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# Transformative innovation for better Climate Change Adaptation – Case study: Gorenjska, Slovenia

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## Contents

## Abstract

The aim of this report is to investigate the potential for harnessing key features of Transformative Innovation to improve the design and the implementation of Climate Change Adaptation (CCA) strategies, based on empirical analyses. The study draws on the conceptual framework on this question previously defined for the JRC (European Commission, 2024), and the methodology for case studies articulated in the same report. The case study research comprises overall 14 case study reports covering 16 different territories from across the EU and beyond, casing various institutional contexts, a variety of biogeographical regions within different climate risks, different ranges of population sizes, and representing a diversity of approaches to CCA and transformative innovation[1].

The framework takes the form of an analytical grid, structured into seven sections, each of them representing a key feature of the 'transformative innovation' approach where the features are understood as essential conditions for the design and implementation of CCA strategies with this high level of ambition. Each section sets out the main question(s) to be addressed in relation to its respective transformative innovation feature.

This Report provides the findings for Gorenjska region in Slovenia, as at October 2023 and is the result of a collaboration between the Joint Research Centre (JRC), DG CLIMA and DG RTD.

[1] A full list of the case studies is provided in Annex 2

## Acknowledgements

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In particular, the authors gratefully acknowledge the support from Črtomir Kurnik, Director of the Local Energy Agency of Gorenjska (LEAG), in charge of coordinating the participation of the region in the EU Mission Adaptation to Climate Change.

Just after the authors' full interview series at the beginning of August 2023, severe flooding affected the region and a large part of the Slovene territory. The authors were shocked to see news of the devastation and loss of life the flash floods have caused in Gorenjska region and beyond. This was particularly poignant considering the subject matter of this study. The authors wish all interview partners and their families every strength in coming through this adversity.

*"It is really a shock what has happened to Slovenia, the worst floods in 100 years. There is really a catastrophic situation. Almost all municipalities in Gorenjska region are devastated, especially roads and infrastructure in municipalities. There are lots of personal stories of people losing everything they worked for: families with small kids that took credits to renovate or build a new house and now losing everything. It looked (and it still does) like an apocalypse."*

*"Hopefully this event will also mark a new start for Slovenia to also build climate resilient infrastructure and to take extreme weather into account. Now we will have to take more seriously weather changes and how it will affect our way of living."*

Extracts from reactions of interviewees communicated subsequently to the authors.

## Executive summary

### Policy context

Adapting to climate change has become an increasingly urgent priority for the EU and its territories. Given this urgency, and the systemic nature of climate resilience, new transformative ways to accelerate adaptation are considered. Transformative Innovation (TI) is the focus of this report, particularly how it can help supporting and accelerating adaptation to climate change. The analysis in this report draws lessons for the region of Gorenjska, Slovenia on how this approach may help the territory increasing climate resilience, and what can be done in addition, to further accelerate the Climate Change Adaptation (CCA). The analysis is based on a theoretical framework along seven dimensions designed previously for the JRC (European Commission, 2024), to compare TI and CCA. It is one out of a series of 15 case studies in different European territories comprising various biogeographical regions with a variety of climate risks, various institutional contexts, different ranges of population sizes, and demonstrating a diversity of approaches to transformative innovation and CCA.

### Main findings

Although a fully-fledged 'Transformative Innovation' approach to climate resilience could not be identified for the territory, there is a clear sense of urgency around the matter, more so after the recent catastrophic flash floods in the region (summer 2023), which claimed human lives and caused enormous economic damage to the infrastructures, industrial production and spatial development.

Goals and Directionality: Currently climate change mitigation and 'green transition' in general are a focus of climate related activities, relevant innovation policies and strategies in the region and country. Absence of administrative powers at the regional level, coupled with reticence of municipalities to cooperate on CCA, restricts the possibilities for transformative CCA approaches to emerge and gain strengths.

Articulating Policy Portfolios: Gorenjska does not have its own instruments to implement the Sustainable Energy and Climate Action Plan (SECAP), which remains a strategy on paper with no attached budget. National-level instruments and EU Funds are therefore crucial for financing CCA projects of scale in the region. As a consequence of the heavy floods in August 2023, at the initiative of the Association of Municipalities of Slovenia, a 'Climate Offices' (= Local Contact Points) are being established in the regions, which should help enhance the role of SECAP in directing funds in the future.

Ensuring Cross-Domain Synergies: Challenges remain to achieve cross-domain synergies relevant to CCA in Slovenia in the form of prevailing 'silo' attitudes among institutions taking part in the related processes, as well as difficulties with the availability of relevant territorial vulnerability data for the CCA perspective.

Increasing Breadth and Depth of Stakeholder Involvement: Stakeholder involvement in strategy making at national and local levels is often seen as problematic in Slovenia in the CCA-related fields where land use issues are prominent and direct citizen engagement is generally under-developed prior to completion of strategies. Regional level structures established for approval of regional spatial plans may help in beginning to overcome traditional difficulties with cooperation between municipalities.

Setting up Effective Multi-level Governance Models: Coordination between national, regional and local levels of authorities in the field of CCA is a weak point in Slovenia. The national level is the key driver

in terms of strategic direction and resources for implementation. As is the case for SECAP in Gorenjska, the regions do not have the necessary means to implement their own strategies, nor do regional-level strategies have any formal status nationally. However, in practice CCA actions are implemented by local authorities, who propose projects directly to the national level. Furthermore, the local authorities lack the necessary incentives for cross-municipality cooperation – an obvious problem for climate change impacts that go beyond municipal borders. Coordination mechanisms between the various levels, foreseen in the 2016 national Strategic Framework for CCA strategy, have only started to be operative following the recent adoption of regional level spatial plans, although the opportunity was missed to integrate these plans with the Regional Development Programmes for 2021-2027.

Making Room for Experimentation: There is no experimentation on potential innovative solutions for CCA at present in Slovenia – neither at national level nor in Gorenjska region. Similarly, capacities to introduce experimental CCA approaches or to undertake innovative public procurement in this direction are so far limited. Certain attempts towards experimentation, though not specifically targeting CCA, are explored in a 'deep demonstration' project of systemic innovation in the circular economy field supported by the EIT Climate-KIC.

Securing High Levels of Policy Intelligence, Learning, and Strategic Capacity: A generally low level of basic awareness and understanding of the CCA topic across a wide spectrum of relevant actors in Gorenjska and Slovenia is hampering the policy intelligence, learning and strategic capacities to act in a well-coordinated manner. Though as per policy intelligence for CCA a good quality climate data is provided by the Slovenian Environment Agency (ARSO) at the national level and to the regions, more detailed scenarios and vulnerability assessments required by regional and local actors are lacking. Furthermore, interconnection of relevant databases, a dedicated climate portal and a mechanism for regular cooperation on CCA between researchers and decision makers, foreseen under Slovenia's 2016 Strategic Framework for CCA, have so far not been delivered. Therefore, throughout the system from national to municipal level, a serious shortage of capacities is apparent for an effective and ultimately innovative CCA.

**Key conclusions**

To address the identified issues and a successful integration of transformative innovation for climate change adaptation at the national, regional and local levels, the following observations can be made regarding the seven transformative innovation features that may be summarised as follows:

Goals and Directionality: In order to effectively introduce transformative CCA approaches in the country, a high-profile national debate about climate change and the breadth and depth of its societal and territorial dimensions should be opened, with regional-level events emphasising the crucial need for cooperation across municipalities. Transformative-type, society-focused objectives with a more radical and innovative CCA solutions should be inserted into the relevant strategic documents.

Articulating Policy Portfolios: In order to cater for the absent regional financing possibilities, support for a headline R&I oriented towards CCA solutions should be enhanced in the national R&I programmes and smart specialisation. To integrate the CCA dimension more visibly in the Slovenia's Sustainable Smart Specialisation Strategy for 2021-2027 (S5) priority areas for EU Cohesion Policy Funding, a CCA-related EDP could be organised to bring CCA firmly onto the R&I agenda. Also, the EU Rural Development structures managing CCA measures should be more closely associated with the S5. Similarly, valorising more innovative CCA solutions in project selection systems under the climate related Cohesion Policy Programme investments could accelerate Slovenia's move towards transformative CCA. Given Gorenjska region's participation in the EU Mission on CCA and its notable

efforts on climate mitigation, domestic programmes and project selection systems for the EU programmes should be tailored to better support such efforts that could, as a pilot experience in developing transformative CCA approaches, possibly influence also the CCA related efforts in the fellow regions.

Ensuring Cross-Domain Synergies: To achieve cross-domain synergies relevant to CCA in Slovenia more forward-looking land planning outcomes and improvements in the context of CCA should be encouraged – possibly with inputs from the CCA institutional 'champion'. Also, enhancing territorial vulnerability data for land planning purposes, previously discontinued after the end of the CLISP project, should be revived. Emerging collaboration between different national agencies, ministries and inter-municipal coordination enhanced by the EIT Climate-KIC efforts within the deep-demonstration project in the field of circular economy on fostering cross-domain coordination could be beneficial also for the CCA activities.

Increasing Breadth and Depth of Stakeholder Involvement: Transfer good practices built up under S5 and its EDP process could be translated into the green transition activities generally, i.e. towards CCA-relevant subject areas more specifically. A practical way to it would be to consider involving stakeholders across policy areas in the S5 EDP (e.g. farmers affected by climate change) to help find solutions bringing together business and research, and establish strategic collaborations with non-government actors. Kranj City's successful experiments in participative processes, engaging diverse stakeholders, including citizens and civil society, local communities, researchers, and the private sector in developing and implementing its smart city strategy, and apply lessons to CCA actions could show the steps forward in policy-making processes in other cases in the region and beyond.

Setting up Effective Multi-level Governance Models: In order to overcome the cumbersome coordination between national, regional and local levels of authorities in the field of CCA in Slovenia, given its visibility due to the recent catastrophic floods, CCA could be promoted as an ideal area for cooperation between municipalities and removing barriers to cooperation. Similarly, opportunities for regional synergies and economies of scope and scale in CCA initiatives could be pursued by establishing contact points at national level responsible for CCA related coordination with regional bodies and local authorities – including the recently proposed local 'Climate Offices'. Furthermore, alignment between regional level spatial plans and Regional Development Programmes could be pursued - possibly as part of a mid-term review process.

Making Room for Experimentation: The experimentation should be encouraged at national and regional levels by aligning regional development plans and national strategies and couple it with a secure external funding for experimental approaches, and enhance the capacity of regions and municipalities for climate change actions. Public sector innovation and innovative public procurement could facilitate private sector experimentation in the CCA field through reinforcing/scale-up of embryonic policy labs and regulatory sandbox initiatives relevant to innovative CCA. Though these types of activities are still at an early stage in Slovenia, the EIT Climate-KIC's recently initiated joint working with the stakeholders in the framework of smart specialisation (S5) on 'smart and green villages' aiming to encourage experimentation by municipalities, which could become a viable example on the CCA experimentation in the country.

Securing High Levels of Policy Intelligence, Learning, and Strategic Capacity: To reach this important objective a national communication strategy (possibly in the framework of the new national debate on CCA suggested earlier) should be developed in order to raise general awareness on CCA - differentiated according to different target groups – with exchanges and possibly forums between municipalities. Furthermore, as foreseen in the 2016 Strategic Framework on CCA in order to complement data already provided by ARSO, more detailed scenario and vulnerability assessments

should be developed and deployed. Climate Adaptation Centre should be established at ARSO and a user-friendly CCA portal, based on functional interconnection of relevant databases, and critical mass of core CCA-relevant expertise should be built in municipal administrations, with trans-municipality dimension to facilitate cooperation. Ideally, CCA training and education for officials in a broad range of relevant policy areas should be included, maximising relevant multiplier effects (e.g. through training of trainers). Finally, it would be beneficial to capitalise systematically on the lessons learned by different Slovene regions/actors participating at the EU-level (e.g. Interreg) projects and networks, to make valuable learning available to all the relevant practitioners.

# 1 Introduction

This report has been prepared at the request of the European Commission's Joint Research Centre (JRC), Innovation Policies and Economic Impact Unit, in collaboration with DG CLIMA. The aim of this report is to investigate the potential for harnessing key features of Transformative Innovation to improve the design and the implementation of Climate Change Adaptation (CCA) strategies, based on empirical analyses of territorial cases across Europe. The study draws on the conceptual framework on this question previously defined in another JRC report (European Commission, 2024). The case study research covered several territories from across the EU and beyond, comprising various institutional contexts, a variety of climate risks within different biogeographical regions, different ranges of population sizes, and representing a diversity of approaches to CCA and transformative innovation[2]. The methodology for the case studies relies on the following main sources:

- Qualitative interviews carried out with key actors in the two main policy fields: R&I and climate/environment.
- Other policy fields chosen for their particular relevance for each territory: e.g. regional development, spatial planning, energy, water, agriculture, forestry, food, fisheries, health, etc.
- Interviewees included decision-makers, officials in implementing bodies, researchers, NGOs and experts active in the field.
- Documentary and website analyses on strategies, policies and projects. A first round was carried out prior to the interviews on publicly available material, followed by a second round, with documents (public or draft) obtained from interviewees.

This Report provides the findings for Gorenjska, Slovenia, as at October 2023.

[2] A full list of the case studies is provided in Annex 2

# 2 Presentation of the case study territory

## 2.1 Profile of the territory

Gorenjska is classified as a 'Mountain' biogeographical type region situated in the north-west of Slovenia. It covers some 10% of the country's land area and has a population of 210,000, also around 10% of Slovenia's total. Gorenjska is a statistical region only, one of 12 in Slovenia[3] , and has no institutional powers. It comprises 18 municipalities, some of which are very small (300 inhabitants). The main urban centre is Kranj, with a population of 57,000.

Figure 1: Gorenjska geographical location in Slovenia


*Source: SECAP, 2018*

The principal economic sectors in Gorenjska are tourism and light industrial activities such as micro-electronics. As for Slovenia, the regional economy is highly dependent on international exchanges. Mountain tourism in the Julian Alps enjoys a high profile, with 3.6m tourist overnight stays in 2022 (23% of Slovenia's total) and Kranj attaining European Destination of Excellence status for 2023.

Table 1: Gorenjska - Key characteristics

| | |
|---|---|
| Area | 2,137km² - 10.5% of country |
| Population | 210,000 inhabitants - 10% of country |
| Geography | Alpine identity: 70% mountainous and 30% valley – 40% over 1000m level – home to highest summit in Slovenia (Triglav) |

[3] NUTS3: SI042 Upper Carniola Statistical Region

| | |
|---|---|
| Environment and land use | 68% forest, 6% agriculture, 4.5% built area<br>home to Slovenia's only National park |
| Main climate change features | Biogeographical region: Mountain<br>Main climate risks: primarily heavy precipitation causing flooding. Warming causing decreasing snow cover, droughts and impacting on biodiversity |

*Sources: BSC,2018 and ARSO, 2018*

Gorenjska is close to the Slovenian capital and its international airport, but underdeveloped transport infrastructure reinforces a culture of car-dependency in the region and under-utilisation of existing public transport features. Transport is a key contributor of GHG emissions in Slovenia (32.3% of total in 2019) and these emissions are rising sharply (EPRS, 2021).

## 2.2 Main climate change risks and vulnerabilities

Slovenia comprises large landscape diversity within its relatively small territory. The presence of three distinct biogeographical types - Mediterranean, Continental and Mountain – with resulting diversity in ecosystems is seen as an asset for Slovenia's resilience to climate change generally, but this diversity requires sensitive land planning[4]. For Gorenjska region, the main climate risks are extraordinary rainfalls, temperature rise and decrease in snow cover (SECAP, 2018). Most visible impacts of these to date have been:

- damage from extreme weather events: loss of forest coverage due to heatwaves and associated fires, as well as storms and flash floods causing damage to housing, road and other infrastructure, disruption in energy distribution etc;
- economic losses from slow onset events: drop in forest revenues due to droughts and pests, uncertain future for ski/snow-related business due to decrease in snow cover.

Box 1 Severe flooding, affecting Gorenjska region and a large part of the Slovene territory in August 2023, represented a. timely reminder of the territory's vulnerability to extreme weather events.

Box 1: Timely reminder of Gorenjska's vulnerability to extreme weather events – August 2023

During the preparation of this case study report, in early August 2023, many parts of Slovenia - including Gorenjska region - were hit by what has come to be known as the worst natural disaster the country has experienced since its independence[5].

Unusually warm Northern Adriatic waters caused high evapotranspiration that then met colder air to the south from the Alps, with the consequence of extreme rainfall over Slovenia. This fell onto soils and rivers, which were already at their maximum water carrying capacity. Subsequent severe flooding brought landslides and widespread damage to private property and public infrastructure. The water table was more than a metre higher than in the last major flooding Slovenia experienced in 2014 and 2010. In Škofja Loka municipality only, some 21 bridges were destroyed, almost all the rest have been damaged as a result of this event.

The situation was so severe that the National Rescue Plan was activated and the Slovenian army brought in. Despite good early warning from the Environment Agency (ARSO), many people had to be rescued by

[4] Id.

[5] Slovenia floods: Damage caused by 'worst-ever disaster' | PreventionWeb

helicopter. The European Commission provided substantial emergency financial support through the EU Civil Protection Mechanism.

Source: https://civil-protection-humanitarian-aid.ec.europa.eu/news-stories/news/eu-supports-slovenia-aftermath-devastating-floods-2023-08-09_en

Slovenia's land use, land use change and forestry (LULUCF) sector acted as a carbon sink from 2005 to 2013. From 2014 to 2018, the country experienced many severe events – ice storms, bark beetle outbreaks and windthrows – which led to sanitary cutting and increased harvests and thus prevented carbon removals from the sector. Slovenian forests are expected to fully recover from these events by 2023 (EPRS, 2021). Looking ahead, the Environmental Agency's Assessment of Climate Change in Slovenia until the end of the 21st Century (ARSO, 2018) notes that Slovenia is a country rich in water sources and that climate projections reveal that it will remain as such in the future. The following changes are expected by the end of the century (Slovenian Climate Strategy, 2021):

- Severe increase in heat load: air temperature is likely to rise by at least an additional degree, with the greatest temperature rise in winter; rise in water temperature by 0.5°C.
- Increased precipitation by up to 20%, mainly in winter, as well as less snow; increase in intensity and frequency of extreme precipitation events, change of flow regimes of rivers.
- Increase in intensity and frequency of droughts in the surface layer of soil.

*"Altered water and river regime and an increased heat load will be the most important effects of future climate change, which will directly and indirectly affect activities such as healthcare, agriculture, forestry, energy, manufacturing and tourism."*

Slovenia's Long-Term Climate Strategy to 2050

## 2.3 State-of-play of CCA and innovation strategies

At Gorenjska regional level, the key strategic document for CCA is the 2018 Sustainable Energy and Climate Action Plan (SECAP) Gorenjska. This was prepared under a project funded by Interreg Alpine Space, PEACE_Alps[6] and includes a chapter on adaptation, with: an analysis of risks, vulnerability and exposure as well as adaptation measures for three domains: forestry, tourism and traffic. The coordination body for SECAP Gorenjska is the Regional Development Agency (RDA) partner 'Business Support Centre' (BSC) Kranj, in cooperation with Local Energy Agency of Gorenjska (LEAG). The document is endorsed by the Gorenjska Regional Council made up of the Mayors of the 18 municipalities and supported by relevant departments of municipal administrations in Gorenjska. However, SECAP Gorenjska does not have formal national level status.

At national level, all approved strategic documents relating to CCA are in accordance with the Paris Agreement and EU regulations[7]. These include the following:

[6] PEACE_Alps - Alpine Space Programme (alpine-space.eu)

[7] Regulation on the governance of the energy union and climate action (EU)2018/1999, agreed as part of the Clean energy for all Europeans package adopted in 2019.

- 2016: Strategic Framework for Adaptation to Climate Change – which incorporates guidelines for better mainstreaming of adaptation in policies, measures and actions, under four building blocks (Box 2).
- 2020: National Energy and Climate Plan (NECP) – although this contains no chapter on CCA (in line with the EU template) and has no regional dimension.
- 2021: Resolution on Slovenia's Long-Term Climate Strategy to 2050 - objective of net zero emissions, or climate neutrality by 2050, including a CCA chapter.

Currently under preparation is the revision of the NECP to 2030, with the help of researchers notably from Jožef Stefan Institute and University of Ljubljana. It is understood that the revised NECP will aim to significantly strengthen policy and action for CCA, including establishment of a Climate Change Adaptation Centre and related local access points for regions and municipalities (draft revised NECP, 2023). Also under preparation is a new domestic Climate Law, which is expected to include guidelines related to CCA.

Building blocks of Strategic Framework for Adaptation to Climate Change in Slovenia are illustrated in the Box 2.

Box 2: Building blocks of Slovenia's 2016 Strategic Framework for Adaptation to Climate Change

1. **Mainstreaming:** Climate change impacts are comprehensively incorporated into the development and implementation of all policies, measures and activities at the national and regional levels and at the levels of local communities, economic operators and individuals. It is particularly important to take climate change impacts into account when undertaking development and spatial planning.

2. **Broader cooperation:** Broader cooperation, integration, and the exchange of experience and examples of good practice.

3. **Research and knowledge transfer:** The continuous improvement of knowledge about climate change impacts and climate change adaptation methods.

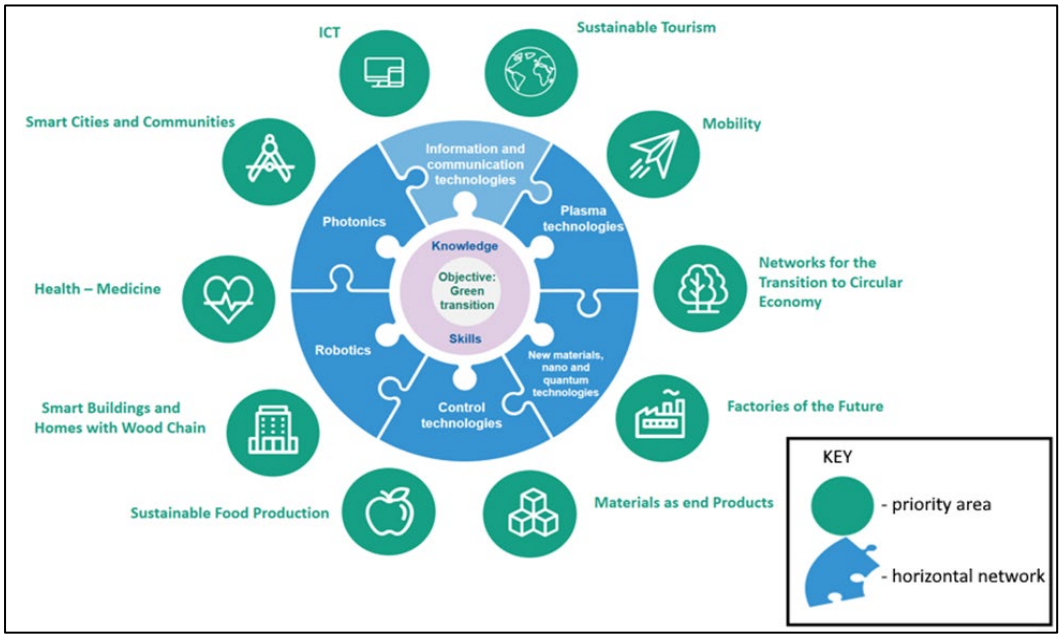
4. **Education and training, awareness-raising and communication:** An appropriate level and quality of education, competence, awareness, information and broader communication about climate change impacts are achieved. The target public is made aware of the impacts of climate change on society.

*Source: Slovenia Strategic Framework for Adaptation to Climate Change, 2016*

In addition, Gorenjska region, under the coordination of LEAG, is a signatory of the EU Mission on CCA and a member of its Community of practice. Within its operation Gorenjska region will receive technical support in preparation of Regional Adaptation Strategy, whilst Kranj is a signatory of the EU Mission '100 Climate Neutral and Smart Cities by 2030'.

As regards innovation strategy, sustainability and green transition in their broader sense (but not CCA specifically) are at the forefront of Slovenia's Sustainable Smart Specialisation Strategy for 2021-2027 – named 'S5', building on the original EU S3 terminology. These sustainability themes are infused throughout the ten S5 priority areas for 2021-2027 and the work of the Strategic Research and Innovation Partnerships (SRIPs) that support them (Figure 2).

Figure 2: Priority areas and support networks of Slovenia's Sustainable Smart Specialisation Strategy ('S5') 2021-2027




Source: Slovenia Smart Sustainable Specialisation Strategy, 2023

S5 is a national level strategy, but 'rooting' events are foreseen later in 2023 in different regions to help enhance the regional dimension of its implementation.

# 3 Analysis against conceptual framework: Transformative Innovation for better Climate Change Adaptation

In their previous framework report (European Commission, 2024), the authors defined an analytical framework identifying seven key features of 'Transformative Innovation' as essential conditions for the design and implementation of CCA strategies with high ambition level. These features can be summarised as follows:

**Directionality:** defining goals and scope of strategic action, as well as articulating impacts, in a way which reflects societal challenges with wide appeal, formalised through endorsement at highest political level to secure engagement of all relevant authorities and stakeholders.

**Articulating instrument portfolios and defining synergies between funding sources:** establishing all-encompassing instrument portfolios addressing the whole innovation cycle and the various aspects of CCA, paired with adequate funding resources.

**Ensuring cross domain synergies:** favouring whole-of-government approaches to ensure greater horizontal coherence between various thematic policy areas (R&I, agriculture, environment, mobility, health etc.), resulting in coordinated mixes of instruments of different types.

**Increasing breadth and depth of stakeholder involvement:** working towards social acceptance of new solutions and shaping of innovative developments, as well as improving public trust, opening up public debates, managing diverse and sometimes conflicting views over alternative pathways.

**Setting up effective multi-level governance models:** maximising potential of vertical synergies, recognising complementary roles for various governance levels - local, regional, national and EU;

**Making room for experimentation:** providing adequate spaces for risk-taking and creativity - ensuring a risk-tolerant environment to facilitate development of new and/or radical solutions.

**Securing high levels of policy intelligence, learning and strategic capacity:** building strong evidence-based policy learning capacities, based on a solid knowledge base and special skills to manage transitions, as necessary companions to the transformative innovation approach.

The analysis below follows this framework. The key characteristics of the territory's approach to CCA strategy development and implementation and their linkages with innovation policies and strategies, as revealed by the case study research, are explored in turn, in relation to the above seven features. Each feature constitutes a core section of the report.

## 3.1 Directionality: defining goals and expected impacts for society

CCA is not explicitly targeted in Slovenia's innovation strategies, nor is innovation given a prominent role in Slovenia's CCA-relevant strategies at national level, or at Gorenjska's regional level Sustainable Energy and Climate Action Plan (SECAP), which contains a chapter on CCA. Most identifiably transformative approaches to sustainability themes, at national level and in Gorenjska region, target climate change mitigation rather than CCA. National CCA strategies currently in place are undermined by lack of leadership and weak governance for CCA at the national level. Absence of administrative power at the regional level, coupled with reticence of municipalities to cooperate on CCA, further restricts the possibilities for transformative CCA approaches to emerge.

### 3.1.1 Goal definition

Slovenia's 2016 Strategic Framework for CCA states that, "*the objective in the field of climate change adaptation is to reduce Slovenia's exposure, sensitivity and vulnerability to climate change impact and increase the climate resilience and adaptive capacity of society*." However, it does not visibly connect with the Research and Innovation (R&I) agenda. Its 'Research and knowledge transfer' pillar deals with climate services and data-bases but does not cover R&I for CCA solutions. Moreover, it does not present climate vulnerability indicators, against which achievements could be measured effectively.

> *"By 2050, Slovenia will become a resilient society adapted to the climate change impact and characterised by a high quality of life and a high degree of safety of life, while taking full advantage of the changed climate on the basis of sustainable development."*
>
> Strategic Framework for Climate Change Adaptation, 2016

Slovenia's Long-Term Climate Strategy to 2050 recognises that whilst the country has begun adapting to certain unavoidable new climate changes, it "*is doing so too slowly*". The strategy goes on to state that to reach its goals, "*numerous technological and social innovations throughout the entirety of society will be necessary*". Whilst this statement is illustrative of an awakening towards the transformative innovation approach, it does not translate into a strong strategic directionality, nor does it address crucial governance factors needed for transformative approaches to flourish.

At Gorenjska regional level, the objectives of the SECAP embrace action for the sectors of forestry, tourism and transport. The related measures largely foresee implementation of known solutions, such as change of tree species, infrastructure management and use of artificial snow. However, there is also an openness in the SECAP to more radical and innovative solutions, in the form of possible new business models and radical transformation of sectors of wood exploitation or winter tourism, even if – again – this is not the major strategic directionality (Box 3).

Box 3: Gorenjska: Climate change adaptation in winter tourism: incremental or transformational adaptation?

With decreasing snow cover trends and increased unpredictability of snowfalls, winter tourism destinations are confronted directly with impacts of climate change. Two types of responses can be envisaged to this threat:

1. Incremental adaptation: improving technologies for maintaining activities dependent on snow (snowmaking systems, slopes management, etc.) some of them leading to maladaptation.

2. Transformational adaptation: this would involve radical changes of business models and in consumers demand, up to a complete abandonment of ski tourism activities and diversification to other 'green tourism' activities.

*Source: authors, based on SECAP Gorenjska*

As regards innovation strategy, the objectives of S5 are characteristically economic: (1) raising value added per employee; (2) improving competitiveness in global markets through increased knowledge and technologies in Slovenia's exports; (3) Increasing entrepreneurial activity. The strong emphasis of sustainability runs horizontally throughout these objectives, but its current focus is predominantly on climate change mitigation and reduction of environmental footprint generally, rather than on CCA.

### 3.1.2 Strategic governance

During the interviews, many interviewees pointed to the lack of national political stability as a major cause for this, resulting in frequent reshuffling of ministry portfolios and movements of key personnel. At the time of the interviews, the country was still in the transition phase to a new government and there was no clear responsibility for CCA established in the Ministry of Environment, Climate and Energy (MECE). There has clearly been a significant gap in recent years between intentions about CCA in national strategies and real implementation. A project application, SLOVE LIFE4ADAPT, had been submitted to the EU LIFE programme to help build coordination structures, management plans, information systems and institutional capacity for CCA in Slovenia. This was rejected by the EC in July 2023, primarily with regard to the assessment criterion 'Resources and Complementary funding'. At the time of the main field research, there were no evident signs that the relevant capacity building for CCA in Slovenia would go ahead without such a project. The application was later reworked and re-submitted to the LIFE programme in September 2023 and two new persons were appointed by MECE to the CCA portfolio.

Truly transformative approaches towards CCA also require that each level of governance (local, regional, national) plays an adequate role and that there is good coordination within and between these levels. This is a problematic issue in Gorenjska and Slovenia, which is discussed in the Section 2.5.

## 3.2 Articulating instrument portfolios and defining synergies between funding sources

Gorenjska does not have its own instruments to implement SECAP, which remains a strategy on paper with no attached budget. National-level instruments and EU Funds are therefore crucial for financing CCA projects of scale in the region. Such funding exists for investments to reduce disaster risks – including those which are climate-induced – as well as to improve disaster response. However, meaningful regional synergies between funding instruments for CCA and innovation remain elusive. There is little sign of dedicated sources or incentives for funding innovative initiatives leading to transformative responses in the field of CCA - even though certain welcome evolutions are being induced by EU rules, such as a better incorporation of nature-based solutions in flood protection solutions. Some encouraging experiences from participation in cross-border, interregional and EU-level programmes are also evident, but they are fragmentary. Neither the existence of the Gorenjska SECAP, nor the region's participation in the EU Mission on CCA, has formal influence on the selection of CCA projects in the region for EU Cohesion Policy funding. Nevertheless, as a consequence of the heavy floods in August 2023, at the initiative of the Association of Municipalities of Slovenia, a 'Climate Office' (Local Contact Point) is to be established in the region, which should help enhance the role of SECAP in directing funds in the future.

### 3.2.1 Domestic instruments for climate action

A major source of relevant domestic funding is the Slovenian Water Agency in the field of flood safety. Slovenia's Long-Term Climate Strategy to 2050 highlights also the Climate Change Fund, with a budget of €542.8m for 2022-2023, of which €15.5m is for R&D&I, although there is no specific mention of R&D&I for CCA[8]. The Public Agency for Scientific Research and Innovation has gained a new remit since 2021 to foster interdisciplinary research on climate issues. There is also a possibility for including CCA as one topic under its Targeted Research Programme, supporting policy-oriented research according to national objectives, under which public institutions can order studies relating to different challenges. The 2021 Long-Term Climate Strategy, mentions that "*at least five target research projects on the topic of climate change adaptation will be tendered by no later than 2023, of which at least two will be interdisciplinary, or funds will be earmarked for somewhat longer projects relating to adaptation.*" However, the field research was unable to identify the projects in question. Ongoing work by the University of Ljubljana to understand the policy mix for green transition under the revised NECP may be relevant here, but again the work focuses on green transition generally, without distinguishing between climate mitigation and adaptation.

### 3.2.2 EU instruments for climate change adaptation

EU Cohesion Policy is the largest EU instrument financing CCA investment in Slovenia – mainly in the field of flood protection. For the 2014-2020 programming period, €100m was allocated from ERDF and Cohesion Fund to co-finance investments in five river basin areas, including the Selška Sora basin in Gorenjska. These were described by the Managing Authority (MA) as largely classical type investments in which multi-use solutions were generally favoured – combining flood protection with irrigation, recreational surfaces, water reservoirs in the case of fires etc. Certain ecosystem measures were also supported outside the flood areas (e.g. afforestation, melioration ditches with plantings, damping belts between land and watercourses, creating wetlands and borders with larger agricultural

[8] Draft NECP 2030, p.164-165.

areas etc.). For 2021-2027, under Specific Objective (SO) 2.4 - *Promoting climate change adaptation and disaster risk prevention and resilience, taking into account ecosystem-based approaches*, the allocation is significantly larger at €159m, reflecting the increased emphasis on climate action in Cohesion Policy linked to thematic concentration rules. The main flood protection investments are foreseen in three river basins, none of which is in Gorenjska region. As in the period 2014-2020, part of the funds will implement ecosystem measures, especially in Natura 2000 areas. Investments are also foreseen for upgrading of certain early warning and awareness raising systems, infrastructure and other capabilities for readiness and response to events – including specialist vehicles and training of personnel.

The MA also noted that the application of the 'Do No Significant Harm' (DNSH) principle throughout Cohesion Policy for 2021-2027 would lead to a better climate-proofing of infrastructure investments across all sectors, which will have a positive influence on CCA. In addition, Slovenia has adopted 'Governing Body Guidelines on climate proofing for infrastructure', which translate the EU 'Technical guidance on the climate proofing of infrastructure in the period 2021-2027' into the Slovenian context. Climate-proofing will be included in Slovenia's new Climate Law, making it obligatory for projects receiving any public funds.

EU Rural Development Policy in Slovenia has been financing broadly traditional CCA measures under the National Rural Development Plan for 2014-2020, which was extended to 2022. This has mainly involved investments in irrigation, hail netting and diversification of crop species. Basic adaptation measures such as these have been made an eligibility criterion for investment in new agricultural areas – e.g. new orchards - under the National Strategic Plan (NSP) for 2023-2027. The NSP features a significant strengthening of its environmental focus overall, but this is principally in the field of climate change mitigation, rather than CCA specifically. Interviewees from the Ministry of Agriculture, Forestry and Food (MAFF) pointed to the existence of a substantial knowledge gap on CCA among their farmer stakeholders as a key reason for the relative lack of popularity of CCA measures. They also highlighting a certain related paradox in the CAP system of continued compensation of farmers for losses due to extreme weather events, weakening their rationale for investment in CCA, despite recent alarm about increasing Spring frosts, droughts and flooding. MAFF will coordinate a series of awareness raising events later in 2023 on the new NSP, which will include its CCA aspects. The MAFF interviewees recognised the lack of connection, outside of LEADER measures, between the EU Rural Development and Cohesion Policies in Slovenia – in particular concerning S5, in which they have no involvement. This was said to be holding back the development of possible innovative approaches to CCA in the agricultural sphere.

Exceptionally for the period 2021-2026, in the aftermath of the COVID 19 crisis, the National Recovery and Resilience Plan (NRRP) contains relevant reforms to strengthen preparedness and response in the event of climate-related disasters. A total of €85m are also foreseen for investments to upgrade related infrastructure, software, information and communication systems, as well as for further investment in reducing flood risk on the basis of specific agreements with municipalities. One of these is for a €10m investment in Škofja Loka, in Gorenjska. As for all such investments by the Recovery and Resilience Facility (RRF) it comes with a strong conditionality on the use of Nature-Based Solutions (NBS). The municipality reported that the NBS requirement represented a major challenge and forced them to change their original planning for the project in question, but that the quality and effectiveness of the project would be significantly better as a result. One NRRP investment to take a broader and potentially more innovative approach to CCA will be the Centre for Seed, Vegetable and Forest Protection. The investment will support the development of biodiversity-friendly forestry practices with a focus on genetic conservation and genetic diversity. It will include

construction of research infrastructure in the fields of seed, nurseries and forest protection, to help build knowledge base for further innovation, development and research in this area.

### 3.2.3 National and EU investments in innovation

S5 is largely implemented in Slovenia through Cohesion Policy Funds. For the 2021-2027 period, this is not only under Policy Objective (PO) 1, which supports R&I investments, but also under the NRRP and other POs providing funding for deployment of S5 products and services in the fields of urban mobility, circular economy, sustainable tourism, health and education, smart cities and communities etc. Although CCA is not a specifically targeted area here, the S5 could potentially support CCA-relevant actions in the near future. Currently, two programmes in particular can fund innovative projects in CCA:

- From 2023, a new NRRP investment includes calls for collaborative R&D&I projects by consortia of at least three public research organisations and at least four companies contributing to the green transition and digitisation, focusing on TRL 3-6. The projects must demonstrate a link to at least one of the S5 priority areas and a direct contribution to the development of a low-carbon society and economy and to climate resilience and adaptation (strand 1 – 'Green Transition'), or a direct contribution and impact on digitisation and digital transformation (strand 2 – 'Digital Transition').
- Support to the implementation of pilot / demonstration projects aimed at developing or testing new or improved products, processes or services in a real environment, which may be assigned to focus areas under S5[9].

S5 delivery processes remain dynamic and could incorporate additional CCA orientation during the current implementation period.

### 3.2.4 Regional interface with national and EU programmes

The Gorenjska RDA, embodying cooperation between the Development Agency for Upper Gorenjska, the Sora Development Agency (Škofja Loka) and BSC Kranj, prepares the Regional Development Programme for Gorenjska. The programme provides the basis for developing project proposals for financing from EU and national sources. However, when it comes funding applications in the CCA field, these are usually prepared and submitted directly by the municipalities themselves. Hence the opportunities for regional synergies and economies of scope and scale in CCA are not systematically exploited. As regards the EU Mission on CCA, regional actors from Gorenjska are yet to become beneficiaries of Mission projects launched by EC-DG R&I and the research found no explicitly dedicated funds aligned to the Mission from national sources. Nonetheless, Gorenjska will receive technical support via the Mission Platform to help build a systemic approach to the implementation of the SECAP, in collaboration with the European Climate, Infrastructure and Environment Executive Agency (CINEA) and national facilitators in Slovenia.

[9] See STIP Compass

*https://stip.oecd.org/stip/interactive-dashboards/policy-initiatives/2023%2Fdata%2FpolicyInitiatives%2F99995550*

https://stip.oecd.org/stip/interactive-dashboards/policy-initiatives/2023%2Fdata%2FpolicyInitiatives%2F24376

The Cohesion Policy MA confirmed that neither the existence of the Gorenjska SECAP, nor the region's participation in the EU Mission on CCA, actually influenced the selection of CCA projects in the region for EU Cohesion Policy funding.

### 3.2.5 Cross-border and interregional dimensions and EU-level projects

Due to Slovenia's relatively small size and its open disposition towards international cooperation, the country makes good use of its participation in cross-border and interregional projects. For Gorenjska, the EU Interreg Slovenia-Italy and Alpine Space programmes have been particularly important, as has the Alpine Convention, currently under Slovene Presidency, which includes a Climate Action in Alpine Towns initiative. The on-going X-RISK-CC project, for example *'How to adapt to changing weather X-treme and associated compound and cascading RISKs in the context of Climate Change'*, under Interreg Alpine Space, brings actors from Sora Development Agency in Gorenjska and Slovenia's National Environment Agency (ARSO) together with partners from five other alpine regions to develop peer-reviewed pilot action plans for different extreme weather events. Although not located in Gorenjska region, the LIFE project VIVaCCAdapt, in the Vipava Valley in Goriška region (also a signatory of the EU Mission CCA), was mentioned by several interviewees as a successful example of a project addressing CCA in an integrated manner. The project was initiated in 2016 to improve irrigation reliability in an area prone to drought, floods, frost and strong winds, which are becoming more frequent due to climate change. The project incorporated a range of innovative adaptation measures including a decision support system for irrigation which substantially improve controllability as well as decreasing water consumption. Whilst examples such as these present a favourable view of Slovenia's potential to enhance innovation in CCA, interviewees were quick to point out that they are highly fragmented in nature and that overall coordination of related capitalisation activity is lacking.

> *"There are more opportunities for learning and for pilot actions from these many EU projects than from national programmes"*
>
> Interviewee from Škofja Loka

## 3.3 Ensuring cross domain synergies

Previous attempts to achieve cross-domain synergies relevant to CCA in Slovenia did not meet with great success. An inter-ministerial working group to ensure coordination in support of the country's first Strategic Framework for Adaptation to Climate Change in 2016 was abandoned after having only met twice. The 'Long-term Strategy for the Spatial Development in Slovenia until 2050' was recently adopted in June 2023 and is supporting a drive by the Ministry of Natural Resources and Spatial Planning to bring more flexibility in land planning to take better account of CCA. Challenges remain, however, in the form of prevailing 'silo' attitudes among institutions taking part in the related processes, as well as difficulties with the availability of relevant territorial vulnerability data for the CCA perspective.

*The need for cross-domain synergies to support CCA is acknowledged in Slovenia's national strategic documents. For example, the 2021 Long-Term Climate Strategy states that, "more intensive incorporation of water protection and sustainable management in other policies, such as local and regional development, spatial planning, energy, transport, agriculture, fisheries and tourism, is vital for a successful adaptation to climate change". Prior to this, however, an inter-ministerial working group to ensure coordination had been appointed in 2016 to support the country's first Strategic Framework for Adaptation to Climate Change, but it met only twice and was then discontinued. Relaunch of this structure is foreseen in the resubmitted LIFE project application LIFE4ADAPT mentioned earlier.. A 'deep demonstrator' project of the EIT Climate-KIC is currently working on fostering this type of coordination in the field of circular economy, which may have subsequent application for CCA (see Section 2.6).*

*The 2021 Long-Term Climate Strategy further states, "knowledge of adaptation will be incorporated in all sectoral policies, especially the policies of sustainable spatial management and spatial planning". However, recent evolutions in land planning are linked more to climate change mitigation objectives: e.g. polycentric urban system with reduction of size of functional urban areas to cut need for travel.*

*The Slovene authorities increasingly see the need to ensure flexibility in land planning to take account of CCA, supported by recent adoption (June 2023) by the Parliament of a new spatial development strategy. In this context, the field research revealed on-going work on developing new climate-proof planning strategies for sustainable and resilient spatial development - notably reflecting Slovenia's previous participation in the Interreg Alpine Space project CLISP – 'Climate Change Adaptation by Spatial Planning' (Pütz, et al., 2011). However, two types of difficulties present in processes for adopting local and regional spatial development plans were highlighted by interviewees.*

- *The first is that the various authorities reviewing the draft plans (in particular Ministry of Natural Resources and Spatial Planning; MECE; MAFF; Office of Nature Conservation) not only come with their different perspectives, but also insist on engaging formally in terms of laws currently in place, rather than seeing beyond these in the required 'spirit' of this future-oriented exercise. In this regard, genuine leadership was said to be absent from the process.*

> *"In the field of adaptation to climate change, we have no institution, personnel, or inter-sectoral cooperation, because so far we have been kind of floundering."*
>
> *"We should work with the idea that it may not be wise to put a house in the same place and a bridge in the same location as before. After the landslide at Log pod Mangartom, the authorities were proud to say that they had built houses for people in the same place - unfortunately, another landslide will come to the same place one day."*
>
> Slovene climatologist dr. Lučka Kajfež Bogataj interviewed by Anja Kralj after the devastating floods in July 2023 (Google translated from www-24ur.com article on 8 August 2023)

- *The second is the shortage of appropriate data for effective CCA integration. Although specific analyses of municipalities' vulnerabilities, incorporating IPCC scenarios, were carried out as a pilot action under the CLISP project, this exercise was discontinued after the end of the project.*

*At the level of Gorenjska region, the SECAP represents an essentially sectoral approach with its separate measures for forestry, tourism and transport sectors. Nevertheless, certain crossovers can be noted in the document, such as the adaptation of transport infrastructure to both climate-induced hazards and changes in tourism models.*

## 3.4 Increasing breadth and depth of stakeholder involvement

Stakeholder involvement in strategy making at national and local levels is often seen as problematic in Slovenia in CCA-related fields where land use issues are prominent and direct citizen engagement prior to completion of strategies is generally under-developed. Regional level structures established for approval of regional spatial plans may help in beginning to overcome traditional difficulties with cooperation between municipalities, but these are too new at present to enable firm conclusions to be drawn. Some good practices exist in broader stakeholder involvement in S5 implementation at national level, as well as in Kranj smart city initiatives in Gorenjska region, which also have strong citizen orientation. Neither of these cases, however, have a specific focus on CCA.

At the level of Gorenjska region, as for the other Slovene regions, there is now a formal participative mechanism for adoption of the regional spatial plans. The plans are adopted by a Development Council in the region comprising representatives of municipalities, the economic sector and NGOs. In addition, there is a consultative body consisting of Mayors of the region's municipalities, that can give an opinion on all important decisions and holds a right of veto. Genuine citizen participation, however, remains problematic at this level, particularly when land use issues are at stake. As obstacles, several interviewees highlighted the lack of trust that citizens have for decision makers generally, the recent rise of 'Google scientists' who can easily mobilise disproportionate support online for minority opinions, as well as the difficulty to engage in fruitful dialogues when entrenched conflicting views are at play. Possible solutions mentioned were mainly based on the idea of early engagement of stakeholders from the beginning of planning processes. Previous government communication with farmers on Natura 2000 area conservation was cited as a positive example of this kind of approach, despite difficult beginnings.

Direct citizen involvement in strategy development is not usual practice at the national level either in Slovenia. Traditionally, citizens are involved only at the end of the process through ex-post consultation type arrangements. Interviewees working on the current revision of the NECP were convinced of the need for wide acceptance of the new Plan for it to function well. However, they were concerned that the preparation of the Plan is currently not sufficiently based on dialogue with wider society. In this regard, some mentioned a critical fundamental problem, highlighting the obvious difficulty of obtaining meaningful consultation results when people are not really aware about CCA and what it is (see Section 2.7).

One good example of national level stakeholder consultations is evident in the Entrepreneurial Discovery Process (EDP), which has evolved in the framework of S5. Recent online events have brought together over 1,000 participants from the economy, research organisations, chambers, associations, NGOs, ministries, support institutions, municipalities and other actors. However, as discussed earlier, these S5 processes are not currently focused on CCA. Within Gorenjska region, an example which must be mentioned is that of Kranj and the substantial citizens' involvement it is achieving in the design of its Climate City Contract (CCC) for the EU Mission '100 Climate Neutral and Smart Cities by 2030'. Here too, the focus is on climate change mitigation, not CCA. However, the city has been able to build up impressive levels of support among its citizens, frequently using novel communication methods via a smart city approach. Moreover, the emphasis in Kranj's CCC processes on how, internally, the city administration must also learn to do things differently bears a distinct flavour of transformative innovation.

A showcase of the vibrant stakeholder involvement in the climate related activity in Gorenjska has been perceived in the City of Kranj (Box 4).

Box 4: Gorenjska - Stakeholder involvement in Kranj smart city's bid for climate neutrality by 2030

The City authorities of Kranj, the main urban area in Gorenjska, are heavily engaged in transforming it into a smart city, bringing multiple benefits to its inhabitants. Smart city systems enable real-time monitoring of water, electricity and gas consumption, traffic data and air pollution with notifications about potential hazards and adverse weather conditions.

The Mayor of Kranj is the publicly identifiable leader of this ambitious plan. A new Strategic Council has been established to ensure broader endorsement of the 'smart' green transition concept, representing a wide range of interests and including a Nobel Prize winning climatologist. The 'Smart city' emphasis has brought a new business type approach to city management – including system innovation in how city administration functions.

Kranj's participation in EU Mission '100 Climate Neutral and Smart Cities by 2030' is enhanced by a wide diversity of public consultation events, plus direct citizen engagement using new digital smart city tools. In the frame of the Mission, the Climate City Contract under development will include:

1. Green mobility (cycling paths, shared EVs and bicycles, 'one car per family' actions, public transport;
2. Green energy: solar panels for public buildings, electric cars for city administration;
3. City open data, smart card, city platform, Internet of Things (IOT) in city facilities, including buses.

Kranj's smart city plans provide room for experimentation, by offering sandboxes for local companies to invest in smart services development.

Source: https://www.care4climate.si/_files/1999/SUSTAINABLE-MOBILITY-IN-KRANJ.pdf

## 3.5 Setting up effective multi-level governance models

Coordination between national, regional and local levels of authorities in the field of CCA is a weak point in Slovenia. The national level is the key driver in terms of strategic direction and resources for implementation. As is the case for SECAP in Gorenjska, the regions do not have the necessary means to implement their own strategies, nor do regional-level strategies have any formal status nationally. In practice CCA actions are implemented by local authorities, who propose projects directly to the national level. However, they lack the necessary incentives for cross-municipality cooperation – an obvious problem for climate change impacts that bypass municipal borders. Coordination mechanisms between the various levels, foreseen in the 2016 national Strategic Framework for CCA strategy, are still non-existent. The recent adoption of regional level spatial plans is seen as a positive step in this direction, although the opportunity was missed to integrate these plans with the Regional Development Programmes for 2021-2027. Also positive is the initiative of the Association of Municipalities to establish a 'Climate Office' in each region to act as a connection between national and local governance in the area of CCA. This initiative is included in the re-submitted proposal of the LIFE4ADAPT project.

To address the need for CCA in the region of Gorenjska, the national level is the key driver. Strategic orientations, rules and significant budgets, including from EU Cohesion and Rural Development Policies and RRF, are decided at the national level. However, the concrete impacts of climate change are felt at local and regional levels, with different manifestations in different places in a country characterised by a varied topology and diversity of configuration of risks and vulnerabilities.

Lack of institutional powers at regional level in Slovenia prevents a strong governance role for Gorenjska, despite efforts invested in drawing up a regional-level CCA strategy (SECAP). The Regional Development Agency partner BSC coordinated the preparation of SECAP Gorenjska in the frame of the Alpine Space project PEACE_Alps, but does not hold powers to support its implementation. LEAG emerges as a key actor at the regional level, particularly through its coordination of Gorenjska's participation in the EU Mission on CCA and its provision of climate related data, but its main remit remains energy management. Although the City of Kranj is becoming a major player in driving forward transformative approaches in the region, including in the context of the EU Mission '100 Climate Neutral and Smart Cities by 2030', these have so far focused on climate change mitigation, not CCA, as noted above.

> *"The problem in Slovenia is that each municipality has its own spatial plan. So we have around 200 spatial plans. And there is no broader view of the fact that one municipality can harm another. So we have municipalities that do not want to do something to protect another municipality if they do not have some immediate benefit from it themselves"*
>
> Slovene climatologist dr. Lučka Kajfež Bogataj interviewed by Anja Kralj after the devastating floods in July 2023 (Google translated from www-24ur.com article 8 August 2023)

Deploying CCA initiatives purely at municipal level, as is the case currently in Slovenia, makes little sense where climate impacts expand beyond municipality borders. A mechanism for voluntary cooperation between municipalities exists and efforts have been made in this direction for CCA. However, competition between municipalities for projects and resources, coupled with a local perception of CCA investment as high cost with no immediate or predictable return, means that there is natural resistance to cooperation. The legal possibility similarly exists for inter-municipal offices to be set up, but this is typically used for police and inspection services rather than for spatial planning or CCA.

The historical lack of coordination between the various levels of governance in the field of CCA, is a well-acknowledged issue in Slovenia. A national contact point envisaged in the 2016 national Strategic Framework for CCA, to ensure such coordination between national, regional and municipal levels, still remains to be established (Long-term climate strategy, 2021). A positive development

can nevertheless be seen in the recent creation and adoption of regional level spatial plans, which should help overcome the current fragmentation to some extent. The Slovene authorities had also intended a close correlation between these regional spatial plans and the Regional Development Programmes for 2021-2027, which underpin project preparation for EU and national funding. However, the regional spatial plans arrived too late for this to be realised. Also positive is the initiative of the Association of Municipalities to encourage MECE to establish a 'Climate Office' in each region to act as a connection between national and local governance in the area of CCA. It is understood that the 'Climate Offices' will offer awareness raising on CCA, technical support and access to financial instruments to support regions and municipalities in building climate resilience. This initiative is included in the re-submitted proposal of the LIFE4ADAPT project.

## 3.6 Making room for experimentation

There is no experimentation on potential innovative solutions for CCA at present in Slovenia at national level or in Gorenjska region. Nor does there appear to be much appetite or capacity to introduce experimental CCA approaches, or to undertake innovative public procurement in this direction. Although not specifically targeting CCA, EIT Climate-KIC is active in a 'deep demonstration' project of systemic innovation in the circular economy field. The KIC has also recently started work in the framework of S5 on 'smart and green villages', which aims to encourage experimentation by municipalities, but this activity was at the moment of holding interviews still at an early stage.

The research found no evidence of experimentation in the field of CCA in Slovenia at national level or in Gorenjska region, with noticeable lack of appetite and skills for experimentation in municipality administrations. The SECAP does not make explicit room for experimentation in its sectoral measures, whilst national and EU programme budgeting processes relevant to CCA lack flexibility to introduce new ideas due to the scale and lead times of the investments concerned.

> *"We have been working on measures against flooding for a long time, but now we have droughts too: this is not yet in our minds. We tend to continue with business as usual".*
>
> Interviewee from municipality administration in Gorenjska region

Interviewees at local level in the region explained that companies hired to carry out physical works related to CCA are invariably traditional construction type operations, due to the standards followed by public authorities in tender specifications. Doubts were expressed as to whether companies which could develop more innovative solutions for CCA even exist on the market in Slovenia. Lack of deployment of innovative public procurement techniques for CCA emerges as a further barrier from the demand side.

Nevertheless, there are some small signs of experimentation in the context of S5, related to green transition more generally, although not specifically to CCA. EIT Climate-KIC is currently advising the Ministry of Public Affairs on the establishment of a unit to support municipalities in developing 'smart and green villages'. The aim is to set up a Policy Lab, which would ultimately include regulatory sandboxes to encourage experimentation on potential innovative green solutions, including for new food systems[10]. The initiative appears promising, but the unit in question is only at an embryonic stage at present.

[10] https://www.gov.si/assets/ministrstva/MJU/CSP-KG/Sticisce-za-oblikovanje-politik/Sticisce_oblikovanja_politik_01_03_2023_SI.pdf

Similarly in 2018, the Slovenian government decided, jointly with the EIT Climate KIC, to develop pathways for a more radical transition towards a circular, regenerative and low-carbon economy, which would call for systemic innovations. Based on this work, a four-year 'deep demonstration' project to Decarbonise Slovenia through a model of systemic transition kicked-off in 2021[11]. The project considers circular economy as a vector of introducing circular principles in order to reach climate goals, and encourages transfer of good practices via horizontal, vertical and cross-border connectivity.

## 3.7 Securing high levels of policy intelligence, learning and strategic capacity

In the first instance, Slovenia as a whole and Gorenjska region in particular share a fundamental shortcoming – a generally low level of basic awareness and understanding, across a wide spectrum of relevant actors, of the CCA topic and what it represents. As regards policy intelligence for CCA more specifically, good quality climate data is already provided by the Environment Agency (ARSO) at the national level and to the regions. However, more detailed scenario and vulnerability assessments required by regional and local actors is lacking. Other items foreseen under Slovenia's 2016 Strategic Framework for CCA but not so far delivered, include the interconnection of relevant databases, a dedicated climate portal and a mechanism for regular cooperation on CCA between researchers and decision makers. Above all, throughout the system from national to municipal level, a serious shortage of capacity is apparent for effective and ultimately innovative CCA. Leadership, coordination and communication capacities, working connections between CCA and innovation policy delivery structures, widespread and plentiful availability of core CCA-relevant skills all seem currently in short supply. This would appear principally to reflect the low profile of CCA itself in the policy landscape, which in turn relates back to the generally low levels of CCA awareness already noted. The situation is remarkable given the evident progress being made on all of these aspects at national level in Slovenia and in Gorenjska region, when it comes to climate change mitigation, as opposed to CCA.

### 3.7.1 Awareness and understanding of CCA in Slovenia

Despite recent extreme weather events, the general perception in Slovenia is that the country will be considerably less affected by future climate change than, for example, typical Mediterranean countries, where loss of greenery, water shortages and widespread episodes of wildfires are already well visible. Public awareness of CCA in Slovenia is therefore generally low. It is seen essentially as a responsibility for public authorities and mainly viewed narrowly in terms of disaster risk management, rather than true CCA - reacting to extreme events rather than anticipation. Low awareness of the specificity of CCA, as distinct from climate change mitigation – on which Slovenia appears to be making commendable progress – was apparent even among some of the senior persons interviewed during the field research. Awareness raising actions foreseen through EU Cohesion Policy focus largely on flooding and early warning. Earlier communication activities carried out under the 2016 Strategic Framework for CCA are generally recognised to have been only partially successful.

> *"Online consultation for the preparation of this Strategy revealed that knowledge of adaptation (and also measures) to climate change is poorer among the broader public than the knowledge of mitigation".*
>
> Long term climate strategy, 2021

[11] https://www.gov.si/zbirke/projekti-in-programi/razogljicimo-slovenijo/

### 3.7.2 Knowledge base for CCA in Gorenjska

Various other expectations of the 2016 Framework have not been met in reality, which has not helped this situation. Actions carried out to establish regular cooperation between researchers and decision makers on CCA were unsuccessful for the most part. Vulnerability indicators envisaged were not prepared, the dedicated climate portal foreseen was not established and the interconnection of relevant databases was only partially implemented (Long-Term Climate Strategy, 2021).

The Gorenska SECAP contains extensive analysis based on detailed data from the National Environment Agency (ARSO) - namely the studies 'Assessment of Climate Change in Slovenia by the end of the 21st Century' and 'Climate variability of Slovenia'. The climate services of ARSO provide information on climate status and anticipated changes that are adapted to the needs of users (sectors and researchers) in a user-friendly form enabling relatively simple further use. Municipalities, however, still express the need for even more detailed and user-friendly micro-level data. Research into impacts of climate change on large forest fires, the spread of tropical diseases, buildings using wood as a material, ski tourism, irrigation, new species in agriculture and forestry, as well as on biodiversity, green, blue and other infrastructure, was planned but has so far proceeded more slowly than foreseen. Only the assessments for forest fires and heat impacts on public health are currently proceeding, whilst vulnerability assessments are missing for tourism and forestry sectors.

### 3.7.3 Strategic capacity

The issue of capacity is at the very heart of a successful pathway towards 'transformative CCA' in Gorenjska region, as in Slovenia as a whole. Yet the lack of genuine leadership at the national level or effective coordination between relevant policy fields were frequently cited by interviewees as a key barrier. Over-dispersed expertise was also cited in this regard, particularly the lack of appropriate anticipatory capacity at municipal and regional levels, with shortages of basic CCA-related knowledge and skills.

Proactive participation in European and international activities is one direction of the 2016 Strategic Framework for CCA where policy learning is emphasised. This is taking place through active participation in EU-level projects, such as the Interreg Alpine Space X RISK CC project mentioned earlier and the LIFE Climate Path 2050 project for the preparation of analytical bases of climate strategies. Whilst valuable lessons are being learned through participation in these EU and international initiatives, the research did not find evidence of strong systematic capitalisation of the knowledge gained from these experiences.

# 4 Conclusions

By becoming a signatory of the EU Mission on CCA, Gorenjska region has declared its aspiration to move beyond business-as-usual and engage in concrete action to address the threats of climate change on its territory in a more radical transformative way. To achieve such goals, there is a powerful role to be played by innovation for developing 'out-of-the box' transformative CCA solutions, tailored to territories' specific needs and opportunities. Yet for Gorenjska, as for Slovenia as a whole, this kind of genuinely transformative CCA, based on systematically innovative approaches, is currently not a reality.

While this situation is far from exceptional among EU regions, there is nevertheless an urgent need to act upon the barriers impeding more ambitious, anticipatory CCA built upon a long-term strategic vision. The risk of rushing into short-term responses to emergencies – such as the recent devastating floods in the region - without considering longer-term and broader adaptation needs could lead to inadequate CCA investments. Maladaptation could also result, such as subsidies to restore buildings located in flood-prone areas, or to sustain businesses heading for climate obsolescence (e.g. ski-related).

## 4.1 Possible Ways Forward

The main conclusions arising from each of the seven key transformative innovation features of the analytical framework are re-stated below. Under each of these features, possible ways forward are suggested, which could help the region of Gorenjska and Slovenia as a whole move towards more of a transformative innovation approach to CCA.

1. Directionality

CCA is not explicitly targeted in Slovenia's innovation strategies, nor is innovation given a prominent role in Slovenia's CCA-relevant strategies at national level, or in Gorenjska's regional level Sustainable Energy and Climate Action Plan (SECAP), which contains a chapter on CCA. Most identifiably transformative approaches to sustainability themes, at national level and in Gorenjska region, target climate change mitigation rather than CCA. National CCA strategies currently in place are undermined by lack of leadership and weak governance for CCA at the national level. Absence of administrative power at the regional level, coupled with reticence of municipalities to cooperate on CCA, further restricts the possibilities for transformative CCA approaches to emerge.

Possible ways forward:

- Establish a strong institutional 'champion' for CCA at national level.
- Open a new high-profile national debate about climate change and the breadth and depth of its societal and territorial dimensions, with regional-level events emphasising the crucial need for cooperation across municipalities.
- Build transformative-type, society-focused objectives for CCA into relevant strategic documents under preparation (e.g. current revision of NECP) and emphasise the need for more radical and innovative CCA solutions. Consider revising the Long-Term Climate Strategy to 2050 along similar lines.
- Work to raise the profile of CCA in relevant innovation policies and strategies, so that it gains a distinctive focus from climate change mitigation and 'green transition' in general.

2. Articulating instrument portfolios and defining synergies between funding sources

Gorenjska does not have its own instruments to implement SECAP, which remains a strategy on paper with no attached budget. National-level instruments and EU Funds are therefore crucial for financing CCA projects of scale in the region. Such funding exists for investments to reduce disaster risks – including those which are climate-induced – as well as to improve disaster response. However, meaningful regional synergies between funding instruments for CCA and innovation remain elusive. There is little sign of dedicated sources or incentives for funding innovative initiatives leading to transformative responses in the field of CCA - even though certain welcome evolutions are being induced by EU rules, such as a better incorporation of nature-based solutions in flood protection solutions. Some encouraging experiences from participation in cross-border, interregional and EU-level programmes are also evident, but they are fragmentary. Neither the existence of the Gorenjska SECAP, nor the region's participation in the EU Mission on CCA, has formal influence on the selection of CCA projects in the region for EU Cohesion Policy funding. Nevertheless, as a consequence of the heavy floods in August 2023, at the initiative of the Association of Municipalities of Slovenia, a 'Climate Office' (Local Contact Point) is to be established in the region, which should help enhance the role of SECAP in directing funds in the future.

Possible ways forward:

- Support headline research and innovation oriented towards CCA solutions in national R&I programmes.
- Integrate the CCA dimension more visibly in S5 priority areas for EU Cohesion Policy Funding – consider organising CCA-related EDP and bringing CCA firmly onto the agenda of S5 'rooting' exercises planned at regional level. Associate EU Rural Development structures managing CCA measures more closely with S5.
- Valorise innovative CCA solutions more in project selection systems under the climate related Cohesion Policy Programme investments (SO 2.4) and consider also financing softer governance-type measures which could accelerate Slovenia's move towards transformative CCA.
- Tailor domestic programmes and project selection systems for EU programmes to better support Gorenjska's participation in the EU Mission on CCA – possibly as a pilot experience in developing transformative CCA approaches, ultimately also of value for other regions.

3. Ensuring cross domain synergies

Previous attempts to achieve cross-domain synergies relevant to CCA in Slovenia did not meet with great success. An inter-ministerial working group to ensure coordination in support of the country's first Strategic Framework for Adaptation to Climate Change in 2016 was abandoned after having only met twice. The 'Long-term Strategy for the Spatial Development in Slovenia until 2050' was recently adopted in June 2023 and is supporting a drive by the Ministry of Natural Resources and Spatial Planning to bring more flexibility in land planning to take better account of CCA. Challenges remain, however, in the form of prevailing 'silo' attitudes among institutions taking part in the related processes, as well as difficulties with the availability of relevant territorial vulnerability data for the CCA perspective.

Possible ways forward:

- Revive the inter-ministerial working group foreseen in the 2016 Strategic Framework for CCA, with renewed vigour for identifying and exploiting potential cross-domain synergies.
- Press ahead with land planning improvements in the context of CCA – possibly with inputs from the institutional 'champion' for CCA suggested above, to encourage more forward-looking planning outcomes.
- Consider reviving the practice of enhancing territorial vulnerability data for land planning purposes, previously discontinued after the end of the CLISP project.
- Learn from EIT Climate-KIC efforts on fostering cross-domain coordination in the field of circular economy.

4. Increasing breadth and depth of stakeholder involvement

Stakeholder involvement in strategy making at national and local levels is often seen as problematic in Slovenia in CCA-related fields where land use issues are prominent and direct citizen engagement prior to completion of strategies is generally under-developed. Regional level structures established for approval of regional spatial plans may help in beginning to overcome traditional difficulties with cooperation between municipalities, but these are too new at present to enable firm conclusions to be drawn. Some good practices exist in broader stakeholder involvement in S5 implementation at national level, as well as in Kranj smart city initiatives in Gorenjska region, which also have strong citizen orientation. Neither of these cases, however, have a specific focus on CCA.

Possible ways forward:

- Transfer good practices built up under S5 EDP, in relation to green transition generally, towards CCA-relevant subject areas more specifically.
- Consider involving stakeholders across policy areas in the S5 EDP (e.g. farmers affected by climate change) to help find solutions bringing together business and research.
- Learn from Kranj City's successful experiments in participative processes, involving citizens in developing and implementing its smart city strategy, and apply lessons to CCA actions.

5. Setting up effective multi-level governance models

Coordination between national, regional and local levels of authorities in the field of CCA is a weak point in Slovenia. The national level is the key driver in terms of strategic direction and resources for implementation. As is the case for SECAP in Gorenjska, the regions do not have the necessary means to implement their own strategies, nor do regional-level strategies have any formal status nationally. In practice CCA actions are implemented by local authorities, who propose projects directly to the national level. However, they lack the necessary incentives for cross-municipality cooperation – an obvious problem for climate change impacts that bypass municipal borders. Coordination mechanisms between the various levels, foreseen in the 2016 national Strategic Framework for CCA strategy, are still non-existent. The recent adoption of regional level spatial plans is seen as a positive step in this direction, although the opportunity was missed to integrate these plans with the Regional Development Programmes for 2021-2027. Also positive is the initiative of the Association of Municipalities to establish a 'Climate Office' in each region to act as a connection between national and local governance in the area of CCA. This initiative is included in the re-submitted proposal of the LIFE4ADAPT project.

Possible ways forward:

- Promote CCA as an ideal area for cooperation between municipalities - create incentives for and remove barriers to cooperation. Seek opportunities for regional synergies and economies of scope and scale in CCA initiatives.
- Establish contact points at national level responsible for coordination on CCA with regional bodies and local authorities – including the recently proposed local 'Climate Offices'.
- Seek alignment between regional level spatial plans and Regional Development Programmes - possibly as part of a mid-term review process.

6. Making room for experimentation

There is no experimentation on potential innovative solutions for CCA at present in Slovenia at national level or in Gorenjska region. Nor does there appear to be much appetite or capacity to introduce experimental CCA approaches, or to undertake innovative public procurement in this direction. Although not specifically targeting CCA, EIT Climate-KIC is active in a 'deep demonstration' project of systemic innovation in the circular economy field. The KIC has also recently started work in the framework of S5 on 'smart and green villages', which aims to encourage experimentation by municipalities, but this activity was at the moment of holding interviews still at an early stage.

Possible ways forward:

- Foster public sector innovation and innovative public procurement to create room for private sector experimentation in the CCA field.
- Reinforce/scale up embryonic policy labs and regulatory sandbox initiatives relevant to innovative CCA.

7. Securing high levels of policy intelligence, learning and strategic capacity

In the first instance, Slovenia as a whole and Gorenjska region in particular share a fundamental shortcoming – a generally low level of basic awareness and understanding, across a wide spectrum of relevant actors, of the CCA topic and what it represents. As regards policy intelligence for CCA more specifically, good quality climate data is already provided by the Environment Agency (ARSO) at the national level and to the regions. However, more detailed scenario and vulnerability assessments required by regional and local actors is lacking. Other items foreseen under Slovenia's 2016 Strategic Framework for CCA but not so far delivered, include the interconnection of relevant databases, a dedicated climate portal and a mechanism for regular cooperation on CCA between researchers and decision makers. Above all, throughout the system from national to municipal level, a serious shortage of capacity is apparent for effective and ultimately innovative CCA. Leadership, coordination and communication capacities, working connections between CCA and innovation policy delivery structures, widespread availability of core CCA-relevant skills all seem currently in short supply. This would appear principally to reflect the low profile of CCA itself in the policy landscape, which in turn relates back to the generally low levels of CCA awareness already noted. The situation is remarkable given the evident progress being made on all of these aspects at national level in Slovenia and in Gorenjska region, when it comes to climate change mitigation, as opposed to CCA.

Possible ways forward:

- Develop and launch a national communication strategy (possibly in the framework of the new national debate on CCA suggested earlier) to raise general awareness on CCA - differentiated according to different target groups – with exchanges and forum between municipalities.
- Develop and deploy more detailed scenario and vulnerability assessments, as foreseen in the 2016 Strategic Framework on CCA, to complement data already provided by ARSO.
- Establish Climate Adaptation Centre at ARSO and a user-friendly CCA portal, based on functional interconnection of relevant databases.
- Build critical mass of core CCA-relevant expertise in municipal administrations, with trans-municipality dimension to facilitate cooperation. Include CCA in training and education for officials in a broad range of relevant policy areas, maximising relevant multiplier effects (e.g. through training of trainers).
- Capitalise systematically on lessons learned by different Slovene regions/actors participating in EU-level (e.g. Interreg) projects and networks, to make valuable learning available to all relevant practitioners.

The possible ways forward suggested here all hang together, with multiple interdependencies between them. They should really be addressed as a coherent whole if Slovenia and Gorenjska region are to begin to move towards a genuinely transformative CCA approach. Many of the suggestions made above already featured in the initially unsuccessful LIFE4ADAPT project application mentioned earlier, which has since been resubmitted to the EU LIFE Programme. The Slovene authorities should pursue this project and also allocate domestic sources commensurate with its importance as a key instrument towards transformative CCA – whether the LIFE application is successful or not.

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## Projects (selection)

Interreg Alpine Space project: Peace_Alps - Pooling Energy ACtion plans and Enhancing their implementation in the Alps: https://www.alpine-space.eu/project/peace_alps/

Interreg Alpine Space project: X-RISK-CC - How to adapt to changing weather eXtremes and associated compound RISKs in the context of Climate Change: https://www.alpine-space.eu/project-news/x-risk-cc-project-the-latest-updates-and-insights/

Interreg Alpine Space project CLISP - Climate Change Adaptation by Spatial Planning in the Alpine Space: https://climate-adapt.eea.europa.eu/en/metadata/projects/climate-change-adaptation-by-spatial-planning-in-the-alpine-space

Interreg Alpine Space project C3-Alps – Capitalising Climate Change Knowledge for Adaptation in the Alpine Space (C3-Alps): https://climate-adapt.eea.europa.eu/en/metadata/projects/c3-alps-2013-capitalising-climate-change-knowledge-for-adaptation-in-the-alpine-space

Interreg Central Europe project Framwat: https://programme2014-20.interreg-central.eu/Content.Node/FramWat.html

Interreg Central Europe project TEACHER-CE: https://programme2014-20.interreg-central.eu/Content.Node/TEACHER-CE.html

LIFE CARE4 CLIMATE: https://www.care4climate.si/en

LIFE ViVaCCAdapt https://life-vivaccadapt.si/en/

## Websites (selection)

ClimateADAPT page on climate adaptation activities in Slovenia: https://climate-adapt.eea.europa.eu/en/countries-regions/countries/slovenia

LEAG Page on Mission CCA: https://leag.si/en/mission-cc-adaptation/

Ministry of the Environment, Climate and Energy - Directorate for the Environment - Adaptation page https://www.gov.si/teme/prilagajanje-podnebnim-spremembam/

Public Agency for Scientific Research and Innovation of the Republic of Slovenia (ARIS) https://www.arrs.si/en/

Slovenia EU Cohesion Policy portals: 2014-2020 https://www.eu-skladi.si/
and 2021-2027 https://evropskasredstva.si/evropska-kohezijska-politika/

## List of abbreviations

| | |
|---|---|
| CCA | Climate Change Adaptation |
| EIA | Environmental Impact Assessment |
| GHC | Green House Gas |
| JRC | Joint Research Center |
| LEAG | Local Energy Agency of Gorenjska |
| NAP | National Adaptation Plan |
| R&D | Research and development |
| R&I | Research and innovation |
| SECAP | Sustainable Energy and Climate Action Plan |
| TI | Transformative innovation |

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# Annexes

## Annex 1: List of interviews

| Date | Interviewee | Position |
|---|---|---|
| | **Local Energy Agency of Gorenjska (LEAG)** | |
| 10.07.2023 | Črtomir Kurnik | Director |
| 10.07.2023 | **City of Kranj, Gorenjska** | |
| | Matjaž Rakovec | Mayor and President of the Gorenje Region Council |
| | Tomaž Lanišek | Head of Department for Development and Smart Community |
| | Polona Prosen Sprajč | Department for Development and Smart Community |
| 11.07.2023 | **Regional Development Agency of Gorenjska - BSC, Business Support Centre** | |
| | Barbara Špehar | Head of Environment and Spatial Planning |
| | Helena Cvenkel | Director of Research and Development |
| | Lidija Kovač | Director of Finance |
| 11.07.2023 | **Development Agency SORA** | |
| | Gašper Kleč | Director |
| | Ženja Brezovar | Officer |
| 11.07.2023 | **Municipality Škofja Loka** | |
| | Tatjana Bernik | Department of Environment and Spatial Planning |
| 12.07.2023 | **Ministry of Cohesion and Regional Development** | |
| | Marko Hren | Head of Division, Smart Specialisation Strategy Coordination |
| | Jože Petkovsek | Smart Specialisation Strategy Coordination Division |
| 26.07.2023 | Gabriel Mezang Nkodo | Cohesion Directorate |
| 12.07.2023 | **Jožef Stefan Institute** | |
| | Katarina Trstenjak | Researcher |
| 12.07.2023 | **University of Ljubljana** | |
| | Matej Švigelj | Associate Professor - School of Economics and Business |
| 13.07.2023 | **Ministry of Natural Resources and Spatial Planning** | |
| | Blanka Bartol | Directorate for Spatial Planning and Construction |
| 13.07.2023 | **EIT Climate-KIC** | |
| | Barbara Simonič | Designer & Producer Circular Economy |
| | Bart Stegeman | Slovenian Orchestrator- Circular Economy and Value Chains Transformation |
| 13.07.2023 | **Stritih Sustainable Development Consulting** | |
| | Nataša Beltran | National facilitator for EU Mission Climate Change Adaptation |
| 16.08.2023 | **Ministry of Agriculture, Foresty and Food** | |
| | Tanja Gorišek | Agriculture Directorate |
| | Boštjan Petelinc | Agriculture Directorate |

| Date | Interviewee | Position |
|---|---|---|
| | Maja Dovžak | Agriculture Directorate |
| 16.08.2023 | **Ministry of Higher Education, Science and Innovation** | |
| | Nataša Vrhovec | Innovation Division |

## Annex 2: List of case studies

Case studies have been carried out to analyse to what extent and how enabling factors towards 'Transformative Climate Change Adaptation' strategies, as identified in the conceptual report (European Commission, 2024), are at play in reality, and what can be done to overcome barriers in various territorial contexts. The methodological framework described in the conceptual report essentially acts as a practical guide for undertaking cases studies on CCA strategies in different territories, in a uniform way. These case studies are listed below:

**"Transformative innovation for better climate change adaptation" – Case studies**

| Country | Territory | URL (*) | DOI | JRC number |
|---|---|---|---|---|
| Belgium | Leuven | https://publications.jrc.ec.europa.eu/repository/handle/JRC137313 | 10.2760/58125 | JRC137313 |
| Finland | Espoo | https://publications.jrc.ec.europa.eu/repository/handle/JRC137316 | 10.2760/177322 | JRC137316 |
| Finland | Turku - Southwest Finland | https://publications.jrc.ec.europa.eu/repository/handle/JRC137315 | 10.2760/211155 | JRC137315 |
| France | Provence-Alpes-Côte d'Azur | https://publications.jrc.ec.europa.eu/repository/handle/JRC137314 | 10.2760/46893 | JRC137314 |
| Greece | Attica and North Aegean regions | https://publications.jrc.ec.europa.eu/repository/handle/JRC137322 | 10.2760/493562 | JRC137322 |
| Iceland | | https://publications.jrc.ec.europa.eu/repository/handle/JRC137291 | 10.2760/305796 | JRC137291 |
| Italia | Emilia-Romagna | https://publications.jrc.ec.europa.eu/repository/handle/JRC137319 | 10.2760/790200 | JRC137319 |
| Netherlands | Northern Netherlands | https://publications.jrc.ec.europa.eu/repository/handle/JRC137312 | 10.2760/10862 | JRC137312 |
| Poland | Mazovia - Stare Babice | https://publications.jrc.ec.europa.eu/repository/handle/JRC137323 | 10.2760/58125 | JRC137323 |
| Portugal | Norte | https://publications.jrc.ec.europa.eu/repository/handle/JRC137321 | 10.2760/399394 | JRC137321 |
| Romania | Nord Vest - Cluj | https://publications.jrc.ec.europa.eu/repository/handle/JRC137317 | 10.2760/923916 | JRC137317 |
| Slovenia | Gorenjska | https://publications.jrc.ec.europa.eu/repository/handle/JRC137320 | 10.2760/502482 | JRC137320 |
| Spain | Andalucia - Granada | https://publications.jrc.ec.europa.eu/repository/handle/JRC137324 | 10.2760/104672 | JRC137324. |
| Sweden | Blekinge and Värmland | https://publications.jrc.ec.europa.eu/repository/handle/JRC137318 | 10.2760/249067 | JRC137318 |

(*) Links may give error message for those studies still under publication

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