



**Report on institutional
framework conditions,
relevant local and regional
processes, instruments and
co-creation factors
related to or adaptable for
climate action**



TABLE OF CONTENTS

1. Introduction	5
2. Methodology	5
3. Institutional framework conditions related to or adaptable for climate action	7
4. Relevant local and regional processes related to or adaptable for climate action	11
5. Co-creation for climate action – a need according to stakeholders	19
6. Appendix 1 – Summaries of Pilot regions state of the art on climate change local context and multi-stakeholder climate initiatives	26
<i>Vechta and South Cloppenburg pilot region - Germany</i>	<i>28</i>
<i>Minsk pilot region – Belarus</i>	<i>30</i>
<i>Poznań agglomeration pilot region - Poland</i>	<i>34</i>
<i>Metropolitan Area of Barcelona pilot region - Spain</i>	<i>37</i>
<i>Brittany, Normandy, Pays de la Loire pilot region – France</i>	<i>42</i>
<i>Belgrade pilot region - Serbia</i>	<i>44</i>
7. Appendix 2 – Methodology: State of the art template	50



What is TeRRIFICA?

Find out on our project website: www.terrifica.eu !

What else has been published in TeRRIFICA?

Case Studies report:

Analysis of case studies on effective practices in community-academia partnerships and their success factors.

Guide on Engagement and Co-Creation:

Supportive document on how to foster stakeholders' engagement and co-creation processes

Free download is available on our project website!

How to get in touch with us?

For general questions or requests, please contact our project coordinator:

Norbert Steinhaus, Science Shop Bonn

norbert.steinhaus@wilabonn.de



Abbreviations:

CCA&M – climate change adaptation and mitigation

CSOs – civil society organizations

CSR – corporate social responsibility

GHG – greenhouse gases

IPCC – Intergovernmental Panel on Climate Change

IPCC – Intergovernmental Panel on Climate Change (an intergovernmental body of the United Nations, UN)

MoRRI – Monitoring RRI

NAP – National Adaptation Plan

NAS – National Adaptation Strategy

NGOs – non-governmental organizations

RRI – responsible research and innovation

SDGs – sustainable development goals

SMEs – small and medium-sized enterprises



1. Introduction

TeRRIFICA, standing for Territorial Responsible Research and Innovation fostering Innovative Climate Action, has a goal of fostering competence for climate change adaptation in different European regions, specifically in Belarus, France, Germany, Poland, Serbia and Spain.

This TeRRIFICA deliverable is produced in the framework of the first phase of the project: the knowledge phase. Indeed, the first step for fostering co-creation on climate change is to learn about the local contexts of the six pilot regions, including specific local climate effects impacting the region, key actors, local policies on climate, if there are some participation mechanisms already in place, what are the types of collaborations between stakeholders, etc.

This is one of the core goals of TeRRIFICA in regards to thematic approach, content definition and implementation strategies. This part of work, led by the Adam Mickiewicz University (Poznań) team, includes different activities to create a comprehensive overview on the state of the art of climate change adaptation research and innovation strategies and examples and communication strategies and methods at different levels of complexity.

This report therefore includes:

- The methodology: how pilot regions gathered information to draw an overview of the climate change initiatives and institutional framework in their region;
- An overview of the climate policy framework: what are the strategies and plans to mitigate or adapt to climate change that are important for TeRRIFICA action in the region.

- A review of relevant local and regional processes: What are the specific climate change issues for each pilot regions and are there existing processes to tackle these issues?
- An analysis of participatory instruments and co-creation degrees in existing policies and multi-stakeholders initiatives tackling climate change.

2. Methodology

Work on this report was carried out in regard to assess the institutional framework conditions and socio-ecological transformation processes at a local and regional level and identify territorial aspects of co-creation process with a strong focus on the regional innovation systems in six pilot regions:

- Belarus (Minsk),
- Germany (Oldenburger Muensterland),
- France (Brittany, Normandy and Pays de Loire),
- Poland (Poznań Agglomeration),
- Serbia (Belgrade), and
- Spain (Barcelona metropolitan area, Catalonia).

The first step on the way to develop this report was the preparation of comprehensive template for data gathering that should include all relevant aspects of climate change adaptation and mitigation (CCA&M) action in pilot regions as well as background information to make a broader view of territorial diversity of climate action (e.g. socio-cultural, political, institutional, environmental and geographical context) (see Fig. 1).



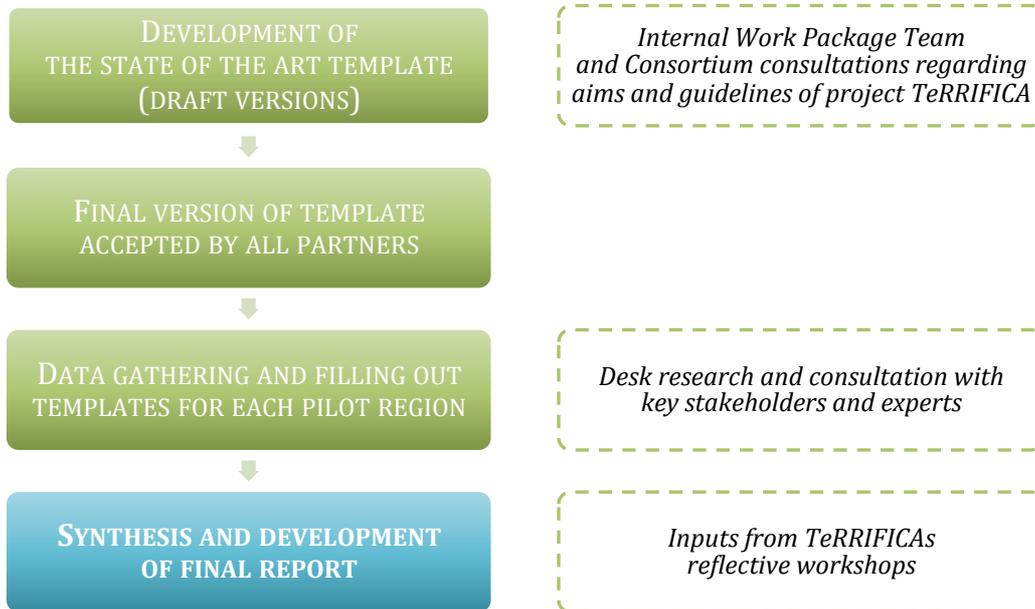


Figure 1: Methodology framework of report

The final, agreed version of template named “State of the Art of Climate Change Adaptation and Mitigation” (Appendix 2) consist of two main parts:

- I. **General characteristics of a pilot region** (scope of information: name of the region, its location and a short description; strategies/agendas/reports developed by the local government; main stakeholders in the region (on the basis of quadruple helix model) and short summary description of a pilot region),
- II. **Projects aimed at climate change adaptation and mitigation** (scope of information: projects aimed at CCA&M implemented by civil society (NGOs, CSOs); projects aimed at CCA&M implemented by academia & education; projects aimed at CCA&M implemented by business; projects aimed at CCA&M implemented by local government and short summary of chosen projects).

consultations with stakeholders and experts were the main inputs to the template. This part of the work has been done by project partners representing a given pilot region. In the last step the synthesis of gathered information has been developed with inclusion of relevant results and findings of reflective workshops organized in Bonn (February 2019), Belgrade (July 2019) and Paris (October 2019). The workshops were dedicated to enhance co-creation between pilot regions stakeholders in respect to identify the current challenges, barriers and needs for climate actions as well as potential solutions and innovations.

The following deliverable is an analysis of the information from pilot regions’ “State of the art of Climate Change Adaptation and Mitigation”. This synthesis therefore is not exhaustive of the research conducted by pilot regions’ leaders. The whole data gathered in the State of the Art will be available in a coming publication, as a reference document, on the TeRRIFICA website.

Desk research data and the outcomes from

3. Institutional framework conditions related to or adaptable for climate action

As stressed by literature (Næss et al. 2005, Tol 2005, Castells-Quintana et al. 2015, Huang-Lachmann and Lovett 2016) and IPCC reports (e.g. Somanathan et al. 2014) institutions and processes of governance are crucial for climate actions. They shape and constrain policy-making and policy implementation in multiple ways relevant for a shift to a low carbon economy to reduce climate impact and to strengthen adaptation processes at different levels (global, national, regional, local) (see Somanathan et al. 2014). Institutions set the incentive structure for economic decision-making, shape the political context for decision-making (empowering some interests and reducing the influence of others), and

can also shape patterns of thinking and understanding of policy choices (North 1991).

Designing and implementing the new policies and effective climate responses should include new forms of multi stakeholder collaboration (like co-creation) and managing the uncertainties, risks, and societal objectives. To tackle this challenge institutional innovation is needed just as much as innovation in the physical and technological infrastructure of cities and regions (Paterson 2018). Well-designed institutional frameworks are basis for proper implementation of climate change policy, such as mitigation and adaptation (Næss et al. 2005, Tol 2005), and can enhance innovation and increase environmental and business performance (Huang-Lachmann and Lovett 2016).

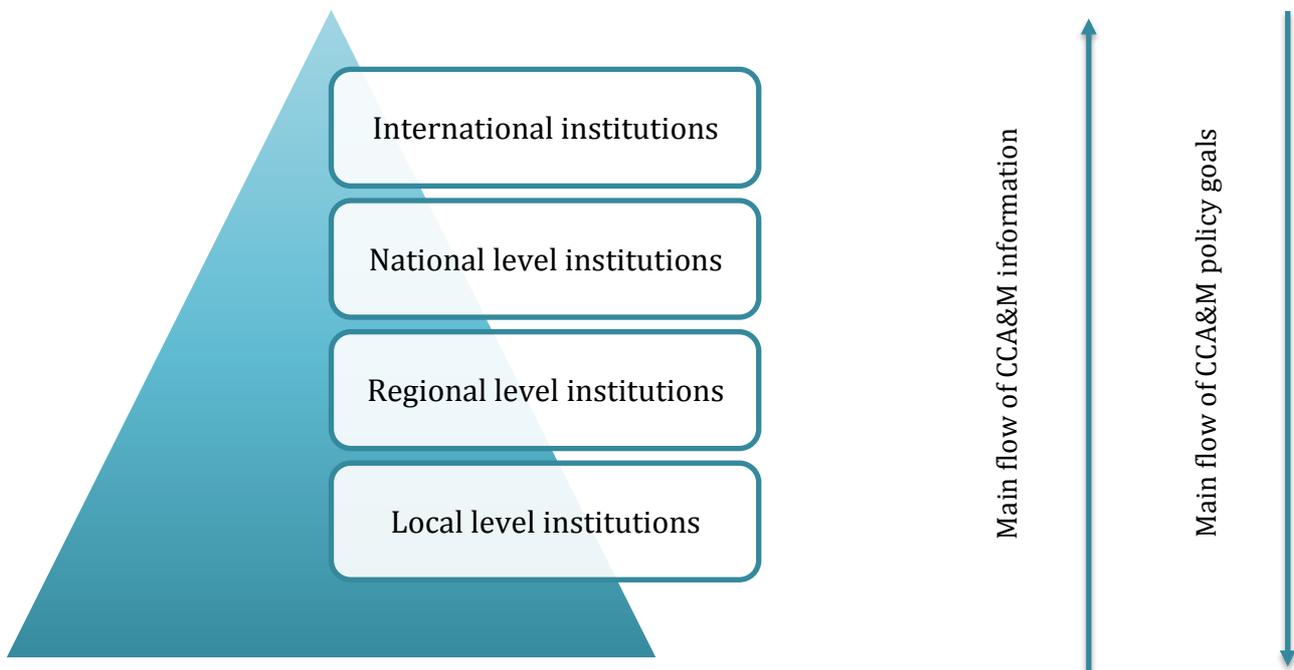


Figure 2: General scheme of public institution functioning in terms of climate change adaptation and mitigation (CCA&M), On the basis of Bernaciak and Spychala (2007)

International institutions and their climate actions and regulations stimulate and foster national and subnational agendas for climate change mitigation and adaptation. The example is the United Nations that acts globally for climate by UN Framework Convention on Climate Change with the institution of Conferences of the Parties (COP) and also activity of Intergovernmental Panel on Climate Change as the UN body for assessing the science related to climate change. The European Union by its climate policy (e.g. EU strategy on adaptation to climate change) drives the Member States to adopt a climate change adaptation strategy and/or plan. To date, 25 EU Member States have adopted a national adaptation strategy (NAS) and 15 have developed a national adaptation plan (NAP)¹. By designating climate policy frameworks these documents stimulate the development of adaptation plans or strategies at regional and local levels giving the opportunity to make climate policy more integral and effective (Fig. 2).

The institutional framework of climate change adaptation and mitigation strategies are developed by the institutions and other political/economical bodies or agencies as well as by the law and binding rules. The legal basis describe the relations between the different institutions and their functional contexts as well as tasks, responsibilities and the dependencies between the goals and aims they want to achieve.

In the TeRRIFICA's pilot regions, the objectives and tasks related to climate change adaptation and mitigation at the national and regional level are dispersed in various laws, strategies, plans and agendas. Laws and strategies against climate change

include mainly the issues of climate adaptation and mitigation in connection with energy, industry and mobility issues - key sectors for reducing GHG emissions. They mainly refer to the low-carbon economy, energy transformation and green growth, thus focus on reducing environmental pollution and climate impact. In most regions, there is usually no separate, single law regulating climate issues at the national level, but some attempts are observed. Good example is Catalonia, where the parliament very recently passed Climate Change Act (2016/2017), whose aim is to reduce Catalonia's GHG emissions by 40% by 2030, as well as encouraging a shift towards a low-carbon economy, among other goals. In addition the Serbian Ministry of Environmental Protection is preparing the Climate Change Law as complex act in the field of climate change adaptation and mitigation. Similar actions are taken in Germany where an official draft of first-ever Climate Action Law was presented in 2018 with the expectation to be enacted in 2019.

Other positive nationwide actions in the 6 pilot regions countries are linked to the adoption of state strategies on climate change adaptation and/or mitigation:

- In Belarus climate policy framework was introduced into "Governmental Program on Mitigation Measures for Climate Change 2013-2020" (2013), "National Strategy for Sustainable Socio-Economic Development of the Republic of Belarus until 2030" and "Environmental Protection and Sustainable Use of Natural Resources" for 2016-2020.
- France adopted a national adaptation strategy in 2006 and a national adaptation plan in place from 2011. At subnational level, a comprehensive system of Climate-Air-Energy Plans, at Regional, Departmental

¹ <https://www.eea.europa.eu/airs/2018/environment-and-health/climate-change-adaptation-strategies> [Accessed on 2019-10-16].

and large town level is in place, and includes a requirement for climate adaptation action to be identified. Regional Plan for Sustainable Development and Territorial Equality are also expected to fix objectives in terms of adaptation to climate change. Adaptation elements are also included in river basin and flood risk plans². Good practice in this regard is integrating several former documents into one, including the strategies and plans dealing with energy management, climate change mitigation and clean air objectives. *A National Strategy Low Carbon has been adopted in 2015. Through this strategy, France committed to decrease by 75% its Greenhouse Gas Emissions by 2050 compared to 1990 levels.*

- Germany adopted its National Adaptation Strategy in 2008 and an action plan in 2011. All 16 states (Bundesländer) have developed adaptation strategies and have developed measures, some as part of an integral climate change strategy or program. Therefore, 100% of the German territory is covered by regional adaptation strategies³.
- The “Polish National Strategy for Adaptation to Climate Change by 2020 with the perspective by 2030” was adopted in October 2013. The most prominent initiatives at the local level are the projects KLIMADA “Development of Urban Adaptation Plans for cities with more than 100 000 inhabitants in Poland” and

CLIMCITIES, providing training on climate change adaptation to local authorities and other stakeholders in municipalities with population from 50 000 to 99 000 inhabitants. Sectoral strategies and plans considering climate change adaptation have been developed in urban policy (see National Urban Strategy 2023⁴), coastal protection, water management, energy (partially), rail and forests⁵.

- Serbia prepared “Serbia’s First National Adaptation Plan” in 2015 (draft) and “Communication Strategy for Climate Change” in 2017. For Belgrade, the “Climate Change Adaptation Action Plan and Vulnerability Assessment” has been also adopted.
- Spain adopted a strategy, the National Climate Change Adaptation Plan (Plan Nacional de Adaptación al Cambio Climático) in 2006. By the end of 2018 almost all of the Spanish regions (apart from Asturias and La Rioja) adopted regional action plans or adaptation strategies covering 97% of Spain’s population⁶.

Climate change adaptation and mitigation issues at the national level are subject to executive authorities - usually, come under the Ministry of Environment (or similar) supported by government agencies (e.g. Environmental Office, General

2

https://ec.europa.eu/clima/sites/clima/files/adaptation/what/docs/summary_fiche_fr_en.pdf [Accessed on 2019-10-18].

3

https://ec.europa.eu/clima/sites/clima/files/adaptation/what/docs/summary_fiche_de_en.pdf [Accessed on 2019-10-18].

4

<http://prawo.sejm.gov.pl/isap.nsf/download.xsp/WMP20150001235/O/M20151235.pdf> [Accessed on 2019-10-18].

5

https://ec.europa.eu/clima/sites/clima/files/adaptation/what/docs/summary_fiche_pl_en.pdf [Accessed on 2019-10-18].

6

https://ec.europa.eu/clima/sites/clima/files/adaptation/what/docs/summary_fiche_es_en.pdf [Accessed on 2019-10-18].



Directorate for Environmental Quality), whose activities focus on the implementation of environmental and climate laws. Against this background, the Government of Catalonia stands out. It has two formal instruments to approach the climatic change: the Catalan Office of the Climatic Change and the Interdepartmental Commission of Climate Change.

The Catalan Office for Climate Change is the executive authority of the Government of Catalonia, being in charge of promoting the establishment of climate change strategies, plans and projects in Catalonia (among others: promote and carry out activities of awareness, analyze the evolution of GHG emissions and carbon markets, information and dissemination to the society of all aspects related to climate change, promote actions and projects to improve adaptive capacity against the impacts of climate change in Catalonia and the integration of adaptation to sectorial policies). The Interdepartmental Climate Change Commission, meets at least once a year and performs indefinitely. The main tasks are coordinating the actions of the Government in the field of the fight against climate change and promoting actions between the different departments, about adaptation to climate change, in order to reduce its effects in Catalonia.

In all TeRRIFICA regions a very important role in climate change policies belongs to universities and research institutes. They not only carry out research on global climate change and its impact or sustainable development but also can guarantee the cohesion and continuity of the actions taken at the regional and local levels (e.g. Potsdam Institute for Climate Impact Research (Germany), Belgrade University (Serbia), Belarusian State University (Minsk – Belarus), Adam Mickiewicz University in Poznań (Poland), University of Barcelona (Catalonia

– Spain) and National Institute of Agricultural Research (INRA) Rennes (Bretagne & Normandie - France). In Catalonia an independent report on climate change from the scientific perspective with the necessary references to the global and European situation is going to be published soon. There is also a number of specialized institutions in the field of energy efficiency, renewable energy sources and energy systems such as the German Energy Agency that supports the implementation of energy shift assumptions and promotes efficient, safe, cheap and climate-friendly energy production and use.

In some regions science-practice hubs promote knowledge & innovation and foster communication & cooperation between science and practice. These institutions very often get involved in local as well as international climate actions. Good examples are the Poznań Science and Technology Park (PPNT, Poznań Agglomeration) and Centre for the Promotion of Science (CPN, Belgrade). PPNT is a non-profit organization with the mission to stimulate collaboration between science and industry to activate the regional development via innovation, technology transfer and international cooperation. Partners are in the process of commercializing scientific and technological research results. CPN is the government institution in charge of the promotion and popularization of science, that through its program activities, such as workshops for children, and lectures for the general public, tackles climate change issues.

In pilot regions, mainly at the local level (cities, municipalities), adaptation plans for climate change are created and implemented as well as environmental protection programs that incorporate climate protection. These are operational documents that specify climate actions taken in pilot regions together with indicators to be



achieved in the near future. These activities implement the objectives and tasks set by national and regional strategies. Main stakeholders in most pilot regions are local administration offices, within which competences are split between different departments (Regional Direction of Environment, Planning and Housing, Regional Direction of Food, Agriculture and Forest). A good example from Oldenburger Muensterland (Germany) is employing a local climate protection manager and establishing of a coordination office named “Climate-Energy-Mobility”. A complete list of significant climate stakeholders in individual pilot regions will be provided in the compilation of pilot regions’ State of the art, the reference document to be published on the TeRRIFICA website. At the local level, the need for cooperation in the field of climate change adaptation and mitigation is the most visible. Local governments cooperate mainly with civil society, NGOs, academia and business to create network of stakeholders in region for better exchange and first of all to get an overview of existing initiatives regarding climate action. Among the climate activists should be marked NGOs out who take the most actions and initiatives. It is worth to emphasize the growing role of business, which is becoming a significant promoter of climate protection policy and green technologies and has initiated another wave of innovation in the regional economy.

The challenge for the pilot regions is to ensure an efficient institutional framework for fostering climate action. This can be done through the implementation and/or strengthening of the sectorial approach (climate change adaptation and mitigation introduced in each economy sectors) as well as the horizontal approach (a holistic view on climate change adaptation and mitigation) that are successfully introduced to the EU policy. This involves the need for supporting existing

institutions, creating dedicated departments or additional jobs focused on climate change as well as creating new institutions dealing solely with this problem. Close and transparent cooperation with a wide range of stakeholders is necessary for this respect.

4. Relevant local and regional processes related to or adaptable for climate action

TeRRIFICA’s approaches and activities are applied in six pilot regions (living labs), which have selected climate change adaptation issues in focus. TeRRIFICA supports these partner’s activities with a focus on raising awareness, fostering climate change understanding, developing local actions and extending the current networks especially with civil society. Climate change adaptation is seen as a complex problem or mission, because of the collaboration between actors from different domains (public, private, knowledge, civil society), and the realization of new co-created action plans. Based on this concept, TeRRIFICA focuses on involvement and engagement of all stakeholders, getting to know each other, enabling cross-fertilization and idea generation through shared knowledge and experiences.

The pilot regions have been carefully chosen to compose a significant panorama of the future adaptability of the results, measures, actions, recommendations and any output from the TeRRIFICA project. Each region or city has its own characteristics and features, contributing relevant aspects to the project's landscape as a whole. The partners line up along Central-South and East-West axis but the consortium includes besides EU member states (four partners) also two non-EU countries. TeRRIFICA operates in a metropolitan



area like Barcelona, in capital and major cities like Belgrade, Poznań and Minsk, in the agricultural region of Vechta and Cloppenburg, and rural regions like Brittany, Normandy and Pays de Loire. The chosen regions have a fascinating blend of cultures. Nevertheless there are some similarities in geography and climate (Spain-Serbia, Poland-Belarus, France-Germany).

Sixteen of the seventeen warmest years since records began have been recorded since 2000, and the planet's average global temperature (the air above the surface of the land and sea) exceeded pre-industrial levels by 1°C for the first time ever in 2015. Finally, permanent atmospheric concentration levels of carbon dioxide (CO₂) now exceed 415 parts per million for the first time in human history⁷. This warming will have numerous effects, and will clearly determine our collective future.

Analysis of changes in climatic and hydrological phenomena carried out within the last 30 years has shown that the most important threats associated with climate change include:

- increase in average annual air temperature and intensification of the effect of urban heat islands
- increase in the frequency of extreme events: heat waves, cold waves, droughts, intense rainfalls and associated flooding, flood threats, strong winds and storms.

These phenomena, especially in heavily urbanized areas, are accompanied by an increase in “low emissions” (pollutions emitted by house chimneys),

7

<https://www.esrl.noaa.gov/gmd/ccgg/trends/weekly.html>
[Accessed on 2019-10-18].

which is a consequence of obsolete heating technologies on the one hand and uncontrolled and chaotic suburbanization on the other hand in some regions, heavy car traffic in others, or polluting activities in rural areas.

According to predictions, in the perspective of 2030 one should expect a deepening of climate change trends, therefore the cities should create spatial, social and economic structures prepared for these phenomena.

In urban and regional policies we can observe a high need for a strategic approach with the specific challenges and tasks relevant for different sectors and areas sensitive to climate change. Those plans, along with the institutional and organizational activities are aimed at increasing the resistance of cities to extreme events, improvement of the awareness, safety, and comfort of residents in the conditions of a changing climate. This creates a wide range of opportunities to use social activity in the counteracting climate change (reducing CO₂ emissions, improving air quality, implementation of a low-emission economy, preventing flooding or water scarcity, restoration of degraded green areas, to name just a few. Necessity and challenges are shaping the policy of urban and regional development, with particular emphasis on complex approach to indicated challenges.

Each region of TeRRIFICA is undoubtedly a subject to climate change and its effects. There are however specific challenges or goals that can be indicated for a particular pilot region (the list is not limited to those listed below – see Appendix 1).

Barcelona Metropolitan Area and Catalonia (Spain):

- the effects of climate change on natural and human systems,



- the contribution of those systems to greenhouse gas emissions (GHG), and
- the adaptation to climate change.

Belgrade: sustainable and renewable city with a special focus on:

- realization of the reduction of air pollution emissions,
- replacement of fossil fuels in the supply of heating plants and boiler rooms,.
- introducing and increasing the share of rail public transport with the modernization of the fleet

Grand West Region (France):

- transition to bio-climatic cities and energy sobriety,
- safeguarding water availability and promoting a system price/usage value including ecosystems needs,
- supporting existing adaptation projects in the building sector,
- capitalizing on past experiences of adaptation and crisis management,
- reducing tourism impact on the environment,
- acknowledging ecosystem services as precious but vulnerable advantages that need protection,
- supporting alert system in prevention of sanitary crisis,
- adopting governance system allowing flexibility, reversibility, stimulating innovation, within a coherent framework.

Minsk (Belarus):

- to prevent the onset (mitigate the effects) of environmental threats to sustainable

socio-economic development due to climate change, loss of biological diversity, degradation of agricultural land.

Cloppenburg and Vechta (Germany):

- renewable energy sources,
- future mobility of inhabitants (use of bicycles),
- energy consultations for inhabitants,
- reduction of CO₂-emissions especially in business sector.

Poznań Agglomeration (Poland):

- mitigating the negative impact of extreme thermal conditions, including pollution accumulation (thermal inversions, MWC),
- lessening the impact of torrential rainfalls, urban flooding, droughts, storms and damaging winds,
- communicating the general knowledge of climate change and its impact on the greater community,
- improving the city organizations and institutions' ability to act against climate change and extreme weather conditions.

The challenges have been identified in regional reports, agendas or climate change plans with a special focus on multi-stakeholder collaboration due to the complexity of the problems and the scale and impact they have on the regional development and the quality of life. The need for building the network of collaboration is high in each pilot region with the emphasis on including all the actors relevant for quadruple helix model (science and education, policy makers, business and civil society organizations). Some of the regions have also identified the lack of systematic planning in response to climate change impact that can lead to



increased costs for adaptation measures. That is why anticipatory strategies and plans based on vulnerability assessment including climate change projections are continuously developed to ensure the adaptation of urban structures to mitigate the impact of a changing climate on the urban living environment.

The weaker part of those strategic measures is quite often the operationalization of the above-mentioned activities, limited to the identification of entities responsible for the implementation of tasks, the financing framework, indicators monitoring the implementation of goals set in urban policy without indicating specific mechanisms for implementing these activities or clear guidelines for evaluation. Usually there are no guidelines for operationalization of activities provided and this is where TeRRIFICA can approach and take the actions to support the process on a regional level but with the link to Sustainable Development Goals. This will provide for a global perspective and will integrate TeRRIFICA actions with other projects and initiatives that are taking place all around the world.

The institutionalization of this process is different in each region but the leading role is usually played by the local municipal or regional body. Strategies or Plans for Adapting to Climate Change (with short-medium and long term goals) have been prepared and inter-sectorial bodies or committees have been nominated to promote the dialogue and to develop the tools and actions needed to deal with the climate change challenges. Those “climate change constitutions” usually include also the explanation of measures, relevant locations, institutions responsible for the implementation, priority level for the implementation, and the time frame.

For Grand West region structures have already been established:

- An Open Conference on Energy transition, set up since 2018, is the structure of shared strategic governance. It is composed of around 30 representatives of the sectors and type of stakeholders concerned by the plan.
- A unique lab for the energy transition, which will be in charge of governance of actions. Its role will be to assist and animate innovative projects of actors from civil society.

The other example can be taken from Minsk:

- 1st National Forum on Sustainable Development (Jan 2019);
- Appointment of National Coordinator for the Sustainable Development Goals;
- Council on Sustainable Development (38 executive bodies, local authorities, legislative bodies);
- Sustainable Development Partnership Group (civil society, the private sector (including participants in the UN Global Compact), international organizations, etc.) with working groups focused on ecology, social welfare, economy and regional affairs.

In Catalonia local authorities, through the Covenant of Mayors for Climate and Energy promoted by the European Commission, and various tools and support networks for governance, have become heavily involved in the fight against climate change, despite the economic and technical limitations and the restrictions on their powers. Nevertheless, adapting to climate change means that a change towards governance on a local level is necessary.



The relevant role in those processes belongs to the universities or research institutes as well as business organizations that usually are able to apply for national or international grants. Their role is crucial for developing the social innovations, new technologies, and the training of high-skilled workforce in the region, organizing seminars and conferences that are spreading the knowledge and integrating main stakeholders. The civil society role is relevant especially for building the awareness amongst citizens and for involving them in the regional debates, consultations, building the links with the local communities. External experts or advisory bodies are also present in this process as well as ministerial bodies and public or private funded agencies. Workshops and consultation meetings are regularly organized in each region to promote and secure the dialogue between the main players. The events open for public should also be mentioned such as science festivals, regional

contests or other promotional activities.

The above considerations can be synthesized and ordered by creating some a general scheme of relevant local and regional processes related to or adaptable for climate action. The four main phases can be distinguished (Fig. 3):

- Phase 1: Identification of actual regional/local needs & challenges related to climate change,
- Phase 2: Establishment of action plans (strategies),
- Phase 3: Implementation of action plans (strategies) including various stakeholders' engagement activities
- Phase 4: Formulation of relevant indicators set and evaluation of actions.

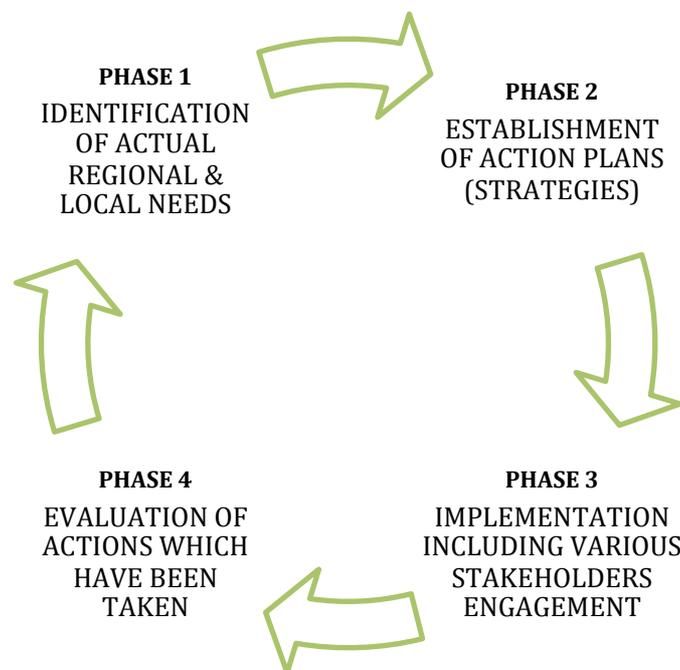


Figure 3: Local and regional processes related to or adaptable for climate action

At this stage, on regional/local level a study on state of the art is carried out with the aim to identify the main challenges, possible scenarios and solutions or the interests and needs of the main players and citizens. Generally, in this phase the most important role is played by regional/local authorities, which cooperate with research institutions and universities that work together on the current diagnosis on socio-economic-environmental situation. Another important aspect of this phase is providing the knowledge about regional/local community needs, which can be identified by qualitative and quantitative research, i.e. survey, in-depth interviews, and focus group interviews with representatives of each stakeholder's group (civil society, public authorities, science & education, business).

Phase 1: Identification of actual regional/local needs & challenges related to climate change

Analysis of "State of the art of Climate Change Adaptation and Mitigation" for pilot regions (summaries in Appendix 1) shows that they share the main needs - in the context of challenges related to climate change that can be arranged as the set of three general categories:

- 1) Limitation of greenhouse gases emissions level,
- 2) Reduction of human impact on natural environment,
- 3) Building environmental awareness.

In the case of stakeholders engagement in the identification of actual regional/local needs, a good practice comes from a German pilot region Oldenburger Muensterland. A round table with an external moderator was established by the city with

the focus on the construction of biogas plants. The outcome of this debate was a proposal of creation of "Integrated concept of climate protection". The meetings were held 11 times from 2011 to 2013. Expert talks were performed to inform and motivate about the participation in the creation process and to gain multipliers (e.g. students). A town meeting was performed during the project time to inform all interested citizens. Two representatives of local business presented their own experiences in energy saving activities and models. A similar set of meetings was held in Poznań Agglomeration during the designing phase of the "Urban Climate Adaptation Plan for the City of Poznań to 2030". The inclusion of stakeholders (workshops, consultations) in adaptation activities and decision-making process was also aimed at building the awareness and obtaining acceptance for the actions indicated in the Adaptation Plan. Another good practice was implemented during preparation of Climate Change Adaptation Action Plan and Vulnerability Assessment in Belgrade, where the draft version of this document was uploaded on the City of Belgrade official web page so as to enable collection of as many useful suggestions as possible. These comments were later integrated in the document.

Phase 2: Establishment of action plans (strategies)

A socio-economic and environmental diagnosis is a basis for formulating relevant goals and actions allowing for achieving these goals. They are usually included in official documents like climate change adaptation plans and strategies of socio-economic development, but not only. A challenge or topic-related documents can also be distinguished. They usually concentrate on important issues for a given region. For example, a "Strategy for Rainwater and Meltwater Management for the City of Poznań" was mentioned, which sets out actions aimed at



increasing retention and a reduction of the dangerous, accelerated outflow of rainwater and meltwater to the sewerage system (enhancing prevention of flash flood and drought phenomena).

Participation of civil society in this process (according to RRI principles) seems to be a crucial aspect at this stage but as described in State of Arts (see reference document), in most cases, the forms of cooperation between stakeholder groups or the ways of their involvement in climate actions were not provided in sufficient way in official documents. On the other hand, there are some good examples that deserve mentioning. One of them is “2030 Climate and Energy Plan” for the metropolitan area of Barcelona. It was designed, coordinated and disseminated via ordinary meetings held by a public administration resilience panel, the Metropolitan Panel for a New Energy Model and the Specialist Monitoring Committee for the Strategy, with the participation of all relevant agents, depending on the requirements of each meeting, between public administration of Barcelona and also with other policy makers, citizens, private sector, and industry (see Appendix 1).

Phase 3: Implementation of action plans (strategies) including various stakeholders' engagement activities

During this stage, all actions earlier planned are implemented into practice. Taking into account the general categories of challenges related to climate change and identified within PHASE 1 (see above) many types of actions devoted to acting against negative climate change effects could be listed from TeRRIFICA practice. A short catalogue of them is given below:

Within “*Limitation of greenhouse gases emissions*

level”:

- installation of photovoltaic systems (Barcelona - ES),
- heat generation from waste water (Oldenburger Muensterland - DE),
- introducing and increasing the share of rail public transport with the modernization of the fleet (Belgrade – SRB),
- leveling the age structure of the forest (increasing the proportion of mature stands and young stands) by regulating forest use and organizing sanitary logging and reforestation (Minsk –BLR),
- adopting governance system allowing flexibility, reversibility, stimulating innovation, within a coherent framework (Grand West – FR),
- thermo-modernization of buildings and development of passive housing (Poznań Agglomeration – PL).

Second challenge – “*Reduction of human impact on natural environment*” refers to actions directed not strictly to climate change issues but also to some broader aspects of environmental protection, i.e.:

- Implementation of flocks to facilitate forest management and fire prevention (Barcelona - ES),
- regulations made by the urban land-use/development planning (Oldenburger Muensterland - DE),
- development of green infrastructure (Belgrade – SRB),
- creating an economically feasible adaptive farming system in agriculture, characterized by the use of a reasonable alternation of crops and a rational structure of crop rotations genetically resistant varieties,

mixed crops, compliance with the optimal timing of agro-technical measures and phytocenotic measures to combat weeds (Minsk –BLR),

- reducing tourism impact on the environment (Grand West – FR),
- reduction of organic waste landfilling (use of organic matter produced by green infrastructure) (Poznań Agglomeration – PL).

And the last, but not the least challenge – *“Building environmental awareness among society”* was linked to actions like:

- awareness, training and environmental education for a citizen more committed to the fight against climate change (Barcelona - ES),
- intensive actions regarding awareness-raising and improving the acceptance of the actions (Oldenburger Muensterland - DE),
- dissemination of information and awareness raising, as well as other institutional and organizational measures (Belgrade – SRB),
- organizing international and national conferences and seminars (Minsk –BLR)
- unique lab for the energy transition, which will be in charge of governance of actions. Its role will be to assist and animate innovative projects of actors from civil society (Grand West – FR),
- ecological/environmental education in terms of low-carbon economy and climate protection (Poznań Agglomeration – PL).

All of these actions should involve broad scope of stakeholders. Not in every region it was possible to identify such approach but still there are some examples of good practices. One of them is Metropolitan Area of Barcelona, where

coordination and continuous dialogue with the companies and organizations was a part of developing the Strategy to redefine and revise the emission targets in accordance with the current or future lines of action, via each organization’s roadmap. Another good example is Territorial Energy Air and Climate Plan for Nantes (Grand West region), which includes special structures in order to foster the collaboration between stakeholders, including the implementation of citizen labs to create connections between initiatives or educational programs.

Phase 4: Formulation of relevant indicators set and evaluation of actions

The final phase of a model vision of local and regional processes related to or adaptable for climate action is the stage of evaluation, which requires designing the set of appropriate indicators and to create the suitable evaluation structures and bodies. Due to the fact, that analyzed strategic plans in pilot regions are currently during implementation phase, it is hard to conclude about their final evaluation. But it is possible to present the examples of set of indicators which are employed to measure the products/results/impact of actions in pilot regions:

- share of the private homes that will be energetically redeveloped until 2030,
- reduction of energy consumption in private homes until 2030,
- reduction of energy consumption by agricultural businesses until 2030,
- emissions reduction compared with 2005,
- total area of green-blue infrastructure solutions being introduced,
- ratio of green rail tracks length to the total length of the rail track system,



- length of newly established bike paths,
- ratio of public transport users to the total city population,
- count of the days in the year with over the limit concentration of PM 10 and PM 2.5,
- number of dwellings modernized to improve their thermal properties,
- number of buildings connected to the heat distribution network,
- number/floor area of newly established buildings with water retention functionality,
- city inhabitants' opinion about the living conditions (survey research),
- city inhabitants' climate change awareness level (survey research),
- renewable energy production.

Generally, the 'hard' effects of plans implementation seems to be covered with appropriate set of indicators, however the 'soft' effects are more complex. It is difficult to find the measures of public engagement in climate change affairs. What is more, only in the case of one region (Metropolitan Area of Barcelona) indicators of Responsible Research and Innovation (MoRRI) were mentioned as tools applied for strategic evaluation:

- OA1: Open access literature,
- GOV1: Use of science in policymaking,
- PE2: Policy-oriented engagement with science,
- OA3: Social media outreach/take-up of open access literature,
- GOV2: RRI-related governance mechanisms within research-funding and performing organizations.

This requires from regions more broad actions focused on promotion of MoRRI among the policy makers who are responsible for final shape of

climate actions strategies and plans. Their awareness in this context is one of the crucial factors for actions designing in the way that allows including various types of stakeholders. It is one of the challenges the TeRRIFICA project is going to take.

5. Co-creation for climate action – a need according to stakeholders

In Bonn Reflective Workshop held in February in January 2019 (see. 2. Methodology), stakeholders worked in groups on climate change topics: agriculture, education, water, air quality, and energy. Stakeholders, when coming to the barriers and solutions for tackling those specific climate change issues, have often underlined the need for more citizens' involvement and co-creation. For instance, the agriculture group identified "Labeling systems, multi-stakeholder panels and more control of lobbying" as key solutions for developing a climate friendly agriculture. The education group observed that "lack of awareness and absence of climate change in curricula" as one of the main barrier for climate action. The water group pointed out the conflict of interest between users on water and underlined that "Increasing Citizen input into public decision making" would improve the situation. On air quality, stakeholders identified the fact that habits, economical constraints and policies are not focused on climate change, which is a main barrier. They proposed as one idea for improving the air quality to implement a bottom up approach and include the needs of elders for transportation. Finally, the industry lobbying and their influence on public policy was seen as a key barrier for tackling climate change by the group working on energy, that should be solved by increasing input of citizens



in decision-making and acknowledgment of citizens and NGOs experience and expertise⁸.

Co-creation is definitely a crucial way implementing RRI as “people increasingly acknowledge that local, experiential or applied knowledge can enrich the quality and impact of investigations. The work is more responsive, socially relevant and connected to affected communities (Durose et al. 2018)”. Co-creation has also been adopted by the private sector as a way to get users’ inputs: “Collaborative development of new value (concepts, solutions, products and services) together with experts and/or stakeholders (such as customers, suppliers etc.). Co-creation is a form of collaborative innovation: ideas are shared and improved together, rather than kept to oneself⁹.” However, we understand in this deliverable co-creation as actively involving different stakeholders – NGOs and citizens, business, science, education and policy-makers - so that they share the decision-making power and co-produce knowledge. Co-production in RRI refers to “People [being] actively involved in knowledge production, usually alongside formally trained researchers (Wakeford and Sanchez Rodriguez 2018).” Therefore, co-creation means not only engaging stakeholders, i.e. involving stakeholders to collaborate with them, but also working together without hierarchy, from the beginning to the end.

TeRRIFICA core goal is to foster co-creation of local actors in order to develop innovative climate actions. In this sense, TeRRIFICA is contributing to achieve SDGs, especially SDG 17 – “Strengthen the

means of implementation and revitalize the global partnership for sustainable development¹⁰”.

This analysis of “Instruments and co-creation factors related to or adaptable for climate action” aims at knowing the starting point in the pilot regions, the level and modes of co-creation and social innovation path in the pilot regions. Are stakeholders already working together on climate change? How are they collaborating? Is there a room for co-creation and bottom-up approaches or are there difficulties?

Knowing the existing co-creation initiatives, instruments, and participation mechanisms allows pilot regions assessing the needs: where and how TeRRIFICA can insert itself in the existing initiatives in order to achieve its core goal – fostering co-creation?

The challenges, drivers and good practices to engage and co-create with multiple stakeholders are identified in the TeRRIFICA “Guide on Co-creation and Stakeholder engagement” (D4.1), as well as in the different success factors in the examples of academia/community partnerships in the “Case Studies Analysis” (D3.2). A mapping of stakeholders (D4.2) in the pilot regions in climate change will supplement the “Knowledge phase” of TeRRIFICA to further help the identification of key stakeholders in the region for climate mitigation and adaptation actions.

Pilot regions conducted an in depth analysis of the State of the art on climate change and co-creation in their local area. This synthesis will first focus on the processes of stakeholder involvement for developing public policies, i.e. reports and strategies on climate change (2); then, we will describe case

⁸ Minutes of TeRRIFICA First Reflective Workshop, Bonn, February 2019.

⁹ <http://fronteer.amsterdam/what-is-co-creation/>

¹⁰ <https://sustainabledevelopment.un.org/>



studies of projects including the collaboration of several types of stakeholders with different configurations, with a research aim or not (2).

Co-creation for policy-making on climate change

In all pilot regions, some reports, strategies and plans to adapt to and/or mitigate climate change have been developed; with some extent of involvement of stakeholders other than civil servants or governmental bodies.

In various cases, there has been cooperation between different policy levels and different administrative services in order to draw the report or policy.

Most generally, documents articulate a need for cooperation between different groups of stakeholders in order to implement the plan/strategy. There is what we can call a “downstream involvement”.

For instance, the Belarus [State program "Environmental Protection and Sustainable Use of Natural Resources"](#) for 2016-2020 states the need for cooperation between governmental bodies, regional and local authorities, civil society, scientific and pedagogical community, business, church, etc., including through holding international and national conferences and seminars and the implementation of international technical assistance projects.

Another common point in the strategies and reports, shown by this previous example, is that often the documents plan unidirectional communication to inform citizens and stakeholders, with at least information activities, dissemination plans, and sometime education. Responsible public

institutions develop the plan, and citizens are informed.

Also, several of these policies / reports have been designed with a public consultation phase. There is therefore an involvement of stakeholders upstream. Several public authorities included some participatory processes to consult on their climate strategies and plans. Consultation of stakeholders may be done with different processes, including online questionnaires, open contributions, workshops or ordinary meeting, such as in the Catalanian example.

For instance in Barcelona, [the Pla Clima i Energia 2030](#) (2030 Climate and Energy Plan) is a comprehensive and coordinated action between departments of the Metropolitan Area of Barcelona (AMB), services, City councils and dealers. Coordination, participation and dissemination has been carried out via ordinary meetings, with the participation of all agents involved depending on the requirements of each meeting, between AMB departments and also with other public administrations, citizens, private sector, industry, etc.

The Catalanian example shows also that this involvement and consultation can be continued to monitor and revise the plan in the longer term:

There is also a continuous dialogue with the companies and organizations involved in the Pla Clima Energia 2030 to redefine and revise the emission targets in accordance with the current or future lines of action, via each organization’s roadmap.



Some local authorities intend to include all stakeholders not only for giving their opinion on a written strategy, but to design at least some parts of the climate plans. Generally, workshops are used to involve stakeholders in that way. The aim is that involvement will broaden the expertise. [The Urban Climate Adaptation Plan \(UCAP\)](#) for the City of Poznań to 2030 (developed as one of 44 adaptation plans for the largest Polish cities with support of Ministry of Environment¹¹) showed that the open formula of the project with the involvement of stakeholders in shaping the UCAP allowed supplementing the expert knowledge with information obtained from specialists from various areas.

Indeed, the plan was designed with workshop gathering representatives of the City Hall, municipal companies (such as Public transport authority), representatives of the government, of universities, of residents and NGOs and entrepreneurs whose activities may be disrupted due to climatic risks. Workshop and consultation meetings were organized at particular stages of work on the Urban Climate Adaptation Plan. Other workshops also consisted in designing and implementing solutions for green and blue infrastructure for representatives of offices, housing co-operatives, property managers and residents.

Furthermore, in this example inclusion of stakeholder in adaptation activities and decision-making in the planning process enabled the simultaneous building of awareness and obtaining

acceptance for the actions indicated in the Adaptation Plan.

We observe in the previous cases that there is often a citizen consultation upstream - before the document is voted/finalized. However, we don't know on what extent citizens' inputs are incorporated into the final document, and thus we don't know the share of power left to citizens.

On sectorial aspects, the governmental bodies usually impulses an initiative but counts on the major actors to carry on the actions. Thus stakeholders are also invited to develop upstream the actions. This is the case of the French [Plan for the Development of Agroforestry](#), where all major actors of the agroforestry sector negotiated the design of the plan, under the lead of the ministry.

A strong mean to ensure the involvement of stakeholders in the design of the report/plan/strategy is to include them directly in the working group designing the plan.

The Serbian [Climate Change Adaptation Action Plan and Vulnerability Assessment](#) developed in 2015 is an example. The Working Group, who realized the whole project and who proposed the document, was composed of representatives of the city administration, the city public enterprises, relevant institutions, representatives of civil society, representative of Belgrade University and experts. The whole process was transparent and the citizens and the interested public had the opportunity to comment and participate.

It is indeed more likely that stakeholders input are taken into account and integrated into the final

¹¹ <http://44mpa.pl/?lang=en>

document if the whole process is led by a multi-actor group.

To conclude, the examples from the pilot regions show that most of governmental bodies and local authorities are including some form of stakeholder's involvement in either designing the strategies/plans/reports, either implementing the actions, or both. Participatory mechanisms are being experimented, mainly by local and regional authorities, in order to engage more with citizens – consultation workshops in the design phase, stakeholder involvement in the working group responsible for leading the project etc.

However, the examples do not allow us to analyze on what extent policies are co-created, if we understand co-creation as not only involvement but also a share of power between citizens and governmental bodies (Arnstein 1969). Indeed, as one stakeholder group stated in Paris third Reflective Workshop, there are no existing institutionalized participatory procedures except consultation. Public authorities might experiment co-creation processes, which are not institutionalized, but the pilot regions examples do not allow demonstrating a share of power.

Co-creation in climate initiatives with multiple-stakeholder involvement

The state of the art research included an overview (non-exhaustive) of ongoing initiatives carried on by CSOs, local authorities, academia and businesses on climate change and involving multi-actor collaboration. Partnerships include CSO-academia, company-local authority partnerships, government/CSO/academia, and sometime more stakeholders covering a large spectrum of the quadruple helix. The summaries of the cases studies

of each pilot region are in appendix 1. Even though the pilot regions are very diverse, the reading of the various case studies, and especially the form of communication and collaboration between partners in each case, allow us to draw some general comments and common points.

Several projects on climate change led by CSOs, especially in Minsk and Belgrade pilot regions, aim at **reinforcing the cooperation between stakeholders and networks of civil society actors**, in order to strengthen the capacity of CSO to influence policy-making on climate change.

For instance, the Belgrade Open School (BOS) is a nonprofit educational civil organization. The BOS conducted the project “Involving civil organizations in the process of climate change adaptation in local communities in Serbia”. The goals were amongst others to improve the capacity of 30 civil organizations for climate change adaptation and to initiate networking processes between civil organizations. The project was aimed at civil organizations that have the capacity to be involved in the process of decision-making and can enhance the process of climate change adaptation in their local communities.

Secondly, many initiatives are **focused on education on climate change**. Citizens are receiving trainings and information. Educational projects may be done in cooperation between educators and universities or CSOs.

For instance in Catalonia, [SOMBLAU](#) is a project developed by environmental and academic entities that was created with the aim of promoting education in climate



change, as well as improving the communication of its effects on the marine and coastal ecosystems of the city of Barcelona. SOMBLAU will involve workers in the education sector, different social agents, communication professionals and other key actors, thus promoting a multi-sectoral and transversal fit.

As another example from Germany, the [“Project day for climate ambassador schools”](#) aims at planting trees to create a mixed forest more resilient to windstorms, in collaboration between Waldpädagogikzentrum [forest education centre] Weser-Ems and schools.

Thirdly, we can observe that only a small part of projects intends to co-create between stakeholders through **co-production of knowledge/participatory research**.

For example, [Clima-East¹² in Belarus](#) is a CSO / Academia project. The overgrowing of peat lands with shrubs, undergrowth and reeds threatens the unique biodiversity of wildlife reserves. To restore the natural landscape, it is necessary to regularly remove excess vegetation. The resulting biomass can be partially replacing fossil fuel, by using biomass as fuel. The project is aimed at effective and inclusive (with wide engagement of civil society) environmental management, monitoring of environmental risks, and the exchange of environmental

information, in particular, in the field of atmospheric air.

Also, in some pilot regions initiatives, there are co-creation aspects or bottom up approaches in the design phase: the first people concerned are **not only participating in the project, but also deciding and designing the actions**.

Participatory budget is one example tool to allow citizen to get at least a share of the decision power. For example, the project [“100 trees for Lazarz”](#) in the City of Poznań was prepared by citizens (including cost estimate), whilst the local government was in charge of planting appropriately selected species of trees, the exchange of ground and getting rid of old roots; paving works around the tree and repairing the pavement destroyed by cars; and financing the project.

Finally, several pilot regions leaders noticed strong collaborations and existing networks on climate change. However, **these collaborations are not necessarily formalized as co-creation** because actors do not realize they are co-creating. Therefore actors don't necessarily work on strengthening in a systematic way the co-creation aspects.

For instance, the project [Label Bois Bocager Géré Durablement](#) (Label Timber Bocage Sustainable Management), which aims at ensuring the very existence of hedgerows in the rural territory, and fostering a sustainable management so that hedgerows are able to ensure eco-systemic services, is gathering all actors along the chain – from national and regional actors to farmers groups who contribute to the designing of

¹² “Conservation and sustainable management of peatlands in the Republic of Belarus to reduce carbon emissions and adaptation of wetland ecosystems to climate change”

the tools, and test the tools directly on the field through field-trips.

The project therefore clearly includes co-creation aspects, whereas it seems that actors don't clearly "label" the project as a co-creative one. Yet, it is likely that formalizing and analyzing the co-creation approach can either help improving even more the co-creation process or allow capitalizing good practices that could be used by others.

Conclusion on co-creation:

The state of the art analysis allowed pilot regions leaders to have an overview of the co-creation mechanisms already in place, through existing co-production of knowledge initiatives, or bottom up projects. However, the overview also reveals some needs of co-creation. For instance, for defining strategies, public consultation is the most common used mechanism. Yet, co-creation requires the participation of citizens and concerned actors from the beginning, and implies that participants get a power share to ensure their ideas and needs are truly incorporated. In the pilot regions case studies, we were not able to determine at which steps stakeholders were involved; and most important, if their views were incorporated.

Regarding climate change projects, many approaches focus on citizens' education or building networks. Others are using co-production of knowledge or multi-sectorial collaboration as a mean for climate action. However, we don't know on what extent actors have the opportunity to collaborate at each steps of the project. Furthermore, there are existing networks and groups working together which are not aware of doing co-creation.

Therefore, we see **two different strategies emerging for TeRRIFICA project in order to foster co-creation as a mean of developing innovative climate action:**

1. **Strengthening existing cooperation relationships**, by growing the networks and bringing more reflexivity on participatory processes, with the aim of reaching co-creation processes;
2. **Gathering actors to develop new collaborations and experiment co-creation methodologies** to demonstrate that co-creation can be a mean of tackling climate change.

TeRRIFICA goal is to foster co-creation to improve and develop climate action, on the assumption that co-creation is a powerful mean of action. Nevertheless, participatory mechanisms may be manipulated to oust divergent opinions (Arnstein, 1969). Further analysis of the impact of co-creation on developing effective climate actions is needed.



Bibliography

Scientific articles:

- Arnstein, Sherry R. (1969). A Ladder Of Citizen Participation, *Journal of the American Planning Association*, 35: 4, 216–224.
- Bernaciak, A., and Spychała, M. (2007). Programowanie ochrony środowiska w gminie, czyli jak skutecznie zaplanować i wdrożyć gminny program ochrony środowiska, 1st Edition, Wyd. Sorus, 163 pp. (in Polish).
- Castells-Quintana, D., del Pilar Lopez-Urbe, M., McDermott, T. (2015). Coping with climate risk: the role of institutions, governance and finance in private adaptation decisions of the poor. Centre for Climate Change Economics and Policy Working Paper No. 225.
- Durose C., Perry P., Richardson L., (2018). Craft metrics to value co-production. *Nature*, vol. 562, p.33
- Hall, P. A. (1993). Policy Paradigms, Social Learning, and the State: The Case of Economic Policymaking in Britain. *Comparative Politics* 25, 275–296.
- Huang-Lachmann, J-T. and Lovett, J. C. (2016). How cities prepare for climate change: Comparing Hamburg and Rotterdam. *Cities*, 54, 36–44.
- Næss, L. O., Bang, G., Eriksen, S., & Vevatne, J. (2005). Institutional adaptation to climate change: Flood responses at the municipal level in Norway. *Global Environmental Change*, 15(2), 125–138.
- North, D. (1991). Institutions. *Journal of Economic Perspectives* 5, 97–112.
- Paterson, J. J. (2018). Adaptive cities? Institutional innovation under climate change: A global survey of 96 cities. April 2018. Institute for Environmental Studies (IVM), VU University Amsterdam, and Open University of The Netherlands.
- Powell, W. E., and DiMaggio, P. J. (Eds.) (1991). *The New Institutionalism in Organizational Analysis*. University of Chicago Press, Chicago, IL, 486 pp.
- Somanathan E., T. Sterner, T. Sugiyama, D. Chimanikire, N. K. Dubash, J. Essandoh-Yeddu, S. Fifita, L. Goulder, A. Jaffe, X. Labandeira, S. Managi, C. Mitchell, J. P. Montero, F. Teng, and T. Zyllicz, 2014: National and Sub-national Policies and Institutions. In: *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- Tol, R. S. J. (2005). Adaptation and mitigation: Trade-offs in substance and methods. *Environmental Science & Policy*, 8(6), 572–578.
- Wakeford, T. and Sanchez Rodriguez, J. (2018). Participatory action research: towards a more fruitful knowledge. In: Facer, K. and Dunleavy, K. (Eds.) *Connected Communities Foundation Series*. Bristol: University of Bristol/AHRC Connected Communities Programme.



Websites:

<https://sustainabledevelopment.un.org>

<http://fronteer.amsterdam/what-is-co-creation/>

<https://www.eea.europa.eu/airs/2018/environment-and-health/climate-change-adaptation-strategies>

https://ec.europa.eu/clima/sites/clima/files/adaptation/what/docs/summary_fiche_fr_en.pdf

https://ec.europa.eu/clima/sites/clima/files/adaptation/what/docs/summary_fiche_de_en.pdf

https://ec.europa.eu/clima/sites/clima/files/adaptation/what/docs/summary_fiche_pl_en.pdf

https://ec.europa.eu/clima/sites/clima/files/adaptation/what/docs/summary_fiche_es_en.pdf

<http://prawo.sejm.gov.pl/isap.nsf/download.xsp/WMP20150001235/O/M20151235.pdf>

Grey literature:

Leaflet of the National Office for Hunt and Wild Fauna

<https://afac-agroforesteries.fr/wp-content/uploads/2018/05/Bocage-et-biodiversité-V4.pdf>



Appendix 1 – Summaries of Pilot regions state of the art on climate change local context and multi-stakeholder climate initiatives

Vechta and South Cloppenburg pilot region – Germany

Description of the region

The German pilot region “Oldenburger Muensterland” consists of the two counties Cloppenburg and Vechta and is located in the north-west of Germany, in the federal state Lower-Saxony. Regarding road network, the region is conveniently placed at a north-south axis. The public transport network is only poorly developed. In contrast to many other rural areas in Germany, the Oldenburger Muensterland still records a population increase. From an economic point of view the agriculture and food sector plays a major role in the region with well-connected production, distribution and processing centres. Almost 70% of the whole pilot region areas are dedicated as agricultural area. The Oldenburger Muensterland has the highest concentration of processors of intensive animal farming in Germany. Hence, a particular focus in this pilot region is set on the meat production value chain (pork and poultry) with all related climatic challenges.

Climate change adaptation strategies are emerging slowly in the Oldenburger Muensterland. However, the consciousness for climate change mitigation and adaptation can still be improved. Current actions comprise public tree planting and education for Sustainable Development/ climate change education in schools. Local governments start programs in order to reduce energy consumption. Several cities in the pilot regions started to employ local climate protection managers.



Climate change in the region

The climate challenges probably mostly affecting the stakeholders in the Oldenburger Muensterland are longer and more intensively occurring heat waves as well as massive rainfalls. Subsequently, it is important to find innovative solution for water management as well as for standing high temperatures over longer periods. In the Oldenburger Muensterland there is no coordinated concept developed until now, how to handle these challenges. Several cities and one of the two counties worked on climate protection plans; climate change adaptation was only mentioned very briefly. Regarding climate mitigation, the main focus is set on energy saving to reduce the CO₂-emissions. The regional innovation system is slightly addressed by local annual “Climate protection awards” initiated by some of the cities. There is no institutional framework especially for the pilot region, but nearby at the Carl-Ossietzky University of Oldenburg there is the Network for Innovation and Entrepreneurship in Times of Climate Change located that also supports businesses in the pilot region. Some cities have their own “round tables” as an exchange forum for stakeholders but on the level of the counties there is no coordinated exchange platform yet.

Summary of climate change initiatives

In the Oldenburger Muensterland, several projects has already been initiated regarding climate change adaptation and mitigation. Especially, the national funding initiative “KLIMZUG” (2008-2014) of the National Environment Agency led to a high increase of started projects. In northwest Germany, the joint project “Northwest 2050” was started with the motto “Perspectives for climate adapted innovation processes in the metropolitan region Bremen-Oldenburg in the northwest”. Within this joint project, many SMEs in the regions initiated climate adaptation projects (such as the Schweinezucht Lutten GmbH & Co.KG) together with a research partner from the University of Oldenburg. In the following years, fewer new projects arose, even though there are still several funding initiatives by the federal ministries as well as by the ministries of Lower Saxony.

Right now, some municipalities decided to newly employ climate protection officers and to start working on climate protection strategies. This might be a new stimulus for the region regarding climate action. Especially, the intensified networking of local actors in the field of climate action is seen as an important factor to ensure a more coordinated way of project planning and implementation.

Overall, the existing projects can mainly be classified into three categories: specific innovations for local businesses regarding climate change adaptation, reduction of energy consumption to reduce CO₂-emission and thus support climate change mitigation, and capacity building among different stakeholder groups regarding both climate change adaptation and mitigation.



Minsk pilot region – Belarus

Description of the region

Minsk is the capital of Belarus, it is an independent administrative-territorial unit. The largest political, economic, cultural and scientific centre of the country. It is the core of the Minsk agglomeration. The tenth most populated city (excluding the suburbs) in Europe. The city is located close to the geographical centre of the country and stands on the Svisloch River. The area is 348.84 km², the population is 1,992,685 people (at the beginning of 2019), excluding the suburbs.

Minsk is located on the southeastern slope of the Minsk Highland, which has a moraine origin. The average height above sea level is 220 m. The climate is temperate continental, with significant influence of the Atlantic sea air. The average daily temperature in July is + 18.5 ° C, in January is –4.5 ° C. Winters are mild, with frequent thaws.

Minsk is the largest economic and industrial city of Belarus. The total amount of tax revenues is about half of the total amount in the country. The city produces 18.8% of industrial products throughout the country. There are the largest assembly enterprises, enterprises of food and light industry, enterprises of cosmetics, etc. Minsk is a modern, dynamically developing city that forms more than ¼ of the GDP of Belarus.

The industry of Minsk takes an indisputable leadership in the republic in the production of refrigerators (100.0% in the republican output), internal combustion engines for cars (98.7%), woolen fabrics (100.0%), trucks (97.6%), tractors (81.2%), buses (98.8%), trolley buses (100%) etc .

Minsk is the largest transport hub of Belarus. It is located at the intersection of transport corridors linking Russia with Poland and Ukraine with the Baltic states. The city accounts for about 30% of rail passenger traffic in the country, 20% of road freight transport for import and 40% for export.



Climate change in the region

The most polluted areas of the city of Minsk are primarily the Zavodskoy and Partizansky districts, the Shabany microdistrict, as well as certain sections of the Oktyabrsky district and the city centre. More than 35% of the territory of Minsk is in the “unfavorable” zone.

It covers the centre, south and south-east of the city, extending southwards to the capital's suburbs. The quality of atmospheric air in cities and areas of their influence depends primarily on the quantity and quality of pollutants emitted by various sources, their relative location and meteorological conditions of the area.

The high industrial potential of Minsk (more than 200 enterprises polluting the atmosphere) and a highly developed transport network with a high population density creates environmental tensions in the city. Minsk is among the cities with a high density of emissions of harmful substances per unit

area. Extremely dangerous enterprises include CHP-4, Minsk Automobile Plant and Minsk Tractor Plant, the emissions of which can reach 10,000 tons per year. CHP-4 runs on fuel oil and natural gas. Sulfur dioxide (52.3%), nitrogen oxides (37.3%) and carbon monoxide (9.7%) predominate in its emissions. Solid dust particles - 0.7%. The CHP-4 is located west of the city behind the ring road. Given the prevalence of western air in the Minsk district (southwestern, westerly and northwesterly winds make up 50% of the annual wind structure), the location of the most dangerous source of air pollution to the west of the city must be considered extremely unfortunate. The structure of MAZ emissions is dominated by carbon monoxide (62.8%), particulate matter (10.7%), xylene (9.4%), toluene (5%). The main sources of emissions at the enterprise are foundry, forging, thermal, galvanic, welding and painting production. The structure of emissions of MTZ is similar to the structure of emissions of MAZ: carbon monoxide - 61%, solid dust particles - 17.3%, solvent - 11.7%.

The share of these three enterprises in the air pollution of the city is more than 20%. The following enterprises pose a serious danger: CHP 3, Minsk Heating Equipment Plant, boiler plants of the Minsk Heat Supply Network, Minskstroyaterialy, a refrigerator plant, a motor plant and CHP-2.

Sources of dust emissions are located mainly in the eastern, south-eastern and south-western sectors of the city and in its central part. Naturally, it is in these areas of the city near industrial enterprises that the greatest deposition of heavy metals on soils and vegetation can be expected. And as in the conditions of cities, industrial enterprises are either mosaically located among residential areas, or are grouped into industrial zones, the distance between enterprises is often small. As a result, the habitat pollution increases.

The main suppliers of dust to the atmosphere of the city are MTZ, MAZ, heating equipment plant, road-bridge construction management number 5, a plant of gypsum and gypsum products, an experimental plant for recycling household waste. The dustier air in the area of "Avtozavod" (about 2 times compared with the rest).

In areas of industrial enterprises, where more than 60 thousand people live in sanitary protection zones, despite the decline in production rates, the unfavorable ecological situation continues to exist. Meanwhile, the pace of development of territories reserved for landscaping is completely inadequate in the city, the structure and continuity of green areas are disturbed.

According to town planning norms, 40–60% of the urban area should be occupied by green spaces, which create a favorable microclimate and help reduce air pollution. However, in Minsk, urban greening is far behind the pace of modern residential and industrial construction. Thus, according to reference data, 63.2 m² of green space falls on one inhabitant of the republic, including 23.6 m² of common use. In Minsk, these averages are almost 2 times lower.

On January 1, 2018, 8 small business incubators were opened in Minsk. Residents of incubators are provided with office and production premises for rent at a reduced rate, information and consulting support is provided. The total area of the premises of incubators in 2017 amounted to 16067 sq. meters (in 2016 - 14062.2 sq. meters). The number of residents of incubators at the end of 2017 amounted to 262 small businesses.

An innovative industrial cluster of high technologies in the field of complex medical equipment, security



systems, non-destructive testing equipment and analytical instrumentation with the conclusion of an agreement on cooperation of cluster members has been formed. The cluster includes 7 organizations of the Republic of Belarus, the Russian Federation, the United Kingdom, the United States and China. In 2017, the state registration of the Association “Innovative Instrument Engineering” was carried out, which is based on the principles of the cluster structure. The initiators of the creation were five instrument-making organizations in Minsk.

Summary of climate change initiatives

- **Green Cities Framework - Green Cities Action Plan for the City of Minsk** is a project to provide the European Bank for Reconstruction and Development (EBRD) with an instrument to address multiple urban issues in a more systematic way in the City of Minsk with use of a specific EBRD GCAP methodology for the development of the Green City Action Plan (GCAP) for the City of Minsk. The aim is that GCAP is not simply a reference document, but a living plan which will be regularly reviewed and more importantly meaningfully implemented in the coming years.
- **Covenant of Mayors East II objective** is to continue support and encourage local and regional authorities in the EaP region to achieve and implement a more sustainable local energy policy, reducing their dependency on fossil fuels, improving security of their energy supply, and allowing them to contribute more actively to climate change mitigation and adaptation.
- **Strengthening the covenant of mayors movement in Belarus**, has for main goal of the project is to improve capacities of civil society organizations (CSOs) in interaction with local authorities and other stakeholders for the Covenant of Mayors implementation (including adaptation and mitigation) and initiation of new Signatories. The project empowers local authorities to implement successfully their current Covenant engagements in cooperation with local civil society organizations and other stakeholders. An important component of the project is strengthening CSOs networking and policy in the dialogue with national authorities on issues connected with energy and climate change.
- **Reclamation of quarries in the Minsk region as a method of restoring degraded land and contributing to mitigating the negative impact of climate change:** The project proposes to reclaim old quarries with afforestation of territories and the creation of grass cover on degraded lands. Based on his example, a system has been developed to prevent the use of sites as landfills, and experience is spread in other regions of Belarus.
- **Engagement public in ecological monitoring and improving the management of environment protection on local level:** Air is one of the most important parts of our world. Harmful substances that get into the air can cause irreparable harm to our health, therefore public attention is paid to monitoring the quality of atmosphere air. Actions include: trainings for teachers, a call for local initiatives (civil society organizations, consultants and partners), establishment of 7 environmental monitoring clubs, support for environmental forums with civil society organizations and other partners, support



for the activities of the Aarhus centres, an extensive educational campaign (creating videos on participation civil society in environmental decision-making)

- **SAVE ELNYA TOGETHER!:** Restoration of one of the largest highland wetlands in Europe, seriously affected by the perennial fires caused by the drying of the upper peat layer, began manually due to the inability to use heavy equipment in the wetland area. The initial goal of the project was to build natural material dams to retain water in peat. The second stage is the construction of 46 cascade dams on the widest channels. The third stage is ecological education of the local population of the region.
- **Braslav district – the first climate neutral municipality in Belarus:** Development of a roadmap of transforming Braslav district into a climate-neutral municipality by 2030; involving of local population into converting Braslav into climate-neutral municipality; sharing Braslav experience among other municipalities and relevant stakeholders in Belarus and other countries.
- **PubLiCity: Energy Efficient Modernization of Public Lighting in the City of Polotsk:** Main challenge – to reduce energy saving in public lighting, thus reducing CO2 emissions by the city. 1570 modern LED street lights, some of them solar-powered, and new decorative lighting will be in operation in 18 central streets and avenues of Polotsk by the end of 2019 to result in energy savings of 1920 MWh and reduced CO2 emissions of 880 tons per year.
- **Cross-border Water Inspectors: Towards Joint Monitoring and Development of Water Resources of the Pripyat River Basin,** with objective of creating joint-cross border

system of public monitoring and management of small rivers and water resources of the Pripyat river basin in the Pinsk (BY) and Liubeshiv (UA) districts.



Poznań Agglomeration pilot region – Poland

Description of the region

As one of the oldest and largest Polish cities, Poznań is the historical capital of the Wielkopolska Region where the Polish State was born over 1,000 years ago. Today Poznań is an important national and European centre of trade, culture, higher education and science; it is also one of the leading Polish cities in terms of its economy. Its geographic and communication location in Europe and in the country provides the city with a privileged position. Poznań is the meeting place of west-east and north-south transportation routes, including the pan-European transport corridors from Berlin to Moscow and from Gdańsk to Prague. The city is situated half way between Berlin and Warsaw, 160 km from the Polish-German border.

Poznań agglomeration is comprised of Poznań and the 17 neighboring communes forming a system of two rings surrounding the city and is characterized by a highly urban character of outlying areas, huge demographic potential with possible migration areas, a buoyant and developed labor market, dynamic economy, established transportation network and a high level of attractiveness for tourism. The region benefits from rich natural resources, as 28% of the total region's area is legally protected. In the metropolitan area layout, the characteristic wedge and ring system of greenery can be distinguished. The main green wedges extend from the suburban area to the city centre along the Warta river valley and its tributaries, and along the post-glacial valley of 70 lakes.

Poznań agglomeration has developed & implemented a common development strategy and sectoral policies, including social issues management, water and sewage management,

waste management, adaptation and mitigation of climate change, flood protection and rainwater management.



Climate change in the region

Analysis of changes in climatic and hydrological phenomena carried out within the last 30 years has shown that the most important threats associated with climate change include:

- increase in average annual air temperature and intensification of the effect of urban heat islands
- increase in the frequency of extreme events: heat waves, cold waves, droughts, intense rainfalls and associated flooding, flood threats, strong winds and storms.

These phenomena, especially in heavily urbanized areas, are accompanied by an increase in low emissions, which is a consequence of obsolete heating technologies on the one hand and uncontrolled and chaotic suburbanization on the other hand.

According to predictions, in the perspective of 2030 one should expect a deepening of climate change trends, therefore the city should create spatial,

social and economic structures prepared for these phenomena.

In urban policy, the most important documents in the climate change area is The Urban Climate Adaptation Plan for sectors and areas sensitive to climate change. The plan challenge, along with the institutional and organizational activities increasing the resistance of cities to extreme events, was to improve the awareness, safety, and comfort of residents in the conditions of a changing climate. Residents of the agglomeration see the greatest threats in exceeding the permissible concentrations of PM10 and PM 2,5 and the harmful effects of smog on health. This creates a wide range of opportunities to use social activity in the counteracting climate change, which consists in ceasing the use of fossil fuels and thus reducing CO₂ emissions. Also in urban policy, improving air quality is the most important challenge, and the implementation of a low-emission economy (reducing energy consumption, increasing the use of renewable energy and reducing emissions in the agglomeration) has been recognized as a priority area for action. Necessity and challenges are shaping the policy of urban development, which will take into account new climatic conditions and adaptations to climate change, in the water management, with particular emphasis on complex approach to rainwater and meltwater management. A comprehensive approach focuses on improving the water management system in the conditions of excess water (floods, flooding) and water scarcity (droughts). It is recommended to increase the share of areas absorbing water excess, delaying the outflow /slowing down the flow, retaining water as: polders, water storage reservoirs, green areas and soils with large water capacity, replacing sealed surfaces with permeable. Another group of activities is the restoration of degraded green areas as well as

water reservoirs and their utility functions, with particular reference to small retention.

The weaker party is the operationalization of the above-mentioned activities, limited to the identification of entities responsible for the implementation of tasks, the financing framework, indicators monitoring the implementation of goals set in urban policy without indicating specific mechanisms for implementing these activities.

Summary of climate change initiatives

Present challenges for Poznań Agglomeration are reflected in a new urban policy development and take into account climate change adaptation and mitigations actions. The most pressing problems indicated by research are the following:

- Air quality - threats in exceeding the permissible concentrations of PM10 and PM 2,5 and the harmful effects of smog on residents health
- Water management- systematic and complex approach to rainwater and meltwater management
- Spatial planning - supporting investments in green infrastructure (including forests, river valley vegetation, parks, other biologically active areas) that provide a range of regulatory services.

The following actions, programs or projects are planned for Poznań Agglomeration to reduce the negative effects of the climate change and to adapt to them:

- Reducing CO₂ emissions in Poznań Agglomeration (especially in the housing and transport sectors), improving air quality, implementing of a low-emission economy



(reducing energy consumption, increasing the use of renewable energy).

- Information and education activities aimed at raising the climate change awareness among citizens. They include above all the dissemination of knowledge about threats related to climate change, their consequences, appropriate and inappropriate behaviors in the situation of threats, best adaptation practices and activities in the field of information and warning with special attention to sustainable water management in the city.
- Establishing cooperation between stakeholders involved in climate change adaptation and mitigation actions organisation of exercises of emergency services, funds raising, updating spatial planning documents, the establishment of one organizational unit capable to plan and coordinate activities in the field of water management.
- New investments in developing/protecting green areas (activities particularly in the city centre and districts with tenement housing) or "grey"solutions (buildings, modernization of facilities and systems, switch of sealed surfaces by permeable).
- Promoting the Poznań Agglomeration as one of the European leaders in the field of innovation and implementation of nature based solutions (NBS) - inspired, supported and based on green and blue infrastructure, which significantly influence the adaptation to climate change, as well as the high quality of life of residents.

The exchange of experiences between stakeholders takes place within regular/periodic workshops (design and implementation of green-blue

infrastructure solutions) and consultations. It is recommended to develop and strengthen dialogue & cooperation between the inhabitants of the region and policy makers infrastructure managers, social organizations and entrepreneurs. The inclusion of all significant stakeholders in the decision-making process would be an opportunity to improve the effectiveness of climate actions and would secure a greater impact. The growing involvement of local government units, NGOs and CSOs in national and international projects would also a further opportunity to exchange experience and transfer best practices to the local level.

The factor limiting the effectiveness of actions in the field of climate adaptation and mitigation in Poland is still an important role of coal in the energy sector. More decisive interventions for the decarbonization of this sector will be decisive for further progress in the field of climate change in this region of Europe.



Metropolitan Area of Barcelona pilot region – Spain

Description of the region

The Barcelona metropolitan area (from now on AMB) (Catalan: Àrea metropolitana de Barcelona, Spanish: Área metropolitana de Barcelona) is a metropolitan area in Catalonia, north of Spain, centered on the city of Barcelona. The metropolitan area occupies a strategic position in southern Europe, in the middle of the Mediterranean corridor that connects Spain with the rest of the continent. This privileged position has allowed it to become the epicentre of Catalonia. Its territory includes the agricultural areas of Llobregat Delta, the fully urbanised areas of the Barcelona plain and the large green areas of the massifs of Garraf and Collserola and Marina mountain range.



The metropolitan area of Barcelona is home to 3,239,337 people in a territory of 636 km². The metropolitan territory of Barcelona represents one of the largest metropolitan areas in Europe and occupies the eighth position in terms of population (Source: Eurostat: metropolitan regions. Eurostat, 2012). Approximately half of the region (48%) is built land and the rest is occupied by forests and agricultural and natural areas. The metropolitan area of Barcelona is the core of economic activity in the region of Barcelona, as well as of Catalonia. The

metropolitan area concentrates 50.9 % of production (GDP) and workers of Catalonia. AMB a supra-municipal administration has an explicit competence in the coordination and formulation of measures against climate change (Law 31-2010, from the 3rd of August, of the 'Àrea Metropolitana de Barcelona, article 14, section E subsection a).

Climate change in the region¹³

Most important climate challenges indicated by local/regional strategy or scientific regional agendas:

The [Third report on Climate Change in Catalonia](#) identifies and foresees several (geological, socionatural, meteorological) challenges of climate change in Catalonia:

- Heat waves, cold waves, snow and frost
- Extreme rainfall
- Flooding
- Drought
- Forest Fires
- Landslides
- Avalanches

These challenges have direct and indirect effect on the biodiversity of the region as well as on the lives of the population of Catalonia and the Barcelona metropolitan area.

The metropolitan area of Barcelona, as in the rest of the major contemporary urban agglomerations,

¹³ Although the “region” we have chosen for this pilot is the metropolitan area of Barcelona, it cannot be fully understood without taking into account the policies and strategies existing at the regional level, i.e. the Autonomous Community of Catalonia. We have therefore opted to include in this state of the art document several initiatives and policies that go beyond the metropolitan area of Barcelona.

faces several environmental challenges, both global and local, derived from its own operation. It is in the metropolises where most of the planet's natural resources (energy, water, materials) are consumed and where a large part of greenhouse gas emissions (main responsible for climate change) and waste (urban solids, wastewater) are generated.

In this context, during the last years, the AMB has been making the improvement of the urban and environmental metabolism a transversal element of the set of policies and services of the metropolitan administration with the aim of reinforcing and guaranteeing the sustainability and resilience of the metropolitan territory.

This objective, which informs all the actions of the Environment Department, has been specified in actions such as:

- The improvement of the protection of natural resources and the metropolitan green infrastructure.
- The continuous improvement of efficiency in the use of basic resources, like water and energy
- The application of the principles of the circular economy in the management of municipal waste
- The fight against climate change and its adaptation to its effects and in the promotion of sustainable economic activities that must lead to the improvement of innovation
- The creation of jobs and the promotion of inclusive sustainable forms of development.

All of the activities by the Environment Department are essential and raised from a holistic and transversal perspective in order to favor the

transition towards a more resilient metropolitan area and with a greater adaptive capacity that becomes a city of reference in the international context.

In this area, three main lines of action are:

- Transform the metropolitan city into a leader in the fight against climate change and atmospheric pollution.
- Develop water supply, supply and treatment in a balanced and socially just manner.
- To move towards a circular economy in the field of waste.

Culture of innovation and institutional framework of the regional innovation system

The AMB is the public administration of the metropolitan area of Barcelona, a large urban conurbation made up with 36 municipalities.

The metropolitan area is a territorial, social, demographic, economic and cultural fact that has been forming over the last century, as a product of the growth and connection of urban systems around the city of Barcelona. It is the largest metropolitan conurbation in the western Mediterranean, which generates half of the GDP in Catalonia.

The public metropolitan administration has as some of its objectives:

- The will to transform the metropolitan area into an intelligent city, where the use of new technologies can offer more and better services to citizens in an environmentally, socially and economically sustainable environment.
- The work of the AMB in environmental preservation is focused on natural areas,



such as Collserola, as well as activities for the recovery and regeneration of Besòs and Llobregat rivers.

- The AMB manages 30 km of metropolitan beaches, from Castelldefels to Montgat, and develops a comprehensive maintenance of a network composed of 51 metropolitan parks.
- The metropolitan area of Barcelona is recognised as the most dynamic metropolitan conurbation of the Euromediterranean area. It shows its commitment to mobilise the skills and knowledge to increase our international presence, strengthen economic activity and attract people and innovative activities.
- The AMB gains competencies in the area of economic and social development, in order to promote economic activity and strategic planning, and to promote employment and entrepreneurship.
- Cohesion and territorial balance, water cycle, waste and environment (already in place since 1987).

The regional **Strategy for the Smart Specialisation of Catalonia (RIS3CAT)** defines the framework within which the Catalan Government establishes research and innovation (R&I) priority actions and programs over the 2014-2020 period and provides support for the generation and development of innovative projects. The RIS3CAT Action Plan has a budget of more than 400 million euros from the European Regional Development Fund (ERDF).

RIS3CAT establishes four strategic objectives:

1. To modernise the business fabric by improving the efficiency of production processes, internationalisation and the

reorientation of consolidated sectors towards activities with greater added value;

2. To promote new emerging economic activities through research and innovation to create and develop new market niches;
3. To consolidate Catalonia as a European knowledge hub and link technological and creative capacities to existing and emerging sectors in the territory;
4. To improve the overall Catalan innovation system, increasing the competitiveness of companies and steering public policies towards promotion of innovation, internationalisation and entrepreneurship.

a) SOMBLAU project

SOMBLAU is a project developed by environmental and academic entities that was created with the aim of promoting education in climate change, as well as improving the communication of its effects on the marine and coastal ecosystems of the city of Barcelona. With a global perspective but with a local focus, the creation of strategies for adaptation and mitigation of climate change through communication and environmental education of the city's youth will be fostered, with the aim of raising awareness and training on the effects of climate change in Barcelona. The project is executed from different perspectives and sectors involved in formal and non-formal education. The educational bases for climate change will be reviewed, addressing key points such as the integration of this in academic curricula, education in extracurricular areas and the development of new strategies from traditional media and entities that have competencies in the world of environmental communication.

SOMBLAU project emerges from the cooperation of different entities of civil society and the academic



sphere: Eco-union, Posidonia Green Project and Institut de Ciències del Mar, which work in the fields of scientific dissemination, public education, environmental and marine research.

b) Climate Change Challenge

An initiative that combines two research institutions (Universitat de Barcelona and ISGlobal), public administration (Barcelona City Council) and students. The overall objectives are:

- Transforming common spaces: since from data gathered conclusions can be drawn to allow urban planning with a climate dimension and evaluate how mobility, green areas, etc. affect urban quality of the city.
- Collective construction: since this initiative has a strong awareness raising objective and it emphasizes the collaboration between agents, communication towards citizenship and social and environmental innovation, with a strong scientific component.

c) RESCITIES: The political ecology of urban resilience to hydro-climatic events in Spain

This initiative combines a research institution (IN3 - Universitat Oberta de Catalunya) and the City Council of Barcelona. Although the central goals are not about climate adaptation and mitigation, there is a strong connection between their objectives and climate action with a co-creation approach. The main goals of this project are:

1. Examine how urban resilience strategies and policies are connected discursively and in practice with other urban policies, such as climate change and smart cities policies.
2. Analyse how urban resilience is articulated with socio-environmental strategies of management and transformation created with and by citizens.

3. Analyse the impacts of the strategies and policies of urban resilience on vulnerable communities.
4. Explore the tensions and challenges of the design and implementation of urban resilience policies, in the context of multi-level hydro-climatic management policies, and particularly of the uneven distribution of benefits and risks for local communities.

d) RESCCUE

The RESCCUE Project is an H2020 research project that aims to help cities around the world to become more resilient to physical, social, and economic challenges, using the water sector as the central point of the approach. RESCCUE will generate models and tools to bring this objective to practice, while delivering a framework enabling city resilience assessment, planning and management. This will be achieved by integrating software tools, methods, and new knowledge related to the detailed urban services performance into novel and promising loosely coupled models (integrated models), multi-risk assessment method, and a comprehensive resilience platform. These tools will allow urban resilience assessment from a multisectorial approach, for current and future climate change scenarios, including multiple hazards and cascading effects. The RESCCUE approach will be implemented in three EU cities (Barcelona, Bristol, and Lisbon) and, with the support of UN-Habitat, disseminate their results among other cities belonging to major international networks.

e) LabTech4 Climate

LAB Tech4Climate - Technology and Innovation for Sustainability is a Platform for investment and



acceleration of startups with high social impact in the field of sustainability and the environment based on a partnership built by Aigües de Barcelona, Griño, Bodegas Torres, Fundació Futur and IRTA under the leadership of Ship2B. In the framework of the Tech4Climate platform, technology-based start-ups with the following characteristics are supported:

- Encourage responsible consumption and the efficient management of resources
- Provide solutions for mitigation or adaptation to climate change
- Contribute to making cities more sustainable and resilient
- Contribute solutions to make agriculture and livestock more sustainable
- Generate energy from clean sources or waste.
- Use models of circular economy applied to any field
- Provide sustainable solutions for food packaging
- Promote a healthy and sustainable lifestyle



Brittany, Normandy, Pays de la Loire pilot region – France

Description of the region

¹⁴The French TeRRIFICA pilot region is sometimes called the Grand Ouest (Grand West) and includes three administrative regions of the Western and Northern part of France: Pays de la Loire, Brittany and Normandy.

The region is composed of major but middle size cities such as Nantes, Anger, Rennes, Brest, Caen or Le Havre, but also includes a variety of natural areas, including regional natural parks (Brière in Pays de la Loire, d’Armorique in Brittany or des Boucles de la Seine Normande in Normandy).

Important parts of the three regions are on the littoral of the Atlantic Ocean and therefore the territories have generally moderate and oceanic climate. Littoral economic activities such as tourism and port activities (maritime transportation, fishing and trade) have been developed and marine renewable energies are a potential for the region. The Loire River Valley and Loire Estuary also characterize the region Pays de la Loire.

The three regions are historically and today still farming lands: some areas are particularly specialized in milk production, but others are specialized in fruits and vegetables, vineyards, crops and meat production. Important part of the region historical landscape is called “bocage”, which means an agricultural landscape of a blend of fields and meadows of multiple forms, delimited with

hedgerows and embankments and sometimes woods and ponds¹⁵.



Climate change in the region

The Grand West region is particularly vulnerable to some climate change effects due to several specificities, including the urbanized and touristy littoral, the Loire River Valley, the weight of maritime and farming activities in the economy in the region.

The coastal location of the region is putting the region at risk of sea rise, coastal erosion, but also marine pollution (ex: algua proliferation in Brittany) or fishing resources depletion. Climate Change may also provoke flooding or very low water levels during draught periods around the Loire River valley. Farming activities may be particularly impacted by climate change mainly because of draughts or weather deregulations or due to parasites and biodiversity depletion. Meanwhile, urbanized areas are vulnerable to sanitary crises, especially due to heat waves and air pollution.

¹⁴ Picture: Afac Agroforesteries : <https://afac-agroforesteries.fr/documentations/phototheque-images/arbres-et-paysages/>

¹⁵ Leaflet of the National Office for Hunt and Wild Fauna <https://afac-agroforesteries.fr/wp-content/uploads/2018/05/Bocage-et-biodiversité-V4.pdf>

The Bocage, this traditional farming landscaping, contributes to mitigate and adapt to climate change. However, hedgerows and trees have been declining since the 1950's, whilst organic farming is not yet very developed in the region¹⁶.

The institutional framework is currently in transition (like in all the country), as strategies to mitigate climate change are being developed or just adopted at the level of inter-communality in order to replace the former climate plans. The new plans are to be coherent with the wider regional strategies - also under development - and national plans.

Summary of climate change initiatives

The institutional framework of the region is moving as new local plans are being developed, embedding climate change mitigation and adaptation, with more or less public consultation. For example, the Brittany Region has chosen to follow the Conference of Parties framework as a mean of public consultation (*Breizh COP project*).

CSOs are also participating in the planning process by developing sustainable scenarios (*Virage Energie Climat Pays de la Loire project*) or by creating networks of citizens analyzing climate change signals to inform decisions (*Habitants sentinelles project*).

As agriculture is an important sector of the region, several projects aim at making farming more sustainable through multiple stakeholders' participation. NGOs, farmers, Scientists, and local cooperatives supported by national and local institutions, are promoting the agroforestry model, contributing to both mitigate climate change and

increase resilience of farms (*Label Bois Bocager Géré Durablement project*). On the other side, Scientists and CSOs - including farmers – are collaboratively working for developing seeds adapted to organic farming, and thus mitigating the impacts of agriculture on the environment, and improving the resilience of farms to climate change (*Pays Blé project*).

Regarding adaptation to climate change, sea level rise seems to be a major threat identified and some projects from the Science community or from local government are trying to anticipate and manage this coastal risk (*ODySeYeu and Notre littoral pour demain projects*).

Finally, there is a rapid development of the low technologies' movement, favoring frugal technical innovations rather than energy-consuming technical innovations. The *LowtechLab project* in Brittany is very emblematic of this movement, contributing to mitigating but also adapting to climate change.

¹⁶ Leaflet of the National Office for Hunt and Wild Fauna <https://afac-agroforesteries.fr/wp-content/uploads/2018/05/Bocage-et-biodiversité-V4.pdf>



Belgrade pilot region – Serbia

Description of the region

City of Belgrade, the capital of the Republic of Serbia, will be pilot region for Centre for the Promotion of Science. Belgrade is located at the [confluence](#) of the [Sava](#) and [Danube](#) rivers. Belgrade is the largest city of Serbia, the third largest city in Southeastern Europe, after Istanbul and Athens, and among the largest in Danubian Europe. It covers 3.6% of the territory of Serbia, and 24% of the country's population lives in the city. Belgrade is the central economic hub of Serbia, and the capital of Serbian culture, education and science. This project encompasses the territory of the city of Belgrade administrative territory of the City of Belgrade. The administrative territory of the City of Belgrade covers an area of 323,496 ha and is divided for administrative purposes into 17 municipalities (Čukarica, Voždovac, Vračar, Novi Beograd, Palilula, Rakovica, Savski Venac, Stari Grad, Zemun, Zvezdara, Barajevo, Grocka, Lazarevac, Obrenovac, Mladenovac, Sopot, Surčin) In May 2014, exceptionally heavy rains fell on Serbia which caused high intensity flash floods leading to the total destruction of houses, bridges and sections of roads and widespread flooding of both urban area, particularly in Obrenovac, one of Belgrade municipalities.

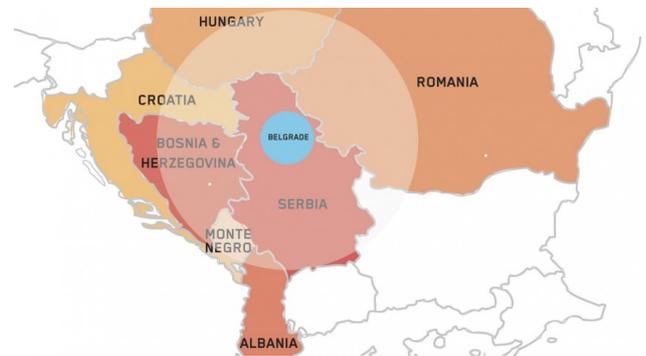
On the other hand, from the whole Serbia, from the whole territory of the Republic of Serbia, Belgrade had the highest increase of mean annual temperatures due to the urban heat island effect: 0.20°C/decade in the period 1949–2009.

The General Urban Plan of the Belgrade Administrative Territory:
<http://slistbeograd.rs/pdf/2016/11-2016.pdf#view=Fit&page=1>

Official

website:

<http://www.beograd.rs/en/discover-belgrade/201004-facts-about-belgrade/>



Climate change in the region

Climate change in Serbia

Since the ratification and application of the UNFCCC and the Kyoto Protocol, considerable efforts have been made in establishing legal, institutional and policy frameworks aiming to fulfil the commitments outlined under the Convention and the Protocol. While the first set of environmental laws designed to combat climate change was adopted in 2004, considerable progress has been achieved with the beginning of the process of European Union (EU) accession and the harmonization of national legislation with that of the EU.

The Initial National Communication (INC) of the Republic of Serbia, as an important national strategic document, was adopted and published in 2010, and highlighted a number of issues recognizing the energy sector as the main contributor to GHG emissions in Serbia and likely the sector with the greatest potential for mitigation.

- [First National Communication of the Republic of Serbia under the UNFCCC First](#)



[Biennial Update Report for the Republic of Serbia](#): The Republic of Serbia submitted its 1st BUR in February 2016.

- [Second National Communication of the Republic of Serbia under the UNFCCC](#)
- Third National Communication of the Republic of Serbia under the UNFCCC -in progress
- [Serbia's First National adaptation plan Communication strategy for climate change](#). This strategy was developed by the OSCE for the Ministry For Environmental Protection.
- [The Law on Climate Change](#):

The National Program for the Adoption of the Acquis Communautaire (NPAA) and the Government's Program of Work foresees the obligation to enact the Law on Climate Change in the second quarter of 2018. In the process of preparation of this law regulating the field of climate change, the Ministry of Environmental Protection conducted a public debate on the Draft Law on Climate Change and the accompanying explanation, and according to the program:

Belgrade - Climate Change Adaptation Action Plan and Vulnerability Assessment

Extreme weather events frequently affected Belgrade in the past and caused serious and sometimes disastrous consequences. Heat waves in the summer seriously affected the entire administrative territory of Belgrade. The droughts were somewhat less frequent and intense compared to heat waves, but also had consequences for the entire administrative territory of Belgrade.

However, the intensity and severity of floods rose. The most vulnerable parts of Belgrade are the flood prone areas near the Sava River. On the

administrative territory of Belgrade there are about 160 small torrential streams, which pose a threat of flooding to populated areas, with short-term but highly dangerous effects.

The current vulnerabilities of specific receptors to extreme weather events in Belgrade have been assessed by combining their sensitivity/exposure (depending on different types of extreme events) and their respective capacity to adapt.

An analysis of observed changes was undertaken for the Initial Communication of Serbia under the United Nations Framework Convention on Climate Change. Conclusions for the area of Belgrade use this data. Climate change projections made using the climate model of the ORIENTGATE project (<http://www.orientgateproject.org/>) for the time periods 2021–2050 and 2071–2100 in comparison to the reference period 1971–2000 (Đurđević and Kržić, 2014). The modelling uses the RCP8.5 scenario.

(Background on the projections: - Downscaling run over Serbia, from 1971 to 2000 – reference period run from 2011 to 2100 – RCP 8.5 scenario; the RCP 8.5 scenario (Representative Concentration Pathways - RCPs), at ~8 km resolution, corresponds to the pathway with the highest greenhouse gas emissions and was chosen in the ORIENTGATE project because there is no observable declining tendency for greenhouse gas emissions currently.

- Integration was done using the Non-hydrostatic Multi-scale Model (NMMB), which is a regional model. The model was developed at –the National Oceanic and Atmospheric Administration/National Centres for Environmental Prediction – USA (NOAA/NCEP), and CMCC-CM (www.cmcc.it) global



climate model results were used for boundary condition.)

Temperature

The observed impacts and vulnerabilities in spring and summer will be reinforced due to expected rising air temperatures and increasing number of hot days. The average air temperatures in winter are expected to increase. Cold extremes are therefore less probable. A balancing effect can be expected.

Precipitation

There is no substantial difference in the general precipitation trends between the time periods 2021–2050 and 2071–2100, except for summer precipitation trends. At the end of the 21st century, fewer precipitations, higher air temperatures and consequently higher evaporation rates could cause longer and more frequent droughts in the summer. No decisive change in the average autumn and winter rainfall is expected for both future periods. However, in autumn, rising temperatures, more evapo-transpiration and a longer vegetation period could result in more droughts. Although no changes are expected in the number of days with heavy precipitation, a more extreme regime with increasing intensity of rain is expected. Heavy precipitation events are more pronounced in spring and summer than in autumn and winter (as shown in the analysis of former extreme weather events).

Winds and storms

An increasing tendency during summer can lead to reinforcing current vulnerabilities, i.e., to trends that intensify the existing situation. –For example, summers are becoming warmer, –which may result in increasing current sensitivity in the future. On the

other hand, no substantial changes are expected during winter.

Expected future changes in weather conditions in Belgrade

Spring and summer:

- Heat waves – reinforcing: the average air temperature in summer will increase.

Additionally, heat waves are expected to happen more often and last longer in future.

- Rain intensity on days with heavy precipitation – reinforcing: increasing rain intensity is expected.
- Storms – reinforcing: an increasing tendency is expected, could lead to reinforcing current vulnerabilities during summer.

Autumn and winter:

- Extreme cold – balancing: the average air temperature in winter will increase. Cold extremes are therefore expected to be less probable.

The changing climate conditions lead to an increasing number of risks but also offer opportunities. The assessment of future risks and opportunities was based on the results of the vulnerability assessment, and the projected climate change impacts, described in the previous chapter.

The future risks were evaluated for different weather sensitivities of each receptor (heat wave, extreme cold, drought, heavy precipitation/floods and storm), and were ranked as very high, high, medium and low.

Climate change adaptation measures for the City of Belgrade are listed in the document Climate Change Adaptation Action Plan and Vulnerability Assessment, including the explanation of measures, relevant locations, institutions responsible for the implementation, priority level for the implementation, and the time frame. The application of the multi-criteria decision analysis method, which involves the use of four criteria for defining priorities in the implementation of adaptation measures, has revealed that protection from flooding and green infrastructure are the two highest priority measures for the City of Belgrade.

Next in order are high priority measures in different areas:

- establishment and improvement of early warning systems, dissemination of information and awareness raising, as well as other institutional and organizational measures,
- urban planning for flood protection,
- construction of retention basins, drainage, saving and reuse of water,
- establishment and rehabilitation of green areas and streets.

There is a long list of measures, set out in the document Climate Change Adaptation Action Plan and Vulnerability Assessment, that the City of Belgrade recognized as necessary to ensure full adaptation to evident climate changes. Although some of them have lower priority than those mentioned above, decision makers in Belgrade have an imperative to use a large number of measures, because one does not exclude the other. The multi sectorial approach to the relevant institutions and other participants is necessary to achieve the full effects. Adequate funding must be raised from

various sources, because once the damage is done future generations of Belgraders may bear the burden.

Summary of climate change initiatives

The project **Implementation of DRR concepts into school curricula** works on societies society resilience on natural disasters. **Main research tasks or actions** aimed at climate change adaptation are informing the schoolteachers and defining hazardous areas. **Main research tasks or actions** aimed at climate change mitigation are teach the people how to properly react before, during and after potential disaster, how know whom to contact in case of emergency situation and raising awareness on experts consulting. The project includes civil society and the academia.

The project **Monitoring, forecasting and development of online public early warning system for extreme precipitations and pluvial floods in urban areas in the Hungarian-Serbian cross-border region (URBAN-PREX)** is co-financed by the European Union through the Interreg-IPA CBC Hungary-Serbia Program. This project presents an opportunity to develop and implement an innovative monitoring, forecasting and online public early warning system for extreme precipitation and pluvial floods in urban areas of the Hungarian-Serbian Cross-border region. **Main research tasks or actions** aimed at climate change adaptation are the development of monitoring, forecasting and public early warning system. The leading institution is The University of Novi Sad which works in partnership with the Local government of the City of Novi Sad and the City of Szeged, as well as The University of Szeged.



The project **New Housing Models for People Threatened by Floods** works on solving the problems brought by floods by involving experts, raising awareness and active participation. It involved six different Faculties of the University of Belgrade, Two public institutions, one private company dealing with the use of GIS in risk management and the Ministry of construction, transport and infrastructure. The main results that can be highlighted are the establishment of the cooperation was creating a multidisciplinary platform for working on recommendations and proposals for risk management projects.

The project **Danube Day** was organized and funded by a company - Coca Cola HBC Group. It works on Improving water quality, Promoting sustainable development, Raising awareness about the environment and sustainable development, Cleaning the river bank, Promoting rational use of water resources. The project includes stakeholders for all the groups in the quadruple-helix model: NALED - National Alliance for Local Economic Development, WWF - World Wildlife Fund, Ministry of Agriculture, Forestry and Water Management - Republic Directorate for Waters, Sekopak, FUTURA - Faculty of applied ecology , The City Municipality of Zemun, Association Young Researchers of Serbia, Aarhus Centre , NBS - National Bank of Serbia, Institute for Water Management "Jaroslav Černi". The form of cooperation includes Implementation of the 10 principles of the UNGC in business and corporate strategy, Promoting 10 principles in the supply chain, Encouraging the development of a local network, Providing support to the global UNGC platform, Contribution to broader UN development goals, Transparent reporting in accordance with the requirements of the UNGC.

The program **"Shut down the heating plants in schools and kindergarten in Belgrade"** is funded by The Secretariat for Environmental protection and it works on improving the air quality. Main actions aimed at climate change adaptation are reducing air pollutants. Main actions aimed at climate change mitigation are rationalization of energy consumption in the public sector. The stakeholders involved are local government that finance this program and a public utility company performed works and school go to do promotion. The main form of cooperation between the stakeholders in this project is working on promotion for reducing CO2 emissions and reducing energy consumption for heating.

The project **Introduction: one of public transport routes with electric buses** is financed by The Secretariat for Environmental protection which aims at improving air quality in cities. Main actions aimed at climate change adaptation and mitigation are Reducing GHG emission and noise reduction. The project includes The Secretariat for Environmental protection/ finances and coordinates, promotion, The Urban Public Transport Enterprise "Beograd"/uses buses for public transport. The stakeholders involved in this project cooperated on introducing The electric busses into Belgrade's public transport.

The project **Revitalization of Topciderka river by biological systems for purification of polluted waters** is financed by The Secretariat for Environmental protection aims at climate change adaptation by saving water resources. It involves local governments in the project that work together to rehabilitate urban river flows.

Local actors for clean energy and air – LA4CEA is a project funded by European Climate Foundation



working on energy transition in coal dependent regions. Main action aimed at mitigating climate change are engaging the citizens, developing monitoring networks, engaging trade unions and developing policy documents. The primary forms of cooperation are consultative meetings and workshops for different civil groups.

Sustainable development goals that they are trying to achieve are sustainable cities, climate action, affordable and clean energy, partnership for the goals.



Appendix 2 – Methodology: State of the art template

Introduction

This template is a tool created for identification of the state of the art of climate change adaptation and mitigation in pilot regions of TeRRIFICA and is linked to Work Package 3 (WP3). It will allow to achieve the following main objectives of WP3:

- to create a comprehensive overview on the state of the art of climate change adaptation research and innovation strategies, tangible climate change adaptation examples and communication strategies and methods at different levels of complexity,
- to create an overview and corresponding information and exchange structures between science, civil society and local government,
- to highlight areas that TeRRIFICA can address and improve,
- to identify useful content for TeRRIFICA from recent and current projects about climate action and climate change,
- to reflect on climate change adaptation ideas and strengths and weaknesses (co-creation),
- to define and adapt supporting innovative outreach and dialogue actions and formats for general public, education, policy makers and the virtual platform, ready for implementation in partner institutions and collaborating organisations,
- to develop common methodologies and recommendations of implementation for Pilots with special focus on social innovation corresponding to SDGs.

Recognition of the current state in the field of climate change adaptation and mitigation activities undertaken by academia & education, local government, civil society and business in each pilot region will be helpful to select the relevant case studies for the purpose of accomplishing tasks 3.1 and 3.2 and achieving deliverables 3.2 and 3.3.

We highly recommend to perform an expert-based evaluation of entered data (interviews or consultations) supplementing the desk research data. Each sector of the quadruple helix (academia & education, civil society, local government, business) should be represented by the local experts.

A case study in this template is understood as an example of current actions allowing for identification both good and bad practice in climate change adaptation and mitigation. It should be related to a pilot region but also national/ European examples can be included. A case study should be focused on a co-creation process.

Specific subtasks especially related to this template are:

- **Subtask 3.1.1. - Assessment of Institutional Framework Conditions and Socio-Ecological Transformation Processes at Local and Regional Level (month 1-9),**
Task leader: AMU | Contribution to this task: all



Each consortium member will identify and make use of existing projects, their reports, tools and communications, as well as tailored surveys and expert interviews to compile relevant local and regional processes and instruments related to or adaptable for climate action. Transdisciplinary formats will be identified to explore local interdependencies. Social innovation development paths in the cities and regions will be considered.

- **Subtask 3.2.1 Identification of Relevant Co-creation Factors and Development of Methodological Case Study Guidelines (month 2-6),**

Task leader: AMU | Contribution to this task: UoV, SciCit, CPN

The territorial aspects of co-creation process will be analyzed with a strong focus on the regional innovation systems. Such factors will be taken into account as there are: the culture of innovation; the institutional framework of this process; the level of existing collaboration and the already developed tools supporting this process; the means by which students, researchers, policy makers may transfer their knowledge and skills for the benefit of their community. Special attention will be paid to the social innovations system.

Abbreviations:

NGOs – non - governmental organizations

CSOs–civil society organizations

SDGs – sustainable development goals

CSR– corporate social responsibility

RRI – responsible research and innovation

SMEs – small and medium-sized enterprises

Glossary – key definitions

Climate change refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity (IPCC).

Climate change adaptation means anticipating the adverse effects of climate change and taking appropriate action to prevent or minimise the damage they can cause, or taking advantage of opportunities that may arise. Examples of adaptation measures include: using scarce water resources more efficiently; considering fresh air corridors in urban planning to improve the air quality in cities; and setting aside land corridors to help species migrate. Adaptation strategies are needed at all levels of administration: at the local, regional, national, EU and also the international level. Due to the varying severity and nature of climate impacts between regions in Europe, most adaptation initiatives will be taken at the regional or local levels. The ability to cope and adapt also differs across populations, economic sectors and regions within Europe (Description of Actions).



Climate change mitigation refers to a wide scope of efforts to reduce or even prevent the emission of greenhouse gases. These efforts range from changing consumer behaviour to boosting the efficiency of outdated equipment to the use of newest technologies and renewable energies. Planning a new city can be a means of mitigation as well as the replacement of an old furnace. This means that mitigation often involves fundamental changes in the way individuals and societies as a whole produce and use energy (Description of Actions).

Responsible Research & Innovations (RRI) - building blocks:

- **public engagement** - in Responsible Research and Innovation is about co-creating the future with citizens and civil society organisations, and also bringing on board the widest possible diversity of actors that would not normally interact with each other, on matters of science and technology.
- **open access** - the global shift towards making research findings available free of charge for readers, so-called 'Open access', has been a core strategy in the European Commission to improve knowledge circulation and thus innovation. It is illustrated in particular by the general principle for open access to scientific publications in Horizon 2020 and the pilot for research data.
- **gender equality** - in Horizon 2020 Gender is a cross-cutting issue and is mainstreamed in each of the different parts of the Work Programme, ensuring a more integrated approach to research and innovation.
- **ethics** - For all activities funded by the European Union, ethics is an integral part of research from beginning to end, and ethical compliance is seen as pivotal to achieve real research excellence.
- **science education** - Building capacities and developing innovative ways of connecting science to society is a priority under Horizon 2020. This will help to make science more attractive to young people, increase society's appetite for innovation, and open up further research and innovation activities(European Commission).

Co-creation: Collaborative development of new value (concepts, solutions, products and services) together with experts and/or stakeholders (such as customers, suppliers etc.). Co-creation is a form of collaborative innovation: ideas are shared and improved together, rather than kept to oneself. It is closely connected to – and mentioned alongside – two other buzz-words: “opensource” and “mass-customisation” (<http://fronteer.amsterdam/what-is-co-creation/>).



TEMPLATE

IDENTIFICATION OF THE STATE OF THE ART OF CLIMATE CHANGE ADAPTATION AND MITIGATION

I. GENERAL CHARACTERISTICS OF A PILOT REGION

<ul style="list-style-type: none"> Name of the region, its location and a short description (max. 300 words)
<ul style="list-style-type: none"> Strategies/agendas/reports developed by the local government <i>(please provide max. 3 cases using the criteria below for each example)</i>
Title:
Timeframe:
Main challenges and goals regarding climate change identified:
Main indicators (of product/result/impact) applied (MoRRI indicators/SDGs indicators):
Main actions aimed at climate change adaptation:
Main actions aimed at climate change mitigation:
Are the guidelines for operationalization of activities related to the climate change provided? If yes, please describe them.
Indicate the SDGs relevant for the region:
Is there a need for cooperation between different groups of stakeholders articulated/described? <input type="checkbox"/> YES <input type="checkbox"/> NO
If YES, mark the appropriate stakeholder groups and describe them
<input type="checkbox"/> local government <input type="checkbox"/> civil society <input type="checkbox"/> academia & education <input type="checkbox"/> business
Short description of stakeholders:
Describe the forms of cooperation between stakeholder groups or the ways of their involvement in climate actions (e.g. public meetings, local workshops, focus groups) (maximum 3000 characters including spaces):
Web link to the document:
<ul style="list-style-type: none"> Main stakeholders in the region (quadruple helix model)
<ul style="list-style-type: none"> Local government (indicate local/regional institutions and their main tasks referring to environmental protection and climate change adaptation & mitigation)
<ul style="list-style-type: none"> Civil society (population; voter turnout in the last elections related to the pilot region; number of NGOs and CSOs; indicate NGOs/CSOs acting for the environment and/or climate change adaptation and mitigation)



<ul style="list-style-type: none"> • Academia & Education (number of students; indicate the most important research institutions/universities & basic directions of their research referring to climate change adaptation and mitigation; number of pupils from primary and secondary schools; indicate institutions promoting science or being involved in science communication)
<ul style="list-style-type: none"> • Business (SMEs and large enterprises (number, employment in SMEs and large enterprises, (%) of total employment in a given region); Regional Smart Specializations (RIS3); general overview of the different industrial sectors which can be found in the region; indicate enterprises actively involved in climate change adaptation and mitigation actions and define the field of their activity)
<ul style="list-style-type: none"> • Short summary of a pilot region (most important climate challenges indicated by the local/regional strategy or scientific regional agendas, culture of innovation, institutional framework of the regional innovation system; existing exchange structures between stakeholders; any other relevant information and additional comments)

II. PROJECTS AIMED AT CLIMATE CHANGE ADAPTATION AND MITIGATION

<ul style="list-style-type: none"> Projects aimed at climate change adaptation and mitigation implemented by <u>civil society</u> (NGOs, CSOs) (please provide max. 3 cases using the template below)
Title:
Source of funding and the budget:
Timeframe:
Main challenges and goals regarding climate change identified:
Main indicators (of product/result/impact) applied (MoRRI indicators/SDGs indicators):
Main actions aimed at climate change adaptation:
Main actions aimed at climate change mitigation:
Please indicate the institution/s responsible for the implementation and its/their main tasks
Please tick the type of stakeholders involved and shortly describe them
<input type="checkbox"/> local government <input type="checkbox"/> civil society <input type="checkbox"/> academia & education <input type="checkbox"/> business Short description of stakeholders:
Shortly describe the forms and tools of cooperation between partners involved in the implementation and the tools used for communication with the society (maximum 3000 characters including spaces):
Indicate the SDGs relevant for the project:
Web link to the project:

<ul style="list-style-type: none"> • Projects aimed at climate change adaptation and mitigation implemented by academia&education (research public or private scientific bodies, universities, schools, extracurricular education organisations) (please provide max. 3 cases using the template below)
Title:
Source of funding and the budget:
Timeframe:
Main challenges and goals regarding climate change identified:
Main indicators (of product/result/impact) applied (MoRRI indicators/SDGs indicators):
Main research tasks or actions aimed at climate change adaptation:
Main research tasks or actions aimed at climate change mitigation:
Does the project promote RRI? If yes, please shortly describe (maximum 100 words)
Please indicate the institution/s responsible for the implementation and its/their main tasks
Please tick the type of stakeholders involved and shortly describe them
<input type="checkbox"/> local government <input type="checkbox"/> civil society <input type="checkbox"/> academia & education <input type="checkbox"/> business Short description of stakeholders:
Shortly describe the forms and tools of cooperation between partners involved in the implementation and the tools used for communication with the society (maximum 3000 characters including spaces):
Indicate the SDGs relevant for the project:
Web link to the project:

<ul style="list-style-type: none"> • Projects aimed at climate change adaptation and mitigation implemented by business (Corporate Social Responsibility, CSR strategies might be useful) (please provide max. 3 cases using the template below)
Enterprise Name:
Sector of activity:
Size and number of employees:
Source of funding and the budget:
Timeframe:
Title of the project:
Main challenges and goals regarding climate change identified:
Main indicators (of product/result/impact) applied (MoRRI indicators/SDGs indicators):
Main actions aimed at climate change adaptation:
Main actions aimed at climate change mitigation:
Please indicate the institution/s responsible for the implementation and its/their main tasks
Please tick the type of stakeholders involved and shortly describe them
<input type="checkbox"/> local government <input type="checkbox"/> civil society <input type="checkbox"/> academia & education <input type="checkbox"/> business Short description of stakeholders:
Shortly describe the forms of cooperation between partners involved in the implementation and the tools used for communication with the society (maximum 3000 characters including spaces):
Indicate the SDGs relevant for the project:
Web links to a project or to CSR strategy:

<ul style="list-style-type: none"> • Projects aimed at climate change adaptation and mitigation implemented by <u>local government</u> (please provide max. 3 cases using the template below)
Title:
Source of funding and the budget:
Timeframe:
Main challenges and goals regarding climate change identified:
Main indicators (of product/result/impact) applied (MoRRI indicators/SDGs indicators):
Main actions aimed at climate change adaptation:
Main actions aimed at climate change mitigation:
Please indicate the institution/s responsible for the implementation and its/their main tasks
Please tick the type of stakeholders involved and shortly describe them
<input type="checkbox"/> local government <input type="checkbox"/> civil society <input type="checkbox"/> academia & education <input type="checkbox"/> business Short description of stakeholders:
Shortly describe the forms of cooperation between partners involved in the implementation and the tools used for communication with the society (maximum 3000 characters including spaces):
Indicate the SDGs relevant for the project:
Web link to the project:

Short summary of chosen projects(parts 1-4)

