/sources/evaluation/2014/guidance_monitoring_eval_en.pdf

Priority	SO	Programme result	Result Indicator
2: Low Carbon	**SO2:** To reduce GHG emissions in NWE through international cooperation on implementing low carbon, energy or climate protection strategies	Increased capacity of public authorities in NWE to implement low carbon measures effectively.	2. Effectiveness of NWE public organisations to implement low-carbon strategies (% of urban population with low carbon strategies)
	SO3: To reduce GHG emissions in NWE through international cooperation on the uptake of low carbon technologies, products, processes and services	Removed barriers to adopting and improving conditions for low carbon technology deployment	3. Status of conditions for low-carbon technology deployment in NWE
	SO4: To reduce GHG emissions in NWE through international cooperation on transnational low carbon solutions in transport systems	Improved conception and coordination of low carbon transport and mobility solutions	4. Status of competence of the transport sector in using low-carbon transport solutions (% transport companies of all EMAS registered enterprises)
3: Resource and materials efficiency	**SO5**: To optimise (re)use of material and natural resources in NWE through international cooperation	Accelerated transition to a circular economy by enabling spill-over effects of eco-innovation in the resource intensive industry	5. Status of competences in NWE resource intensive sectors for eco-innovation diffusion (Eco-innovation activities in the Eco-Innovation Scoreboard)

Source: NWE Cooperation Programme

For each indicator a baseline was established in 2014. This should be compared with updated values for 2023 (see Annex 2 for methodological details).

The calculation of updated values for the result indicators faced some methodological challenges. For example, a change of available data for the SO3 indicator, makes a comparison between the values impossible. Also the SO4 result indicator does not reflect the change in the territory. These indicators refer to large-scale developments at macro-level in the whole NWE area and should not be linked to Programme activities. They are context indicators to show general evolution in a Programme field.

The **SO1 result indicator** presents innovative SMEs collaborating with others and was calculated in 2014 based on an index in the European Innovation Scoreboard. This calculation in 2023 needed to rely on indicator INN_CIS12_CO provided by Eurostat. This shows the share of SMEs in each country that co-operated on business activities with other enterprises or organisations in relation to the total number of SMEs. Since the indicator is no longer available for the UK, a new baseline for 2014 was calculated excluding the UK (14.5%), which is still close to the originally assumption (15%). The 2023 value (27%) is based on 2020 data and exceeds the 20% target. This shows that development in the NWE Programme area (excluding the UK) went in the expected direction.

The **SO2 result indicator** presents the effectiveness of Programme area public organisations to implement low-carbon strategies and was measured as the share of urban population covered by these strategies in 2014, based on 2012 data from the Covenant of Mayors report. Due to submission and approval issues, the number of strategies decreased significantly for one year, which is why the Programme expected negative growth. Due to a changed methodology and data availability, the share could only be calculated with a total population denominator instead of the urban population as before. Therefore, a new baseline was calculated for 2014. The data is from 2014 for all Programme countries, apart from the UK which is from 2015. The updated value is slightly lower (28%) than the original baseline (31%), due to a different baseline year (2014 rather than 2012) and a different denominator.

The value based on data from 2021 (2018 for UK) of 39% exceeds the target (18%) but also both baselines. Thus, the share of population covered by low carbon strategies significantly increased during the Programme period.

The **indicator for SO3** describes the status of low-carbon technology deployment in the Programme area. The baseline for 2014 was based on indicators from the 2013 ESCO report. Each country was rated on a scale of 1-5 resulting in an average of 3 (60%) and a target of 80% was set. Since this study was not published as a time series, a different approach was used in the latest report by the Joint Research Centre 'Energy Service Market in the EU – Status review and recommendations 2019'. Although this report addresses similar aspects, the indicators differ significantly and seem to be more detailed than the previous ones. Technically the 2023 value for this result indicator can only be indirectly related to the 2014 values, but this still allows for a rough comparison.

The **result indicator for SO4** describes the status of low-carbon transport and based on the share of transport companies among all EMAS registrations in each country. Based on the 2014 baseline and growth related to the number of ISO14001 certifications, the target of 15% was determined. Due to a lack of available data, the baseline had to be recalculated without the UK but is still based on the initial baseline numbers. The value for 2023 is only 4%, against the target of 15%. However, this is due to the methodology applied by the Programme. Since each country has the same weighting the significant growth in only one country is not visible. In addition, it assumes more transport enterprises registrations in the EMAS register compared to the overall average. A positive and statistically valuable development is supported by data from an alternative calculation, where the number of transport-related registered EMAS increased by 32%.

The **result indicator for SO5** presents the status of eco-innovation in resource intensive sectors and derives from the Eco-Innovation Scoreboard from DG Environment. The Programme countries improved their score to 128 in 2023 compared to 110 in 2014. The target (112) was exceeded.

Three out of five result indicators have either achieved or exceeded their targets for 2022 (SO1, SO2, SO5). However, the results need to be considered carefully, given the statistical methodology. This especially concerns the indicators for SO 3 and SO 4.

Table 2.11 Result Indicators in 2023 and assessment of the evolution

SO	Programme Result Indicators	Baseline value 2014	Target 2023	Calculated value 2023	Assessment of evolution
SO1	1. Degree of SME involvement in collaboration with other institutions	15	20	27	The positive evolution is caused by diverse factors such as regional and national support programmes, the macro-economic situation, global competition and social capital.
SO2	2. Effectiveness of NWE public organisations to implement low-carbon strategies (% of urban population with low carbon strategies)	31	18	39	The positive evolution is due to diverse factors such as regional and national support programmes, the macro-economic situation, the political landscape and available skills and competences.
SO3	3. Status of conditions for low-carbon technology deployment in NWE	60	80	60*	The unchanged situation is caused by diverse factors such as regional and national support programmes, the macro-economic situation, innovation

SO	Programme Result Indicators	Baseline value 2014	Target 2023	Calculated value 2023	Assessment of evolution
					performance and available skills and competences.
SO4	4. Status of competence of the transport sector in using low-carbon transport solutions (% transport companies of all EMAS registered enterprises)	6	15	4*	The value does not refer to an absolute decrease but to a changed calculation methodology. In absolute terms, there was significant growth in only one NWE country. The registrations indicate that the number of transport related registered EMAS increased by 32%, so there has been a positive development.
SO5	5. Status of competences in NWE resource intensive sectors (Eco-innovation activities in the Eco-Innovation Scoreboard)	110	112	128	The positive evolution is caused by diverse factors such as support programmes, the macro-economic situation, global competition, innovation performance and available skills and competences.

* Different (but similar) methodology between updated values and baseline/target values. If we apply consistent criteria, the evolution cannot be properly assessed due to incomparability of the two data sets.

Source: NWE Cooperation Programme, Annex 5 Methodology for Result Indicators, and own calculations (see Annex 2).

The analysis leads to the following conclusions regarding the qualitative contribution of the Interreg NWE Programme to expected results. As mentioned before, the result indicators are only context indicators.

The quantitative contribution of the Programme to the result indicators is not possible to define:

- Project and Programme contributions are only one factor among many others confounding factors that influence the evolution of macro-economic indicators and national/regional statistics. This makes a direct causal attribution impossible.
- The time lag between project results and impacts becoming observable is too big for this evaluation. Many NWE projects have not finished, so it is impossible to see the effects in 2023.
- Result Indicators refer to situations that are influenced by the Programme (and its projects), but also depend on many other actors (individuals and organisations). Beneficiaries also have to act in a favourable way to produce relevant effects. This co-production of beneficiaries is not under the control of the Programme so it cannot be traced and attributed to the Programme.

Table 2.12 Assessment of Interreg NWE contribution to Programme Results

SO	Programme result	Programme Result Indicator	Assessment of Interreg NWE contribution
SO1: To enhance innovation performance in NWE through international cooperation	Increased SME innovation	1. Degree of SME involvement in collaboration with other institutions	Interreg NWE produced a significant contribution with many projects and impacts on SMEs. However, diverse factors such as regional and national support programmes, the macro-economic situation, global competition and social capital factors make the Programme contribution too low to be measured in statistical data.

SO	Programme result	Programme Result Indicator	Assessment of Interreg NWE contribution
SO2: To reduce GHG emissions in NWE through international cooperation on implementing low carbon, energy or climate protection strategies	Increased capacity of public authorities in NWE to implement low carbon measures effectively.	2. Effectiveness of NWE public organisations to implement low-carbon strategies (% of urban population with low carbon strategies)	Interreg NWE significantly increased the low-carbon capacity of public authorities. However, external factors make this contribution too low to be measured in statistical data.
SO3: To reduce GHG emissions in NWE through international cooperation on the uptake of low carbon technologies, products, processes and services	Removed barriers to adopting and improving conditions for low carbon technology deployment	3. Status of conditions for low-carbon technology deployment in NWE	Interreg NWE removed barriers and improve conditions for low-carbon technology deployment in NWE. However, external factors make this contribution too low to be measured in statistical data.
SO4: To reduce GHG emissions in NWE through international cooperation on transnational low carbon solutions in transport systems	Improved conception and coordination of low carbon transport and mobility solutions	4. Status of competence of the transport sector in using low-carbon transport solutions (% transport companies of all EMAS registered enterprises)	The low number of projects in SO4, together with dominant external factors such as energy prices, indicate a small influence of the Programme to low carbon transport and mobility solutions. External factors make this contribution too low to be measured in statistical data.
SO5: To optimise (re)use of material and natural resources in NWE through international cooperation	Accelerated transition to a circular economy by enabling spill-over effects of eco-innovation in the resource intensive industry	5. Status of competences in NWE resource intensive sectors for eco-innovation diffusion (Eco-innovation activities in the Eco-Innovation Scoreboard)	Interreg NWE produced significant spill-over effects of eco-innovation in the resource intensive industry. However, external factors make this contribution too low to be measured in statistical data.

Source: NWE Cooperation Programme and own assessment

3 Evaluation of project results, benefits and impact per SO

This chapter analyses and evaluates the project results, benefits and contribution to impact of the Programme for the SO. This is based on 36 closed projects[3] from the 2014-2020 funding period which corresponds to 34% of the supported projects. This is deemed to be representative for a qualitative assessment of results, benefits and impacts. Of course, the results and benefits would be much higher, if all projects could been taken into account.

The assessment combines the aggregation of results and outcomes with a qualitative description of the achievements and benefits for participants and target groups. The evaluation puts the achievements in the context of expectations, or targets, included in the original Cooperation Programme 2014-2020.

Project outcomes[4] have been categorised to facilitate an overview of the diverse outcomes for each SO. These categories of outcomes have been set by the evaluator team and are based on the expected types of action and expected SO results, as expressed in the Cooperation Programme.

- Common understanding, raised awareness;
- Improvement of framework conditions;
- Increased availability of data and information;
- Enhancement of competencies/skills;
- Mobilisation and engagement of relevant stakeholders, new cooperations;
- Developed and tested tools, pilots, technologies, applications;
- Market opportunities;
- New or better coordinated policies, strategies, local/regional plans across the NWE area.

In the same line, the analysis examines the contribution of each SO to the 'impact categories' of expected contributions of the Programme to:

- better coordination of national and transnational agendas;
- stronger alignment of national and transnational priorities;
- an increased use of social, political or technical innovation;
- increased capacity of decision makers to solving challenges;
- more efficient and effective processes and workflows in public and private sectors;
- topics higher on the political agenda;
- making regions more attractive and liveable.

[3] This means closed and with information available (final project report, final appraisal report) as at 30 June 2023.

[4] This refers to project outputs (tangible and final products, services or solutions of a given project) and results (the societal benefits of using the project's main outputs), as far as available and observable by September 2023.

The analysis highlights 'impact stories' for each SO to give examples of how the difference projects could make. The analysis examines the contribution per SO and offers examples. This is contribution analysis and examines the likeliness of impacts through multiple and diverse interventions[5].

The analysis in this chapter is structured per SO, including projects with some of their features, outputs and results.

3.1 Overview of project results, benefits and impact

Interreg NWE projects have produced a wide variety and diversity of results and benefits. Even if not all projects are finalised at this point (October 2023), there are results and impacts in all five SO areas.

The analysis below shows results and benefits for each SO more in detail. At this point a brief summary gives an overview of the assessment, based on the evaluation questions.

Evaluation question	Key Findings
How have projects generated lasting results and benefits (including unintended and secondary benefits) in the Programme Area?	SO 1: Projects that contributed to more innovative capacity by connecting regions, territories, networks and clusters focused on Ocean Energy, Life Sciences and the Bioeconomy. Projects that improved the competitiveness of SMEs brought together automotive and consumer goods production, metal and machine construction, agri-food and medical products with new technology and innovative processes such as digitalisation, advanced materials, sensor techniques, robotics and digital administration. Six of the 15 projects analysed produced benefits through social innovation and the impact-oriented use of new technology and digitalisation. Projects developed and tested new technology, processes and products under real life conditions, contributing to their readiness and leveraging additional funds for development and commercialisation. Most of the projects have cross-cutting elements that link different types of technology (e.g. digitalisation, sensors, robotics) with stages of innovation (e.g. SME growth, demonstration, proof-of-concept) in sectors such as health and care, energy, agri-food, metal-machine and retail. All projects brought together stakeholders from across the innovation ecosystem, companies/SMEs, research centres, universities, public sector organisations, business support organisations and service providers. They contributed to the development of new tools and products including by investing in a pre-pilot facility to facilitate new technologies and pilot testing for SMEs. Voucher schemes supported many SMEs and entrepreneurs with advice and guidance. The six social innovation projects brought interesting results especially in addressing vulnerable or excluded groups. Important unintended and secondary benefits include transnational networks for the bioeconomy, life sciences and ocean energy, where the projects created concrete benefits for the regions such as company growth, employment, attractiveness of rural/peripheral regions for jobs and workers. In other projects, new technology could be applied beyond the primary sector (e.g. sensor technology also for air quality monitoring).

[5] See for more detail also: https://www.betterevaluation.org/en/plan/approach/contribution_analysis

Evaluation question	Key Findings
	SO 2: All the projects facilitated the implementation of low-carbon, energy strategies to reduce GHG emissions in new. They focused on renewables and efficiency, while tackling climate was more an indirect effect of the activities. Two projects addressed bottom-up energy communities and decentralised energy production. They aimed to increase the number and effectiveness of local Energy Community co-operatives. ACE-RETROFITTING addressed co-owner associations and condominium inhabitants on the energy transition pathway. E=0 aimed at creating sustainable markets for net zero energy retrofits across NWE by transforming the residential refurbishment market in NWE and introducing industrialised and efficient energetic solutions. This was based on the Energiesprong programme in the Netherlands, which was rolled-out to other parts of NWE. HeatNet focused on supplying renewable and low carbon heat (including waste heat) to residential and commercial buildings. It, developed and tested in six local district heating and cooling networks (DHC). All projects fully involved stakeholders, enhancing their capacity and ability to develop low-carbon strategies to reduce emissions and optimises energy performance. All projects addressed the public sector as core partners and one decided to involve them as associate partners for administrative reasons. All projects supported local and regional authorities to set up low-carbon strategies to optimise distribution and consumption of (renewable) energy. Two projects addressed citizens and local communities by enhancing awareness of energy communities and community virtual power plants, stimulating behavioural changes towards energy efficiency. Projects increased the supply of renewable and low carbon heat, including waste heat, to residential and commercial buildings. Demand increased through district heating for social housing and new social enterprises. Engaging SMEs and companies as service providers was important. This brought also new market opportunities to companies as well as more and better products and services, even if not intended under SO2. The SO2 projects addressed 'soft' aspects of renewable energy development especially financing feasibility studies (two projects), increasing public acceptance and speeding up infrastructure deployment. SO3: Projects facilitated the uptake of low carbon technology, products, processes and services. However, only three projects tackled sectors with high energy saving potential (two for energy generation and supply, one for construction). One project addressed public street lighting as a (public-private) sector with high energy saving potential. FORESEA focused on ocean and tidal energy generation as well as related products and services. For SMART-SPACE, public street lighting had high energy saving potential which also reduces CO_2 emissions. The project demonstrated smart lighting in four pilot municipalities. LOGIC made a moderate contribution to the uptake of low carbon technology offering decentralised hybrid energy systems to remote areas. The PowerVIBES project tackled both technical and non-technical barriers that prevent low carbon technology use in festivals and events by sharing test facilities, experience and best practice. It also built trust on the demand side by proof of performance and extensive communication such as constructive integration of renewable energy, unit assembly, transport to and storage at test sites and event management. UP-STRAW: facilitated the uptake of a low carbon solution in construction which has high energy saving potential.

Evaluation question	Key Findings
	The projects have helped better match technology supply and service provision in innovative low-carbon fields with demand from both private and public sectors. The projects matched the need for renewable and efficient energy technology for SMEs and companies. In the FORESEA project, the technology readiness level (TRL) of ocean technologies could be improved through tests under real conditions. The other projects had a more indirect influence on market opportunities. Their focus was less on improving market opportunities and more on efficient and smart public energy/lighting systems. Of course, working with the public sector indirectly created new market opportunities for local firms and experts. SO 4: The projects facilitated the implementation of transnational low-carbon solutions in transport systems to reduce GHG emissions in NWE. CHIPS, eHUBS and H2Share contributed significantly to SO4. CHIPS facilitated transnational low-carbon solutions in transport systems by developing and promoting cycle highways. eHUBS improved coordination of low-carbon transport and mobility solutions by introducing shared mobility hubs. H2Share developed and tested a hydrogen-powered truck and a flexible low-energy mobile refueller. NWE region has many environmental issues due to traffic density and logistics. Hydrogen-powered trucks can support the shift to a more environmental mode of freight transport. The RIVER project contributed research on carbon dioxide transformation and recycling. The projects under SO 4 can reduce the environmental impact of transport in NWE. However, this contribution is still theoretical and might take place only in the long run, as most projects are local and still in the research, development and testing phase. No significant changes in the transport sector can be observed yet. Long-term contributions might decrease emissions by implementing eHUBS across NWE, CO_2 transformation (RIVER), hydrogen-powered trucks and flexible low-energy mobile refuellers (H2Share) and cycle highways (CHIPS). In addition, RIVER and H2Share focused on research and innovation and supported new technologies, products and services. SO 5: The projects contributed to better (re)use of material and natural resources in NWE and were all targeted at different resource-intensive sectors. The projects started at different points in value chains to make them more circular. Four projects valorised by-products or waste material (Phos4You, SeRaMCo, ALG-AD, RAWFILL). In addition FoodHeroes reduced waste during the food production and harvesting. Also, AFTB reduced resource consumption and toxic material use by developing less harmful material for the (wood) construction sector. Fibersort did not reach targets for recycled material but improved the technology for textile sorting. The target for material recovery was not achieved by the time the project finished as one enterprise went bankrupt, Phos4You managed to optimise the recovery of phosphorus from wastewater and initiate uptake of the technology. RAWFILL contributed to optimising material and natural resource use by promoting waste reduction, advancing resource efficiency and making both more accessible to landfill miners and public authorities. SeRaMCo focussed on recycling construction waste and producing concrete from recycled aggregates, reducing primary material consumption. ALG-AD initiated the (re)use of a by-product of biogas production, which can only be used in the EU for animal feed products, due to nutrient overflow. At the local and regional level, some projects led to close cooperation and new working groups ,including landfill owners and local administrations as well as cooperation between a municipality and the national strategy on food waste. These show that lower administrative barriers facilitate eco-innovation in resource intensive sectors, but stronger cooperation and political support, also at higher levels, are needed.

Evaluation question	Key Findings
What have been the mechanisms of change used in projects?	Multiple mechanisms were important to make projects effective. Successful approaches were: • Involving stakeholders and partners of an entire value chain with the expertise to achieve results. • Collaborating between universities and applied field research stations for complementary knowledge creation. Bringing together researchers with practitioners and SMEs under real-life conditions. • Using targeted capacity building e.g. on retrofitting condominiums and low-carbon district heating that increase capacity in public authorities and services, houseowners and other citizens. • Ensuring public acceptance for low-carbon technology deployment and the circular economy. This is important in local municipalities. • Ensuring acceptance of new technology in the public sphere. It was important to involve infrastructure development and planning units and services in public authorities. • Addressing and involving groups in a targeted way is crucial as public acceptance requires involvement, especially of residents. • Addressing a gap or creating new market opportunities including for low carbon heat, ocean energy and renewables at festivals and events. • Creating a network of infrastructure and services in different countries to offer a test bed for renewable and efficient energy generation under real-world conditions. • Bringing together different national and local knowledge and expertise to address common challenges, as in retrofitting or installing new smart public lighting (four pilot municipalities with more than 1 600 LED poles, sensors, communication units and other smart technical equipment). Building on a public-private partnership with local and regional public authorities plus business support organisations and sector specific stakeholders (e.g. cycling networks and federations) is key to promoting innovation in sectors such as a transport, energy provision and waste management. Capitalisation has been key to enhance the reach and dissemination of project results. Other mechanisms to increase impact include the involvement of sector-specific or European associations who can widen and extend dissemination or even build new products or services on NWE project results, as well as new demonstration sites that continue to be available for visitors and to explain impact mechanisms.
What is the added value of performing the projects in a transnational rather than national context?	Member States to receive funding or for final testing under real-world conditions. Thus, cooperation across borders is necessary for the expertise and to build a critical mass of demand. The projects addressed specific transnational development needs, as defined in the Cooperation Programme. Under SO1, most projects developed stable innovation networks and transnational clusters actively encouraging cross-sectoral and cross-regional collaboration. All projects benefitted from transnational exchanges of experience. Results are usually more transferable if they have been tested and applied in pilot or demonstration schemes in different territories.

Evaluation question	Key Findings
What is the added value of performing the projects in a transnational rather than national context?	In many areas specific emerging and innovative sectors are too small in individual NWE Understanding different framework conditions and developing joint and valid solutions for stakeholders in different countries is an important added value of transnational projects. Topics receive more attention and it is easier to compare different national settings and legislation to find solutions that fit more settings. This could be observed for example in the retrofitting projects under SO 2. Under SO3, projects addressed common challenges with innovative approaches. The cooperation of similar territories helped to test energy efficiency technology and highlight unexploited energy saving potentials for example in remote areas, such as islands or coastal areas. The share of renewable energy in production and consumption can be significantly increased with more autonomy especially for remote and peripheral territories. It can even lead to economic development and more jobs, as with the FORESEA project. SO4 projects built on transnational focus to create a critical mass for innovative approaches to low-carbon transport. However the focus was more on cooperation between similar territories than on connecting transnational networks. Projects under SO 5 showed that transnational exchange is relevant due to the cross-border dimension of most value chains and varying national legal frameworks. This ensured the transferability of applied methods to more regions and NWE areas. In most SO5 projects the need for cooperation all along value chains, also across borders, was highlighted.

The chapters below show how projects contributed to SOs and the types of outputs and results.

3.2 SO 1

SO 1 aimed at 'enhanced innovation performance of enterprises in NWE'. The mission of the Interreg NWE Programme was to increase the 'degree of SME involvement in collaboration with other institutions (including R&D)' and to 'increase SME innovation levels'.

15 closed projects have been analysed to determine how they contributed to SO 1:

- ASPECT
- BioBase4SME
- QCAP
- SHICC
- UNEET
- B4H
- BE-GOOD
- COTEMACO
- eMEN
- EYES
- MACHINING 4.0
- MATMED
- NWE-Chance
- UV-ROBOT
- OPIN

The Programme has supported (or continues to support) 44 projects under SO1. Among the analysed projects, three offer little contribution to the SO. UNEET was prematurely closed and did not achieve any output (i.e. no contribution to the Programme's output indicators). The contribution of COTEMACO was not significant, due to the limited contribution to improved cooperation. The EYES project faced difficulties during implementation which has led to outputs not being fully reached and its contribution to the SO was very limited.

3.2.1 Key findings

Evaluation question	Key Findings
Has the Programme facilitated innovation in SMEs, directly and indirectly?	The Programme facilitated innovation in SMEs directly involved in the co-financed projects as beneficiaries or target groups and those indirectly involved with spillovers of the actions (e.g. ASPECT, QCAP, COTEMACO, MATMED, UV-ROBOT, MACHINING 4.0). Innovation in SMEs has been facilitated by improving collaboration between enterprises and R&D facilities with direct vouchers, business plans, training or one-to-one advice and with the innovation camps in the thematic areas of the projects. In addition to the different tools and services, working transnationally enabled SMEs to collaborate with experts they would probably not have met, enhancing their innovations. Projects also facilitated innovation in SMEs indirectly through voucher schemes and coaching (e.g. the MACHINING 4.0 voucher scheme, as showcased by testimonials published on the machining4.eu website).

Evaluation question	Key Findings
Has the Programme allowed a better exploitation of research outcomes for the development/testing of new technologies/ products/ processes/ services? If so, how?	The Programme has supported exploitation of research for the development/ testing of new technologies/ products/ processes/ services. Several projects focused only partly on research but more on dissemination and exploitation. These were largely tailored to the sector providing evidence that customised solutions are essential to outcomes. The appropriate mix of partners was crucial to collect the needs of different stakeholders and design an efficient strategy. Another key element was the dialogue between the public and the private sector to overcome specific(administrative and legislative barriers.
How has the Programme helped SMEs access the mix of actors bringing the developed/tested products closer to the market?	The Programme facilitated collaboration between SME's and R&D organisations via a structured partnership and open ecosystem development with transnational elements. The projects that worked on improving the competitiveness of SMEs brought together automotive and consumer goods production, metal and machine construction, agri-food and medical products with new technologies and innovative processes such as digitalisation, advanced materials, sensor techniques, robotics and digital administration. SMEs were addressed through new systems and products. In particular, market access was facilitated by supporting SME participation in seminars and conferences to pitch their products.
What can be concluded for the territorial cohesion relevant questions raised for this SO?	Seven projects tackled the territorial gap between regions performing strongly and those performing moderately (ASPECT, BioBase4SME, NEW-CHANCE, BE-GOOD, B4H, MATMED, OPIN). The projects improving competitiveness through cooperation for market readiness did not have a territorial focus (e.g. ASPECT, QCAP, MATMED, UV-ROBOT, MACHINING 4.0. The three projects supporting capacity building to improve innovation (B4H, OPIN, BioBase4SME) had an indirect focus on peripheral areas such as coastal and rural, agricultural regions with many bioeconomy resources. The Life Science project connects high-level research centres in agglomeration centres and larger cities. The five projects bringing societal benefits (NWE-Chance, BE-GOOD, SHICC, UNEET, EYES, eMEN) indirectly address less densely populated and rural areas with improved access to health services through electronic tools for diagnostics, therapies and training. Projects focussing on youth had indirectly impacted disadvantaged urban areas.

3.2.2 Analysis and evaluation

The projects under SO 1 had different approaches to enhancing innovation capacity, innovative performance of SMEs and societal benefits through innovation in NWE regions. They addressed:

- Building capacity in regions and territories to improve their innovation performance (OPIN, B4H, BioBase4SME);
- Improving the competitiveness of enterprises, through cooperation that helps the development of specific products, services or processes to market readiness (ASPECT, QCAP, COTEMACO, MATMED, UV-ROBOT, MACHINING 4.0);
- Delivering societal benefits through innovation. Actions aim at all territories of NWE and target excluded people or those at risk of exclusion and communities under pressure (NWE-Chance, BE-GOOD, SHICC, UNEET, EYES, eMEN).

The projects that contributed to increasing innovative capacity by connecting regions, territories, networks and clusters focused on new technology for ocean energy, life sciences and the bioeconomy.

The projects that worked on improving the competitiveness of SMEs brought together automotive and consumer goods production, metal and machine construction, agri-food and medical products with new technologies and innovative processes such as digitalisation, advanced materials, sensor techniques, robotics and digital administration. Six of the 15 projects produced societal benefits through social innovation and the impact-oriented use of new technology and digitalisation.

Box 3.1 Social Innovation under SO1

Within the Interreg NWE 2014-2020 Programme social innovation is part of SO1 Priority 1, as a Type of Action (ToA3). The Cooperation Programme asked for projects 'to target excluded population or population at risk for exclusion and communities under pressure and to support development, testing and implementation of innovative solutions for social needs and problems'. As with any Priority 1 project, social innovation projects had to demonstrate they went beyond established practice. As an innovation project, they should include a disruptive element that could improve framework conditions or introduce systemic change.

There was a high interest in social innovation which was the focus of 21% of all projects submitted under SO1. However, many applications faced difficulties and didn't match the NWE selection criteria. Many of these lacked transnational relevance or had no or a weak territorial analysis. Many applications lacked focus or had unclear objectives (e.g. the targeted group was too broad/general). In other cases there was no precise baseline for indicators or a lack of quantification. Many organisations interested in social innovation had no previous experience with Interreg Programme requirements. Moreover, applicants faced difficulties fitting into the SO1 indicator (social innovation bids also had to address at least one compulsory output indicator on transnational clusters, innovation networks or the number of enterprises receiving support.

In all the calls for proposals launched by the Programme, the Programme Monitoring Committee approved six of the 66 projects that submitted applications. This means social innovation projects had a 9% approval rate. Eventually, the Programme allocated almost EUR 14 million to the six projects.

These projects tackled innovative organisation models for inclusive housing, addressing the needs of young people, especially those unemployed, innovative approaches to social entrepreneurship and impact startups through social innovation hubs, support to migrants and refugees wanting to start a business or become self-employed.

The projects brought interesting results especially for addressing specific vulnerable or excluded population groups and social benefits. Even if innovation at organisational or community level is applied in all projects it is still difficult to make social innovation projects fit easily into SO1 and consider them alongside technological and business innovation projects. The social projects (if not directly dealing with social enterprises or support to entrepreneurs or SMEs) might have difficulties to fit in the usual SO 1 output, result and indicator logic. It is a pity that the social benefits of these projects cannot be reflected and aggregated in more detailed social benefit indicators. Even with additional indicators a general framework to observe social impact is recommended. This could involve a framework that follows the SDGs[6] and learning from Interreg experience with social innovation projects[7].

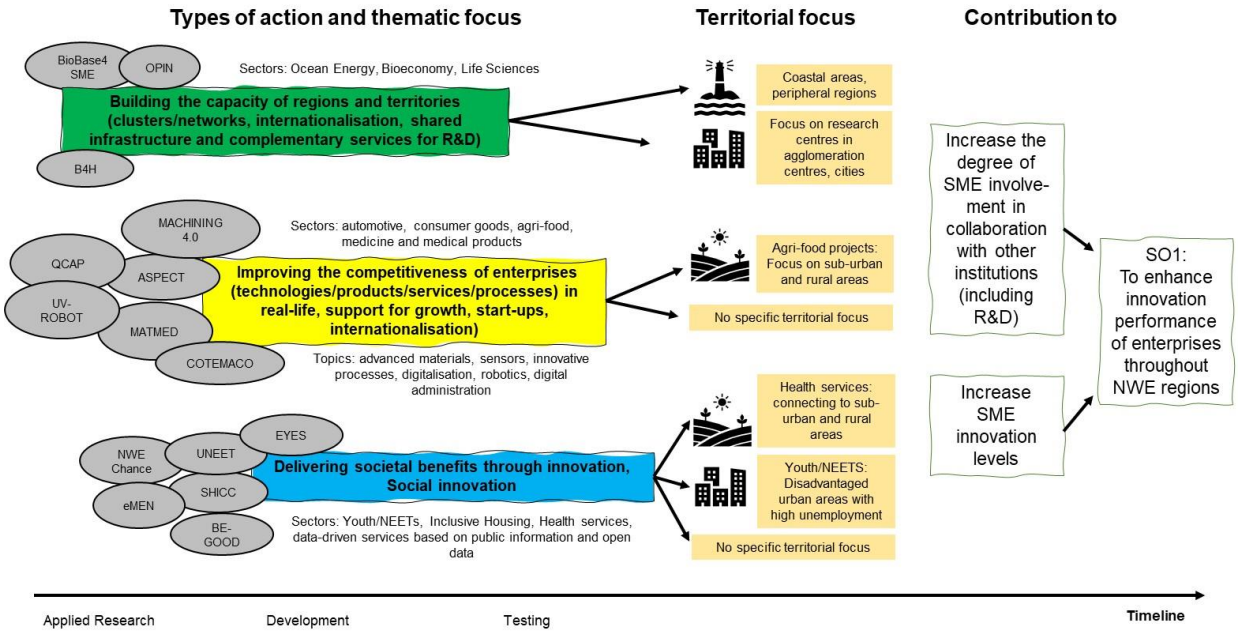
Most of the projects present have cross-cutting elements that link different activities with meaningful synergies (i.e. shifting health prototypes to market readiness, increasing competitiveness by building innovation capacity, etc.). The projects had different thematic focuses and some had a specific territorial focus.

The diagram below shows the orientation of four projects and how they addressed the SO from different angles.

[6] https://urban.jrc.ec.europa.eu/sdgs/?lng=en

[7] https://socialinterreg.eu/

Figure 3.1 Different dimensions of project contributions to SO 1



Source: own elaboration

The projects under SO1 produced multiple types of results.

Table 3.1 Examples of SO1 project results

Type of Result	Examples
Common understanding, raised awareness	SHICC: Different target groups (authorities, citizens, NGOs, etc.) became familiar with the Community Land Trust model through various activities. One was distributing a paper describing potential cooperation in Berlin to >20 local politicians. BE-GOOD: Greater awareness on the implications of re-using Public Sector Information for data-driven services. eMEN: Raised awareness about the potential of e-mental health tools for mental health professionals, SMEs and public authorities.
Improvement of framework conditions	SHICC: A financial framework for Community Land Trust (CLT) analysed the potential funding and needs for housing and mapped the financial sources; Start Up Fund Voucher Scheme.
Increased availability of data and information	BioBase4SME: 'Needs and challenges of companies in the bioeconomy in NW Europe' report.
Enhancement of skills	ASPECT: Improved processes through innovation by bringing together science, software and industry as well as training for researchers and professionals. Further skills development through outreach of the demonstration line at TU Darmstadt. BioBase4SME: 11 Training sessions to provide entrepreneurs with practical knowledge regarding important aspects of innovation in the biobased economy; three Innovation Bio-camps with 56 young entrepreneurs. QCAP: Knowledge creation in partner institutions of interactive storage sensor system technology.

Type of Result	Examples
Enhancement of skills	SHICC: Capacity building of all partners and other groups through peer-to- peer mentoring and exchanges; advocacy campaign, newsletters, mentoring and transnational events, the Start-up Fund informed and educated citizens. B4H helped SMEs explore international growth opportunities within the NWE area through individual and group coaching, deep dive sessions, webinars, matchmaking and vouchers to travel and meet potential business partners abroad.
Mobilisation and engagement of relevant stakeholders, new cooperations	QCAP: Cooperation across different technology areas (photonics and agro-technology) and between universities and applied field research stations for complementary knowledge creation, including private partners with commercialisation interest. SHICC: Expansion of the CLT movement into new geographical areas, e.g. through four new partners from additional countries during the capitalisation; improved cooperation between very different local stakeholders (citizens, local authorities, neighbourhood organisations, etc.). NWE-Chance: A Digital Innovation Hub was developed to bring together stakeholders in home hospitalisations with a clear need to connect and exchange knowledge.
Developed and tested tools, pilots, technologies, applications	ASPECT: Two pilots testing new metal shaping technical tools and models in real life and a public demonstration line showing the new models and simulations. It also facilitated innovative processes for SMEs involved in the project. BioBase4SME: investment in a pre-pilot facility in Ireland to facilitate biobased technologies and pilot testing for SMEs. QCAP: Prototype of the Integrated Storage Sensor system and real-life validation under commercial conditions (at TRL6) for selected agricultural produce. SHICC: Four CLT pilots in Lille, Brussels, Ghent and London and another four through new partners (capitalisation initiative) in Scotland, Germany, Ireland and the Netherlands, geographical spreading CLTs. eMEN: Seven pilots tested and implemented (e-mental health products) MACHINING 4.0 portal, which provides free access to specialised knowledge on innovative technology for machining and a new transnational field lab network, where SMEs can access state-of-the-art equipment and inspiring demonstrators. OPIN received 49 applications for technology testing from nine countries.
Market opportunities	ASPECT: Better NWE enterprise competitiveness through increased efficiency and cost reductions for metal shaping. New market opportunities for four enterprises when introducing new products. BioBase4SME: Improved opportunities for bioeconomy SMEs: Innovation Coupons for 63 SMEs with over EUR 1.5 million spent; Enhanced innovation in SMEs via 17 Workshops with interaction between different stakeholders. QCAP: New markets for sensor technology enterprises (photonics) in the agri-food sector with further potential in other sectors benefitting from air sensor systems; joining forces to reach critical demand for a niche (agri-food sector). MATMED: Acceleration programme that facilitated 130 matches between stakeholders and supported 31 SMEs through vouchers to validate or demonstrate their technology. MACHINING 4.0: benefited suppliers of Industry 4.0 services and software to SME's. The promotional actions helped the vendors to reach new contacts.

Type of Result	Examples
New or better coordinated policies, strategies, local/regional plans across the NWE area	BioBase4SME: The Joint Strategy Action Plan on Bioeconomy in participating NWE regions. SHICC: Creation of a European CLT Network UV-ROBOT: Development of UVC strategy to control Botrytis (strawberry, cucumber), tomato russet mite (tomato) and spider mite (tomato and cucumber), UV-C strategy in strawberry breeding (branching and transplanted phase). eMEN: Developed a European Policy Action Plan for e-mental Health.

Twelve of the fifteen projects provided a significant contribution to the **SO** enhancing innovation in enterprises in several fields with different tools and mechanisms. ASPECT enhanced innovation in SMEs producing metal shaping applications by improving the tribological library. BioBase4SME facilitated innovation and improved collaboration between enterprises and R&D facilities with direct vouchers, business plans, training, one-to-one advice and innovation bio-camps for the bioeconomy. QCAP addressed SMEs through new systems and products and involved three partners. This facilitated innovation with R&D involvement in the testing phases. SHICC introduced innovation in models and processes for social housing. B4H, working transnationally, enabled SMEs to collaborate with experts they would probably not have met, enhancing their innovations. The project also facilitated innovation in SMEs indirectly through the vouchers and coaching. BE GOOD facilitated innovation in SMEs directly. The methodology involves both idea development – boosting innovation, facilitating collaboration and innovation via a structured project partnership, and a tangible link between testing, development and implementation. eMEN: directly contributed to innovation in SMEs through the co-creation, development and piloting of e-mental health support, while MACHINING 4.0 increased SME innovation mainly through the voucher scheme, as showcased by testimonials on the machining4.eu website. MATMED improved innovation in SMEs for advanced materials and regenerative medicine and met its objectives. NWE-Chance enhanced innovation in NWE enterprises opening up to business opportunities for home hospitalisation technology. In UV-ROBOT, partners facilitated innovation with a specific management strategy for Intellectual Property to control powdery mildew. OPIN increased the TRL level of ocean energy technologies, products and services by facilitating collaboration and innovation through a structured project partnership, free masterclasses and events to foster innovation and knowledge sharing.

All the analysed projects **boosted knowledge flows between innovation stakeholders** in many sectors from ocean energy to the bioeconomy and horticulture to mental health. Most of the projects focused on advancing knowledge flow horizontally (between regions) and vertically (between stakeholder groups) creating new or enhancing existing innovation environments. Only some 20% of the projects focused on innovation in technological products, while the majority stimulated innovation in processes and services. Although most projects tackled issues and sectors with a significant private sector orientation there are good examples of directly or indirectly increased innovation for the public sector.

Another interesting element to highlight in relation to the initial expectations of the Cooperation Programme is **the strong link between internationalisation and innovation processes** showing that critical mass and international knowledge transfer is pivotal.

All the analysed SO 1 projects addressed **transnational development needs**, as defined in the Cooperation Programme. Most projects developed stable innovation networks and transnational clusters actively encouraging cross-sectoral and cross-regional collaboration. Of the twelve successful projects, ten clearly aimed at developing and implementing innovation (technologies, products, services and processes) to create a significant impact on societal challenges previously identified in the territorial analysis in a wide number of different sectors. Emerging economic sectors (ocean energy, life sciences and bioeconomy) and sectors with a high transformation potential (agri-food, metal and machine-tool, health) benefitted from transnational exchanges and knowledge transfer. Three projects with less activities or results did not tackle transnational development needs significantly.

The challenge to close the innovation performance gap between NWE regions by spreading knowledge and know-how from innovation leaders to followers was actively addressed by seven projects but is present in others. This approach was less relevant in social innovation projects. The link between sectoral collaboration and regional S3 strategies was considered in most cases but is not as evident as other transnational development needs.

Comparing the achievements to initial CP expectations for SO 1, the following assessment can be made:

CP Expectation	Achievements by selected SO 1 projects	Assessment
Focus	SO1 focuses on applied research and innovation, in comparison to SO3 (part of Priority 2) which focuses on the uptake of existing technologies. All the projects have a clear applied research focus to the benefit of diverse economic sectors. Most projects focus on research and development and the transfer of knowledge to SMEs, the link to regional S3 strategies is not always evident and very often not clearly visible. It would probably give more visibility and outreach to projects if the link to S3/S4 strategies were clearer. Social Innovation projects have a clear focus on societal benefits.	
Concrete needs	All the SO1 projects corresponded to concrete needs in technological sectors, areas of innovation or territories. Ten projects improved exploitation of research into new technologies / products / services to impact social, spatial, economic and environmental challenges. Eight provided evidence they reinforced internationalisation and cooperation for regional clusters and innovation stakeholders. Ten projects were particularly successful in addressing regional disparities in terms of innovation potential and cohesion in the area.	
Leader-follower approach	Seven of the SO1 projects delivered outcomes following the leader/ follower approach (e.g. B4H, BioBase4SME, MATMED, BE-GOOD, NWE-CHANCE).	
High social impact for all types of territories and population	Six projects aimed at societal benefits. Two could benefit youth, especially NEETs, one had an impact on social housing, two on better access and quality in health services, one for better use of open data in public services.	
Expected result of the SO	Twelve of the projects increased innovation in involved and targeted SMEs through the co-creation, development and piloting of tools and products. Four projects showed that voucher schemes have been particularly useful for supporting SMEs while another three highlighted specific training and/or coaching. Four projects developed and implemented innovative solutions for social needs (including health) and another four supported the 'marketability' of specific products.	

CP Expectation	Achievements by selected SO 1 projects	Assessment
Programme Result Indicator	All these SO1 projects contributed to the Programme Result Indicator 'Degree of SME involvement in collaboration with other institutions (including R&D)' with SMEs collaborating with other institutions (including R&D) namely public actors, civil society organisations, sector professionals, etc.	
Expected Impact of the SO	The projects contributed at least to one impact category for SO1 although several projects contributed to two or more impacts. Also highly interdependent impacts were expected for this SO. - innovation enabler for enterprises (including social enterprises) and other institutions; - support for testing and development of technologies, products, processes and services; - beneficiaries accessing the mix of people bringing developed/tested products closer to the market; - better exploitation of research to develop/test new technologies/ products/processes /services; - collaboration between SMEs and other institutions (including R&D).	
Sectors addressed	Projects focused on new technologies in the emerging sectors of ocean energy, life sciences and the bioeconomy, on economic sectors such as automotive and consumer goods production, metal and machine construction, agri-food and medical products with new technologies and innovative processes such as digitalisation, advanced materials, sensor techniques, robotics and digital administration. Some projects focused on societal benefits through social innovation and the impact-oriented use of new technology and digitalisation. The Cooperation Programme requested projects to demonstrate a clear link between their objectives S3 or regional ESIF strategies and programmes with participating regions. This has been only partly achieved. There is little evidence of clear links with S3 regional strategies in the projects, whilst the cross-sectoral relevance (enterprises, researchers, education institutions, training organisations, policy-makers, private investors, end users) is evident from the mix of partners and stakeholders addressed by the projects.	

For **territorial challenges**, seven projects tackled the gap between strongly and moderately performing regions, mostly mirroring the leader/follower approach. The projects improving competitiveness through cooperation for market readiness did not show a direct territorial focus, even if the agri-food projects address rural regions more. The projects dedicated to ocean energy and the bioeconomy indirectly focus on peripheral areas such as coastal and rural, agricultural regions with many bioeconomy resources. The Life Science project connects high-level research centres in agglomeration centres and larger cities. For the five projects bringing societal benefits, the health-related projects indirectly address less densely populated and rural areas by reducing the gap with urban areas for health services through electronic tools for diagnostics, therapies and training for professionals. Projects focussing on the young had an indirect focus on disadvantaged urban areas.

For **target groups and beneficiaries**, stakeholders have been properly involved and targeted in all analysed projects. SMEs have been specifically involved together with research institutions and other innovation actors. Several projects feature the triple or even quadruple helix approach, paying specific attention to civil society and vulnerable groups (involved specifically in some health-related projects). All

projects brought benefits to a wide array of beneficiaries, from public authorities to private organisations (clusters, associations), SMEs and companies to students, teachers and the education sector.

13 projects from SO1, and five of the analysed projects were involved in capitalisation under the specific Capitalisation Calls of the Programme. A review (see section 3.7) shows that outputs and results could be significantly increased and/or transferred to more regions/beneficiaries through capitalisation. Some projects also enhanced their impact through additional activities. For example, OPIN delivered more events than planned – the event target was increased in the amendment request approved in 2021 and they went beyond this new target. More than 35 events (webinars, workshops, masterclasses) attracted more 1 500 attendees. OPIN now has more than 500 members from 34 countries, which far exceeds the original target of 200 members.

For **wider impacts**, SO1 projects contributed to all the impact categories. For this report only direct and short-term impacts could be analysed as it is too early to observe long-term changes. Even for the short-term impacts, it is still too early to evaluate the full effects, so the assessment builds on first observations.

Impact category	Evidence from SO1 projects	Assessment
Better coordination	Projects contributed increased coordination for national and transnational agendas as well as development and implementation of transnational strategies and work plans. Examples: OPIN: the project facilitated coordination through Collaborative Innovation Groups and, to a small extent TAPs. ORE Catapult have continued to engage with TAP recipients through different programs – for example Crack Map, who are supported by ORE Catapult (an R&D organisation) in the Launch Academy Programme. BioBase4SME: A Memorandum of Understanding has been signed. This outlines future cooperation activities (e.g. inviting each other to events), and a plan to keep the Bioeconomy network support to SMEs in the future. B4H: Partners have signed a Memorandum of Understanding to continue their cooperation beyond Interreg funding and continue their joint work to support SMEs across the NWE area.	
Use of innovation through better conditions	Several projects improved networks for cooperation between research institutions and enterprises as well as increasing the use of social, political and technical innovation. Examples: OPIN: increased innovation capacity in SMEs by facilitating collaboration and innovation through a structured project partnership, that offered TAP & CIG support with a free masterclass and events to foster innovation and knowledge sharing. BE-GOOD development involves idea development – boosting innovation, facilitating a culture of collaboration and innovation, as well as a tangible link between testing, development and implementation.	
Use of innovation through better conditions	B4H: accessing Boost4Health support increased TRL levels for SMEs. The SME evaluation report shows that TRL increased by 1.5 points. ASPECT: Cooperation between SMEs and R&D organisations was facilitated.	

Impact category	Evidence from SO1 projects	Assessment
Governance Capacities of decision makers	Three projects have contributed to increased capacity for decision makers to solve challenges and developed new solutions for them. Examples: MATMED: Work Package 4 on Regulatory Framework is a good example of the project's contribution to support SMEs to adapt to a changing administrative context and legal requirements for medical devices. BE-GOOD generated an ecosystem (network) where public authorities at all levels (local, regional, national and transnational) share knowledge and reuse services to enable transnational uptake and cross-sectoral access to new data-driven services, based on new business models for SMEs. B4H: NWE level: cooperation between partners enhanced Life Science Clusters in NWE; Nationally: Boost4Health led to cooperation between national organisations (e.g., Kent County Council and Manchester Growth Company).	
Better and efficient processes	Two projects introduced more efficient, effective and environmentally friendly processes. Examples: ASPECT: improved processes through innovation by bringing together science, software and industry as well as training for researchers and professionals. Further skills development is through the demonstration line at TU Darmstadt.	
Impact on policy agendas, policy changes	Several projects increased awareness of issues tackled thanks to the transnational cooperation. Examples: SHICC project improved cooperation and governance at different geographical levels. At local level, cooperation between citizens, neighbourhood organisations and local authorities improved significantly with exchanges, SHICC events, transnational conferences, peer-to-peer workshops, etc. to interact on affordable housing.	
Liveability, Attractiveness of NWE territories	Three projects improved the quality of life for citizens. Examples: NWE-Chance stimulated business opportunities for the novel concept of home hospitalisation. eMEN: promoted more affordable, effective and empowering mental health with a transnational cooperation platform for e-mental health product innovation, development, testing, implementation and exchanges of implementation expertise. These bring shorter waiting lists, diagnosis procedures and treatment with more prevention, self-control, coaching and daily support. ASPECT: contributed to NWE enterprise competitiveness through increased efficiency and cost reductions for metal shaping. The positive effects also concern the environment, as the new model reduces waste and energy consumption.	

The SO 1 projects produced tangible, diverse and positive impacts by enhancing the innovation capacity of SMEs and regional players in several sectors in North-West Europe. The results and impacts will be considerably higher, since 29 projects under SO 1 were not analysed for this evaluation.

3.3 SO 2

SO2 aimed at 'facilitating the implementation of low-carbon, energy and climate protection strategies to reduce GHG emissions in NWE'. The Interreg NWE Programme mission was to support 'NWE public sector organisations in getting more effective in implementing low carbon strategies' and to 'increase the capacity level of the public authorities in NWE in implementing low carbon measures effectively'.

The Programme has supported (or continues to support) 11 projects under SO2. Five closed projects have been analysed to determine how they contributed to SO2:

- ACE-Retrofitting
- cVPP
- E=0
- ECCO
- HeatNet NWE.

3.3.1 Key findings

Evaluation question	Key Findings
Has the Programme helped increase energy efficiency in the domestic and non-domestic sector? If so, how?	The Programme increased domestic and non-domestic energy efficiency through projects reducing energy consumption in private and public buildings, public infrastructure and social housing. ACE RETROFITTING and E=0 focused on making co-owned residential buildings more energy efficient, as many private owners can simultaneously benefit from more energy efficient homes, with reduced energy bills and carbon footprints. Both projects introduced tools for efficient retrofitting, extending the impacts of the projects by involving social housing organisations. HeatNet supplied renewable and low carbon heat (including waste heat) to residential and commercial buildings, developed and tested in six local DHCs. cVPP activities focused on Community Virtual Power Plans strengthening efficient energy management of citizen energy communities. ECCO project accelerated the growth of local Energy Community Co-Operatives (ECCOs), with networking and educational activities and a toolkit for new ECCOs.
To what extent has the Programme facilitated the increase in share of renewable energies, particularly on the demand side?	The projects demonstrate that the Programme increased the share of renewable energy. Three projects (cVPP, HeatNEt NWE, ECCO) specifically aimed at that. cVPP promoted community-based Virtual Power Plants (cVPP), a novel model to organise and significantly boost local renewable energy production and distribution. Beyond the significant results of setting up three cVPPs, the project fostered coordination between stakeholders, including vulnerable groups. ECCO promoted energy community cooperatives, voluntary associations of energy consumers and producers who jointly declare and implement the goals of energy independence through the use of their own renewable energy production. HeatNet supplied renewable and low carbon heat (including waste heat) to residential and commercial buildings, developing and testing in six DHCs. All three projects were particularly keen on involving producers and users.

Evaluation question	Key Findings
How has the Programme enhanced the public acceptance of the low-carbon, energy and climate protection strategies of the NWE regions	All the projects enhanced public acceptance of NWE low-carbon, energy and climate protection strategies. Most invested significant efforts in mapping and selecting the most relevant stakeholders, setting up participatory processes whose outcomes not only focused on enhanced public acceptance and awareness raising but ensured democratisation of the sector through citizen and community involvement and their acknowledgement as new, relevant actors to accelerate the energy transition.
What can be concluded for the territorial cohesion relevant questions raised for this SO?	All five projects addressed specific territorial needs and potential for energy generation, increasing energy efficiency and promoting integrated strategies. Three projects generated positive effects on specific territories. In the cVPP projects three types of virtual Power Plants address different disparities: the rural cVPP in Loenen, the dispersed cVPP in Ireland and the social cVPP in Ghent. In Loenen and Ireland, rural areas were connected to the cVPP, which increased their participation in electricity markets and empowered the prosumers to take a more active role in the energy system. The social cVPP in Ghent paid special attention to including vulnerable groups. The mix of regions for ECCO enabled easy knowledge transfer between leading and following regions and thus enhanced territorial cohesion throughout NWE. This is evidenced by project effects, such as the new Community Energy Federation for Ireland (CEFI), that wants to collaborate with Irish policy makers on an Irish energy market. In the spirit of the EU directives this would bring Ireland up from a 'follower' towards a more leading development country. The ACE-Retrofitting project helped reduce disparities within NWE, as it both provided knowledge exchange between more experienced member states (such as France) and the less experienced (such as Germany). E=0 worked with social housing organisations improving the quality of life and expenses of tenants (retrofits in France and the UK). Three HEATNET NWE pilots supply heat to social housing with more efficiency for tenants. The focus is on urban solutions in view of the demand. The leader-follower approach is visible in the exchanges between more advanced partners such as MijnWater and Aberdeen.

3.3.2 Analysis and evaluation

The projects under SO2 facilitated the implementation of low-carbon and energy strategies to reduce GHG emissions in the Programme area, addressing the following types of action:

- Testing and developing new schemes (e.g. local energy distribution, energy microgeneration, financing) (ACE-Retrofitting, ECCO);
- New governance arrangements or low-carbon, intelligent energy networks, energy neutral communities (cVPP);
- Integrating mitigation and adaptation measures (technical, financial, organisational, regulatory and institutional) (HeatNet NWE, E = 0).

The type of action *Delivering integrated territorial strategies* was transversally included in all the analysed projects. This is consistent with objectives of the activities, strongly rooted around the involvement of regional and local public administrations who are territorially based and multi-sectoral.

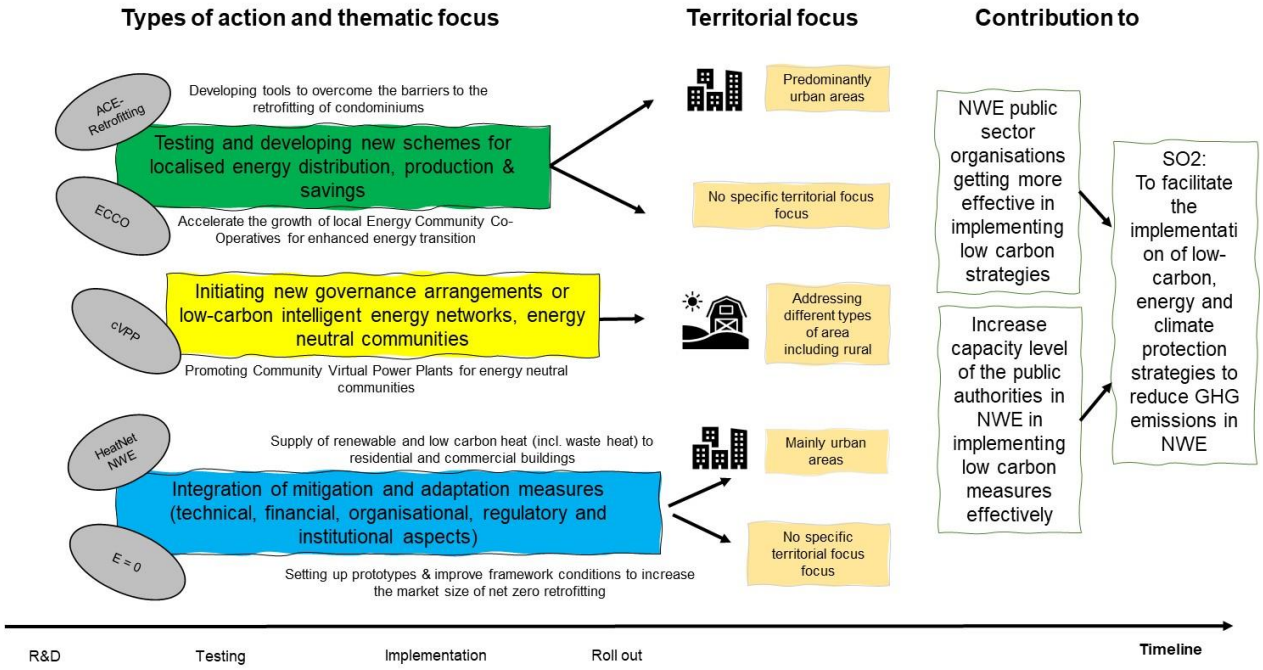
The type of action *Developing synergies between existing large-scale infrastructure projects* remained in the background and was not directly tackled, at least by the analysed projects. Stimulate and linking

significant investments in energy infrastructure may be hard under territorial cooperation projects given other instruments for transnational networks (e.g. TEN-E) and research (e.g. HORIZON, Clean Energy Transition Partnership) and partnerships (e.g. Partnerships for Regional Innovation).

The projects had different thematic focuses under energy efficiency and low carbon energy in buildings and district networks.

The diagram below shows how the five projects addressed the SO from different angles.

Figure 3.2 Different dimensions of the project contribution to SO 2



Source: own elaboration

A classification of some of the results from projects under SO 2 is shown below:

Table 3.2 Examples of SO 2 project results

Type of Result	Examples
Common understanding, raised awareness	HeatNet NWE: Some 955 000 members of the public, especially in the six pilot regions, were informed or actively engaged through public consultations and events, articles in local and national publications, social media and promotional videos.
Improvement of framework conditions	ACE-Retrofitting: Contributions to the revision of condominium legislation in France and Germany. HeatNet NWE: Changes in heating and planning legislation (e.g. in Ireland) to better consider GHG emissions and the integration of local district heating systems with waste heat from large producers.

Type of Result	Examples
Increased availability of data and information	ACE-Retrofitting: A dashboard on ACE-retrofitting results was created. ECCO One Stop Shop – centralised platform for new ECCOs and developing existing ECCOs cVPP: a transnational cVPP platform design process is based on the common knowledge of partners. An inventory covers community goals, technical possibilities and regulatory and geographical conditions against a continuously transitioning energy system.
Enhancement of skills	ACE-Retrofitting: capacity building and tool development for retrofitting condominiums enhanced public authority skills to work in this field. E = 0: involving various target groups (public local and national authorities, enterprises, general public, regions and cities, energy agencies, energy efficiency solution providers, construction companies, social housing organisations etc) increased the knowledge and understanding of the Energiesprong approach to NetZero retrofits. HeatNet NWE: targeted capacity building events on low carbon district heating with SMEs and public authorities as well as DHC skills development in partner regions.
Mobilisation and engagement of relevant stakeholders, new cooperations	ACE-Retrofitting: mobilised and engaged cities and actors with previously only initial contacts but no working relationships. E = 0: Roll-out of the Dutch Energiesprong approach to more cooperation partners (within the partnership and beyond). Initiation of follow-up project with new partners in NWE including a territorial widening of the approach. HeatNet NWE: Cooperation with other EU low carbon district heating projects and a follow-up project. ECCO: Established the Community Energy Federation for Ireland. cVPP the Mobilisation-and-Replication (MoRe) model supports process moderators who want to support energy communities explore the possibilities of a community-based Virtual Power Plant (cVPP). It helps clarify and address challenges, reduce the complexity of cVPP and the role of energy communities in the energy transition.
Developed and tested tools, pilots, technologies, applications	ACE-Retrofitting: Three tools facilitate the delivery of low carbon activity by retrofitting condominiums including one ICT tool for local authorities to accelerate energy retrofitting. Six pilot cities were involved in developing and testing tools. E = 0: incubator for innovators to activate the supply side of NetZero retrofitting and 'industrialise' the approach. Pilot actions test new financing schemes for private apartment building associations. The six pilot investments and their living labs attain direct learning from stakeholders. This included six DHC transition roadmaps which are available as guidance for other regions. cVPP: Three operating cVPPs have been established and tested, decreasing CO_2 emissions.
Market opportunities	E = 0: 44 houses have been refurbished to NetZero standards and market uptake has started. Scalability is key for the supply chain to invest. This transnational approach in NWE should introduce retrofit products at an industrial scale.
New or better coordinated policies, strategies, local/regional plans across the NWE area	E = 0: It created new funding opportunities from national and local governments in DE, FR and the UK. cVPP: Following significant stakeholder engagement, the Irish Electricity Regulator is starting to change how energy communities and energy citizen can participate in the energy transition. ECCO's local and national partners employed their vast networks with (potential) energy communities as well as local and regional authorities to insert the transnational ECCO legacy into local and regional energy policy initiatives as well as developing local energy communities.

All analysed projects contributed to the **Specific Objective** to implement low-carbo, energy strategies to reduce GHG emissions in NWE focusing on renewables and efficiency while tackling climate change more as an indirect effect of the activities. Two projects were dedicated to promoting energy communities (cVPP and ECCO), cVVP focused on energy management systems. Two projects focused on retrofitting buildings to make them energy efficient (E=0 and ACE-Retrofitting). One project worked with DHC networks (HeatNet NWE). cVPP supported energy strategies rooted on the community-based Virtual Power Plant, a novel model that helps organise local renewable energy production and distribution. ECCO increased the number and effectiveness of local Energy Community Co-Operatives. ACE-RETROFITTING addressed co-owner associations and condominium inhabitants to accompany buildings and people on the energy transition pathway. E=0 aimed at creating sustainable markets for net zero energy retrofits across NWE by transforming residential refurbishment by introducing industrialised and efficient energy solutions. These are based on the *Energiesprong programme* in the Netherlands, which was rolled-out to other parts of NWE. HeatNet focused on supplying renewable and low carbon heat (including waste heat) to residential and commercial buildings, as well as developing and testing in six local DHCs, investments in the six pilots.

The projects address the **challenge** of **energy security and supply**. All projects focus on fully involving stakeholders to increase resource efficiency by enhancing their capacity and ability to develop low-carbon strategies aimed at reducing emissions and optimising energy performance. All projects addressed the public sector as core partners, however one involved them as associate partners for administrative reasons. All projects supported local and regional authorities to set up low-carbon strategies to optimise distribution and consumption of (renewable) energy. Two projects strongly addressed citizens and local communities by enhancing awareness of the importance of energy communities and community virtual power plants, stimulating behavioural changes toward energy efficiency.

All projects fostered an innovative **transnational approach** to energy supply and security.

When we compare the projects and their results under SO2 to 2014-2020 Cooperation Programme goals, the achievements are in line with the expectations.

All analysed SO2 projects addressed ‘soft’ aspects of renewable energy development especially financing feasibility studies and increasing public acceptance accelerating infrastructure deployment. ECCO also increased the share of renewable energy in the production and consumption mix stimulating citizens to set up local energy markets. The original expectation of complementing Regional Operational Programme activities appears only partially achieved and no projects highlighted these aspects.

Comparing the achievements to the initial expectations for SO 2, the following assessment can be made:

Expectation	Achievements by selected SO3 projects	Assessment
Focus	All the projects strongly focused on the public sector, supporting public authorities implementing their low-carbon and energy strategies, also by engaging private initiatives in low-carbon energy and electricity production and distribution.	

Expectation	Achievements by selected SO3 projects	Assessment
Concrete needs	All analysed SO 2 projects corresponded to concrete needs in certain sectors, areas or territories. cVPP: addressed the needs of reducing carbon footprints and low carbon strategies by promoting community energy management systems. ECCO accelerated the growth in effectiveness and numbers of local Energy Community Co-Operatives, by bringing them together and linking them with sources of knowledge from around NWE to overcome barriers they face. ACE-RETROFITTING: increased energy efficiency in buildings. E=0: cost savings and increased efficiency were achieved through better services and supply chain organisation. HeatNet primarily addressed the lack of district heating in NWE by increasing local municipality participation in infrastructure development and planning.	
Leader-follower approach	Projects under SO 2 implemented actions across the entire NWE area, providing opportunities for partners from all regions to participate. The scale-up and roll-out of existing strategies allowed the 'leader/follower' approach for four of five projects (cVPP, ECCO, E=0, HEATNET NWE).	
High social impact for all types of territories and population	One project paid special attention to vulnerable groups, such as tenants, people who do not speak the local language, or with less financial means etc. The inclusion of disadvantaged groups contributes to a just and socially inclusive energy transition. Two other projects generated positive territorial effects on specific territories. Two did not have a specific focus or effects on a specific type of territory or population.	
Expected result of the SO	All five projects under SO2 reduced GHG emissions and increased use of renewables in NWE. Three projects focus on public buildings and infrastructure, one has strong potential to be implemented in social housing. Three projects specifically increased the capacity of public institutions to implement low carbon measures effectively.	
Programme Result Indicator	All projects contributed to the SO2 result indicator 'Effectiveness of the NWE public sector organisations in the implementation of low carbon strategies'.	
Expected Impact of the SO	All the projects contributed enable the public sector in NWE to implement their low-carbon strategies. Additionally, they contributed to at least one of the expected impact categories for SO 2: - increased energy efficiency in the domestic and non-domestic sector; - accelerated use of energy efficiency infrastructure in NWE; - the public acceptance of NWE region low-carbon, energy and climate protection strategies.	
Sectors addressed	Projects tacked several energy topics (distribution, efficiency, public infrastructure, etc.) for public infrastructure / buildings. cVPP: the project also developed the mobility sector, by including electric vehicles and a focus on (innovative) vehicle-to-grid solutions. As such, the project has a multi-sectoral perspective, although the main focus is on energy.	

For **territorial challenges**, projects under SO 2 implemented actions across the entire NWE area, providing opportunities for partners from all regions to participate. The important potential of energy-generating buildings under this SO, especially in urban areas has been confirmed by the outcomes of three projects (ACE-Retrofitting, Heat Net, E=0). cVPP contributed to the development of specific rural regions in the Netherlands, Belgium and Ireland where cVPP pilots were located and replicated. The

outreach of the project and the project results, however, went far beyond new, including students from universities all over the world and energy communities from many European countries, including Southern and Eastern Europe. Four projects applied the leader/follower approach (cVPP, ECCO, E=0, HEATNET NWE): ECCO involved partners from across the NWE area, from 'leading' regions in decentralised community energy management (DE and NL) as well as 'following' regions (UK, BE, FR, IE) where local examples exist and they are developing such strategies. E=0: the project has contributed to knowledge exchange and enabled transfer of know-how from the leading region in The Netherlands to follower regions in France, the United Kingdom and Luxembourg, which have increased their capacity for net zero retrofits. HEATNET NWE: the leader-follower approach is visible in exchanges between more advanced partners such as MijnWater and Aberdeen, for example. All organisations have more DHC skills, especially public authorities in learner regions (Plymouth, Kortrijk, South Dublin). Including rural areas and communities in the projects to strengthen territorial cohesion was considered in one project (cVPP), focusing on farmers as key to decentralising energy supplies. Three types of cVPP address different disparities: rural in Loenen, dispersed in Ireland and social in Ghent. In both Loenen and Ireland, rural areas were connected to the cVPP, increasing their participation in electricity markets and empowering prosumers to take a more active role in the energy system. Including disadvantaged groups contributes to a just and socially inclusive energy transition.

Regarding **target groups and beneficiaries**, all projects involved the public sector and enhanced its capacity and ability to develop low-carbon strategies. Two projects had significant involvement from the private sector (construction companies and energy efficiency providers) and three had good involvement of civil society and social housing organisations. One project involved public authorities as associated partners to avoid delays in the implementation. All projects had an effective mix of organisations in the partnership, even if almost all projects had problems with individual partners who left the during the project. In most cases, problems were solved with new partners.

All projects brought benefits to a wide array of beneficiaries, from public authorities to private organisations (clusters, associations), SMEs and companies to students, teachers and the education sector. For four projects there was a considerable outreach to many beneficiaries and organisations. One outreach went far beyond the NWE area, with interested students from universities all over the world and energy communities from many European countries, including Southern and Eastern Europe.

Following significant stakeholder engagement, one project managed to change how energy communities and energy citizens can participate in the energy transition. This has included introducing a separate community category in the market auction, a new grid connection process for community projects, and signals that community generators will be allowed to sell and share renewably generated power.

Six projects from SO2, and two of the analysed projects benefitted from extra **capitalisation** through the Capitalisation Calls. A review (see section 3.7) shows outputs and results could be significantly increased or transferred to more regions and beneficiaries through capitalisation. Two of the analysed projects collaborated with each other during the capitalisation phase. They explored synergies between the projects, provided a durable link with involved energy communities and methods to establish a wider European network.

All projects mention post-funding strategy strengthening the potential for enlarging Programme impacts in a cost-efficient way.

For **wider impacts**, SO 2 projects contributed to all the impact categories. Only direct and short-term impact contribution could be analysed for this report as it is too early to observe any long-term changes. It is still very early to evaluate the full display of even short-term impacts effects, so the assessment builds on first observations.

Impact category	Evidence from SO 3 projects	Assessment
Better coordination	SO 2 projects contributed to better coordination between stakeholders to work on setting up low carbon strategies with specific efforts between different governance levels. Examples: HEATNET NWE: the transition roadmaps for each pilot region have been crucial for coordination across governance levels and regions. For example, the South Dublin roadmap has now been expanded to include the entire Dublin region and is influencing other district heating nodes. The Flemish pilot is helping the roadmap for the SW Flanders region to become climate neutral. ACE-RETROFITTING: all six pilot cities played important roles due to cooperation between governance levels. Liège is part of the Walloon working group to update the regional long-term strategy for retrofitting the building stock and was a pilot for the Walloon Strategy. The Reno-CoPro platform in Liège can easily be duplicated by other Walloon cities as it was developed in collaboration with the intermunicipal IT system. Frankfurt has become a leader in Germany, sharing information with other German cities and contributing to Hessian ministries work, which has in turn fed into Federal condominium law.	
Use of innovation through better conditions	The projects worked more on social and organisational innovation than on technical innovation by improving conditions for general innovation in the housing and energy sectors. Examples: Improved conditions for innovation in energy communities via cVVP. ACE Retrofitting worked on favourable conditions for innovation by increasing energy efficiency in buildings.	
Governance Capacities of decision makers	Two of the projects contributed clearly to increased capacity for decision makers solving challenges in low carbon district heating and local Energy Community Co-Operatives. Examples: HeatNet NWE: targeted capacity building on low carbon district heating with SMEs and public authorities as well as DHC skill development in partner regions. ECCO One Stop Shop – centralised platform for new ECCOs and developing existing ones.	
Better and efficient processes	Two of the projects improved process efficiency and effectiveness. Example: ACE-Retrofitting: capacity building measures and tool development for the retrofitting of condominiums enhanced skills and facilitated processes of public authorities to work in this field.	

Impact category	Evidence from SO 3 projects	Assessment
Impact on policy agendas, policy changes	Impact on policy agendas and policy changes. Examples: HEATNET: changes in heating and planning legislation in Ireland to better take into account GHG emissions and integrating local district heating systems with waste heat from large producers. ECCO's local and national partners employed their vast national and regional networks amongst existing and potential energy communities as well as local and regional authorities. This included inserting the transnationally built ECCO legacy into local and regional energy policy initiatives as well as the development of local energy communities.	
Liveability, Attractiveness of NWE territories	Almost all analysed projects made regions more attractive by increasing energy security, new work and business opportunities and supporting new value chains. Example: cVPP: including disadvantaged groups contributed to a just and socially inclusive energy transition. REScoop.eu leveraged project results by sharing them through their network of energy communities, NGOs, city representatives and decision-makers.	

SO 2 projects produced a tangible, diverse and positive impact on low carbon strategies in North-West Europe. The results and impacts will be higher, since six projects were not analysed for this evaluation.

3.4 SO 3

SO3 aimed at 'facilitating the uptake of low carbon technologies, products, processes and services in sectors with high energy saving potential, to reduce GHG emissions in NWE'. The Interreg NWE Programme mission was to improve the 'Status of conditions for low carbon technology deployment in NWE' and to 'remove barriers to the adoption of and improved conditions for low carbon technology deployment'.

The Programme has supported 16 projects under SO3, some until the end of December 2023. For this evaluation report, five closed projects have been analysed to determine how they contributed to the SO:

- FORESEA
- LOGiC
- PowerVIBES
- SMART-SPACE
- UP-STRAW

3.4.1 Key findings

Evaluation question	Key Findings
Has the Programme tackled the barriers (technical and non-technical) preventing low carbon technology use? If so, how?	Various projects under SO3 have tackled multiple barriers preventing low carbon technology use. Technical barriers were tackled in different fields include the emerging field of ocean energy (FORESEA), and renewables-based decentral hybrid energy systems (LOGIC). Barriers to smart public lighting (SMART-SPACE), building with straw (UP-STRAW) and renewables-based energy production for events and public occasions (PowerVIBES) were also tackled. At the same time, non-technical barriers were identified and tackled. Sometimes, the projects underestimated the importance of non-technical barriers, such as coordination and awareness-raising with other authorities (PowerVIBES) or informing the general public about the need for change and the benefits of new technology (SMART-SPACE). The lack of skills for a new technology was another barrier addressed by training (UP-STRAW). Administrative barriers within public authorities were tackled especially by SMART-SPACE (street lighting) and PowerVIBES (permits for festivals).
Has the Programme increased the match between the supply and demand for the tested low-carbon technologies/ products/ processes/ services? If so, how?	The Programme has increased the match between the supply and demand for low-carbon technologies. FORESEA clearly improved matches between supply and demand for testing ocean energies under real-world conditions. LOGIC matched supply and demand for decentral hybrid energy systems in energy-remote areas, but unfortunately only managed to present results in one pilot area instead of the three initially planned. PowerVIBES developed a new solution for energy efficiency and less emissions in large-scale events. Supply and demand from festival organisers and technology experts was matched. SMART-SPACE developed a match between supply and demand for new smart public lighting systems in four pilot municipalities with the installation of more than 1 600 LED poles, sensors, communication units and other smart technical equipment. UP-STRAW managed to bring together professionals and experts on straw-building with existing demand on five demonstration sites.
Have the market opportunities for the tested technologies/products/ processes/services been increased for the private sector? If so, how?	Market opportunities for the low-carbon technologies, products and services for the private sector increased through various SO3 projects. PowerVIBES created the GEM tower/stage which opens up new opportunities for renewable energy use at festivals and events. Market opportunities emerged also for the defence industry. In the FORESEA project, the ocean energy TRL could be improved through tests under real conditions. UP-STRAW contributed with multiple results and products to the market for building and insulating with straw. Two other projects had a more indirect influence on market opportunities.
What can be concluded for the territorial cohesion relevant questions raised for this SO?	Five projects applied a leader-follower approach and managed to link strong with weaker regions (FORESEA). Three projects addressed specific territorial needs and potential for energy generation, low carbon technology and energy efficiency. Three projects generated positive effects on specific territories such as remote and rural areas (LOGIC, FORESEA, UP-STRAW), however, one project partially failed, so the effects were limited. One project did not have a specific territorial focus or territorial effects.

Evaluation question	Key Findings
	One SO3 project (LOGIC) also addressed inclusion, considering the energy supply needs and challenges of communities in remote areas. Another project had positive secondary territorial spillover effects due to multiple research and development activities carried out in remote coastal areas (FORESEA). A third project benefitted socioeconomic development in rural areas (UP-STRAW) with added value from using straw bales for construction. The projects and results under SO3 achieve initial expectations and goals.

This chapter presents information and data to answer the evaluation questions.

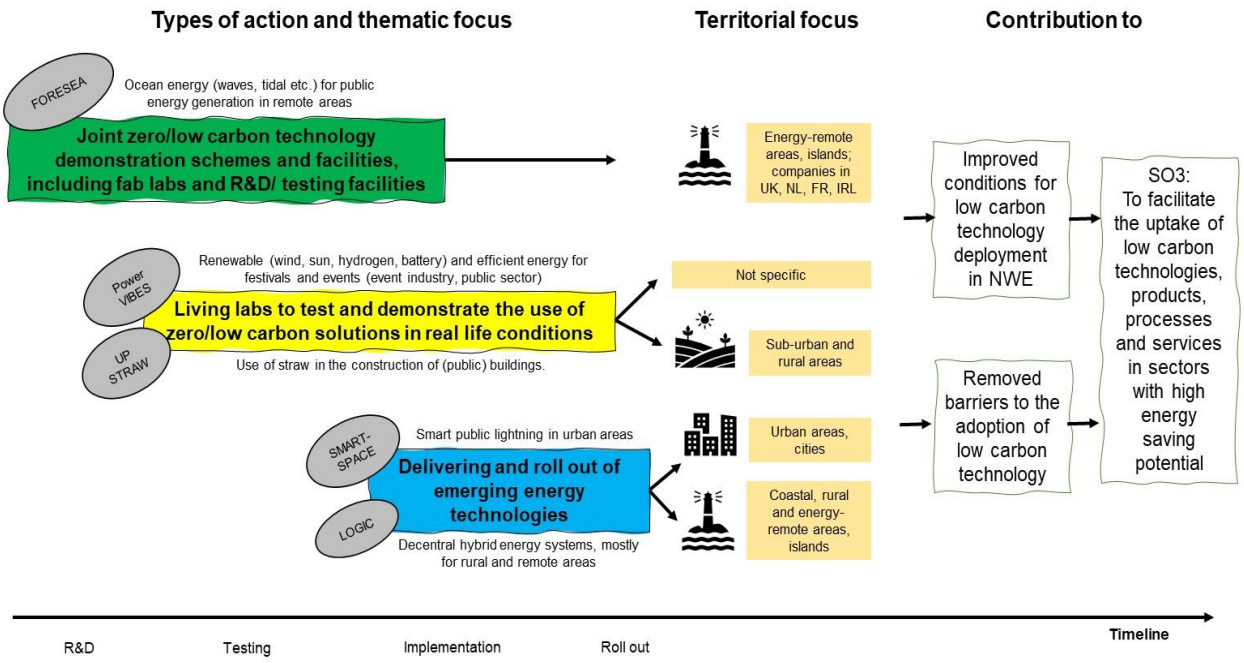
3.4.2 Analysis and evaluation

The projects under SO 3 tackled specific areas of low-carbon technology uptake:

- Joint zero/low carbon technology demonstration schemes and R&D/testing facilities (FORESEA)
- Living labs to test and demonstrate zero/low carbon solutions in real life conditions (PowerVIBES and UP-STRAW)
- Delivery and roll out of emerging energy technologies (SMART-SPACE and LOGIC)

The projects had different thematic focuses and addressed different territories. The diagram below shows how they addressed the SO from different angles.

Figure 3.3 Different dimensions of the project contribution to SO3



Source: own elaboration

The projects under SO3 produced multiple results.

Table 3.2 Examples of Results of SO 3 projects

Type of Result	Examples
Common understanding, raised awareness	SMART-SPACE: Increased awareness of smart public lighting, the energy saving benefits and challenges at municipal level to implementation. Outreach to almost 300 municipalities. PowerVIBES: Efficient, renewable energy use at festivals and large-scale events. LOGIC: On energy poverty of remote areas and decentral hybrid energy systems (DHES) combining renewables, such as wind and solar, with battery storage. UP-STRAW: Multiple publications, databases, information on technical specificities and pilot projects across Europe to raise awareness and create a good common understanding about building with straw.
Improvement of framework conditions	PowerVIBES: Improving communication between research, SMEs, festival promotors and local authorities about energy at festival/event sites. FORESEA: Testing for ocean energy technology under real conditions improved.
Increased availability of data and information	SMART SPACE: Knowledge Centre. Roadmap and toolbox including 1) guidelines for implementation; 2) specifications of smart lighting systems; 3) policy recommendations; 4) procurement standards and 5) implementation tools for large-scale roll-out. LOGIC: Material on decentral hybrid energy systems as well as business cases for eight remote European locations. UP-STRAW: Databases of 1 200 straw projects/buildings in Europe, database of straw building experts and professionals, research database/library of publications on straw, technical tools to help professionals use straw (BIM-Building Information Modelling-3D models, life cycle analysis, etc.)
Enhancement of skills	UP-STRAW: Training courses, cooperation with universities, a teaching plan and training has considerably improved education and training for building with straw in NWE. Training 2 050 professionals and students (architects, constructors and straw craftsman). University modular programme elements made students aware of straw as an insulation material. In total, 6 643 people registered for an online MOOC (free 6-week training course) on building with straw.
Mobilisation and engagement of relevant stakeholders, new cooperations	PowerVIBES: Smart Power Plan for event organisers to design the most efficient energy system for each occasion and eliminate unnecessary energy consumption. FORESEA: 46 enterprises, mainly SMEs, cooperate with research centres on ocean energy. UP-STRAW: ESBA (European Straw Building Association) supports the long-term results of UP-STRAW actions, extending UP-STRAW results with data from other countries, wide dissemination of the results and sustainability of the project results.
Developed and tested tools, pilots, technologies, applications	SMART-SPACE: Demonstrated the impact of smart lighting at four pilot municipalities: Installation of more than 1 600 LED poles, sensors, communication units and other smart technical equipment. PowerVIBES: Development of the GEM tower/stage, testing at 17 sites under different conditions. LOGIC: Test site Texel: Decentral hybrid energy system created (https://logic.lizard.net/dashboards/dashboard). FORESEA: 33 low carbon ocean-related technologies have been tested. UP-STRAW: Five new or refurbished demonstration buildings using straw for projects under public procurement contracts. Documentation on: https://www.youtube.com/watch?v=M6CC-bbF7DI&t=756s

Type of Result	Examples
Market opportunities	PowerVIBES: GEM tower/stage opens new opportunities for renewable energy at festivals/events. FORESEA: TRL of ocean technologies could be improved by tests under real sea conditions. UP-STRAW: Increased availability of straw building knowledge and information on projects and experts. Better matching of demand and supply.
New or better coordinated policies, strategies, local/regional plans across the NWE area	FORESEA: Better cooperation and coordination between ocean research centres and regional governments to promote ocean energy deployment. SMART-SPACE: The new partner FLUVIUS is responsible for local street lighting in Flanders brings spillover effects to other municipalities supporting 'Ledification' of the whole network by 2030.

All analysed projects contributed to the **SO** to facilitate the uptake of low carbon technologies, products, processes or services. However, only three projects tackled sectors with high energy saving potential (two on energy generation and supply, one in construction). One project addressed the public service of street lighting as a (public-private) sector with high energy saving potential. FORESEA focused on existing ocean and tidal energy generation technology as well as related products and services. For SMART-SPACE, public street lighting has high energy saving potential which also reduces CO_2 emissions. Public lighting accounts for 30% of the electricity bill of an average municipality. For LOGIC, there was a moderate contribution to the uptake of low carbon technologies and decentral hybrid energy systems in remote energy areas. The project tackles technical and non-technical barriers to decentral energy systems. The Texel case showed a clear contribution even if this was only one out of three initially planned pilot locations. The project clearly contributed to SO3 and the tools can still contribute to long-term effects. The PowerVIBES project tackled both technical and non-technical barriers that prevent low carbon technology use in festivals/events by sharing test facilities, experiences and best practices as well as building trust on the demand side by proof of performance and extensive communication (e.g. integrating various renewable energies in one unit; assembly, transport to and storage at test sites, event management). UP-STRAW: contributed to the uptake of a low carbon solution in a sector with high energy saving potential (construction).

The projects address the **challenge of energy security and supply**, as described in the Cooperation Programme. All projects focus on low carbon technologies, products, or processes with considerable energy saving potential. Also, the share of renewable energy in generation and distribution is promoted by three of the projects. All projects addressed energy efficiency technology and unexploited energy saving potential. One project directly tackled the energy supply challenge in remote areas, using renewable energy. Two projects tested and developed new low carbon technology (ocean energy, straw as insulation material in buildings) to increase the readiness level of the technologies, reduce the use of fossil-based energy and reduce GHG emissions in the long term.

One of the SO3 projects also addressed the **challenge of inclusion** for communities in remote areas with regard to energy supply. Another project had positive secondary spillover effects due to multiple research and development activities in remote coastal areas. A third project produced a positive effect on socioeconomic development in rural areas by generating added value for straw bales in construction. The projects and their results under SO 3 are satisfactory compared to initial expectations and goals.

All analysed SO3 projects address **specific transnational development needs**. Four out of five projects increase the share of renewable energy in the production and consumption mix. Three of the five projects specifically addressed 'soft' aspects such as more efficient and transparent permit procedures, developing demonstration sites, offering training, increasing public acceptance, and speeding up infrastructure deployment.

Comparing the achievements to initial expectations for SO3, the following assessment can be made:

CP Expectation	Achievements by selected SO 3 projects	Assessment
Focus	All analysed SO 3 projects focused on the uptake of existing low carbon technologies, products and services. Several low carbon technologies could be further developed, tested and rolled out in the NWE area.	
Concrete needs	All analysed SO 3 projects corresponded to concrete needs for energy use or in specific territories for energy security or supply.	
Leader-follower approach	One project (FORESEA) intentionally applied a leader-follower approach and managed to link strong regions with weaker ones.	
High social impact for all types of territories and population	Three projects generated positive territorial effects on specific territories, however one project partially failed, so the effects were limited. One project did not have a specific territorial focus or effects on a specific type of territory or population.	
Expected result of the SO	All five projects produced results that will lead (or have already led) to reduced GHG emissions and pollution and optimise energy consumption and production in NWE. All projects removed barriers and obstacles to market development and deployment of low carbon technologies. Both technical and non-technical barriers and conditions were addressed by the projects, including public acceptance and awareness of new solutions.	
Programme Result Indicator	All projects contributed to the result indicator for SO 3 'Status of conditions for low-carbon technology deployment in NWE'.	
Expected Impact of the SO	All the projects contributed at least to one expected impact for SO3: - an increased match between supply and demand for private sector technologies; - improved market penetration for low carbon technology; - increased share of renewable energy in sectors with high energy saving potential; - accelerated deployment of small infrastructure leading to GHG emission reduction.	
Sectors addressed	The goal to 'target economic sectors with high GHG emissions' was only partially achieved. Two projects targeted energy generation, one targeted the public sector (with a service with high savings potential, street lighting). Two projects targeted the private sector (festivals and events as well as construction) with high potential to save energy and GHG emissions.	

With regard to **territorial challenges**, three projects (LOGIC, FORESEA, UP-STRAW) had a natural focus on coastal, rural or remote (e.g. island) territories. The results and benefits of the projects can be

transferred to other territories, but they are especially useful to support economic development in NWE peripheral areas with energy supply and security. One project focused on rural and sub-urban areas (UP-STRAW). The results and effects can also benefit urban areas. One project (SMART-SPACE) focused on small/mid-size municipalities, but the results can be used in other territorial contexts. One project (PowerVIBES) did not have a specific territorial focus. Three projects addressed specific territorial needs and potential for energy generation, low carbon technology and energy efficiency.

For **target groups and beneficiaries**, all analysed projects widely and directly involved private stakeholders in testing and rolling out technology. In two projects, the public sector was more central due to the services (energy distribution and street lighting). Three projects focused on the private sector to develop and deploy low carbon technology (PowerVIBES, FORESEA, UP-STRAW). All had an effective mix of organisations in the partnership, though in almost all projects there were problems with individual partners, who left the partnership. In most cases, issues could be solved with new partners. All projects involved representatives of the target groups, mostly as associated partners. Involving European associations and federations helped to considerably widen the outreach and dissemination of project results and outcomes and ensured the sustainability of project results. This was observed in three projects (UPSTRAW and the European Straw Building Association, FORESEA with Ocean Energy Europe, and SMART-SPACE with LUCI). There were positive secondary effects with knowledge transfer and spillovers to other European countries and regions through the associations.

All projects brought benefits to a wide array of beneficiaries; public authorities, private organisations (clusters, associations), SMEs and companies, students, teachers and the education sector. Four projects had considerable outreach to a very high number of beneficiaries and organisations.

Four projects benefitted from extra **capitalisation** support. None of these is finalised, so they were not analysed during this evaluation.

The projects had good practices that led to an increased outreach, higher sustainability and continuity of project results as well as a better knowledge transfer to other areas in NWE and Europe.

- Demonstration sites are still available for visitors, explaining impact mechanisms or telling impact stories
- Longer-term contracts ensure services or availability of project results, on the web, in publications or at events and demonstration sites.
- Sector-specific and European associations structure and disseminate knowledge and can widen and extend dissemination or even build new products or services on top of the results.

For the **wider impacts**, SO3 projects contributed to all the impact categories. For this report only direct and short-term impact contribution could be analysed as it is too early to observe any long-term changes. Even for the short-term impacts, it is still very early to evaluate the full effects, so the assessment builds on first observations.

Impact category	Evidence from SO 3 projects	Assessment
Better coordination	SO3 projects contributed to better coordination between different types of stakeholder to deploy low carbon technologies. Especially coordination between political processes, technical knowledge (universities or technical experts from private companies) and user perspectives was a value added of most projects. Examples: PowerVIBES: effective coordination between researchers, technology experts, festival organisers and public authorities (permits, licenses) to facilitate energy-saving at large events and festivals. UP-STRAW: contributed to a better coordination between experts, private companies, research and education, national and regional networks as well as the public sector in the field of low carbon construction with renewable materials (straw).	
Use of innovation through better conditions	Three projects (FORESEA, UP-STRAW, SMART-SPACE) improved conditions for innovation and their use in the private and public sectors. Example: FORESEA: Improved conditions for R&D on ocean energy. Strong and lasting partnership between ocean energy research centres in NWE. The same partnership is already engaged in the follow-up project Ocean Demo (supported by NWE). Partners also cooperate in other projects, financed by INTERREG (different programmes) and H2020.	
Governance Capacities of decision makers	Two projects increased decision maker capacity to solve challenges, for decentral hybrid energy systems and public street lighting. Examples: SMART-SPACE: Increased awareness on potential savings in public street lighting. Roadmaps and methods on how to switch to new systems. Specific guidance increased capacity for 300 municipalities. LOGIC: Practical guidance on decentral hybrid energy systems in energy-remote areas, but only in one location.	
Better and efficient processes	Two projects improved the efficiency and effectiveness of processes. Examples: SMART-SPACE: Successful public sector processes and workflows for planning and installing energy-saving public lighting systems. Methodology on engaging citizens tested in four cities. Municipalities can use the methodology to engage stakeholders in smart light systems. UP-STRAW: The project helped generate the Environmental Product Declaration of Straw in Buildings in the UK.	
Impact on policy agendas, policy changes	Two projects placed topics higher on the political agenda and increased awareness among decision makers. Examples: SMART-SPACE: In all participating countries, strategies have been rolled out for the 'Ledification' of public lighting. The project helps municipalities implement this commitment. FORESEA: ocean energy is now high on the agenda in the UK.	

Impact category	Evidence from SO 3 projects	Assessment
Liveability, Attractiveness of NWE territories	Almost all the projects made regions more attractive by increasing energy security, work and business opportunities and value chains. Examples: SMART-SPACE improved liveability and safety of the public space for all citizens in NWE municipalities. Indirectly, also in at least the four pilot municipalities. LOGIC, potentially adding to a better energy supply and more attractive remote/island regions. UP-STRAW: The sustainable use of a renewable resource such as straw increases the liveability of rural areas. Buildings can be more energy efficient and reduce GHG emissions, while farmers and rural value chains benefit from additional income.	

The SO3 projects produced tangible, diverse and positive impacts for low carbon technologies, products, processes and services in North-West Europe. The results and impacts will be considerably higher, since nine projects under SO3 have not been analysed for this evaluation.

3.5 SO 4

Specific Objective 4 aimed at ‘facilitating the implementation of transnational low-carbon solutions in transport systems to reduce GHG-emissions in NWE'. The mission of the Interreg NWE Programme was to improve the ‘Status of competences of the transport sector in the use of low carbon solutions in the transport systems’ and/or to ‘improve the conception and coordination of low carbon transport and mobility solutions by the sector’.

The Programme supported eight projects under SO 4, some until the end of December 2023. For this report, four closed projects have been analysed to determine how they contributed to SO4 missions:

- CHIPS
- eHUBS
- H2Share
- RIVER

Below, the key findings and responses to the SO4 evaluation questions are presented, followed by a detailed analysis and evaluation of the projects, their outputs and results.

3.5.1 Key findings

Evaluation question	Key Findings
Has the heterogeneity of the public-private partnerships facilitated the conception or coordination of low carbon transport and mobility solutions?	The analysed projects benefitted from similar their partnerships which was key for the conception and coordination of low-carbon transport solutions. One project developed and implemented more efficient traffic management with smart mobility and IT for mobility solutions (eHUBS). Two projects developed new, zero-carbon technologies and solutions bringing them closer to use in NWE transport systems or networks (RIVER and H2Share). One project changed large scale behaviour through new mobility solutions (CHIPS). Large and heterogenic partnerships are necessary for the conception and coordination of low carbon transport and mobility solutions. However, projects are increasingly complex and difficult to manage. Large transport partnerships require large investments even for testing, pilot facilities or solutions. This requires commitment from all partners. Projects have shown that engaging local and regional public authorities with infrastructure and service providers is key to implementing transport solutions, eHUBS and CHIPS have a core partnership. Projects increased the understanding of the role of public authorities in shared urban mobility and the need for public and private mobility service collaboration.
	Projects working on alternative fuels and emergent mobility technology such as RIVER and H2SHARE require a broad partnership with private technology companies, transport operators and regional/national public authorities (for permissions and licences), as well as dedicated research institutes. RIVER addressed transport enterprises through 22 companies collaborating with research institutions. The partnership consisted of different types of private and public partners such as higher education and research partners (e.g. JUNIA), oxyfuel combustion SMEs, inland waterway navigation and control (e.g. Cleancarb) and national public authorities (e.g. Canal & River Trust). H2Share involved private transport enterprises, local and regional public authorities and public transport organisations. VDL built its first rigid truck; Wystrach built its first mobile refueller; Colruyt, DHL and Breytner got experience driving and fuelling trucks. Umbrella organisations such as Hydrogen Europe and WaterstofNet implemented the results in future visions/plans.
Has the Programme helped the transport sector improve their environmental performance and decrease the carbon footprint? If so, how?	The Programme contributed to a potential improvement of the transport sector's environmental performance and carbon footprint in certain transport fields and geographical areas. However, improving the environmental performance of the transport sector is still limited, as any effects can be expected only in the long run and if investments sustain the new and emergent solutions. Further investment and continuing support is needed for research and development projects such as RIVER and H2SHARE. First steps have been made in the projects, but still at the level of research, development and testing. Pilots have started, but it is too early to expect a general change in the carbon footprint of the transport sector. Impacts will also be limited due to the low number of projects under SO4.

Evaluation question	Key Findings
Has the Programme facilitated the shift to more environmentally friendly transport modes, for both passenger and freight transport? If so, how?	The Programme contributed to more environmentally friendly passenger and freight transport. Two projects were active in local passenger and commuter transport, while two projects focused on freight transport via roads and inland waterways. CHIPS addressed the need to reduce transport sector pollution and GHG emissions and for more environmentally friendly transport by developing and promoting cycle highways. eHUBS implemented inner city mobility hubs, a crucial step towards the adoption of shared and electric mobility services. The project reduced GHG emissions and increased environmentally friendly passenger transport. RIVER and H2Share contributed to the progress of research on reducing transport pollution and GHG emissions. H2Share took the first steps of a shift towards more environmentally friendly freight transport by developing and testing a 27-ton rigid truck on hydrogen (the first hydrogen-powered truck in Europe) and a flexible low-energy mobile refueller.
What can be concluded for the territorial cohesion relevant questions raised for this SO?	By definition, transport projects add directly and indirectly to territorial integration. However, connecting territories can have negative side effects with new transport flows and outmigration. Two SO 4 projects (CHIPS and H2Share) contributed to the territorial cohesion with a leader-follower approach and by reducing disparities in hydrogen refuelling infrastructure standards across Member States. Two projects (eHUBS and CHIPS) focused on urban areas and the surrounding hinterland, adding to territorial integration. CHIPS used the leader-follower approach for exchanges between municipalities with more cycling infrastructure and municipalities with those with less. eHUBS provided an alternative to private cars with different modes of transport and partners used a leader-follower approach to introduce the concept to other cities and regions.

The following chapter presents information and data that answers the evaluation questions.

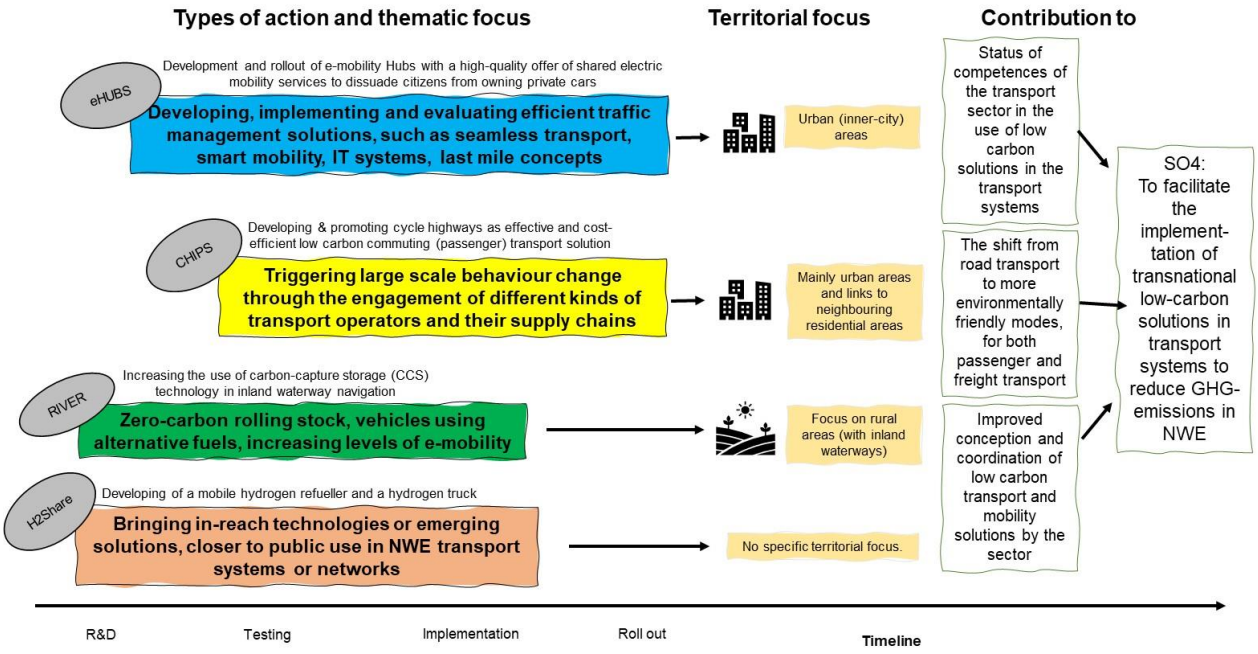
3.5.2 Analysis and evaluation

Projects under SO 4 facilitated transnational low-carbon transport solutions and addressed the following types of action:

- Developing, implementing and evaluating efficient traffic management solutions, such as seamless transport, smart mobility, IT systems, last mile concepts and services, journey planning tools (eHUBS);
- Triggering large scale behaviour change through by engaging different kinds of transport operators and their supply chains (CHIPS);
- Zero-carbon rolling stock, alternative fuel vehicles, increasing e-mobility (RIVER); and
- Bringing in-reach transport technology or emerging solutions, closer to public use (H2Share).

The project had different thematic focuses and addressed different territories. The diagram below shows how the four projects addressed SO4 from different angles.

Figure 3.4 Project contributions to SO4



Source: own elaboration

The Programme has not been able to progress on the type of action 'Optimising transnational logistic chains and systems in transport corridors or transport systems'. Most projects were still doing research and testing on new technologies and low carbon transport concepts. Rolling out new technologies in transnational logistic chains probably was too complex for projects in 2014-2020.

The projects under SO4 produced multiple types of results.

Table 3.3 Examples of Results of SO 4 projects

Type of Result	Examples
Common understanding, raised awareness	eHUBS: The project increased understanding of the role of public authorities in shared urban mobility and the need for collaboration between public and private mobility services.
Increased availability of data and information	eHUBS: Partners worked on standardising data exchange between shared mobility and mobility as service providers and cities. H2Share: Data from the demonstrations helped all partners make steps towards heavy duty hydrogen-powered transport.
Enhancement of skills	eHUBS: Partners increased the capacity of public authority and public transport officials and shared mobility providers among others with eHUBS academy, masterclasses, workshops and the eHUBS blueprint. H2Share: End-users learned to drive hydrogen-powered trucks and local authorities learned to deal with permits for them. RIVER: The project increased the skills of partners in boat construction, energy, chemical, automation, etc.

Type of Result	Examples
Mobilisation and engagement of relevant stakeholders, new cooperations	CHIPS: Policy changes for e-bikes, leverage funding for cycling investments and a new bus line for CHIPS hubs. Improved connections by involving other government levels to close missing links. H2Share: Several partners in H2Share are working together on new project ideas. The project has stimulated additional European calls for heavy-duty hydrogen-powered transport, such as H2Haul (16 trucks) and HyTrucks (target is 1 000 trucks in the Antwerp-Rotterdam-Duisburg area). RIVER: The project established collaboration between 22 companies and research institutions. Some partners will continue their collaboration after the project. JUNIA, University of Bedfordshire and Université de Picardie Jules Verne will continue to work together on oxyfuel combustion. Canal & River Trust, DST Entwicklungszentrum für Schiffstechnik und Transportsysteme e.V. and Stichting STC group will collaborate on electrical motors to replace diesel engines.
Developed and tested tools, pilots, technologies, applications	CHIPS: Five pilot investments supporting cycle highways or improved cycle highway networks. These investments can be used for future national planning and branding. eHUBS: Project partners demonstrated the added value and user acceptance of eHUBS in the pilot cities with different geography, demographics, target groups and transport connections. H2Share: The project developed a mobile hydrogen refueller and a 27-ton rigid hydrogen-powered truck, the first of its kind in Europe. RIVER: The project contributed to a carbon capture and storage technology installed in a container base in Aqueduct Marina.
New or better coordinated policies, strategies, local/regional plans across the NWE area	eHUBS: Some policies were adjusted or developed to facilitate shared mobility in cities. Nijmegen and Arnhem merged the eHub concept with their mobility policy and will continue to have mobility hubs. The project contributed to several Sustainable Urban Mobility Plans. H2Share: The project will contribute to the new European policy on hydrogen.

All the projects contributed to the **SO4** to facilitate implementation of transnational low-carbon solutions in transport systems to reduce GHG emissions in NWE. CHIPS, eHUBS and H2Share significantly contributed to SO4. CHIPS facilitated transnational low-carbon transport solutions by developing and promoting cycle highways, with an approach on designing and planning cycle highways, introducing the maturity assessment tool and a cycle academy. eHUBS contributed to improved coordination of low-carbon transport and mobility solutions by introducing shared mobility hubs. H2Share developed and tested hydrogen-powered transport and a flexible low-energy mobile refueller. These were developed in collaboration with end-users in different regions. A demo plan was co-created with sectoral agencies to ensure maximum involvement of regions, end-users, associations and other stakeholders. The demonstrations built strong visibility, joint experiences and public awareness around hydrogen solutions in heavy-duty transport. A joint H2-roadmap for transport in NWE was developed. The RIVER project contributed to research on carbon dioxide transformation. Methods to transform and recycle CO_2 were developed and tested.

All the projects addressed the **challenge of energy security and supply** to foster an innovative transnational approach. Transport is the fastest-growing sector and the largest consumer of final energy. All the projects contributed to better distribution and consumption of, especially renewable, energy in the transport sector. CHIPS developed and promoted cycle highways as an effective and cost-efficient low carbon solution for urban commuting. eHUBS has kickstarted the mobility transition by providing a critical mass of eHUBS (physical cluster of shared electric transport) and shared mobility.

RIVER and H2Share also addressed the **challenge of boosting knowledge flows** with transport innovations. H2Share developed and tested low-carbon hydrogen-powered transport – a 27-ton rigid truck (the first in Europe) and a flexible low-energy mobile refueller, while RIVER produced significant research on carbon capture and storage technology based on oxyfuel combustion technology which eliminates nitrogen oxides and CO_2 storage. Moreover, RIVER delivered valuable results in the recovery of captured CO_2. However, the main investment of the project, a narrowboat with carbon capture and storage technology was not delivered by the consortium.

All the SO4 projects address **specific transnational development needs**, as defined in the Cooperation Programme. These projects under SO 4 would reduce the environmental impact of transport in NWE. However, this contribution is still theoretical and might take place only in the long run, as most projects are local and still in the research, development and testing phase. No comprehensive changes in the transport sector can be observed at this stage. Long-term contributions might be decreased emissions by implementing eHUBS concept across NWE, improved methods for CO_2 transformation (RIVER), developing and testing hydrogen-powered transport and a flexible low-energy mobile refueller (H2Share) as well as cycle highways (CHIPS). In addition, RIVER and H2Share focused on research and innovation supporting new technologies, products and services.

Comparing the achievements to initial expectations for SO 4, the following assessment can be made:

CP Expectation	Achievements by selected SO 4 projects	Assessment
Focus	The SO4 projects focused on transnational solutions for transport and traffic management systems, to reduce GHG emissions.	✓
Concrete needs	The SO 4 projects addressed the need to reduce transport pollution and GHG emissions and a stronger shift towards more environmentally friendly freight and passenger transport.	✓
Leader-follower approach	Two projects intentionally applied a leader-follower approach and linked strong with weaker regions.	✓
High social impact for all types of territories and population	None of the projects had a relevant social impact. CHIPS indirectly promoted inclusive growth as cycling is the most democratic mode of transport. Cycle highways linking urban centres and employment zones will support inclusive growth as cycling is a much cheaper form of transport than cars or public transport. eHUBS had an indirect impact on tackling inclusive growth by enhancing more affordable transport. Three projects had a specific territorial focus effects, two on urban and peri-urban areas, one on rural areas (with inland waterways). One project did not have a specific territorial focus.	✓
Expected result of the SO	The SO 4 projects improved the conception and coordination of low carbon transport and mobility by increasing institutional capacity.	✓
Programme Result Indicator	Most of the projects contributed to the result indicator, to improve competences in the transport sector to use low carbon solutions. However, due to the few projects under this SO the contribution is low.	—

CP Expectation	Achievements by selected SO 4 projects	Assessment
Expected Impact of the SO	eHUBS, H2Share and CHIPS contributed to the shift from road transport to more environmentally friendly modes in the long run. RIVER did not deliver the narrowboat fitted with carbon capture and storage technology and so did not meet initial expectations.	
Sectors addressed	All the projects involved a diverse mix of active transport innovation stakeholders.	

Under the Cooperation Programme, all regions and stakeholders can participate in actions under this SO since low carbon transport solutions are relevant for the entire NWE area. Actions should target major urban areas, but also peripheral NWE regions. For **territorial challenges**, two projects had an urban focus - CHIPS and eHUBS and one (H2Share) did not have a specific territorial focus. The RIVER project focused indirectly on rural regions as few inland waterways are in urban areas. However, the narrowboat fitted with carbon capture and storage technology was not delivered and the project progressed with research into carbon dioxide transformation, so the contribution to development in rural areas is insignificant.

For **target groups and beneficiaries**, all projects analysed maximised the potential heterogeneous public-private partners. Projects addressed all key target groups: transport enterprises (such as service companies, logistic operators), public transport organisations, households/inhabitants as well as local, regional, national and international government organisations with strategic or regulatory powers for transport. Large and diverse partnerships are necessary to conceive and coordinate low carbon transport and mobility. However, projects become increasingly complex and difficult to manage. Large partnerships for transport require large investments even if only for testing or pilot facilities. This requires significant commitment from all partners. Projects have shown that engaging local and regional public authorities together with infrastructure and service providers are key to implementing transport solutions. This has been the core for projects such as eHUBS and CHIPS. Projects increased understanding of the role of public authorities in shared urban mobility and the need for collaboration between public and private mobility services.

Two of the SO 4 projects benefitted from **capitalisation** support. A review (see section 3.7) shows that outputs and results could be significantly increased and transferred to more regions/beneficiaries through capitalisation. One project was analysed in this evaluation (eHubs). During capitalisation, eHUBS added a new economic sector as well as two regions (Highlands UK and Wallonia BE) to the project and the pilot sites, all different to the existing pilot cities. This brought additional insights in the added value of eHUBS to a modal shift so it can be applied in more NWE cities and situations. Some of the project partners also started a new project, ShareDiMobiHub.

H2Share stimulated projects focused on hydrogen technology. The results of H2Share are used in follow-up projects (H2Haul, HyTrucks) in NWE. Many lessons from H2Share were implemented in the follow-up projects. The aim of H2Haul is to increase the number of trucks. HyTruck aims to go from prototype and research to commercial deployment. H2Share also inspired other Interreg projects such as H2Accelerate and R'HYSE (Interreg Med).

CHIPS's follow-up project Cycle Highway Academy was not approved. However, the Cycle Highway Manual on how to plan and design cycle highways is available on the project website.

For **wider impacts**, SO4 projects contributed to all the impact categories. For this report only direct and short-term impacts could be analysed as it is too early to see long-term changes. For the short-term impacts, it is still very early to evaluate the full effects, so this assessment builds on first observations.

Impact category	Evidence from SO 4 projects	Assessment
Better coordination	eHUBS, H2Share and CHIPS increased the coordination of national and transnational agendas for more efficient low carbon transport solutions. Examples: The eHUBS concept was rolled out to the pilot cities and regions. In the Netherlands, the national government provided funding for more hubs in different cities and the city of Amsterdam has published a 'hubs vision' to establish hundreds of hubs in the city. CHIPS improved cooperation and governance between geographical levels. Sub-partner and associate partner involvement helped the outreach to enterprises and business support organisations.	
Use of innovation through better conditions	All the projects improved conditions for innovation in the transport sector. Examples: eHUBS demonstrated added value and user acceptance in pilot cities with different geography, demographics, target groups and transport connections. RIVER progressed research into carbon dioxide transformation. H2Share developed the first mobile refueller. Technological innovation was key to this project. Together with other NWE projects it helped release the potential of hydrogen for energy storage. Seven NWE projects worked on new hydrogen solutions.	
Governance Capacities of decision makers	eHUBS, H2Share and CHIPS increased the capacity of decision makers to solve challenges. Examples: eHUBS increased understanding of the role of public authorities in shared mobility and policies were adjusted or developed to facilitate shared mobility in the cities. Aligned policies for shared mobility policies enable further rollouts. Cargoroo are rolling out their services to cities throughout Europe. All pilot regions and cities (except Dreux and Kempten) plan to continue and even upscale shared mobility hubs. H2Share's demonstrations helped local authorities to learn to permit hydrogen-powered trucks. More zero-emission regions will be established and lessons from H2Share demonstrations will become even more valuable. CHIPS outcomes are being transferred to the federal level in Regionalverband Ruhr. In the Netherlands, 'Tour de Force' is being developed to stimulate cycling at a higher level.	
Better and efficient processes	eHUBS, H2SHARE and CHIPS projects contributed to more efficient and effective processes and workflows in both public and private sectors. Examples: eHUBS drafted a blueprint to replicate eHUBS experiences in other European cities and regions. H2Share partners highlighted the need for continuous dialogue between partners and Interreg, as well as for more flexible change processes.	

Impact category	Evidence from SO 4 projects	Assessment
Impact on policy agendas, policy changes	Three projects (eHUBS, H2SHARE, CHIPS) contributed to influencing the political agenda with informed policy documents and increased awareness among decision makers. There is no evidence yet that laws or regulations were changed due to Interreg SO4 project results. Examples: eHUBS contributed to several Sustainable Urban Mobility Plans (SUMPs). Some policies were adjusted or developed to facilitate shared mobility in the cities. Nijmegen and Arnhem merged the eHub concept with their mobility policy and will continue with mobility hubs. H2Share's results have been used to create a new European policy on hydrogen. In the European hydrogen strategy, heavy duty transport is recognised as a key area to implement hydrogen power. CHIPS triggered a policy change on e-bikes in the UK. UK regulation considers e-bikes as a motorbike which prevented CHIPS from fully carrying out its pilot. The European Cyclists' Federation is working with DGMOVE on road safety memoranda and regulations that include cycle highways.	
Liveability, Attractiveness of NWE territories	Two projects indirectly contributed to improving the liveability and attractiveness of NWE territories. Examples: eHUBS made cities more liveable, cleaner and more pleasant by encouraging the use of shared electric mobility services and dissuading citizens from using private cars. CHIPS enhanced the infrastructure of cycle highways and strengthened the link between public transport, cycling highways and E-bikes.	

The SO4 projects produced a tangible impact on the implementation of transnational low-carbon transport solutions to reduce GHG emissions in NWE. SO4 projects have widespread short-term effects, but long-term effects and environmental contributions transport sector need additional and long-term investments and changes. The results and impacts are considerably higher, as four SO4 projects were not analysed for this evaluation.

3.6 SO 5

SO5 aimed at 'optimising the (re)use of material and natural resources in NWE'. The mission was to 'improve the status of competences in the resource intensive sectors in NWE for eco-innovation diffusion' and 'accelerate the transition or the NWE economy to a circular model (3Rs – Reduce, Reuse, Recycle) by enabling spill-over effects of eco-innovation in the resource intensive industry'.

Seven closed projects have been analysed to determine how they contributed to SO5:

- AFTB
- ALG-AD
- Fibersort
- FoodHeroes

- Phos4You
- RAWFILL
- SeRaMCo

The Programme has, or continues to, support 23 projects under SO 5.

3.6.1 Key findings

Evaluation question	Key Findings
How and to what extent has the Programme facilitated the removal of barriers to eco-innovation?	Sustainability and circularity were promoted throughout different value chains, testing and demonstrating new techniques and processes that will progress further (all projects) The projects improved the image and raised awareness about alternative techniques and products in different industries, facilitating future use (SeRaMCo, AFTB, ALG-AD, Phos4You). Raised awareness and interest in the circular approach among public authorities and policymakers decreased administrative barriers and might be used more in future (RAWFILL, FoodHeroes, Fibersort). Collaboration with public authorities can help raise interest but stronger political support and legislation are needed to facilitate eco-innovation in resource intensive sectors and many non-technical barriers still need to be tackled.
How has the Programme increased the capacity of resource intensive sectors to eco-innovate?	SMEs could enter new and expanding markets, also to innovate their processes (AFTB, Fibersort, Phos4You) Increased cooperation and exchange along the value chains through intensive networking, also with public authorities, facilitated future collaboration and research (all projects). Involving SMEs matters with the potential to dynamically diversify their processes. The high diversity of sectors increases applicability and ensures long-lasting learning from project results. Some projects encountered technical difficulties in the roll-out and real-life testing, limiting achievements (Phos4You, ALG-AD). The projects highlighted the relevance of transnational exchange for shifting to a circular economy approach due to the cross-border or even global dimension of most value chains.
How has the Programme helped the development and testing phases of solutions that are less material intensive?	Alternative techniques, processes and products were developed and mainstreamed in different value chains, reducing the impact of resource intensive sectors or increasing the circularity and re-usability of material (all projects). Testing and demonstrating the usability of new, innovative techniques and products under real life conditions demonstrates their value and feasibility.
What can be concluded for the territorial cohesion relevant questions raised for this SO?	The projects' connections to the industrial and agricultural sectors enabled implementation and testing in rural, peripheral areas. Most projects did not target specific territories but followed value chain dynamics. Two projects highlighted the territorial diversity (Phos4You, ALG-AD). Two projects focused on more targeted territorial aspects (AFTB, FoodHeroes), but implementation involved more than one type of territory. All projects addressed territorial challenges in different sectors and the nature of the value chains normally determined the territorial focus. Two projects (SeRaMCo and RAWFILL) did not specify a territorial focus but were often located in rural/peripheral/suburban areas due to the sectors involved (landfill mining, construction material production).

The following section presents information and data that answers the evaluation questions.

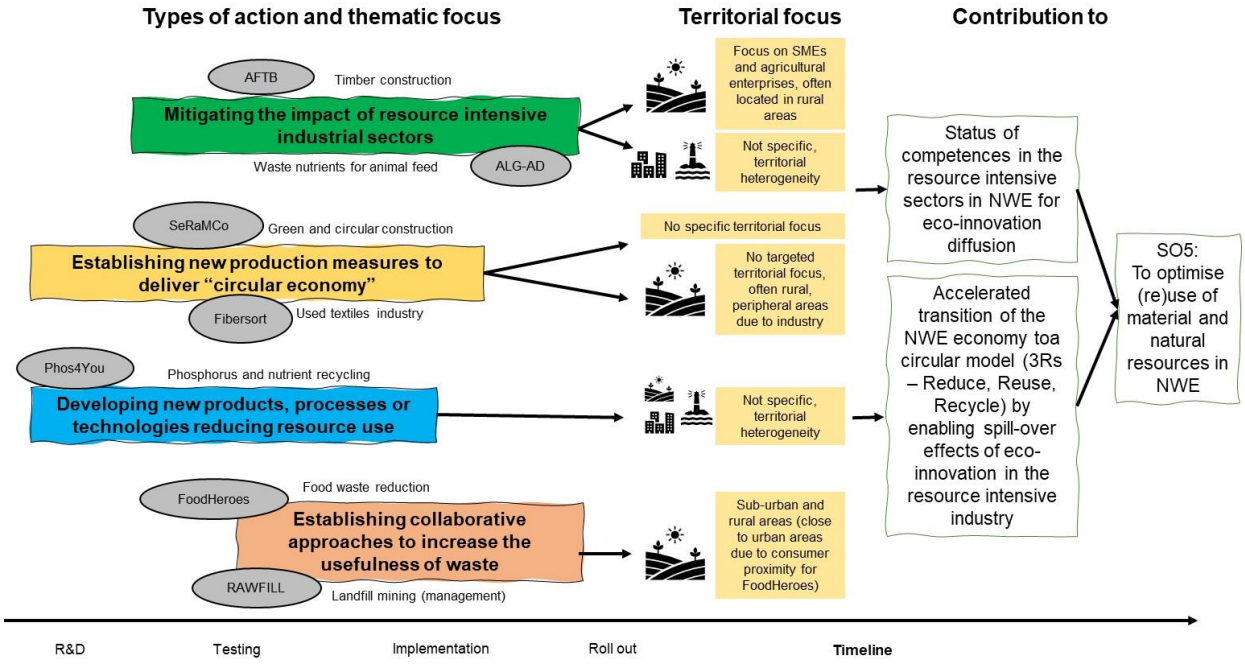
3.6.2 Analysis and evaluation

The projects under SO 5 tackled different areas for the (re)use of material and natural resources:

- Mitigating the impact of resource intensive industrial sectors (AFTB and ALG-AD)
- Establishing new production measures for the circular economy (SeRaMCo and Fibersort)
- Developing new products, processes or technologies reducing resource use (Phos4You)
- Establishing collaboration to increase the usefulness of waste (FoodHeroes and RAWFILL)

The projects had different thematic focuses and addressed different territories. The diagram below shows how the four projects addressed the SO from different angles.

Figure 3.5 Different dimensions of project contributions to SO5



Source: own elaboration

The projects under SO5 produced multiple types of results.

Table 3.4 Examples of Results of SO 5 projects

Type of Result	Examples of Results
Common understanding, raised awareness	AFTB: developed awareness and trust in sustainable, adhesive- and metal-free construction. Fibersort: raised awareness about increasing the circularity in the textile industry. FoodHeroes: raised awareness and interest in technical solutions and business opportunities of reducing food waste. Phos4You: raised awareness about phosphorus recycling among policymakers and stakeholders in the value chain. SeRaMCo: improved the image of recycled concrete as a construction material by demonstrating its durability and stability. ALG-AD: raised awareness and initiated (political) discussions about reusing excess nutrients in anaerobic digestion waste as feed.
Improvement of framework conditions	AFTB: created knowledge about using Engineered Wood Products instead of toxic adhesives and metal. Fibersort: gave policy recommendations on how instruments can accelerate technology to upcycle textiles. FoodHeroes: improved cooperation and exchange between enterprises, research institutions and public authorities on food waste. RAWFILL: initiated cooperation between landfill owners and public authorities, facilitating future landfill mining projects. SeRaMCo: raised interest from public authorities in using recycled concrete to feed into their circular economy goals.
Increased availability of data and information	Fibersort: discovered label inaccuracy of fabrics in Europe. RAWFILL: developed a harmonised framework to measure the economic potential of landfill mining to recover unused material, energy transmitters and land resources. SeRaMCo: increased knowledge about processing construction and demolition waste and using the aggregates for recycled cement a durable and stable construction product. ALG-AD: clarified concerns of anaerobic digestion facility managers related to the policy landscape and financing.
Enhancement of skills	All projects triggered or enabled skill and competence enhancement by disseminating their technology, enabling SMEs to apply it and diversify their processes. SeRaMCo initiated online training for future engineers and architects to promote techniques and raise awareness about using recycled construction and demolition waste.
Mobilisation and engagement of relevant stakeholders, new cooperations	AFTB: mobilised 28 enterprises, mainly SMEs to cooperate on testing and applying adhesive-free wood products; facilitated cooperation and integration of more stakeholders, including researchers, authorities and technical staff for Engineered Wood Products. Fibersort: 10 enterprises and the partnership network created diverse cooperation along the textile value chain. FoodHeroes: facilitated the cooperation of 84 enterprises with research institutions and a new stakeholder network. Phos4You: engaged 72 enterprises to cooperate and involved research institutions and public authorities in phosphorus recovery from wastewater. RAWFILL: supported a network of 116 enterprises, several research institutions and many public authorities; recommended a Landfills Directive, which was not adopted by the European Parliament. SeRaMCo: the network focused on transnational exchange and strong engagement of public authorities. ALG-AD: enabled scientific and practical exchange on the reuse of waste nutrients by integrating algal and anaerobic digestion technology, connected different parts of the value chain even transnationally and enabled collaboration with local and regional authorities.

Type of Result	Examples of Results
Developed and tested tools, pilots, technologies, applications	AFTB: tested sustainable wood construction technologies and applied these in three demonstrations. Fibersort: further tested and upgraded fabric sorting technology. FoodHeroes: promoted and developed 15 solutions to reduce food waste among stakeholders in the food value chain. Phos4You: tested phosphorus recovery technologies in demonstration sites and allowed companies in the fertiliser sector to test the use of recovered phosphors, leading to seven solutions and 22 innovative processes and products from waste materials. RAWFILL: tested landfill mining methods on eight pilot sites and mainstreamed instruments to measure the profitability and potential of landfill mining on over 3 600 sites. SeRaMCo: demonstrated and validated a method to produce concrete (products) out of recycled aggregates with 17 innovative uses of waste products. ALG-AD tested the remediation of excess nutrients in anaerobic digestion waste as feed for the fishing sector at three demonstration sites.
Market opportunities	AFTB: the project network opened international markets for adhesive-free, alternative wood products to SMEs. Fibersort: showed enterprises an opening market of a more sustainable and circular textile industry. Phos4You: opened and expanded the eco-innovation market for stakeholders. RAWFILL: demonstrated opportunities to increase the efficiency and profitability of landfill mining.
New or better coordinated policies, strategies, local/regional plans across the NWE area	Fibersort: enabled cooperation between municipalities and the textile industry by establishing a circular textile hub. RAWFILL: initiated cooperation between landfill owners and public authorities facilitating future landfill mining projects.

All the projects contributed to the **SO** to optimise the (re)use of material and natural resources in NWE and all targeted different resource-intensive sectors. The projects started at different points of value chains to make them more circular. Four projects valorised by-products or waste material (Phos4You, SeRaMCo, ALG-AD, RAWFILL), one project contributed to reusing (waste) products (Fibersort), one project aimed at reducing waste during the production phase (FoodHeroes) and one project developed alternative, less harmful products (AFTB). The contribution varied slightly for each project. FoodHeroes contributed to a more efficient use of (produced) resources by reducing waste during food production and harvesting. AFTB contributed to reducing resource consumption and the use of toxic material by developing less harmful material for the (wood) construction sector. Fibersort did not reach the targets for recycled material but advanced textile sorting technology. Though the target for material recovery was not achieved when the project finished due to the bankruptcy of one enterprise, Phos4You improved the recovery of phosphorus from wastewater and initiated uptake of the technology. RAWFILL contributed to optimising material and natural resource use by promoting waste reduction, advancing resource efficiency and making both more accessible to landfill miners and public authorities. SeRaMCo aligned with the SO goal by focusing on recycling construction waste and producing concrete from recycled aggregates reducing primary material consumption. ALG-AD contributed to the SO goal by initiating the (re)use of a by-product of biogas production, which can only be used for animal feed products in the EU due to nutrient overflow.

The projects under SO5 primarily addressed **resource and materials efficiency**. The projects tackled resource and materials efficiency in NWE regions with their high population and resource consumption. This highlights the importance of more sustainable practices. All projects reached or overachieved – if applicable –targets for the number of efficient natural / material resources solutions (5.01) and the number of innovative uses of waste (5.02). However, three projects underperformed (Fibersort, ALG-AD, Phos4You) regarding the amount of decreased raw material use and material recovery. This indicates that the solutions could be implemented but were not sufficiently advanced for upscaling, market uptake or real-life conditions. However, the projects contributed significantly to developing technologies and processes that facilitate resource efficiency.

Some projects also increased the **innovative capabilities of SMEs** to foster innovation and competitiveness of the region. Two projects overachieved the number of SMEs engaged and fostered collaboration among them or with research institutions. One project found SMEs particularly willing to try new products and services, increasing their competitiveness.

All projects addressed the challenge of **boosting knowledge flows between regions and between stakeholders** in the NWE area. While most projects demonstrated strong validation and cross-sectoral interactions, one project (ALG-AD) faced challenges in enterprise cooperation with research facilities. Nevertheless, the projects achieved initial targets of cooperation with research institutions, promoted circular economy practices, (over-) achieved the targets for enterprises introducing new products. Additionally, all projects reinforced innovation networks.

All analysed SO5 projects addressed **transnational development needs**, mostly resource and material efficiency. While none directly implemented common transnational strategies, they all promoted eco-innovation by reducing barriers, disseminating findings and raising awareness about the opportunities to (re)use material. They also potentially contributed to reduced dependence on imported material, but these effects will unfold only in the long term.

Comparing achievements to initial expectations of the Cooperation Programme for SO5, the following assessment can be made:

CP Expectation	Achievements by selected SO 5 projects	Assessment
Focus	All analysed SO5 projects focused on resource productivity. However, SO5 focused on the implementation and uptake of technology instead of proof of concept (SO1), some projects might have performed better under SO1 (Fibersort). Also, ALG-AD technology as well as demonstrations of other projects could not immediately be taken up further. The majority of projects, however, contributed to the focus of SO5 as they were tested at demonstration sites under real life conditions.	
Concrete needs	All the SO5 projects were aligned with needs identified in the Programme, increasing resource efficiency and placing resource efficiency and the green economy on national and European political agendas by mainstreaming the topics on a large-scale and transnational project platform.	
Leader-follower approach	Three projects (Phos4You, FoodHeroes and Fibersort) applied the leader-follower approach and linked weaker with stronger regions.	

CP Expectation	Achievements by selected SO 5 projects	Assessment
High social impact for all types of territories and population	One project supported SMEs in rural areas, but the projects normally impact the territories indirectly and social effects will mostly be visible only in the long run, since the technologies can make the regional economy more circular and sustainable. Projects under SO5 were limited to that dimension of social impact. However, the contribution to innovation capacity especially in SMEs supports competitiveness and the labour market.	
Expected result of the SO	Not all the projects achieved their targets for waste / material re-used or recycled, which seems related to the early phases of development (testing under real life conditions) and sometimes to a slow market and low demand (Fibersort). However, by enabling eco-innovation, all projects contributed to a knowledge base as well as the up-take of technologies facilitating the move towards a more circular economy.	
Programme Result Indicator	All the projects provide contributed significantly to the Programme result indicator for SO 5 'Status of competences in the resource intensive sectors in NWE for eco-innovation diffusion'.	
Expected Impact of the SO	All the projects contributed at least to one expected impact of SO 5: • to reduce the use of natural resources on its territory; • to help the development and testing of solutions that are less material intensive than those on the market; • to facilitate the application of environmental management requirements in resource intensive sectors in new and increase their environmental awareness and management capability.	
Sectors addressed	The projects targeted food production, construction, textile sorting, phosphorus recovery and fertiliser production as well as solid waste management, and waste nutrient processing. The Programme goal to promote innovative technologies helping environmental protection and resource efficiency in the waste sector, water sector and soil protection or to reduce air pollution and in general resource intensive sectors was achieved.	

For **territorial challenges**, SO5 projects did not focus on specific (types of) regions but selected locations based on economic sectors, value chains and legal contexts. However, project connections to industry and agriculture meant implementation and testing involved demonstration sites in rural, peripheral areas. FoodHeroes focused on losses in food production and involved rural areas close to consumers mainly in urban areas, addressing territorial heterogeneity. One project (AFTB) actively targeted decreased disparities between urban and rural areas, particularly boosting the potential of SMEs in forested, rural regions. Fibersort did not have a specific territorial focus but identified a crucial issue across Europe, the false labelling of textiles, emphasising a challenge that crosses regional boundaries and requires collective (EU-wide) solutions. Phos4You adopted a territorial focus by including countries with different legislation and practices for sewage sludge disposal, involving rural, urban as well as peripheral and port areas. ALG-AD focused on agriculturally influenced NWE territories, with regional digestate and economic differences, emphasising the adaptability of solutions to various regions. This project highlighted its territorial heterogeneity. Two projects (SeRaMCo and Rawfill) did not specify a territorial focus but were also naturally based in rural/peripheral/suburban areas due to the sectors (landfill mining, construction material production). In summary, two projects focused on territorial aspects more purposefully, but all addressed territorial challenges in different sectors. The nature of the value chain and industries addressed by the projects mainly determined the territorial focus.

The **target groups and beneficiaries** involved in these SO5 projects differed and collaboration facilitated knowledge exchange. In all projects, private stakeholders were significantly involved in testing and developing, but enterprises were rarely involved in the partnerships. Most partners were from the public sector. Three projects engaged more extensively with public authorities and / or public (environmental) organisations (AFTB, ALG-AD, Fibersort, Phos4You, Rawfill). Six projects involved higher education and research institutions in their partnerships. Most projects benefitted from knowledge transfer between partners and networking across borders, exchanging on different national practices and legislation. This increases the transferability of project results and a general understanding of applicability in different countries. In alignment with SO5 specifications, three projects included actors across their whole value chains to ensure harmonised processes and dynamics. This increased the variety of stakeholders in projects as well as connectivity and exchange along the whole value chain. Four projects disseminated their results and raised awareness at European level through participation in competitions, platforms and networks, ensuring the sustainability and availability of project results after closure. Three projects involved a considerable number of beneficiaries and institutions.

Eight SO5 projects benefitted from extra **capitalisation** under the Capitalisation Calls. One (ALG-AD) is already finalised and was analysed in this evaluation. It received an extra budget in the CAP initiative to demonstrate the use of microalgae grown on digestate as sustainable fish feed. The capitalisation enabled collaboration with a new economic sector (aquaculture) and created a new market for algae grown from industry waste.

Several projects increased their outreach and the sustainability of project results as well as knowledge transferability to other territories through additional capitalisation practices.

- Continuation and further development of and research on applied technologies;
- Demonstration sites available for involved actors or external representation as a visiting site;
- Involvement in sector-specific European and national associations and platforms that catalyse, shape the discussion and feed into policymaking (Fibersort, FoodHeroes, Phos4You, ALG-AD);
- Tools that make project results easily accessible, transferrable and facilitate experience exchange (databases, guides, e-libraries, recommendations, decision support tools);
- One project organised an international competition (Food Heroes Award) for innovative solutions, which increased outreach;
- Two projects attracted the international market. One project saw interest from the French spirulina sector which is competing with the Asian market (ALG-AD). Another project saw interest from the North American market and Istanbul.

Due to the short time before several projects close, the **wider impacts** will become visible only in the long run. This evaluation could only analyse direct and short-term impacts. However, all projects contributed to the impact categories.

Impact category	Evidence from SO 5 projects	Assessment
Better coordination	The following examples show how the SO5 projects contributed to stronger alignment in political processes and new transnational strategies, enhancing the impact of the projects in the NWE region: 1. Strengthening Supply Chains: FoodHeroes connected regional and national governance levels, empowering farmers and creating a collaborative environment with strong stakeholder engagement, contributing to better coordination. 2. Awareness-raising and starting a discussion: Fibersort's findings about inaccurate textile labelling facilitated discussions on a national and European level, demonstrating the potential to bring attention to industry-wide concerns. 3. Integration along the value chain: Phos4You working across the Phosphorus-recycling value chain involved different geographical levels leading to EU-wide recommendations, which highlights collaboration within the project and its alignment with transnational priorities. 4. Standard approaches: RAWFILL's common framework and methodologies for landfill management facilitated a cooperative transnational market, promoting consistency and interaction among public authorities.	
Use of innovation through better conditions	The projects contributed to the use of innovation through better conditions, aligning with the Programme's expectation for increased use of social, political and technical innovation: 1. Connecting the supply chain: FoodHeroes connected stakeholders along the food supply chain, including technology providers and research institutions. This facilitated the market uptake of innovative technologies. The co-creative approach, and the FoodHeroes Award further strengthened the network. 2. Collaboration: AFTB fostered collaboration between SMEs and research institutions. The project introduced timber construction techniques, provided technical knowledge, and triggered further research, leading to stronger ties between SMEs and research entities. 3. Cross-border and interregional collaboration: SeRaMCo's focus on innovative reuse of waste construction materials led to cross-regional collaboration involving construction companies, producers, researchers and public authorities. This expanded the network, demonstrating successful cooperation to implement innovative practices. 4. Adaptation and virtual communication: All projects faced challenges regarding the covid-19 pandemic. However, this also called for adaptability and sometimes new chances. ALG-AD broadened its stakeholder network by adapting to virtual communication.	
Governance Capacities of decision makers	The project achievements align well with the program's expectation of enhancing the capacity of decision-makers to tackle challenges by providing them with practical solutions and knowledge. The projects' focus on developing tools, sharing best practices and tailoring solutions to specific contexts has empowered decision-makers to make informed and impactful choices. Examples: RAWFILL developed an e-learning tool and an e-library as well as two decision support tools to classify and prioritise projects and mainstream project methodologies. Phos4You provided decision-makers with technical solutions and guidance on how to implement phosphorus recovery from sewage, adaptable to different regional (legal) contexts. The project also gave	

Impact category	Evidence from SO 5 projects	Assessment
	recommendations for national and EU funding bodies on applicants and projects. ALG-AD developed decision support tools targeting waste industry actors to implement the technology.	
Better and efficient processes	All projects enabled stakeholders but focussed on enterprises to optimise their processes by implementing new technologies. The projects focused on the uptake of new technologies and methods, which could be tested under real life conditions in facilities and enterprises, but also further developed and advanced. All the projects were aligned with a more circular economy and the new processes and workflows enabled stakeholders to contribute to that shift and economically diversify as well as make their processes more sustainable. Some projects could not achieve the planned outputs due to technological hindrances and the need for further testing. Examples: FoodHeroes improved food production processes and made them more efficient by reducing harvest losses on the field, increasing the use of fishing by-products and finding alternatives to eliminating male chicks. Phos4You developed a more environmentally friendly alternative to phosphorus extraction from rock, reducing imports and increasing the value of wastewater. SeRaMCo enabled 21 enterprises to introduce new products and contributed to standardising the aggregated products and their production.	
Impact on policy agendas, policy changes	Most of the projects produced output targeted at decision-makers including recommendations for implementing the technology or methods, or the legal context required to facilitate further uptake. ALG-AD and Phos4You contributed to discussions for legislative changes and to the work of the European Sustainable Phosphorus Platform (ESPP) with detailed policy recommendations. However, no further impact on policy agendas from recommendations could be tracked by the projects.	
Liveability, Attractiveness of NWE territories	By focussing on the circular economy and sustainable resource management, the projects contribute to the liveability and attractiveness of NWE territories. While some initiatives are still in the early stages or require up-scaling, their alignment with the Programme's goals contributes to long-term positive impacts on these regions. 1. Strengthening economic performance: AFTB's focus on supporting SMEs in rural (forested) areas directly contributes to economic competitiveness for these regions. Economic diversification, shifting to more sustainable processes and increased cross-sectoral connectivity of enterprises can secure and enhance their economic competitiveness. 2. Ecologically less damaging methods: Phos4You's efforts in facilitating phosphorus recovery from wastewater impacts ecological and social dimensions of NWE territories. By shifting from environmentally damaging extraction and phosphorus imports, the project contributed to more sustainable and resilient resource management. The same goes for ecologically less damaging methods in the construction sector (AFTB) and indirectly by reducing the need for more damaging procedures (SeRaMCo) 3. Circular Agriculture: ALG-AD's focus on the agricultural sector contributes to the attractiveness of NWE territories, which often have a strong agricultural presence. The project's initiative to promote more sustainable and circular use of food and farm waste will potentially impact the economic sustainability of a region.	

The analysed projects under SO 5 contributed to Programme objectives for the (re)use of natural resources and a shift towards a more circular economy. Although some results cannot be seen immediately, the projects enabled progress in various technologies that contribute to the sustainable transformation in NWE. Other long-term effects will unfold such as job creation and economic competitiveness. The impact will be even higher since this analysis could only evaluate seven out of 23 projects under SO5.

3.7 Capitalisation

In February 2019, the Programme's 15th Monitoring Committee approved the Capitalisation strategy. Capitalisation is a process to systematically enable the uptake of results. It looks to identify, capture and enable the uptake of results from actions implemented throughout the Programme. The objective was to increase the uptake of project results and widen their impact beyond individual project level and in line with the long-term effects in project application forms. Long-term effects are beneficial economic, environmental or social effects that occur between 5 and 10 years after the project end-date, extending the project impact.

This requires identifying, collecting and analysing the results, and developing targeted initiatives and activities to stimulate their uptake, including:

- Support for synergies between projects (clusters, clustering events or workshops bringing together similar projects from NWE and other programmes);
- Support replicability of project results (roll-out budgets, maximising uptake of the results to other areas, sectors, organisations);
- Support unforeseen project results (extensions to support benefits and potential not anticipated at the start of the project);
- Raising awareness of stakeholders (policy makers, multipliers, media etc.), specific and targeted communication and events focused on capitalisation.

The capitalisation process should contribute to enhancing the NWE Programme's territorial impact and capacity to reach its objectives. It should also offer a better overview and understanding of NWE project results and the possibility to use this knowledge to shape the future NWE Programme. NWE has developed various tools and activities including organising calls for capitalisation approved in June 2019, open to approved projects within the 2014-2020 programming period. The Programme organised **two calls for capitalisation**. Upscaling or roll-out of project results beyond the initially anticipated was perceived as the best way of boosting the project results, maximising the project and Programme impact.

- Capitalisation Call 1 from October 2019 until January 2020 for projects approved in calls 1 to 4.
- Capitalisation Call 2 from October 2020 until January 2021 for projects approved in calls 5 to 9 as well as the targeted call on renewable energy.

Both calls for capitalisation targeted projects with a solid basis for additional activities and where continued cooperation brought significant added value.

Based on successful project results (foreseen or unforeseen), three directions could be taken by capitalisation initiatives:

- **New geographical areas within NWE**: where a project has successfully implemented solutions in the three countries and proposes to replicate it to other NWE countries, or a project has successfully implemented transformation in urban areas and would like to test or apply it in small towns or rural areas in NWE considering their specific needs.

- **New target group/ stakeholders**: where a project has successfully implemented a process and proposes to address a new target audience or has successfully implemented solutions in the business sector and wants to extend it to the public/non-profit sector.

- **New economic sector**: where a project has developed a technology for one business sector which can be used in another sector or a project focusing on new materials identified unforeseen market opportunities for other products.

For the second capitalisation call, the consequences of the COVID crisis were also addressed. Capitalisation initiatives which tackled the impact of the pandemic were also welcome, even if they did not follow one of the approaches above and as long as they were based on successful project results.

The use of **specific selection criteria** should help to promote projects with large impacts on territories and stakeholders and make this impact visible and measurable.

- Territorial relevance: The capitalisation projects were expected to reduce territorial disparities by rolling out or supporting further uptake of results in territories that either had not yet been covered, were lagging behind (leader / follower approach), or were less developed (e.g. GDP per capita lower than the NWE average).

- Partnership and cooperation: The capitalisation calls asked for justification of the need for transnational cooperation.

- Results: The capitalisation projects should have measurable and quantified outputs and results.

This impact evaluation has analysed and assessed the additional expected impact of capitalisation projects to identify effects on territorial cohesion and transnational cooperation.

3.7.1 Capitalisation projects

In total, 33 projects were approved, for total support of EUR 30 453 403, of those, eight projects were in capitalisation call 1 (of 16 submitted) and 25 projects in call 2 (of 39 submitted).

The distribution per SO is:

Table 3.5 Approved capitalisation projects per SO

SO	No. of approved projects	Total projects per SO	Rate of approved capitalisation projects per SO
SO1	13	44	30%
SO2	6	11	55%
SO3	4	16	25%
SO4	2	8	25%
SO5	8	23	35%
Total Programme	**33**	**102**	**32%**

Source: Data from the JS in May 2023.

The most capitalisation projects come from SOs 1 and 5. SO 2 had the highest share of capitalisation projects. An analysis of the applications shows that most projects chose to extend the uptake or roll-out of their results to new geographical areas. However, projects often also chose upscaling to new target groups and economic sectors.

Three projects had a specific relationship with the consequences of the pandemic (CODEX4SMEs, PASSION-HF and VR4REHAB), all within SO1.

3.7.2 Additional outputs and results from capitalisation

A review of the intended outputs and results shows important contributions from capitalisation. In most cases, these add to existing outputs and results. In some cases, qualitative advances are also foreseen (e.g. new or extended innovation networks or clusters, new focus on products or markets, new pilots, improved technologies, etc.).

Table 3.6 Outputs and results envisaged by capitalisation projects per SO

SO	Examples of output indicator contributions	Examples of expected results
SO1	• 310 additional SMEs receiving support. • 6 solutions (products or services) developed and implemented in real life conditions. • 28 E-mental health implementation pilot actions: 1-2-day in-house eMH implementation training for mental health service providers in rural areas. • 52 000 people assessed (service providers and people with mental health problems) using eMH tools after training and product demos. • The EU CLT network further expanded and reinforced with the expansion of current pilots and integration of new countries. • 3 new transnational clusters of research centres and companies. • Additional 7 tested solutions, 15 enterprises supported, 6 enterprises co-operating with research institutions. • Additional 100 SMEs receiving support and 14 companies cooperating with R&D organisations. • 10 technologies related to algae growth developed and demonstrated, 4 technologies related to algae biomass use developed and demonstrated at pilot scale (Crop protection, Feed or food). • EUR 1 million of funding leveraged (Transnational matchmaking to raise private investment) - Investment from private investors in Covid-19 SME solutions, via online/offline matchmaking events.	• Enhanced impact by rolling out results into rural communities with less access to services and focus on the complexities of eMH integration into existing mental health services. • 4 new CLT country champions, 4 strengthened CLT/ OFS pilots focusing on new topics (social economy, etc.), a viable financial infrastructure channelling EU funds. • Increased demonstration area (the Netherlands and Germany) and adapting the use of UV-C to control pests and diseases. • Reduce chemical treatments of strawberries adding 804 ha of German greenhouses and 780 ha in North-France. • New demand-driven Fast-Track Programme including an extended catalogue of service modules for product development. • 100 new stakeholders in the MATMED ecosystem, 30 new matches, which lead to 10 new collaborations, 6 reaching technology validation phase (TRL 4-5) and 4 reaching technology demonstration (TRL 6-7). • Improved control improves animal welfare and health while safeguarding food safety and increasing productivity. • Development of the marine energy value chain. EUR 6 million leveraged. Realising the 'Marine Energy Hub'

SO	Examples of output indicator contributions	Examples of expected results
	• 2 new clusters, 8 companies benefiting from demonstrations, 2 companies supported to improve and test biological control. • 1 transnational cluster strengthened (Marine Energy Hub), 10 incubators supported and least 4 enterprises from other sectors working with Universities. • Innovative eHealth product DoctorMe and 6 components - DoctorMe will be tested and implemented under real-life conditions in rural areas. In addition, 5 components of DoctorMe will be exploited to increase market access. • 5 additional enterprises receiving support through the accelerator programme. • 5 VR game enterprises involved in challenges developing new products for the new market related to self, -home and primary care.	platform in the harbour of Scheveningen (NL). It will be a vibrant meeting space where stakeholders connect to work on new solutions. • Uptake of DoctorMe by >750 new HF patients in primary care, rural areas and over 75 years-old. Capitalisation of 5 components of DoctorMe in participating regions. • Additional enterprises (rearing, processing, product development) in the NWE insect sector (end project/ after 5 years); Additional insect based marketable feed product. • Focus on COVID-19 rehabilitation (Long COVID) instead of traditional rehabilitation. Potential market is 700 000 patients.
SO2	• 10 solutions: cVPPs to be upscaled or replicated • Expanding the current ECCO development and mentoring framework with entrepreneurial skills and adopting new tools for managing and trading renewable energy so ECCOs can enter the market. • 2 new solutions, small measures in 1 330 SMEs. • 1 new Guidebook and 2 demonstrated methods to increase CO_2 storage capacity in natural peatlands. • 2 financing and scaling mechanisms, at least 20 farmers supported. • 40 houses retrofitted, 8 new solutions.	• Reduce additional 2.4kT CO_2 emissions, create 19 jobs and leverage EUR 1.25 million. • 11 000 tonnes additional reduction of CO_2 emissions. • 1 330 SMEs in 4 NWE countries will reduce their GHG emissions by 12 635 tonnes CO_2/year (average 9.5 tonnes/SME/year) through energy efficiency measures in buildings, leveraging EUR 13 million additional investment. • 330 tonnes of CO_2 equivalent reduced. • EUR 400 000 funding leveraged. • 119.2 tonnes of CO_2 emission reduction per year.
SO3	• 3 pilot sites to scale up energy supply and create a more attractive proposition for electricity grid operators. • Roll out to 100 enterprises. Replace 6 fossil-fuel buses. • Support 10 pioneers, exploiting synergies with existing or new buildings in the UK, Ireland, the Netherlands and Germany. • Fit Hybrid Storage System in 2 IE-UK universities. 20 000 NWE students aware of the project.	• 3 pilot investments result in 2.26 MW additional capacity of RES and 705 tonne CO_2eq/year additional reduction of GHG emissions. • 10 000 tonnes additional reduction of CO_2 emissions. • Avoiding 100 tonnes/year of CO_2.
SO4	• Roll out of eHubs in new regions with new mobility profiles. • Pilots in 5 cities. 50 enterprises to join the testbed collaborative group.	• 308 tonnes of GHG emission reduction. • Urban modal shift will reduce negative impacts of freight deliveries which are 25% of urban transport related CO_2 emissions.
SO5	• 1 tonne of nutrients recovered from digestate and conversion into algal biomass, 1 waste material from anaerobic digestion will be formulated into ingredients for the fish feed industry, 2 enterprises working with the team. • 30 enterprises receiving support, 3 cooperating with research institutions. Network with 100 SMEs, NGOs and other target groups to grow by 50%. • 1 digital marketplace concept for support services, 100 enterprises supported. • 70 construction industry SMEs supported, 1 method tested in 4 live projects and adopted by min. 4 public organisations. • 8 urban vertical farming pilots, 2 optimised conversion technologies, 8 new urban farming strategies. • 50 demonstrations for enterprises (private, recreational, horticultural sector), 10 companies receiving expert guidance. • Introduction of 2 new recovered sewage products.	• Market development for anaerobic digestion sector by proving viability of another potential market (fish feed for aquaculture). • Increase product reuse to 65% after 5 years and 75% after 10 years. • Improve the uptake of FAB measures, as a nature-based solution to reduce natural and material resource use. • Fostering the roll-out of reuse practices in the construction industry in FR, BE, LU and NL. • 200 tonnes Biochar produced for urban farming; 400 tonnes CO_2 reduced. • Replacement of mineral fertiliser by recycling derived fertilisers will reduce NWE mineral fertiliser use by 0.5%. • Reuse of 7 000 tons of sediment to produce the material to be used for demonstration. • 2 new value chains for production using industrial wastewater streams, 3D printed products.

Source: Own elaboration based on data from Capitalisation project application forms, sent by the JS in May 2023.

The diversity of outputs and results, especially for existing processes within the original projects, makes it difficult to aggregate outputs and results only for the capitalisation activities. The review shows that

important learning and reflection must have taken place within the original projects, so capitalisation activities are straightforward and clear in defining their area of upscaling and roll-out.

In direct relationship to the number of approved capitalisation projects, most additional outputs and results can be found under SOs 1 and 5, but also for SO2 there are important additional outputs and results. Additional results of SO2, SO3 and SO4 capitalisation projects generally lead to reduced GHG emissions, while SO1 and SO5 capitalisation results improve market opportunities and uptake of new products, services or technologies. Consolidated value chains and additional leveraged funds are additional results of nearly all capitalisation projects.

3.7.3 Impact of capitalisation projects on transnational cooperation

Capitalisation had a considerable effect on extending partnerships and outreach for transnational cooperation. 50% of capitalisation call 1 and 59% of call 2 projects planned to engage new target groups or stakeholders. In addition, 31% of call 1 projects and 46% of call 2 envisaged additional work with other economic sectors.

The table below demonstrates the diversity of new stakeholder and target groups in the capitalisation activities. The detail of the added value of new partners or new target focus shows these changes are well considered and based on mature decisions. Transnational cooperation should benefit considerably from the capitalisation.

Table 3.7 Effects on cooperation envisaged by capitalisation projects per SO

SO	New stakeholders/ target groups	New economic sectors	Other examples for enhanced cooperation
SO1	• 28 eMH policy cooperation sessions will reach new stakeholders across NWE - i.e. European Psychiatry Association, GAMIAN (advocacy network), EUFAMI (family support), European Network for Workplace Health Promotion, Mental Health Europe. • New partner: The Loiret Department is neighbouring a very developed region in NWE (Ile de France). By extending 'Continuity of Traffic Flow' as a crisis management solution Loiret reduces the gap with its neighbour. • Capitalise on new stakeholders (waste-stream owners in chemical & agri-food sector, companies aiming at circularity). • Expansion of the IPM programmes to include rearing and broiler breeding farms will increase the impact on the poultry sector in NWE. • New target groups: incubators and energy utilities. The acceleration programme will be rolled-out to 10 incubators: Startupbootcamp (NL), PortXL (NL), RockStart Energy (NL), Energy Research Accelerator (UK), Blue Accelerator (BE), Business Ventures Partners (IE), Katapult Ocean (NO), Nordic Innovation Accelerator (SE), and EO Accelerator (GR), and the Energy Incubator Karlsruhe (DE). • New clinical partner (Suffolk) with well-known scientific expertise, a rural area experienced in evaluating digital applications for elderly patients. • New target groups: GP's, occupational therapists and physiotherapists.	• Active targeting of life sciences subsectors (e.g. digital health, nutrition for health). • 'Waste Water tracing' algorithm for sewer and surface water in urban areas will transition to rural, agricultural areas. • At least 50 additional SMEs to benefit from the project in new region/ sector (COVID-19 Dx included). • Expand to a new sector (crop protection, fertiliser), involving new partners, experts in pretreating digestate, crop protection, circularity. • New economic sectors: offshore wind, drinking water, ports and hydrogen. • Transfer knowledge from the food sector to the feed (including pet food) sector. • Focus on a new economic sector (self-, home and primary care), which is a major market.	• Collaboration with the Interreg Baltic Sea project, BiC, via EATRIS as project partner. • Join forces with other projects e.g. MATMED, complementary focus on advanced materials. • Cooperation with three new associate partners, all are major and global health care players, i.e. medical diagnostics (Roche Diagnostics), medical devices and products (Medtronic), and drugs (Boehringer Ingelheim).

SO	New stakeholders/ target groups	New economic sectors	Other examples for enhanced cooperation
SO2	• New target groups : SMEs & industry (Tintelijn in BE; local paper mill in NL; Clare leisure centre in EI), Rental and housing cooperatives (Veluwonen in NL), Rural ECCO communities (farmers Gent region in BE), Distribution System Operator (ESB Networks in IRL). The groups have new assets: (hybrid) heat pumps, storage or EVs that can increase community flexibility. • New partner: Climate Alliance as city network will bring an effective model for cooperation on climate action between local authorities and SMEs at neighbourhood level based on the experiences of 1 700 members in Europe. • Include farmers and farmer organisations as a target group by engaging with them directly and incorporate best practices for carbon savings on farmland. • New pilot sites that differ in geographical location, peatland type and restoration stage. • Incorporating market actors (industry interested in buying peatland products and investors interested in ecosystem services) as a new target group.	• Project is in dialogue with market actors across the value chain (wholesalers, manufacturers, retailers), and with untapped industries interested in peatland investment and products (water utilities, food & beverages, energy, pharmaceuticals).	• Collaboration with NWE ECCO to expands and professionalise local ECCOs. • Ville de Liège becomes formal CANCap partner bringing valuable experience from the NWE project ACE-Retrofitting. • Greifswald University, Germany as associated partner is outside the NWE area but a world leader in peatland science and practice. • Strong engagement with EU sister projects (lead partners of Care-Peat NWE, CANAPE NSR, and LIFE Peat Restore while Natuurpunt, Broads Authority, and NABU are associate partners) and FABulous Farmers NWE will accelerate the uptake of best practices and offer more pilot site data. • In contact with ACE-Retrofitting / RENEW European programmes and could benefit from their feedback on condominium retrofits and schools.
SO3	• New stakeholders, electricity grid operators (EX, and EN) will work with the pilot hosts to integrate the thermal grid with the electricity grid and define the governance structures. • New partner: FarmTech Society (FTS) to strengthen the reach-out to UK, EI and NL.	• Add solar to geothermal as renewable energy source. • Opening to tech-led urban agriculture with UK Urban Agritech, UK's industry body for urban agriculture. • A new sector, education, will implement the system.	--
SO4	• To increase replication, 'Mobipunt vzw' (Flanders BE) is a new partner. Mobipunt vzw specialises in promoting eHUBS and will support cities, regions and municipalities to realise mobility hubs in NWE. • New actors will better connect (digitally and physically) inland waterways to urban multimodal last-mile. POLIS (European network of cities, provinces and regions, transport authorities and urban mobility agencies) as funded partners to engage urban public/private stakeholders. BCLF (Belgian Cycle Logistics Federation) will strengthen the associated partners network.	• An energy service provider as a new economic sector in eHUBS. • Opening up to urban freight transport with Urban hubs operators and eco-friendly last-mile deliveries.	• Synergies with projects such as IWTS2.0 (UWL), SPaCiH (logistics hub/park outside the city connected to rail and inland waterway, with TUL UDE as partner), FENIX, RIS COMEX, LEAD, IW-NET (Charleroi city, Multitel), etc.
SO5	• Additional aquaculture partners as advisors and disseminators. • Free ICT Europe and Techbuyer (secondary IT-market players) join to ensure critical mass and stakeholder engagement. • Engage citizens by developing digital marketplaces that reward farmers for ecosystem services created. • Engage insurance companies and related organisations to set a framework for insuring reused materials. • Adding new stakeholders to target new markets for recycling derived fertilisers, namely 1) horticulture and 2) recreation/ private user. • New end-user targets (municipalities and local public authorities more than sediment managers in ports and waterways).	• New industries: coastal and freshwater aquaculture businesses. • Engage with new economic sectors (food and non-food SME's and enterprises). • New circular economy cases in urban farming. • New sector: horticulture. • Moving from flood and coastal erosion to dam sediment accumulation and sustaining local renewable energy production.	• Synergies with the 2 NWE projects THREE C (which develops products and business from RE-DIRECT feedstock) and GROOF (greenhouses on urban rooftops). • Project cooperation is already lively with GROOF, Phos4You, Nutriman, Nutrirecycle, Systemics, Grassification, Greenresilent, EGHN.

SO	New stakeholders/ target groups	New economic sectors	Other examples for enhanced cooperation
	• Targeting wastewater treatment plants in rural areas. New associate partners Entsorgungs-verband Saar (Saarbrücken) and Scottish Water (Scotland).	• New economic sectors e.g. food processing & packaging industry	

Source: Own elaboration based on data from Capitalisation project application forms, sent by the JS in May 2023.

Spillover effects to new economic sectors are most important for capitalisation projects under SOs 1, 2 and 5. This can be completely different sectors, related sub-sectors or sectors linked through complex value chains. Transfers to new economic sectors seem more difficult for SO3 and SO4 projects.

There are new stakeholder groups under all capitalisation projects. These are mostly additional public authorities in new regions, but also new partners from the private sector, especially from industry, interest groups and sector organisations. Other stakeholder groups for some projects are citizens or NGOs. Many capitalisation projects add regional associations of municipalities or service providers, as this kind of organisations helps increase outreach, dissemination and impact.

There are positive effects also on increased cooperation (a) with other Interreg NWE projects in the same area, or (b) projects and partners outside NWE working on the same topic. This will surely lead to synergies between pilots, new solutions and better knowledge transfer within and outside NWE.

3.7.4 Territorial effects of capitalisation projects

Capitalisation considerably extended regional coverage and transnational cooperation. 56% of capitalisation call 1 and 62% of call 2 projects planned activities with additional territorial coverage or a new territorial focus.

The table below shows the effects of capitalisation on geographical coverage and territorial focus for projects. Almost all capitalisation projects added partners in new regions or countries often extending coverage of the project. Many projects had the leader-follower approach in mind or planned to focus on specific territories (or differentiation between different types of territories) with the additional activities. This is an important added value for the territorial orientation of the Interreg NWE Programme.

Table 3.8 Territorial effects envisaged by capitalisation projects per SO

SO	Additional coverage of countries and regions	New focus on (additional) territory
SO1	• Adding two new partners (Ireland and a region in Germany), leader and follower. • Transnational roll-out of specific products to Ireland and France. • Four new partners from countries outside the existing partnership group: Germany, The Netherlands, Scotland, Ireland. • Roll out of UV-C IPM strategies already in Belgium, France and the UK, now to include the Netherlands and Germany. • Capitalisation will actively support the rollout of the project into new regions with new partners: (1) FlandersBio (2) EATRIS (European Infrastructure of Translational Medicine) (3) EIT Health Germany. • New NUTS2 regions North Brabant, Kassel and Düsseldorf. All are very innovative, but still they can benefit from advanced regions such as Limburg and East Flanders. • Teagasc (Ireland), HS OS (Germany) and Tiergesundheit Bayern (Germany) cover new regions in NWE. • By connecting to the Energy Accelerator in Karlsruhe Germany and the Blue Accelerator in Belgium, strengths of both regions are brought into the project. Collaboration with Business Ventures	• Extending to rural areas complements the initial urban area of Orléans. 'Discovery of natural heritage' reduces disparities by allowing less developed, rural areas, to benefit from Orléans Metropole experience - leader / follower principle. • 5 large eMH implementation/ roll-out seminars for rural communities. • Extending delivery and evaluation of DoctorMe to rural areas, primary care doctors and older (≥75 years) people, where using eHealth is difficult and important: Eifel, Suffolk will include its residential care homes and Primary Care Network for patients (2/3 aged ≥75 years and half in rural areas). Belfast and Dublin will include rural, little populated areas with limited access to health care and

SO	Additional coverage of countries and regions	New focus on (additional) territory
	Partners in Ireland allowed further growth of the sector boosting both the region and country as a whole. Working with the EO accelerator in Greece can capitalise this potential. • Expanding the partnership with partners of the feed sector and a more active role for DE & FR partners in the project. • The capitalisation initiative will include besides the six regions (5 countries) which joined VR4REHAB, two new regions, being Flanders and Southern Ireland. Adding these new regions results in new transnational collaboration, strengthening the VR community and outreach to new companies and healthcare organisations involved in rehabilitation.	Maastricht will link with primary care, in their closer and larger area. • The top 3 region innovation categories (innovation leader, strong & moderate innovator) are represented, joining forces in establishing the NWE region's economic position in VR for Covid-19 rehabilitation.
SO2	• Work in new territories with support of a new partner rescoop.eu, a federation of EU cooperatives to identify and include new mature ECCO communities (e.g. in NL, IRL, and BE) in both types of upscaling and as sources of MoRe insights. • Roll-out to new geographic area of Southern Ireland beyond CAN territories through a new Irish partner. • New regions through new associated partners: Energy Agency of Rhineland-Palatinate (DE) and PP3 City of Arnhem (NL). • New territories: Wales, UK and Brittany, FR. • Upgrading sub partners to full partners, representing 6 countries across NWE (DE, NL, IE, UK, FR, BE) ensuring a strong territorial representation and 4 EU projects. • Two new partners: the city of Raismes and the London Borough of Sutton. These partners test the approach on a standard 1960s two-storey school with high energy and comfort issues, and on 40 2-storey flats.	• Connect current frontrunning cVPPs in BE, NL & IRL with adjacent follower groups in these countries to strengthen the frontrunners and join operating cVPPs. • Energy Agency of Rhineland-Palatinate (DE) to extend the territory from urban to rural areas and bring in experience from 'factor e', an energy efficiency initiative targeting SMEs. • Capitalisation leveraged knowledge complementarity and helped create tailored opportunities in sustainable peatland management, addressing territorial disparities and contributing to cohesive territorial development in NWE (leader-follower approach).
SO3	• Extending existing geographical coverage to Luxembourg. • Additional stakeholders in the Netherlands, UK, Ireland and Germany. • New country (Luxembourg) covered by a new partner, bringing experience in implementing/retrofitting renewable energy solutions and CO_2 reduction. New partner in Ireland with a new pilot site in north-west Ireland, adding to existing pilots in the south of the country (Cork area).	• Adding solar, shows that 5GDHC can work with other sources of renewable energy and can be deployed almost anywhere in Europe. • Strengthened territorial focus on UK and Ireland, still relying significantly on oil and gas for heating and grid electricity.
SO4	• Roll out to one new region (Dublin) and regions lagging behind in cohesion policy (Inverness, Scotland with Hitrans and Wallonia with their transport authority). • Including 4 transnational organisations (POLIS, INE, EFIP, GS1) to support transferability and replicability of results between pilot and other cities.	• Deepen the differentiated concept for different pilot sites and approaches for large, medium sized and small cities. • Extend ST4W beyond terminals and ports up to inner-city centres.
SO5	• Extend CEDaCI to 3 new countries, BE, IE and LU. • Expand activities to include Germany and the West Midlands region. • The project is extending its territorial scope to the NL and LU. • New partner region in Luxemburg. Uptake the RE-DIRECT product and value chains in 8 new circular carbon city pilots in Kassel, Göttingen (DE) Bettembourg (LU), Apeldoorn (NL), Dublin (IE), Cardiff (UK), Rennes (FR) and in East-Flanders (BE). • New project partner a local authority in charge of sediment management (EPTB, France) and new pilot. The Rance estuary is a perfect case study for small and medium municipalities and rural territories. • Participation of a new Finnish partner LAP and Irish partner Trinity College Dublin, with associate partner vanderKroon (Southwest NL) and Looop (Southeast NL).	• Focus on aquaculture in: remote, predominantly rural and predominantly urban territories. • Virtual tools and materials help SMEs in rural and less developed areas to develop knowledge. • Focus on growers in deeply rural, less developed areas of England and Wales. • Focus on peri-urban regions which are ideal spaces for biomass conversion. Within RE-DIRECT they add to a circular urban and peri-urban carbon economy. • Address rural territories and small/medium scale sediment management issues. Such territories lack expertise and financial resources to develop the expertise for sediment reuse strategies and projects. • Targeting many new rural NWE territories.

Source: Own elaboration based on data from Capitalisation project Application Forms, sent by the JS in May 2023.

Additional coverage of countries or regions is part of capitalisation for all SOs. Most projects are under SOs 1 and 5. Many capitalisation projects focus on rural areas, or different urban areas (e.g. inner-city, large cities, smaller towns or peri-urban areas). This applies to all SOs equally.

3.7.5 Effectiveness of upscaling and roll-out of project results

The capitalisation activities have generated important additional outputs and results building on existing projects. The effectiveness of capitalisation projects seems even higher than for 'usual' projects since partnerships are effective and resources can be spent directly on proven methodologies. Expectations from partner organisations (also the newly added) on their role and potential contributions/benefits seem to be clearer, so their integration is easier. Capitalisation projects can multiply impact when they build on tested approaches, processes and structures. However, this might not work for all projects.

There are important positive effects for transnational cooperation, attracting/addressing new target groups and stakeholders and addressing new economic sectors. Apart from new partners from research, academia and public authorities, the following target groups and stakeholder have been added:

- Service providers, e.g. public utilities, water, wastewater, energy, electricity, housing.
- Private business partners, SMEs/companies that can provide services or advice or industrial partners (large companies) to be involved in rolling out new technologies, products or services.
- European networks/associations for engagement, outreach or dissemination and to sustain results after project closure.

Partnerships of capitalisation projects are more focused on implementation and/or dissemination. They have learnt from earlier phases and pilot projects. They know the differences between countries and regions that require more differentiated approaches.

There is a strong positive effect on territorial orientation. Many projects open up or intensify activities in a specific type of territory (mostly rural). Others become aware about the differences between territories and develop outputs and results adapted to territorial needs.

Capitalisation has brought high added value and substantially enhanced the Programme's impact.

4 Contribution to territorial development, cohesion and competitiveness in the NWE area

This chapter examines the links between project results and benefits to territorial cohesion and development. The analysis follows a theory-based approach establishing a logical connection between change in the territory and contributions of results and benefits in the context of external factors.

4.1 Key Findings

Evaluation question	Key Findings
What has been the likely contribution to impact of the NWE Programme 2014-2020 to socio-economic and territorial cohesion changes in the Programme Area?	Projects across all SOs have increased enabling conditions for cohesion: governance capacity, as well as policy and stakeholder cooperation and coordination. Important examples from projects show that the Programme has significantly enhanced capacity and supported cooperation and coordination. Many projects under all SOs have influenced and helped coordinate national and EU policy agendas. Some projects even contributed to policy and legislative changes. For competitiveness and balanced development as dimensions of territorial development and cohesion the Programme contributed significantly in many impact categories. The highest contribution across all SOs is to 'More competitive companies and SMEs'. There was a high contribution also to 'More and better technologies, products and services' and 'Increased attractiveness and quality of life'. These contributions are meaningful and systematic, as they are found across at least three SOs for various projects in diverse thematic fields and geographical areas. Several projects under different SOs contributed to 'Increased capacity level of the public authorities in NWE in implementing low carbon measures', 'Enhancing public acceptance and removing barriers to the adoption of low carbon technology deployment' and 'Generation and/or maintenance of jobs''.
What has been the role of other external factors in influencing changes in the Programme Area?	Major external factors during the 2014-2020 programming period were the COVID-19 pandemic and Brexit. National policies, long-term trends and smaller events may have further influenced indicators and change in the territory as well as impacts from the war in the Ukraine and inflation since 2022. These, however, have not significantly influenced projects that started already early in the programme lifetime. External shocks and global trends affecting EU member states and regions in different ways mean national and regional policy objectives change over time. This may enhance or reduce support for the transnational NWE Programme SOs, including interest in applications to Programme calls. Last but not least, quality of government is an important external factor. This has multiple dimensions from absorption capacity, structures and competences in different countries and levels of government to the implementation of technology.
Has the Programme contributed to an increased coordination of national and transnational agendas? Has the Programme contributed to stronger alignment of national and transnational priorities in political processes?	The Programme has contributed significantly to stronger alignment of national and transnational priorities and better coordination of agendas, especially for business and technological innovation in emerging fields such as health digitalisation, life sciences, bioeconomy, agri-food innovation, low carbon district heating, energy efficient buildings and retrofitting building stock, energy communities, construction, ocean energy, urban mobility, hydrogen-powered freight transport, the circular economy in agri-food, textile and construction industries and waste reduction. Several projects have positively influenced regional and national agendas. Some projects even influenced European level action plans and networks with demonstrations and pilot applications.

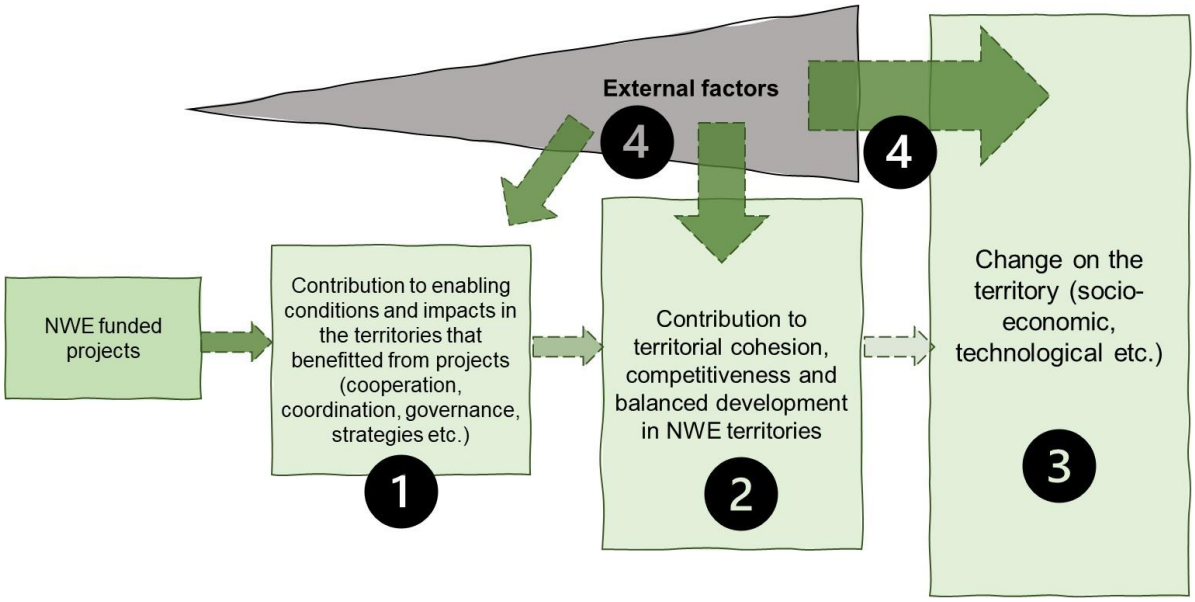
Evaluation question	Key Findings
Has the Programme contributed to an increased use of social, political or technical innovation across all Specific Objectives?	The Programme has contributed to social and technological innovation in many policy fields and economic sectors. Under SO1, many projects stimulated the uptake of technological innovation and digitalisation by SMEs, clusters and public authorities. Other projects improved the conditions for innovation in regional ecosystems for ocean energy, life sciences and bioeconomy. Social innovation and better conditions for social entrepreneurs has brought societal benefits for vulnerable and disadvantaged groups. Under SOs 2, 3 and 4, favourable conditions were created for technological and organisational innovation for energy efficiency and low carbon energy technologies, especially in the housing/construction, transport and productive sectors. Under SO5, many projects helped new collaborations and technological and organisational innovation for resource efficiency and the circular economy in different industries including waste management.
Has the Programme contributed to an increased capacity of decision makers to solving challenges?	The Programme has increased decision maker capacity to solve challenges, especially through guidance, training, advice and pilot demonstrations for local and regional public authorities, the private sector, national authorities and service providers. Capacity increased especially for final beneficiaries in e-health and medical devices, data-driven services based on open data, start-ups in emerging sectors, low carbon district heating, energy communities, LED-based and smart public street lighting, hybrid energy management systems, urban mobility and eHubs, hydrogen-powered trucks, cycling highways, recovery of waste and materials, phosphorus recovery and algae-based technology.
Has the Programme contributed to the application of more efficient and effective processes and work flows in both public and private sector?	The Programme has contributed to more efficient processes and workflows in public and private sectors. New tools, guidance material, libraries, methodologies and blueprints have helped improve the efficiency of processes especially when adapting and implementing new administrative processes and rolling out of local pilot projects. It is too early to detect efficiency improvements in usual processes in the public or private sectors.
Has the Programme contributed to placing topics higher on the political agenda and to the increased awareness of topics among decision makers (on regional, national, European level)? Has this resulted in any changes to laws and regulations?	The Programme contributed to placing topics higher on the political agenda, especially in participating regions (local and regional level), but also sometimes on national and EU policy agendas. Some project policy recommendations for the national and EU levels support topics such as e-mental health, energy communities, hydrogen as an innovative fuel, road safety for cyclists or the sustainable use of phosphorus. NWE projects have often influenced regional policy agendas and supported policy development with pilot implementations and test sites. Regional policies have been influenced for urban mobility hubs and smart public lighting systems. Changes to laws and regulations, influenced by the projects include the Environmental product declaration for Straw as insulation material in constructing in the UK, e-bikes in the UK and a legislative change initiated by the European Sustainable Phosphorus Platform.
Has the Programme contributed to making regions more attractive as a result of economic, ecological, social or structural improvements?	The Programme has made regions more attractive and liveable with economic, ecological, social and structural improvements. These effects have been mostly indirect, such as addressing disadvantaged groups or peripheral and less populated areas, creating new opportunities for business and employment, or improving access to services in such territories. Minor contributions include ecological and social effects that might improve life in certain territories in the long run.

4.2 Analysis and Evaluation

The analysis is based on a stepwise CoA approach. To verify the logical connection between the Programme contribution and the change on the territory, the elements are presented in the sub-chapters below with a concluding assessment of the Programme's role in territorial cohesion and development in the NWE area.

Step 1 describes the contribution to enabling conditions and impacts in territories that benefitted from projects. Step 2 presents the Programme contribution to different dimensions of territorial development and cohesion. The analysis is supported by impact stories and evidence. Step 3 describes how the territory has evolved in recent years with a comparative spatial analysis of selected territorial indicators. Step 4 examines the influence of external factors on conditions affected by the projects and on the territory as a whole. This leads to an assessment of the Programme contribution in the context of the external factors.

Figure 4.1 Elements to be analysed in the CoA



4.2.1 Contribution to impacts of NWE funded projects

Step 1 examines the aggregated Programme contribution to enabling conditions and intermediary factors such as better cooperation, more governance capacity for decision-makers, more efficient and effective processes, agenda setting and the attractiveness of territories. These enabling conditions are the intermediate link which can be directly influenced by Interreg NWE projects and contribute to territorial cohesion, competitiveness and balanced development in NWE territories.

SO-specific inputs of Chapter 3 have been aggregated to show contributions across the Programme.

As seen in Table 4.1 below, projects across all SOs have increased the **enabling conditions for cohesion**: governance capacity, cooperation and coordination of policies and stakeholders. Important examples and stories from projects show that the Programme has enhanced capacities and supported

cooperation and coordination. Many projects under all SOs have helped influence and coordinate national and EU policy agendas. Some projects even contributed to policy and legislative changes.

- Programme contribution to better coordination of national and transnational agendas: The Programme has contributed significantly to better aligned national and transnational priorities and better coordination of agendas, especially for business and technological innovation in emerging fields such as health digitalisation, life sciences, bioeconomy, agri-food innovation, low carbon district heating, energy efficient buildings and retrofitting building stock, energy communities, construction, ocean energy, urban mobility, hydrogen-powered freight transport, circular economy in agri-food, textile and construction industries and waste reduction. Several projects have positively influenced regional and national agendas. Some projects even influenced European level action plans and networks with demonstrations and pilot applications.

- Programme contribution to increased use of social, political, or technical innovation: The Programme has contributed to the use of social and technological innovation in many policy fields and economic sectors. Under SO1, many projects stimulated the uptake of technological innovation and digitalisation by SMEs, clusters and public authorities. Other projects improved conditions for innovation in regional ecosystems for ocean energy, life sciences and the bioeconomy. Social innovation and better conditions for social entrepreneurs has brought societal benefits for vulnerable and disadvantaged groups. Under SOs 2, 3 and 4, favourable conditions were created for technological and organisational innovation in energy efficiency and low carbon energy technology, especially in the housing/construction, transport and productive sectors. Under SO5, many projects created conditions for new collaboration as well as technological and organisational changes for more resource efficiency and circular economy approaches in different industries including waste management.

- Programme contribution to increased capacity of decision makers to solve challenges: The Programme has contributed to increased capacity of decision makers to solve challenges, especially through guidance, training, advice and pilot demonstrations with local and regional public authorities, the private sector, national authorities and service providers. Capacity could increase especially for final beneficiaries in e-health and medical devices, data-driven services based on open data, start-ups in emerging sectors, low carbon district heating, energy communities, LED-based and smart public street lighting, hybrid energy management systems, urban mobility and eHubs, hydrogen-powered trucks, cycling highways, recovery of waste and materials, phosphorus recovery and algae-based technology use.

- Programme contribution to more efficient and effective processes: The Programme has contributed to more efficient and effective processes and workflows in both public and private sectors. New tools, guidance material, libraries, methodologies and blueprints have improved the efficiency of processes especially when adapting and implementing new administrative processes and rolling out local pilot projects. It is too early to detect general efficiency and effectiveness improvements in the public and private sectors.

- Programme contribution to placing topics higher on the political agenda: The Programme helped place topics higher on the political agenda, especially at local and regional level in NWE, but also on national and EU policy agendas. Some projects developed policy recommendations for

the national and EU levels to further support e-mental health, energy communities, hydrogen as an innovative fuel, road safety for cyclists and the sustainable use of phosphorus. NWE projects often influenced regional policy agendas and supported policy development with pilot implementations and test sites. There was influence on regional policies for example on urban mobility hubs and smart public lighting systems.

- Programme contribution to making regions more attractive and liveable: The Programme has made regions more attractive and liveable through economic, ecological, social and structural improvements. These effects have been mostly indirect, for example by addressing disadvantaged groups or territories (such as peripheral or less populated areas) and creating new opportunities for business and employment, or by improving access to services in such territories. Minor contributions through ecological and social effects might improve life in certain territories in the long run.

Table 4.1 Contributions to impacts by analysed projects per SO

Impact Area	SO1	SO2	SO3	SO4	SO5
Better coordination of national and transnational agendas	• UV-ROBOT: putting UV-robotics on the agri-food sector agenda in various regions of NWE. • BioBase4SME: A Memorandum of Understanding includes an outline for future cooperation (e.g. inviting each other to events), and a plan to continue the Bioeconomy network support for SMEs. • B4H: Partners have signed a Memorandum of Understanding to continue cooperation beyond Interreg funding and continue to support SMEs across the NWE area.	• HEATNET NWE: transition roadmaps have been crucial for coordination across governance levels. For example, the South Dublin roadmap has now been expanded to the entire Dublin region and is influencing other district heating nodes. • ACE-RETROFITTING: important cooperation between governance levels. Liège is part of the Walloon working group to update the regional long-term strategy for retrofitting building stock and was as pilot for the Walloon Strategy. Frankfurt shared information with other German cities and contributed to Hessian ministerial work, which in turn fed into the Federal condominium law.	• UP-STRAW: the project contributed to better coordination between experts, private companies, research and education, national and regional networks as well as the public sector for low carbon construction with renewable materials (straw). • FORESEA: pilots and demonstrations helped increase priority of ocean energy on national agendas.	• eHUBS rolled out in the involved cities and regions. In the Netherlands, the national government provided funding to deploy more hubs in different cities. • CHIPS has contributed to improved cooperation and governance at different geographical levels. Sub-partner and associate partner involvement helped the outreach to enterprises and business support organisations.	• ALG-AD: unexpectedly facilitated Flemish Algae Month in May 2022 together with the Flemish Minister of Agriculture, Fisheries and Food. • Fibersort's findings about inaccurate textile labelling has facilitated discussions at national and European levels. • RAWFILL's introduction of a common framework and methodologies for landfill management facilitated a cooperative transnational landfill management market.
Use of innovation through better conditions	• OPIN: the project increased the innovation level of SMEs working on ocean energy. • BE-GOOD facilitated a culture of collaboration and innovation for data-driven services. • B4H: improved conditions for SME innovation. • QCAP: Created conditions to use IoT sensors and big data technology to monitor food quality and support rapid decision making.	• Improved conditions for innovation in energy communities via cVVP. • ACE Retrofitting worked on favourable conditions for innovation through retro-fitting to increase energy efficiency in buildings.	• FORESEA: Improved conditions for technological development of ocean energy. Strong and lasting partnership between Ocean energy research centres in NWE. The partnership is already engaged in the follow-up project Ocean Demo (supported by NWE). Partners are also cooperating in other INTERREG and H2020 projects.	• User acceptance of eHUBS tested in the pilot cities. • H2Share created the conditions to develop and test hydrogen-powered trucks.	• FoodHeroes connected stakeholders along the food supply chain to take up innovative technologies. • AFTB improved collaboration between SMEs and research institutions on timber construction techniques. • SeRaMCo Various innovative precast concrete products have been designed and produced. • ALG-AD 3 pilot investments to cultivate algal biomass using digestate.
Governance Capacities of decision makers	• MATMED: Work Package 4 on Regulatory Framework helps to adapt to changing administration	• HeatNet NWE: targeted capacity building events on low carbon district heating with SMEs and public	• SMART-SPACE: Increased awareness of potential savings in public street lighting. Roadmaps and	• eHUBS increased understanding of the role of public authorities in shared mobility. All pilot regions and	• RAWFILL developed an e-learning tool and an e-library as well as two decision support tools.

Impact Area	SO1	SO2	SO3	SO4	SO5
	and legal requirements for medical devices. • BE-GOOD ecosystem (network) for public authorities at all levels (local, regional, national and transnational) to share knowledge, based on new SME business models. • Boost4Health led to cooperation between national organisations (e.g., Kent County Council and Manchester Growth Company).	authorities as well as DHC skills development in the partner regions. • ECCO One Stop Shop – centralised platform for starting new energy communities and developing existing ECCOs.	methods to switch to new systems. Specific guidance increased the capacity of up to 300 municipalities. • LOGIC: Practical guidance on decentral hybrid energy systems in energy-remote areas, but only materialised in one location.	cities (except Dreux and Kempten) plan to continue with shared mobility hubs and even upscale them. • H2Share's demonstrations helped local authorities learn to deal with permitting hydrogen-powered trucks. • CHIPS outcomes are being transferred to the federal level in Regionalverband Ruhr. In the Netherlands, the 'Tour de Force' platform is being developed.	• Phos4You provided technical solutions and guidance on phosphorus recovery from sewage, adaptable to regionally different (legal) contexts. • ALG-AD developed decision support tools targeting actors of the waste industry to implement the technology.
Better and efficient processes	• UV-Robot: Developed effective UV-C – IPM strategy to control mildew in strawberry, tomato and cucumber crops. • BE-GOOD increased the efficiency of processes with data-driven services.	• ACE-Retrofitting: capacity building and tool development to retrofit condominiums enhanced skills and facilitated public authority processes, which is still new for most of them.	• SMART-SPACE: Successful public sector processes and workflows on planning and installing energy-saving public lighting systems. Methodology on how to engage citizens. • UP-STRAW: helped generate the Environmental Product Declaration of Straw in Buildings in the UK.	• eHUBS drafted a blueprint to replicate eHUBS experiences in other European cities and regions.	• FoodHeroes improved food production processes by reducing harvest losses in the field and increasing the use of fishing by-products. • RAWFILL: Enhanced Landfill Inventory Framework for future homogenisation of landfill databases to facilitate work flows of public authorities and waste management companies

Impact Area	SO1	SO2	SO3	SO4	SO5
Impact on policy agendas, policy changes, new legislation	• SHICC project improved cooperation and governance between different geographical levels on affordable housing. • eMen: the consortium developed eight policy recommendations to support implementation of eMH in Europe.	• HEATNET: changes in heating and planning legislation (e.g. in Ireland) to better take into account GHG emissions and the integration of local district heating systems in waste heat from large producers. • ECCO's local and national partners employed their national and regional networks with local and regional authorities to insert ECCO into local and regional energy policy initiatives. On a national level, project was directly involved in a new national federation for renewable energy communities in Ireland.	• SMART-SPACE: In all the participating countries, strategies have been rolled out for the 'Ledification' of the public lighting. The project also helps municipalities to implement this commitment. • UP-STRAW: Environmental product declaration for Straw as insulation material in UK. • FORESEA: ocean energy now high on the political agenda in UK.	• H2Share's results contributed to the European hydrogen strategy. • CHIPS triggered a policy change regarding e-bikes in the UK. European Cyclists' Federation is working with DGMOVE on road safety memoranda and regulations that include cycle highways.	• ALG-AD examined the EU legislation across the entire microalgae production value chain and investigated the regulatory framework for alternative markets, policy recommendations address the main barriers identified at EU, national and business level. • ALG-AD and Phos4You contributed with policy recommendations to legislative proposals and the work of the European Sustainable Phosphorus Platform (ESPP).
Liveability, Attractiveness of NWE territories	• NWE-Chance brought business opportunities for the novel concept of home hospitalisation improving the quality of life in the regions. • eMEN: promoted more affordable, effective and empowering mental health This means shorter waiting lists, diagnosis procedures and treatment.	• E = 0: 44 houses refurbished to NetZero standards. • cVPP: including disadvantaged groups contributed to a just and socially inclusive energy transition. REScoop.eu levered the project results through their network of energy communities, NGOs, city representatives and decision-makers.	• LOGIC: potentially adding to a better energy supply and more attractiveness of remote/island regions. • UP-STRAW: The use of a renewable resource such as straw increases the liveability of rural areas. Building construction can be more energy efficient, while farmers and rural value chains benefit from an additional income.	• eHUBS project contributed to making cities more liveable, cleaner and more pleasant by encouraging the use of shared electric mobility services and dissuading citizens from using private cars. • CHIPS enhanced cycle highway infrastructure and strengthened the link between public transport, cycling highways and E-bikes.	• AFTB's focus on strengthening SMEs in rural (forested) areas improves local economic competitiveness. • Phos4You's phosphorus recovery from wastewater impacts ecological and social aspects in NWE territories. • ALG-AD's focus on the agricultural sector contributes to the attractiveness of NWE rural territories.

4.2.2 Contribution to territorial cohesion in NWE territories

Step 2 of the analysis presents the Programme contribution to territorial development and cohesion.

'Territorial cohesion' was defined in earlier reports and evaluations for the Interreg NWE Programme. Two dimensions and several indicators were identified in 2017[8] as possible proxies to reflect territorial cohesion. The **dimensions of territorial cohesion** were selected in line with previous deliberations of the NWE Programme and other studies:

Dimension	Coverage	Rationale
Competitiveness	Competitiveness of private sector and territories, smart growth, innovation, R&D, knowledge, education, human capital, attractiveness for skilled workers	'*The issue of education of the population and access to technology seems important to assess the situation of European regions in terms of territorial cohesion. They can reflect the quality of human capital for economic development, but also have a social value independent from any economic consideration*.' (Vandermotten and Van Hamme 2017:31)
Balanced development	Balanced integrated development, inclusive growth, equality, fair and universal access to services and public goods, territorial structure, polycentricity, quality of life, attractiveness	'*We stress that polycentric and balanced territorial development of the EU is key element of achieving territorial cohesion. Where the most developed cities and regions within Europe cooperate as parts of a polycentric pattern they add value and act as centres contributing to the development of their wider regions*.' (EU 2011, TA 2020)

Competitiveness and balanced development are overlapping dimensions of territorial cohesion. Even if indicators were defined for both dimensions, they cannot be clearly separated from each other. For example, 'employment' and 'skilled workers' are relevant for both, as is the quality of life and attractiveness of territories for people and firms.

NWE Projects should contribute to the territorial cohesion objectives of regional competitiveness and balanced development in many ways. However, this is usually at different levels, within a complex process.

For a better understanding of the Programme impact on territorial cohesion and its dimensions, closed NWE projects were analysed with the storyline tool to identify and explain the contribution of a project to wider territorial cohesion indicators. The storyline tool shows that each project contributes along a pathway of causal effects to territorial cohesion. Some projects contribute to a specific goal of territorial cohesion, either competitiveness or balanced development. However, some projects contribute to both. Even if the final contribution is usually very small, an effective contribution can be visualised and justified with the storytelling tool (see Annex A.2).

As **categories of territorial cohesion**, the storylines identified:

[8] Spatial Foresight (2017): Task 4: Co-development of a territorial cohesion indicator system, facilitating the Programme performance and impact evaluation. Final Report. Elaborated for Interreg NWE Programme 2014-2020.

- More competitive companies and SMEs through new technology as well as improved processes and products;
- More and better suited technologies, products and services;
- More resources and people dedicated to R&D of measures;
- Using innovation and R&D to promote social innovation and inclusiveness;
- Increased capacity of public authorities in NWE to implement low carbon measures;
- Increase the share of renewable energies and energy efficiency levels;
- Promote green public procurement;
- Enhance public acceptance and remove barriers to the adoption of low carbon technology;
- Better capacity in the transport sector to use low carbon solutions;
- Facilitate resource efficiency and a more sustainable use of natural resources;
- Mitigate negative environmental impact of resource intensive industries;
- Accelerate transition of the NWE economy to a more competitive circular model;
- Generate and maintain employment;
- Increase the attractiveness and quality of life in NWE territories.

Table 4.2 shows the contribution to the impact dimensions of territorial development and cohesion.

All impact categories are addressed by projects in at least one SO. The highest contribution across all SOs is to ‘More competitive companies and SMEs’.

There is a high contribution also:

- ‘More and better technologies, products and services’.
- ‘Increased attractiveness and quality of life’.

The Programme has contributed to all territorial development and cohesion categories, especially:

- ‘Increased capacity level of the public authorities in NWE in implementing low carbon measures’.
- ‘Enhancing public acceptance and removing barriers to the adoption of low carbon technology deployment’.
- ‘Generation and/or maintenance of jobs’.

The contribution can be considered as meaningful and systematic when it comes from several projects, or across at least three SOs for various projects as well as diverse thematic fields and geographical areas.

Box 4.1 Example for NWE systematic contribution to ocean energy competitiveness

The FORESEA project (2016-2019) has deployed 33 low carbon technologies, more than any other project. It helped developers leverage nearly EUR 70 million, all injected directly into the ocean energy sector. The project tested new technology under real sea conditions and made a clear contribution to offshore renewable energy technology development. A follow-up project OCEAN DEMO was launched in January 2019. BLUE GIFT was inspired by FORESEA and implemented the same methodology in Southern European countries. Different Interreg NWE projects (FORESEA, OCEAN-DEMO, MEA, ITEG and OPIN) built important competence in ocean energy. They demonstrated that promoting ocean energy has economic effects for coastal regions. The competitiveness of ocean energy test facilities and hosting regions are an important competitive advantage for NWE.

Box 4.2 Example for NWE systematic contribution to removing barriers for deployment of low carbon energy production in energy communities

Interreg NWE 2014-2020 has systematically supported the development of energy communities. ECCO accelerated local Energy Community Co-Operatives, especially in rural areas, helping the 'Clean Energy for all Europeans Package', to trade the energy they produce in the renewable energy market. cVVP developed Community-based Virtual Power Plants to assist energy communities in real-time with smart supply and demand management in local networks. The project sought to empower prosumers and energy communities. Its efforts have been rewarded by winning the EU Sustainable Energy Citizens Award 2020 and the IE&IS Valorization Price 2020. Both projects connect with Rescoop, a European federation of over 1 500 cooperatives, who use project results in their communications with members.

Table 4.2 Programme contribution to territorial development and cohesion

Categories	SO 1	SO 2	SO 3	SO 4	SO 5
More competitive companies and SMEs	• ASPECT, BioBase4SME, QCAP and other projects: innovation services, small-scale funding and support to innovation with and for SMEs	• E = 0: SMEs could develop new markets and cooperation. • HeatNet NWE: SMEs could develop new markets and cooperation.	• FORESEA, SMART-SPACE and PowerVIBES: companies in innovative fields working in emerging markets.	• eHUBs: support to SMEs working with urban mobility hubs and sharing mobility systems.	• **All projects** worked with innovative companies: diversified products, enhanced economic performance and resilience and optimised processes.
More and better technologies, products and services	• ASPECT, QCAP, MATMED, MACHINING 4.0, COTEMACO, UV-ROBOT, BE-GOOD: better processes for product quality	• cVVP: Improved smart energy management technology used by energy communities.	• FORESEA, SMART-SPACE and PowerVIBES: new energy generation and lighting technologies tested and installed.	• H2SHARE, RIVER: knowledge creation of hydrogen-powered trucks and combustion technology for diesel engines.	• **All projects** developed new technologies which have been tested and sometimes installed.
Increased resources and people for R&D	• BioBase4SME: support bioeconomy R&D. • B4H: support life sciences. R&D				• ALG-AD: R&D on high value algae using food and farm waste.
Innovation and R&D for social innovation and inclusion	• SHICC: widening the application of new model for affordable (social) housing. • eMen: e-mental health services. • NWE-Chance: eHealth applications for home hospitalisation of heart patients.				
Increased low carbon capacity in public authorities		• ACE-Retrofitting: more condominiums retrofitting • HeatNet NWE: more low-carbon district heating. • E = 0: public administrations as associated partners learn about retrofitting in social houses.	• LOGIC: public authority capacity increased on decentral hybrid energy systems in energy-remote areas. • UP-STRAW: capacity in public authorities on building with straw.	• CHIPS: knowledge creation through new tool & Cycle Highway Academy training	

Categories	SO 1	SO 2	SO 3	SO 4	SO 5
Promotion of green public procurement			• SMART-SPACE: capacity developed for green public procurement of public street lighting systems. • LOGIC: capacity developed for green public procurement of decentral energy systems.		
Enhancing public acceptance for the adoption of technologies		• ACE-Retrofitting: involving co-owner associations and condominium inhabitants in transition pathways	• SMART-SPACE: methods of participation and the relevance of engaging citizens.		• SeraMCo: improved image of recycled, aggregated cement. • AFTB demonstrated the stability of adhesive-free wood products.
Increased share of renewable energies and more energy efficiency		• E = 0 & HeatNet NWE: Investments in energy efficiency and low-carbon district heating respectively.	• SMART-SPACE: more energy efficiency in public lighting systems. • LOGIC: share of renewable energy increased. • FORESEA: share of renewable energies increased. • PowerVIBES: share of renewable energy increased.		
Low carbon solutions in the transport systems				• CHIPS: better coordination of multi-modal commuting. • eHUBS: low carbon urban mobility.	
Mitigated impact of resource intensive industrial sectors	• QCAP: sensors to reduce waste in agrifood sector.				• Phos4You: reduced phosphorus pollution. • AFTB: less toxic material use. • RAWFILL: less waste in landfills. • SeRaMCo: promoted the use of recycled construction material.

Categories	SO 1	SO 2	SO 3	SO 4	SO 5
Resource efficiency and sustainable use of natural resources	• QCAP: sensors to reduce waste in agrifood sector.				• Phos4You: facilitated use of recycled phosphorus from waste water. • FoodHeroes: less food waste by increasing the value of products. • RAWFILL facilitated reuse of material from landfills. • AFTB: less fabric waste.
Accelerated transition to a circular model	• BioBase4SME: Bioeconomy business models based on a circular model.				• **All projects**: reducing waste and facilitating the (re-)use of recycled material.
Generation and/or maintenance of jobs	• QCAP: jobs for prototyping and attracting high-tech staff from outside the EU • **Various projects**: support to SMEs helps create new jobs in emerging sectors such as life sciences.		• FORESEA: jobs created or maintained in research about ocean energy.		• **Various projects** contributed to new activities, job profiles and knowledge that might increase employment in traditional sectors such as agri-food, waste management, construction, textiles, HORECA.
Increased attractiveness and quality of life	• SHICC: alternative models for affordable housing. • NWE-Chance: home hospitalisation adding to the quality of life in regions. • eMEN: more affordable and effective mental health care and better access to medical treatment in peripheral areas.	• ACE-Retrofitting: identification of poor fuel households in an involved city. • E = 0: including social housing helped improve quality of life for tenants. • HeatNet NWE: including social housing helped improve quality of life tenants. • ECCO and cVVP: contribution to energy autonomy for peripheral territories.	• FORESEA: New economic opportunities for coastal and peripheral regions where ocean energy sites are located. • LOGIC: better connection to energy generation services based on renewable energy and hybrid systems.	• CHIPS: more and better low-carbon commuting alternatives.	• **Various projects** provide new business and job opportunities for sectors based predominantly in rural areas (agri-food).

4.2.3 Change in the territory: evolution of development indicators 2014-2023

Step 3 of the CoA describes how the territory has evolved in recent years. Territorial cohesion indicators were agreed in preparatory actions to this evaluation. A baseline was established and calculated in 2017. These territorial cohesion indicators have been analysed again for this evaluation. The indicators and their evolution are included in Annex 1. Below is a short summary of the evolution of indicators.

Recent data shows that the NWE Programme area performs better than the rest of the EU for all Competitiveness Indicators (letter 'C') and most of the Balanced Development Indicators (letter 'B'). This has not changed since 2014. For a few indicators, the gap between the NWE Programme area and the rest of the EU has decreased. This indicates cohesion within the EU. Nevertheless, it may also indicate a loss of competitive advantage in the NWE Programme area for these indicators. Table 4.3 summarises the assessment of change.

Table 4.3 Evolution of NWE in relation to the EU

Indicator	NWE in the EU in 2014	NWE in the EU 2023*	Assessment of the change
C1. Intramural R&D expenditure	POSITIVE	POSITIVE	The change was similar so disparity remained the same.
C2. Well-educated economically active population	POSITIVE	POSITIVE	The change was positive in both areas, however stronger in the NWE Programme area.
C3. Innovative SMEs collaborating with others	POSITIVE	POSITIVE	The change was higher outside NWE regions; so the disparity slightly reduced.
C4. Employment rate in technology and knowledge-intensive sector	POSITIVE	POSITIVE	The change was similar between NWE and other EU regions;, maintaining the disparities.
B1. Employment rate	POSITIVE	POSITIVE	Positive change was stronger in other EU regions, however, the NWE baseline was higher in 2014 and remained higher in 2022.
B2. Population change - crude net migration	POSITIVE	POSITIVE	The NWE average increased and was positive in 2021 compared to a negative average for the other EU regions; increasing the disparities.
B3. People at risk of poverty	POSITIVE* analysed with national data	POSITIVE	Even though there was an increase in people at-risk-of-poverty across NWE regions, in 2020 the average was still lower than for other EU regions.
B4. Life expectancy	POSITIVE	POSITIVE	There was a decrease across NWE regions, as well as other EU regions, however the stronger decrease in other EU regions means average NWE life expectancy remains higher than the other EU regions and the distance has increased.
B7. Use of internet for interaction with public authorities	POSITIVE	POSITIVE	The change was greater in other EU regions, however, the NWE average remains higher.
B8. Municipalities covered by the Covenant of Mayors	NEGATIVE	Not possible to measure	Not possible to measure due to the shift to regional data for NWE.
B11a. Change in land-use towards artificial surface	POSITIVE	NEGATIVE	The change in land use towards artificial surfaces increased in the NWE and other EU regions, however the NWE average exceeded the EU average.
B11b. Change in land-use from artificial surface	N/A *new Indicator	NEGATIVE	Positive change has been stronger in the other EU regions.
B12. Annual road freight transport	NEGATIVE	POSITIVE	There has been a decrease in average road freight transport in NWE compared to an increase in other EU regions, reversing the relationship between the NWE area and other EU regions.

Source: Annex 1. *see Annex 1 for the reference years for each indicator.

The majority of indicators show significant disparities within the NWE region. Even though some became more balanced, strong national patterns remain. This is similar for other European regions. Table 4.4 provides a summary of change in the NWE region.

Table 4.4 Evolution of NWE area within itself

Indicator	Disparities in 2014	Disparities in 2023*	Assessment of the change
C1. Intramural R&D expenditure	HIGH	HIGH	The changes had a significative negative impact in different countries, reducing cohesion.
C2. Well-educated economically active population	HIGH	HIGH	The changes seem to have no significant effects on cohesion in NWE.
C3. Innovative SMEs collaborating with others	HIGH	HIGH	A general positive change that reduced disparities between regions.
C4. Employment rate in technology/knowledge-intensive sector	HIGH	HIGH	Changes were uneven across the territory, reducing cohesion.
B1. Employment rate	HIGH	MEDIUM	Change was mostly positive.
B2. Population change - crude net migration	MEDIUM	MEDIUM	Change very different across the NWE territory but with a slight shift towards more balanced migration.
B3. People at risk of poverty	MEDIUM	MEDIUM	Reductions in NWE regions, with a slight decrease in social disparities.
B4. Life expectancy	HIGH	HIGH	Life expectancy variation increased across NWE regions, implying rising disparities.
B7. Use of internet for interaction with public authorities	MEDIUM	HIGH	Change differed across the regions. Despite some reductions, the general change was positive. However, disparities have increased.
B8. Municipalities and groups of municipalities covered by the Covenant of Mayors	MEDIUM	HIGH	Change was uneven across the regions with an outstanding increase in Belgium, resulting in more disparities.
B11. Change in land-use towards artificial surface	HIGH	HIGH	Very large differences in artificial surface increases across the Programme area.
B11. Change in land-use towards more natural surface	N/A	LOW	Change was stronger in a few regions, but small for the large majority.
B12. Annual road freight transport	HIGH	HIGH	Changes uneven across the territory, with only slightly reduced disparities.

Source: Annex 1. *see Annex 1 for the different years of reference for the data for each indicator.

The evolution of development indicators in the NWE area 2014-2023 shows that:

- Indicators related to **technology and innovation** showed increased disparities compared to the 2014 baseline, reducing cohesion. These are ‘C1. Intramural R&D expenditure’ and ‘C4. Employment rate in technology and knowledge-intensive sector’.

- Disparities of **social and health indicators**, ‘B3. Population at-risk-of-poverty’, and ‘B4. Life expectancy’ differed, less disparities for the first and more for the second. These indicators might have been affected by external influences, such as the COVID-19 pandemic and Brexit.

- The indicator ‘B2. Population change’ might also have been influenced by these external events, but showed more cohesion as **migration flows** became more evenly spread across the region.

- Some **environment** indicators highlighted increase disparities. Indicator ‘B11. Change in land-use towards artificial surface’ demonstrated increased disparities and seems to be subject to national influences. The indicator ‘B12. Annual road freight transport’ showed uneven changes across the NWE territory, but with no considerable changes to the disparities.

- Overall, competitiveness and balanced development of NWE is still positive. NWE is a strong region within the EU. This has not changed since 2014, even if Brexit changed indicator calculations. For some indicators, mainly on land use, the NWE is negative compared to the EU average.

- Regional disparities within the NWE area were high in 2014 and remain high in 2023. In most thematic areas there are high disparities, not only between NWE regions but also within NWE countries. The was a slight improvement for three indicators in 2023: employment, net migration-related population change and change in land use. This means there is still a need for territorial cohesion and balanced regional development within NWE.

This describes the long-term expected impact of Programme. However, not only the Programme but also many other external factors as well as historical development pathways and geographical conditions contribute to the socio-economic situation in North-West Europe. The Interreg Programme cannot be expected to change this but only try to influence certain regional capacities and conditions to trigger a long run change in the right direction.

The next sub-chapter offers an overview of external factors that – in addition to the Programme – influence socio-economic changes in the NWE area.

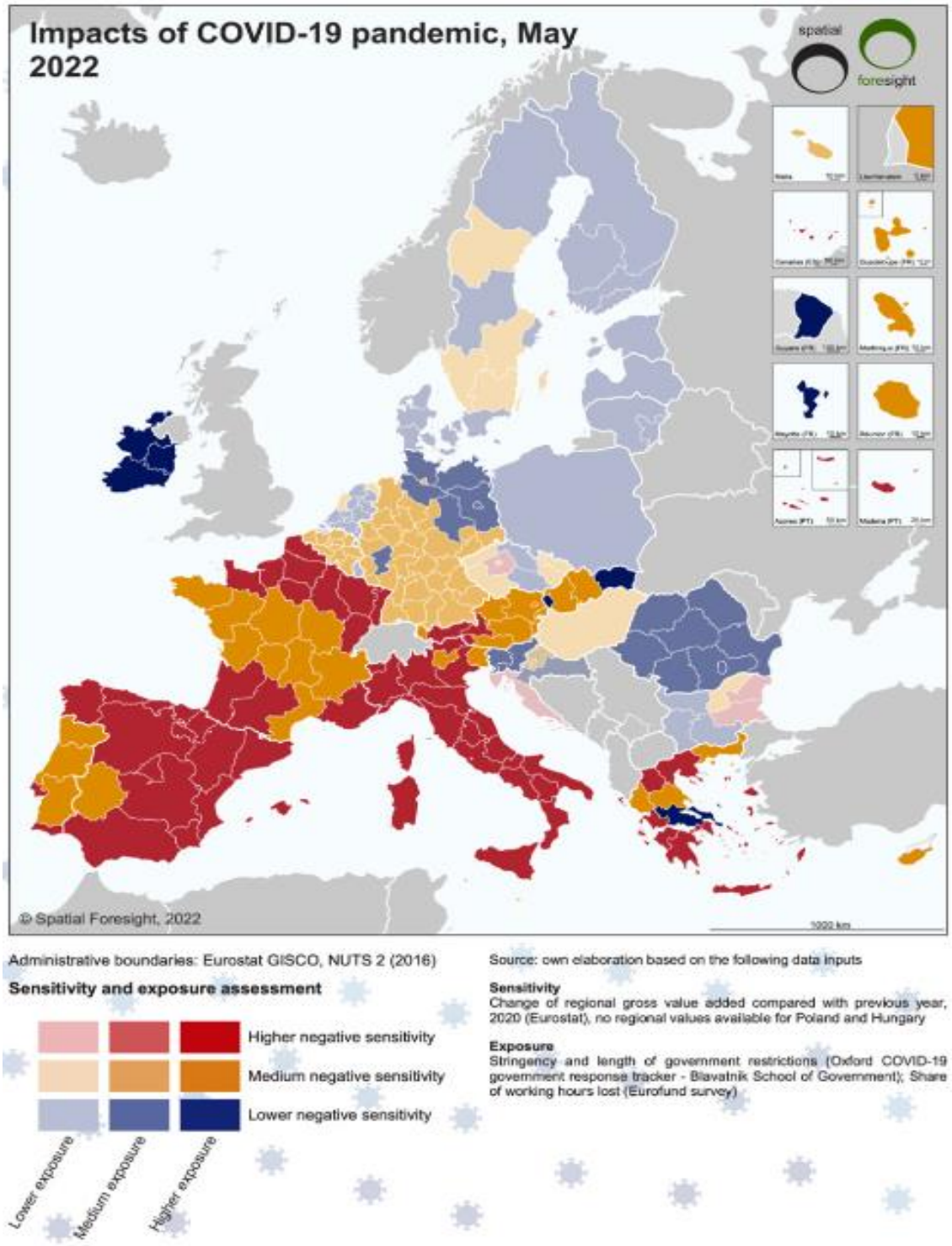
4.2.4 The role of external factors in influencing changes in the NWE area

Step 4 of the CoA looks into external factors that may have influenced changes in the Programme area or even have influenced the performance of NWE projects. Among these are primarily the COVID-19 pandemic and Brexit, both during the 2014-2020 programming period. National policies, long-term trends as well as smaller events may have influenced the territorial indicators and changes in the territory. There were impacts from the war in the Ukraine and inflation in 2023. These, however, had no significant influences on projects closed before 2022.

The **COVID-19 pandemic** was a game changer for social and economic life in Europe. As shown in the 2020 Barometer of regions and cities in Europe[9], the pandemic and restriction policies affected local and regional development in Europe, impacting cohesion. Impacts were multi-dimensional, well beyond GDP and including several indicators such as life expectancy. Apart from the pandemic itself policy measures and strategies to counteract and recover induced different territorial impacts. Figure 4.2 shows that NWE regions have been affected differently. Besides national patterns of exposure due to different policy responses, most parts of the Programme area experienced medium to high impacts.

[9] CoR. (2020). 2020 Barometer of Regions and cities (EU annual regional and local barometer). Brussels: European Committee of the Regions. https://cor.europa.eu/en/our-work/EURegionalBarometerDocs/4370-Barometer%20optimized.pdf

Map 4.1 Impacts of the COVID-19 pandemic



Source: Böhme, K, Mäder Furtado, M, Toptsidou, M, Zillmer, S, Hans, S, Hrelja, D, Valenza, A & Mori, A, 2022, Research for REGI Committee – The impact of the COVID-19 pandemic and the war in Ukraine on EU cohesion, Part II: Overview and outlook, European Parliament, Policy Department for Structural and Cohesion Policies, Brussels, p. 39

Research literature suggests that costs from **Brexit** are significantly greater for the UK than for the EU as a whole. Brexit reduced the UK economy by about 1.5% prior to completing the split from the EU at the end of 2020.[10] Not surprisingly, EU member states with strong UK trade relations, including some of the NWE Programme area (Ireland, Luxembourg and Belgium), have been affected more than other parts of the EU. In addition, employment has been affected differently across sectors as illustrated in the box below. Adding to these changes in competitiveness, Brexit has increased UK regional disparities. Finally, Brexit induced out-migration of EU workers and reduced student and academic mobility between the UK and the EU. Thus, there is a multitude of effects with different impacts on people, sectors and regions across the NWE Programme area.[11]

Box 4.3 Impacts of Brexit on different national economies and economic sectors

In **Ireland**, the sectors most affected by changing relations due to the trade agreement are agriculture, financial services and industry. These sectors had a high share of employees with lower secondary education. In **Germany**, around 188 000 manufacturing jobs could be directly attributed to UK exports, of which almost half are linked to the automotive industry. In the **Netherlands** agriculture in the provinces of Zeeland and Flevoland was expected to be the most negatively affected. At the same time, Brexit increased the attractiveness of the Dutch capital market and financial sector.[12]

In addition to the external shocks mentioned above, **several global trends** are relevant for territorial development in NWE and other regions in Europe.

Figure 4.2 summarises current global trends affecting socio-economic development in territories. The differentiation between types of regions indicates that urban regions may be overall more affected by all types of changes than other types of regions. In addition, many trends have a negative influence (indicated in red) but may be partially balanced by positive influences (in blue).[13]

This figure shows the variety of trends and external factors that influence changes in the territory. NWE funded projects are only one small influence to change socio-economic trends, strengthen positive developments and soften negative impacts of trends and conditions. Within this context, the role of the NWE Programme can have a limited impact for projects, but probably not at a wider macroeconomic or territorial scale.

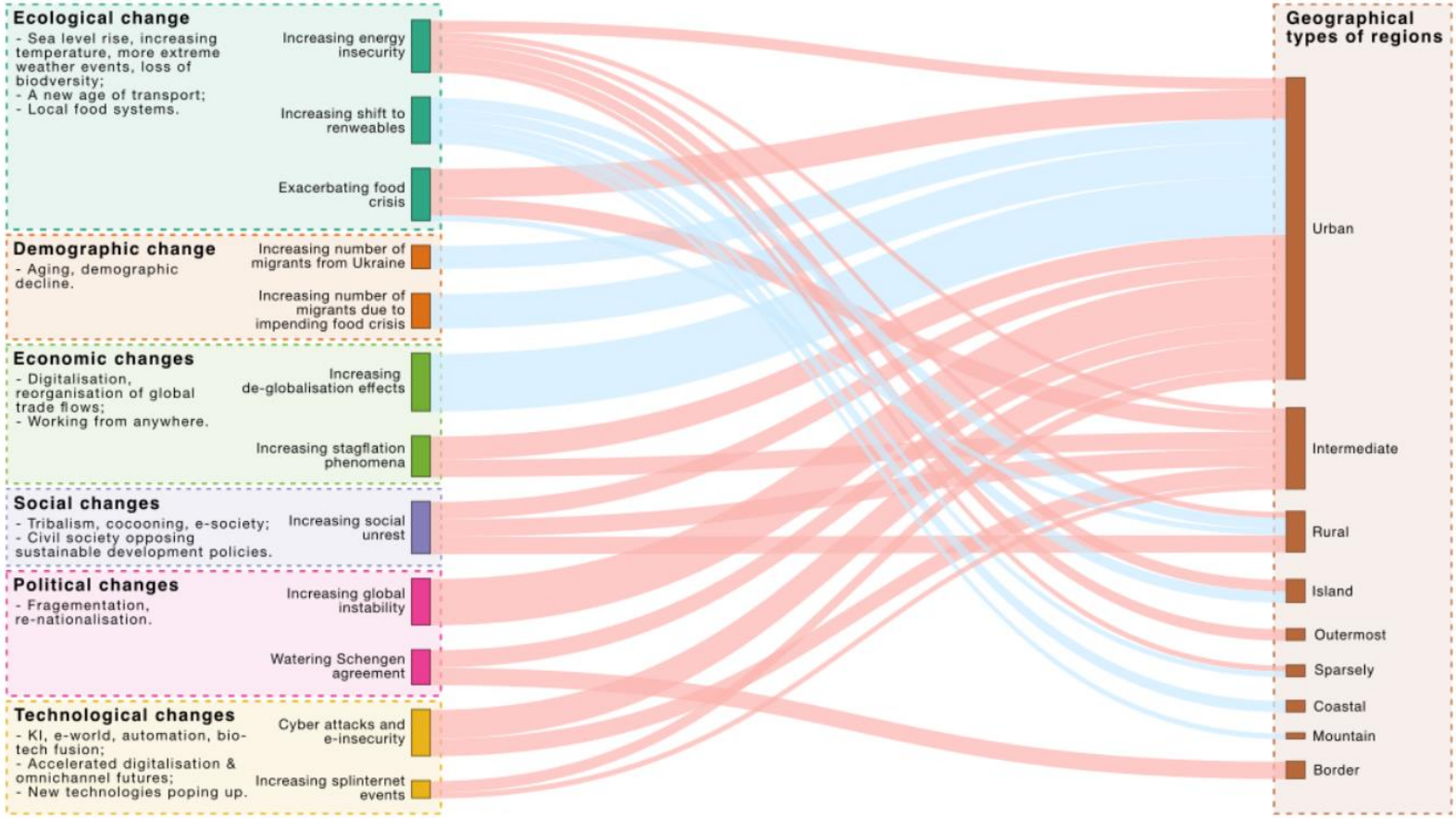
[10] UK Office for Budget Responsibility (2020)

[11] Alessandrini, M.; Bettini, C.; Iacobucci, E.; Gløersen, E.; Zillmer, S.; Gorny, H.; Hat, K. and Münch, A. (2022): New trade and economic relations between EU-UK: the impact on regions and cities. European Committee of the Regions, ECON. https://cor.europa.eu/en/engage/studies/Documents/New%20trade%20and%20economic%20relations%20between%20EU_UK%20the%20impact%20on%20regions%20and%20cities.pdf#search=Brexit

[12] Ibid, pp. 21

[13] Böhme, K, Mäder Furtado, M, Toptsidou, M, Zillmer, S, Hans, S, Hrelja, D, Valenza, A & Mori, A, 2022, Research for REGI Committee – The impact of the COVID-19 pandemic and the war in Ukraine on EU cohesion, Part II: Overview and outlook. European Parliament, Policy Department for Structural and Cohesion Policies, Brussels. https://www.europarl.europa.eu/RegData/etudes/STUD/2022/733095/IPOL_STU(2022)733095_EN.pdf

Figure 4.2 Potential trend impacts by type of region



Source: Böhme, K, Mäder Furtado, M, Toptsidou, M, Zillmer, S, Hans, S, Hrelja, D, Valenza, A & Mori, A, 2022, Research for REGI Committee – The impact of the COVID-19 pandemic and the war in Ukraine on EU cohesion, Part II: Overview and outlook, European Parliament, Policy Department for Structural and Cohesion Policies, Brussels, p. 66

External shocks and global trends affect different EU member states and regions in different ways, changing national and regional policy objectives. This may enhance or reduce support for the SOs through interest in applications to Programme calls. In consequence, the structure of funded projects across SOs may differ from planned or changed priorities may affect the capacity of regions to work on an SO. The box below illustrates such influences on the prematurely closed UNEET project.

Box 4.4 Global trends affecting national policy and changing the conditions for UNEET

Implementation of the UNEET project suffered from several external factors, most of which changed **national or regional interest and decisions**. UNEET aimed to respond to two major issues faced by NWE regions: high youth unemployment in recent years and the recruitment for the hotel, restaurant and catering sector (HORECA). The project aimed to develop a matching platform for the sector. The French partners lost interest because a similar one had been developed at national level just before the project started. In Ireland, priorities changed due to a significant reduction of young people Not in Employment, Education and Training (NEETS), which in turn significantly reduced the relevance of target group as defined by the project. In parallel, the focus shifted towards establishing a national platform which was considered more important for Irish stakeholders.[14]

Last but not least, **quality of government** is an important external factor. Multiple dimensions ranging from absorption capacity, different structures and competences at levels of government and across countries impact the implementation of technological change. Data analysis for 223 EU regions indicates that the quality of regional government matters more for economic development than decentralisation. The effectiveness of government is crucial for designing and implementing policies that stimulate economic activity.[15]

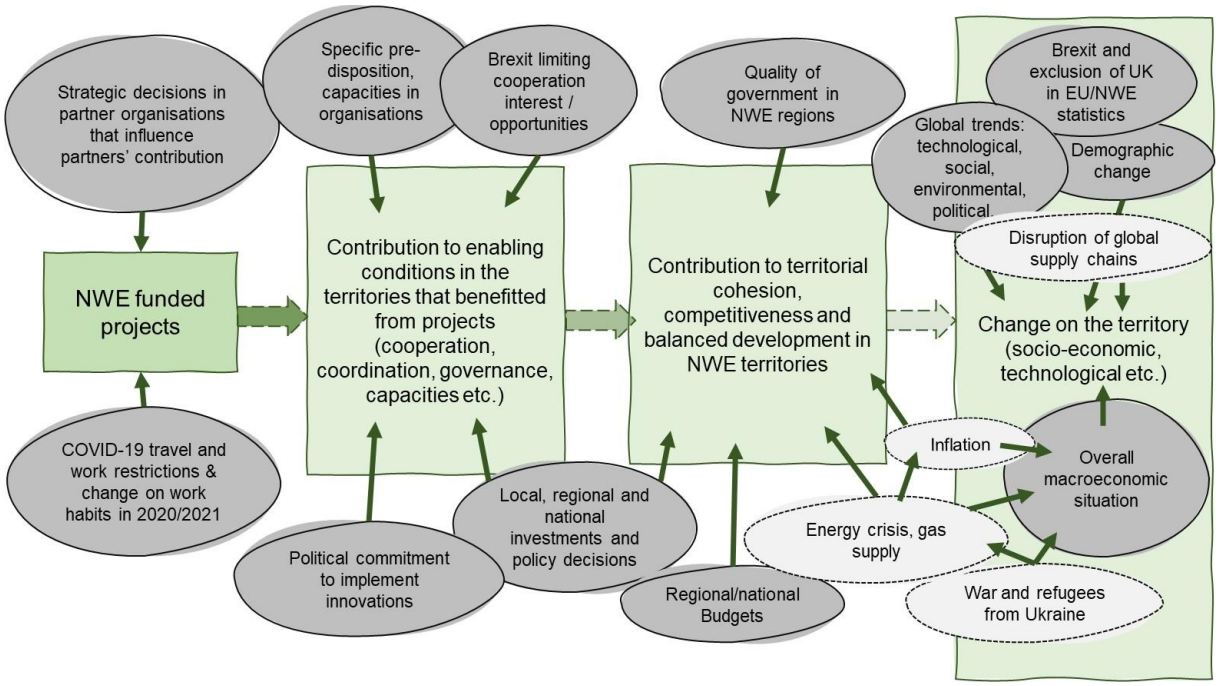
The external factors influencing changes in the NWE area affect the Programme and its performance at different stages as summarised in below figure. Some factors directly affected project implementation, such as COVID-19 through travel restrictions or limiting the use of laboratories and workplaces. Brexit is limiting cooperation and thus enabling conditions, as well as the territorial development of NWE regions. Global trends mainly affect territorial development but with limited e-government, can also affect regional capacity to change.

Figure 4.3 shows how external factors influence the contribution from NWE projects to change in the territory. Factors that affect wider regional development such as political commitment, regional and national budgets and investment plans or the overall global macroeconomic situation can strongly influence competitiveness and cohesion.

[14] Final Appraisal Report, NWE UNEET project

[15] Muringani, J.; Dahl Fitjar, R. and Rodríguez-Pose, A. (2019): Decentralisation, quality of government and economic growth in the regions of the EU. LSE Research Online. https://eprints.lse.ac.uk/91023/1/Rodriguez-Pose_Decentralisation-quality-of-government.pdf

Figure 4.3 External factors influencing Programme impact and contribution to change



4.2.5 Programme contribution in the light of other external factors

The CoA has found evidence that the NWE territory has developed positively since 2014. Most indicators show positive development, even if spatial disparities within countries and the wider NWE area persist.

The Programme has clearly increased enabling conditions for cohesion through governance capacity as well as cooperation and coordination of policies and stakeholders. At the same time, there is a significant contribution across different SOs to several impact dimensions. This is meaningful and systematic when it is found across at least three SOs for projects in diverse thematic fields and geographical areas. All impact dimensions are addressed by projects under at least one SO.

The Programme has significantly enhanced capacity, cooperation and coordination to promote territorial cohesion and balanced development.

Contributions to territorial development and cohesion have been found for all SOs. The Programme clearly contributed to goals and specific categories of balanced development and competitiveness. However, it is difficult to quantify or specify the impact beyond the expected qualitative contribution to changes in the territory, especially given the small interventions compared to national and regional public funds and the magnitude of external factors.

It is difficult to demonstrate the Programme contribution to change in the territory given the impact of external factors.

External factors include diverse influences on socio-economic change and territorial cohesion, such as regional and national support programmes, the macro-economic situation, political landscape and available skills and competences. In 2014-2023 major events disrupting previous development paths were Brexit, the pandemic (after 2020) and related travel restrictions, the Ukraine war and its influence on energy supply and prices, in addition to high inflation in 2022 and 2023. Given the time lag of the territorial analysis and the statistical data, the full effects of COVID and other external macroeconomic factors cannot yet be fully appreciated. But these effects will strongly influence NWE territorial development.

5 Territorial impact of the NWE Programme

This chapter analyses the territorial impact for distribution, regional coverage, types of territory and territorial specificities of projects.

5.1 Key findings

Evaluation question	Key Findings
Where are white spots on the map, i.e. which regions did not benefit?	A few regions did not benefit directly from the Programme, as they had no allocation or partners. The NUTS 2 regions with no lead, project or associate partners are Bourgogne in France, Oberfranken in Germany, and Cumbria in the UK. The five regions with no leading or project partners (only associate partners – therefore no budget allocation) are the province of Luxembourg in Belgium, East Yorkshire, Northern Lincolnshire and Shropshire and Staffordshire in the UK, and Espace Mittelland, and Ostschweiz in Switzerland. Along with the eight regions mentioned above, Dorset and Somerset in the UK had no allocation even though it hosts one project partner and one associate partner. Other regions that benefited very little, (below EUR 0.10/ inhabitant) are Alsace in France; Southern Scotland, and Leicestershire, Rutland and Northamptonshire in the UK.
In how far rural and intermediate regions have benefitted?	Rural and intermediate regions generally benefited less than urban regions. Most of the regions that did not benefit at all, listed in the above section are rural or intermediate. There are some exceptions including Highlands and Islands in the UK which received the 4th largest fund allocation with by far the highest allocation per inhabitant. The next rural region with large investments is Southern Ireland. In both regions the largest investment was directed to Priority Axis 2. The most lead partners and project partners, in these types of regions, are in Southern Ireland (third largest), and Bretagne in France (both rural) followed by Pays de la Loire in France and Luxembourg (both intermediate).
What can be observed in relation to cohesion, i.e. have (in the NWE context) less wealthy regions benefitted?	Several regions with a GDP per capita below the EU average received large shares of funds. Highlands and Islands in the UK with the highest total and per capita allocation has a GDP below the EU average. Other regions with below EU average GDP and above average per capita allocation are Namur and Liège in Belgium, Northern and Western Ireland, Nord-Pas de Calais in France, and Northern Ireland in the UK. However, with the exception of Oberfranken in Germany, and Ostschweiz and Espace Mottelland in Switzerland, all other regions with no funds allocation had a GDP per capita below the EU average. These are Bourgogne in France, Luxembourg in Belgium; Dorset and Somerset, Shropshire and Staffordshire, East Yorkshire and Northern Lincolnshire, and Cumbria in the UK. There is a contribution to cohesion for some poorer regions, but no clear contribution across the whole territory.
What could be the reasons for eventual uneven participation from different types of territories?	There seems to be no clear pattern behind the uneven participation of different types of territories. Urbanised regions (outside the UK) tend to have a higher Programme participation in line with their population size, knowledge-based organisations, researchers and innovative SMEs. Other imbalances regarding the low participation of Switzerland may be due to more active involvement in other Programmes such as the Alpine Space Programme.
Did territoriality (location of project partners) impact on the topics and activities in projects?	The share of predominantly urban regions in total ERDF allocations reflects them having the highest share across all three Priority Axes. This urban focus is particularly visible in Priority Axis 1 (Innovation – SO1) projects. Highlands and Islands in the UK and Southern Ireland as predominantly rural regions are exceptions. Priority Axis 2 projects (Low carbon – SO2, SO3, and SO4) are most evenly distributed across the whole Programme area and have been implemented in more regions than the other two priority axes. Priority Axis 3 (Resource of materials – SO4) projects were more frequent in Belgium and the

Evaluation question	Key Findings
	Netherlands, especially in urban regions. Exceptions are Liège in Belgium as an intermediate region and Bretagne in France as a rural region.
Which were the success factors in involving economically weaker rural areas in the projects?	Certain characteristics of projects successfully involve economically weaker rural areas. • Focus on the endogenous potential and assets of rural regions (e.g. renewable energy production, bioeconomy resources, biodiversity, ecosystem services, etc.). • Integrating public authorities and other stakeholders representing or based in rural regions in the partnership. • Addressing topics that challenge a certain type of territory from the start, e.g. energy security, access to services, lack of qualified workers, innovative transformation of traditional business sectors, new schemes for mobility. • Identify and engage in European champions of the topic or the territorial challenge, even if they are not based in the NWE area, for example as associated partners. • Join forces with stronger urban and rural regions with experience of transnational and other ERDF funded projects.
Can any possible territorial unintended effect be detected among interventions? If such effects occurred, what was the context and mechanisms that generated them?	The analysis has identified unintended territorial effects from projects, though it is still very early as most unintended effects need time to be visible. Many projects that dealt with new technologies and innovation in fields such as health, housing and circular approaches produced social and environmental benefits associated with such innovations. Beyond those expected and intended, there were some positive secondary effects. For example, phosphorus recovery benefits the rural areas where it is used as a fertiliser or feed additive. It also has benefits urban areas where it is recovered from municipal sewage water, increasing water quality. Some projects addressing territorial challenges in rural or coastal regions with less business diversification and few employment opportunities paved the way for new business opportunities, increasing the competitiveness of existing companies in certain sectors (e.g. agri-food, textile) or new job and business profiles within existing or emerging value chains. Examples of positive effects on regional development, economic growth and business development can be found in projects BioBase4SME (SO1), FORESEA and UP-STRAW (SO3), and AFTB (SO5). Some projects especially under SO5 have unintended ecological benefits from increasing resource efficiency and using by-products previously considered as waste by this reducing municipal, industrial, food or farm waste and the pollution of natural resources. One example is the ALG-AD project. Other projects have positive effects on the attractiveness of territories, for example by reducing limitations and challenges for everyday life in remote areas. Projects such as NWE-Chance and eMen contribute to better access to healthcare and medical services in remote areas.
What are the main aspects to be improved, considering the experiences and what are the best practices for a fair territorial impact, that could be used in the 2021-2027 Programme? E.g. what can be concluded from the specific funding of capitalisation activities regarding outputs as well as	The leader-follower approach was used in many projects. Especially under SO1 and SO2, the majority of analysed projects actively brought together stronger with weaker regions to stimulate knowledge transfer and learning. The approach was applied by projects under SOs 3, 4 and 5, but to a lesser extent. This is positive as the leader-follower approach addressed mostly SO1 projects but was also actively accepted and integrated by many other projects. This added to learning for follower regions and reduced disparities between NWE regions, confirming the value of this approach. The analysis per SO shows that many projects have a specific territorial focus, actively addressing disparities between types of territories, or implicitly focusing on a challenge especially for a certain types of regions (urban, rural or coastal). Many projects had a specific territorial focus, for example, testing tools and

Evaluation question	Key Findings
broadening the results (territorially, stakeholders)?	methodologies in different types of territories. Or the central topic of the project addressed a specific type of territory or territorial development challenge, for example mainly islands or coastal regions, or tackles new opportunities for farmers and agri-food SMEs. Many projects considered the transfer of knowledge to other regions (of the same or different types) adopting a territorial perspective. Encouraging a territorial focus for applications should continue, as this helps make results and effects easier to transfer to different territories. Capitalisation brought important added value to the Programme, especially outputs and results. In most cases, these add to existing outputs and results. In some cases, qualitative advances are also foreseen (e.g. new or extended innovation networks or clusters, new products or markets, new pilots, improved technology, etc.). Capitalisation also considerably extended partnerships and outreach. 50% of capitalisation call 1 and 59% of call 2 projects planned new types of target groups or stakeholders. In addition, 31% of call 1 projects and 46% of call 2 envisaged working with other economic sectors. Capitalisation within supported projects with a focus on geographical extension and a broader territorial focus is a good practice for the 2021-2027 Programme and future funding periods. Another good practice could be the positive effects of increased cooperation (a) with other Interreg NWE projects in the same area, or (b) with projects and partners outside NWE working on the same topic. This might lead to synergies between pilot actions and new solutions as well as to more knowledge transfer between NWE and other European regions.

5.2 Analysis and evaluation

There were three types of analysis. First, a spatial analysis of financial allocation, distribution of beneficiaries and projects. Second is a territorial focus with territorial aspects of projects under all five SOs, their coverage and consideration of different types of territories and thirdly the territorial aspects of capitalisation.

Further background data and territorial analysis is included in Annex 1.

5.2.1 Spatial analysis of financial allocation, beneficiaries and projects

The spatial analysis of data related to financial allocation, beneficiaries and projects includes:

- Spatial distribution of financial allocation;
- Spatial distribution of project partners;
- Relationship between project financial allocation and development of a region;
- Relationship between types of regions and involvement in the Programme.

Spatial distribution of financial allocation

The allocation of funds was analysed in relation to the population of NUTS 2 regions in 2014, the first year of the Programme period (see Map 5.1).

The highest share of allocation of funds per capita went to Highlands and Islands in the UK, some three times larger than the second, Région de Bruxelles-Capitale in Belgium. Limburg, in the Netherlands, had the third highest, followed by Luxembourg country and Namur in Belgium.

The regions with the lowest allocations (below 0.10€/ inhabitant) are Southern Scotland, the region of Leicestershire, Rutland and Northamptonshire in the UK and Alsace in France.

No allocations were made for Bourgogne in France; Oberfranken in Germany; Prov. Luxembourg in Belgium; Cumbria, Dorset and Somerset, Shropshire and Staffordshire, East Yorkshire and Northern Lincolnshire in the UK; and Espace Mittelland, and Ostschweiz in Switzerland.

Spatial distribution of project partners

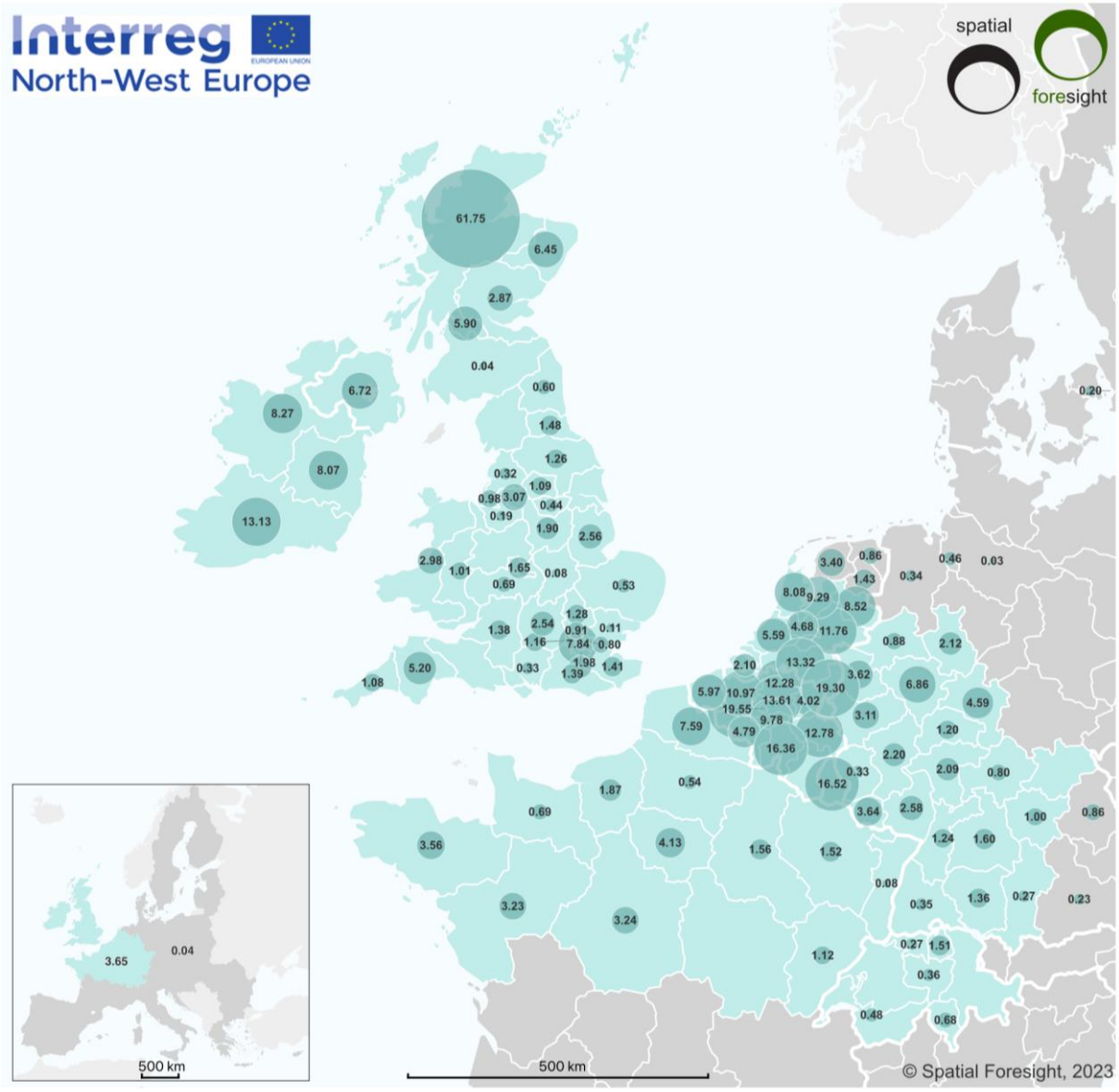
The distribution of partners correlates with the spatial distribution of funds (see Figure 5.1).

The most partners (lead, project, associated and sub-partners) are in Noord-Brabant in the Netherlands, and Région de Bruxelles Capitale in Belgium - each with 131 partners. The next largest are Ile-de-France in France (119), Zuid-Holland (97) and Gelderland (92) in the Netherlands (see Map 5.2).

The most in the Netherlands are distributed in a balanced way across the country's Programme territory. In France and Belgium the distribution is more imbalanced, with most partners in the capital regions.

Within the NWE Programme area some NUTS 2 regions have no partners. These are Bourgogne in France, Cumbria in the UK, and Oberfranken in Germany. Other regions with no lead or project partners (only associated partners) are Prov. Luxembourg in Belgium, Espace Mittelland and Ostschweiz in Switzerland, and the two UK regions of East Yorkshire and Northern Lincolnshire, and Shropshire and Staffordshire.

Map 5.1 EUR per inhabitant allocated by the NWE Programme



EUR per inhabitant allocated by the NWE Programme (2014-2022), NUTS2 region

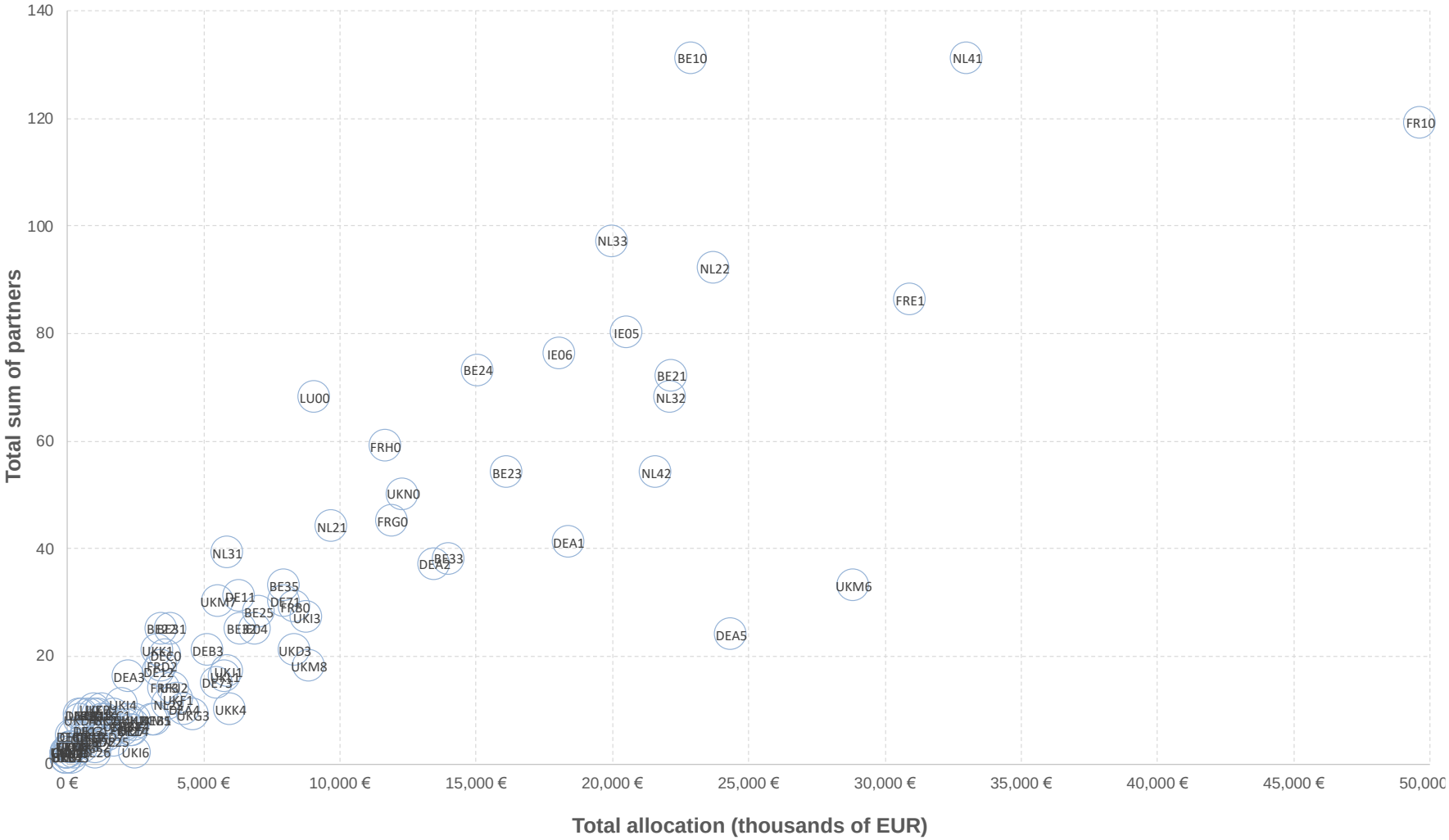
60 €
30 €
15 €
1 €

NWE Programme Area

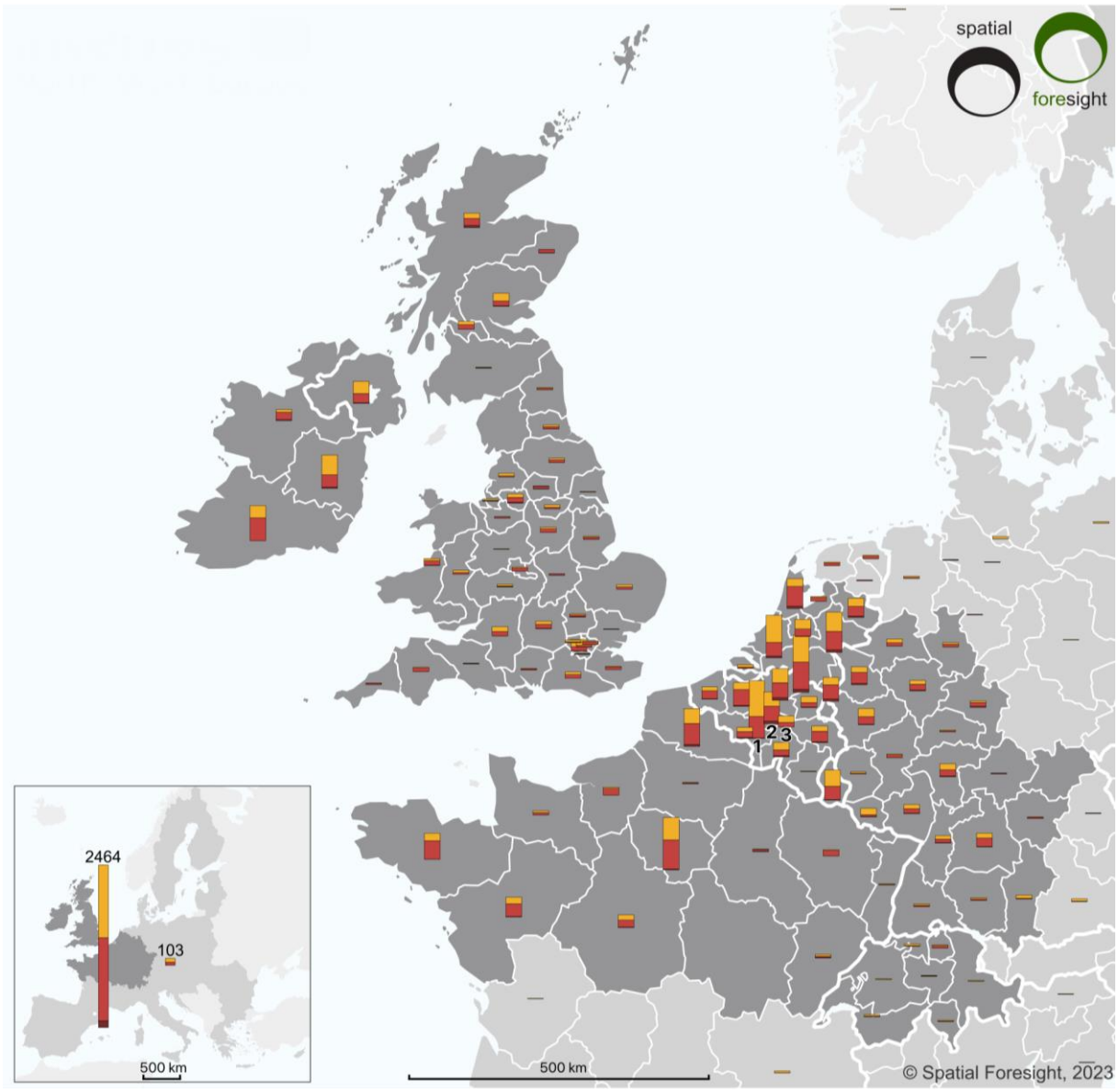
Source: own elaboration (2023), based on NWE Programme data (status July 2023), and "Population on 1 January by NUTS 2 region in 2014" [TGS00096] from Eurostat. Administrative boundaries: Eurostat GISCO, NUTS 2 (2016).

Note: The NWE average includes all regions of the NWE Programme 2014-2020. The EU average refers to all EU regions except for those of the NWE Programme 2014-2020. The NWE Programme data was converted from NUTS3 2010 to NUTS2 2016 according to geographical location.

Figure 5.1 Total partners in relation to total allocation (EUR thousands)



Map 5.2 Distribution of Lead Partners, Project Partners (including sub-partners), and Associated Partners



Number of lead, project and associated partners by NUTS 2 region

150
100
50

Associated Partners
Project Partners
Lead Partners

Source: own elaboration (2023), based on NWE Programme data (status July, 2023). Administrative boundaries: Eurostat GISCO, NUTS 2 (2016).

Note: The sum of partners in other European countries refers to all EU regions except for those of the NWE Programme 2014-2020. The sum of partners in NWE refers to all NWE Programme 2014-2020 regions except those for which there is no data. The NWE Programme data was converted from NUTS 3 2010 to NUTS 2 2016 according to geographical location.

Regions that present overlapping graphs were numbered, as following: (1) Brussels, (2) Flemish Brabant, and (3) Walloon Brabant.

Relationship between project financial allocation and development of a region

In this subsection, we investigate the Programme allocation of funds in relation to 'GDP at current market prices' (Map 5.3 and Map 5.4, Source: ESPON) and the 'European Social Progress Index' (Map 5.5, Source: EUSPI). The EUSPI complements traditional measures of the GDP with 'Beyond GDP'. It is based on 12 indicators grouped into basic human needs, foundations of wellbeing, and opportunity[16]. EUSPI data is lacking for the UK, which limits the possibilities for this index.

All EU regions with no fund allocation had a GDP per capita below the EU average in 2020, except for Oberfranken in Germany. The regions are Bourgogne in France; Prov. Luxembourg in Belgium; and the four UK regions Dorset and Somerset, Shropshire and Staffordshire, East Yorkshire and Northern Lincolnshire, and Cumbria. Moreover, the Luxembourg, in Belgium, was not only below the EU average GDP per capita, but also had among the lowest values for the Social Progress Index in 2020. The other regions with no fund allocation had about average EUSPI values, as far as data is available.

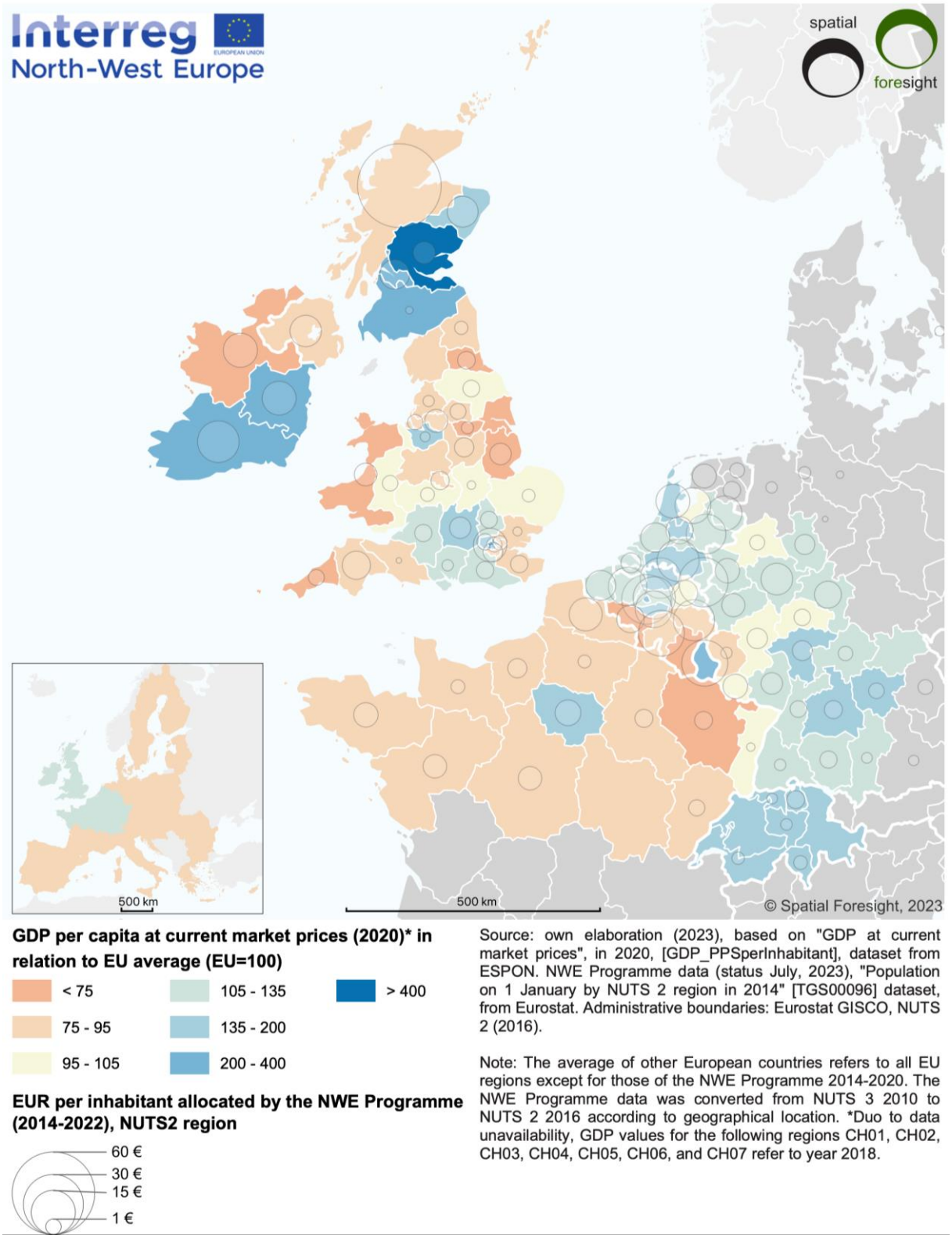
It is not possible to conclude that regions with GDP and/or EUSPI values clearly below the EU average generally received small allocations. The region with the largest allocation of funds per capita is Highlands and Islands in the UK, with a GDP value below the EU average in 2020. Other regions below the EU average in 2020 that benefited more from the Programme are Namur, Hainaut, and Liège in Belgium, Northern and Western Ireland, Nord-Pas de Calais in France, and Devon and Northern Ireland in the UK. Hainaut in Belgium has not only a below average GDP per capita but also one of the lowest values for EUSPI (where data is available). No clear EUSPI pattern can be identified for the other regions mentioned above, as far as data is available,.

Many regions with much higher than EU average GDP per capita had higher Programme allocations than the NWE Programme regional average. Examples are West Inner London, West Central Scotland, in the UK, Southern Ireland, and Luxembourg. EUSPI data shows average values for the latter two regions.

Comparing Programme allocation with the change in GDP (Map 5.4) shows that GDP dropped significantly between 2014 and 2020 in some regions with the highest allocations (mainly in Scotland and Luxembourg). This might partly explain the exceptional observations for Highlands and Islands in the UK. The only regions with GDP values below the EU average in 2014, and received allocations per capita higher than the NWE area average, were Namur, Hainaut, and Liège in Belgium, Northern and Western Ireland, and Devon and Northern Ireland in the UK. All other regions with EU average GDP in 2014 had allocations below the NWE area average or had no allocation.

[16] For the detailed composition of the EUSPI and its dimensions see https://cohesiondata.ec.europa.eu/stories/s/EU-Social-Progress-Index-2020/8qk9-xq96

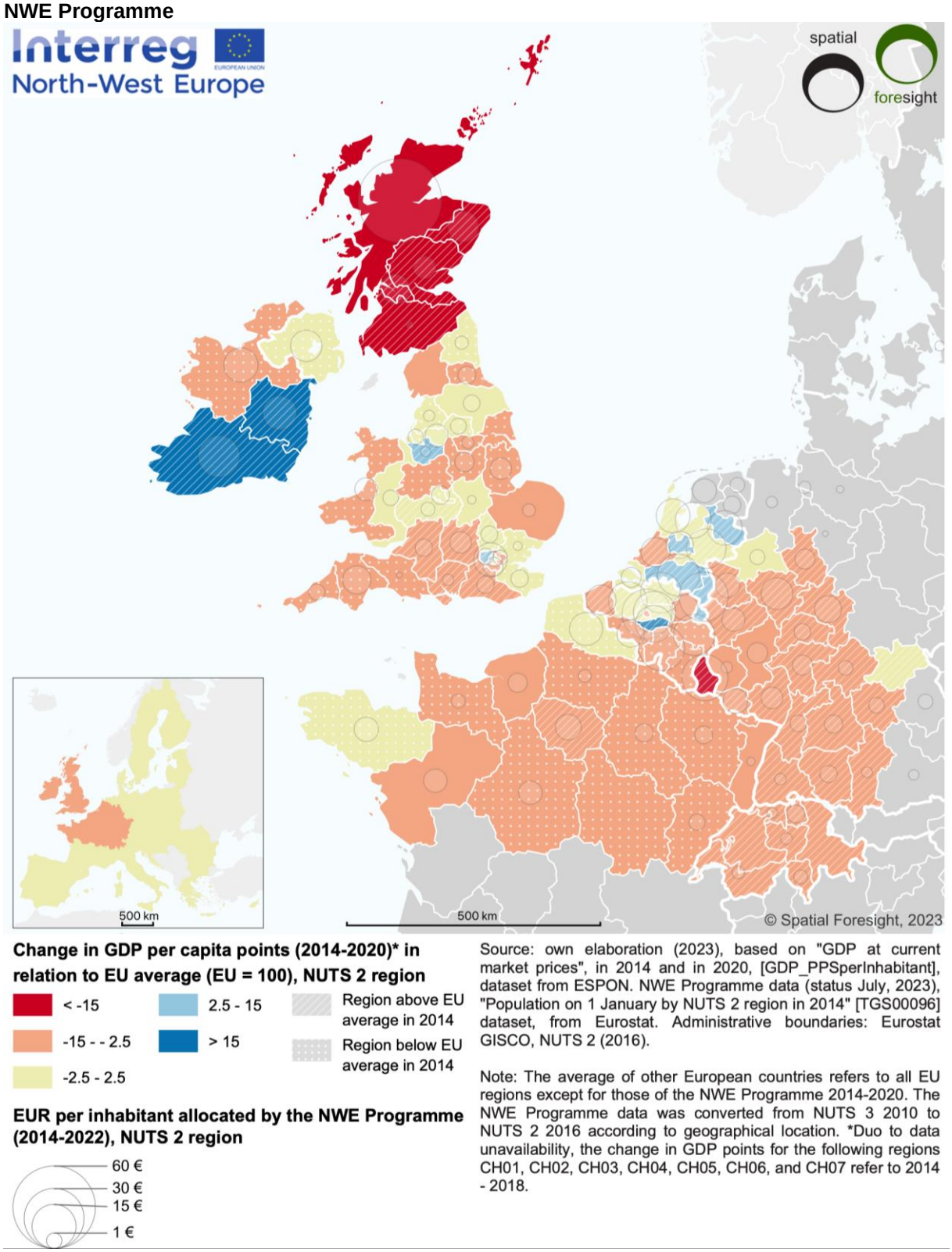
Map 5.3 GDP per capita (2020)* and EUR per inhabitant allocated by the NWE Programme



Source: own elaboration (2023), based on "GDP at current market prices", in 2020, [GDP_PPSperInhabitant], dataset from ESPON. NWE Programme data (status July, 2023), "Population on 1 January by NUTS 2 region in 2014" [TGS00096] dataset, from Eurostat. Administrative boundaries: Eurostat GISCO, NUTS 2 (2016).

Note: The average of other European countries refers to all EU regions except for those of the NWE Programme 2014-2020. The NWE Programme data was converted from NUTS 3 2010 to NUTS 2 2016 according to geographical location. *Duo to data unavailability, GDP values for the following regions CH01, CH02, CH03, CH04, CH05, CH06, and CH07 refer to year 2018.

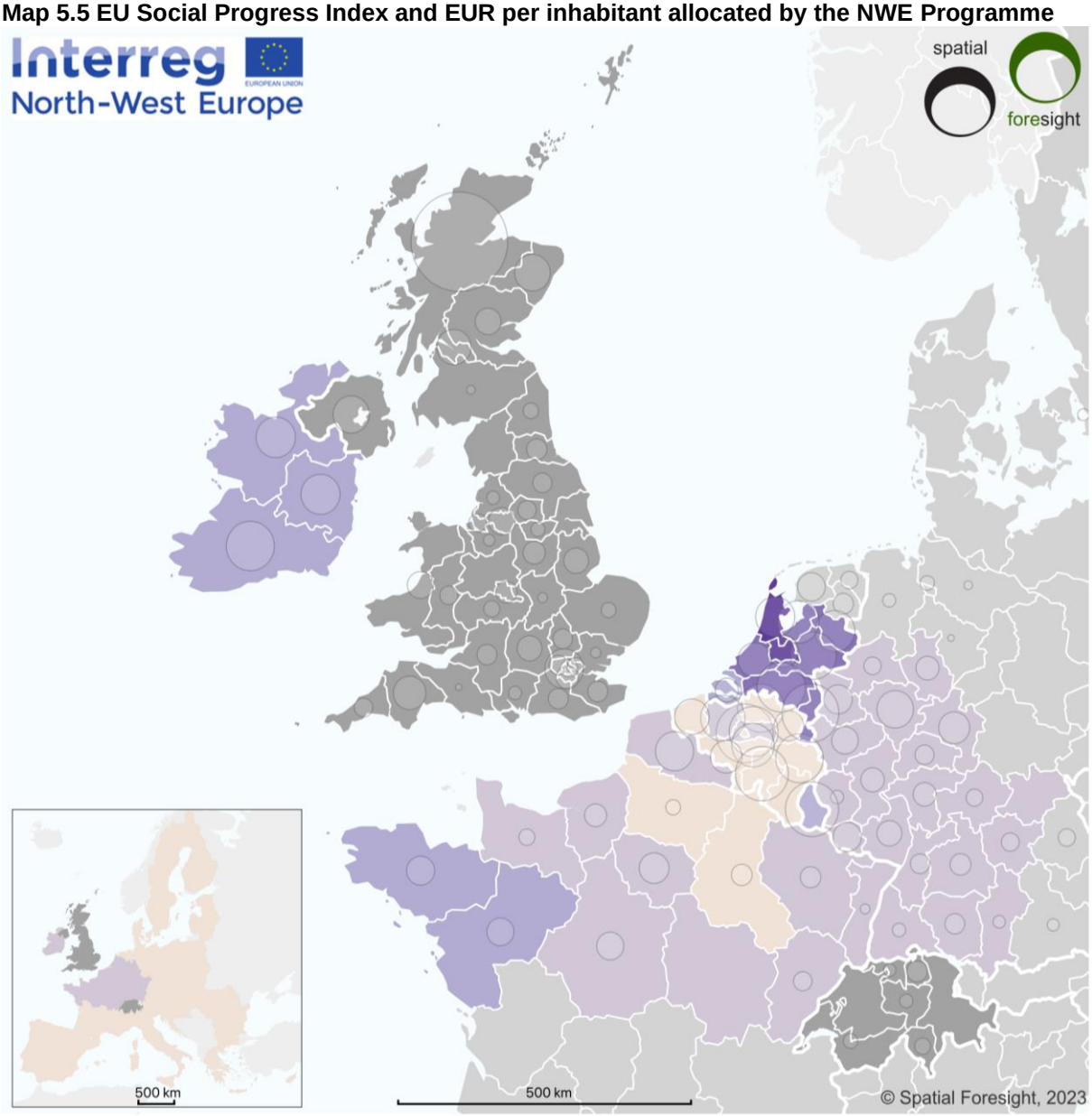
Map 5.4 Change in GDP points between 2014 and 2020*, and EUR per inhabitant allocated by the NWE Programme



Source: own elaboration (2023), based on "GDP at current market prices", in 2014 and in 2020, [GDP_PPSperInhabitant], dataset from ESPON. NWE Programme data (status July, 2023), "Population on 1 January by NUTS 2 region in 2014" [TGS00096] dataset, from Eurostat. Administrative boundaries: Eurostat GISCO, NUTS 2 (2016).

Note: The average of other European countries refers to all EU regions except for those of the NWE Programme 2014-2020. The NWE Programme data was converted from NUTS 3 2010 to NUTS 2 2016 according to geographical location. *Duo to data unavailability, the change in GDP points for the following regions CH01, CH02, CH03, CH04, CH05, CH06, and CH07 refer to 2014 - 2018.

Map 5.5 EU Social Progress Index and EUR per inhabitant allocated by the NWE Programme



Source: own elaboration (2023), based on "EU Social Progress Index", in 2014 and in 2020, [2020 EUSPI Dimension and Component scores], dataset from Cohesion Open Data Platform. NWE Programme data (status July, 2023), "Population on 1 January by NUTS 2 region in 2014" [TGS00096] dataset, from Eurostat. Administrative boundaries: Eurostat GISCO, NUTS 2 (2016).

Note: The average of other European countries refers to all EU regions except for those of the NWE Programme 2014-2020. The NWE average refers to all NWE Programme 2014-2020 regions except those for which there is no data. The NWE Programme data was converted from NUTS 3 2010 to NUTS 2 2016 according to geographical location.

Relationship between types of region and involvement in the Programme

This subsection investigates the allocation of funds, number of partners, Priority Axes and population[17], in relation to regional types.

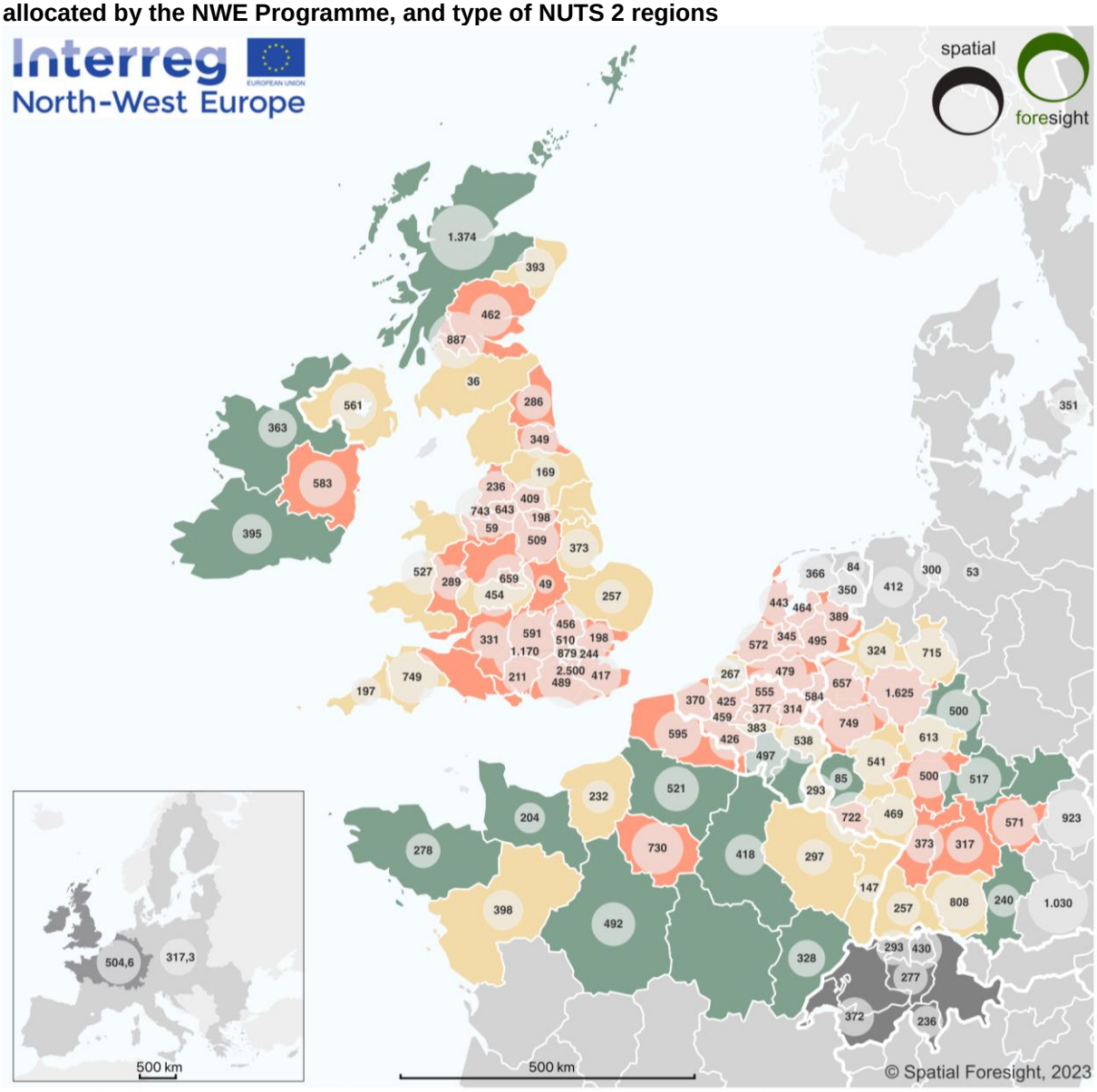
Rural and intermediate regions generally benefited less than urban regions. All but one had no allocated funds and/or partners. Those that were part of the EU and did not participate in any ERDF co-financing are Bourgogne in France, Luxembourg in Belgium, Oberfranken in Germany, Cumbria and East Yorkshire and Northern Lincolnshire in the UK. All rural and intermediate regions in France had allocations per inhabitant below the NWE average, as well as most rural and intermediate regions in Germany, and most intermediate regions in the UK. The three regions with no partners are predominantly rural and intermediate: Bourgogne in France, Cumbria in the UK and Oberfranken in Germany. As mentioned previously, most regions with the largest number of partners are in the Netherlands and are highly populated, all are predominantly urban.

Of the fifteen regions with the most investments under Priority Axis 1, thirteen were predominantly urban. This is similar for Priority Axis 2 and 3, in both cases twelve of the fifteen highest values were allocated to predominantly urban regions. This underlines the above observation that these benefitted more than other types of region. The regions with the lowest ERDF allocations (below EUR 0.1/ inhabitant) are distributed evenly across the different types of region. As were those with no lead or project partners (only associate partners). This illustrates that being a predominantly urban region is not sufficient for an above average Programme allocation. There were some exceptions among rural and intermediate regions. Highlands and Islands in the UK received the largest allocation per capita (and 4th largest total allocation of all) and most of the investments were directed to Priority Axis 2. The next rural region with the highest total allocation is Southern Ireland, where most of the investment was also directed to Priority Axis 2. Other rural and intermediate regions that received high total allocations were Liège in Belgium (especially for Priority Axis 3), Northern Ireland in the UK (especially for Priority Axis 2), Pays de la Loire (especially for Priority Axis 1) and Bretagne (especially Priority Axis 3) in France.

Table 5.1 shows the top 10 NUTS 2 regional values (1) allocation of funding per capita, (2) total partners (including associated partners), and (3) average regional allocation per partner (excluding associated partners who do not have any allocation). Of the 25 listed regions, 17 are predominantly urban and only four are predominantly rural. The other four are intermediate. The top 10 regions with the most partners are predominantly urban regions, mirroring the wider availability of institutions. Apart from the Highlands and Islands, the average allocation per partner is highest in regions without a high allocation per capita. No Swiss NUTS 2 region falls into any of the three rankings. The German regions only rank among the top 10 regions in terms of allocation per partner.

[17] The total population data refers to the year 2014, as it is the year of the starting point of the programme allocations.

Map 5.6 Total project budget in EUR per partner (lead partner, project partner and sub partner) allocated by the NWE Programme, and type of NUTS 2 regions



Total EUR (thousands) per partner allocated by the NWE Programme (2014-2023), NUTS2 region

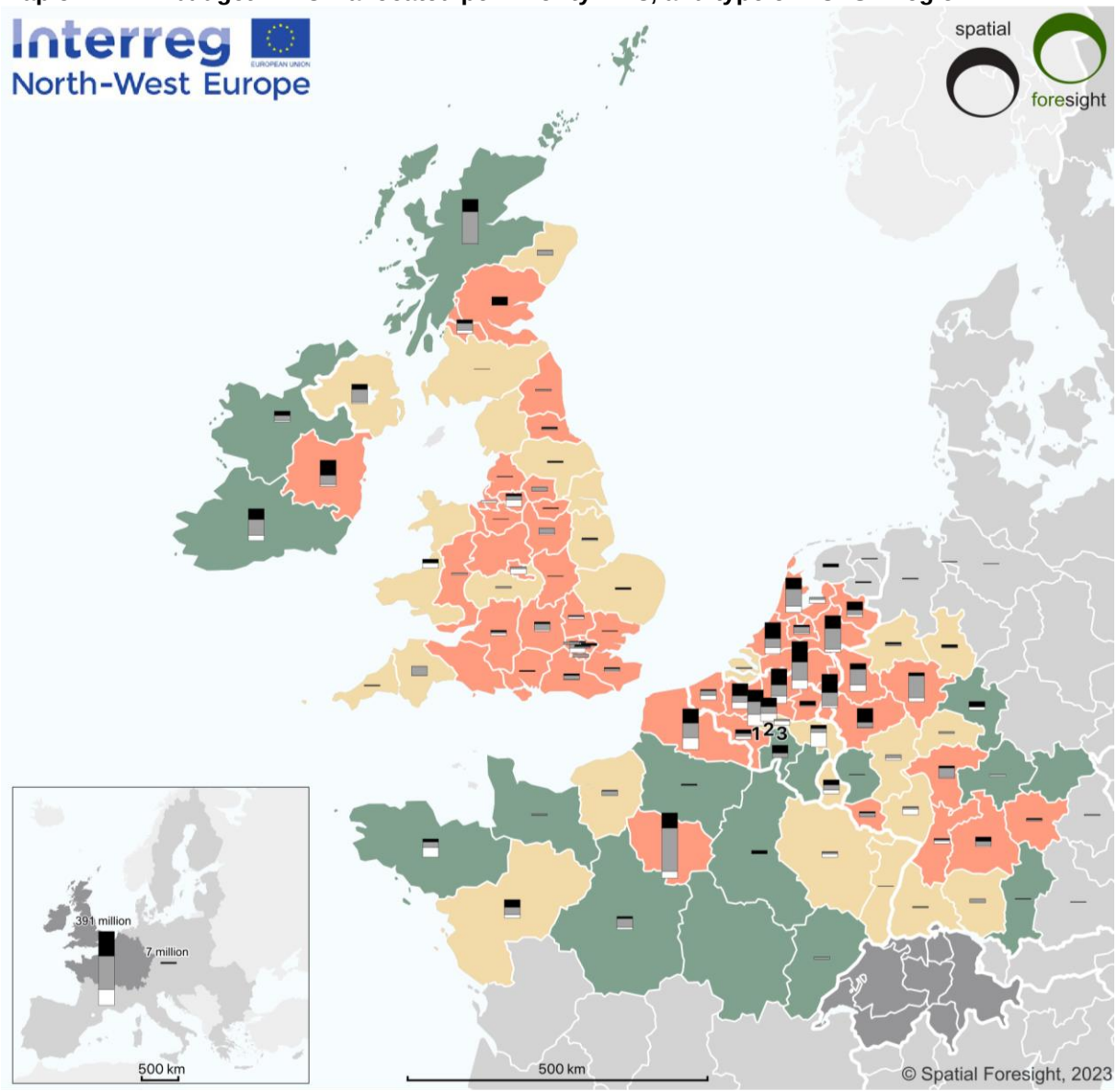
1.000 €
500 €
100 €

Source: own elaboration (2023), based on NWE Programme data (status July, 2023). Administrative boundaries: Eurostat GISCO, NUTS 2 (2016).

Typology

- Predominantly rural regions
- Predominantly urban regions
- Intermediate regions
- No data

Map 5.7 ERDF budget in EUR allocated per Priority Axis, and type of NUTS 2 region



ERDF budget in EUR allocated per Priority Axis, and typology of NUTS 2 regions

- Innovation (SO1)
- Lowcarbon (SO2, SO3, SO4)
- Resource and materials efficiency (SO5)

- € 30 million
- € 15 million
- € 10 million
- € 1 million

Typology

- Predominantly rural regions
- Predominantly urban regions
- Intermediate regions
- No data

Source: own elaboration (2022), based on NWE Programme data (status July 2023). De Beer, J., van der Gaag, N., van der Erf, R. "New classification of urban and rural NUTS2 Europe",NIDI Working Paper no. 2014/3. Administrative boundaries: Eurostat GISCO, NUTS 2 (2016).

Reference numbers were included below graphs that present overlaps. These refer to the following regions: (1) Brussels, (2) Flemish Brabant, and (3) Walloon Brabant.

Table 5.1 Regions with highest allocations per inhabitant, number of partners and allocation per partner

Region (Predominantly rural regions / Intermediate regions / Predominantly urban regions)	Country	Allocation per inhabitant (total allocation)		Number of partners (lead, project, associated and sub partners)		Allocation per partner (without associated partners)[18]	
		EUR/inhabitant	rank	Number of partners	rank	EUR/partner	rank
Highlands and Islands	UK	61.75	1	33	20	874 451	3
Région de Bruxelles-Capitale	BE	19.55	2	131	1	175 060	68
Limburg	NL	19.30	3	54	12	400 272	14
Luxembourg	LU	16.52	4	68	10	133 528	80
Prov. Namur	BE	16.36	5	33	20	241 033	52
Prov. Vlaams-Brabant	BE	13.61	6	73	8	206 598	55
Noord-Brabant	NL	13.32	7	131	1	252 153	48
Southern Ireland	IE	13.13	8	80	6	256 543	45
Prov. Liège	BE	12.78	9	38	18	368 380	18
Prov. Antwerpen	BE	12.28	10	72	9	308 093	32
Ile-de-France	FR	4.13	31	119	2	417 285	11
Zuid-Holland	NL	5.59	26	97	3	206 220	56
Gelderland	NL	11.76	11	92	4	258 235	44
Nord-Pas de Calais	FR	7.59	20	86	5	359 628	22
Eastern and Midland Ireland	IE	8.07	18	76	7	237 836	53
Noord-Holland	NL	8.08	17	68	10	325 717	29
Outer London - South	UK	1.98	49	2	46	1 250 0000	1
Arnsberg	DE	6.86	21	24	27	1 015 464	2
Devon	UK	5.20	27	10	38	599 522	4
Unterfranken	DE	0.80	75	2	46	517 053	5
West Midlands	UK	1.65	52	9	39	512 882	6
West Central Scotland	UK	5.90	25	18	30	493 044	7
Düsseldorf	DE	3.62	34	41	16	448 760	8
Detmold	DE	2.12	46	10	38	429 165	9
Mittelfranken	DE	1.00	70	4	44	428 106	10

[18] This analysis does not consider associated partners, which would distort the calculation.

5.2.2 Revision of territorial focus and territorial aspects of analysed projects

The analysis of projects under the SOs contained the revision of territorial aspects and focus of projects, including an explicit or implicit orientation towards territorial challenges.

Under SO1, most projects developed stable innovation networks and transnational clusters actively encouraging cross-sectoral and cross-regional collaboration. Of the twelve assessed as successful, ten clearly aimed at developing and implementing innovation (technologies, products, services and processes) for significant impact on societal challenges that had been identified in the Programme's territorial analysis of a many sectors. Closing the gap in terms of innovation performance between regions in the NWE area by spreading knowledge and know-how from **innovation leaders to followers has been actively addressed by seven of the projects** (ASPECT, BioBase4SME, NEW-CHANCE, BE-GOOD, B4H, MATMED, OPIN) but was present in more projects. This approach was less relevant for social innovation projects. The projects improving competitiveness through cooperation for market readiness did not show a specific territorial focus (e.g. ASPECT, QCAP, MATMED, UV-ROBOT, MACHINING 4.0. The three projects supporting capacity building to improve innovation frameworks (B4H, OPIN, BioBase4SME) have an indirect focus on peripheral areas such as coastal areas and rural, agricultural regions with a high share of bioeconomy resources. The Life Science project (B4H) connects more high-level research centres in agglomeration centres and larger cities. For the five projects bringing societal benefits (NWE-Chance, BE-GOOD, SHICC, UNEET, EYES, eMEN), health-related projects indirectly address less densely populated and rural areas trying to reduce the gap with urban areas for access to health services through electronic tools for diagnostics, therapies and training for professionals. Projects focussing on youth had an indirect focus on disadvantaged urban areas.
Under SO2, all five analysed projects address energy security and supply, as described in the Cooperation Programme. Projects under SO 2 implemented actions across the entire NWE area, providing opportunities for partners from all regions to participate. The scale-up and roll-out of existing strategies included **'leader/follower' approach for four of the projects** (cVPP, ECCO, E=0, HEATNET NWE), demonstrating appropriate consideration for this approach by most of the partnerships. One project paid **special attention to including vulnerable groups**, such as tenants, people who do not speak the local language and people with less financial means. Including disadvantaged groups contributed to a just and socially inclusive energy transition. **Three projects generated positive effects on specific territories.** In cVPP projects three types of virtual Power Plants have been implemented that address different disparities: the rural cVPP in Loenen, the dispersed cVPP in Ireland and the social cVPP in Ghent. In Loenen and Ireland, rural areas were connected to the cVPP, which increased their participation in electricity markets and empowered prosumers to be more active in the energy system. The social cVPP in Ghent paid special attention to including vulnerable groups. The mix of regions for ECCO enabled easy knowledge transfer between leading and following regions and thus enhanced territorial cohesion throughout the NWE area. This is evidenced by project effects, such as the development and establishment of the Community Energy Federation for Ireland, a federation that wants to collaborate with Irish policy makers for an Irish energy market where, in the spirit of EU directives, brings Ireland up to speed from a 'follower' to a more leading development country. The ACE-Retrofitting project helped to reduce disparities within NWE, as it provided knowledge exchange between the more experienced member states (such as France) and less experienced ones (such as Germany). E=0 worked with social housing organisations to improve the quality of life and expenses of tenants (retrofits in France and the UK). Three HEATNET NWE pilots supply heat to social housing more efficiently for tenants. The focus is on urban solutions for demand. The leader-follower approach is visible in exchanges between more advanced partners such as MijnWater and Aberdeen.
Under SO3, all analysed projects address energy security and supply, as described in the Cooperation Programme. **One of the five projects intentionally applied a leader-follower approach** and linked strong with weaker regions (FORESEA). Three of the projects addressed specific territorial needs (e.g. lack of energy security and grid stability in remote areas,) and potential (e.g. ocean energy, energy saving potential in urban areas) for energy generation, low carbon technology and energy efficiency. Three projects generated positive effects on specific territories such as remote and rural areas (LOGIC, FORESEA, UP-STRAW), however, one partially failed in delivering results, so the effects were limited. One project did not have a territorial focus or effects on a specific type of territory or population (PowerVIBES). One of the projects (LOGIC) also addressed inclusion, considering the energy supply needs and challenges of communities in remote areas. Another project had positive secondary spillover effects (i.e. on socio-economic development of regions in remote areas) in addition to the direct project results and short-term effects on innovation, research and development in remote coastal areas (FORESEA). A third project also produced a positive effect on socioeconomic development in rural

areas (UP-STRAW) through the added value of straw bales for construction. Comparing the projects and results under SO 3 to initial expectations and goals included in the Cooperation Programme 2014-200, the achievements are satisfactory. One project focused on urban areas of small/mid-size municipalities, but the results can be also used in other territorial contexts (SMRT-SPACE). **Three projects addressed specific territorial needs and potential** for energy generation, low carbon technologies and increasing energy efficiency.
Under SO4, all analysed projects address specific transnational development needs, as defined in the Cooperation Programme. All analysed projects under SO 4 can reduce the environmental impact of transport in NWE. However, this contribution is still theoretical and might take place only in the long run, as most projects are local and still in the research, development and testing phase. By definition, transport projects directly and indirectly add to territorial integration. Two SO 4 projects (CHIPS and H2Share) **contributed to territorial cohesion by using a leader-follower approach** and by reducing improving standardised hydrogen refuelling infrastructure across Member States. Two projects (eHUBS and CHIPS) focused on urban territories and the surrounding hinterland, adding to territorial integration. CHIPS used the leader-follower approach for exchanges between municipalities with more and less developed cycling infrastructure. eHUBS provided alternatives to private cars. Project partners partly used a leader-follower approach to introduce the concept in other cities and regions. One project (H2Share) did not have a specific territorial focus. The RIVER project focused more on rural regions as inland waterways are rarely in urban areas. However, as the narrowboat fitted with carbon capture and storage technology was not delivered and the project has not progressed beyond research, the **contribution to development in rural areas is theoretical** and might be realised only in the future.
Under SO5, the projects did not have a strong focus on specific (types of) regions but selected locations based on the economic sector, value chain and legal contexts. However, some projects connected to the industrial and agricultural sectors **often implemented and tested in rural, peripheral areas**. One project (FoodHeroes) focused on losses in food production and involved rural areas close to consumers in urban areas, addressing territorial heterogeneity. One project (AFTB) actively targeted decreased **disparities between urban and rural areas**, particularly by boosting the potential of SMEs in forested, rural regions. One project (Fibersort) with no specific territorial focus identified false textile labelling, a crucial challenge that crosses regional boundaries and requires collective (EU-wide) solutions. One project (Phos4You) **adopted a territorial focus** by including countries with different legislation and practices for sewage sludge disposal. This involved rural, urban, peripheral and port areas. One project focused on the **agriculturally influenced NWE territories**, considering regional differences in digestates and economic contexts, emphasising the adaptability of solutions to various regions (ALG-AD). This project highlighted territorial differences. **Two projects** (SeRaMCo and Rawfill) had **no specific territorial focus** but were naturally realised in **rural/peripheral/suburban areas due to the sectors** (landfill mining, construction material production). **Three of the seven** projects (Phos4You, FoodHeroes, Fibersort) applied the **leader-follower approach** to link weaker and stronger regions. In summary, two projects focused on singular territorial aspects, but all the projects addressed territorial challenges in different sectors. The nature of the value chain and industries addressed by the projects mainly determined the territorial focus. Generally the projects impacted territories indirectly and social effects will mostly become visible in the long run, since the technologies can make the regional economy more circular and sustainable. The projects under SO5 were limited to that dimension of social impact. However, contributions to innovative competences especially of SMEs also supports competitiveness and employment for territorial development.

In general, the projects used different options to tackle territorial challenges. Some started with the partnership which took into consideration the leader-follower approach, linking economically stronger with weaker regions or had an urban-rural focus by design.

The leader-follower approach was used in many projects. Especially under SO1 and SO2, most analysed projects actively brought together stronger with weaker regions to stimulate knowledge transfer and learning. The approach was also applied by projects under SO3, 4 and 5, but to a lesser extent. This is positive as the leader-follower approach addressed mostly SO1 projects but was also actively integrated by many other projects, confirming the value of this approach.

Also during implementation, many projects had a specific territorial focus, including testing tools and methodologies in different types of territories. Some projects addressed a specific type of territory or a territorial development challenge on purpose, for example islands and coastal regions or new opportunities for farmers and agri-food SMEs. Moreover, many projects considered transferring knowledge to other regions (the same or different types) adopting a territorial perspective.

The analysis per SO shows that many projects have a specific territorial focus, actively addressing disparities between types of territories, or implicitly focusing on a topic which is a challenge especially for a certain type of region (urban, rural or coastal). Comparing the number of projects with a specific territorial focus indicates that mostly rural territories are addressed explicitly, as well as rural-urban disparities, while urban topics and challenges are treated implicitly, without mentioning the challenge is mostly for them.

Finally, some projects produced outputs and results with a specific territorial perspective, for example the impact of the project (or a new technology, process, service or product) on development in partners' regions, even if the project focus was on innovation and technologies rather than territorial development.

The analysis identifies **characteristics of projects which successfully involve poorer rural areas**.

- Integrating rural region public authorities and other stakeholders in the partnership. They bring a rural-sensitive perspective to the project from the beginning and during implementation.
- Addressing a topic that is a challenge for a certain type of territory such as energy security, access to services, lack of qualified workers, innovative transformation of traditional business sectors, or mobility. Such projects are aware of the consequences for rural regions who they can then engage directly in the project or indirectly through research institutions, regional development agencies or networks.
- Identifying and engaging European champions of the topic or the territorial challenge for rural areas, even if they are not based in the NWE area, for example as associated partners. This helps to overcome the lack of knowledge and expertise in the regions.
- Joining forces with stronger urban and rural regions with experience of transnational and other ERDF funded projects. It can be difficult for economically weaker rural areas to have the capacity for project management, leverage additional funds, raise awareness or work with new technology, so they can cooperate with experienced partners and regions who have more administrative and innovation capacity.
- Focus on the endogenous potential and assets in rural regions (e.g. renewable energy or, bioeconomy resources, biodiversity, ecosystem services, etc.).

Box 5.1 Example of strengthening rural areas in an Interreg NWE project

The focus of UP-STRAW was to create competence and capacity with low-carbon construction for urban and public buildings using straw. Rural regions have many natural resources with potential for economic development. Most builders of wood/straw buildings find suppliers for straw bales within a few dozen kilometres and need little transportation. This local product may contribute directly to the ecological transition of construction, without affecting agricultural or other uses for straw. This provides diversification and additional income for agricultural businesses.

The analysis has identified **unintended territorial effects from projects,** though it is still very early for this analysis as most unintended effects need time to appear.

Many projects that dealt with new technology and innovation in fields such as health, housing and circular approaches produced social and environmental benefits associated with such innovations. Some were expected and intended, but some cases also produced positive secondary effects. For example, the recovery of Phosphorus benefits the rural areas where it is used as a fertiliser or feed additive. However, it also has positive effects on urban areas when recovered from municipal sewage water, which helps increase water quality.

Box 5.2 Example of additional territorial effects

The focus of Phos4You was on resource efficiency and waste reduction and the project targeted rural, urban and port areas in NWE. In rural areas, partners focused on eliminating phosphorus from small wastewater treatment plants to reduce or prevent the eutrophication of water bodies receiving the effluent. To avoid additional waste from any new process, integral solutions were developed and tested. The aim was to recover phosphorus that could add value such as fertilising properties that met the needs of local/regional stakeholders. In urban territories, the focus was to reduce phosphorus losses in the mono- or co-incineration of sewage sludge. Depending on the technology, one or several materials may be recovered. Integrating these new materials into existing value chains required close cooperation and testing with potential users, as well as clarification of the legal aspects. Local demonstrations optimised the technology to recover phosphorus from sewage sludge (EuPhoRe®, STRUVIA™ coupled with biological acidification, PULSE) and sewage sludge ashes (REMONDIS TetraPhos®, PARFORCE, Phos4Life™) .

Some projects addressing territorial challenges in rural areas or coastal regions with less business diversification and few employment opportunities paved the way for new business opportunities, This increased the competitiveness of existing companies in sectors such as agri-food and textile, or created new job and business profiles in existing or emerging value chains. There are examples of such positive effects on regional development, economic growth and business development in Biobase4SME (SO1), FORESEA and UP-STRAW (SO3), and AFTB (SO5).

Some projects especially under SO5 have unintended long-term ecological benefits from improved resource efficiency and using by-products previously considered as waste, reducing the amount of municipal, industrial, food or farm waste and pollution of natural resources. One example is the ALG-AD project.

Some projects addressed energy supply and access to basic services (power, heat) for vulnerable groups.

Box 5.3 Example of unintended effects on inclusion

The focus of HeatNet NWE was on developing low carbon heat solutions with local district heating and cooling networks. The project improved inclusion by providing affordable warmth for groups excluded or at risk of exclusion from society through economic deprivation. Three of the pilots supply heat to social housing. HeatNet managed to impact the policy level more than initially planned as the project partners gave practical examples to policy makers of what District Heating could look like and the benefits it could bring to society.

Other projects positively affected the attractiveness of territories, for example by reducing limitations and challenges for everyday life in remote areas. Projects such as NWE-Chance and eMen tested and implemented solutions for better access to healthcare and medical services in remote areas.

More examples can be found in the case study reports (Annex 3) and the impact stories (Annex 4).

5.2.3 Territorial aspects of capitalisation

The capitalisation activities brought a substantial effect by extending regional coverage and the outreach of transnational cooperation within Programme regions and territories. 56% of capitalisation call 1 and 62% of call 2 projects planned activities with additional territorial coverage or a new territorial focus.

Almost all capitalisation projects added partners in new regions or countries to their project, normally extending coverage of the project. Many projects had the leader-follower approach in mind or planned to focus on specific territories (or differentiation between types of territories) with the additional activities.

Sometimes a new partner had specific territorial experience or brought a new perspective to the project.

Some projects 'up-graded' former sub-partners or associated partners to full project partners, increasing their engagement and benefits for their associated territories.

Many projects opened up or intensified activities on a specific type of territory (mostly rural). Some initiated pilot and demonstration sites in new regions, leading sometimes to testing innovations or new technology, services or products in new types of territories.

Box 5.4 Example of territorial orientation of capitalisation

The aim of eHUBS was to test and develop the use of urban mobility hubs by making available information on hubs as a service–app stimulating standardised information exchange (with the TOMP-API[19]) between shared mobility providers and mobility-as-a-service providers. To increase the number of eHUBS locations during capitalisation, the focus was to include regions that are not yet part of the consortium or those lagging behind in cohesion terms. eHUBS added one new region and a new economic sector in a large metropolitan area as well as two regions lagging socio-economically. This brought additional insights to the added value of eHUBS as a modal shift in different NWE cities. The consortium wanted to ensure the new locations differed from existing pilot cities. Already before the capitalisation, the existing pilots differentiated according to potential urban mobility needs:

- Bigger cities: In Amsterdam the focus is on citizens determining the size and locations of eHUBS, while in Manchester, this is a top-down approach.

- Medium sized cities: Leuven works with a combined approach in neighbourhoods (for residents) and at strategic interchanges (for commuters and students). Nijmegen/Arnhem work with a top-down approach with lots of interventions focused on residents.

- Small cities Dreux and Kempten focused mainly on residents (both) and on tourists (Kempten), using a tendering procedure instead of cooperation.

Others increased the awareness and focus on differences between types of territories and developed outputs and results adapted to specific territorial needs (see Table 3.8 in section 3.7 for more examples).

Capitalisation brought important added value to the Programme. A review of the intended outputs and expected results shows important contributions from the capitalisation activities. In most cases, these add to existing outputs and results. In some cases, qualitative advances are also expected (e.g. new or extended innovation networks or clusters, new products or markets, new pilots, improved technology, etc.). Capitalisation also considerably extended the partnerships and outreach of transnational cooperation. 50% of capitalisation call 1 and 59% of call 2 projects planned activities with new target

[19] Transport Operator Mobility-as-a-service Provider (TOMP) - Application Programming Interface (API)

groups or stakeholders. In addition, 31% of the call 1 projects and 46% of call 2 envisaged new economic sectors.

There was a strong positive effect on the territorial orientation of capitalisation activities Capitalisation of projects with a focus on geographical extension and broader territorial focus are a good practice for the 2021-2027 Programme and future funding periods.

Another good practice is to stimulate positive effects through increased cooperation (a) with other Interreg NWE projects in the same area, or (b) with projects and partners outside NWE working on the same topic. This should lead to positive synergies between pilot actions and new solutions as well as better knowledge transfer between NWE and other European regions.

6 Analysis and evaluation of the contribution to Europe 2020

The final impact evaluation of the NWE Programme 2014-2020 ends with an analysis and evaluation of contributions of the five SOs and related operations, concluded or still running, to support the three growth priorities of the Europe 2020 Strategy ('Europe 2020'). A brief 'reminder' on the role and main elements of this strategy can be found in Box 6.1. This analysis was done by relating the five SOs and their output indicators to the headline targets and / or actions of Europe 2020 (see section 6.2).

Box 6.1 Europe 2020 in a nutshell

Europe 2020 was a reform strategy for the EU for 2010-2020 that aimed to develop a smarter, knowledge-based and greener economy, expected to grow fast and sustainably while creating high employment and social progress. It succeeded the Lisbon Strategy, which was the EU's reform strategy for 2000-2010. Europe 2020 put forward three mutually reinforcing growth priorities:

- Smart growth: developing an economy based on knowledge and innovation.
- Sustainable growth: promoting a more resource efficient, greener and more competitive economy.
- Inclusive growth: fostering a high-employment economy delivering social and territorial cohesion.

To define where the EU wanted to be by 2020, the Commission proposed five interrelated 'headline targets':

(1) 75 % of the population aged 20-64 should be employed (inclusive growth).

(2) 3% of the EU's GDP should be invested in R&D (smart growth).

(3) The '20/20/20' climate/energy targets should be met, including an increase to 30% emission reductions if the conditions are right (sustainable growth).

(4) Early school leavers should be under 10% and at least 40% of the younger generation should have tertiary education (smart growth).

(5) 20 million less people should be at risk of poverty (inclusive growth).

The Commission also put forward seven flagship initiatives to catalyse progress under the three priority themes ('Innovation Union', 'Youth on the move', 'A digital agenda for Europe', 'Resource efficient Europe', 'An industrial policy for the globalisation era', 'An agenda for new skills and jobs', 'European platform against poverty'). These actions committed both the EU and Member States.

This was the framework which marked the design and early implementation of Interreg NWE Programme 2014-2020. A new framework was introduced by the 'von der Leyen European Commission', in office since 1 December 2019. The 2020+ framework is marked by the Next Generation EU package to deal with consequences of the COVID-19 pandemic and the EU Green Deal to transform the EU by 2030 into a modern, resource-efficient and competitive economy, ensuring no net emissions of greenhouse gases by 2050, economic growth decoupled from resource use, and no person and no place left behind. The last years of implementation of the Interreg NWE Programme were dominated by this strategic framework.

The ESIF legal framework 2014-2020 requires evaluation of the Programme's contribution to Europe 2020.

Source: Communication from the Commission: EUROPE 2020 - A strategy for smart, sustainable and inclusive growth. COM (2010)2020, Brussels, 3.3.2010. Communication from the Commission: The European Green Deal. COM(2019)640 final, Brussels, 11.12.2019.

6.1 Key findings

Evaluation question	Key Findings
How substantial is the NWE contribution likely to be to Europe 2020 (based on both approved and running projects), via the Investment Priorities and SOs implemented by the Programme?	NWE Programme contributions to Europe 2020 are significant for the smart and sustainable growth priorities, but less so for inclusive growth (see also summary table 6.5 at the end of section 6.2). For smart growth, there are consistently high and medium contributions for all NWE-specific aspects addressed (SO1). These contributions are reinforced by additional cross-thematic contributions from other SOs (SO3, SO4, SO5). For sustainable growth, the most comprehensive and highest contribution is made to reducing GHG emissions (SO2, SO3, SO4). There is also a major contribution to improving energy efficiency (SO2). The contributions to inclusive growth are medium for increasing employment for those aged 20-64 (SO1, SO3) and high for promoting social innovation and improving access to affordable, sustainable and quality services in NWE (SO1). However, the macroeconomic variables in the Europe 2020 headline targets for inclusive growth should not be considered (evaluated) for the cross-thematic impacts of all SOs for methodological reasons (see also the comment in section 6.2).
Has there been any potential external factors facilitating the Programme contribution to Europe 2020?	The analysis of Europe 2020 contributions in 2014-2020 did not reveal any specific external factors that facilitated Programme contributions. Thus, 'only' the external influences already identified for implementation of the SOs are relevant here.
Can we identify additional benefits that increase the NWE contribution to Europe 2020 – boosting competitiveness, green economy and inclusive growth in NWE? How?	An important additional benefit that increases the NWE Programme's contribution to the Europe 2020 smart growth priority is the cross-thematic contribution from SOs focussing on sustainable growth (SO3, SO4, SO5). This contribution was foreseen by the NWE Programme from the outset. Future programming processes should, wherever possible and useful, foresee such cross-thematic contributions, for example between SOs of different or the same priority axes. This not only strengthens the internal coherence of a Programme's strategy, but also increases the potential for outputs.
How can these additional benefits be integrated into the context of the Programme impact?	The foreseen cross-thematic contributions to smart growth (SO3, SO4, SO5) should be considered in other parts of the impact evaluation. They should be evaluated in terms of their additional impact on increasing transnational knowledge transfer throughout NWE and enhancing the transformation of innovative ideas into new products and services. However the macroeconomic variables used in the Europe 2020 headline targets for inclusive growth should exclude the cross-thematic contributions of all SOs for methodological reasons (see also the comment in section 6.2).

6.2 Analysis and evaluation

A starting point for the analysis and evaluation of contributions to Europe 2020 is **the initial expectation of the NWE Programme** to support the three growth priorities. The following references can be found in the Programme strategy[20]:

[20] NWE Programme document, pp. 16 and 17

- ***Contribution to Smart Growth:*** *The Programme strategy will promote excellence and synergy by matching regional innovation approaches and connecting key clusters and innovation stakeholders in the NWE area. Based on the analysis of needs and challenges, there is no 'one size fits all' innovation strategy for NWE. The Programme focuses on applied research and technological development activities close to the market (such as proof of concept), and market exploitation of new products, processes and services. The challenges addressed in relation to innovation should be preferably linked to green growth and social inclusion, because these are promising and urgent in NWE.* (…)

- ***Contribution to Sustainable Growth:*** *The Programme strategy contributes to reduced GHG emissions, increased energy efficiency and an increased share of renewable energy in the consumption and production mix, by stimulating eco-innovation and the development and uptake of low carbon technologies and transport systems. Furthermore, the Programme focuses on projects in the field of resource and materials efficiency. In addition, the Programme focuses on energy accessibility and affordability which contribute to territorial cohesion and social inclusion.* (…) *The strategy also focuses on the mitigative and adaptive capacity of at-risk territories to respond to climate change natural events. In relation to the low carbon Roadmap, the NWE Programme contributes to the realisation of low carbon goals in sectors that have high energy saving potentials, such as the de-carbonised power sector (SO2 and SO3), industrial sectors (SO3 and SO5), transport (SO4) and the built environment (SO2). The Programme also takes the EU strategy on climate change into account. SO2 considers large parts of this strategy by promoting cooperation on the integration of adaptation and mitigation measures.* (…)

- ***Contribution to Inclusive Growth:*** *Transnational and territorial aspects of social inclusion may include removing barriers for a transnational labour market, as well as transnational education, entrepreneurship education and pre-employment training. This also links to the innovation strategy (social innovation). Social inclusion is embedded throughout the Programme strategy and will be made visible in the SO, where applicable* (…). *The Programme seeks to link the weak regions with the strong regions in the NWE area, and to support the development of technologies and services with a high social impact (for example, in the health domain) for all types of population. Moreover, the Programme strategy addresses energy accessibility and affordability and improving energy efficiency in social housing.* (…)

Analysing the nature and scope of Programme contributions to Europe 2020

The above references taken from the NWE Programme suggest **two types of contributions to Europe 2020:** 'thematic contributions' and 'cross-thematic contributions'.

Thematic contributions are from SOs that directly relate to the smart and sustainable growth priorities of Europe 2020. Smart growth is supported by enhancing the innovation performance of enterprises throughout NWE regions (SO1), which can generate contributions to the headline target of investing 3% of EU GDP in R&D and to related Europe 2020 actions (especially the flagship initiative 'Innovation

Union')[21]. There are thematic contributions to sustainable growth from the other four SOs. They implement low-carbon, energy and climate protection strategies (SO2), facilitate the uptake of low carbon technologies, products, processes and services in sectors with high energy saving potential (SO3), promote low-carbon solutions in NWE transport systems (SO4) and optimise a (re)use of material and natural resources (SO5). These contributions can support achievement of the '20/20/20' climate/energy headline targets and issues addressed by elated Europe 2020 actions (especially. the flagship initiatives 'Resource efficient Europe' and 'An industrial policy for the globalisation era').

Cross-thematic contributions from SOs, in addition to their main intervention focus on the smart or sustainable growth priorities of Europe 2020, also support headline targets and / or actions of other growth priorities. Such cross-thematic contributions were often foreseen by the NWE Programme. A good example is the inclusive growth priority of Europe 2020, which was integrated as a horizontal and cross-cutting issue within the Programme objectives to promote the inclusion of vulnerable social groups and territories. Inclusive growth is supported through the creation / preservation of jobs in NWE (all SOs) and by promoting social innovation (under SO1)[22]. Another example is the smart growth priority, which is also supported by several SOs focussing on sustainable growth if projects promote eco-innovation or 'green' technologies.

The next step was to determine the scope of both types of contributions for each SO and substantiate the SO contributions with data from the NWE Programme monitoring system. For this, we **relate the key elements of Europe 2020** (i.e., headline targets, actions) **to all output indicators used by the SOs** (see: table 6.1). This provides a detailed overview of NWE Programme thematic and cross-thematic contributions to Europe 2020, for each SO and across SOs. Thematic contributions of SOs are shown in darker colours (with 'white crosses') and cross-thematic contributions of SOs are shown in lighter colours (with 'black crosses'). The relationships of output indicators enable a quantitative evaluation of Europe 2020 contributions.

[21] For smart growth, the NWE Programme does not directly address the second headline target ('The share of early school leavers should be under 10% and at least 40% of the younger generation should have a tertiary degree') nor other related Europe 2020 actions (i.e., the flagship initiatives 'Youth on the move' and 'A digital agenda for Europe'). This is (…) *because the challenges within these fields require a more regional and national approach and the added value of transnational cooperation is limited. Accordingly, they can be better dealt with by other European programmes such as the European Social Fund, Horizon 2020 and Erasmus+ or by national programmes and instruments.* See: NWE Programme document, p. 9

[22] For inclusive growth, the NWE Programme does not directly address the Europe 2020 action 'An agenda for new skills and jobs' because (…) *the related challenges require a more regional and national approach and the added value of transnational cooperation is limited.* See: NWE Programme document, p. 9

Table 6.1 Relationships between key elements of Europe 2020 (i.e. headline targets, actions) and NWE Programme output indicators

Key elements of the Europe 2020 Strategy		Programme-specific and common output indicators		Thematic and cross-thematic contributions of SOs				
Growth priority	**Related headline targets and actions**	**ID**	**NWE Programme indicator**	**SO1**	**SO2**	**SO3**	**SO4**	**SO5**
Smart Growth: Developing an economy based on knowledge and innovation	3% of EU GDP should be invested in R&D.	1.06	Amount of funding leveraged by the project (in €)	X				
	Unleashing Europe's innovative capabilities and re-focussing R&D and innovation policy on the challenges facing our society. Promoting innovation and knowledge transfer throughout the EU, by making full use of ICT and ensuring that innovative ideas can be turned into new products and services.	CO01	No. of enterprises receiving support	X				
		1.01	No. of new or enhanced transnational clusters or innovation networks	X				
		1.02	No. of technologies, products, services and processes developed and tested in real life conditions	X				
		CO26	No. of enterprises co-operating with research institutions	X		X	X	X
		CO28	No. of enterprises supported to introduce new to the market products	X		X	X	X
		CO29	No. of enterprises supported to introduce new to the firm products	X		X	X	X
Sustainable Growth: Promoting a more resource efficient, greener and more competitive economy	20% reduction in GHG emissions	CO34	Estimated annual decrease of GHG (in tonnes of CO_2eq)		X	X	X	
		4.02	No. of new or improved transport management systems leading to GHG reduction				X	
	20% of energy from renewable sources	CO30	Additional capacity of renewable energy production			X		
	20% increase in energy efficiency	CO31	No. of households with improved energy classification		X	X		
		CO32	Decrease of annual primary energy consumption in public buildings		X			
	Strengthening the EU economy's resilience to climate risks and the capacity for disaster prevention and response. Achieving climate goals by fully exploiting the potential of new technologies and spreading innovative technological solutions, including the development of new green technologies. Helping SMEs and all sectors to adjust their production processes and products to a low-carbon economy.	2.02	No. of combined mitigation-relevant adaptation solutions implemented		X			
		2.01	No. of solutions facilitating delivery of existing or emerging low-carbon, energy or climate-protection strategies		X			
		2.05 / 3.04	Amount of funding leveraged by the project (in €)		X	X		
		3.01	No. of adopted or applied low carbon technologies			X		

Key elements of the Europe 2020 Strategy		Programme-specific and common output indicators		Thematic and cross-thematic contributions of SOs				
Growth priority	**Related headline targets and actions**	**ID**	**NWE Programme indicator**	**SO1**	**SO2**	**SO3**	**SO4**	**SO5**
	To increase modernising and decarbonising to increase competitiveness.	4.01	No. of implemented low carbon solutions in transport				X	
		4.03	No. of transport operators supported implementing low carbon solutions				X	
		4.06	Amount of funding leveraged by the project (in €)				X	
	Becoming a more resource efficient economy, giving Europe a competitive advantage and reducing its dependency on foreign sources for raw materials and commodities. Maintaining the EU's lead in green technology, ensuring resource efficiency throughout the economy and boosting industrial competitiveness Assisting consumers to value resource efficiency.	5.01	No. of efficient natural and material resources solutions implemented and tested					X
		5.02	No. of innovative uses of waste processes / products / services from waste materials					X
		5.03	Amount of funding leveraged by the project (in €)					X
		5.04	Amount of decreased raw material use					X
		5.05	Amount of increased material recovery, re-use and recycling					X
		CO01	No. of enterprises receiving support					X
Inclusive Growth: Fostering a high-employment economy delivering social and territorial cohesion	75% of 20-64 year-olds to be employed. At least 20 million fewer people in or at-risk-of-poverty and social exclusion.	1.04 / 2.03 / 3.02 / 4.04 / 5.06	No. of jobs created in all economic sectors	X	X	X	X	X
		1.05 / 2.04 / 3.03 / 4.05 / 5.07	No. of jobs maintained in all economic sectors	X	X	X	X	X
	Promoting social innovation for the most vulnerable, reducing health inequalities in society and promoting a healthy / active ageing population to allow for social cohesion and higher productivity. Building a cohesive society, by spreading the benefits of economic growth to all parts of the EU, strengthening territorial cohesion.	1.03	No. of pilot actions implemented, focusing on social innovation	X				
		1.07	No. of end-users benefitting from social innovation	X				

The following quantitative evaluation of NWE Programme contributions to Europe 2020 is separate for each of the three growth priorities. These evaluations consider the 'expectations' (What are the output targets at Programme level to be achieved by the end of 2023? What are the outputs that approved projects plan to produce at the end of their implementation process?) and 'actual achievements' (What outputs are already produced by completed or ongoing projects?). A comparison of the two helps estimate the extent of thematic and cross-thematic contributions to Europe 2020. This is particularly relevant where the outputs are significantly above or below the expected Programme targets for 2023 and/or the projects' own targets as stated in the application forms.

This quantitative and indicator-based evaluation does not consider many other qualitative improvements achieved by the operations (e.g., individual and organisational learning of project partners; change or improvement in management practice in the public and / or private sectors; improved employability of target groups, etc.). As these improvements are not captured by the established set of output indicators, their positive effects to support the implementation of Europe 2020 cannot be specified.

Evaluation of Programme contributions to 'smart growth'

The above overview (Table 6.1) shows that smart growth is primarily supported through thematic contributions from operations approved under SO1, but to some extent also by cross-thematic contributions from operations implemented under SOs 3, 4 and 5. These thematic and cross-thematic contributions focus on:

- the smart growth target of investing 3% of EU GDP in R&D (only SO1),
- other NWE-specific aspects related to R&D and innovation to foster innovative capabilities of the private sector, strengthen the transnational dimension of innovation, promote innovation / knowledge transfer across the transnational cooperation area, and to transform innovative ideas into new products and services (SOs1, 3, 4 and 5).

The SO1 contribution to the target of investing 3% of EU GDP in R&D is seen in the funding leveraged by all operations under this SO (i.e., indicator 1.06).

Although the NWE Programme has set an ambitious target for the end of 2023 (i.e. EUR 222 million), monitoring data shows (Table 6.2) that the funding leveraged by operations is only 24% of the expected target. Despite this very modest achievement, monitoring data shows that SO1 operations have over-achieved their cumulative output target as stated in their application forms (127%).

In summary, the thematic contribution to the Europe 2020 target of investing 3% of EU GDP in R&D is considerable, but low compared to initial expectations of the Programme.

Table 6.2 Targets for output indicators contributing to 'smart growth'

Specific Objective	Output indicator	Programme target value (PTV) for 2023	Operations' target value (OTV)	Outputs generated by operations	Achievement rate … (*)	
					… for PTV	… for OTV
SO1	(1.06) Amount of funding leveraged by the project (EUR)	222 000 000	41 732 000	53 073 461	24%	127%
	(CO01) No. of enterprises receiving support	540	2.909	2.603	482%	89%
	(1.01) No. of new or enhanced transnational clusters or innovation networks	27	81	77	285%	95%
	(1.02) No. of technologies, products, services and processes developed and tested in real life conditions	68	491	506	744%	103%
	(6) No. of enterprises co-operating with research institutions	340	493	488	144%	99%
	(CO28) No. of enterprises supported to introduce new to the market products	340	801	831	244%	104%
	(CO29) No. of enterprises supported to introduce new to the firm products	200	731	451	226%	62%
SO3	(CO26) No. of enterprises co-operating with research institutions	220	304	381	173%	125%
	(CO28) No. of enterprises supported to introduce new to the market products	220	140	142	65%	101%
	(CO29) No. of enterprises supported to introduce new to the firm products	220	54	10	5%	19%
SO4	(CO26) No. of enterprises co-operating with research institutions	200	123	146	73%	119%
	(CO28) No. of enterprises supported to introduce new to the market products	200	37	41	21%	111%
	(CO29) No. of enterprises supported to introduce new to the firm products	200	50	53	27%	106%
SO5	(CO26) No. of enterprises co-operating with research institutions	200	187	169	85%	90%
	(CO28) No. of enterprises supported to introduce new to the market products	200	110	101	51%	92%
	(CO29) No. of enterprises supported to introduce new to the firm products	200	53	121	61%	228%

Source: JS data as of 29 August 2023 and own calculations.

(*) Achievements are calculated as follows: current output from operations, divided either by the Programme target for 2023 or the operations' own target (cumulative, as indicated in the project application forms).

In contrast to the R&D target, **thematic and cross-thematic contributions to other relevant actions of the Europe 2020 smart growth priority are much more significant.** This general statement can be supported by looking more closely at four NWE-specific aspects of smart growth and analysing them using data from the output indicators shown in Table 6.2.

Box 6.2 Examples of NWE contributions to Smart Growth

The project ASPECT increased productivity of metal forming production lines by model-based prediction and the control of temperature increases from friction. By addressing the root cause of technical failures causing production shut downs, ASPECT has enhanced productivity of the processes by 35% and reduced maintenance costs by 23%

The BioBase4SME project helped bio-economy start-ups and SMEs overcome technological and non-technological barriers to bring their innovations to market. More than 40% of services were delivered to SMEs across borders, especially supporting smaller companies. The project reached out to over 650 SMEs with bio-innovation support for entrepreneurs throughout NWE regions and granted Innovation Coupons to 63 SMEs with over EUR 1.5 million spent on SMEs.

COTEMACO aimed to tackle current low sectorial awareness and knowledge gaps of SMEs in the automotive and food sectors by supporting regional field labs and working to implement collaborative robotics (cobots) through transnational cooperation.

Machining 4.0 helped increase knowledge and innovation in the machine industry SMEs in line with Industry 4.0 automating traditional manufacturing and industrial practices using smart technology. Demonstrators were developed in 7 field labs (BE, CH, DE, FR, IE, NL,UK). The project's findings are inspiring machine industry SME's.

MATMED's objective was to create a sustainable NWE cross-regional ecosystem bringing innovative solutions closer to the market for advanced materials, medical devices and regenerative medicines. A total of 53 transnational matches and 16 vouchers have resulted in a TRL increase of 1-3+ in all cases supported and over 40 new jobs.

Boost4Health provides support to life science SMEs to explore international growth, by expanding their international network, finding expertise abroad or validating products in another market. The project has surpassed its objectives: 482 SMEs were supported, 519 jobs created, 328 SMEs received a voucher.

FORESEA facilitated real-sea testing activity in the ocean energy sector harnesses the expertise and knowledge of each test site with a collaborative partnership. 28 ocean energy technologies were deployed across four test centres. Over EUR 64 million for R&D funding was leveraged.

H2SHARE facilitated the development of a market for low-carbon heavy-duty hydrogen-powered vehicles for logistics. A 27-tonne rigid hydrogen-powered truck and a mobile refueler were developed and built.

Phos4You focused on phosphorus recovery from municipal wastewater to contribute to food security in NWE by scaling-up seven technologies. Recycling uses of the recovered materials were identified under the revised EU Fertilising Products Regulation 2019/1009.

Source: Interreg Programme NWE 2014-2020: NWE making an impact! Cooperation in action.

(1) The thematic contribution of SO1 strengthens innovation capacity in the private sector. This is seen in the high number of enterprises supported under this SO (indicator CO01). The number of companies already supported is significantly above the programme target for 2023 (482%). Moreover, the operations have made good progress in reaching their own output target as stated in their project application forms (89%).

(2) The thematic contribution of SO1 strengthens the transnational dimension of innovation in NWE. The operations establish new or enhanced transnational clusters or innovation networks (indicator 1.01) and jointly develop technologies, products, services and processes that are tested in real life conditions (indicator 1.02). For both indicators, the outputs are significantly above the programme

targets for 2023 (for indicator 1.01: 285%; indicator 1.02: 744%). Moreover, the operations are either close to their own output target (for indicator 1.01: 95%) or already surpassed this (indicator 1.02: 103%).

(3) The thematic contribution of SO1 and cross-thematic contributions of SOs 3, 4 and 5 increased transnational knowledge transfer throughout NWE. This aspect of smart growth can be seen in the number of enterprises cooperating with research institutions (indicator CO26). A total of 1 184 companies from NWE cooperate with research institutions under these four SOs.

- 41% of these business-research collaborations were established by SO1 operations (488). The performance of this SO is clearly above initial expectations, since the output already exceeds the programme target for 2023 (144%). Also, the cumulative output target as stated in project application forms of the SO1 operations is almost fully achieved (99%).

- The remaining 59% of these collaborations were established by operations under SO3 (381), SO4 (146) and SO5 (169), which shows the importance of cross-thematic contributions to smart growth. SO3 operations facilitating the uptake of low carbon technology, products, processes and services in sectors with high energy saving potential are particularly successful. These operations already achieved an output significantly above the programme target for 2023 (173%) and have also surpassed their own targets (125%). A weaker performance is seen for SOs 4 and 5, since their outputs are 'only' 73% and 85% of the 023 targets. Nevertheless, SO4 operations have surpassed their own cumulative target (119%) and SO5 operations made good progress (90%).

(4) The thematic contribution of SO1 and further cross-thematic contributions of SOs 3, 4 and 5 enhance the transformation of innovative ideas into new products and services. This aspect of smart growth can be assessed by looking at the number of companies that introduced new products to the market (indicator CO28) and / or new to the firm products (indicator CO29). However, the monitoring data shows that these contributions vary across the SOs:

- The thematic contributions of SO1 operations are the strongest. For both indicators, the outputs are significantly above the programme targets for 2023 (indicator CO28: 244%; indicator CO29: 226%). Their own targets are either surpassed (indicator CO28: 104%) or show a significant shortfall (indicator CO29: 62%).

- The cross-thematic contributions of SOs 3, 4 and 5 to both indicators are much weaker, as the total output for these SOs (468 new to the market and new to the firm products) is significantly lower than the output from SO1 alone (1 282). The outputs of the three SOs are below or even significantly below the programme targets for 2023 (from 5% to 65%). However, achievement of the projects' own targets for the six indicators is much better. Initial targets have been surpassed for four indicators (101%, 111%, 106%, 228%), while for the other two indicators is either adequate (92%) or unsatisfactory (19%).

The following **conclusion** can be drawn from these analyses. Thematic contributions of SO1 to the four NWE-specific aspects confirm its leading role in promoting smart growth, both in terms of output volume (absolute figures) and performance (target achievements). The cross-thematic contributions of SOs 3, 4 and 5 to increasing transnational knowledge transfer throughout NWE and improving the transformation of innovative ideas into new products and services are less important, but still relevant.

A notable exception is the cross-thematic contribution of SO3 to increasing transnational knowledge transfer (indicator CO26), with an even better performance than the contribution of SO1 (i.e., for the 2023 target and projects' own targets).

Evaluation of Programme contributions to 'sustainable growth'

The NWE Programme supports the sustainable growth priority of Europe 2020 exclusively through thematic contributions from operations under SOs 2, 3, 4, and 5. These contributions focus on:

- the three headline targets for sustainable growth; a 20% reduction in GHG emissions (SOs 2, 3 and 4) and a 20% increase in energy from renewable sources (SO3) as well as a 20% increase in energy efficiency (SOs 2 and 3),

- other NWE-specific aspects helping to establish a more resource efficient, green and competitive economy in the transnational cooperation area (SOs 2, 3, 4 and 5).

The contribution of these SOs to enhancing sustainable growth in NWE is substantial. This can be demonstrated by analysing the Europe 2020 headline targets and NWE-specific sustainable growth with data for the related output indicators (Table 6.3).

A first, but general, indication is provided by looking at **financial resources mobilised to support sustainable growth.** This is reflected under the four relevant SOs by the indictors 'Amount of funding leveraged by the project' (indicators 2.05, 3.04, 4.06 and 5.03).

The total amount of funding leveraged by all operations of the four SOs is high (EUR 403 248 430), but slightly below the expected target for the end of 2023 (EUR 410 791 309, an achievement rate of 98%). Moreover, the operations of the four SOs have significantly exceeded their originally target for leveraged funding (EUR 261 170 000, an achievement rate of 154%).

However, the thematic focus of funding to support sustainable growth in NWE differs from the Programme's initial expectations per SO:

- Funding already leveraged by operations implementing low-carbon, energy and climate protection strategies (SO2) and promoting low-carbon solutions in NWE transport systems (SO4) surpassed both the Programme target for the end of 2023 (143% and 254% respectively) and the project targets (171% and 343% respectively).

- The mobilisation of funding for an uptake of low carbon technologies, products, processes and services in sectors with high energy saving potential (SO3) is satisfactory, since operations have almost reached the target for the end of 2023 (89%). However, they are still significantly behind their own targets (59%).

- Programme support for optimising the (re)use of material and natural resources (SO5) did not perform well. The operations have only mobilised a small proportion of the 2023 target funding (3%), but have clearly exceeded their own, low, output target (250%).

The above clearly shows that the primary focus of sustainable growth funding under the NWE Programme is for issues addressed by SOs 2, 3 and 4.

Thematic contributions to the first headline target of reducing greenhouse gas emissions by 20% are made by operations under SOs 2, 3 and 4. Their contributions can be assessed by looking at the indicator 'Estimated annual decrease of GHG' (indicator CO34), used by all three. Further information is given by the indicator 'Number of new or improved transport management systems leading to GHG reduction' (indicator 4.02), used by SO4 only.

The contributions of SOs 2, 3 and 4 to the reduction of GHG emissions are strong and outputs are considerably above the Programme targets for 2023 (21 315% for SO2, 1 672% for SO3 and 2 470% for SO4). The total output of all three SOs corresponds to an annual GHG reduction of around 115 795 tonnes CO_2eq. The performance of the SOs in terms of achieving output targets in the project application forms is mixed. SO4 performs extremely well (533%), while the other two SOs are either slightly or significantly behind achieving the projects' own targets (SO2: 84%; SO3: 55%).

SO4 has established eight new or improved transport management systems leading to GHG reductions, slightly below the initial Programme expectations (80%) but above the projects' own targets (114%).

Table 6.3 Achievements for output indicators contributing to 'sustainable growth'

Specific Objective	Output indicator	Programme target value (PTV) for 2023	Operations' target value (OTV)	Outputs generated by operations	Achievement rate … (*)	
					… for PTV	… for OTV
SO2	(2.01) No. of solutions facilitating delivery of existing or emerging low-carbon, energy or climate-protection strategies	18	97	88	489%	91%
	(2.02) No. of combined mitigation-relevant adaptation solutions implemented	15	21	8	53%	38%
	(2.05) Amount of funding leveraged by the project (EUR)	80 811 405	67 450 000	115 372 552	143%	171%
	(CO31) No. of households with improved energy classification	450	7.679	7.444	1 654%	97%
	(CO32) Decrease of annual primary energy consumption of public buildings (kWh/year)	300 000	23 328	30 809	10%	132%
	(CO34) Estimated annual decrease of GHG (in tonnes of CO_2eq)	450	114 450	95 918	21 315%	84%
SO3	(3.01) No. of adopted or applied low carbon technologies	44	84	72	164%	86%
	(3.04) Amount of funding leveraged by the project (EUR)	87 545 688	132 020 000	77 875 878	89%	59%
	(CO30) Additional capacity of renewable energy production	120	27	30	25%	111%
	(CO31) Number of households with improved energy classification	660	0	0	0%	0%
	(CO34) Estimated annual decrease of GHG (in tonnes of CO_2eq)	500	13 618	7 526	1 672%	55%
SO4	(4.01) No. of implemented low carbon solutions in transport	20	26	31	155%	119%
	(4.02) No. of new or improved transport management systems leading to GHG reduction	10	7	8	80%	114%
	(4.03) No. of transport operators supported implementing low carbon solutions	200	13	19	10%	146%
	(4.06) Amount of funding leveraged by the project (EUR)	80 811 405	59 700 000	205 000 000	254%	343%
	(CO34) Estimated annual decrease of GHG (in tonnes of CO_2eq)	500	2 316	12 350	2 470%	533%
SO5	(5.01) No. of efficient natural and material resources solutions implemented and tested	42	126	104	248%	83%
	(5.02) No. of innovative uses of waste processes / products / services from waste materials	18	106	104	578%	98%

Specific Objective	Output indicator	Programme target value (PTV) for 2023	Operations' target value (OTV)	Outputs generated by operations	Achievement rate … (*)	
					… for PTV	… for OTV
	(5.03) Amount of funding leveraged by the project (in EUR)	161 622 811	2 000 000	5 000 000	3%	250%
	(5.04) Amount of decreased raw material use (tonnes)	1 000 000	263 204	311 438	31%	118%
	(5.05) Amount of increased material recovery, re-use and recycling (tonnes)	1 000 000	337 443	446 242	45%	132%
	(CO01) No. of enterprises receiving support	200	1 451	1 354	677%	93%

Source: JS data as of 29 August 2023 and own calculations.

(*) Achievement rates are calculated as follows: current output generated by operations, divided either by the Programme target value for 2023 or by the operations' own target value (cumulative, as indicated in the project application forms).

A thematic contribution to the second headline target of increasing energy from renewable sources by 20% is only made by operations under SO3. However, their contribution to increased energy from renewable sources is very modest as seen by the outputs for the indicator 'Additional capacity of renewable energy production' (CO30). The output is considerably below the Programme target for 2023 (25%), but the performance of operations in reaching their own (low) output target is positive (111%).

Thematic contributions to the third headline target of increasing energy efficiency by 20% are made by operations under SOs 2 and 3. Their contributions can be seen in the indicators 'Number of households with improved energy classification' (CO31) and 'Decrease of annual primary energy consumption of public buildings' (CO32). While the first indicator is used by SOs 2 and 3, the second is only used by SO2. However, looking at the monitoring data shows the contribution to this headline target is often below expectations.

- For the indicator on households with improved energy classification, only SO2 operations make a strong contribution. Their output is considerably above the Programme target for 2023 (1 654%) and the performance of in achieving their own targets is also satisfactory (97%). This may compensate for SO3 operations not yet producing any output for this indicator.

- The expected reduction in the annual primary energy consumption of public buildings is much lower than initially expected. The actual output of SO2 operations is very low (10% achievement rate) against the Programme target for 2023, but still a 132% achievement against the projects' own low target.

Box 6.3 Examples of NWE contribution to Sustainable Growth

The ECCO project built an Accelerator Network to transnationally rally knowledge, experience and expertise to develop energy community cooperatives (ECCOs). It developed a prototype of an open electronic one-stop shop facilitating do-it-yourself development in the first stages of the ECCO life cycle. 192 new ECCOs were supported, 26 are already operating. Green Energy produced: +/- 52 000 MWh/year. CO_2 emissions reduced: +/- 7 500 tonnes/year.

Climate Active Neighbourhoods focused on GHG reduction in residential buildings of deprived neighbourhoods with local authorities implementing climate action strategies more effectively and involving residents. 1 922 households with improved energy standards. 2 669 tonnes GHG savings. EUR 13.5 million funding leveraged.

ACE-retrofitting increased the number of shared energy retrofitting measures in privately owned condominiums thanks to governance linking demand and supply, facilitated by local authorities. It created an online platform adapted to local contexts in the six pilot cities (Paris, Aberdeen, Maastricht, Liège, Antwerp, Frankfurt). As a result almost 6 000 households improved their energy class resulting in over 9 500 tonnes of CO_2 savings per year.

UP-STRAW focused on using straw for new buildings and to retrofit existing ones, with a focus on urban and public buildings. Technical support and tools for professionals to facilitate the use of straw as a building material were developed. Straw specifications were integrated into Building Information Modelling. A Massive Online Open Course had 3 970 registered users.

eHUBS created a critical mass of shared mobility options for light electric vehicles and EVs, leading to behaviour change, contributing to less congestion and CO_2 emissions in cities. eHUBS are available in pilot cities (BE, DE, FR, NL, UK), with a mix of shared electric bikes, cargobikes and cars. In many cases, they can be accessed with a mobility-as-a-service app.

Green WIN carried out laboratory and site trials and demonstrated new low-carbon water pumping technologies, systems and processes for Waterway Management Organisations to reduce energy use and CO_2 emissions.

RAWFILL (Supporting a new circular economy for RAW materials recovered from landfills) provided knowledge and tools to screen landfills to select profitable landfill mining projects, recovering huge amounts of dormant raw materials and land resources, as well as identify interim use projects to be developed.

Within the SeRaMCo project treatment for construction and demolition waste has been significantly improved. New cement and concrete mixes have been developed using such waste. Various innovative precast concrete products have been designed and produced.

Source: Interreg Programme NWE 2014-2020: NWE making an impact! Cooperation in action.

The above analysis enables **conclusions on thematic contributions to the three Europe 2020 headline targets for sustainable growth.** The NWE Programme contributes significantly to the first headline target of a 20% reduction in greenhouse gas emissions with SOs 2, 3 and 4. The outputs of all three SOs are well above the Programme targets for 2023, but the performance to meet the projects' own targets is uneven. In contrast, the thematic contributions of the SOs to the other two headline targets are much more modest. This is particularly so for the second headline target of a 20% increase in energy from renewable sources. Contributions to the third headline target of a 20% increase in energy efficiency are also behind initial expectations, although a noticeable effect is 'secured' thanks to the high output of SO2 operations.

In addition to these contributions to the 20/20/20 headline targets, **the NWE Programme also contributes to three NWE-specific aspects closely related to the Europe 2020 sustainable growth priority.** These aim (1) to enhance climate action (mitigation and adaptation) and the emergence of a

low-carbon economy, (2) to modernise and decarbonise the transport sector, and (3) to promote a more efficient use of material and natural resources.

(1) Thematic contributions to enhancing climate action (mitigation and adaptation) and the emergence of a low-carbon economy in NWE[23] are made by operations under SOs and 3. The contribution can be assessed using three indicators[24] that capture output to implement low carbon, energy and climate protection strategies (SO2) and to facilitate the uptake of low carbon technologies, products, processes and services in sectors with high energy saving potential (SO3).

- For SO2 the contribution is mixed. Establishing solutions that facilitate delivery of existing or emerging low-carbon, energy or climate-protection strategies is very strong. The output of related operations is well above the Programme target for 2023 (489%) and satisfactory for the projects' own targets (91%). However, the performance for combined mitigation-relevant adaptation solutions is modest. The output is considerably below the target for 2023 (53%) and achievement of the projects' own targets is even lower (38%).

- The SO3 contribution to this aspect is positive, as output of adopted or applied low carbon technologies is well above the Programme target for 2023 (163%). Only the achievement of the projects' own targets is not yet satisfactory (86%).

(2) Thematic contributions to modernising and decarbonising the transport sector in NWE are made by operations under SO4. Contributions can be assessed by looking at the indicators 'Number of implemented low carbon solutions in transport' (4.01) and 'Number of transport operators supported implementing low carbon solutions' (4.03).

- Although the actual number of transport operators implementing low carbon solutions has fallen far short of the programme's expectations for the end of 2023 (10%), there are positive developments. With an achievement rate of 146%, SO4 operations have significantly exceeded their own initial (but low) target for this indicator.

- The implementation of low carbon solutions in the transport sector is clearly positive. SO4 operations have not only significantly exceeded the Programme target for 2023 (155%), but have also 'produced' more outputs compared to their own initial target (119%).

(3) Thematic contributions to promoting more efficient use of material and natural resources in NWE[25], also through stronger development and uptake of green technologies[26], are made by operations implemented under SO5. Contributions to this aspect of Europe 2020 can be assessed by

[23] Strengthening the EU economy's resilience to climate risks and the capacity for disaster prevention and response. Achieving climate goals through fully exploiting the potential of new technologies and spreading innovative technological solutions, including the development of new green technologies. Helping SMEs and all sectors to adjusting their production processes and products to a low-carbon economy.

[24] (2.02) No. of combined mitigation-relevant adaptation solutions implemented. (2.01) No. of solutions facilitating delivery of existing or emerging low-carbon, energy or climate-protection strategies. (3.01) No. of adopted or applied low carbon technologies.

[25] Becoming a more resource efficient economy, giving Europe a competitive advantage and reducing its dependency on foreign sources for raw materials and commodities. Assisting consumers to value resource efficiency.

[26] Maintaining the EU's lead in the market for green technologies for ensuring resource efficiency throughout the economy and boosting industrial competitiveness.

indicators associated with SO5 operations[27] as well as those that capture specific effects generated by operations[28]. For the overall importance of this thematic contribution, however, the current situation suggests a mixed picture:

- SO5 operations on resource efficiency support many enterprises from different sectors. This output exceeds the initial Programme target for 2023 by far (677%) and the projects' own target is close to being fully met (93%). The situation is also very positive for the two types of action under these operations. For efficient natural and material resource solutions implemented and tested (indicator 5.01) and for the innovative uses of waste processes / products / services from waste materials (indicator 5.02), outputs far exceed the original Programme targets for 2023 (248% and 578% respectively). In addition, SO5 operations for both types of action are close to meeting the projects' own targets (83% and 98% respectively).

- However, the situation is less positive for project actions. The outputs for both the reduction in raw material use (indicator 5.04) and the increase in the recovery, re-use and recycling of materials (indicator 5.05) are still well below the Programme targets for 2023 (31% and 45% respectively). Despite this modest performance, SO5 operations have exceeded the projects' own output targets for both indicators (118% for 5.04 and 132% for 5.05).

The analysis of **NWE related to the Europe 2020 sustainable growth priority offers the following conclusion.** The significance of the thematic contributions to the three aspects is generally medium. This is because the indicators show both positive and negative output performance (i.e., for the Programme's 2023 targets and for the projects' own targets). Nevertheless, there are examples of strong performance for the delivery of existing or emerging low carbon, energy or climate protection strategies (Aspect 1, SO2), adopted or applied low carbon technologies (Aspect 1, SO3), low carbon solutions in the transport sector (Aspect 2, SO4), and the natural and material resource solutions as well as innovative uses of waste processes/products/services from waste materials (Aspect 3, SO5).

Evaluation of Programme contributions to 'inclusive growth'

The NWE Programme supports the inclusive growth priority of Europe 2020 exclusively through 'cross-thematic contributions' from projects under all five SOs. A look at the output indicators (see above Table 6.1) shows cross-thematic contributions to:

- the headline targets for inclusive growth, namely 'increasing the employment rate of the population aged 20-64 to at least 75%' and 'lifting at least 20 million people out of the risk of poverty and social exclusion';

- NWE aspects closely related to Europe 2020 actions on 'promoting social innovation for the most vulnerable, reducing health inequalities in society and promoting a healthy / active ageing population to allow for social cohesion and higher productivity' and 'building a cohesive society

[27] (CO01) No. of enterprises receiving support. (5.01) No. of efficient natural and material resources solutions implemented and tested. (5.02) No. of innovative uses of waste processes / products / services from waste materials.
[28] (5.04) Amount of decreased raw material use. (5.05) Amount of increased material recovery, re-use and recycling.

by spreading the benefits of economic growth to all parts of the EU for strengthening territorial cohesion'.

All NWE Programme SOs expect to create jobs and thus contribute to **increasing the employment rate of the population aged 20-64.** The creation and / or preservation of jobs can also help **vulnerable groups to reduce / prevent their risk of falling into poverty** (or help them escape from poverty) **and of being exposed to social exclusion.** However, current data for 'jobs created' and 'jobs maintained' shows that contributions to these Europe 2020 headline targets is uneven (Table 6.4).

Table 6.4 Targets for output indicators contributing to 'inclusive growth'

Specific Objective	Output indicator	Programme target value (PTV) for 2023	Operations' target value (OTV)	Outputs from operations	Achievement rate … (*)	
					… for PTV	… for OTV
SO1	(1.03) No. of pilot actions implemented, focusing on social innovation	30	207	73	243%	35%
	(1.04) No. of jobs created in all economic sectors	860	637	801	93%	126%
	(1.05) No. of jobs maintained in all economic sectors	860	1.448	377	44%	26%
	(1.07) No. of end-users benefitting from social innovation	600	55 480	136 496	22 749%	246%
SO2	(2.03) No. of jobs created in all economic sectors	200	48	62	31%	129%
	(2.04) No. of jobs maintained in all economic sectors	200	125	118,40	59%	95%
SO3	(3.02) No. of jobs created in all economic sectors	220	242	232	105%	96%
	(3.03) No. of jobs maintained in all economic sectors	220	565	1 061	482%	188%
SO4	(4.04) No. of jobs created in all economic sectors	200	0	0	0%	0%
	(4.05) No. of jobs maintained in all economic sectors	200	0	0	0%	0%
SO5	(5.06) No. of jobs created in all economic sectors	400	88	56	14%	63%
	(5.07) No. of jobs maintained in all economic sectors	400	100	92	23%	92%

Source: JS data as of 29 August 2023 and own calculations.

(*) Achievement rates are calculated from the current output generated by operations, divided either by the Programme target for 2023 or by the operations' own target (cumulative, as indicated in the project application forms).

Operations under all SOs have contributed to around 2 800 new and maintained jobs in NWE[29].

- Under most SOs, the outputs for both indicators are far below the NWE Programme target for 2023 (e.g., SOs 2, 4 and 5)[30]. The exceptions are SO1 (for 'jobs created') and SO3 (for 'jobs created' and 'jobs maintained'), as they either show a satisfactory achievement (SO1: 93% for

[29] Of the total 2 798 jobs, 1 150 are newly created and 1 648 safeguarded.

[30] For these SOs, achievements against Programme targets for 2023 range from 0% to 59%.

'jobs created') or have exceeded targets (SO3: 105% for 'jobs created' and 482% for 'jobs maintained').

- Despite this modest performance, data for some SOs show that operations have clearly or even significantly exceeded their own 2023 output targets in project application forms (e.g., SOs 1, 2 and 3)[31] or are close to achieving these targets (SOs 2, 3 and 5)[32].

A conclusion is that the Programme has contributed to the first headline target of increasing employment for people aged 20-64. However, with 1 150 new jobs across all economic sectors the increase is very modest. The Programme's contribution to the second headline target is much more difficult to demonstrate, since it is not possible to determine from the indicator data whether new or maintained jobs have benefited vulnerable groups.

Apart from the outputs on job creation / preservation, **the most significant contribution is to the Europe 2020 action promoting social innovation and improving access to affordable, sustainable and high-quality services in NWE.**

This contribution is only from SO1 operations implementing social innovation pilot actions to address problems for specific groups such as young people aged 15-34 who are not in employment, education or training, refugees, or people with specific diseases and other issues including housing affordability and social entrepreneurship in disadvantaged regions.

- The number of implemented pilot actions focusing on social innovation greatly exceeds the Programme's target for 2023 (243%). However, achievement against the projects' own target is still very low (35%) and is not expected to increase significantly in the remainder of the implementation period.

- There is a very positive situation for the number of end users benefiting from social innovation, since the total of 136 496 end users is hugely above the 2023 target of 600. Moreover, SO1 projects have already exceeded their own targets in the application forms (246%).

Box 6.4 Examples of NWE contribution to Inclusive Growth

The EYES project aimed to empower young people not in education, employment, or training in NWE metropolitan areas to use the support schemes offered by their cities to (re)enter the labour or education market. It developed of training material for professional and volunteer coaches.

eMEN promoted more affordable, accessible, effective and empowering e-mental health (eMH) products. They developed and implemented seven e-mental health applications through multidisciplinary cooperation and co-creation - two for depression, two for anxiety and three for post-traumatic stress disorder.

Enter to Transform addressed refugees with a background in business management and with mentoring helped them adapt to the NWE economy by increasing their entrepreneurial capacity and by strengthening and tailoring the existing business support infrastructure. The project established one entrepreneurial hub replicated in four regions (DE, FR, IR and NL) and increased the entrepreneurial capacity of 500 recognised refugees.

[31] For these SOs, the achievements against the projects' own targets range from 126% to 188%.

[32] For these SOs, the achievements against the projects' own targets range from 92% to 96%.

SHICC supported more successful Community Land Trusts and Organismes de Foncier Solidaire in cities across the NWE region. It offered support to four pilots in Lille, Brussels, London and Ghent with 87 housing units and more than 300 in the project pipeline.

SuNSE developed a network of social entrepreneurship hubs, as local points to stimulate community driven economic activity in disadvantaged regions.

Source: Interreg Programme NWE 2014-2020: NWE making an impact! Cooperation in action.

In conclusion, the NWE Programme has significantly promoted social innovation, clearly supporting implementation of this aspect of the Europe 2020 inclusive growth priority. The outputs of operations benefit vulnerable people and reduce various inequalities, contributing to a more cohesive and inclusive society.

Europe 2020 contributions at a glance

Based on the evaluation of SO contributions to Europe 2020, it is now possible to determine their overall magnitude. This assessment covers the Europe 2020 headline targets and NWE aspects of smart, sustainable and inclusive growth (Table 6.5).

Table 6.5 Overview of contributions to Europe 2020

Europe 2020 growth priority	Europe 2020 headline targets and other NWE aspects addressed	Thematic and cross-thematic contributions (*)				
		SO1	SO2	SO3	SO4	SO5
Smart Growth: Developing an economy based on knowledge and innovation	3% of EU GDP should be invested in R&D.	+				
	Strengthening innovative capabilities of the private sector in NWE.	+++				
	Strengthening the transnational dimension of innovation in NWE.	++ / +++				
	Increasing the transnational knowledge transfer throughout NWE.	+++		+++	++	+++
	Enhancing the transformation of innovative ideas into new products and services in NWE.	+++		++	+	+++
Sustainable Growth: Promoting a more resource efficient, greener and more competitive economy	20% reduction in greenhouse gas emissions		+++	+++	+++	
	20% of energy from renewable sources			++		
	20% increase in energy efficiency		+++	+		
	Enhancing climate action (mitigation and adaptation) and a low-carbon economy in NWE.		+ / ++	++		
	Modernising and decarbonising the transport sector in NWE.				++	
	Promoting more efficient use of material and natural resources in NWE, also through stronger development and uptake of green technologies.					+++
Inclusive Growth: Fostering a high-employment economy delivering social and territorial cohesion	75% of 20-64 year-olds employed.	++	+	++	+	+
	At least 20 million fewer people in or at-risk-of-poverty and social exclusion.	+ / 0	+ / 0	+ / 0	+ / 0	+ / 0
	Promoting social innovation and improving access to affordable, sustainable and high-quality services in NWE.	++				

(*) Thematic contributions = dark background colours; Cross-thematic contributions = light background colours.
+++ = high contribution; ++ = medium contribution; + = low contribution; 0 = no contribution

For each of these Europe 2020 elements, the extent was determined based on the combined contribution of the respective output indicators. In addition, NWE Programme specificities have been duly considered when determining the extent of contributions (i.e. small budget to tackle major territorial or societal challenges in the large transnational cooperation area; mandatory cooperative approach to address challenges or development opportunities, etc.).

Looking at **the Europe 2020 headline targets,** it is clear the NWE Programme makes the most comprehensive and largest contribution to reducing GHG emissions (SOs 2, 3 and 4). There are also high or medium contributions to improving energy efficiency (SO2) and increasing employment of 20-64 year-olds (SOs 1 and 3).

However, contributions to these Europe 2020 headline targets should not be considered (and evaluated) in terms of impact. Given the Commission's definition of 'impact' in the 2014-2020 period[33], this would mean the headline target quantitative values should be understood as targets similar to SO-level results. Consequently, an impact evaluation would have to be carried out against the reference values and the benchmark for results. Here, the actual change to these macroeconomic variables across the entire EU or within the NWE Programme area, which obviously leads to a very low significance of the contributions to these headline targets.

For the **NWE-specific aspects of the growth priorities,** consistently high and medium thematic contributions are made by SO1 to smart growth. These contributions are reinforced by additional cross-thematic sustainable growth contributions from SOs 3, 4 and 5. In addition, SO1 makes a strong cross-thematic contribution to inclusive growth by promoting social innovation and improving access to affordable, sustainable and quality services in NWE. However, contributions to the three NWE-specific aspects of sustainable growth are only medium or medium-low.

[33] Impact is the change that can be credibly attributed to an intervention (e.g., direct effect or contribution of a project).

ANNEXES

The annexes describe the methodological details used during data gathering and analysis for this evaluation.

In addition, there are four complementary documents with further information:

Annex 1: Evolution of Cohesion Indicators in the NWE Programme area 2014-2020

Annex 2: Situation of Result Indicators 2022

Annex 3: Case Study Reports

Annex 4: Impact Stories

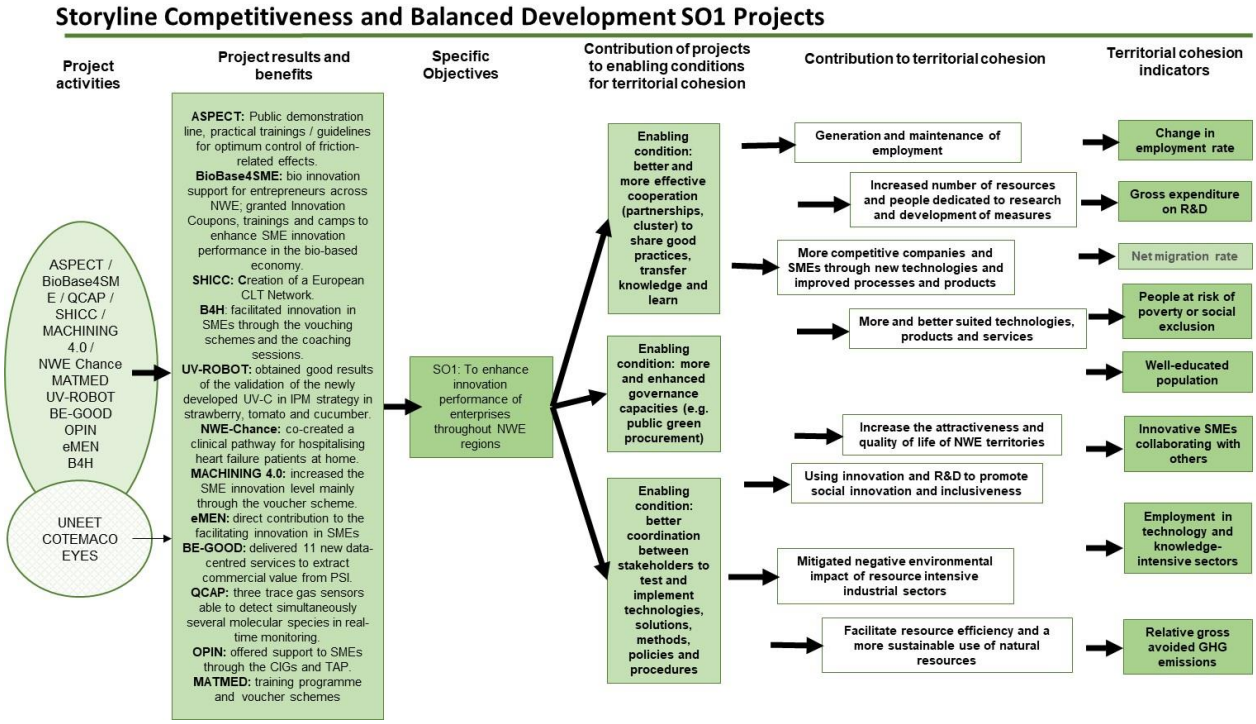
A.1 Projects analysed during the case study analysis

SO	Project name
1	**ASPECT**
	EYES
2	**HeatNet NWE**
	ECCO
3	**SMART-SPACE**
	FORESEA
4	**CHIPS**
	H2SHARE
5	**Food Heroes**
	Phos4You

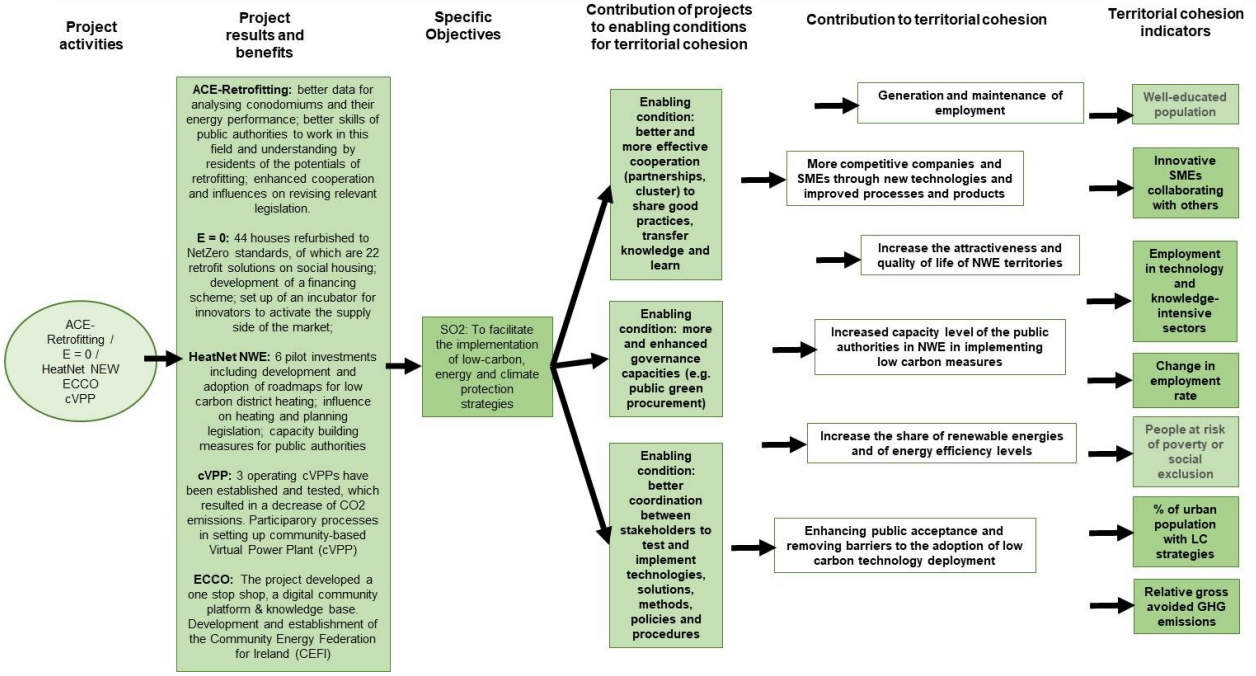
A.2 Storylines per SO

The storylines were defined already in 2016 as methodological tool to trace and visualise the contribution of projects to different dimensions and indicators of territorial development and cohesion, in order to facilitate to find evidence for the contribution pathways from projects and the Programme to territorial cohesion, competitiveness and balanced development of the NWE territories.

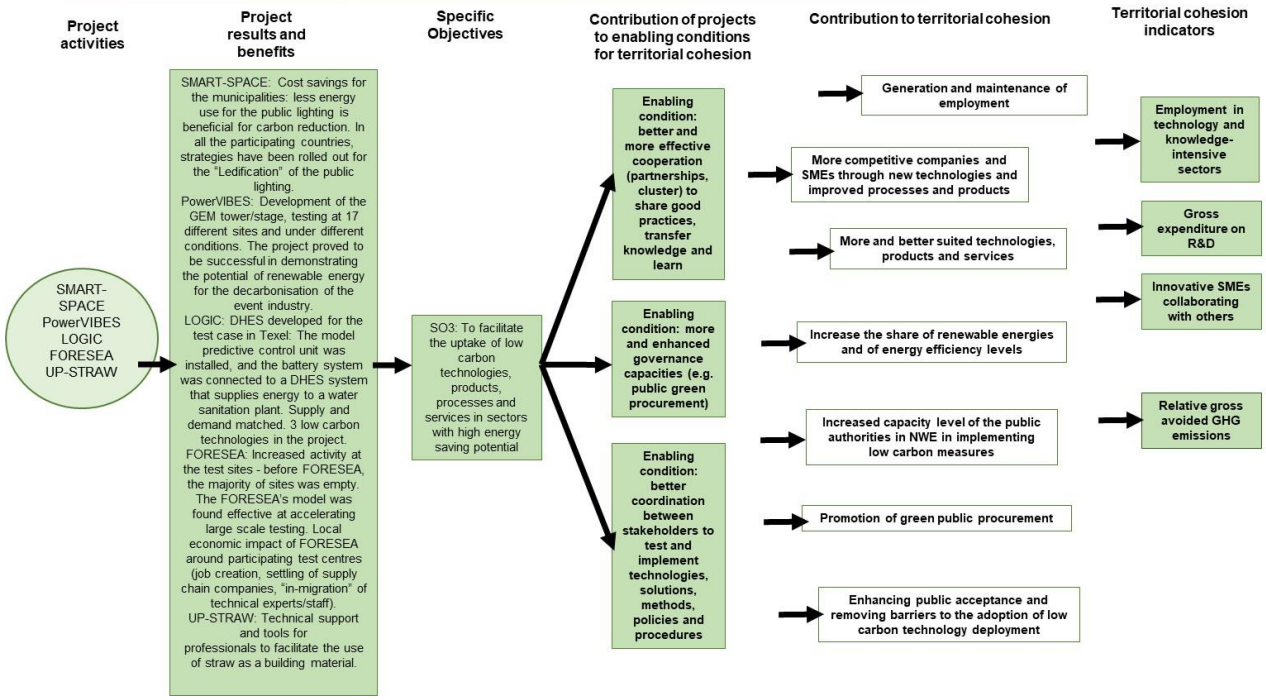
Below the storylines that have been confirmed with evidence form the analysed projects are presented. For each SO, they show the contribution to the dimensions of territorial cohesion.



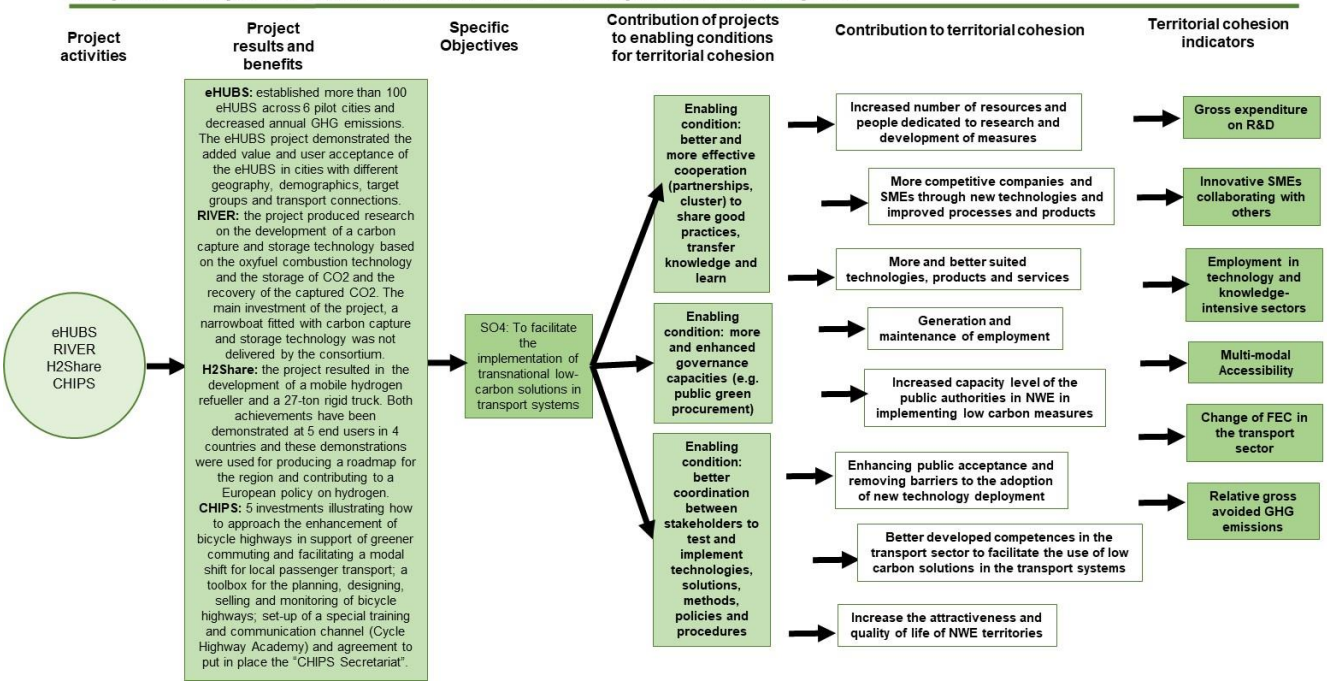
Storyline Competitiveness and Balanced Development SO2 Projects



Storyline Competitiveness and Balanced Development SO3 Projects



Storyline Competitiveness and Balanced Development SO4 Projects



Storyline Competitiveness and Balanced Development SO5 Projects