European Commission

Transformative innovation for better Climate Change Adaptation – Case study: Turku, Southwest Finland

Authors: Harding, R., Nauwelaers, C.
Editor: Reimeris, R.

2024





EU Science Hub
https://joint-research-centre.ec.europa.eu

JRC137315

PDF ISBN 978-92-68-13903-5 doi:10.2760/211155 KJ-02-24-397-EN-N

Luxembourg: Publications Office of the European Union, 2024

How to cite this report: European Commission, Joint Research Centre, Harding, R. and Nauwelaers, C., *Transformative Innovation for better Climate Change Adaptation - Case Study: Turku, Southwest Finland*, Reimeris, R. editor(s), Publications Office of the European Union, Luxembourg, 2024, https://data.europa.eu/doi/10.2760/211155, JRC137315.

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, also articulated in the same report. The case study research covered several territories from across the EU and beyond, 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 – features 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 Turku and Southwest Finland, 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

The authors would like to thank those persons who participated in the interviews and provided information for the Case Study (list in annex), as well as staff of the European Commission in charge of this project, both from JRC (Karel Haegeman, Gérard Carat and Ales Gnamus) and from DG CLIMA (Irene Bonvissuto) and DG RTD (Prisca Haemers).

In particular, the authors gratefully acknowledge the support of Miika Meretoja from City of Turku in helping us with a well-balanced programme of interviews.

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 ways to accelerate adaptation are considered. Transformative innovation (TI) is at the focus of this report, particularly how it can help support and accelerate adaptation to climate change. The analysis in this report draws lessons from Turku (Finland) on how a TI approach is already helping the territory in increasing climate resilience, and what can be done in addition, to further accelerate adaptation. The analysis is based on a theoretical framework along seven dimensions designed to compare TI and Climate Change Adaptation (CCA). It is one out of a series of 14 case studies covering several territories from across the EU and beyond.

Main findings

The City of Turku is a leader in climate change mitigation but needs to focus more on CCA. The city has strong leadership, connections with research, and access to EU funding, but CCA is not as visible in its plans and actions as mitigation. The city lacks a clear vision for CCA and needs to address governance issues, clarify the roles of regional bodies, and make the business case for CCA to the private sector. The current approach to CCA is fragmented and incremental, and the city needs to take more ambitious and radical steps to achieve transformative CCA.

Key conclusions

For each of the seven key transformative innovation features, possible ways towards a transformative climate adaptation approach for city of Turku include:

- Directionality: Finland's National Adaptation Strategy lacks specific targets for climate change adaptation. Turku's Climate Plan 2029 has a stronger emphasis on adaptation, but lacks explicit goals. The focus in Southwest Finland is primarily on mitigation. To move forward, there is a need to engage in scenario-building exercises, emphasize Turku's resilience, and broaden consideration of adaptation in priority areas.

- Instrument portfolios and funding synergies: Funding for CCA projects in and around Turku is currently non-specific, primarily reliant on the quality of project proposals. While the city effectively utilizes various EU funds for CCA actions, the lack of dedicated national funding limits long-term resilience-building efforts. Potential solutions include establishing a national funding line specifically for CCA, implementing a tracking system for CCA-related expenditure, defining CCA as a theme for large-scale projects, and expanding the use of the CCA component of the EU Taxonomy for Sustainable Activities in public investments. These steps can enhance the financial support for CCA initiatives and contribute to lasting resilience pathways.

- Ensuring cross-domain synergies: At the national level, governance structures for CCA in Finland are fragmented, with different ministries overseeing various strategic frameworks. While CCA provisions have been integrated into national regulations and certain strategies, mainstreaming CCA across all domains affected by climate change remains a challenge. In Turku, CCA interventions have primarily focused on water management and infrastructure,

with limited mainstreaming beyond these areas. The University of Turku has conducted interdisciplinary research on the health impacts of urban heat, but such efforts are isolated. Moving forward, potential actions include integrating CCA requirements into climate roadmaps for companies, developing 'Climate Action Cards' for CCA in Turku's Climate Plan, implementing CCA criteria in public procurement, and introducing CCA topics in education and vocational training curricula. These steps can help stimulate demand for innovative CCA solutions and promote broader mainstreaming of CCA across different sectors.

- Stakeholder involvement: In Finland, stakeholder participation is open and encouraged in public policy design and implementation, as seen in the Southwest Finland Region's collaboration with public, private, and civil society partners on climate issues. However, there are barriers to full participation from farmers and landowners. The City of Turku has established working groups for its Climate Plan 2029, including a focus on CCA, but broader citizen involvement in CCA activities remains challenging. New participative approaches will be tested under EU projects, and the city's strong links with higher education institutions are actively engaged in CCA research. Potential steps for progress include reviewing successful stakeholder participation techniques from EU projects, enhancing the CCA working group's activities under Turku's Climate Action Plan, and considering novel forms of citizen participation in CCA, such as youth forums. These measures can help broaden stakeholder involvement and increase engagement in CCA activities.

- Multi-level governance: The governance of national and local CCA strategies in Finland lacks effective integration, especially since the withdrawal of the regulatory obligation for Municipalities and other sub-national bodies to implement CCA elements. There is also fragmentation of CCA-relevant responsibilities within the regions, further complicating the situation. To address these challenges, potential solutions include maintaining the obligation for Climate Planning at sub-national levels with explicit CCA inclusion, enhancing the role of the Region in orchestrating sub-national CCA strategies, defining cooperation protocols between Wellbeing Services Counties and Municipalities on CCA, and establishing a national network of local authorities focused on CCA. These steps can help improve the integration and implementation of CCA strategies across different governance levels.

- Experimentation: Turku has shown commendable involvement in experimenting with CCA solutions, particularly through its participation in EU projects like the RESIST project. These efforts have mainly focused on water management, with limited attention to other areas of CCA. Moving forward, it is important to boost experimentation in less addressed aspects of CCA, explicitly incorporate CCA in ongoing experiments with relevance, and emphasize the scale-up of successfully piloted CCA solutions in new financing instruments. These steps can help diversify and expand the impact of CCA experimentation in and around Turku.

- Policy intelligence, learning and strategic capacity: Finland's public awareness of CCA is generally low, but awareness among public authorities is growing, driven by the adoption of the 2022 version of the National Adaptation Plan (NAP) and substantial research at the national level. However, there are substantial shortcomings in the knowledge base, particularly in terms of the lack of quantified CCA indicators in the NAP and practical applicability of available data for implementing CCA solutions at regional and local levels. The City of Turku has its own dedicated Green Transition Team, primarily focused on mitigation, with limited capacity for CCA. Moving forward, potential solutions include developing better indicators for CCA, funding research on cost-benefit analysis of CCA solutions, delivering a training program for municipal and regional authorities in developing CCA plans, and

expanding the climate change information portal to incorporate adaptation actions and good practices. These steps can help strengthen the knowledge base and capacity for effective CCA implementation in Finland.

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, 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 grey) obtained from interviewees.

This Report provides the findings for city of Turku, as at February 2024.

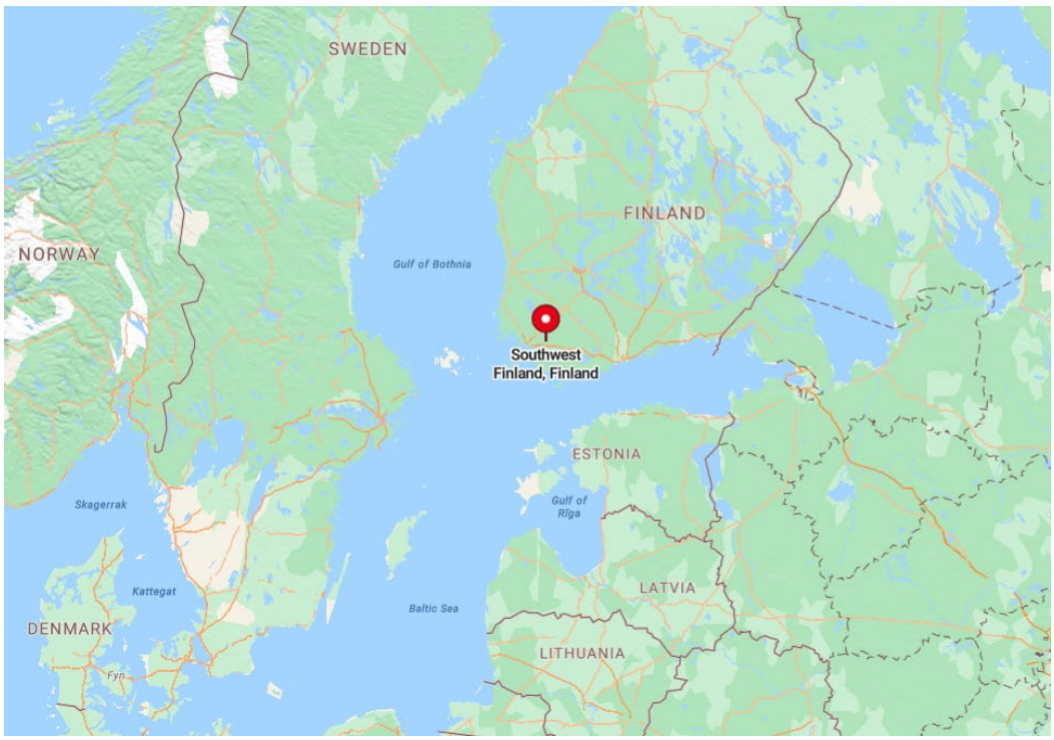
[2] A full list of the case studies is provided in Annex 2

2 Presentation of the case study territory

2.1 Profile of the territory

Turku is Finland's oldest city and is capital of the region of Southwest Finland (Varsinais-Suomi). Finland has 18 + 1 such 'regions' at NUTS 3 level (18 regions in Mainland Finland and the island Province of Åland). These regions are forums for cooperation between Municipalities, of which there are 27 in Southwest Finland. Regional Councils are composed of delegates from the Municipal councils and have statutory responsibilities for regional planning, maritime planning and other development tasks. Southwest Finland is home to almost 500,000 inhabitants and is one of the most densely populated areas in Finland. The city of Turku has a population of just under 200,000 (2022)[3]. Counting also its surrounding urban Municipalities, this rises to around 345,000, making the Turku urban area the third largest in Finland, after those of Helsinki and Tampere. The city is officially bilingual, with 5.5% of the population having Swedish as their mother tongue[4].

Figure 1. Geographical location of Turku in Finland



Source: Bing online maps, 2024

[3] https://ec.europa.eu/eurostat/cache/RCI/#?vis=nuts3.population&lang=en

[4] Statistics Finland (2023)

At €43,135 (2020), Turku's GDP per capita is roughly equivalent to that of Finland as a whole and considerably higher than the EU average of €31,254[5]. Key economic sectors for Turku are represented by the maritime, life sciences, IT, entertainment, chemicals, biotechnology and circular economy industries[6].

The South Finland NUTS 2 region, in which Turku is the major urban area is classed as a 'strong innovator+', with innovation performance increasing at a rate higher than that of the EU (8.5% points)[7]. Turku has two universities, University of Turku and Åbo Akademi University (Swedish language), plus four polytechnic type institutions, including Turku University of Applied Sciences, the second largest of its type in Finland. Overall, there are some 40,000 higher education students studying in Turku.

Turku prides itself on being a leader in green transition. The City is part of the EU Mission '100 Climate Neutral and Smart Cities by 2030' and has set a goal of achieving climate neutrality by 2029, in advance of the overall target of the Mission itself. The previous milestones set for 2021 (reducing GHG emissions by 50% compared to 1990) were already exceeded in 2020. The most significant remaining sources of GHG emissions in Turku are road transport (25%), electricity consumption (25%) and district heating (19%)[8]. Another of Turku's objectives is to significantly reduce consumption-based emissions, regardless of where consumption goods have been manufactured. The region also faces the problem of reducing nutrient flows from agriculture in water and eutrophication of Baltic Sea and its Archipelago region facing Turku. Both the City of Turku and the Southwest Finland region are signatories of the EU Mission 'Climate Change Adaptation', through which Turku is involved in collaboration on CCA with counterparts from different EU Member States. Turku is an active participant in environmental actions of the Union of the Baltic Cities and the Baltic Sea Challenge focused primarily on reducing marine pollution.

Table 1: Turku and Southwest Finland - Key characteristics

Area	Southwest Finland 10,910 km² - Turku city 306 km²
Population	Southwest Finland 485,567 inhabitants – Turku city: 197,900 inhabitants (2022)
Geography	26% of Southwest Finland land area is used for agriculture. The region is home to approximately 5,000 farmers and 20,000 forest owners. Turku is situated at the mouth of the Aura river, with Port of Turku its main economic hub. The nearby Archipelago Sea, with its large number of islands, is attractive for leisure and tourism, but eutrophication from nutrient pollution severely threatens its marine environment.
Economy	GDP per capita 2020: Turku €43,135. Southwest Finland: €39,987. Country: €43,049. Main economic sectors in Turku are maritime industry, life sciences, IT, entertainment, chemicals and environmental technologies.
Green transition	Turku has ambitious plans for climate neutrality by 2029 and is part of EU Mission '100 Climate Neutral and Smart Cities by 2030'. The City aims at reducing consumption-related emissions, adopting 1.5° lifestyle and strengthening circular economy. The City and the region of Southwest Finland are signatories of the EU Mission charter 'Climate Change Adaptation'.

[5] https://data.europa.eu/data/datasets/lxeqay13nlotu97przjw?locale=en

[6] www.turkubusinessregion.com

[7] European Commission (2023)

[8] (City of Turku, 2022).

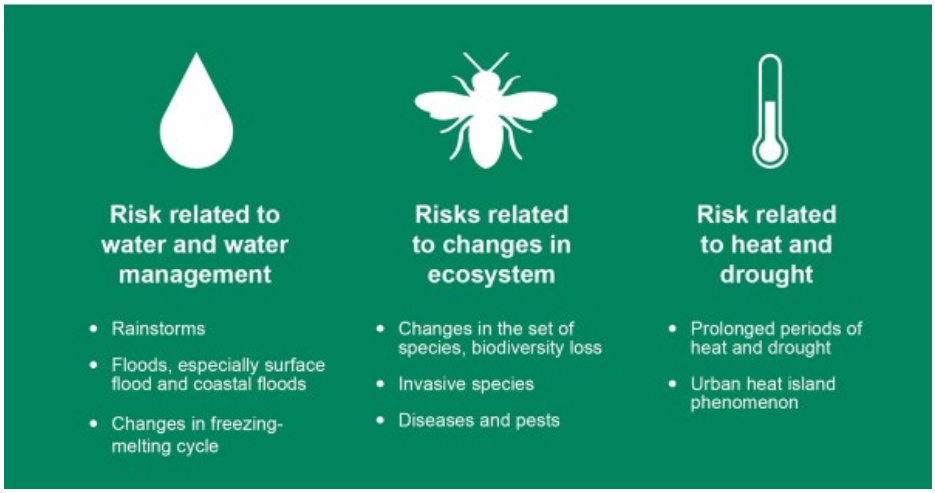
Main climate change features	Heavy rain and increasing sea level causing flooding. Longer-lasting droughts and heat stress in urban areas. Serious impacts on water protection, agriculture, forestry and natural eco-systems from floods and droughts referred to above. Less snow and ice - lower number of freezing days.

Sources: (City of Turku, 2022), www.stat.fi; https://resist-project.eu/regions/southwestfinland/

2.2 Main climate change risks and vulnerabilities

Turku Climate Plan 2029[9] identifies three main climate risk areas: water and water management; changes in ecosystems and heat and droughts (Figure 2). The latter category of risk has been added in the recent revision of the Plan. Using the SECAP methodology, the Plan assesses the likelihood of occurrence and expected impact levels of the different climate risks threatening Turku.

Figure 2. The three risk entities identified as the most significant climate risks for Turku



Source: City of Turku, 2022

Over the next ten years, year-round rainfall of an intensity not witnessed in the past[10] is expected to become commonplace in the region, with overall rainfall projected to increase by some 2% to 4%. Pollution of water is a potentially growing problem, because increased rainfall is likely to cause significantly increased surface runoff into waterways and contamination, including in the Archipelago Sea. Paradoxically and simultaneously, water scarcity is a growing concern in this area of Finland, the '*Country of thousand lakes*'. Annex 3 of the Turku Climate Plan 2029 provides further details on the climate change risks facing the city and surrounding area, in the form of Climate Risk Cards, as follows:

- Increased (urban) heat

[9] (City of Turku, 2022).

[10] https://www.rcinet.ca/eye-on-the-arctic/2021/09/24/flooding-in-finland-is-getting-worse-new-climate-report-says/

- Drought and scarcity of water
- Increased incidence of forest fires and wildfires
- Changes in the freezing-melting cycle
- Increased risk and severity of rainfall and storms
- Floods and rising sea levels
- Changes to ecosystems and other biological risk factors
- Diverse spill-over effects of climate change originating outside of Finland but with potentially severe socio-economic consequences, such as shortages of raw materials and/or energy, mass climate migration, effects on human health etc.

The Plan identifies the action plans and policies of the City in which these risks must be taken into consideration in each case.

2.2.1 State-of-play of CCA and innovation strategies

Finland was one of the first countries in the world to adopt a National Climate Change Adaptation Strategy (NAS), as long ago as 2005. The NAS was evaluated in 2013, leading to the development of the National Climate Change Adaptation Plan (NAP) in 2014 and integration of CCA into Finland's climate policy under its first Climate Change Act adopted in 2015. The NAP was evaluated in 2022 and a new Climate Act (423/2022)[11] and NAP were adopted the same year. Key principles in the new legislation, translated through NAP, are mainstreaming of CCA across national sectoral policies and fairness in CCA with special regard to Finland's indigenous Sámi people.

Southwest Finland's Climate Roadmap, adopted in 2021-2022, focuses predominantly on mitigation, as do those of all Finland's regions. Certain pieces of sectoral legislation, for example the Land Use and Building Act, enables establishment of regional CCA related objectives, but so far few concrete goals have been set in this regard. Turku's Climate Plan 2029, first adopted in 2018 and revised in 2022, follows the SECAP (Sustainable energy and climate action plan) model of the Covenant of Mayors[12]. The Plan includes the Climate Risk Cards described above, but only features 'Climate Action Cards' for mitigation, not for CCA.

As regards innovation policy, Smart Specialisation Strategies 'RIS3' are developed in Finland at NUTS 3 level. The RIS3 of Southwest Finland is part of its Regional Strategy 2040+[13]. Its objectives focus on sustainability, carbon neutrality, energy efficiency, and circular economy. RIS3 priority areas are: Innovative Food chains, blue economy and life science and health technology. The R&I actions foreseen, which could implicitly support CCA, are mainly connected with agriculture, the Archipelago Sea and urban green infrastructures. However, the RIS3 does not explicitly target CCA as a field of action in its own right.

[11] Climate Act (423/2022) VN0068724_ilmastolaki_423_2022_EN.docx (finlex.fi)

[12] https://eu-mayors.ec.europa.eu/en/node/203

[13] https://varsinais-suomi.fi/en/top-fields/smart-specialisation/

3 Application of the conceptual framework: Transformative Innovation for Climate Change Adaptation

The "mapping-based framework" report (European Commission, 2024), which serves as the conceptual reference framing this case study, defines 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:

1. **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 the highest political level to secure engagement of all relevant authorities and stakeholders.
2. **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.
3. **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.
4. **Increasing breadth and depth of stakeholder involvement:** working towards social acceptance of new solutions and shaping innovative developments, as well as improving public trust, opening up public debates, and managing diverse and sometimes conflicting views over alternative pathways.
5. **Setting up effective multi-level governance models:** maximising potential of vertical synergies, recognising complementary roles for various governance levels – local, regional, national and EU.
6. **Making room for experimentation:** providing adequate spaces for risk-taking and creativity - ensuring a risk-tolerant environment to facilitate the development of new and/or radical solutions.
7. **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

Despite Finland's pioneering approach in defining its first National Adaptation Strategy (NAS) far in advance of other EU Member States, the goals of the most recent version of its National Adaptation Plan (NAP) remain relatively general and lack quantified targets by which CCA achievements, including improved adaptive capacities, could be judged. National innovation policy and the Southwest Finland Smart Specialisation Strategy 'RIS3' are predominantly focused on competitiveness and economic growth, rather than societal challenges. Strategic directionality for a genuinely transformative type of CCA therefore appears somewhat insufficient at the national level. Turku's new Climate Plan 2029 has stronger emphasis on CCA than its previous version, but the CCA goal at this level is not explicitly articulated or quantified either, whilst the co-benefits of mitigation and adaptation are under-emphasized.

At the level of Southwest Finland, the Regional Council is responsible for orchestrating climate action, but again the main focus is on mitigation rather than CCA. Valonia, the public regional sustainable development agency and part of the Regional Council, is active in RIS3 processes and appears as a valuable partner in climate-related activity and coordinates the Region's participation in the EU Mission on CCA's RESIST project. The ELY Centres, which deliver a range of national policies in Finland's regions, are establishing a special CCA Unit which will ultimately see experts in CCA attached to the different regional centres, including Southwest Finland. Unlike most smaller Municipalities, the City of Turku has a dedicated Green Transition Team. This Team acts mainly as a locus for mitigation activity, but also increasingly for CCA in Turku and the surrounding area, in partnership with Valonia, the ELY Centres and other relevant bodies.

3.1.1 Goal definition

At national level, the different sectors covered by the NAP have general objectives expressed in terms of the need to adapt to, or prepare for, climate change. However, no quantitative goals are set, for example, in relation to limiting the amount of flood damage or to reducing the number of cases of illness caused by heatwaves. As regards national innovation policy, goals remain strongly oriented towards economic growth and competitiveness, rather than addressing societal challenges. A recent independent review of CCA in Finland[14] traces the reasons for this back to the political fallout resulting from the 2008 financial crisis and the Nokia closure. Other commentators describe Finland as beginning to lag behind international thinking about refocusing parts of research and innovation policy towards the societal challenges and the UN Sustainable Development Goals.[15] This view is reflected in the RIS3 for Southwest Finland which, although thorough in its sectoral approach, does not have a strong transformational focus from the societal perspective.

> *"There is no cross-checking of the GHG impact of adaptation measures, nor the climate 'proofness' of mitigation measures."*
>
> Source: (Nordic Council of Ministers, 2023)

[14] (Hildén et al., 2022)

[15] (Arnold et al., 2022), p. 6[12] cited in (OECD, 2023)

The City of Turku's Climate Plan 2029 was prepared in 2022 with considerably stronger stakeholder involvement than was the case for the previous version in 2018. The new CCA chapter in the Plan was developed through a working group for CCA, in line with the Covenant of Mayors framework. Whilst the sectoral coverage of Turku's Climate Plan is wide, its implementation side focuses primarily on water management rather than broader CCA dimensions. In this sense, the Plan cannot be said to articulate a transformational approach. Turku's goal for CCA is expressed in the Plan as follows: "*The city will prepare for the effects of climate change effectively and comprehensively (…) the risks, vulnerabilities and effects will be analysed once every Council term as a minimum and preparedness measures will be taken to address them*"[16]. This mainly reflects a 'process' goal, rather than a measurable indicator of progress. Annual reporting to the City Council on the Climate Plan overall can be seen as a good practice, but the directionality would be stronger if CCA objectives were more explicitly defined for this reporting. Also while recognising the necessity of adapting to climate change, the possibility to fully exploit co-benefits generated by measures targeting both mitigation and adaptation is underplayed in the Climate Plan.

3.1.2 Strategic governance

The Ministry of Agriculture and Forestry was the main driving force behind the original NAS and has remained responsible for subsequent NAPs. Many Ministries took part in the preparation of the successive versions of the NAP: Ministry of Traffic and Communications, Ministry of Trade and Industry, Ministry of Social Affairs and Health, Ministry of the Environment, Ministry for Foreign Affairs, Finnish Meteorological Institute and Finnish Environment Institute. Each Ministry remains responsible for assessing the impacts and identifying adaptation measures in its own sector. The general message from interviews and analyses[17] is that coordination on CCA at national level is not optimal.

At Southwest Finland regional level, climate change mitigation and CCA promotion are designated duties of the Regional Council. This includes a requirement to conduct regional risk reviews as part of NAP preparation, in cooperation with Rescue Departments and Regional State Administrative Agencies [18]. Under the Regional Council, the Regional Management Board takes decisions on the financing of development projects, including ERDF funding. One of its five sub-committees is 'Climate Responsibility', composed of representatives of mainly local authorities, regional development organizations and companies. Its work focuses mainly on climate change mitigation, rather than CCA. Valonia[19] is an independent organisation for sustainable development, active in RIS3 processes, that is shared by the Municipalities of Southwest Finland. It is known for its relative flexibility and responsiveness compared to purely government agencies. Similar organisations are not found in many other Finnish regions. Valonia has recently started working as coordinator of the EU RESIST project, financed by Horizon Europe under the EU Mission CCA[20]. The 15 ELY Centres for Economic Development, Transport and the Environment[21], under the Finnish Ministry of Employment and Economy, are responsible for a wide range of state administration tasks in the regions. These notably

[16] (City of Turku, 2022)

[17] In particular (Hildén et al., 2022)

[18] Regional Development Act (756/2021) Legislation on regional development - Ministry of Economic Affairs and Employment (tem.fi)

[19] https://valonia.fi/language/en/home/

[20] https://resist-project.eu/regions/southwestfinland/

[21] https://www.ely-keskus.fi/en/web/ely-en

include construction and built environment, water resource use and flood risk management and monitoring the public interest in environmental and water matters. The ELY Centres are also responsible for allocation of ERDF funding for companies. A key evolution currently underway is the establishment of a new ELY unit dedicated to CCA to be centred in Oulu, which will comprise 12 experts to be distributed around the different regions. Another new development since 2023, is the designation of 'Wellbeing Services Counties', which will oversee health, social and rescue services, previously under the responsibility of Municipalities. These new functional regions are expected to play a role in CCA, but the modalities have not yet been formally defined.

> *"The development work in Turku has traditionally been fragmented, carried out in separate programmes and organisations, and this has hindered Turku's ability to identify its development needs. However, the city's new operating model, implemented in early 2021, will improve this situation. The model will help the city carry out more coherent projects and development."*
>
> Source: (Six City Strategy, 2021)

The City of Turku plays a pivotal role in climate action with its Green Transition Team. Although most of its efforts are directed towards mitigation and Turku's participation in the EU Mission '100 Climate Neutral and Smart Cities by 2030', the Green Transition Team is also active in CCA. It is the central participant, together with other City departments, regional actors such as Valonia and relevant experts, in the working group initially established to support preparation of Turku's Climate Plan 2029, which continues to meet regularly to follow up on planning and implementation of climate-related activity.

3.2 Articulating instrument portfolios and defining synergies between funding sources

Domestic funding channels for climate action and R&I can, in principle, accommodate CCA projects in and around Turku, but none is specifically dedicated to CCA. Much depends on the existence of good quality proposals. Funding for pilots is more easily accessible than funding for upscaling solutions with a long-term perspective. CCA work has therefore become largely project-based, which appears somewhat at odds with an ambition to build robust lasting pathways towards resilience.

In this context, the City of Turku demonstrates an impressive ability to combine different funding sources to implement CCA actions. The City makes good use of EU Funds from Cohesion Policy, as well as from the LIFE and Horizon programmes, to finance CCA-relevant actions. Highlights include: the ERDF projects from the 2014-2020 period: 'Climate-Proof City' (ILKKA) and INTERREG 'i-Water'; and the on-going project Horizon Europe 'RESIST' under EU Mission CCA.

Turku is also currently involved in several other EU projects for which CCA is not the main goal, but a welcome by-product.

3.2.1 Domestic instruments for climate action

No permanent public funding sources specifically dedicated to CCA exist for the local level in Finland. Under the broader climate action banner, the Municipal Climate Solutions Programme of the Ministry of Environment supports and finances the climate work of municipalities and regions – mainly in mitigation - through procurement and government transfers. A key criterion for funding under the programme is the adoption of best climate practices and the trying out of new ones, with neighbouring municipalities encouraged to cooperate with each other. At the regional level, this climate work can be accelerated through additional support from Regional Councils and ELY Centres[22]. CCA actions and solutions can also be funded within a wide range of domestic programmes which have other objectives. A common view to emerge from the interview research was that while financing for pilot actions is often readily available, funding for replication and upscaling, as well as for larger investments is more difficult to obtain. At local level, budget cuts due to creation of the Wellbeing Services Counties have lowered the financing potentially available to Municipalities for CCA.

> *"In practice we are creative when developing our CCA projects. We first work on them and then try to bring them under existing funding sources"*
>
> Source: Interviewee from City of Turku

In practice actors rely on short-term specific projects to fund long-term plans. This situation presents a risk of discontinuity, which can lead to difficulties in retaining expertise and impedes implementation of CCA solutions.

The City of Turku nonetheless presents a good example of success in proactively combining various funding sources to support its work on CCA, from design to pilot and implementation. Turku has also recently initiated a system of climate budgeting by voluntarily applying the EU Taxonomy for Sustainable Activities[23] to all projects larger than €1m in its own Investment Plan. In this way, projects of the City itself and of its publicly owned companies are assessed according to the Taxonomy's six main criteria, one of which is CCA. The City of Turku's Climate Plan announces an intention to transition towards carbon-neutral - but not climate-proof - public procurement.

3.2.2 Domestic R&I instruments

Several national research funding channels can and do fund R&I in CCA, even though none have established thematic programmes specifically targeting CCA[24]. These include:

- Under the Research Council of Finland (formerly the Academy of Finland), the Strategic Research Council (SRC)[25], which funds research with strong societal relevance and impact through a small number of large-scale projects with long duration, typically 6 years, carried out by multidisciplinary research consortia.

[22] https://ym.fi/kuntien-ilmastoratkaisut-ohjelma

[23] https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en

[24] See examples of research projects in Chapter 7

[25] https://www.aka.fi/en/strategic-research/strategic-research/strategic-research-in-a-nutshell/overview/

- VNTEAS[26], which funds research projects ordered by the Government and coordinated by the Prime Minister's Office, including the 2022 review of CCA in Finland[27] and shorter-term projects responding to immediate policy needs.
- The Finnish Environment Institute (SYKE)[28] and the Natural Resources Institute Finland (LUKE)[29], which also finance CCA-relevant research.
- Several universities - among them Turku University[30] and the Turku University of Applied Sciences[31], which carry out research and development activities funded by domestic and international sources.
- Business Finland, under the Ministry of Employment and Economy, which can accommodate CCA-related innovative projects by companies.

RIS3 can also potentially direct ERDF funding towards CCA-relevant R&I activity, but this is not specifically identified.

3.2.3 EU instruments

The City of Turku makes good use of EU funding for its work on CCA. Under Cohesion Policy, examples from the 2014-2020 period include:

- Climate-Proof City (ILKKA)[32] – Tools for Planning. The project was co-financed by ERDF and co-ordinated by the City of Helsinki, with Cities of Lahti, Turku and Vantaa, Helsinki Region Environmental Services Authority, Finnish Meteorological Institute and the University of Turku as participants. The goal of the project was to create tools for climate-proof planning, including the Blue-Green Factor tool[33] for urban designers, bringing co-benefits in terms of CCA by regulating urban heat, managing stormwater and improving biodiversity.
- INTERREG project i-Water [34] - This €3m project enabled piloting of the Blue-Green Factor tool in Turku's Kirstinpuisto district as an urban design and stormwater management instrument to reduce peak loading of the drainage system. The project featured a linear park in the middle of the site with several connected detaining ponds, providing blue-green infrastructure for stormwater management and recreational space for residents, as well as enhancement to biodiversity and potential to provide educational benefits.

Under the current national Cohesion Policy Programme 'Innovation and Skills in Finland' 2021–2027, funding allocations are limited in this part of Finland, as compared to northern sparsely populated regions. The current Programme[35] allocates €38m of ERDF to the Specific Objective 'Promoting

[26] https://vnk.fi/valtioneuvoston-selvitys-ja-tutkimustoiminta

[27] (Hildén et al., 2022)

[28] https://www.syke.fi/en-US

[29] https://www.luke.fi/en

[30] https://sites.utu.fi

[31] https://www.turkuamk.fi/fi/turun-amk/tutu/organisaatio/

[32] https://ilmastotyokalut.fi/en/about-the-project/index.htm

[33] https://www.turku.fi/siniviherkerroin

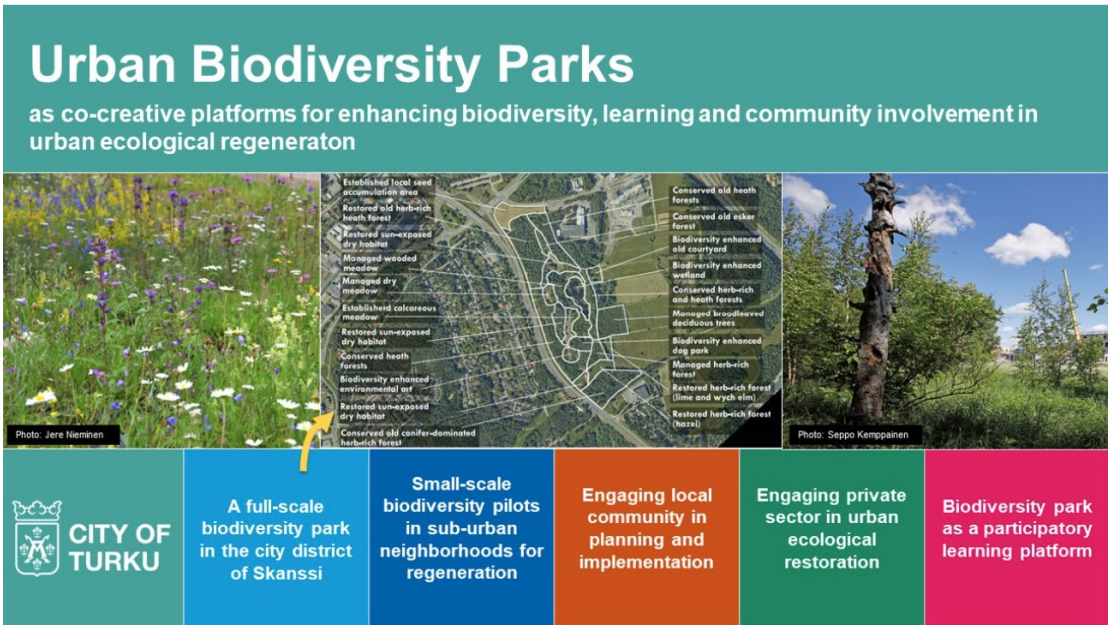
[34] http://www.integratedstormwater.eu/pilot-site/turku and (EIB, 2022). See cover page picture.

[35] https://rakennerahastot.fi/en/european-regional-development-fund-erdf-

adaptation to climate change, risk prevention and disaster preparedness' for the whole of Finland, but there have been few applications so far overall[36]. Turku also remains part of the 'Sustainable Urban Development' element of the current Programme, under which the 6 City Strategy of the 2014-2020 period has been enlarged to cover 16 urban areas, but this does not directly address investment in CCA.

In 2023, Turku was successful in obtaining additional ERDF funding of €3.9m from the European Urban Initiative (EUI) for an innovative New European Bauhaus demonstrator project 'Urban Biodiversity Parks' (Figure 3), which has some relevance to CCA. The project is just beginning implementation and will develop an innovative concept for active enhancement of biodiversity in the urban environment. Particularly noteworthy is the involvement of local residents and NGOs together with private sector actors, as well as the strong learning content, with active engagement of three higher education and research organisations.

Figure 3. Turku's Urban Biodiversity Parks project. EUI Call for innovative New European Bauhaus demonstrators



Source: Photo montage of Selected projects - urban-initiative.eu

Turku also uses EU funding outside of Cohesion Policy for CCA-relevant projects. Two key examples of such projects currently underway are:

- LIFE-IP project CANEMURE[37] 2019-2024 - Towards carbon-neutral municipalities and regions. This €15m national level project is coordinated by ELY Centre and supports the preparation of Climate roadmaps under 14 sub-projects carried out by project partners, including Turku. These roadmaps cover climate change mitigation as well as CCA - largely in the form of climate sustainable urban planning.

[36] JRC Questionnaire national level

[37] https://hiilineutraalisuomi.fi/en-US/Canemure/Subprojects/Turku

- Horizon Europe project RESIST[38] 2023-2027 under the EU Mission CCA – Turku is involved together with the Region of Southwest Finland, the Finnish Natural Resources Institute (LUKE), Turku University and Turku University of Applied Science as one of the four beacon regions. The project brings together 12 regions in total with different socio-economic profiles and levels of climate preparedness. It works with local authorities to harness science and technology to address climate change impacts in relation to floods, droughts, heatwaves, wildfires, and soil erosion (Box 1).

Box 1. Turku's active involvement in the Horizon Europe RESIST project under EU Mission CCA

Under Turku and Southwest Finland's participation in the Mission CCA project RESIST, demonstration sites have been established in Turku to experiment with Nature-based Solutions (NbS) for water management as part of urban stormwater infrastructure. One of the Turku sites represents the challenging situation of an already developed urban area in which large-scale NbS are not feasible. Instead, the effectiveness of a large number of small NbS on the site needs to be tested. Citizens will be involved in the co-creation of the planning and implementation of the project activities. The innovation here resides more in the process of acceptability of NbS, rather than new technological solutions. The first step of the project is to help create broader awareness not only of NbS, but also that CCA needs to cross sectors and is not just limited to water management and urban planning. The aim is that the project activities in Turku will be followed by further funding to upscale the investment.

The City of Turku and the Regional Council of Southwest Finland are involved in several other projects under the EU LIFE and Horizon programmes in which CCA is not the main focus, but an ancillary aspect. Examples of such projects currently under implementation include:

- LIFE Priodiversity project[39] 2024-2031 - The largest project to combat biodiversity loss ever implemented in Finland, with total funding of €50m over 8 years (€30m EU funds), has Southwest Finland as one of the participating regions. The aim is to collect best practices and find new forms of funding to preserve biodiversity. CCA is not a goal but can be incorporated in the action.
- Horizon Europe Co-evolvers project[40] 2022-2026 - The project worth €5.2m is coordinated by the Natural Resources Institute (LUKE) and has Turku City as one of the partners. It aims to encourage co-evolutionary approaches to unlocking the transformative potential of NbS for more inclusive and resilient communities, with emphasis on fairness in NbS governance techniques, models and practices.

3.3 Ensuring cross-domain synergies

Governance structures relevant for CCA at the national level appear fragmented with three ministries responsible for different strategic frameworks. Mainstreaming of CCA at national level is happening

[38] https://resist-project.eu/

[39] https://ym.fi/en/-/finland-s-largest-ever-eu-funded-life-biodiversity-project-started-new-and-more-effective-means-to-combat-biodiversity-loss

[40] https://co-evolvers.eu/

at different paces in different domains. An inter-institutional monitoring group for the NAP at national level promotes cooperation between different sectors, but coordination between the sectors is reportedly not strong. CCA provisions have been built into national regulations on building and land use, as well as into certain strategies, notably for water use management. However, CCA mainstreaming in Finland is not yet a reality for all domains potentially affected by climate change.

Turku highlights climate risks for a wide range of sectors in its Climate Plan, but the City's CCA interventions have so far been mainly limited to water management, climate proofing of infrastructures and expansion of green infrastructure. Key investments undertaken by the City to substantially improve drinking water supply and wastewater treatment have had strongly positive CCA impacts, even though CCA was not among their principal objectives. It can also be difficult to distinguish between maintenance and CCA in the case of work undertaken on other infrastructures. The initial stages of Turku's involvement in the RESIST project, under the EU Mission CCA, have highlighted the need for broadening CCA action across different domains. However, mainstreaming CCA beyond water management and infrastructure remains challenging. The University of Turku has undertaken interdisciplinary research on health impacts of increasing urban heat, but this is a relatively isolated case. Turku University of Applied Sciences is involved in action by local authorities to pilot new CCA-related criteria in public procurement under the RESIST project.

Responsibilities for climate-related strategies are split across three ministries: The Ministry of Economic Affairs and Employment is responsible for the Energy and Climate Strategy; the Ministry of Environment is responsible for the Medium-term Climate Change Policy Plan; and the Ministry of Agriculture and Forestry is responsible for the Climate Plan for the Land Use Sector. OECD describes the governance of these national climate-related strategies as, *'fragmented and their integration partial'*[41]. Finland's NAP 2022 lists sectors and policy areas where CCA should be mainstreamed (Box 2), including "Regional and municipal risk management". The NAP also makes provision for including justice assessments in adaptation action[42]. A national monitoring group follows and evaluates the implementation of the NAP and promotes the cooperation between sectors. It includes 10 Ministries, 8 agencies, institutes and associations, representatives from ELY-Centre and regional councils and experts[43]. Yet mainstreaming of CCA has so far progressed at different speeds in different sectors. Whilst CCA has been incorporated in certain sectoral regulations, e.g. Land Use and Building Act and National Land Use Guidelines[44], as well as in several national strategies such as Water Resources Management Strategy of Finland 2030, it is not yet recognised in all areas of legislation potentially affected by climate change. Moreover, there remain *"challenges*

> *"The analysis (of the Finnish Climate Change Panel) highlights the need to extend adaptation policy to ecological habitats and ecosystem services"*
>
> *"The Department of Health and Welfare has stated that Finnish health care is not prepared for the increasing effects of climate change"*
>
> Source: (Finnish Climate Change Panel, 2023b)

[41] (OECD, 2023)

[42] (Nordic Council of Ministers, 2023) p.42

[43] (Nordic Council of Ministers, 2023) p.39

[44] (Nordic Council of Ministers, 2023) p.35

in identifying and implementing practical adaptation activities, especially in sectors that cross different administrative sectors."[45]

Box 2. Key areas identified for CCA mainstreaming under the Finnish NAP 2022 (Nordic Council of Ministers, 2023)

Themes identified in the NAP 2022

1. Governance
2. Comprehensive security and general preparedness
3. Food and nutrition security
4. Infrastructure and built environment
5. Drought risk management, use and care for natural resources, biodiversity and Nature-based Solutions
6. Healthcare
7. Cultural heritage and cultural environment protection
8. Regional and municipal risk management
9. Strengthening (and mobilizing) the knowledge base
10. Communication and interaction
11. International cooperation
12. Monitoring and evaluation.

Similarly, for Turku itself, the identification of a wide range of sectors with climate risks in both 2018 and 2022 versions of the City's Climate Plan reflects creditable CCA mainstreaming intentions. However in reality, the City's CCA investment has so far mainly concerned only climate proofing of critical infrastructure, water management and associated urban green infrastructure. Of these, key projects often showcased are the innovative upgrades to the city's drinking water supply and wastewater treatment system (Box 3). CCA was not the main original intention of either facility – the infrastructures in question needed upgrading in any case - but their completion represents a huge step up in climate resilience for Turku.

The experience of the drinking water supply investment has led Turku Region Water Ltd to place greater emphasis in its activities on research into possible evolving climate change effects. The company would ideally like to re-perform all of the detailed measurements and calculations made for the project over 10 years ago to see what differences climate changes in the intervening period may have had. However, convincing its shareholders to fund such research is problematic, pointing in the first instance to a need for stronger collaboration with relevant research institutes.

Box 3. Upgrades to Turku's water management systems, with CCA as a substantial co-benefit

Turku's drinking water used to be sourced from local water bodies which were becoming unreliable during summer months and increasingly unsustainable in relation to actual and predicted climate change effects. Turku Region Water Ltd, a not-for-profit company of the City, started work in 2011 on a new water supply system. This collects water from a vastly more plentiful water body some 100 km away and uses it, via an innovative Managed Aquifer Recharge (MAR) technique, to create Finland's largest artificial groundwater plant at Virttaankangas. The artificial infiltration of

[45] (Hildén et al., 2022) pages 24-39

groundwater imitates the natural groundwater recharge and is both ecological and efficient. No water is wasted in the process and the drinking water produced is of exceptionally high quality. The system came fully online in 2013 and was awarded the title 'cleanest drinking water in the world' by UNESCO in 2021. Storage of the drinking water deep underground in pre-Cambrian bedrock, coupled with the massive increase in security of source water, has made Turku's drinking water considerably more resilient to future climate change than it was before, even though this was not a main goal of the original investment. Moreover, the system combines climate change adaptation with mitigation – it is entirely self-sufficient in electricity for its functioning, through the use of solar PV and hydro power at the collection station.

The drinking water system is complemented by investment by Turku Region Wastewater Treatment Ltd in a new wastewater treatment plant, which sits at the top of worldwide rankings in terms of results and efficiency. In addition to treatment and cleansing of wastewater, the plant recovers energy from the sludge generated and uses heat from the treated wastewater in district heating and cooling for the city. Again, location of the facility deep underground in the bedrock allows it to be located in the centre of Turku and safe from possible increased flooding resulting from climate change in the future.

These new drinking water supply and wastewater treatment systems are highly advanced technologically. An additional benefit for Turku is that its water management expertise is becoming increasingly valued on world markets as a result.

Source: Turku Water Company interview and slides and UNESCO (2021) https://www.epressi.com/tiedotteet/kaupungit-ja-kunnat/turku-shares-its-water-expertise-on-world-water-day-on-22-march-2022-in-dubai.html)

Beyond the domains already mentioned, CCA is not an explicit target in Turku's various sectoral plans. Nevertheless, CCA measures can be accommodated within, for example, the Turku biodiversity strategy, Turku Forest Plan, Turku Building Order, Turku Green City Accord and Green Network Plan. A first report produced under the RESIST project highlights the need for an implementation plan for Turku's CCA intentions under its Climate Plan. In the City's spearhead projects[46] – i.e. politically important major projects - City departments work together constructively, but none of these projects target CCA directly.

The University of Turku is engaged in multidisciplinary research on the costs and benefits of CCA investments to combat urban heating in relation to human health. Turku University of Applied Science and Syke are active in subjects related to CCA. The former highlighted the potential for more innovative public procurement approaches to encourage CCA mainstreaming. In this context, the introduction of public procurement criteria to favour enhancement of ecosystem services will be tested under the RESIST project.

3.4 Increasing breadth and depth of stakeholder involvement

[46] City of Turku (2022b)

In Finland generally, there is a high degree of openness for stakeholder participation and co-creation in public policy design and implementation. The Southwest Finland Region reflects this openness in the way it orchestrates dialogue between public and private sector partners and civil society actors on Climate issues. Relevant examples can be seen in the Region's participation in the current LIFE 'CANEMURE' and Interreg Baltic Sea 'We make transition' projects. The latter uses the Transition Arena method to build stakeholder consensus around transition pathways. These examples focus mainly on climate change mitigation, rather than CCA, but the approach could also be used for different aspects of CCA. Certain barriers exist to full participation of farmers in such dialogues, due to tensions around nutrient pollution of rivers and the Archipelago Sea. There is also a need to increase participation by land owners.

The City of Turku introduced a structure of working groups for preparation of its Climate Plan 2029, one of which is focused on CCA. These working groups continue to function for implementation, planning and monitoring of actions carried under the Plan. Broader involvement of citizens in CCA activities is nevertheless more challenging. New participative approaches in this regard will be tested under the EU Mission CCA RESIST project, as well as through the use of dedicated digital tools under the Urban Biodiversity Parks project, designed to promoting local ownership and enhanced learning. The City has strong links and particularly good cooperation with its higher education institutions, which are actively engaged in CCA-relevant research. However, CCA also does not currently significantly feature in basic education and vocational training curricula. Private companies remain less enthusiastic about becoming involved in CCA activity, due to a lack of compelling CCA business cases made so far.

The Region of Southwest Finland places cooperation with stakeholders high on the agenda, but CCA has not yet been a main focus of participatory processes in the region. Nevertheless, under the Regional Sub-Committee on Civil Society, there is an ongoing dialogue on the potential role of civil society associations in climate change mitigation activity and CCA. The Region's participation in the LIFE project CANEMURE[47] involves experimenting with regional cooperation groups - including businesses and residents, together with public authorities – in the production of roadmaps for climate change mitigation. Such experience with bottom-up activation of stakeholders at regional level could be useful for CCA roadmaps.

Under the Interreg Baltic Sea project 'We make transition' 2023-2025, public authorities work on social and ecological initiatives with civil society bodies to co-create changes in the areas of consumption, mobility, energy and social life[48]. The project uses the Transition Arena co-creation process as a method and is expected to also develop a tool for municipalities to implement the discussion with civil society actors (Box 4).

Box 4. Transition Arena method experimented in Southwest Finland

Under the Interreg Baltic Sea project 'We make transition' 2023-2025, the Regional Council of Southwest Finland is cooperating with foreign partners in adapting the Transition Arena method to support collaboration in sustainability work between local authorities and local civil society bodies. It is a method for creating a vision for a specific system's sustainable future and building a path to turn the vision into reality. The topic for a transition arena can be any aspect of building a more eco-

[47] https://hiilineutraalisuomi.fi/en-US/Canemure

[48] https://interreg-baltic.eu/project/we-make-transition-interreg-baltic-sea-region/

socially sustainable world, for example the role of civil actors in greening a city's energy system or bringing about circular economy.
The method was originally developed by the Dutch Research Institute for Transition. It is centred around a series of workshops, includes also preparatory steps beforehand and collaborative and reflective sessions after the workshops. In a nutshell, the method aims to give space and resources to visionaries and by bringing together those who are personally committed to sustainability and innovate new practices, with more conventional societal developers and those who can institutionalize new practices via local government.

Source: https://varsinais-suomi.fi/en/new-tools-for-collaborative-sustainability-work-between-municipal-organizations-and-civil-society/

The regional experiences reflect the generally strong traction which new methods of participation and co-creation with partners have gained in Finland overall. Certain societal tensions nevertheless persist in the region, notably with farmers, who face criticism in relation to nutrient pollution levels in rivers and in the Archipelago Sea. This hampers the participation of farmers in dialogues around CCA issues. Fragmented ownership of land emerges as another barrier to effective CCA dialogue. There is a need to bring land owners closer together in this context.

As regards the City of Turku, the formation of working groups for the preparation of different aspects of the Climate Plan was a new development introduced for the 2022 Plan compared to the previous version. One of these working groups concerns CCA. It includes City officials and Valonia, researchers and experts, but so far not NGOs. Even though the Climate Plan has been completed, the working group structure has remained, with the groups still meeting regularly to feed into implementation, planning and annual reporting. The results of a research project at Åbo Akademi University published in 2019 recommended a more ambitious approach for Turku's Climate Plan involving, '*citizen facilitated public participation steering group that aims to inspire citizens towards taking action and engaging in the decision-making process for a carbon neutral 2029*"[49].

"Reinforcing the sense of community is excellent preparedness for exceptional situations. Not only the significance of citizens but also the significance of associations for the sense of community has been recognised in Turku"

Source: (City of Turku, 2022)

The City is keen to encourage meaningful and effective involvement of citizens in CCA processes, but this is proving difficult. Some experiments with gift cards for citizen participants have nevertheless been moderately successful. Under the RESIST[50] project, activities in and around Turku will take place in three demonstration sites in total, where different groups of actors will be mobilised. In the urban district Rauvolanlahti residents, recreational users, a club for small-scale farming, and potentially residential clubs and birdwatchers will be involved. Additionally, the regional partners plan focus group discussions with vulnerable groups that cannot easily access surveys, such as young children and elderly people. The concerned actors in the industrial demonstration site Oriketo are local companies and the regional ELY Centre. In the more rural demonstration site near the Savijoki river, the main stakeholders are farmers and forest owners,

[49] (Jetoo, 2019)

[50] https://resist-project.eu/regions/southwestfinland/

as well as citizens and the ELY Centre. The EUI Urban Biodiversity Parks project will also involve citizens directly in planning, implementation and monitoring. Dedicated digital tools for the project, including mobile apps that enable crowdsourcing environmental data and promote 'citizen science' approaches, will enhance local ownership of park areas and contribute to the project's learning dimension.

Turku enjoys good connections and cooperation with the Universities and other higher education institutions, as well as with companies in the framework of the Climate Plan. Mostly this is in relation to mitigation rather than CCA. Specifically for companies, difficulties were identified during the research in making a sufficiently convincing business case for CCA for them to become actively involved. For example, the climate roadmaps prepared in the framework of the NAP for companies in different sectors, relate only to mitigation, not to CCA. Limitations in CCA-related education and skills were also highlighted. Turku University of Applied Science proposed introducing CCA into the curricula of schools and vocational training courses for farmers in this regard. The importance of maintaining simplicity in CCA solutions - for example rain gardens purchasable in normal garden centres - was also emphasised to boost widespread take-up of and engagement in CCA by citizens.

3.5 Setting up effective multi-level governance models

There is insufficient connection between the governance of national and local CCA strategies in Finland to enable effective integrated CCA implementation. In sectors where existing regulations have a multi-level character – such as water management, flood protection, land use and transport planning – CCA can use the frameworks in place, but this is less straightforward in other sectors. The problem is compounded by the recent withdrawal of the regulatory obligation, by the national Government, for climate strategies with CCA elements to be put in place by Municipalities and other sub-national bodies. There is also fragmentation of CCA-relevant responsibilities within the regions, especially since the creation of the new Wellbeing Services Counties to oversee health, social and rescue services – all relevant for CCA - on top of existing structures, with territorial definition different from NUTS 3 regions. It is too early to determine how far this situation can be helped by the recently enhanced role of the ELY Centres to support CCA implementation.

The presence of the regional agency Valonia has strengthened cooperation between Municipalities within Southwest Finland, which voluntarily commit to develop on Climate Plans, with recent emphasis on the region's smaller Municipalities. The City of Turku remains the main driving force of coordination on climate action with its immediately neighbouring Municipalities. Most of these activities focus on climate change mitigation, rather than CCA specifically, but attention on CCA is growing. There would appear to be scope to reinforce the power of the Regional Council as intermediary between National and Municipal levels on CAA.

Finland's NAP developed at national level is not very well connected with CCA strategies formulated at local level. One area of action in the 2022 version of the NAP is 'Regional and Municipal Risk Management', yet national support for CCA strategies at sub-national level has recently weakened. The 2022 Climate Act was to be revised to oblige Municipalities to prepare Climate Plans with an examination of CCA needs and measures. However, Finland's new national Government elected in 2023 has announced that it will suppress this obligation. Municipalities that do prepare Climate Plans with CCA elements do so on a voluntary basis – mainly these are the larger cities. This situation has further weakened an already patchy national-local vertical coordination on CCA. In fields where legislation requires planning at different levels – such as water management, flood protection, land

use and transport planning - procedures already exist for interaction between different levels, which can also serve CCA. However in other fields covered by CCA strategies at the different levels, this interaction is less easy[51].

The existence of different functional regions in addition to the administrative NUTS 3 regions and Municipalities, such as the recently introduced Wellbeing Services Counties mentioned earlier, local Environment Protection Agencies and Security Regions, present a fragmented picture of territorial responsibilities. This does not appear conducive to supporting an integrated approach to CCA. It is too early to say how much of a positive impact the appointment of CCA experts to the ELY Centre network might have on these apparent shortcomings in multi-level governance of CCA.

> *"At regional level coordination on climate adaptation is difficult due to diversity of the subject with many actors and complicated interlinkages."*
>
> Source: Interviewee at Turku City

The NUTS 3 regional level has relatively modest powers in its own right and does not provide a full coordination of these disparate elements. The role of the Regional Councils is more one of fostering cooperation between municipalities. In this regard, Southwest Finland is in a stronger position than most Finnish regions, thanks to the activities of its regional-level agency Valonia. One example of Valonia's work in this respect is the assistance it provides to five of the smaller Municipalities in Southwest Finland which have committed voluntarily to developing Climate Plans. With funding from the Ministry of the Environment's Municipal Climate Solutions programme, Valonia supports joint planning processes of these Municipalities. Valonia's experts will also help in the long term to initiate measures and to identify available financing for the implementation each participating Municipality's Plan. This activity is mainly focused on mitigation but issues related to CCA can also be covered[52].

On climate change mitigation, Municipalities cooperate at national level through participation in national networks such as the Hinku[53] network (Figure 4). Hinku brings together Municipalities, regions, businesses and citizens with experts to create and implement solutions to reduce emissions. For example, the Kuntanielu[54] (Municipal sink) project allows Municipalities to increase the net carbon sink of the land use sector and creates a basis for Municipal-level offsetting.

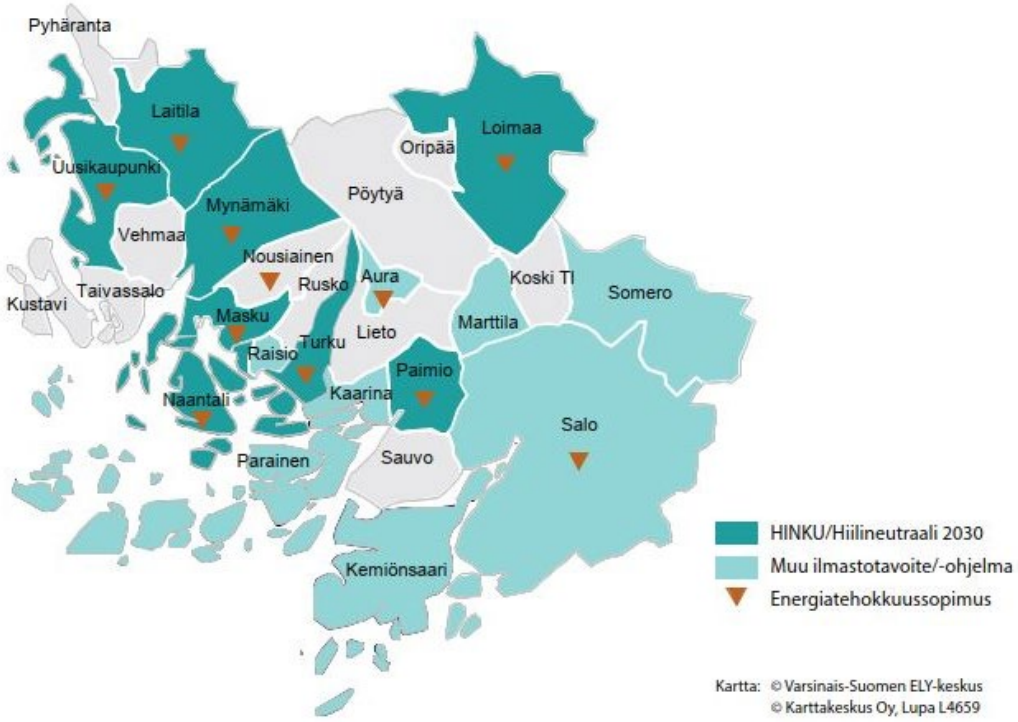
Figure 4. Map of Municipalities' green transition commitment in Southwest Finland

[51] (Hildén et al., 2022) page 49

[52] https://valonia.fi/uutinen/pienissakin-kunnissa-halutaan-tehda-aktiivista-ilmastotyota/

[53] https://hiilineutraalisuomi.fi/en-US/Hinku

[54] https://www.turku.fi/en/kuntanielu



Source: https://ymparistonyt.fi/varsinais-suomen-kuntajohdolle-suunnatussa-ilmastoseminaarissa-keskustelu-kavi-vilkkaana/

Turku City has been the main driving force in joint Climate Planning with its most immediately neighbouring urban Municipalities. Here, the Regional Council has played more the role of observer. The City considers the degree of cooperation achieved so far on climate action with these neighbouring Municipalities to have been an important success.

3.6 Making room for experimentation

Turku demonstrates creditable involvement in experimentation on CCA solutions through many relevant examples, most of which are observed under EU projects. The City and Southwest Finland's participation, through Valonia, in the EU Mission CCA RESIST project presents a particularly important opportunity for dedicated experimentation on NbS in different settings. Three demonstration sites for such experiments have been established in and around Turku. RESIST will also use innovative digital twin technology to enhance the value of experiments undertaken on different CCA solutions. Overall, Turku's CCA experimentation remains predominately in the field of water management, with little focus so far on other areas of CCA. Although the experimentation is welcome, there is also an emerging danger of over-emphasis on piloting, at the expense of scale-up and mainstreaming of promising CCA solutions.

The City of Turku is visibly open to experimentation on CCA solutions and makes room for it, as evidenced by many of the EU-funded project examples already mentioned. In the 2014-2020 period under Interreg Baltic Sea, various experiments in water management have taken place, for example, in the Interactive Water Management (IWAMA) project and through the BSR WATER Platform for Integrated Water Cooperation . As regards the current 2021-2027 phase, the EU Mission CCA RESIST

project, with its three demonstration sites in and around Turku, is all about experimentation with NbS in different situations, from planning and management as well as from technical points of view. Valonia, as Southwest Finland's main interface with RESIST, has the necessary agility to set up and steer innovative activity of this kind. RESIST will use digital twin approaches to enhance the value of the experiments undertaken (Box 5).

Box 5. Experimenting on CCA solutions using digital twins under the RESIST project

The Mission CCA project RESIST has a strong focus on water management challenges in different types of territories, urban, industrial, rural. As part of Southwest Finland's involvement in the project through Valonia, three demonstration sites have been established in and around Turku. RESIST will pilot the use of digital twins in modelling how different climate change scenarios will impact societal and environmental systems in the real world. These digital models and predictions will then help the development of more effective, targeted and financially-sound climate solutions and strategies. Through the work of its 12 participating regions, RESIST aims to develop 100 innovative CCA solutions. Digital simulation will allow for rigorous testing of these solutions, ensuring that stakeholders can engage with them throughout the process, as well as avoiding unnecessary costs and undesired outcomes when applying them in the real world.

Source: https://resist-project.eu/regions/southwestfinland

Commentators nevertheless point to the danger of a dominance of short-term pilot-type projects in CCA at the local level in Finland, cautioning that, *'continuity, and monitoring of activities, as well as learning and knowledge sharing, have often been left unsecured*"[55]. This view is borne out by Turku City officials' previously mentioned observations that it is considerably easier to obtain funding for pilots than for scale-up and mainstreaming of CCA solutions. For Turku, continuity is nonetheless visible in the example of the Blue-Green Factor planning tool, which was developed under the ERDF Climate-Proof City (ILKKA) project, tested under the INTERREG project i-Water, then updated and applied under the LIFE-IP project CANEMURE[56].

At this stage, Turku's experimentation with CCA solutions reflects a mainly incremental rather than radical innovation approach. Also the overwhelming focus remains on water management, with little venturing into other areas of CCA so far. Under the EUI Urban Biodiversity Parks project, experiments are planned beyond the main park area to determine the viability of biodiversity measures on much smaller urban sites. However this is a relatively isolated example of experimentation outside of the water management field.

[55] (Hildén et al. 2022) p.83

[56] See details and references in Chapter 2

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

Finland has not been affected greatly by climate change to date and public awareness of the need for CCA in the country is generally low. However, CCA awareness among public authorities is growing – helped by the adoption of the 2022 version of the NAP and reports of Finland's Climate Change Panel. There is substantial relevant research on CCA undertaken at the national level, including the HERCULES project on climate and health led by the University of Turku. The national Climate guide website, building on an earlier EU LIFE project, makes comprehensive research-based CCA-relevant information available to practitioners. The City of Turku also implements its own research programme in partnership with local universities and other research institutes, which, although not currently focused on CCA, could include CCA topics. The recent independent review of CCA in Finland nevertheless identifies substantial shortcomings in the knowledge base – principally in terms of the lack of quantified CCA indicators in the NAP and the practical applicability of available data for implementation of CCA solutions at regional and local levels.

The City of Turku stands out from other Municipalities in the region by having its own dedicated Green Transition Team, although it is focused largely on mitigation, including Turku's participation in the EU Mission '100 Climate Neutral and Smart Cities by 2030'. The Team only has only one full-time equivalent person working on CCA at present, which does not seem adequate given the City's ambitions. There are high expectations of the EU Mission CCA Implementation Platform which has already provided some expert support for methodological development. Valonia provides limited capacity building assistance to Municipalities in the Southwest Finland region for implementation of their Climate Plans. The new CCA Unit of the ELY Centres is expected to provide additional capacity – although at 12 experts to cover 15 regional Centres around the country, this too will be limited.

3.7.1 Awareness and understanding of CCA

The impacts of climate change have so far been relatively minor in Southwest Finland compared to other European regions further south. General public awareness of the need for CCA is consequently comparatively low overall – for many it does not go beyond the welcome prospect of living with warmer winters. The risk of water shortages as a result of drought has nevertheless been extensively covered in the local media and there is growing understanding in the region of the linked imperative of leaving more room for nature in and around urban areas. Public communication on climate issues in Finland has so far mostly focused on mitigation, so awareness is also much higher for mitigation than CCA. Awareness of the need for CCA is nevertheless rising, particularly among public authorities. The adoption of the new NAP in 2022 has contributed to this trend. The Government submits an Annual Climate Report to the Parliament, which includes an evaluation of NAP implementation during the year in question. In addition, the Finnish Climate Change Panel[57] brings together high-level researchers and supports

> *"Adaptation is a rising theme in many Regional Councils, and the work will increase in the future"*
>
> *"When talking about adaptation, only bad outcomes are seen and it would be good to try to take into account not only the risks but also the opportunities"*
>
> Source: (Hildén et al,. 2022) p. 63, 66

[57] https://www.ilmastopaneeli.fi/en/

dialogue about the key issues of climate policy, including CCA through its expert reports and statements"[58]

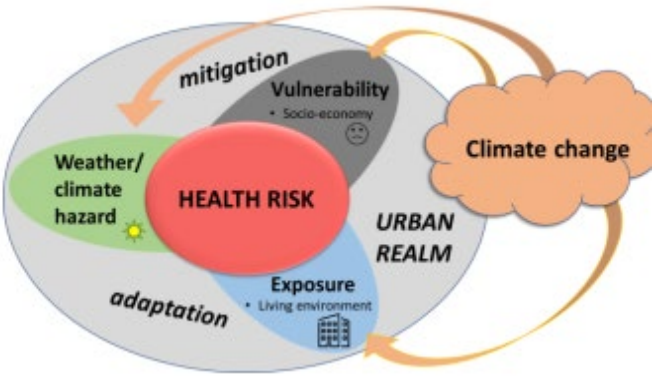
3.7.2 Knowledge base for CCA

The national risk and vulnerability assessment studies underlying successive versions of the NAP were funded by the Government in 2015-2016, 2017-2018 and most recently in 2020-2022. The latter, the SUOMI project[59] of the Finnish Climate Change Panel, explored the state of adaptation action and related strategies in the regions and collected information on the temporal and local impacts of climate change[60]. Another recent report by the Climate Change Panel[61] examines the impacts of a warming climate on the production of public goods, such as national defence, health and ecosystems. One of the findings of this scientific work is that, due to urban warming, cooling systems are likely to be needed in nearly 100% of the housing stock in Helsinki and Turku. The recently completed HERCULES project on climate and health[62], led by the University of Turku, examines how the spatial pattern and intensity of health-relevant climatic hazards have changed since the 1980s, predicting also how these might change during the coming decades, in particular in urban areas (Box 6).

Box 6. University of Turku leading policy-relevant research on impacts of heat on health

The HERCULES project 2020-2023, funded by Academy of Finland, was led by a consortium of researchers from the University of Turku, the Finnish Meteorological Institute and the University of Helsinki. The project covered the whole of Finland, with focus on the six largest cities, including the City of Turku which was associated to the project. To ensure a multi-disciplinary perspective at the University of Turku, two laboratories were involved: the Laboratory of Geography and the Public Health Laboratory.

The overall goal was to provide actionable knowledge about climate related health risks. A key expected result is better understanding of how urban development, including climate policy, drive vulnerability and exposure, as well as how adaptation can be used to alleviate undesired transformations.



[58] (Hildén et al., 2022) p. 20

[59] https://en.ilmatieteenlaitos.fi/suomi-project

[60] (Gregow et al., 2021)

[61] Finnish Climate Change Panel (2023b)

[62] https://sites.utu.fi/hercules/

Source: The HERCULES project (https://sites.utu.fi/hercules)

- HEATCLIM[63] at the University of Eastern Finland, funded by Academy of Finland programme Climate change and health – CLIHE (2020–2023)[64], which studies the effects of high summer-time temperatures on human health, as well as cost-effective and socially acceptable CCA solutions.
- KUITTI[65], led by the Finnish Meteorological Institute, which conducted an assessment of the direct and induced cost of climate change risks for Finland for different levels of CCA.
- FINSCAPES at Syke[66], which is developing new integrated scenarios of socioeconomic and climate change during the 21st century for use in climate change research and policy making in Finland.

In addition, the national Climateguide.fi website[67] provides reliable, research-based information about climate change, its impacts, mitigation and CCA. The website is maintained and continuously updated by the Finnish Meteorological Institute, the Finnish Environment Institute, and Natural Resources Institute Finland. It was originally created from an EU LIFE project in 2009-2011.

The City of Turku has its own research programme and provides funding for post-graduate programmes on urban sustainability (Box 7). The City has a long history of cooperation with the University of Turku and Turku University of Applied Science, with many co-authored papers published. These universities have strong research capacities, notably in water management, also attracting expertise from outside Finland through their participation in EU projects and networks. The University of Turku has unique expertise with historical time-series data on measurement of climate data. Turku University of Applied Science delivers education programmes in energy and environmental engineering, with CCA integrated in the curricula. Turku City also collaborates with key national research institutes, in particular the Natural Resources Institute Finland, the Finnish Environment Institute, and other Finnish Universities.

Box 7. Turku Urban Research Programme

The Turku Urban Research Programme, launched in 2010, is a research collaboration and knowledge-brokerage initiative between the City of Turku, the University of Turku and Åbo Akademi University, also involving co-operation with other universities and research institutes. By funding multi-disciplinary research projects and Master's theses, the City of Turku gains policy insights, while the universities benefit from regional engagement and strengthening of urban scholarship, through projects with both academic and practical relevance. The research programme follows Turku's strategic priorities. It focuses on urban development and urban governance topics, ranging thematically from economic development to social policy, and from urban planning to democratic innovations. Unlike carbon neutrality and circular economy, CCA has not been singled out as a specific research topic so far, but CCA research can potentially fit into several of the City's priorities. While the researchers are expected to publish in peer-reviewed academic journals, the programme

[63] https://sites.uef.fi/heatclim/

[64] https://www.aka.fi/en/research-funding/programmes-and-other-funding-schemes/academy-programmes/climate-change-and-health-clihe-2020-2023/

[65] https://en.ilmatieteenlaitos.fi/kuitti

[66] https://www.syke.fi/projects/finscapes

[67] https://www.climateguide.fi/frontpage/

supports the dissemination of the results to practitioner audiences. Since 2010, the City of Turku has been involved in and funded – either fully or partially – more than 100 research projects of strategic importance for the City. In 2018, an external evaluation praised the success of the Turku Urban Research Programme in building a permanent bridge between the city and the universities.

Source: https://www.turku.fi/en/turku-urban-research-programme

Despite this sizeable catalogue of relevant CCA research at national level in Finland, as well as in Turku, monitoring of CCA activity remains problematic. In particular, the NAP lacks quantified targets and indicators of effectiveness. In addition, the 2022 independent review of CCA in Finland identifies, *"differences in consistency and risk assessments in sector specific adaptation strategies"*[68] in the framework of the NAP. The review also notes that "*the lack of high-resolution regional and local climate data complicates adaptation planning and increases uncertainty*" [69]. This, coupled with a shortage of more concrete and applied research on developing CCA solutions and assessing their effectiveness[70], points to a need to enhance the practical dimension of the CCA knowledge base.

3.7.3 Strategic capacity

The City of Turku is somewhat exceptional among Municipalities in Southwest Finland for having a dedicated Green Transition Team in place. The annual report made by the Green Transition Team to the City Council of Turku emerges as a key good practice. However, the Team is small and not all of its posts are full-time. In fact there is only one full-time equivalent staff member working on CCA at present, which makes the City's capacity vulnerable. Given the relative newness and generally underdeveloped understanding of the CCA theme, this does not seem adequate. As noted in Turku's Climate Plan itself, "c*onsolidating the overall view of adaptation measures and coordination, and securing sufficient expertise and resources in city services remain extensive challenges*"[71]. The City needs to make extensive use of consultancy services help with assessment of its work on CCA.

Support from EU Mission CCA Implementation Platform (MIP4ADAPT)[72] has been allocated, in the form of 23 expert days, to support the development of methodologies for establishing transformative pathways towards climate resilience. These include the identification of appropriate climate adaptation demonstration projects and the accessing relevant funding, as well as support for stimulating the mobilisation and engagement of citizens and stakeholders. Under the RESIST project, an initial report produced centrally by experts in the consortium points to a need for "*bridging the gap between existing individual measures and establishing a long-term cross-sectoral adaptation strategy*"[73]. The new CCA Unit of the ELY Centres is expected to make an important contribution to available expertise, but this only amounts to 12 experts to be distributed across 15 regional Centres. Valonia recently began implementation of a new project 'From words to deeds' to help build capacities in selected Municipalities in the region for implementing their Climate Plans (Box 8).

[68] Finnish Climate Change Panel (2023b)

[69] (Hildén et al., 2022) p. 83, 85

[70] (Hildén et al., 2022) p. 83, 58

[71] (City of Turku, 2022) p.59

[72] https://climate-adapt.eea.europa.eu/en/mission/the-mission/about-mip4adapt

[73] (RESIST, 2023)

Box 8. 'From words to deeds': supporting implementation of Climate Plans at Municipal level in Southwest Finland

Valonia assists the implementation of the Climate Plans of the Municipalities of Southwest Finland through a new project 'From words to deeds', which started in November 2023 and lasts until September 2024. The project offers support for planning and monitoring of Municipal climate measures, help with reaching companies and residents, and networking opportunities with others working on climate matters.

'From words to deeds' provides senior officials, decision-makers and other actors with information on the benefits of climate work for Municipalities. The materials and tools produced are published on Valonia's website for everyone to use. The project organises a joint 3-part training for the senior officials and decision-makers of 4–6 Municipalities to strengthen the implementation and management of their Climate Plan. The training focuses on the responsibilities and management of climate work, budgeting and monitoring, impact assessment and communication. All Municipalities engaged in climate work are offered cooperation, support and information related to:

- Reaching out to companies and tools for climate work.
- Accelerating Municipal residents' climate work and communication.
- Monitoring and budgeting.

Source: https://valonia.fi/hanke/sanoista-tekoihin-kuntien-ilmastosuunnitelmien-jalkautus/

4 Conclusions

The City of Turku represents a good example of a territory with many success conditions in place for transformative Climate Change Adaptation. However Turku needs a boost to accelerate the translation of its sound intentions and valuable, yet limited, experimentations into concerted and effective action to set up a pervasive and more radical trajectory towards a more resilient territory.

Turku is already a frontrunner in climate change mitigation, with strong City leadership, a powerful narrative and a convincing presence in national, Nordic and EU networks. Mitigation has so far enjoyed considerably greater weight in the City's green transition investment than CCA, but Turku is well poised to deliver effective CCA. This assessment identified no specific resistance to Turku's substantially increased engagement in CCA, as well as numerous assets to exploit in this direction. A major asset for Turku is the strong connection between public authorities and research, facilitated by City authority's own involvement in research activity. This can be used to expand the contribution of research to the design of innovative CCA solutions. The proven ability to make smart use of a range of EU funding opportunities is another strong asset, which makes Turku visible on the EU map and well positioned to access knowledge from other territories. Available funding is generic and can accommodate CCA investment, even if it not specifically geared to promoting CCA by name. Ongoing climate mobilisation efforts by stakeholders and citizens can be broadened to incorporate the adaptation dimension. The Southwest Finland Region and its agile agency Valonia play a positive role in supporting Turku's strategy and its value added in the larger region.

A new momentum has emerged recently thanks to the use made by the City and the Region of their participation in the EU Mission CCA. Notably, this has been instrumental in bringing about reinforcement of ELY Centres in the field of CCA, as well as providing capacity building support through the Mission's Implementation Platform. The RESIST project under the Mission is helping to increase awareness in regional public bodies on CCA, encouraging experimentation and interregional peer learning on transformative approaches to climate resilience.

The relative invisibility of CCA nevertheless remains a key problem. Compared to mitigation, CCA is somewhat hidden in Turku's Climate Plan, lacking in meaningful indicators and quantified targets as well as in 'Action Cards'. CCA is also under-emphasised in implementation structures, crucially including the City's Green Transition Team. While Turku's pragmatic, project-based approach on CCA is commendable and is achieving some concrete results, an overarching vision of what a resilient Turku would entail is not yet there. The City needs a more explicitly mobilising CCA goal. The business case for CCA has not been convincingly made to private sector operators and the multiplicity of functional regions does not facilitate progress towards an integrated deployment of CCA. Governance issues need to be addressed in this regard. The role of different regional bodies is yet to be fully clarified for CCA and appropriate structural capacities have largely not been established beyond project-based tasks, while regulatory incentives have been weakening. The CCA part of Turku's Climate Plan is broad in its intentions, however in practice action is restricted to water management and climate-proofing of infrastructures under direct control of the City's water and energy companies. Heat and drought were added as major threats to the latest version of the Climate Plan, but these have not yet been translated substantively into CCA action. Turku still has work ahead to achieve a stronger shared vision of what CCA really is, as different levels of understanding still prevail in different circles.

Today, Turku's CCA approach is too fragmented through its short-term project basis and too incremental. It lacks the kind of shared vision on CCA necessary to move forward with systemic changes. The following pages highlight some 'low hanging fruit', as well as more challenging steps Turku and the Southwest Finland region as a whole would need to take to embark upon a more ambitious, radical trajectory towards transformative CCA, which measure up to their acknowledged climate change mitigation ambitions.

> *"In adaptation policy, time is money"*
>
> *"The estimated time scale of the natural effects of climate change is long, but the speed of development can surprise"... "The costs of poor adaptation can be high – and Finland cannot afford that"*
>
> Source: (Finnish Climate Change Panel, 2023a)

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 City of Turku and Southwest Finland Region move towards more of a Transformative Innovation approach to CCA.

1. Directionality

Despite Finland's pioneering approach in defining its first National Adaptation Strategy (NAS) far in advance of other EU Member States, the goals of the most recent version of its National Adaptation Plan (NAP) remain relatively general and lack quantified targets by which CCA achievements, including improved adaptive capacities, could be judged. National innovation policy and the Southwest Finland Smart Specialisation Strategy 'RIS3' are predominantly focused on competitiveness and economic growth, rather than societal challenges. Strategic directionality for a genuinely transformative type of CCA therefore appears somewhat insufficient at the national level. Turku's new Climate Plan 2029 has stronger emphasis on CCA than its previous version, but the CCA goal at this level is not explicitly articulated or quantified either, and the co-benefits of mitigation and adaptation are under-emphasized.

At the level of Southwest Finland, the Regional Council is responsible for orchestrating climate action, but again the main focus is on mitigation rather than CCA. Valonia, the public regional sustainable development agency and part of the Regional Council, is active in RIS3 processes and appears as a valuable partner in climate-related activity and coordinates the Region's participation in the EU Mission on CCA's RESIST project. The ELY Centres, which deliver a range of national policies in Finland's regions, are establishing a special CCA Unit which will ultimately see experts in CCA attached to the different regional centres, including Southwest Finland. Unlike most smaller Municipalities, the City of Turku has a dedicated Green Transition Team. This Team acts mainly as a locus for mitigation activity, but also increasingly for CCA, in Turku and the surrounding area, in partnership with Valonia, the ELY Centres and other relevant bodies.

Possible ways forward:

- Engage in a scenario-building exercise around 'resilient Turku', possibly using the 'transition arena' method currently experimented in the region (Box 4). Vision-creating efforts should emphasise the positive aspects of CCA beyond risks and threats, in order to raise business interest in CCA solutions.
- Build on the successful branding of Turku as a dynamic city on its way to become carbon-neutral in 2029, by adding an explicit goal of Turku as a resilient city. Capitalise on strong

city leadership focused on 'green' future and exploit co-benefits from linking mitigation and adaptation measures, or contributing to other goals such as food security.

- Encourage broader consideration of CCA dimensions in the Entrepreneurial Discovery Processes (EDP) across Southwest Finland's RIS3 priority areas of innovative food chains, blue economy, life science and health technology – capitalising, where appropriate, on Valonia's pivotal role in the EU Mission on CCA RESIST project.

2. Articulating instrument portfolios and defining synergies between funding sources

Domestic funding channels for climate action and R&I can, in principle, accommodate CCA projects in and around Turku, but none is specifically dedicated to CCA. Much depends on the existence of good quality proposals. Funding for pilots is more easily accessible than funding for upscaling solutions with a long-term perspective. CCA work has therefore become largely project-based, which appears somewhat at odds with an ambition to build robust lasting pathways towards resilience.

In this context, the City of Turku demonstrates an impressive ability to combine different funding sources to implement CCA actions. The City makes good use of EU Funds from Cohesion Policy, as well as from the LIFE and Horizon programmes, to finance CCA-relevant actions. Highlights include: ERDF projects from the 2014-2020 period: 'Climate-Proof City' (ILKKA) and INTERREG 'i-Water'; and the Horizon Europe 'RESIST' project under EU Mission CCA. Turku is also currently involved in several other EU projects for which CCA is not the main goal, but a welcome by-product.

Possible ways forward:

- Establish a national public funding line with distinct CCA thematic objective, which can be used by sub-national authorities to prepare CCA elements of Climate Plans and finance CCA investments under adopted Climate Plans.
- Set up a national system ('tagging') to track CCA-relevant expenditure integrated into different policy fields to help build up a picture of public funding volumes going to CCA. It is accepted that there would be difficulties inherent in such a system, in terms of attributing proportions of wider and more complex investments to CCA, but work should start to establish suitable proxies to support estimation methods, which could ultimately be standardised.
- Define CCA as a theme for large-scale projects funded, for example, by the Strategic Research Council of Finland, or through other research funding instruments.
- Broaden the use of the CCA component of the EU Taxonomy for Sustainable Activities in public investment based on Turku's experience as a good practice case.

3. Ensuring cross domain synergies

Governance structures relevant for CCA at the national level appear fragmented with three ministries responsible for different strategic frameworks. Mainstreaming of CCA at national level is happening at different paces in different domains. An inter-institutional monitoring group for the NAP at national level promotes cooperation between different sectors, but coordination between the sectors is reportedly not strong. CCA provisions have been built into national regulations on building and land use, as well as into certain strategies, notably for water use management. However, CCA mainstreaming in Finland is not yet a reality for all domains potentially affected by climate change.

Turku highlights climate risks for a wide range of sectors in its Climate Plan, but the City's CCA interventions have so far been mainly limited to water management, climate proofing of

infrastructures and expansion of green infrastructure. Key investments undertaken by the City to substantially improve drinking water supply and wastewater treatment have had strongly positive CCA impacts, even though CCA was not among their principal objectives. It can also be difficult to distinguish between maintenance and CCA in the case of work undertaken on other infrastructures. The initial stages of Turku's involvement in the RESIST project, under the EU Mission CCA, have highlighted the need for broadening CCA action across different domains. However, mainstreaming CCA beyond water management and infrastructure remains challenging. The University of Turku has undertaken interdisciplinary research on health impacts of increasing urban heat, but this is a relatively isolated case. Turku University of Applied Sciences is involved in action by local authorities to pilot new CCA-related criteria in public procurement under the RESIST project.

Possible ways forward:

- Add a requirement to address CCA in the climate roadmaps prepared in the framework of the NAP for companies in different sectors, to help build the business case and stimulate demand for innovative CCA solutions[74]. At regional level, encourage actors involved in RIS3 to collaborate and participate in this national-level exercise, bringing place-specific expertise when relevant.
- In the framework of Turku's Climate Plan, support the development of 'Climate Action Cards' for CCA related to the different risk areas identified, similar to those established for mitigation topics.
- Develop and deploy CCA-related criteria in public procurement across all domains covered by the NAP and sub-national Climate Plans.
- Develop and implement plans for introducing CCA topics in basic education and vocational training curricula for different sectors.

4. Increasing breadth and depth of stakeholder involvement

In Finland generally, there is a high degree of openness for stakeholder participation and co-creation in public policy design and implementation. The Southwest Finland Region reflects this openness in the way it orchestrates dialogue between public and private sector partners and civil society actors on Climate issues. Relevant examples can be seen in the Region's participation in the current LIFE 'CANEMURE' and Interreg Baltic Sea 'We make transition' projects. The latter uses the Transition Arena method to build stakeholder consensus around transition pathways. These examples focus mainly on climate change mitigation, rather than CCA, but the approach could also be used for different aspects of CCA. Certain barriers exist to full participation of farmers in such dialogues, due to tensions around nutrient pollution of rivers and the Archipelago Sea. There is also a need to increase participation by land owners.

The City of Turku introduced a structure of working groups for preparation of its Climate Plan 2029, one of which is focused on CCA. These working groups continue to function for implementation planning and monitoring of actions carried under the Plan. Broader involvement of citizens in CCA activities is nevertheless more challenging. New participative approaches in this regard will be tested under the EU Mission CCA RESIST project, as well as through the use of dedicated digital tools under

[74] This is a suggestion in (Hildén et al., 2023) p. 117

the Urban Biodiversity Parks project, designed to promoting local ownership and enhanced learning. The City has strong links and particularly good cooperation with its higher education institutions, which are actively engaged in CCA-relevant research. However, CCA also does not currently feature significantly in basic education and vocational training curricula. Private companies remain less enthusiastic about becoming involved in CCA activity, due to a lack of compelling CCA business cases made so far.

Possible ways forward:

- Review the success of techniques for stakeholder and citizen participation piloted under different EU projects - CANEMURE, We make transition, RESIST and Urban Biodiversity Parks etc. - broadening deployment of the most effective ones in subsequent CCA actions.
- Continue with the operation of the CCA working group under Turku's Climate Action Plan and consider providing additional resources for enhancing its activities – e.g. special events with wider groups of stakeholders, including RIS3 partners etc.
- Consider also novel forms of citizen participation in CCA – e.g. youth forums etc.

5. Setting up effective multi-level governance models

There is insufficient connection between the governance of national and local CCA strategies in Finland to enable effective integrated CCA implementation. In sectors where existing regulations have a multi-level character – such as water management, flood protection, land use and transport planning – CCA can use the frameworks in place, but this is less straightforward in other sectors. The problem is compounded by the recent withdrawal of the regulatory obligation, by the national Government, for climate strategies with CCA elements to be put in place by Municipalities and other sub-national bodies. There is also fragmentation of CCA-relevant responsibilities within the regions, especially since the creation of the new Wellbeing Services Counties to oversee health, social and rescue services – all relevant for CCA - on top of existing structures, with territorial definition different from NUTS 3 regions. It is too early to determine how far this situation can be helped by the recently enhanced role of the ELY Centres to support CCA implementation.

Possible ways forward:

- Maintain the obligation for Climate Planning at sub-national level and develop it to explicitly include CCA. Set obligations for incorporating CCA in Regional Plans and Local Master Plans.
- Enhance the role of the Region as orchestrator of sub-national CCA strategies, building on the growing CCA experience of Valonia – possibly with additional funding for reinforcement of Valonia in this regard.
- Define cooperation protocols between Wellbeing Services Counties and Municipalities on CCA – notably in relation to heat impacts.
- Establish a national network of local authorities working on CCA, as platform for dialogue with national level, peer learning and provision of expert services on CCA to its member authorities[75].

6. Making room for experimentation

[75] This is based on suggestions in (Hildén et al., 2023) p. 119

Turku demonstrates creditable involvement in experimentation on CCA solutions through many relevant examples, most of which are observed under EU projects. The City and Southwest Finland's participation, through Valonia, in the EU Mission CCA RESIST project presents a particularly important opportunity for dedicated experimentation on NbS in different settings. Three demonstration sites for such experiments have been established in and around Turku. RESIST will also use innovative digital twin technology to enhance the value of experiments undertaken on different CCA solutions. Overall, Turku's CCA experimentation remains predominately in the field of water management, with little focus so far on other areas of CCA. Although the experimentation is welcome, there is also an emerging danger of over-emphasis on piloting, at the expense of scale-up and mainstreaming of promising CCA solutions.

Possible ways forward:

- Boost experimentation in less addressed (i.e. non water management) aspects of CCA.
- Incorporate CCA more explicitly in on-going experiments which have CCA relevance but are not CCA focused - e.g. LIFE-IP CANEMURE project (with focus on mitigation) and LIFE PRIODIVERSITY project (with focus on biodiversity).
- Emphasise scale-up of successfully piloted CCA solutions in any new instruments established for financing CCA (as suggested in Section 2).

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

Finland has not been affected greatly by climate change to date and public awareness of the need for CCA in the country is generally low. However, CCA awareness among public authorities is growing – helped in no small part by the adoption of the 2022 version of the NAP and reports of Finland's Climate Change Panel. Substantial relevant research on CCA is undertaken at the national level, including under the HERCULES project on climate and health led by the University of Turku. The national Climate-guide website, building on an earlier EU LIFE project, makes comprehensive research-based CCA-relevant information available to practitioners. The City of Turku also implements its own research programme in partnership with local universities and other research institutes, which, although not currently focused on CCA, could include CCA topics. The recent independent review of CCA in Finland[76] nevertheless identifies substantial shortcomings in the knowledge base – principally in terms of the lack of quantified CCA indicators in the NAP and the practical applicability of available data for implementation of CCA solutions at regional and local levels.

The City of Turku stands out from other Municipalities in the region by having its own dedicated Green Transition Team, although this is focused primarily on mitigation, including Turku's participation in the EU Mission '100 Climate Neutral and Smart Cities by 2030'. The Team only has only one full-time equivalent person working on CCA at present, which does not seem adequate given the City's ambitions. There are high expectations from the EU Mission CCA Implementation Platform which has already provided some expert support for methodological development. Valonia provides limited capacity building assistance to Municipalities in the Southwest Finland region for implementation of their Climate Plans. The new CCA Unit of the ELY Centres is expected to provide additional capacity – although at 12 experts to cover 15 regional Centres around the country, this too will be limited.

[76] (Hildén et al., 2022)

Possible ways forward:

- Develop better indicators for CCA – starting at national level – as part of an integrated CCA monitoring, reporting and evaluation system. Such a system should cover inputs (action deployed/funding to CCA), outputs (achievements of the actions), outcomes (reduction of risks) and impacts (effectiveness in terms of state of resilience and adaptive capacity). This echoes recommendations from the Finnish Climate Change Panel[77] and the recent independent review of CCA in Finland[78].
- Fund applied and policy-relevant research on cost-benefit analysis of different CCA solutions – building on work in this field carried out notably by the University of Turku.
- Develop and deliver a training programme for Municipal and regional authorities in developing CCA plans and actions, including exchange of experiences - possibly extending mandate of Hinku network beyond mitigation to cover CCA.
- Enlarge the climate change information portal for Finland Climateguide.fi to incorporate also adaptation actions and good practices. Make full use of learning opportunities from the EU Mission CCA and Cohesion For Transition (C4T)[79] support from DG Regio.

Many of these suggested possible ways forward complement and reinforce one another. It is hoped that – together – they prove useful to the City of Turku and Southwest Finland regional authorities in their journey towards better CCA through deployment of Transformative Innovation approaches.

[77] Finnish Climate Change Panel (2023b)

[78] (Hildén et al., 2023) p. 122

[79] https://ec.europa.eu/regional_policy/policy/communities-and-networks/cohesion-4-transition_en

References

Documents

City of Turku (2022a). Turku Climate Plan 2029. City of Turku Environmental Publications 3/2022. https://issuu.com/turunviestinta/docs/turku_climate_plan_2029

City of Turku (2022b). Turku City Strategy: Turku in the 2030s. Turku City. https://www.turku.fi/en/finances-and-strategies/strategy/turku-city-strategy-turku-2030s

City of Turku (2021). Turku Urban Research Programme 2022-2025. https://www.turku.fi/en/turku-urban-research-programme

European Commission (2024). European Commission, Joint Research Centre, Harding, R., Nauwelaers, C. and Haegeman, K., *Transformative Innovation for Climate Change Adaptation - A mapping-based framework*, Carat, G., Gnamus, A. editor(s), Publications Office of the European Union, Luxembourg, 2024, JRC137300: https://publications.jrc.ec.europa.eu/repository/handle/JRC137300

European Commission (2023). Regional Innovation Scoreboard 2023 Regional profiles Finland. https://ec.europa.eu/assets/rtd/ris/2023/ec_rtd_ris-regional-profiles-finland.pdf

European Investment Bank - EIB (2022). Climate change adaptation and economics and investment decision making in cities: 'how-to' guide and case studies. European Investment Bank. https://advisory.eib.org/publications/attachments/climate-change-adaptation-and-economics-and-investment-decision-making-in-the-cities.pdf

Finnish Climate Change Panel (2023a). Guidelines for the development of Finland's adaptation policy. Publications of the Finnish Climate Panel 7/2023. https://www.ilmastopaneeli.fi/wp-content/uploads/2023/10/ilmastopaneelin-julkaisuja-7-2023-suuntaviivoja-suomen-sopeutumispolitiikan-kehittamiseen.pdf

Finnish Climate Change Panel (2023b). Development of measures for Finland's adaptation policy by means of risk modelling and effectiveness monitoring. Publications of the Finnish Climate Panel 4/2023. https://www.ilmastopaneeli.fi/wp-content/uploads/2023/10/ilmastopaneelin-raportti-4-2023-suomen-sopeutumispolitiikan-kehittaminen-toimenpiteiden-riskimallinnuksen-ja-vaikuttavuuden-seurannan-avulla.pdf

Gram-Hanssen, I., C. Aall, M. Drews, S. Juhola, A. Jurgilevich, R. Klein, M. Mikaelsson and V. Lyngtorp Mik-Meyer (2023). Comparison and analysis of national climate change adaptation policies in the Nordic region, TemaNord 2023:525. Available at https://pub.norden.org/temanord2023-525/index.html

Gregow, H., Mäkelä, A., Tuomenvirta, H., Juhola, S., Käyhkö, J., Perrels, A., Kuntsi-Reunanen, E., Mettiäinen, I., Näkkäläjärvi, K., Sorvali, J., Lehtonen, H., Hildén, M., Veijalainen, N., Kuosa, H., Sihvonen, M., Johansson, M., Leijala, U., Ahonen, S., Haapala, J., Korhonen, H., Ollikainen, M., Lilja, S., Ruuhela, R., Särkkä, J. & Siiriä, S-M., (2021). Ilmastonmuutokseen sopeutumisen ohjauskeinot, kustannukset ja alueelliset ulottuvuudet. (Summary in English.) The Finnish Climate Change Panel Report - Suomen ilmastopaneelin raportti 2/2021. https://www.ilmastopaneeli.fi/wp-content/uploads/2021/09/SUOMI-raportti_final.pdf

Hildén, Mikael; Tikkakoski, Päivi; Sorvali, Jaana; Mettiäinen, Ilona; Käyhkö, Janina; Helminen, Meeri; Määttä, Helena; Berninger, Kati; Meriläinen, Päivi; Ahonen, Sami; Kolstela, Joonas; Juhola, Sirkku; Tynkkynen, Oras; Gregow, Hilppa; Groundstroem, Fanny; Halonen, Jaana I.; Munck af Rosenschöld, Johan; Tuomenvirta, Heikki; Carter, Tim; Lehtonen, Heikki; Luomaranta, Anna; Mäkelä, Antti (2022). Adaptation to climate change in Finland: Current state and future prospects. Prime Minister's Office. Publications of the Government's analysis, assessment and research activities 2022:61. https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/164414/VNTEAS_2022_61.pdf?sequence=1&isAllowed=y

Jetoo, Savitri (2019). "Stakeholder Engagement for Inclusive Climate Governance: The Case of the City of Turku" Sustainability 11, no. 21: 6080. https://www.mdpi.com/2071-1050/11/21/6080

Kern, Kristine, Sam Grönholm, Wolfgang Haupt, Luca Hopman, Nina Tynkkynen, and Pekka Kettunen (2021). Matching Forerunner Cities: Assessing Turku's Climate Policy in Comparison with Malmö, Groningen and Rostock. Turku Urban Research Programme. Research reports 1/2021. https://www.turku.fi/sites/default/files/atoms/files/kto-tutkimusraportteja_1-2021.pdf

Ministry of Agriculture and Forestry of Finland (2022). Finland's National Climate Change Adaptation Plan 2030. https://mmm.fi/paatokset/paatos?decisionId=0900908f807fc600

Ministry of Agriculture and Forestry of Finland (2014). Finland's National Climate Change Adaptation Plan 2022. https://mmm.fi/documents/1410837/5120838/MMM_Finland_s_National_climate_Change_Adaptation_Plan_2022.pdf/68262a61-24c5-4173-a06a-62a9f8a91370/MMM_Finland_s_National_climate_Change_Adaptation_Plan_2022.pdf/MMM_Finland_s_National_climate_Change_Adaptation_Plan_2022.pdf?t=1503553156000

Meretoja, M. (2021). Turku: resilience and vulnerability of the city. Presentation at Final conference of CASCADE project. https://docslib.org/doc/3905229/resilience-and-vulnerability-of-the-city-of-turku

Ministry of Agriculture and Forestry of Finland (2005). Finland's National Strategy for Adaptation to Climate Change. https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/80613/2005_1a%20Finland%27s%20National%20Strategy%20for%20Adaptation%20to%20Climate%20Change.pdf?sequence=1&isAllowed=y

Ministry of Economy and Employment (2022) - Innovation and Skills in Finland Programme 2021–2017 https://rakennerahastot.fi/en/european-regional-development-fund-erdf-

Ministry of the Environment of Finland (2022). Climate Act (423/2022). https://www.finlex.fi/fi/laki/kaannokset/2015/en20150609.pdf

Nordic Council of Ministers (2023). Policy Brief: stronger together for a climate resilient north. Mainstreaming adaptation to climate change at the local level in the Nordic Countries. Based on recommendations from workshops, presentations, and panel discussions at the 6th Nordic Conference on Climate Change Adaptation, NOCCA 2023 held in Reykjavik, Iceland April 17-18. Nord 2023:017. Available at: https://pub.norden.org/nord2023-017/nocca-2023.html

OECD (2023). Transformative innovation policy in practice in Austria, Finland and Sweden: What do the Recovery and Resilience Plans tell us about linking transformation and innovation policy? OECD Science, Technology and Industry Policy Papers, July 2023 No. 156
https://www.oecd-ilibrary.org/docserver/45d3a149-en.pdf?expires=1699288474&id=id&accname=guest&checksum=60B09C90D3EA322C7930F48AC4542167

Regional Council South West Finland (2022). The Regional Strategy of Southwest Finland 2040+. Southwest Finland of Sustainable Partnerships. Includes the Smart Specialisation Strategy of Southwest Finland 2021–2027.
https://varsinais-suomi.fi/en/top-fields/smart-specialisation/

RESIST (2023). Needs assessment for large-scale demonstrator regions. Unpublished document of the RESIST project.

Six City Strategy (2021). Era of Cities.
https://6aika.fi/en/out-now-era-of-cities-results-publication/

UNESCO (2021). Managing Aquifer Recharge: A Showcase for Resilience and Sustainability. UNESCO IHP studies on Groundwater Resources and Aquifer Systems.
https://unesdoc.unesco.org/ark:/48223/pf0000379962

Projects

BSR WATER platform – Platform for Integrated Water Cooperation 2018 – 2021
http://www.bsrwater.eu

CANEMURE LIFE integrated project - Towards Carbon Neutral Municipalities and Regions 2018-2024
https://hiilineutraalisuomi.fi/en-US/Canemure

CLIHE – Academy of Finland
https://www.aka.fi/en/research-funding/programmes-and-other-funding-schemes/academy-programmes/climate-change-and-health-clihe-2020-2023/

Co-evolvers project – Horizon Europe
https://co-evolvers.eu/

FINSCAPES - Syke
https://www.syke.fi/projects/finscapes

HEATHCLIM - University of Eastern Finland
https://sites.uef.fi/heatclim/

HERCULES - University of Turku
https://sites.utu.fi/hercules/

ILKKA – ERDF Project
https://ilmastotyokalut.fi/en/about-the-project/index.htm

Interactive Water Management (IWAMA) 2016 – 2019 - Interreg Baltic Sea
https://interreg-baltic.eu/project/iwama

Iwater - Integrated Stormwater Management 2015-2018 - Interreg Baltic Sea

http://www.integratedstormwater.eu/pilot-site/turku

KUITTI – Finnish Meteorological Institute
https://en.ilmatieteenlaitos.fi/kuitti

PRIODIVERSITY - LIFE project
https://ym.fi/en/-/finland-s-largest-ever-eu-funded-life-biodiversity-project-started-new-and-more-effective-means-to-combat-biodiversity-loss

RESIST 2023-2027- Mission CCA project funded under Horizon Europe
https://cordis.europa.eu/project/id/101093968 https://resist-project.eu/regions/southwestfinland/

SUOMI - the Finnish Climate Panel
https://en.ilmatieteenlaitos.fi/suomi-project

We make transition 2023-2025 - Interreg Baltic Sea
https://interreg-baltic.eu/project/we-make-transition-interreg-baltic-sea-region/

Websites

Business Turku – Clean Turku
https://businessturku.fi/en/cleanturku/

Centres for Economic Development, Transport and the Environment
https://www.ely-keskus.fi/en/web/ely-en

ClimateADAPT – country page Finland
https://climate-adapt.eea.europa.eu/en/countries-regions/countries/finland

Climate change information portal Finland
https://www.climateguide.fi/frontpage/

Cohesion Policy in Finland
https://rakennerahastot.fi/en/front-page

Finnish Climate Change Panel
https://www.ilmastopaneeli.fi/en/

LUKE - Natural Resources Institute Finland
https://www.luke.fi/en

Ministry of Agriculture and Forestry of Finland – webpage on climate adaptation
https://mmm.fi/en/nature-and-climate/climate-change-adaptation

Regional Council of Southwest Finland
https://varsinais-suomi.fi/en

SYKE - Finnish Environment Institute
https://www.syke.fi

Six City Strategy
https://6aika.fi/en/city/turku-2/

Turku City
https://www.turku.fi/en

Turku University of Applied Sciences
https://www.turkuamk.fi/fi/turun-amk/tutu/organisaatio/

Turku University Urban Climate Research Group
https://sites.utu.fi/turclim/

Union of the Baltic Cities – Sustainable Cities Commission
https://www.ubc-sustainable.net/

Valonia – South West Finland regional advisory organisation for municipalities and companies in sustainable development https://valonia.fi/language/en/home/

List of abbreviations and definitions

Abbreviations	Definitions
CCA	**Climate Change Adaptation**
ELY	**Centre for Economic Development, Transport and the Environment**
GDP	**Gross domestic product**
JRC	**Joint Research Centre**
LUKE	**Natural Resources Institute**
NAP	**National action plan**
NAS	**National Climate Change Adaptation Strategy**
NUTS	**Nomenclature of Territorial Units for Statistics**
R&I	**Research and development**
RIS3	**Research and Innovation Strategies for Smart Specialisation**
SECAP	**Sustainable energy and climate action plan) model of the Covenant of Mayors**
SYKE	**The Finnish Environment Institute**

List of boxes

List of figures

List of tables

Annexes

Annex 1. List of interviewees

Date	Interviewee	Position
20 November	**City of Turku**	
	Miika Meretoja	Senior Specialist, Green Transition Department
	Minna Kivimäki	Project Manager, Urban construction Department
	Misa Tuomala	Project Specialist, Green Transition Department
	Björn Grönholm	Director of Strategic Projects, Spearhead projects Dpt.
	Centre for Economic Development, Transport and the Environment - ELY	
	Pekka Salminen	Development Manager, ELY Centre Southwest Finland
	Turku Science Park Ltd.	
	Linda Fröberg-Niemi	Senior Executive, Clean Turku
21 November	**Turku Region Water Ltd**	
	Aki Artimo	CEO
	Turku University of Applied Sciences	
	Piia Leskinen	Principal Lecturer, Water and Environmental Engineering Research
	Regional Council of Southwest Finland	
	Riikka Leskinen	Head of Department, Valonia
	Katariina Yli-Heikkilä	Environmental Specialist, Valonia
22 November	Salla-Maria Lauttamäki	Development Manager
	Turku EU Office	
	Miia Paananen	Manager
	University of Turku	
	Jukka Käyhkö	Professor in Geography, member of the Finnish Climate Change Panel
23 November	**Sitowise Group Oyj**	
	Emma Liljeström	Group Manager, Climate & Sustainability
	Association of Finnish Local and Regional Authorities	
	Pauliina Jalonen	Advisor, Urban Development and Environment Unit
	The Finnish Environment Institute - Syke	
	Mikael Hildén	Senior Advisor, Climate solutions unit

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

Getting in touch with the EU

In person

All over the European Union there are hundreds of Europe Direct centres. You can find the address of the centre nearest you online (european-union.europa.eu/contact-eu/meet-us_en).

On the phone or in writing

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

— by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),

— at the following standard number: +32 22999696,

— via the following form: european-union.europa.eu/contact-eu/write-us_en.

Finding information about the EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website (european-union.europa.eu).

EU publications

You can view or order EU publications at op.europa.eu/en/publications. Multiple copies of free publications can be obtained by contacting Europe Direct or your local documentation centre (european-union.europa.eu/contact-eu/meet-us_en).

EU law and related documents

For access to legal information from the EU, including all EU law since 1951 in all the official language versions, go to EUR-Lex (eur-lex.europa.eu).

EU open data

The portal data.europa.eu provides access to open datasets from the EU institutions, bodies and agencies. These can be downloaded and reused for free, for both commercial and non-commercial purposes. The portal also provides access to a wealth of datasets from European countries.

Science for policy

The Joint Research Centre (JRC) provides independent, evidence-based knowledge and science, supporting EU policies to positively impact society

EU Science Hub
joint-research-centre.ec.europa.eu

Publications Office
of the European Union