

A methodological guide for the development of joint city-company climate adaptation strategies

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Executive summary

Climate change is one of the most crucial global challenges of our era. Policy responses are split into 3 pillars in international, as well as in national climate policy: **mitigation, adaptation, and awareness-raising** – to support the former two fields.

Significant acceleration of **global average temperature rise** has been witnessed in the last half century, especially from the eighties. Based on observations up until now, **the Carpathian Basin** belongs to regions warming above average. Considering expected consequences of climate change, the region is **one of Europe's vulnerable areas**. Besides constant temperature rise, main causes of climate vulnerability include **changes in precipitation patterns, growing frequency and intensity of extreme weather events** – such as heatwaves, heavy precipitation, or extreme storms.

Furthermore, climate change exacerbates existing regional and social differences, as it weakens adaptive capacity of socially-economically disadvantaged regions, areas, settlements, and social groups. Hence, it is necessary to start the planning and implementation of climate strategies to offer effective solutions to real problems.

A climate strategy can comprise all three pillars, but planners can also focus on a particular field. The target area of a strategy could be a country, a region, a county, a district, or a settlement – but functional units irrespective of administrative boundaries (e.g. ecoregion, landscape, water catchment areas) could also be the subject of planning. Moreover, even two different organisations, for example a municipality of a regional centre and an industrial company operating on its area – as key players of the region – can cooperate in climate adaptation. A cooperation like this is in the focus of this Methodological Guide.

The Guide presents in detail the method of adaptation-focused, joint city-company strategy planning aimed at giving an effective response – based on experiences of the planning process of the **joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc.**, elaborated in the framework of the LIFE-CLIMCOOP project. **The aim of the Guide is to offer step-by-step tangible planning-methodological tools** as an example **for other potential city-company cooperations**, by walking through the elaboration process of the Strategy.

For the planning process, the Guide further developed and adapted the

- **methodology for supporting the preparation of Hungarian county and settlement climate strategies**, elaborated in 2017 by the National Adaptation Centre upon the request of the Association of Climate-Friendly Municipalities;
- the solutions offered by **Urban Adaptation Support Tool** of the Climate Adapt webpage to a city-company cooperation.



The logical chain of the joint city-company adaptation strategy planning process in the case of the city of Kazincbarcika and BorsodChem Inc.

Source: Energy Strategy Institute, 2023

The document itself is the final part of the **vulnerability assessment → climate adaptation strategy → methodological guide** logical chain, as the last experience and knowledge-sharing phase of the complete climate adaptation planning process.

As for its structure, it consists of chapters built on each other in a logical and planning-methodological order: following an introduction, these are **identification of the planning framework; system planning; action planning; and implementation framework planning** chapters. **Conclusions** are summarized at the end of the Guide.



The spiral logic of the planning cycle in climate adaptation planning.

Source: Energy Strategy Institute, 2023.

The Guide was made with the explicit goal of

- **promoting the practical implementation of collected theoretical experiences** in different local and regional climate strategy planning activities;
- **supporting the replication of the adaptation planning process** in the city-company cooperation taken place in Kazincbarcika **in other locations**: in the Sajó-valley, in Hungary, in the Eastern-Middle European region and more broadly on the whole continent.

Therefore, we suggest that local experts, planners, consulting firms or other associated higher education institutions study each chapter in detail while reading the Guide. This is facilitated by the **similar, template-like structure of mentioned chapters**, improving transparency and comprehension.

The intention of the publication is to demonstrate **methodological steps** focusing on technical issues in a relatively easy-to-understand language, complementing these with background information about the *method of planning*. **Examples from the concrete vulnerability assessment and adaptation strategy planning process of Kazincbarcika are attached to each of the steps**; in some cases (in the lack of illustrative or any examples) turning to **other national or European examples**. Finally, we draw attention to potential mistakes, pitfalls and planning techniques help to avoid these (in the text we mark these parts by special icons).

Identification of the planning framework

After the introductory thoughts in the chapter identifying the planning framework, the Guide goes through the essential steps to take before starting to elaborate a joint city-company strategy. These include the **identification of the conceptual framework**; a **preliminary analysis of the settlement/region to be examined**; **identification of the strategic planning environment**; **identification and assessment of stakeholders**; and **setting up the planning team**.

Conducting a situation analysis

The **situation analysis** serves a dual purpose in adaptation strategies. On the one hand, it **presents natural, social, and economic characteristics of the city and its regions** based on detailed factual data, highlighting most important ongoing changes and tendencies; on the other hand, it **defines and analyses the local manifestation and intensity of climate impacts relevant for the city and its regions**. This information will provide the base of the vision, the objective system, and the measures that emerge in later chapters of the adaptation strategy. The situation analysis chapter contains the following methodological subchapters: **analysis of relevant local, regional, and national planning documents**; **in-depth analysis of social, economic, and natural environment**; **climate risk mapping**; **study of climate vulnerability**; **introduction of those municipal level decision-supporting modules of National Adaptation Geo-Information System (NAGiS)**; such as the Settlement Adaptation Barometer; or the Municipal Decision Support System Module) that can be **applied during the situation analysis**. **These subchapters support the identification of vulnerability topics and the degree to which these are affecting the city and its regions**.

Kazincbarcika and BorsodChem Inc.: together for climate adaptation, as an outstanding example of adaptive cooperations for a climate-friendly, water-conscious, adaptive, liveable city-region.

Building on the assets of Kazincbarcika and the close cooperation between the municipal government and the Company, on top of the improvement of their own position relative to climate change, serves as a best practice in municipal climate adaptation and awareness raising in the whole Sajó catchment area, meanwhile it puts special emphasis on nature-based, water-retentive solutions and the creation of a harmonic and liveable city region.

The joint climate adaptation vision of the Municipality of Kazincbarcika city and BorsodChem Inc.

Source: Joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc (2023).

Objective system planning

The aim of planning the **objective system** and its elements is to reach the desired state described by the vision. The complex, multi-level system of objectives (overall goal, specific and sub-objectives) outlines the directions of sectoral/thematic measures to achieve the vision. The methodological Guide provides a detailed insight into the **planning the climate adaptation objective system and prioritising techniques of adaptation opportunities**, and the recommended methodological steps.



The climate adaptation objective system of Kazincbarcika city and BorsodChem Inc.

Source: Joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc (2023).

Action planning

Based on the objective system, **measures** are set for each sub-objective, **serving the implementation of the objective system**. In contrast with the objectives, **measures (actions) should contain concrete content** instead of general, inaccurate titles and descriptions. **For each measure, subtasks are defined in detail, responsible partners for execution are nominated, financial background and the exact resources are identified, and expected actual outputs are described**. The action planning chapter of the Guide introduces the **approaches to be applied** while planning measures, the exact **methods**, and **possible pitfalls of measure planning**.

Implementation framework planning

The frameworks of the implementation (scheduling, financial planning, monitoring and evaluation tasks, partnership process) **need to be developed** for the completed city-company joint climate adaptation strategy to function as an actually feasible **development roadmap**. The mere listing of objectives and measures, following a thorough situation analysis is not enough; it is even more crucial to guarantee that planned measures are well-established, feasible and trackable. For this reason, the Guide offers a detailed information package, going through the clarification of **the implementation framework**; the **specification of short-term, immediate tasks**; **scheduling tasks of implementation**; the description of the **tasks of financial planning** (from the identification of the resource map to the financial background of measures). **Furthermore, this chapter touches on the institutional framework; monitoring, reporting and evaluation tasks; and the establishment of the partnership of the strategic planning and implementation processes.**

Lessons learned and suggestions

The final chapter of the Guide is the Conclusions, summarizing lessons learned from the planning process. These are listed as follows:

Planning team: requirement of diverse knowledge – when establishing and operating a planning team, **it is crucial to ensure full coverage of expertise** (water management, meteorology, geography, regional and settlement development, development policy, agriculture/rural development, nature protection etc.) **and competences** (project management, financial planning, participative planning, facilitation, awareness-raising). Climate policy is a horizontal field, involving various sectors and professions – thus, planners of this area should develop knowledge of a broad spectrum.

Planning is time-consuming – the planning process is complex, compact, and therefore, it requires time. At the beginning of the process, **planning the steps carefully is vital**, and calculating with wider time frames is suggested. Piling up of tasks should be avoided by making decisions with farsighted, but strict and manageable deadlines.

Involving partners? As soon as possible! We recommend **identifying stakeholders as soon as possible and contacting potential organisations and subjects on time**, because several unforeseen circumstances can arise. Not only external partners, but the planning team could also face difficulties, unexpected staffing, or technical problems, hence it is key to discuss tasks and organize meetings on time.

Flexibility in analysis and planning – a learning experience is that **statements about schedules and the financial background should not be set in stone**, primarily for the leaders of local settlements, but also for other regional actors like the company. We recommend being cautious as failed or incomplete implementation of too specific and definite statements could negatively influence the reputation of the whole strategy.

Methods aligned with local characteristics – by all means, it is useful applying a **similar methodological base** for different strategic planning initiatives. This supports on the one hand the comparability of strategies with each other, on the other hand a new strategy can be built on the experience of another existing one. Apart from easing workload, using a similar base facilitates comparing initiatives. One of the functions of this Guide is to establish these common professional foundations. Central and unified methods are only useful until we can adapt them to local conditions: existing foundations are already in place, but even local characteristics are considered.

Building on local strengths – **The city's existing regional organizing role – originated from its size and central functions – combined with the company's regional employer role** offers a long-term opportunity for a climate adaptation cooperation. Based on these, **the city-company partnership can set a good example for other settlements in their smaller or wider region**. This requires demonstrating the proactive attitude of the two main partners by organising awareness-raising or knowledge-sharing conferences, events, or through the production of specific adaptation cooperations and investments. Dissemination of the results of the city-company cooperation on regional level can generate other similar projects in the area, even on a national or Central European scale.

Do not hesitate to rely on existing practices – it is highly recommended (especially when planning objectives and measures) **exploring national and international best practices, well-adaptable, progressive, and innovative adaptation examples** through online search or if possible, on field trips. In this way, the strategy can become up-to-date and ambitious, creating the possibility of its brand-like dissemination to a wider audience.

Balanced mix of methodologies – different methodologies can be applied when conducting the situation analysis, planning the objectives and measures or the monitoring and assessment actions. Among these are **primary research** – producing and collecting own data, self-obtained information; and **secondary research** – the usage of existing data sources and information bases. Depending on the type of research methods, we can use **quantitative** (data analysis) and **qualitative** (field mapping, interviews, planning document analysis) methods, that prove effective during risk assessments and monitoring. Instead of exclusive use of a given method, a combination of different tools is recommended, utilizing advantages of each type: time- and cost-effectiveness of the first type, less labour-intensity in case of the second one, quantifiability of the first type; and easier access to special local information in case of the second.

Attitude – the base to build on – besides the difficulties and hardships listed until now, a lot of positive experience have been gained while preparing the strategy of Kazincbarcika. It turned out during the interviews that there is an adequate foundation on which we can build: **most interviewees living in the region recognize diverse climate change issues** (e.g. intensifying heatwaves, growing frequency of flash floods, etc.) **and the need to respond to them**. For now, not everybody links these issues with climate change; and their attitude towards the interviews also varied, along with the credibility of the received information.

Nevertheless, the fact that *local actors becoming more climate conscious* and showing enthusiasm is welcomed. People are interested in changes happening around them, and they show a growing sense of responsibility towards processes in their narrower environment. This attitude proves to be helpful when preparing and implementing local climate strategies.

Key role of communication – *ensuring and continuously practicing proper communication skills* are crucial both within *the project consortium* (among project partners), *and among* leaders, implementing organisations and partners *to be involved in implementation*, governmental, civil and industrial organisations and eventually, the local public. During this process, it is essential to establish the right connections and cultivate personal relations.

At the beginning of the LIFE-CLIMCOOP project, strategic planning-related professional tasks were carried out by the National Adaptation Centre Department of the Mining and Geological Survey of Hungary (MGSZ) within the project consortium.

However, under the Government decree No. 702/2021. (XII.14.), climate adaptation-related duties of the MGSZ were transferred by succession to the Western Balkans Green Centre Nonprofit Ltd. (WBGC), thus the team of the National Adaptation Centre continued fulfilling the tasks of the LIFE-CLIMCOOP project as part of the WBGC between 14th December 2021 and 30th June 2023.

From 1st July 2023 with the dissolution of the WBGC Nonprofit Ltd., previous tasks were transferred by succession to the newly established Energy Strategy Institute (ESI). Accordingly, organisation names indicated above as data- or material source mean the same professional unit employed in different institutional frameworks.

Preface: Climate change and adaptation

Climate change is one of the most crucial global challenges of our era. Its complex impacts result in not only environmental, but also economic and social consequences, affecting today several sectors, regions and social groups. Policy responses to these challenges are based on **three main pillars**: 1) **mitigation** (reducing greenhouse gas emissions), 2) **adaptation** (adapting to and preparing for the impacts of climate change), and 3) **awareness-raising** to support former pillars.

Significant acceleration of **global average temperature rise** has been witnessed in the last half century, especially from the eighties. Based on observations up until now, **the Carpathian Basin** belongs to regions warming above average. Considering expected consequences of climate change, the region **is one of Europe's vulnerable areas**. Besides constant temperature rise, main causes of climate vulnerability include **changes in precipitation patterns, growing frequency and intensity of extreme weather events** – such as heatwaves, heavy precipitation or extreme storms.

Furthermore, climate change exacerbates existing regional and social differences, as it weakens adaptive capacity of socially-economically disadvantaged regions, areas, settlements, and social groups. For this reason, territorial and municipal vulnerability to climate change needs to be explored more extensively, and its changes also need to be monitored. In addition, it is necessary to start planning and implementation of climate strategies offering effective solutions to real problems. Meanwhile, it is crucial to involve as wide range of local community actors as possible, such as local governments, civil society, businesses, academic institutions and churches. This is facilitated by **awareness-raising** activities.

Climate adaptation aims to reduce the risks and negative impacts of climate change. In recent years, there has been a growing focus on mitigation, as climate change is already having a wide range of environmental impacts that need to be adapted to. Climate change is likely to continue to have impacts for decades to come, and it is therefore in our common interest to adapt to the intensifying impacts of climate change as soon as possible. It is important to underline that **adaptation is a long-term process** that needs to be aligned with the territorial environmental/economic/societal specificities. This is precisely where mitigation differs from the essentially global logic of mitigation which seeks responses to the global challenge of greenhouse gas emissions (GHG emissions) embodied in global cooperation, treaties and commitments. **Adaptation is typically a local, regional issue**: locally (regionally) seeking locally (territorially) relevant responses to specific challenges. The search for territorially logical responses is facilitated by comprehensive **adaptation strategies at different territorial levels, serving long-term forward-thinking and in line with mitigation objectives**.

The Guide presents in detail the method of adaptation-focused, joint city-company strategy planning aimed at giving an effective response – based on experiences of the planning process of the **joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc.**, elaborated in the framework of the LIFE-CLIMCOOP project. **The aim of the Guide is to offer step-by-step tangible planning-methodological tools** as an example **for other potential city-company cooperations**, and to collect and disseminate best practices and lessons learned to interested parties. Following the **Executive summary** and the **Introduction**, the Guide presents the **Identification of the planning framework**, focusing on the outline of the planning environment; then **the joint city-company situation analysis and situation assessment work**

phases are presented, including practical tools such as SWOT analysis, problem tree or tree of objectives.

It also presents the decision support tools and modules available in Hungary to support municipal/regional climate strategy planning. The chapters on **defining a vision, objective system planning, and action planning** all provide an overview of the mandatory content, criteria, the approach to be followed and the mistakes to be avoided in the process. Following the **Implementation framework planning** chapter, **conclusions** are summarized at the end of the Guide, which can also be used by other regional actors.

At the beginning of the LIFE-CLIMCOOP project, strategic planning-related professional tasks were carried out by the National Adaptation Centre Department of the Mining and Geological Survey of Hungary (MGSH) within the project consortium.

However, under the Government decree No. 702/2021. (XII.14.), climate adaptation-related duties of the MGSH were transferred by succession to the Western Balkans Green Centre Nonprofit Ltd. (WBGC), thus the team of the National Adaptation Centre continued fulfilling the tasks of the LIFE-CLIMCOOP project as part of the WBGC between 14th December 2021 and 30th June 2023.

From 1st July 2023 with the dissolution of the WBGC Nonprofit Ltd., previous tasks were transferred by succession to the newly established Energy Strategy Institute (ESI). Accordingly, organisation names indicated above as data- or material source mean the same professional unit employed in different institutional frameworks.



Figure 1.: The spiral logic of the planning cycle in climate adaptation planning.

Source: Energy Strategy Institute, 2023.

The material is substantial and richly illustrated with practical examples. Its practical usefulness will hopefully soon become apparent to the users. Wishing you an enjoyable time in the effective use of the Guide:

The Editors.

1. Introduction

1.1. Determining the place of the task in the project

The overall goal of the LIFE-CLIMCOOP project is to develop, test and disseminate public-private partnerships, city and company cooperation, where stakeholders act together to reduce local climate risks. In addition, steps will be taken to strengthen joint climate adaptation in vulnerable urban and business areas in the region, in Hungary and in socio-economically similar areas in Middle Eastern Europe.

The task C1.5. “*Methodological guide and best practice inventory for replicating common urban and business climate change adaptation strategies*” is one of the sub-activities of the LIFE-CLIMCOOP project C1. “*Elaborating the common climate adaptation strategy of Kazincbarcika (KB) and BorsodChem Ltd. (BC)*”. The sub-activities of the whole project build on each other and together form the logical chain illustrated by the figure below:

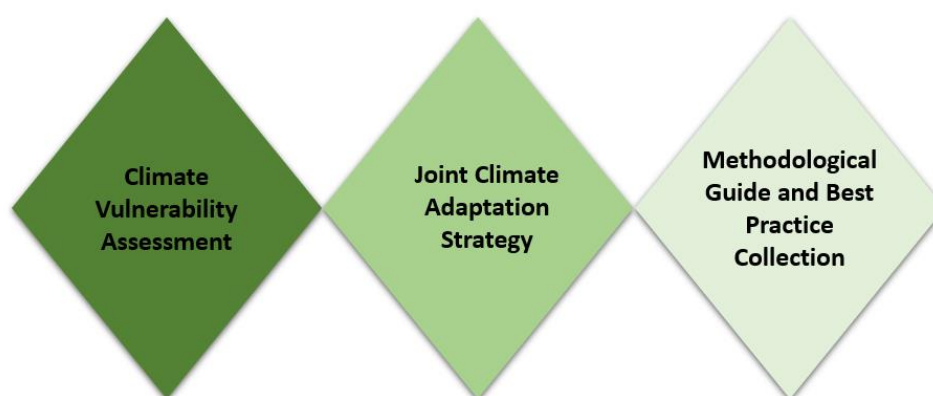


Figure 2.: The logical chain of the joint city-company adaptation strategy planning process in the case of the city of Kazincbarcika and BorsodChem Inc.

Source: Energy Strategy Institute, 2023

- As a first step, a **vulnerability assessment study** was completed in the summer of 2021, based on data and document analysis and field interviews to identify climate vulnerability topics with the greatest impact of the region of Kazincbarcika. These were heatwaves and their health impacts, municipal rainwater inundation and flash floods, in addition to storm damage to municipal and industrial infrastructure.
- Subsequently, based on the findings of this study, a joint city-company **Climate Adaptation Strategy** 2022-2023 was prepared, which sets out the priority objectives to be achieved in the field of climate adaptation. Furthermore, it defines the measures needed to achieve them, together with a precise framework for their implementation. This will effectively serve as an adaptation “roadmap” for the city of Kazincbarcika and BorsodChem, taking stock of and systematising the tasks ahead.
- As the last element in the logical chain, this **methodological guide** and the accompanying set of good practices will be developed – based on the existing Strategy – to show the methodology for preparing joint city-company climate adaptation strategies in a clear and accessible way. The methodological guide will lead the reader through the steps of developing a general climate adaptation strategy, while drawing attention to the use of the various recommended planning methodologies (e.g. goal

and problem setting, SWOT analysis) and how to avoid potential planning mistakes. A **collection of best practices** closely linked to the guide – which will be completed later – will present international and national climate adaptation best practices on different territorial scales that can be applied to climate impacts relevant in Hungary.

One of the key goals of the LIFE-CLIMCOOP project is to promote the development of new city-company partnerships, whether at home or abroad. This objective is served by a series of activities, like the methodological guide and the best practice inventory, creating a **planning-methodological background suitable to replicate in other locations**.

1.2. The objective of the task

The objective of the task C1.5. “*Methodological guide and best practice inventory for replicating common urban and business climate change adaptation strategies*” is to develop a guide and a collection of best practices that will facilitate the establishment of joint city-company cooperations similar to the cooperation between the municipality of Kazincbarcika and BorsodChem Inc. in other locations in the Sajó water catchment area, or in other Hungarian or European locations.

In this activity a **methodological guide** will be prepared which will develop and adapt the **methodology – supporting the preparation of county and municipal climate strategies in Hungary** – elaborated by the National Adaptation Centre on behalf of the Association of Climate-Friendly Municipalities in 2017 and the solutions offered by the **Urban Adaptation Support Tool** to the context of a city-company cooperation. In addition to these two methodological pillars, the guide also draws heavily on the data and research results available in the National Adaptation Geo-Information System (NAGiS), as well as on the thematic online questionnaire of the NAGiS modules to the Settlement Adaptation Barometer (SAB), which aims to assess the adaptation situation of settlements.

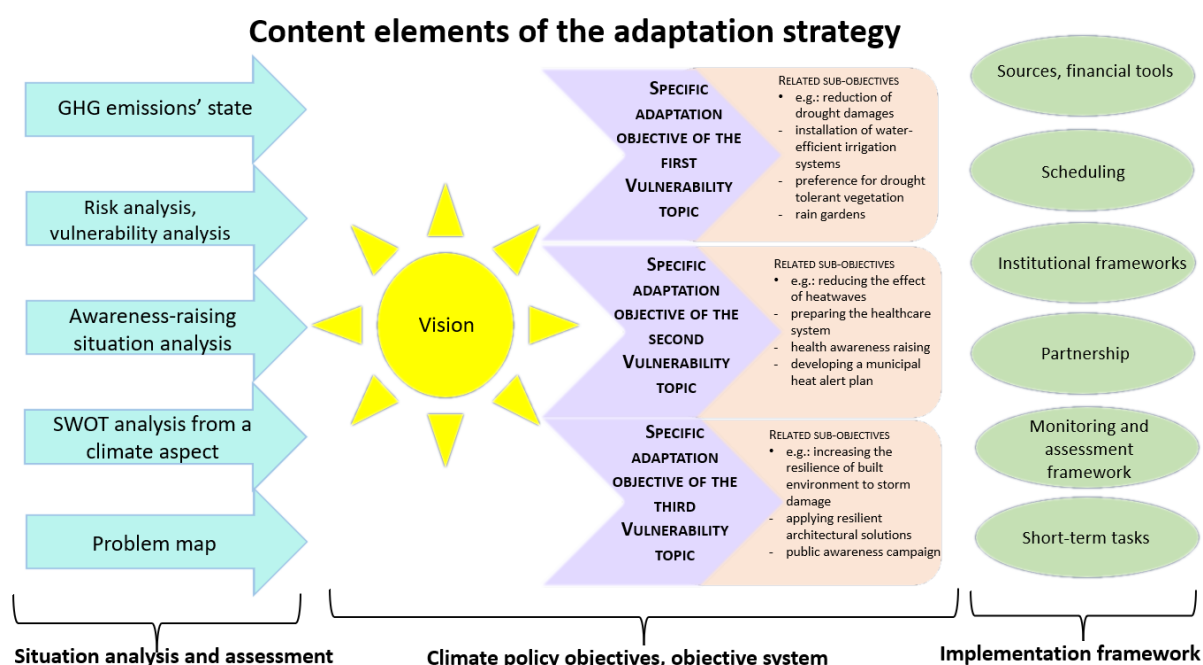


Figure 3.: The climate adaptation strategic planning.

Source: Energy Strategy Institute, 2023

The aim of the Guide is to offer step-by-step, **tangible planning-methodological tools for further potential city-company partnerships**, by walking through the process of developing an adaptation strategy in detail, while also highlighting the mistakes to avoid and the most useful practical planning concepts. The main content elements of the adaptation strategy are illustrated in Figure 3. In order to complement the Guide, an online **best practice collection** will be developed in the future, based on the experiences gathered during the LIFE-CLIMCOOP project (the planning process and solutions seen at Kazincbarcika and seen during international study visits, practices of cities and industrial companies, etc.). It will be also complemented by other examples of climate adaptation abroad that respond to climate impacts relevant to Hungary.

1.3. The methodology to be used

In the preparation of the Guide, we have used the methodology, steps and work phases of **the joint Kazincbarcika-BorsodChem adaptation strategy**, one of the main outputs of the LIFE-CLIMCOOP project. This is because on the one hand, the Strategy mentioned before is based on two well-established methodologies (one at a European and one at a national level) and, on the other hand, the synthesis of the methodologies has been tested on the example of the cooperation between Kazincbarcika and BorsodChem, thus we are following through tangible elements taken from practice.

1.3.1. The UAST methodology

The planning methodology used was partly based on the **Urban Adaptation Support Tool (UAST)**. In the context of local and regional adaptation, there has been a strong demand from municipalities in recent decades for a precise presentation of various guides, planning support tools, planning, implementation, and evaluation steps, and to answer problematic questions that may arise. This 'demand' has been recognised by various professional organisations in Europe, which is why the Urban Adaptation Support Tool application was created on the Climate-ADAPT website. Both the site and the tool are a **planning support tool** developed by Mayors Adapt, an adaptation initiative of the **Covenant of Mayors** which provides a tool to explore the steps, pitfalls and opportunities of the urban (and more generally: municipal) adaptation planning process. The tool explores and presents these steps and the issues involved in a system theory and includes at each point resource-rich references, broadening the available knowledge¹.

¹ For each planning step, the available literature, best practices, "EU city specific information", "EU general information", "International information" and in some cases a "Worth checking" aspect with additional information is added to the subsections presented.

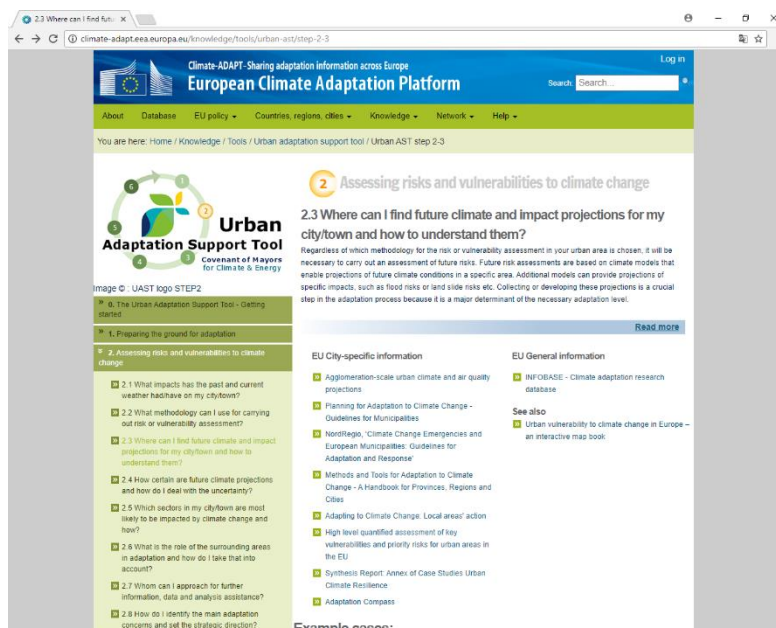


Figure 4.: Indication of available resources in a planning step subsection of the UAST.

Source: <http://climate-adapt.eea.europa.eu/knowledge/tools/urban-ast/step-2-3>

The application provides a kind of "planning roadmap" for the preparation of adaptation strategies, offering users a **knowledge repository organised by topics and steps**, providing simplified access to relevant information, data and tools for adaptation planning. The main menu items on the website also model the planning steps, passing through *"preparing the ground for adaptation"*, *"assessing risks and vulnerabilities to climate change"*, *"identifying adaptation options"*, *"assessing and selecting adaptation options"*, *"implementing adaptation"* and *"monitoring and evaluation adaptation"*.

Each section is accompanied by a 'Self-check' section, listing the key aspects that, if met, are of particular importance to be implemented and responded during the planning step. This element clearly reinforces the educational character of the website.

What is less presented on the website is the quantified data and availability of specific climate parameters, impact factors, illustrative information and map data on exposure-sensitivity-adaptive capacity-vulnerability. Overall, the UAST can be a useful tool, providing a thorough knowledge base and **planning assistance** for interested municipal users. However, its usefulness as a **practice-oriented guideline** for the planning and implementation of adaptation activities should be highlighted. It provides an excellent opportunity to contact local authorities, experts or institutions and to obtain background material. At the same time, this website lacks the use of databases, maps and interactive interfaces which are also important sources of information.

1.3.2. Climate strategy planning guides in Hungary

While climate change is a global process whose impacts are independent in space and time of the greenhouse gas emissions that cause it, **managing its effects is a local task**. This is partly due to **territorial differences**, which fundamentally influence the nature and severity of the impacts (not only because of different natural conditions but also because of very diverse socio-economic characteristics). **Adaptation must be designed to be locally relevant** and integrated into local development activities because – as a non-foreign element – it is more likely to be successful. Local knowledge and expertise must also be given space to ensure that relevant and effective adaptation practices are implemented. Territorial/municipal climate strategies can play an important role in helping to achieve this.

Local and regional climate strategies

- Client: *Association of Climate-Friendly Municipalities*
- Source of funding: *KEHOP 1.2.0.*
- *Work phases:*
 - Developing the scientific background
 - Preparation of manuals
 - *Cities*
 - *Settlements*
 - *Budapest and its districts*
 - *Counties*
 - Local energy (and climate) documents, action plans
 - *SEAP*
 - *SECAP*



Figure 5.: The methodological background of domestic territorial/municipal climate strategy planning.

Source: Energy Strategy Institute, 2023.

On behalf of the Association of Climate-Friendly Municipalities, in 2017 the National Adaptation Centre Department of the Mining and Geological Survey of Hungary developed a series of four guides for 1) Hungarian counties; 2) Hungarian cities; 3) Hungarian villages; and 4) the capital of Budapest and its districts to encourage the preparation of **municipal climate strategies** supported by the grants awarded under the KEHOP 1.2.0 call. The aim of the guides was to provide practical, usable assistance to local authorities in developing climate strategies. The first part of the document on urban plans provides a framework for the problem of climate

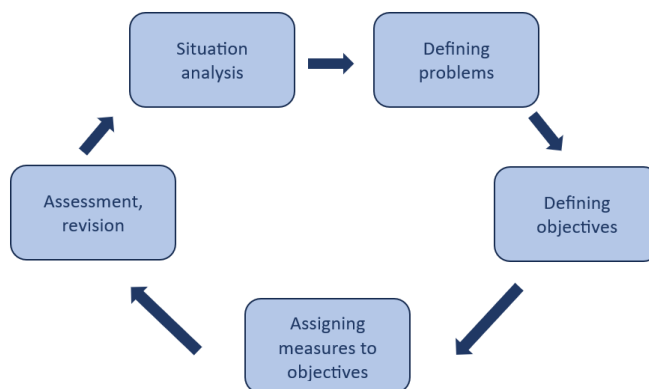


Figure 6.: Logical framework for the county's climate strategy planning.

Source: MGSZ, 2017.

change, giving an overview of its key concepts and drivers. It briefly outlines main greenhouse gas emitters and the options that can help to prevent and avoid problems arising from the effects of climate change. It then sets out the sub-headings which it proposes to use to form a climate strategy:

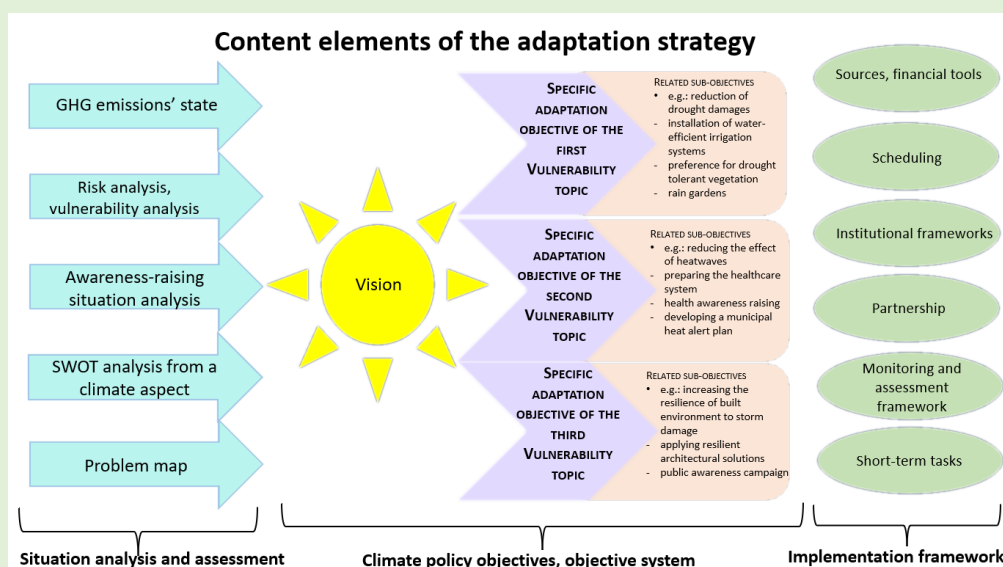
What happened in Kazincbarcika?

Following the UAST methodology and the Climate Strategy Planning Methodological Guide for Hungarian cities, **synthesizing and applying the content** proposed by them, the first step was to analyse the recent and present meteorological/climatological data and the future climate model results for Kazincbarcika and its region between 2020 and 22 based on the latest NAGiS results.



A socio-economic-environmental situation analysis of Kazincbarcika and its region was also prepared. In addition, relevant climate change issues and vulnerability topics have been identified and analysed using the results of the 2020-21 vulnerability assessment and the Settlement Adaptation Barometer's methodology – also following the assessment logic of the Barometer. Therefore, a comprehensive environmental-climatic-socio-economic situation analysis has been carried out and is included in the Strategy's *Appendix*; a short summary of this was included in the Strategy under the title

3. Situation analysis.



This is followed by a **Situation assessment**, which synthesises the elements of the Situation analysis, organises them into break-out points and challenges, and is underpinned by a SWOT and problem tree analysis. Based on the findings of the first two chapters, the following chapters describe the **joint city-company's climate adaptation vision** as a desired goal to be achieved by 2030; and the **objective system** at different levels to ensure its achievement. The latter can be achieved through **concrete measures**. The fifth major section of the Strategy sets these out, with specific responsables, task descriptions, financial and output information. The last chapter called **Implementation framework**, presents to readers and decision-makers the timetable, financial background, monitoring and evaluation tasks, institutional background, and information on the public participation process of the planning process.

1.4. Instruction manual

Our handbook was specifically designed to

- **facilitate the practical application of accumulated theoretical experience** in various local and regional climate strategy planning activities;
- and **support the replication of the adaptation planning process** in Kazincbarcika, in cooperation between the city and company, **in other locations** in the Sajó Valley, in Hungary, in the Central and Eastern European region and more broadly across the continent.

For this reason, we recommend that local professionals, planners, consultancies or even related higher education institutions study each chapter in detail while using the book which is facilitated **by the similar, template-like structure of these chapters**, improving its transparency and comprehensibility.

The publication is intended to present the **methodological steps** in relatively easy-to-understand language, focusing mainly on technical issues, with background information on *how to plan*. **Each of the steps presented is accompanied by examples** either from the specific vulnerability assessment and adaptation strategy planning process in Kazincbarcika (**highlighted in green text box**); in case of its possible absence (if it is less illustrative) **other general national or European examples** are presented (highlighted in yellow).

The basic structure of the chapters and subchapters follows the pattern below:

- the main chapters pass through 1+6 main work phases (identification of the planning framework + situation analysis, situation assessment, defining a vision, objective system planning, action planning, implementation framework planning);
 - while each subchapter presents a part of the work including
 - a general description of how to carry out the task, with a detailed explanation of the activities;
 - an introduction of what happened in the context of the concrete joint Kazincbarcika-BorsodChem adaptation strategy in a framed section from the LIFE-CLIMCOOP project's sample field work of the last two years;
 - a list of potential mistakes and how to avoid them (with a highlighted icon to indicate these).



2. Identification of the planning framework

2.1. Identification of the conceptual framework

Planning work starts with a calculation, like practically every other project. **What is the purpose of the planning, what area or municipality will be the focus, what economic, social, natural, political, legal and development policy environment will the planning take place in?** – these are the questions we need to answer. The first step in the planning process is therefore to go through these aspects in advance and identify potential target groups and partners to be involved. This can be followed by setting up a team to carry out the design, considering both internal and external capacities.

It is essential to define **the time horizon of the planning document** at the outset of planning process, the date by which time the activities should be completed. **The geographical area of the planning, the territorial unit or region to which the planned interventions will apply, must be specified** (a thematic and geographical focus can be used here – first example is the development of an action plan for awareness-raising; second is the climate strategy for the county of Hajdú-Bihar). The **scope of the planning** must also be specified: it is a complex territorial planning process that covers the **adaptation of social, economic, and environmental subsystems of the region**.

The first step of the preliminary tasks is a **quick, broad overview of the natural, social, and economic characteristics of the settlement or region to be investigated**. This is not yet a detailed situation analysis of the strategy which will be launched shortly; it is merely a broad overview of the local society, economy, and natural environment. In addition to the desk research, this should be complemented by a quick visit to the target area.

One of the most important points in the examination of the planning environment is the review of legislative, strategic planning and development policy background – by this time, it is also just an overview. An overview of existing local strategic documents is carried out. It is not enough to look at local strategies: national, regional, and sectoral documents affecting the municipality or region are also collected to generate ideas for future development directions or to carry out coherence studies. It is important to review existing legislation to identify which legislation should be taken into account in the planning process and which may influence climate policy interventions.

Potential target groups, partners and future beneficiaries of the planning should also be identified. Among them, it is also useful to identify the key actors (local public authorities, municipal leaders, operators of critical infrastructure networks, local representatives of sectors particularly affected by climate change) and to define the depth of their involvement.

The final element of the initial steps is to set up a planning team. The planning could be carried out by the local authority and the industrial company itself, by a team of experts set up by them, or by external experts if capacity is lacking. The first step in setting up the planning team is to identify and distribute the tasks and milestones for the planning period (typically six months to a year and a half), and then to draw up a related work plan. The development of a preliminary schedule will greatly assist clarity. It is also important to assign tasks to people – internal specialists, team members and external consultants and experts. **The final step is to develop an initial indicative table of contents** which will help to review the expected tasks of the planning based on the scheduled work phases, already moulded into concrete chapter headings.

What happened in Kazincbarcika?

The planning process in Kazincbarcika started in late spring 2022, with the preparatory steps to assess the planning environment taking place in April 2022, under the coordination of the chief planner. Virtually all the steps detailed above were carried out: a quick review of the natural, social and economic conditions, an overview of the legal, strategic planning and development policy background, the identification of target groups and partners, and the drafting of the planned table of contents. These steps have provided the necessary groundwork for the strategy planning exercises which started in May 2022.

2.2. Setting up the planning team

The task of the chief planner is to think through the expected subtasks and milestones of the planning process in advance, as well as to put together the human resource capacity to carry out the actual planning work, considering professional competences, specialised knowledge and skills required by the chapters to be developed. A local municipality, company, or a consortium of them may decide how to carry out the tasks themselves, or to involve experts or consultants to manage the whole project. This can be followed by the setting up of the planning team, with all its concrete steps:

- **Involving experts:** the selection of professional and financial planners, analysts, situation assessment and monitoring experts who will work on the tasks,

These are partly

- provided by internal resources (employees who are already expert on a certain field or are assigned by the manager to constantly monitor a certain field at the beginning of the process, entrusting them with the task of learning and deepening their knowledge). In principle, when setting up the team, it is advisable to think in terms of geographers, regional analysts, sociologists, ecologists, meteorologists/climatologists, human ecologists, economists, environmental economists, environmental engineers, and public administration specialists.
 - external experts, in areas of expertise that cannot be covered by the internal team, and who can bring in locally relevant information or knowledge that adds professional value to the planning and is not already available in the planning team.
- **Division of tasks, work plan preparation:**
 - The task of the project's professional leader (chief planner) is to think through the challenges and tasks of the planning period ahead, and to put together subtasks and sub-activities, which can later be organised into larger groups and arranged in sequence over time. The sum of these will produce the final set of activities.
 - Naturally, it is not possible to foresee and determine every event, changes, and demand. Therefore, planning can be flexible, moving forward in time, as new unforeseen challenges are faced by the strategists.

- **Scheduling:** a tabular, visualised chronology of listed and recorded tasks, revealing the interdependency and sequencing features that influence the successful completion of the whole job.
- **Developing the indicative table of contents** – the activity of internal and external staff involved is made much easier and more efficient by the preparation of a preliminary (even indicative) table of contents for the planned strategy which allows everyone to plan how much content to produce and on which topics.

After setting up the team, the first joint work phase, led by the chief planner, consists of the following steps:

- Before starting to elaborate the situation analysis and assessment chapters, it is worthwhile to specify **the conceptual, physical, and intentional framework, objectives and reasons for the need to prepare the planning document** (concept/strategy/action plan/programme).
- We need to clarify **the possible place of the document in the national planning system** and identify its links to local, regional, and national development policy directions. **It is necessary to summarise the planning system linkages of the document to be prepared**, synthesising the adaptation aspects of relevant local and regional planning documents, relying on them, and aligning them hierarchically.
- **Defining the specific geographical and temporal framework of the planning process** by defining the reference points is essential for establishing the validity of the planning document. For the planning area/municipality, it is necessary to define its national and regional role, its location, and its importance in settlement network, and to identify the potential energy, potential/strong local exposure on which the region/municipality is considering developing a climate (adaptation) strategy. The fundamental purpose of preparing adaptation strategies is to produce a complex planning document outlining the adaptation vision for the whole targeted region, and to synthesise existing regional and local ideas and objectives. If there is something specific among the reasons for planning, it should be explored (e.g. the need for long-term local thinking, the lack of a local policy concept, which could be filled by a strategy, defining the desired adaptation role of the municipality/region and its social and economic adaptation goals and directions). The geostrategic environment, the growing local and regional identity, and the self-determination of development direction of the given regions may also be decisive.
- The planning process described above can only be implemented in close cooperation with local actors whose legitimacy is essential. Planning should serve to deepen cooperation between local actors based on mutual benefits. It is important **to identify the target groups for the document to be produced** – it should be considered whom to target before starting to elaborate the document. It is important to clarify who will lead the planning process and who can legitimise the document. These parameters will determine the thematic characteristics, the 'depth' of the material and the range of partners reached in the planning process.

What happened in Kazincbarcika?

Within the framework of the project, two key members of the LIFE-CLIMCOOP project consortium, BorsodChem Inc. and the Municipality of Kazincbarcika, cooperated in climate adaptation, aiming at the preparation of a joint adaptation strategy in addition to practical interventions. Within the consortium, the City and the Company commissioned the National Adaptation Centre of the Energy Strategy Institute - NAC (more precisely its predecessor, the National Adaptation Centre of the Mining and Geological Survey of Hungary), which is responsible for the strategy planning. Drawing primarily on internal resources, NAC appointed a chief planner from the internal team with more than 10 years of experience in strategic planning, analysis, monitoring and evaluation, who had been responsible for the preparation of several national (national, county, and regional level) spatial, economic and tourism development concepts and development policies. Following the selection of the lead planner, 4 junior, 2 senior colleagues and a professional quality assurance officer joined the planning team. For those areas not covered by this team, external expertise was brought in, focusing primarily on the priority vulnerability topics identified by the situation analysis (health impacts of heatwaves, climate vulnerability of water management). For the third vulnerability topic identified in advance, the vulnerability of urban development to storm damage, the team, which included several land and urban planners in the planning unit, drew on its own resources.

Figure 7.: A completed work plan template for the KB-BC strategic planning process.

Source: Energy Strategy Institute, 2023.

A general and detailed task and schedule plan was prepared to divide the tasks among team members (the latter with solutions to organise the elementary tasks into larger groups and then placing them in a chronological order); in parallel, an indicative table of contents was developed to provide a clear overview of the work for the next year (spring 2022 - spring 2023). The production of these planning and work organisation materials was also the responsibility of chief planner.

At the beginning of the planning activity the time horizons and the specific geographical area of the planning, the subject of the planning document, as well as possible target groups and partners were specified.

2.3. Preliminary analysis of the settlement/region to be examined

One of the most important triggers of the planning process is the exploration of the natural, economic, and social environment of the targeted municipality (and its region). The definition of a baseline described by all of these is central to the preparation of an effective and efficient climate change strategy. By exploring the local geography, it is possible to identify which climate change impacts are likely to occur in the area and which local assets may be at risk. Local social and economic characteristics and attributes can provide preliminary information on climate change vulnerability and resilience. In the case of a joint city-company adaptation strategy, the same analyses should be carried out for the municipality and the company sites. The preliminary overview will lay the foundations for subsequent situation analysis, highlighting the geomorphological and geographical features, social groups and conflicts, economic potential (income, added value and other related data) that should be examined in detail in the extensive situation analysis; optimally, the preliminary analysis can already outline the main directions of the strategy to be planned and certain elements of its target structure.

In summary, in this initial phase, **the chief expert coordinating the planning and one or two key members of the planning team will review the aspects mentioned above and identify the structure of the subsequent situation analysis, the future chapters through the topics to be covered.**

Besides geographical location of the municipality and its region, **the mapping of the natural environment** should focus on its *hydrography, biodiversity, and the identification of ecosystems vulnerable to climate change*. In addition to natural features, it is essential to consider *recent changes in climatic factors and their expected future evolution*.

Social specificities play a crucial role in adapting to impacts of climate change: it is strongly recommended that the social section of the analysis of city-company adaptation strategies should include *demographic, educational and public health issues*. A *shrinking and ageing population* could lead to supply problems in the future, affecting adaptation. *The state of health care* is also an important determinant of preparedness for extreme weather events, in particular heatwaves.

An assessment of the **economic situation of a given municipality/region** also provides important information on the vulnerability and adaptive capacity of its population and economic organisations to the impacts of climate change. The economic performance is an indicator of *the strength and financial situation* of a municipality, region or enterprise and, depending on this, its adaptation potential. In addition, *unemployment rates, the number of outdoor employees and the proportion of people employed in sectors exposed to climate impacts, such as agriculture*, are important indicators.

2.3.1. Preliminary field trip

However, a quick overview from the planning office is not enough. Just as we lay the groundwork for the desk research part of the situation analysis, we also need to do so for the field work that will be done later. This is accomplished by a **preliminary field survey** that also serves to identify the main axes of the situation analysis. This is a preliminary visit of half a day or a day to the target area and its wider surroundings, to give the chief planner and his/her colleagues a first, personal impression. This will include a preliminary identification of possible focal points of local impacts and consequences of climate change, e.g. water scarcity or abundance in the area, possibly with regional variations, the proportion of forested areas and

their estimated vulnerability, the characteristics of social environment by settlement and by district, the nature of built-up areas in the same breakdown, etc. Overall, this preliminary field survey helps to validate the preliminary information gathered from other sources and to form a personal impression in planners. However, the real situation analysis and assessment only starts afterwards.

2.4. Identification of the strategic planning environment

Among the steps to prepare for the planning process, it is essential to examine the existing planning and development policy environment and the range of available documents before starting the strategy development process. In addition to the local material to be collected, it is also necessary to take stock of relevant national strategies, in addition to the regional (county, agglomeration, priority regional etc.) documents affecting the municipality/region. Afterwards, these can be analysed in detail, based on their claims and content, to see what existing local, regional, macro-regional and national planning documents or sectoral planning documents, local legislation, climate change impacts and related vulnerability issues show, and whether they mention potential responses to these. In the case of a joint city-company adaptation planning process, it is particularly critical how much attention is paid in these documents to the cooperation between municipality and company in the area, or whether the cooperation between municipality and its region is reflected in some form in these documents. The analysis aspects are discussed in more detail in the relevant document analysis subsection of the

3. Situation analysis

3. Situation analysis.

2.4.1. Local documents

The scope of local documents may vary from region to region/municipality/municipality-industrial company partnership; depending mainly on the size, status and financial situation of the municipality; the size and regional role of the industrial company; the degree of city-company cooperation. There are mandatory and voluntary planning documents, more horizontal material dealing with urban development and planning, and those dealing with essentially sectoral issues. The documents to be considered potentially are listed below, grouped together:

- **Local Environmental/climate and energy policy related documents**
 - Municipal climate strategy;
 - Environmental Protection Programme of a City;
 - Heritage Impact Assessment;
 - Sustainable Energy and Climate Action Plan (SECAP)
- **Local settlement development and spatial planning documents**
 - Background study of the long-term settlement development concept and the integrated settlement development strategy;
 - Settlement Development Concept;
 - Settlement Development Programme;
 - Settlement Structure Plan;
 - Settlement Land Use Plan;
 - Local Building Regulations;
 - Integrated Urban Development Strategy;
 - Integrated Settlement Development Strategy;
 - Townscape Design Manual;
 - Townscape Protection Regulation
- **Local sectoral documents**
 - Economic programme, development plan;
 - Local Community Development Strategy;
 - Integrated Municipal Water Management Plan (may be developed in the future);
 - Municipal Waste Management Plan;
 - Equal opportunities concept, plan, programme;
 - Health Promotion Plan as part of Settlement Development Plan

2.4.2. Regional documents

In the case of regional documents, the ones mainly with a county-level environmental/climate and energy policy focus, as well as the documents on settlement development and physical plans should be reviewed. In addition, if a given city-company partnership belongs similarly to two priority areas (e.g. Budapest Agglomeration; Balaton Preferential Recreational District), it is recommended to examine their spatial plans as well. The scope of the regional documents is summarised below:

- **Regional environmental/climate and energy policy documents**
 - County Climate Strategy;
 - County Environmental Action Programme;
 - Micro-regional Sustainable Energy and Climate Action Plan (SECAP)

- **Regional development and physical planning documents**
 - Regional development concept of a county;
 - Regional development programme of a county;
 - Development concept/programme of priority regions;
 - Physical Plan of the Budapest Agglomeration;
 - Physical plan of the Balaton Preferential Recreational District

2.4.3. National documents

National level documents should also be reviewed, primarily to see if they contain valuable climate change-related information (e.g. sectoral climate and environmental issues and trends to be addressed) in relation to the city-company region. At the national level, the range of environmental/climate and energy policy documents is quite extensive. The National Development and Spatial Development Concept and the National Spatial Planning Plan can provide guidance. In sectoral terms, the main reference documents are those on water management, forestry, disaster management, security policy and nature conservation.

- **National environmental/climate and energy policy documents**
 - National Climate Change Strategy;
 - National Climate Change Action Plans;
 - National Clean Growth Strategy;
 - Governmental Report on the Current and Expected Climatic Challenges of the Carpathian Basin;
 - National Energy and Climate Plan (NECP);
 - National Environmental Action Programme;
 - National Energy Strategy.

- **National development and spatial planning documents**
 - National Development and Spatial Planning Concept
 - National Spatial Plan.
- **National sectoral documents**
 - 3rd Water Catchment Area Management Plan;
 - National Water Strategy – Kvassay Jenő Plan;
 - Further development of the Vásárhelyi Plan;
 - National Rural Development Strategy;
 - National Landscape Strategy;
 - National Forest Strategy 2016-2030;
 - National disaster risk assessment report of Hungary 2020;
 - „Healthy Hungary 2021–2027” Strategy for Health.

2.5. Identification and assessment of stakeholders

As part of the process of defining the planning framework, it is necessary to identify, at least roughly, the relevant target groups of the project, the potential partners of planning and implementation, from the beginning of the process – but it is even more useful to identify them precisely and to specify their involvement.

Identifying and involving stakeholders is an important part of the community planning process. This type of planning, based on community involvement, is founded on the premise that *"in the life of a settlement, it is the local society or community that knows best its own problems"* (NFGM, VÁTI 2010, cited in the Settlement Adaptation Barometer, 2018). This allows stakeholders to find locally relevant answers to real problems, taking into account locally relevant factors. This process should preferably involve as wide range of stakeholders as possible, which can help to ensure an adequate overview of local knowledge, even at the level of the whole sector. In this way, the wider stakeholder group (and its various elements) can not only play a consulting, but also a participatory role in the planning process from the outset, which is more time-consuming and requires more caution than traditional processes, but it is more effective in the long term. A multi-level, multi-stakeholder working phase can thus effectively support joint adaptation strategies of companies and municipalities. In addition, involvement supports the acceptance of the planned intervention/plans by giving the involved city/company/other actors a sense of ownership of the development ("our issue"). In general, involvement can strengthen self-determination, the ability to enforce interests, the rural population retention ability, local identity; its benefits are hardly disputable.

The first step in the involvement and participatory planning is therefore to **define the levels of stakeholders** in advance. It is useful to distinguish between the main groups, grouping them into levels according to the depth of involvement (from top to bottom in terms of strength):

- **Lead partners in the community's life:** who are the stakeholders who, through their role as public, municipal or business leaders, can influence the life of the whole community of the targeted municipality/region, can decide on the policies that will determine the mitigation and management of climate change impacts? This could include senior local government officials (mayor, mayor-general, notary), local and regional administrative officials, local professional decision-makers (e.g. chief architect), company executives (CEOs, sustainability/environmental directors/deputy directors). Their involvement will help to create the narrow steering group that will decide on the main strategic directions and focal points of the planning process.

- **Key sectoral stakeholders most affected by the impacts of climate change:** economic organisations, sectoral decision-makers, representatives and decision-makers of companies, operators of critical infrastructure networks (directorates of water management, electricity suppliers, district heating suppliers, gas utilities), who can play a key role in either mitigating or avoiding the impacts, damages or losses that will occur, and whose opinions and experiences are therefore crucial – they will be consulted on a regular basis (e.g. every 3 months) by the planners, and regularly consulted on the materials being prepared.
- **Broader circle of stakeholders:** other stakeholders in society, local economy, civil society who are also affected by climate change and whose views should be consulted at major milestones in the planning process (e.g. end of situation analysis and assessment, setting the objective system, action planning).
- **The actors of awareness-raising and training, who are responsible for awareness-raising and informing local society:** these include primarily educational and training institutions and NGOs. They provide related information/research/training voluntarily as well. If these can be channelled into the strategic planning process, there may be further mutual benefits.
- **Local population:** their views should be sought at the latest before the planned adoption of the strategy, and they should be informed through various information forums.

What happened in Kazincbarcika?

The situation analysis and assessment chapter were based on three main background studies. First, a **review and analysis of existing databases and relevant planning documents** was carried out. **Field research** was also carried out in four phases during September 2021 and April 2022, where **professional interviews were conducted and processed, as well as field trips and photo documentation were carried out**. Thirdly, a **climate change vulnerability assessment**, which directly underpins the Strategy, was carried out to identify the most prominent climate risks in the city and its region.



Figure 8.: Selecting and involving the right stakeholders in the planning process can be done via workshops and brainstorming sessions.

Source: Energy Strategy Institute, 2023.

An indicative stakeholder list was established at the beginning of the planning process, identifying stakeholders directly affected by climate change in general and during the planning process. The potential interviewees were divided into four groups: 1) companies;

2) educational/health/social and civil society organisations; 3) municipalities; 4) operators/”managers” of critical infrastructure and natural resources.

The main part of the field research was the Interviews with the selected interviewees, which took place in Kazincbarcika and its region between 14-16 September 2021 and 21-23 September 2021, at a pre-arranged time, based on a uniform methodology. This was complemented by two further field studies between 4-6 and 12-14 April 2022. Although the latter primarily served the LIFE-CLIMCOOP project action C 7.1 (Water Stewardship), several of the interviews conducted during this period also provided useful input for the adaptation strategy being prepared (e.g. Vadna municipality, ÉSZAKERDŐ Erdőgazdasági Ltd., BT Nyroplast Ltd.). These basically **covered the most important actors in Kazincbarcika and its region affected by the impacts of climate change**. The sets of questions varied to some extent from one target group to another, adapting to the specificities of each segment and the information relevant to their case.

3. Situation analysis

3.1. Analysing planning documents

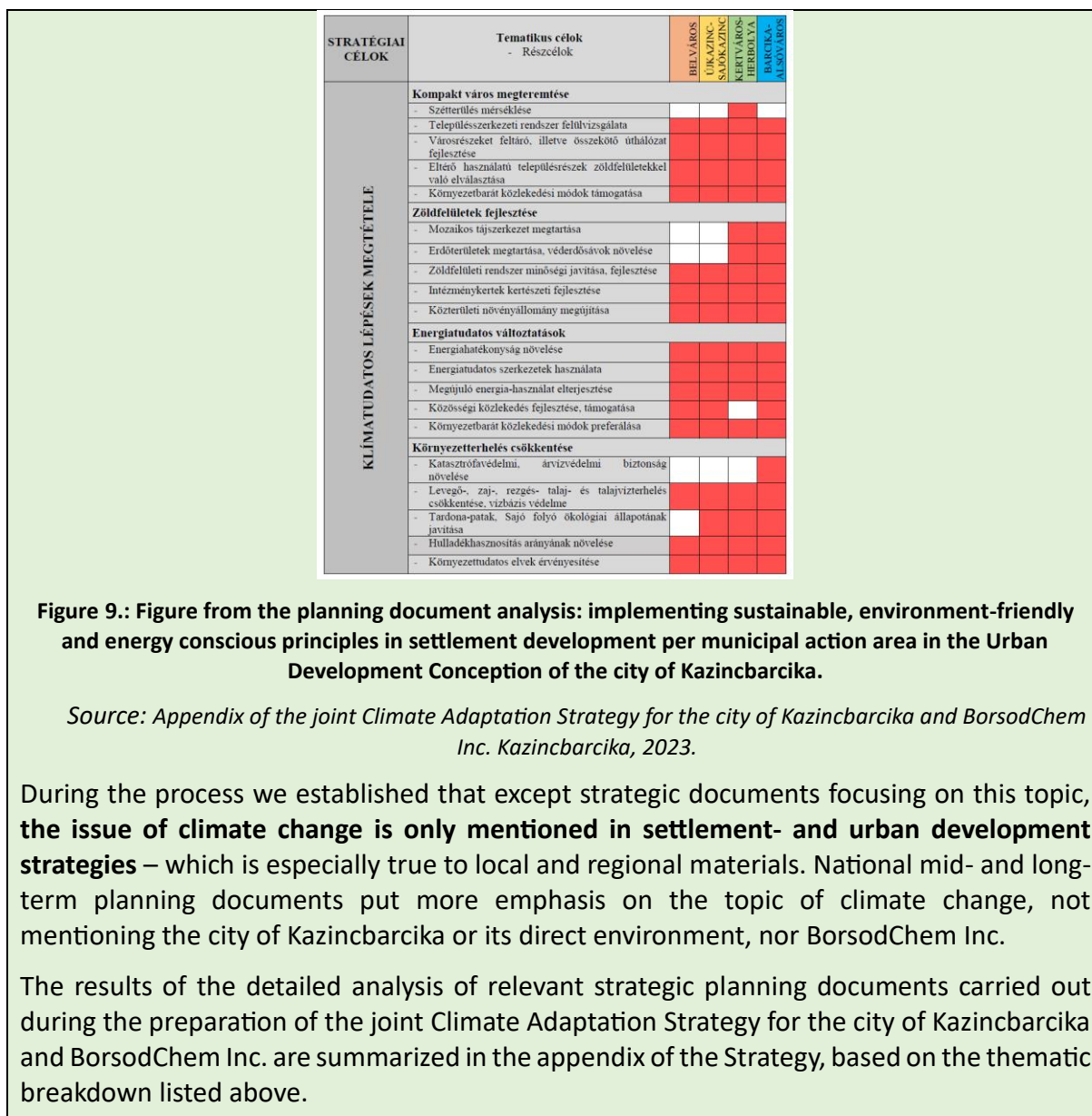
Planning documents to review during a situation analysis were already mentioned in the chapter defining planning frameworks. **These strategic documents related to the planning target area (settlement/region/company site) serve sectoral, regional or development policy purposes. Relevant national and county documents should also be studied** to discover new information regarding the specific region/settlement. When preparing the planning framework, one of the tasks is making a list of documents to review belonging to sectors highly impacted by climate change, general development policy and regional, settlement development/management actions. The second step of the **situation analysis** is **analysing these documents based on a unified criteria system**.

This unified criteria system practically contains a short introduction of the document with a focus on its objective system and structure. We recommend highlighting points of the documents' objective system and measures with a direct or indirect climate adaptation purpose. **Paying extra attention to documents mentioning climate change impacts and consequences is also suggested. The way how these climate effects are depicted** and how they manifest in the city-company relation also matters. Making a **unified template** to analyse the documents significantly facilitates the analysis.

What happened in Kazincbarcika?

During the planning of the city-company joint adaptation strategy of the LIFE-CLIMCOOP project, one of the foundations of the vulnerability assessment-focused situation analysis was the analysis of local, regional, and national strategic documents relevant for the city and its regions. The 38 settlement, regional and national city, regional and land-use development, environmental protection, and climate policy planning documents were selected based on a unified criteria system during the preliminary analysis and selection. These criteria were the following:

- the way how climate change, **impacts** of climate change **and connected vulnerability topics** appear in the document;
- the appearance of **potential measures and responses** to these issues;
- **and the identified factors' connection to Kazincbarcika** (if possible, to specific quarters). The latter's aim was to discover correlations between regional differences identified in the strategies.
- **naming BorsodChem Inc. or even the cooperation of the city and the company;**
- **the appearance of Kazincbarcika and its regions (climate) cooperation in the strategy: if this content appears, on what level and in which form.** Between the cooperation of Kazincbarcika – BorsodChem Inc., and the relationship system of the city and its region, cooperation related to environment protection and climate change were in the focus of the analysis.



3.2. Analysis of the natural, social, and economic situation

Once the planning framework is defined, the actual situation analysis phase can begin. In this phase, the natural environment, social and economic situation, and characteristics of the settlement/region (in our case the city, the company's site, and their wider region) need to be analysed from an adaptation perspective. Several factors contribute to the effectiveness of climate adaptation; therefore, it is necessary to take stock of the natural, social and economic characteristics listed above. Climate change impacts all three areas, this is why it is important to identify most endangered and vulnerable local assets, social groups and economic sectors. Based on the identification of parties/objects affected by climate change and climate impacts manifested locally, the vulnerability situation can be assessed, and the objective system and specific measures of the document can be developed in response. Analysis sources can be statistical databases, literature information, remote sensing data (e.g. aerial photos, satellite images), as well as planning document analysis.

3.2.1. Natural environment

During the adaptation situation analysis, emphasis should be put on the identification of climate issues impacting the region, relevant for the settlement and/or the company, specifying main impacts caused by these issues and finally, mapping of affected local assets (affected parties/objects).

Analysis of the natural environment consists of presenting the geographical location of the settlement, the company site(s), and their region, and *taking stock of natural geographical, geomorphological, transport geographical attributes*. Significant points are the *hydrography, biodiversity, ecological conditions* (ecosystems vulnerable to climate change) and the *identification of endangered local natural and architecture values*. The analysis and presentation of changes in climatic factors over the past decades, their expected evolution including recent and present climatic trends, in particular quantitative and temporal changes in temperature and precipitation patterns can prove to be useful. Identification of future projections (practically concerning the middle and end of 21st century) – in Hungary, NAGiS databases can serve as a basis, but other, own modelling procedures, databases, scenarios can also be used – facilitates defining long-term directions of the climate strategy. When **identifying climate change issues** relevant for the city and company, **stakeholders** (e.g. municipality, industrial organisations, civil organisations, public) **should be involved** as widely as possible, to not leave out any opinion. When defining local impacts of climate change and local values endangered by them, regional, national sectoral documents, and the list of questions of the Settlement Adaptation Barometer (SAB) made during the development of the NAGiS system can provide an adequate foundation.

3.2.2. Social environment

Social characteristics play an important role in climate sensitivity and adaptation. Social factors relevant for estimating sensitivity to climate change impacts are for instance *age distribution of population, emigration rate, ethnic composition, population distribution within the settlement and the region, education, and healthcare situation*. **With these indicators, certain risks can be identified or even projected forward**, for example a shrinking and ageing population could lead to supply problems in the future, which influences adaptation. The state of healthcare can also influence preparation for extreme weather events, especially heatwaves. Note that the lowest level of regional sensitivity data in NAGiS is the district level (apart from the 10*10 km grid point resolution logic of climate factor-based exposure data), that is the reason why social data of settlement parts and their changes within the settlement can be accurately identified by local interviews, field trips.

3.2.3. Economic environment

Like social characteristics, analysing the economic situation of a specific settlement/region gives important information about the adaptive capacity of the settlement's population and its industrial organisations to climate impacts. **Economic performance is an indicator of power, financial situation and dependent on this, adaptation opportunities of a settlement/region and/or company**. Important data for related analyses are indicators of economic performance (on the national, regional level most often GDP/capita. In the case of a city-company cooperation, due to the size of the study area, GDP data are not available, so the gross value added/capita is often used). Likewise **important is the employment indicator** or the **unemployment rate**. Within the employed population, **those working outdoors, in protective clothing or with heat-generating machines are highly exposed to climate effects**,

hence their proportion in the employed population is revealing; **similarly, to the proportion of those employed in sectors highly exposed to climate impacts** e.g. agriculture or architecture. Innovation also plays a significant role in the effective adaptation to climate change, and certain local companies can play a major role in this area. **Investments in R&D and innovation activities can be a vital part of the company side of a city-company cooperation**, as well as their complementary adaptation aspects.

What happened in Kazincbarcika?

The situation analysis part of the joint city-company climate adaptation strategy of the LIFE-CLIMCOOP project is based on three different background studies: these are 1) statistical databases, datasets and the analysis of settlement, regional and national policy documents, 2) conducting field research complemented by interviews, 3) as well as conducting a climate vulnerability assessment for Kazincbarcika and its regions.

Types of threat related to climate change	Risk level	Expected change of intensity	Expected change of frequency
Extreme heat	!!	↑	↑
Extreme cold	!!	↓	↓
Extreme precipitation	!!!	↑	↑
Floods	!!	↑	↑
Droughts	!	↑	↑
Storms	!!!	↑	↑
Landslides	!!	↑	↑
Forest fires	!!	↑	↑

!: Low	↑: Increase
!!: Moderate	↓: Decrease
!!!: High	↔: No change
(?): Unknown	(?): Unknown

Figure 10.: Expected tendencies of climate change in Kazincbarcika.

Source: Sustainable Energy and Climate Action Plan of the city of Kazincbarcika (SECAP, 2018).

During the analysis of the geographical location and hydrography of the city and its regions, **potential climate change issues** were defined – e.g. flash flood, more frequent municipal inundations – and **ecosystems and local values most vulnerable to climate change** were identified. These were followed by the analysis of ongoing and future climate tendencies built on the data and projections of the **NAGiS**.

Within the mapping of social characteristics, besides the analysis of general social indicators (population size, population age distribution, ethnic distribution, education level), **social characteristics affecting adaptation** were emphasized e.g. distribution and health status of the population by different characteristics within the city and its regions, that play a crucial role in the impact of heatwaves or in personal responses, preparation to storm or flood damages.

Apart from natural and social factors affecting adaptation to climate impacts, analysis of the economic situation was also carried out by identifying **industrial sectors sensitive to climate impacts** (e.g. agriculture, forestry). The company partner of the adaptation strategy,

BorsodChem Inc. is the main driver of Kazincbarcika's economy. Due to its prominent role, the company takes part in financing R&D activities, promoting more effective adaptation, its functions were thus given special emphasis in the situation analysis.

3.3. Field research

One of the most general sources of information for the preparation of regional and sectoral strategic documents is the **analysis of existing statistical databases, datasets** (e.g. Hungarian Central Statistical Office, National Regional Development and Spatial Planning Information System, NAGiS) and the **analysis of relevant local** (e.g. Sustainable Energy- and Climate Action Plans, Municipal Environmental Programme, Integrated Settlement Development Programme etc.), **regional** (e.g. County Climate Strategy, County Environmental Programme), and **national** (e.g. the second National Climate Change Strategy, Partnership Agreement, National Development and Regional Development Concept etc.) **documents and the review of other literature on the specific settlement/region/company**; perhaps application of **remote sensing methods** (analysis of satellite images and aerial photos etc.). These give an overview of the natural, social and economic situation of the analysed region, and trend-like changes can also be identified, that can be used to predict the future of the region; latter can constitute the important basis for the strategy's objective and measure system planning.

Besides a lot of substantive data and changes revealed during the **secondary data analysis and research, more such information is not available, that can have a decisive influence on the process of strategy preparation**. The limits of different data sources, documents include:

- **Scales**
 - Social and economic statistical data necessary for the environmental exposure assessments and to support the study of sensitivity/adaptation oftentimes are only available on county or district level.
 - At most, grid point resolution climatic and exposure data is available in the NAGiS system; in the case of sensitivity and adaptation indicators the biggest resolution is the district level. Settlement/district within settlement level datasets and map layers representing them are not available in the system for now.
- **Temporality**
 - The database of NAGiS containing specifically climate adaptation data – unlike other big statistical databases (e.g. Hungarian Central Statistical Office, National Regional Development and Spatial Planning Information System) – is not updated yearly, which can be disadvantageous when preparing adaptation strategies.
 - In general, different settlement-level planning documents (e.g. integrated settlement development strategy) set settlements' environmental, social and economic processes for several years. However, these documents are only revised and renewed every few years, allowing that some of the previous certainties (e.g. extent of green spaces, number of segregated areas) are now different.

In the light of these, besides using secondary data sources, primary information gathering, and field research should be considered. One of the most obvious tools of this is **conducting professional field interviews**. This method has numerous advantages; hence it is useful, even necessary to apply it during the groundwork analysis of the strategy. **With this method, “soft” data and information on local climate impacts can be retrieved that cannot be obtained elsewhere**; these nuance and complement the situation analysis revealed during the secondary data analysis. We can gain insight into the life of settlements, institutions and organisations and learn about their attitudes towards climate change, their related responses and development intentions. With their help, **results of the secondary analysis can be validated; besides, it provides an opportunity for recognizing correlations and relationship-building with local actors**. However, the method has several drawbacks, for example the **high cost, effort and time, the fact-distorting subjectivity of the questioner/evaluator (or even the interviewee), potentially weak relevance of responses**.

During field interviews, it is useful to interview **persons from different target groups, who are competent in the environmental, social and economic situation of the settlement/region/company**. Stakeholders to be contacted include:

- regional and local governmental actors, heads of municipalities and decision-makers;
- operators of critical infrastructure networks (e.g. drinking water, electricity, gas, district heating etc.)
- owners and operators of nature reserves, forest areas;
- key actors of local economy (managers of major companies, businesses);
- actors from the education/research sector;
- actors from the local civil sector.

Interviews can be complemented with another field research. For instance:

- **field research to experience in person the regional characteristics, traces of climate change related damages**, presence and situation of climate vulnerability key topics, or even **geographical location and operation of good practices**.
- **photo documentation** that can be taken during the field research to identify and support these information;
- field mapping can be carried out to support geographic location of future strategic directions.

Using the output products of field research, the photo collection, impact- and risk maps, interview transcripts and the extract summarizing their lessons as the appendix of the strategy or as an illustration in chapters make the document more graphic and provide fact-based planning background for defining the objectives and measures later.

What happened in Kazincbarcika?

Preliminary studies carried out before the preparation of the joint city-company adaptation strategy apply two approaches in Kazincbarcika. On one hand, databases, datasets and relevant municipal, regional and national documents mentioned above were reviewed and analysed. On the other hand, the analysis included **field research**, where **professional interviews** with selected interviewees at a pre-arranged appointment, based on a common methodology **were recorded and processed**. Additionally, **field trips** were also included in

the research, where the planning team observed and **photo documented** settlement parts, objects mentioned by the interviewees, affected by natural disasters, or assessed as an outstanding adaptation practice.

Interview talks constitute a transition between traditional interviewing and semi-structured professional interviews, typically applying open-end questions beside close-end ones. Question lists of the interviews are **based on the questionnaire of the Settlement Adaptation Barometer (SAB) tool of the NAGiS system**, to channel in the opinion, experience and suggestions of local actors and affected parties.

An important aspect of the interview preparation work phase was **to interview local actors who can be directly affected by climate change** and at the same time, cover the city of Kazincbarcika and its regions from a territorial and sectoral aspect. We identified 4 different target groups during the interviews:

- **municipal governments** – contacting heads of municipalities (mayors, representatives, notaries, environmental desk officers etc.) is practical, as urban management is already significantly affected by the impacts of climate change, and preparation for future effects is also an important task. When selecting interview subjects besides Kazincbarcika, we contacted several municipal governments that are upstream settlements of the tributaries and streams of the Sajó, as potentially more climate change related damages could manifest, for example flash floods or pluvial flooding. These caused significant damages in recent years.
- **industrial organisations** – the most important interview subject of this target group was obviously BorsodChem Inc., as one of the leading partners of the LIFE-CLIMCOOP project. Several experts from the company took part in the discussion, facilitating to understand the company's attitude towards climate change and to identify relevant local climate impacts. Other companies in the target group were selected to cover, if possible, the whole area of the city and the wider region and their activities are at least indirectly affected by climate change.
- **education/healthcare/social institutes and civil organisations** – the target group reflected the society of Kazincbarcika, as an affected party. Climate impacts significantly affect different social groups, actors of the labour market, and healthcare actors on both the receiving and the using sides. A big proportion of the interview subjects manage regional tasks; thus, we could obtain relevant information on the city and its agglomeration from their interviews. Territoriality was also an important criterion at the selection of subjects, as differing climate impacts can be relevant at separate parts of Kazincbarcika (e.g. in the case of kindergartens, we contacted institutions of different city parts).
- **operators of critical infrastructure, natural resource managers** – actors of this target area are significantly affected actors of the issue of climate change adaptation, because of their day-to-day work and expertise. Major part of them plays a regional role, hence with their information, we can paint a more nuanced image of climate impacts affecting the regions.

The set of questions varied to a certain extent by target group, tailored to the characteristics of each segment, and to the relevant information they can provide. **Essentially, interviews consisted of four major parts:**

- The first part contained introductory questions, focusing on climate change effects and related attitudes appearing in the interviewee's own day-to-day and professional life.
- In the second part, the interviewee could choose from ten climate vulnerability topics specific to Hungary listed by the interviewers, which of them and to what extent they are relevant in and around Kazincbarcika.
- In the third part, interviewers followed through the detailed sub-questions related to the topics they had chosen from the aspect of exposure, sensitivity and adaptive capacity based on the methodology of the SAB.
- Finally, in the fourth part, questions focused on summarizing the lessons learned and good practices, that closed the discussion.

The following figure shows different types of climate impacts (e.g. drought, storm damage, human health, heatwaves etc.), their main form and location of appearance and number of mentions by the interviewees of Kazincbarcika.

Klímahatás	Megjelölések száma (db)	Hatások helyi megjelenése	Érintett település/településrész
Aszály	18/28	Háztáji termelés nehezebbé válik, a közterületek növényzete kiszárad.	Kazincbarcika külterületi gyümölcsösei és kiskertjei, belterületi parkjai és a BorsodChem Ipari Park, Radostyán, Varbó, Múcsony, Parasznya.
Emberi egészség: hőhullámok	21/28	Az idősebbeket, szív-és érrendszeri betegeket és a panelházakban élőket megviseli az extrém meleg.	Kazincbarcika Herbolya városrésze és belvárosa, Berente, Radostyán, Varbó, Parasznya.
Árvíz	10/28	Épületkárok, pincék, kertek elöntése, hidak alámosása.	Kazincbarcika (Felső-Barcika, BorsodChem Ipari Park, Sajókazinc), Múcsony.
Belvíz	7/28	Mezőgazdasági károk.	Kazincbarcika (BorsodChem, Sajó mente), Múcsony, Berente.
Erdőkár, erdőtűz	3/28	Antropogén eredetű erdőtűzek, csapadék miatt fellazult talaj utakra csúszása.	Kazincbarcika tágabb térsége
Természetes élőhelyek csökkenése	2/28	Változás a növényfajok ciklusában, az aszályok hatására pusztulnak a kocsányos tölgyesek.	Kazincbarcika tágabb térsége
Turizmus	3/28	Szezoneltolódás, rendezvényeket veszélyeztető kiszámíthatatlan időjárás.	Kazincbarcika belváros, Varbó
Allergének, betegségetterjesztő rovarok elterjedése	6/28	Szúnyogok számának és csípésük erősségének növekedése, parlagfű jelenléte kisebb területeken.	Kazincbarcika (BorsodChem, Csónakázó tó, külterület) Tardona, Varbó.
Viharkárok	17/28	Épületkárok, fakidőlések, vezetékszakadások, tetőkárok.	Kazincbarcika (Belváros, Herbolya, BorsodChem Ipari Park, Sajókazinc, Felső Barcika), Berente, Varbó, Tardona, Múcsony.
Villámárvizek és elöntések	14/28	Épületkárok, kertek és pincék elöntése.	Kazincbarcika (Tardona patak mente, Herbolya), Berente, Radostyán, Tardona, Varbó, Parasznya.

Figure 11.: Number, main form, and location of appearance of climate impacts mentioned by the interviewees. (Columns from left to right: climate impacts, number of indications, local appearance of impacts, affected settlement/part of settlement; rows from top to bottom: drought; human health, heatwaves; flooding, inland water inundation; forest damage, forest fire; loss of natural habitats; tourism; allergens, spread of disease-carrying insects; storm damages; flash floods and inundations)
Source: Climate vulnerability assessment on human health, water management, settlement development and operation topics (MGSH, 2022.)

Lessons learned:

- **Contacting interviewees on time is vital** because their workload is highly variable. E.g. it was difficult to arrange an appointment with certain heads of municipality around the parliamentary election of 2022.
- **Where the interview based on SAB was too strict, interviewers prepared separate target group specific questions** to avoid situations where interviewees cannot

respond to certain questions. For comparability purposes, it is practical to pay attention to the uniform structure of interviews.

- It is effective to **organise interviews in blocks** for more efficient progress; based on our experience, this process can work **with a minimum of three interviewing units of 2-2 people at a time**. In Kazincbarcika in autumn 2021 and spring 2022 two interviewing teams of 3 arrived for a week, where units could conduct 2-3 interviews per day.
- If possible, **it is recommended to record the discussion in agreement with the interviewee**, because it facilitates the preparation of transcripts later, and the conversation can also flow more smoothly due to the reduced need for notetaking. Where the interviewee does not agree, this does not apply.
- Interviewers should arrive prepared: it is important to **get familiar in advance with the basic activity of interviewees**, to avoid asking unnecessary questions on information available in other platforms.

3.4. Hazard mapping

Hazard mapping is a recommended, but not mandatory element of the situation analysis. During this phase, **we summarize information from different sources** (own research, analysis of available statistical data, review of available sources about the region/settlement, analysis of local and regional documents, field research, field interviews etc.) **and display them on a map**. If we prepare a municipal strategy, the base map can be a map of the town/village containing both the inner and outer areas; but also in the case municipal strategies, especially in the case of the Kazincbarcika-BorsodChem example of a joint city-company adaptation strategy, it may be useful to go beyond the administrative boundaries of the city and expand the cartographic representation to the whole area, if possible, to the ecologically/hydrologically relevant region (e.g. the water catchment area related to the municipality) – as climate change processes do not adapt to settlement boundaries! **Vulnerability topics** (e.g. *vulnerability to flash floods, risk of landslides, increasing risk of flooding, risk of pluvial flooding, settlement part most exposed to heatwaves*) **and their typical locations** (e.g. *settlement parts, district, sub-region, area*) **identified based on the analysis mentioned above can be indicated on the map in different ways** (e.g. *colour hatching, possibly using pictograms or labelling*).

The essence of hazard mapping is to provide background information facilitated by visualisation to the planning team itself and to decision-makers, helping to spatialise the problems identified, to set out topics and locations of development and intervention directions, and to synthesise spatially challenges and possible responses.

What happened in Kazincbarcika?

In the LIFE-CLIMCOOP project, the joint climate adaptation strategy of the city of Kazincbarcika and BorsodChem Inc. is based on several source analysis (statistical data analysis, strategic planning document analysis, field interviews, field trips) and vulnerability analysis summarizing the results of these sources. In parallel with the latter, a **climate risk and hazard map** were also prepared **extended to the whole Sajó water catchment area**. **The goal** of the map prepared in the project by the Western Balkans Green Centre and GeoGold Kárpátia Ltd. in 2022, **was to draw attention to growing environmental and social-economic risks due to climatic effects on the Sajó water catchment area**, identifying the

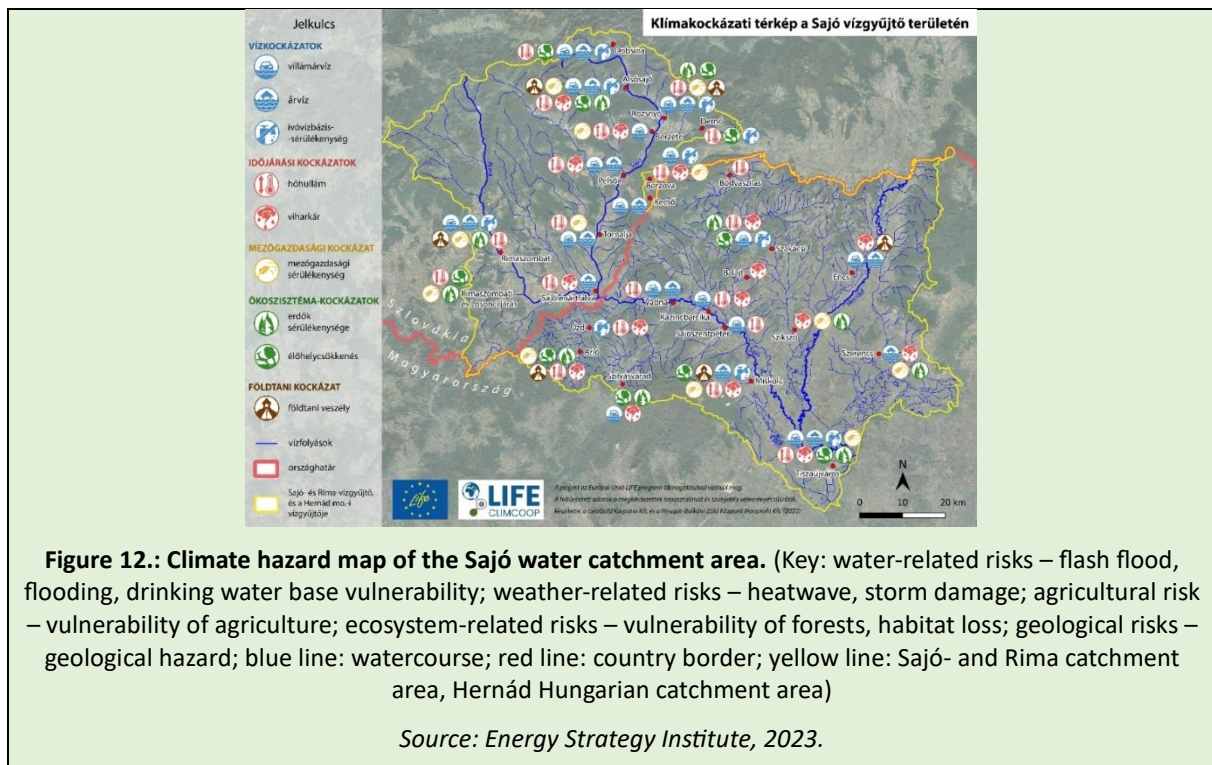
incidence rate of each type of damage that has occurred and is still occurring in the studied municipalities, facilitating focused solution of these problems.

Hazards displayed on the map were identified with the help of personal interviews with Hungarian and Slovakian organisations and the evaluated results of questionnaires; the data presented reflect the experiences and subjective opinions of the respondents. During the desk research activity before selecting Hungarian organisations, **most exposed, potentially most affected areas were identified on the water catchment area using the NAGiS database.** The goal was to contact and engage cities and companies in the Sajó water catchment area, where one or both parties need to adapt to water-related climate risks. The analysis included assessing climate risks, examining the interactions between stakeholders and water resources, developing cooperation between parties, promoting a mutually beneficial water management model at a water catchment area level for stakeholders. The interviewees were limited to large water users and municipalities in the area – as identified in the Hungarian River Basin Management Plan – who are likely to encounter several risk factors. **The goal of selecting Slovakian interviewees was to cover the cross-border section of Sajó with information, if possible. Contacted stakeholders were asked questions about 9 problems in 5 risk categories:** *flash floods, floods, vulnerability of drinking water sources, heatwaves, storm damages, agricultural vulnerability, vulnerability of forests, habitat loss, geological hazards* (rockfall, landslide, earthflow, presence of cavity collapse after large precipitations).

To gather necessary inputs, the Adaptation Specialization of the Western Balkans Green Centre (the predecessor of the Energy Strategy Institute) and the GeoGold Kárpátia Ltd. **conducted interviews in spring 2022 in the Slaná/Sajó water catchment area.** Prior to the fieldwork, the methodological basis was developed, related desk research, data collection, selection of interviewees, contacting cities/companies to be involved was carried out. Interview templates were developed based on the focus point of the preliminary analysis. Prior to contacting stakeholders, questionnaires were sent out. Specific templates have been prepared for municipalities, companies and separately for national parks, water management organisations and other organisations. Completed questionnaires were evaluated as the appendix of the report.

Based on the water catchment management plan, key regional water-related risks and key sectors, platforms and influencing factors in the Sajó water catchment area have been identified, followed by the sectors and most important stakeholders most affected by water-related risks.

Based on the water hazard map completed on Sajó water catchment level, identified risks were discussed on the meetings of the Climate Platform and Futurologist Group, later presented them to stakeholders (following sites, as well as cities and companies involved from the Sajó catchment area). The map and collected information contributed to laying the foundation for later work phases of CLIMCOOP, helping the identification of specific hazards affecting certain companies, municipalities, and the development of other joint climate adaptation strategies.



3.5. Climate vulnerability analysis

One of the key steps to plan and implement objectives and measures summarising adaptation responses to the expected impacts of climate change is the precise **definition of relevant vulnerability topics affecting the planning target area** (in our case a city, its industrial company, and their regions), identifying **their local manifestation forms, as well as their effects, consequences.**

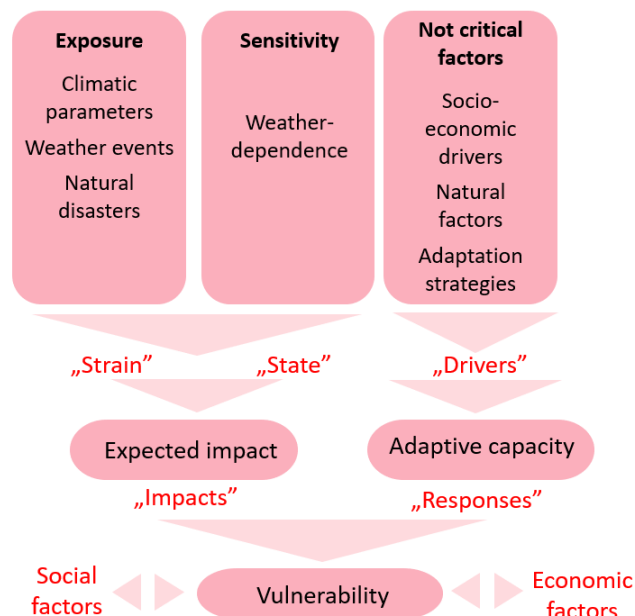


Figure 13.: The conceptual framework of the vulnerability assessment and the conceptional design of the CIVAS model.

Source: PÁLVÖLGYI 2008b

Such analysis is supported by Hungary's first climate adaptation policy decision supporting database and mapping system, the **NAGiS**. Since its launch in 2016, the system has carried out several sample vulnerability analyses, the results of which are published on its website; for this analysis, an own vulnerability analysis methodology was developed, the basis of which is the so-called **CIVAS model**,² which was originally developed in the CLAVIER³ international climate research project. The model assesses the vulnerability of each region by comparing environmental changes, the sensitivity of affected systems and their adaptive capacity. The quantified indicators calculated in the vulnerability assessments make it possible to compare the vulnerability of each territorial unit with each other, helping to carry out regional impact-, risk- and vulnerability analysis. With this and its extensive vulnerability database, the NAGiS system provides an appropriate basis for planning adaptation strategies for municipalities and regions. The result of the vulnerability analysis, the complex vulnerability indicator is a combination of 5 basic factors:

- **Exposure:** Data(s) specific to a given geographical location, showing how the climate and its components (temperature, precipitation, wind etc. conditions) vary in that location. Data are derived from meteorological measurements and climate models (e.g. temperature rise rate, precipitation distribution).
- **Sensitivity:** Informs on the weather-dependent behaviour due to its own characteristics (e.g. drought susceptibility) of affected parties/objects or certain groups of affected parties/objects (e.g. society or its group, economy or its sector, ecosystems).
- **Potential impact:** the combination of the previous two indicators, which is specific both to the geographical location and to the studied affected system (e.g. mortality-weighted urban heat island effect).
- **Adaptive capacity:** indicates the nature and strength of local socio-economic responses to climate change (e.g. the resilience of the local housing stock depends on its physical condition, which is also a function of the socio-economic position of the area)
- The complex **vulnerability** of a specific territorial unit is obtained as a result of the expected impact and the adaptive capacity.

In summary, conducting vulnerability assessments is a complex process, where **the first step is to identify the problems and affected systems**, as well as revealing what role do this play in the development of local climate vulnerability. Then it is necessary to determine the **parameters of exposure and sensitivity**, the **factors of adaptive capacity**, and **the method used to calculate the expected impact and vulnerability**. Once the calculations have been carried out, the results can be analysed and evaluated to identify the most vulnerable affected parties, objects/regions/settlement parts.

² CIVAS model: Climate Impact and Vulnerability Assessment Scheme.

³ CLAVIER project: Climate Change and Variability: Impact in Central and Eastern Europe EU 6th Framework Programme, GOCE Contract Number: 037013 (2006–2009).

What happened in Kazincbarcika?

In the framework of the LIFE-CLIMCOOP project, one of the essential outputs is the implementation of a model climate adaptation strategy for the regions of Kazincbarcika and the company, in the cooperation of the municipality of Kazincbarcika, BorsodChem Inc. and regional actors. The vulnerability to climate change of the region's environment, society and economy was a key aspect of the situation analysis and situation assessment that underpinned the Strategy.

As the climate adaptation strategy aims to formulate the common climate adaptation vision for the municipality, the region, and the company, considering their characteristics, the most important objectives at different hierarchical levels to achieve this vision and the concrete measures that can be derived from them, for their development, **preliminary situation analysis provided the appropriate basis**. In this framework, the experts of the National Adaptation Centre prepared the "*Vulnerability Situation Analysis*" document.

Based on the research and analysis, the vulnerability assessment study **analysed the three key topics of climate change adaptation** in Kazincbarcika and its immediate regions, with a spatial focus on three priority areas. These include the vulnerability of **human health, water management** and **urban affairs**.

The analysis and presentation of each vulnerability topics consisted of three main elements per topic:

- One of the pillars is ***the impact chain analysis of the most prominent impact*** (e.g. heatwaves for human health, extreme precipitation events for water, storm damage to buildings for municipal vulnerability) ***related to a certain vulnerability topic***, which was already outstanding during the field research, as a local phenomenon.
- The other pillar is a ***narrative description*** that goes beyond the impact chain, to present all the relevant ***general and local risks related to certain topics***, locally appeared ***current and potential problems***.
- ***Proposals for interventions*** will be formulated that provide the basis for future climate strategy objectives and measures.

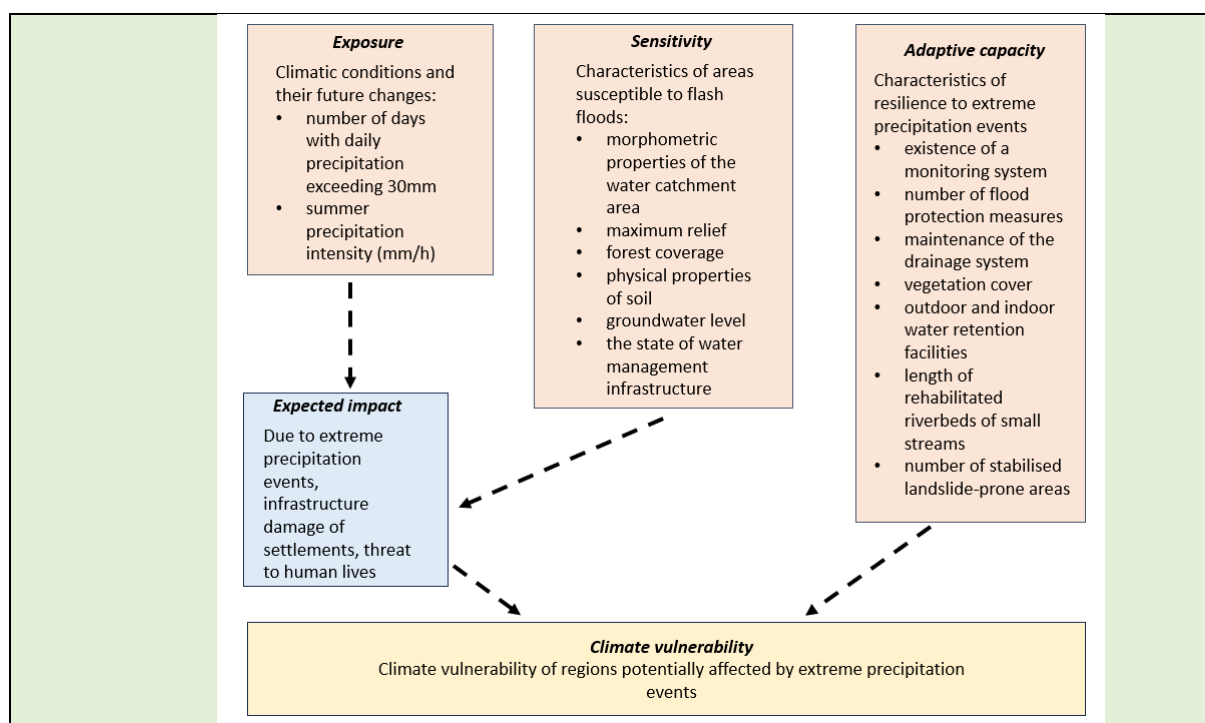


Figure 14.: The analysis of vulnerability to extreme precipitation events.

Source: Climate vulnerability assessment in human health, water management, settlement development and operation topics. (MGSH, 2022.)

On one hand, detailed unfolding of these topics through vulnerability assessments provided an excellent base for the preparation of the situation analysis and assessment chapters of the Strategy, and on the other hand, it foresaw problems to be solved on which the Strategy's objective system can be built.

3.6. Climate change scenario analysis

When planning climate adaptation strategies, it is essential **to be aware of** the current and even more so of the **expected future elements of climate change and their impacts**, as this information and projections will be the basis for the objective and measure system forming the core of the strategies to be developed on this issue. Future climate projections are based on so-called **climate models**, mathematical models that approximately describe the processes of the real climate system. However, precisely because of the nature of the models, **they always carry a degree of uncertainty and do not take into account the various socio-economic processes that have a significant impact on greenhouse gas emissions** also affecting the climate system. To address this uncertainty factor, so-called **emissions scenarios** are made that describe expected anthropogenic scenarios for GHG emissions. Consequently, **the climate projection closest to reality can be obtained by a combination of several climate models and emissions scenarios.**

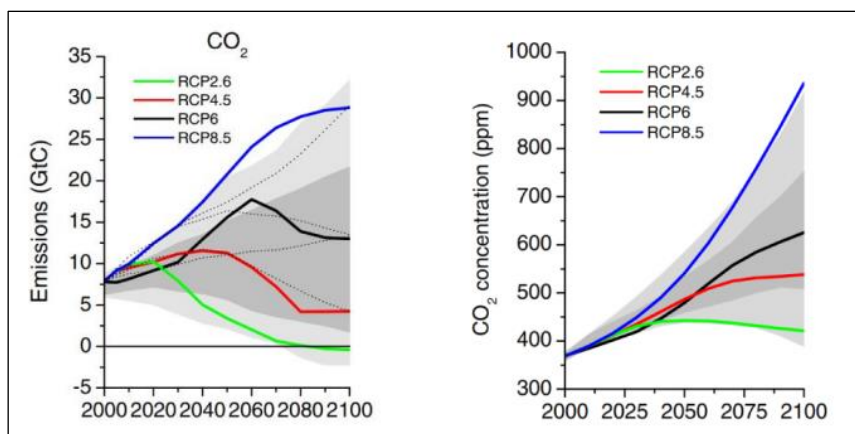


Figure 15.: CO₂ emission trajectories in Gt of carbon for the RCP scenarios (left) and the associated atmospheric CO₂ concentrations in ppm (right) between 2000 and 2100.

Source: van Vuuren, D.P., Edmonds, J., Kainuma, M., Riahi, K., Thomson, A., Hibbard, K., Hurtt, G.C., Kram, T., Krey, V., Lamarque, J., Masui, T., Meinshausen, M., Nakicenovic, N., Smith, S.J., Rose, S.K., 2011: *The representative concentration pathways: an overview. Climatic Change*, 109, 5–31.

Climate change analysis is based on so-called **circulation climate models**, that describe changes on a global scale. **Although these models developed significantly in last decades** – with advances in the study of atmospheric and surface processes and a notable increase in computing capacity –, **their resolution is still not suitable for local analyses** (e.g. there are only a few grid points in our country, and because of regional differences in climate change, even the opposite of global effects can prevail in a given area). Therefore, to increase resolution of the results from global climate models, **regional climate models were created using so-called regionalisation or downscaling** (dynamic, statistical) **methods**.

The CORDEX (Coordinated Regional Climate Downscaling Experiment) **initiative, coordinated by the World Climate Research Programme (WCRP), has resulted in the CORDEX database, which is a high-resolution, scaled-down climate projection data set covering all land areas, using multiple global and regional climate models.** The CORDEX database distinguishes a total of 14 regions on Earth, of which for Hungary, the database sections of 2 regions can provide data for climate adaptation analyses. Med-CORDEX reports data for the Mediterranean region, which includes our country, while EURO-CORDEX covers the European continent as a whole.

However, the uncertainty that characterises global climate models does not disappear with scaling down, but is also transferred to regional climate models, so that in order to determine the future potential impacts of climate change in a given area, **it is necessary to test a combination of several regional climate models and emission scenarios.** In the analysis, **projections of climatic data** (temperature, precipitation) **that are the same in several combinations are considered the most likely.** For example, as part of the LIFE-CLIMCOOP project's situation analysis, combinations compared during the climate analysis equally showed that the average annual temperature in Kazincbarcika and its regions will increase in the future. The analysis should therefore focus on these similar trends.

The Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) used newer generation RCP (Representative Concentration Pathway) scenarios as the basis for future climate assessments. As a cross-section of researchers' professional opinion and users' needs, four types of scenarios were identified - RCP2.6, RCP4.5, RCP6.0 and RCP8.5⁴.

The **IPCC's Sixth Assessment Report (AR6)**, due in 2021, already considers five types of scenarios. Among these, a new scenario, **RCP 1.9, which is the most optimistic scenario, is a net zero decrease in global CO₂ emissions by 2050, while RCP7.0, also a new but dangerous scenario, is a doubling of global CO₂ emissions by 2100**, with all its consequences.

In Hungary, the National Adaptation Geo-Information System (NAGiS) contains the latest climate projections for our country. Within the framework of the KEHOP-1.1.0-15-2016-00007 project "*Further development of the NAGiS*" launched in November 2016, selected results of climate models based on the new generation scenarios defined in the IPCC 5th Assessment Report were integrated into the system, which contain data sets for three time-windows (1971-2000 as reference; 2021-2050, 2071- 2100).

For these climate projections, the CNRM-CM5 and EC-EARTH global climate models, the RCA4 model for regional scaling, and the RCP4.5 and RCP8.5 emission scenarios were selected for the development of the climate projections. The climate projections are made up by a combination of these parameters, summarised in the table below:

Global climate model	Regional climate model	Emission scenario
CNRM-CM5	RCA4	RCP4.5; RCP8.5
EC-EARTH	RCA4	RCP4.5; RCP8.5

Figure 16.: Climate model and scenario combination projections selected in the framework of the “Further development of the NAGiS” project.

Source: Energy Strategy Institute, 2023.

What happened in Kazincbarcika?

As part of the situation analysis for the development of the joint municipality-company adaptation strategy, the **climatic parameters of the region were presented**. In the Strategy, this was based on recent and current climate trends and on data and indicators from future climate model simulations, which are available in the NAGiS database. The analysis **summarised the temperature and precipitation projections for the mid- and late-century climate scenarios compared to the 1971-2000 reference period**. These

⁴ RCP 2.6 is the most optimistic scenario, projecting large reductions in emissions from anthropogenic activities (GHGs, polluting aerosols, fossil fuels, etc.). It also anticipates increasing use of renewable energy sources and nuclear power.
RCP 4.5 is a moderately optimistic scenario. In this scenario, the role of fossil fuels is still significant, resulting in a steady increase in atmospheric CO₂ concentrations. However, by 2065, primary energy use and population growth will peak and then decline.
In the RCP 6.0 scenario, greenhouse gas emissions peak in 2060 and decline thereafter. It also considers efforts to mitigate climate change and assumes a greater role for renewables.
RCP 8.5 is the most pessimistic scenario, as it does not include anthropogenic mitigation actions as a factor at all. In this scenario, greenhouse gas emissions are high due to continued population growth, which increases the demand for energy that can only be met by using fossil fuels.

changes indicate which climate topics require the most attention in the development of the Strategy.

On this basis, the climate of Kazincbarcika and its regions can be **classified as a moderately cool and moderately dry continental**. According to the **optimistic scenarios**, the average annual **temperature** in Kazincbarcika **may rise by 1-1.5°C on average by mid-century** compared to the reference period, **while a warming of 2-3°C is expected in the end of the century**. However, **pessimistic scenarios suggest a warming of up to 3.5-4.5°C by the end of the century**. The average temperature rise in Borsod-Abaúj-Zemplén county and in Kazincbarcika as well exceeds the national average. Accordingly, by the end of the century, the frequency of heatwave days could increase from the current 2-3 days per year to an average of 0-10 days by mid-century and a significant increase in the number of hot days is also expected.

An increase in extreme events is observed in the distribution of precipitation. The intensity of precipitation and the expected increase in the number of days with extreme rainfall will further increase the risk of flash floods, which are major problems in the region.

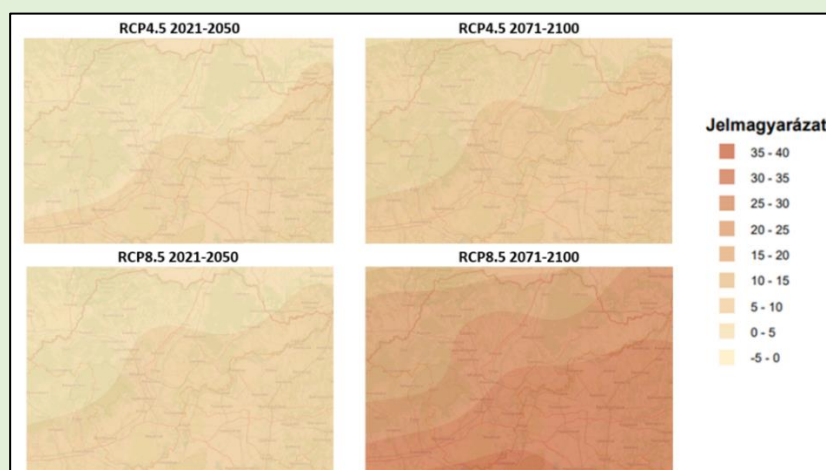


Figure 17.: Projected change in the number of heatwave days for the period 2021-2050 (left) and 2071-2100 (right), based on RCA4/EC-EARTH climate model and IPCC RCP 4.5 and 8.5 scenarios (in units).

Source: Appendix of the joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

It is clear from the climate projections above that in Kazincbarcika and its regions, **heatwaves, flash floods and inland/pluvial flooding**, as well as **extreme storms will be the main issues to be addressed in the future**. The preparation of the objective and measure system of the climate adaptation strategy should respond to the associated risks.

3.7. NAGiS municipality decision-supporting modules and their potential applications

The situation analysis and assessment phases need to build on a substantial data and information base. However, in addition to having these, it is also useful to acquire the methodological knowledge and tools to gather this information. Such tools can be found in the NAGiS modules developed between 2017-20. Their potential uses in the planning are explored in the following two sub-chapters.

It was already mentioned earlier in the handbook that the NAGiS as a policy tool supports climate policy preparation, decision-making and strategic planning through its map interfaces and data platform. **Based on measured data and climate model results, it presents the climatic changes of the past decades**, providing climate projections for the period 2021-2050 and 2071-2100, and **shows the differences in climate vulnerability between different regions of Hungary on map layers**. Data sets of NAGiS interface can be applied in local climate change planning, as well as in the preparation of national, county-level and municipal climate strategies and Sustainable Energy and Climate Action Plans (SECAPs).

The first development phase of NAGiS took place between 2013-2016, in the coordination of the Mining and Geological Survey of Hungary. Further development of the system was carried out between 2017 and 2020, focusing on enhancing the climate adaptation knowledge base, expanding the IT toolkit, developing decision-supporting applications, and increasing social acceptance. During the development process, the main objective was to develop professional **decision-supporting modules – Leader Information System, Settlement Adaptation Barometer, Municipal Decision Preparation Application and the Settlement Building Stock Vulnerability Estimator Module** for adaptation policies and municipal measures. These tools support municipalities' planning to prepare for climate change. In the following, the Settlement Adaptation Barometer and the Municipal Decision Preparation Application will be presented in detail, as modules especially useful in strategic planning. These two modules are available free of charge to municipalities (after registration) on the NAGiS platform and can be used effectively in the situation analysis work phases of adaptation strategies.

3.7.1. The Settlement Adaptation Barometer

The Settlement Adaptation Barometer is a **climate strategy planning tool for municipalities**, in the form of an online questionnaire available on the NAGiS website. **It essentially has three main functions: collects climate impacts affecting settlements into a single database, helps to set adaptation directions for municipalities and supports community planning.**

With the help of the Settlement Adaptation Barometer's questions, we can assess the impacts and consequences of climate change on local governments (municipalities), the challenges they face in addressing them, and the proposals of local actors concerned. Besides facilitating the preparation of the adaptation situation analysis of settlements, this questionnaire **helps selecting which areas to focus on when preparing the situation assessment and adaptation responses**. With the help of different topics affected by climate change, respondents can easily select relevant, observable problems concerning their settlement. Adaptation measures to climate impacts and the directions of a potential climate strategy can thus be more smoothly defined.

The module encourages a **community planning approach**, as the questionnaire should be completed with the widest possible involvement of stakeholders. The municipality determines the circle of stakeholders based on its own decision and selection principles. The **participation of actors with expertise in climate change impacts and issues** relevant to the municipality, **representing different perspectives** provides an opportunity to learn about sector-specific problems, share knowledge and take into account all perspectives. The characteristics of the settlement (e.g. position in the settlement hierarchy, size, management type, major sectors) and the issues related to climate change determine who should be involved. For example, while the representative of the health sector at the municipal level is the general practitioner

and the nurse, in larger cities the competent authority is the Department of Public Health of the County Government Office or the District Office.

Cooperation of different actors can later become the consultation platform of municipality-level climate protection, resulting among others in long-term municipal strategic planning and the implementation of further developments.

The questionnaire of the Settlement Adaptation Barometer has a general and a specific part. The general part helps to outline the adaptation situation of the settlement, influenced by the socio-economic characteristic and geographical location, while the specific questions focus on the main climate change vulnerability topics relevant to the settlement. From these, the municipality selects the most relevant and important challenges/topics of its area and completes the detailed sub-questionnaires only for these topics. **The method thus highlights the areas where the climate strategy planning should focus, and adaptation measures should be identified.**

3.7.2. Municipal Decision Support System Application

The Municipal Decision Support System Application **makes information on the current and potential future impacts of climate change easily available to local municipalities**, but it has an important role in the national comparison and assessment of expected impacts. It is therefore more forward-looking than the Settlement Adaptation Barometer presented earlier and **aims to contribute to the definition of long-term development directions.**

The Municipal Decision Support System Application contains the relevant layers of the NAGiS data layers for local adaptation planning, thus **supporting the planning of municipal adaptation strategies as well as the development of related sectoral strategies.**

The two functions of the Municipal Decision Support System Application are comparison and thematic reports. The **comparison function** makes it possible to compare the expected changes in each settlement with national averages, or with other administrative units. This function is divided into two comparison methods: one is the individual comparison, which *allows the results of any two territorial units to be compared, and the other allows the data of a given settlement to be compared with the district averages.* **Thematic reports of the application** cover a wide range of areas including forestry, agriculture, human health, water management and natural habitats. Several indicators can be selected to compare against, as well as different climate scenarios and climate models or time periods based on which to analyse given sensitivity/adaptive capacity/vulnerability indicator.

What happened in Kazincbarcika?



Figure 18.: Login surface of the Settlement Adaptation Barometer inside the NAGiS system.

Source: <https://tab.mbfisz.gov.hu/bejelentkezes>

In the preparation of the climate adaptation strategy, the methodology of the Settlement Adaptation Barometer was used as one of the decision support modules of the NAGiS system.

One of the most time-consuming tasks in the elaboration of the Strategy was the **preparation of the Situation analysis chapter**, which served as a basis for the whole document, and as the prelude, the **preparation of the Vulnerability assessment study**, analysing local appearance of main climate impacts. These could not rely exclusively on secondary data and document analyses, as the need to obtain comprehensive information required primary research work. In the case of the Strategy, this meant conducting semi-structured field interviews, complemented with field trips and photo documentation.

The thematic questionnaire of the semi-structured professional interviews focused on questions related to relevant vulnerability topics. **The structure of the questionnaire, the question posing, and the interview process followed the structure of the so-called Settlement Adaptation Barometer**, building on an established data collection methodology of the planning of county climate strategies.

3.8. Mistakes to avoid

It is already clear from the information listed in previous subchapters: **although the situation analysis is technically perhaps the easiest part of the strategy writing process** – since we have to gather partly ready-made and partly self-generated information about the region and use it to describe local characteristics, climate trends, climate change impacts and consequences, social, economic and ecological adaptive capacity and risks (it practically requires data sources and analytical skills, so that the least experienced members of the planning teams can usually test their skill here with relatively little stakes) – **yet its scope and details make it one of the most time-consuming parts of the process**. As a result, there are several pitfalls and potential

for errors during the preparation process – now we are trying to draw attention to these. In contrast to the vision, objective system and measure planning phases, which require more planning experience, the situation analysis is more of a description, a summary, so as mentioned above, it is an ideal task for younger, less experienced members of the planning team.

One of the most important criteria for a proper situation analysis is **completeness**, which can be approached in two ways. According to the spectrum of the situation analysis, there can be several types:

- **complex climate strategy**: in this case a complex situation assessment is needed, equally covering decarbonization, adaptation and awareness-raising measures, in other words, it is essentially complete;
- **adaptation strategy**: in this case (perhaps complemented with awareness-raising) it is only necessary to go through the main vulnerability topics affecting the settlement/region, and main actors of awareness-raising – within the adaptation, we strive for thematic completeness;
- in the **situation analysis based on a sectoral approach**, we go through information sector by sector;
- in the **situation analysis with a territorial focus**, we present in detail what the problem is and in which part of the settlement part/sub-region. Note here that even if the basic approach is sectoral, a spatial synthesis chapter should always be inserted at the end of the situation analysis, summarising the sectoral/vulnerability characteristics per settlement part/sub-region (using the Municipal Decision Support System Application of the NAGiS system can be helpful).

Whether a complex climate strategy, adaptation document or awareness-raising action plan is to be prepared is obviously **decided at the beginning of the planning process** – this is usually in line with the intentions of the client. (The joint document of Kazincbarcika is one of the latter.)

All issues relevant in the region should be covered in the situation analysis: main GHG emission sectors, if it is a complex analysis; sectors most exposed and sensitive to climate change, if the focus is on adaptation; finally, actors of awareness-raising. In practice, this means that in the case of a climate (adaptation) strategy, **we need to go through all the environmental, social and economic aspects of the local (municipal or regional) environment**. The situation analysis on these topics covers the changes in environmental, climatic, socio-economic factors in the settlement or region; the identification of main affected parties/objects; the results of vulnerability assessments carried out; the assessment of local or regional climate and energy awareness attitude studies; the collection of local/regional values threatened by climate change. In the case of a decarbonization strategy, planners are preparing a GHG inventory. Exactly which of these sub-areas and to what level of detail are addressed that should be decided in advance, possibly at the beginning of the situation analysis and assessment work phase. **Attention! Completeness does not equal to “disintegration”**, redundant repetition of topics, endless analysis of irrelevant topics (e.g. the legal background of cultural heritage protection, or the mysteries of local electoral geography), or thoughtless text-heaping.

An important aspect of local climate policy planning is the need for a situation analysis that **reveals local “specifics” and clearly identifies circumstances**. It is essential that the situation analysis is focused and has a clear backbone. In different chapters, the relevant findings should result from each other. Professional and amateur readers alike should sense which conclusions the material is “heading towards”.

Looking ahead, once we see what development directions we are thinking about, we should always make sure that these are already well founded in the situation analysis chapters. All later objectives, measures must be based on a foundation, so if there seems to be a lack of something, an “unfilled gap”, an area to be addressed, the situation analysis must explore it in depth.

A joint city-company document is not an average material, nor is its situation analysis. In the situation analysis and assessment work phase, **the city and the company are managed both separately and as a whole**, analysing separately the natural, social and economic characteristics of one, and the site and activity characteristics of the other, but **we also cover common climate aspects, climate impacts and vulnerability topics affecting both**.

There is a wide spectrum of methods available in terms of data sources and methods for the situation analysis. Most often we conducted our own desk research, using secondary data sources (analysing statistical data). We should aim to use accurate data from official sources, and various statistical and geo-information databases. These are complemented by monographs, books, scientific and newspaper articles, and studies about or indirectly related to the settlement/region/company. The company, local and regional development policy, sectoral and spatial planning documents provide important background information on local development trends affecting the region, the settlement, and the company, and we can deduce fundamental (climate) challenges from these materials. Remote sensing data and methods: aerial photos, space images, drone images are also an important source of information, which are excellent for cross-checking previous analytical claims.

However, all the information obtained in this way **needs to be verified, confirmed, and validated in person**, using other methods such as fieldwork (field trips, field mapping) and a special form of fieldwork: conducting field interviews to obtain additional qualitative information base. The advantage of the latter lies precisely in its nature, in their specific additional information content; their disadvantage, however, lies in the time and effort required, as well as the threat of subjectivity. The main challenges identified should always be supported by multiple sources. It is unfortunate, if a problem only identified by a single municipal interviewee is highlighted, or if a problem supported by statistical data is not verified by local field analyses.

It is essential to fully involve local actors (the Settlement Adaptation Barometer presented earlier provides an excellent opportunity to do this). **Local interviews** are also a good example of how to involve local stakeholders and partners in the planning process as widely and as early as possible, right from the beginning of the planning process. Conducting field studies to complement statistical data and literature analyses can significantly increase the relevance of a situation analysis carried out in a top-down manner, from the “ivory tower” of planning.

It is strongly recommended to work in a larger team during the situation analysis and assessment work phase, **with each sub-area/discipline having its own person in charge**. In the text in progress, in addition to seeking to make findings, it is also important to make one’s own findings: **instead of gathering and giving back information exclusively, giving an**

analytical opinion is what matters – even if the *situation analysis* is primarily about identifying and presenting the information background, the essential field of synthesis will come later, in the *situation assessment*.

It is true for all written material, but especially in case of the situation analysis work phase it is of utmost importance that the text should be **relatively easy readable, clear, well-structured and comprehensible contributing to the transparency of the chapter** for decision-makers and target groups. Similarly, interpretability is promoted by **adequate visualisation**: proportionate diagrams, charts, maps of vulnerability topics, attaching photographic documentation of field visits - even recording field trip experiences as a separate appendix. **It is recommended not prolonging the situation analysis to an unlimited length** for the sake of comprehensibility, although there are no particularly strict length limits – if the material is too long, it should be attached as an Appendix to the Strategy or publishing it in a separate volume with the main strategic document.

4. Situation assessment

4.1. Description of content elements, methods to be applied

The situation assessment chapter of the adaptation strategy contains a **summary and synthesis of the local and regional knowledge identified in the situation analysis chapter**. It has a number of tools, for example SWOT or PEST⁵ analyses that categorize the findings, problem trees and objective trees that form the basis of the objective system planning, logical framework matrixes, descriptions and lists that summarize the evaluation in a narrative way.

This sub-chapter presents the **SWOT analysis**, which is better suited to climate strategies, and the **problem tree and objective tree** among the tools supporting responses, as three interdependent steps. A **narrative situation assessment** that identifies risks and breakout points is presented in a separate chapter of the guide. It is also important to note that – similarly to the adaptation strategy – the sub-chapters of the situation assessment build on each other's findings as consistently as the whole situation assessment builds on the situation analysis and provides an appropriate basis for the subsequent planning of the objective system and measures.

4.1.1. The SWOT analysis

The SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis is a popular tool for strategic planning activities, as it provides a simple, understandable summary of the findings of the situation analysis chapter, while leading to the subsequent chapters of the strategy. The analysis aims to provide **a summary of the findings of the situation analysis, divided into strengths and weaknesses** at a local and regional level, typically those within the control of the actors concerned or arising from fundamental natural/social conditions, and **opportunities and threats** defined by external factors. The actors involved have no influence on the latter.

To prepare the analysis, it is recommended that **the drafting organization** discusses the most important formal (structure of the analysis, use of traditional or thematic divisions, etc.) and content elements (selection of findings) within **internal workshops**. Feedback on the planned analysis should be collected from any additional partners involved in the project later.

Mistakes worth avoiding:

- **Avoid setting goals or unrealistic aspirations**, work with short statements rather than objectives.

Example:

If we would add to the opportunities: *“A 2x2 lane freeway has to be established in the Sajó valley to reduce transit traffic in Kazincbarcika, which would improve the quality of life of the residents”*, then it would not be appropriate for two reasons.

On the one hand, it formulates an unrealistic goal, not an opportunity, which, could not be realized either by the city-company or in the framework of a climate strategy; on the other hand, it is too extensive and long, instead a shorter formulation is necessary.

⁵ The PEST analysis is a strategic planning tool to identify the external political, economic, social and technological factors that may have an impact on the subject of the analysis. Usually, business organisations use it in their strategic planning activities, but it can also form part of the analysis toolbox of city-company climate strategic planning.

- **Longer elaborations do not belong in the SWOT**, they are relevant in the situation analysis or maybe in the narrative situation assessment. The SWOT should contain brief, comprehensive, summary statements.

Example:

Similar to the previous point, excessive detail is a mistake.

“Due to its location in the Sajó Valley and its basin position, Kazincbarcika is particularly exposed to the effects of flooding and flash floods. Flooding rivers often wash away houses and flood basements, causing significant damage to private and public buildings and infrastructure in the affected neighbourhoods. These are expected to increase in the future due to deteriorating climatic effects.”

This description was added to the threats section of the SWOT analysis, but it is so detailed that it would really fit in the water management or general natural characteristics chapter of the situation analysis, or maybe in the narrative situation assessment.

Instead, it is sufficient to write that: *„Kazincbarcika is currently and is expected to remain particularly vulnerable to the effects of flooding and flash floods according to climatic trends.”*

- **The SWOT analysis should be connected to the situation analysis and form the basis of subsequent problem- and objective tree setting.**

Example:

If the situation analysis chapter of the strategy emphasizes that the given area has high number of hours of sunshine, which is expected to increase in the future, then it is preferable not to add a statement to the opportunities section of the SWOT analysis that says: *“It is necessary to develop wind power capacities in the settlement to exploit the geographical conditions characterized by outstanding wind power.”*

All of this would not be appropriate, because it would lack coherence with the previous situation analysis chapter. To avoid this, it is necessary to base the situation analysis on the characteristics and opportunities related to wind, or else it should be built on the characteristics that exist.

In this case, the correct statement regarding the opportunities would be: *“Due to the high number of hours of sunshine in the settlement, there is great potential for using solar energy, for example in the form of solar parks.”*

- **It is necessary to avoid presenting contradictory or conflicting statements.**

Example:

If we add to the opportunities that: *„Increased economic/infrastructure investment in the region in recent years can also provide an excellent basis for climate adaptation improvements”,* then we should not write in the threats section that: *„The stagnation of economic/infrastructure investments in the region in recent years may also stop climate adaptation efforts”.*

This would result in a huge contradiction in the SWOT analysis. We should choose the one of the two statements that is more likely to occur.

4.1.2. Problem tree and objective tree setting

In addition to the SWOT analysis, the situation assessment phase can also include a so-called **problem and objective tree setting**, which can be interpreted as a **transitional, foundational activity prior to creating the objective system**. If we decide to develop these methodological elements, it is first necessary to prepare the problem tree, basically based on the weaknesses and threats identified in the SWOT analysis. An **internal workshop is suggested to be organized** for this, which can be useful because each internal and external expert involved in the strategy planning and participating in the situation assessment can contribute to the problem tree in different aspects.

4.1.3. The steps of setting a problem tree

1. The participants of the workshop write the most significant problems in the region according to them on small sheets. In doing so, there are four sources of inspiration:
 - what is described in the situation analysis,
 - own experiences from the situation analysis,
 - weaknesses collected and validated in the SWOT,
 - and threats collected and validated in the SWOT.
2. After that, by mutual agreement, we organize the problems written on the sheets thematically (e.g. by vulnerability topics, challenges, social/natural/economical characteristics), and filter out possible duplications (problems or sub-problems written by several planners).
3. Then, we arrange the thematically organized problems into a hierarchy (by selecting the elementary problems, the medium-level problems formed by groups of elementary problems and the most general problems above these) and we try to identify meaningful connections between each level of the hierarchy.

For example, in case of the **problem connected to water**:

- **Elementary problem:**
 - *According to climate models the number of days with extreme precipitation could triple by 2100.*
 - *The number of extreme precipitation events is increasing.*
- **Medium-level problem:**
 - *Municipal rainwater inundation is expected to increase.*
 - *BorsodChem's water supply is based exclusively on the Sajó river (water supply exposure).*
- **Most general problem:**
 - *The double constraint of water abundance and water scarcity in the region.*

4. We deal with the deficiencies and imbalances in the structure of the problem tree (e.g. one topic has numerous elementary and medium-level objectives, while another has only one or two statements). Where necessary, we reformulate the problem descriptions, aligning and stylistically unifying the different elements.
5. Eventually, the final paper-based problem tree, which has been thought over and agreed upon several times, will also be prepared digitally. If the structure is so large that the tree is becoming less transparent, or the structure itself is so complicated due to cross-connections that it makes visual interpretation difficult, then it is worthwhile to prepare sub-problem trees by topics in addition to the overall problem tree and to display them in the Strategy's Annex or in the Appendices.

As the problem tree is mainly based on the SWOT, **the objective tree is based on the problem tree itself and its sub-topics**. For this reason, if we have worked out the former with sufficient overview, then we will have an easier time when setting the objective tree, since practically **by transforming the problems of different hierarchy levels into objectives, we will have our objective tree**.

4.1.4. The steps of setting an objective tree

1. Within an internal workshop, we create objectives to solve existing problems.

Example:

Problem: According to climate models the number of days with extreme precipitation could triple by 2100.

Objective: Preparing for an increase in the number of days with extreme precipitation.

2. The objectives are arranged hierarchically according to topics, similar to the problem tree. In practice, this step is already accomplished, since we convert our entire problem tree into an objective tree, and the problem tree already has this structure.
3. Finally, we also create the objective tree digitally. It is also true here that if the starting point was a problem tree of such size and complexity that the objective tree is also becoming less transparent, or the structure itself is so complicated due to cross-connections that it makes visual interpretation difficult, then in addition to the overall objective tree it is also worthwhile to prepare sub-objective trees by theme and to display these in the Strategy's Annex or in the Appendices.

What happened in Kazincbarcika?

As part of the development of the situation assessment chapter of the joint Municipality-Company adaptation strategy, the planning team carried out a SWOT analysis. **In the framework of the workshop, they discussed the most important methodological and content elements.**

Due to the large number of findings, in the case of strengths and weaknesses, **the SWOT table was divided according to different vulnerability topics and other social and economic factors to ensure easier interpretation and transparency**. However, **in the case of opportunities and threats, this division was discarded**, since most findings in the weaknesses and threats sections appeared **in a redundant and repetitive form across several topics**, thus unnecessarily expanding **the related sections of the table**.

The **categorization of climate trends and their impacts** – which, **according to the traditional strategic approach, should be included among the opportunities/threats which are external factors** – caused a methodological challenge. It is important to note that the Hungarian municipal and county-level climate strategy planning methodology of 2017 uses a slightly different approach compared to the established SWOT methodologies. The cited methodology classifies climatic characteristics of the recent past and present, and the findings related to them into strengths/weaknesses. On the other hand, climate processes expected in the future are mentioned as opportunities/threats.

One may ask why climatic processes of past decades have been interpreted as internal strengths/weaknesses, when these factors cannot be influenced by the “subjects” of the Strategy: the Company, the City and their region. The reason is the sectoral shift in the emphasis of climate adaptation planning compared to general strategic planning: since, in

the context of climate adaptation, the climate of a given municipality/region is a landscape feature, like the geographical, geological, geomorphological, hydrographic characteristics, it is considered a strength/weakness. However, their future trends – as a result of the accelerating climate change and the upsetting of the system balance – are interpreted as external factors that represent an opportunity/threat for the region. The logic of the indicated abstraction may indeed raise questions, but its general acceptance and use can be explained by the specific treatment of climate aspects within climate adaptation planning.

The following figure presents the strengths and weaknesses of the climate adaptation SWOT analysis of Kazincbarcika, BorsodChem Inc. and their region by topics (e.g. drought, extreme water regime: water scarcity, floods).

Tematika	Erősség	Gyengeség
		jellemzők.
Aszály	<ul style="list-style-type: none"> • Az ország relatíve hűvösebb vidékei közé tartozik a térség, az aszálykárrok mérsékeltebben jelentkeznek. • Kazincbarcika a zöldfelületek öntözése, karbantartása megoldott. 	<ul style="list-style-type: none"> • Az aszály gyakran hőhullámos időszakokkal együtt jelentkezik, dupla terhelést okozva. • A térség kitettségét fokozza a tavaszi aszály egyre gyakoribb megjelenése. • A téli csapadék jellemzően már nem hó formájában hullik, így a talaj felső rétegeinek visszatöltődése sem tud megvalósulni. • Az aszály ideje alatt az öntözési igények növekednek a városban és térségében. • Megfigyelhető a házi kutak kiszáradása, melyek negatívan érintik a háztáji kertművelést, terméskiesést okozva.
Szélsőséges vízjárás: vízhiány, árvíz	<ul style="list-style-type: none"> • A Sajó mentén az árvízi védművek, töltések, gátak megerősítésre kerültek a 2010-es extrém árvíz után. • A jeges árvizek, illetve a hóolvadásból származó tavaszi árvizek csökkenése figyelhető meg az utóbbi évtized során. • A belvíz problematikája általában nem jellemző a városban. 	<ul style="list-style-type: none"> • A zöldárak intenzitása és hossza növekszik. • A mintegy 35 ezer fős konurbációban (Kazincbarcika, Berente, Sajószentpéter) jelentős népesség és infrastruktúra tömörül, ami koncentráltan kitett a Sajó árvizeinek. • Felső-Barcika, Sajókazinc és BorsodChem telephelye a Sajó árvizei által veszélyeztetett területen helyezkednek el. • A nyári időszakokban a BorsodChem hűtővíz ellátottsága problémás. A meleg miatt növekszik a párolgási veszteség, csökken a víz mennyisége, és emelkedik a hőmérséklete. • A BorsodChem ipari vízellátásában csupán a Sajó folyóra támaszkodik. • A BorsodChem termelési vízigénye a kisvízidőszak idején a legnagyobb (hűtővíz igény). • A feltöltött folyóvölgy és a domboság találkozásánál az összeáramló talajvíz magas felszín alatti vízszintet eredményez. Ebből pangó vizek jönnek létre (Kazincbarcikai TESCO környéke; a vasúti töltés és a 26-os út közötti terület).

Figure 19.: Climate adaptation SWOT analysis of Kazincbarcika, BorsodChem and their region: strengths and weaknesses (excerpt). (Columns from left to right: topic, strength, weakness; Rows from top to bottom: drought, extreme water regime: water scarcity, flood)

Source: The joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

Lehetőség	Veszély
<ul style="list-style-type: none"> A zöldfelületek összekötését javító, nyomokban a városban már jelenleg is megfigyelhető szemléletmód és tervezési megközelítés uralkodóvá válik a településfejlesztésben. Tudatos, településrész-specifikus zöldfelület-menedzsment és fejlesztési szemlélet további térhódítása a városüzemeltetésben. Az ivóvízbázisok tudatos, fenntartható használata teret nyer, miközben a nem ivóvízcélú felhasználás mértéke jelentősen csökken. Megindul a fakadó bányavizek hasznosítási lehetőségeinek vizsgálata a BorsodChem ipari vízfelhasználásának forrásbővítése érdekében. A BorsodChem környezetirányításában a víztakarékossági, szürkevíz használati és vízvisszaforgatási szempontok érvényesítése erősödik. Az új technológiák tervezésénél kiemelt figyelmet fordít a BorsodChem, a fokozott vihar- és villámtevékenységre, fokozva a vállalat alkalmazkodóképességét. Adaptív módszerek honosodnak meg a települési vízgazdálkodásban, beleértve a vízmegtartást, vízvisszatartást és a beszivárgtatást. A 2021-2027 programidőszak EU kohéziós politika a források kb. harmadát klímaváltozási, energetikai, zöldgazdaság-fejlesztési célokra tervezi fordítani. Egyéb nemzetközi és hazai források elérhetővé válnak (rekreációs, alternatív közlekedési infrastrukturális beruházásokra, továbbá épületenergetikai-, szigetelési-, árnyékolástechnikai- korszerűsítésekre) segíthetik a kazincbarcikai és térségi épületállomány megújulását. A családátogatási programok indulnak/folytatódnak, segítve az épületállomány megújulását. A nagytérségi közlekedési elérhetőség további fejlődése új impulzusokat adhat a gazdasági fejlődésnek. A város fejlődő gazdasága a lakosság szociális helyzetének javításán keresztül az alkalmazkodás képességét is előmozdíthatja. 	<ul style="list-style-type: none"> A klímaelemek szerint az átlaghőmérséklet tovább növekszik, a század végére akár 3,5-4 fokot is elérve a nyári időszakban. Nyáron a térségben a forró napok száma akár 15 nappal is növekedhet a század végére, míg a fagyos napok száma akár 20-25 nappal is mérséklődhet. A hőhullámok intenzitása és gyakorisága tovább növekszik a térségben. A forróbb és szárazabb nyarak tovább növelik a természetes és antropogén eredetű erdő- és bozóttűzveszélyt. A száraz, meleg nyarak és a hazánk északi területeit is elérő aszályok tovább növelik az ivóvíz- és öntözővíz igényt a térségben. A BorsodChem esetében az extrém csapadékesemények a Sajó folyó ipari vizét érintő vízminőség-romlást és a kritikus vízhozam (4m³/sec) meghaladásának gyakoriságát eredményezhetik, nehezítve a hűtővízigény kielégítését. A szomszédos országok negatív vízgazdálkodási gyakorlati folytatódna, főként a Sajó és a Bódva esetén, amelyek Szlovákiában erednek. A fokozódó nyári felmelegedési tendenciák felerősíthetik az állóvizek további minőségromlását (a felgyorsuló eutrofizáció következtében a természetes vizek ökológiai funkciói betöltéséhez szükséges vízmennyisége csökken). A szélsőséges csapadékmintázatok tovább fokozódnak (extrém csapadéku napok száma a század végére a háromszorosára nőhet). A viharok gyakorisága és intenzitása tovább növekszik a klímaelemek szerint. A vihar- és széllárok fokozódása az épített értékek és a rendezvények klímakitettségét fokozza. A hóings intenzitásának növekedése miatt veszélyeztetett távvezetékek és további kritikus infrastruktúra elemek miatt teljesítménykorlátozásokra lehet szükség és szélsőséges esetekben az adott szolgáltatás ideiglenes kiesésével is számolni kell.

Figure 20.: Climate adaptation SWOT analysis of Kazincbarcika, BorsodChem and their region: opportunities and threats (excerpt). (Columns from left to right: possibility, threat)

Source: The joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

While setting the problem tree and the objective tree, we followed the methodology presented in the general description: identifying and arranging the problems into a **tree-structure** during collective reflection in workshops. From our experience, **it is worthwhile to quickly sketch the results of the work or take a photo of the problem trees created from the sheets of papers**, because it can help a lot during digital editing. It is important to note that **neither the hierarchy nor the descriptions of the problems are final**, they can be changed in the future in the light of any new information or comments received. In addition to the overall problem tree, we displayed one of the sub-problem trees in the figures below.

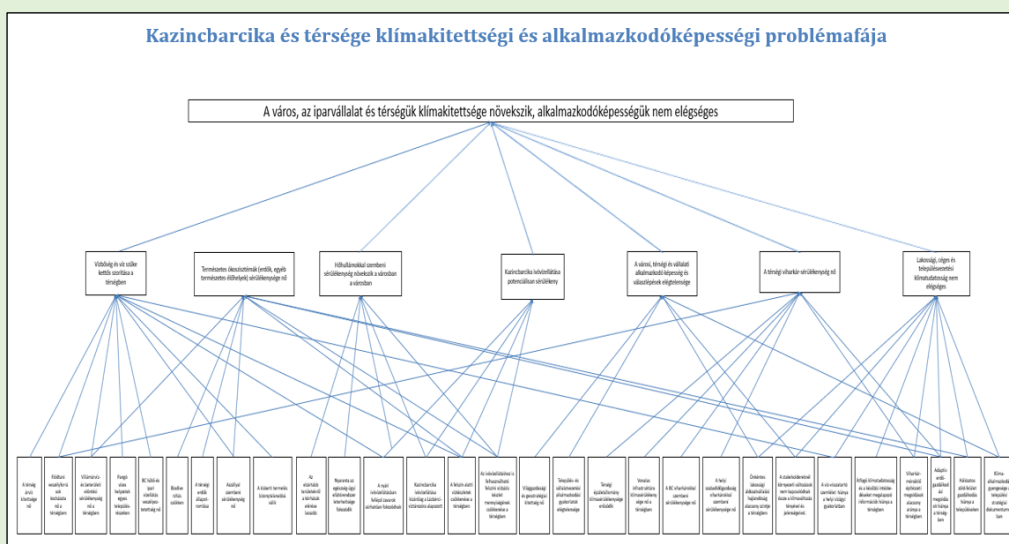


Figure 21.: The overall climate adaptation problem tree of Kazincbarcika, BorsodChem and their region.

Source: Appendices to the joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

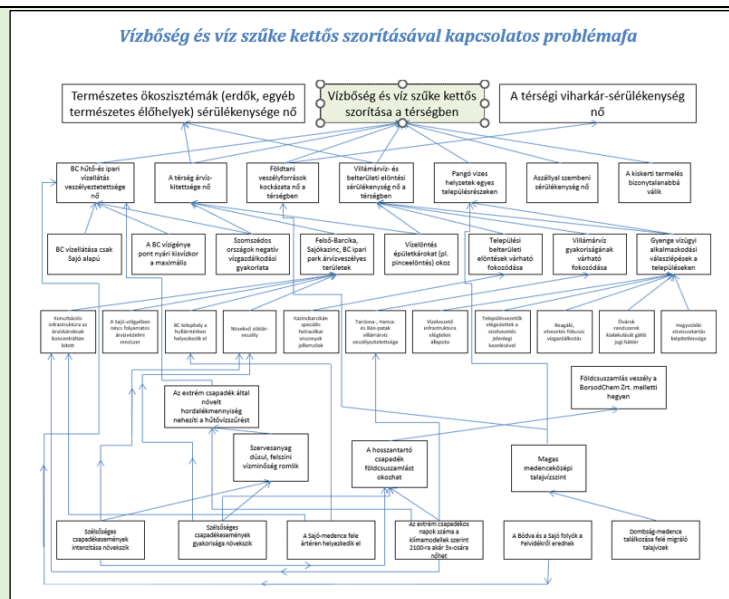


Figure 22.: Sub-problem tree related to the double constraint of water abundance and water scarcity.

Source: Appendices to the joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

As indicated above, **the objective tree is based on the existing problem tree(s)**, so the whole structure is practically the same, **only objectives are displayed in the figures instead of problems**. For this reason, setting an objective tree is a much quicker process than setting a problem tree, but the planners organized an internal workshop for this as well, involving external and internal experts that participated in the situation analysis, taking advantage of the common reflexion.

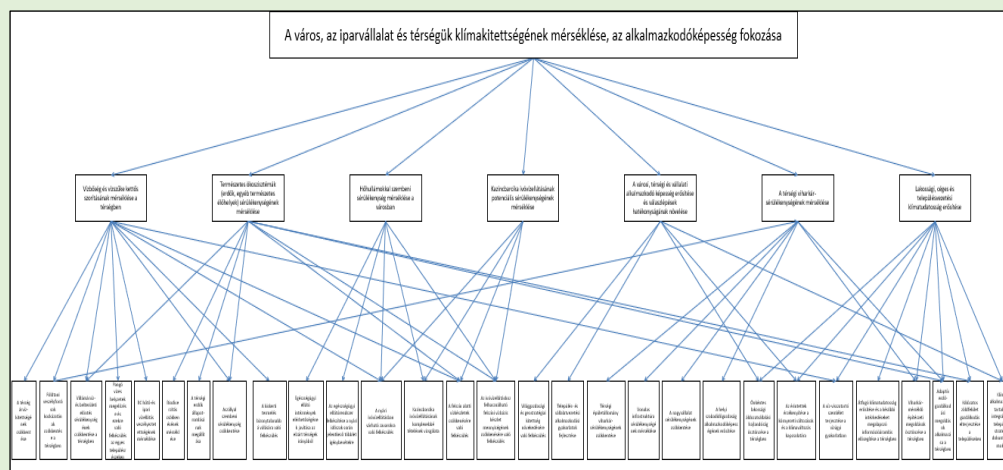


Figure 23.: The overall climate adaptation objective tree of Kazincbarcika, BorsodChem and their region.

Source: Appendices to the joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

In addition to the overall objective tree, we display one of the sub-objective trees in the figure below.

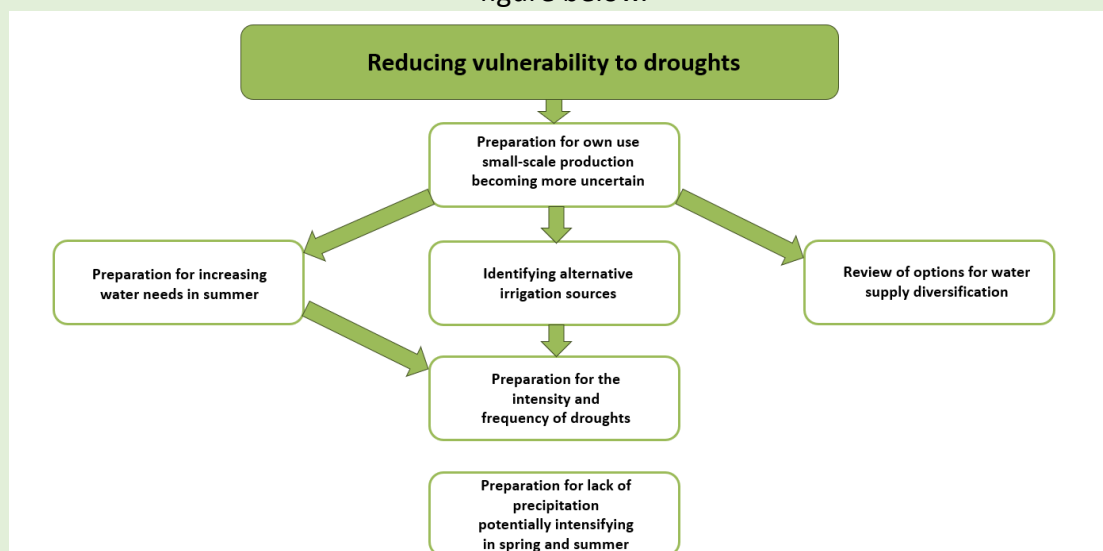


Figure 24.: Sub-objective tree related to reducing the vulnerability to drought.

Source: Appendices to the joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

Referring back to the general statement that, if we have performed a precise job in the sub-tasks presented in the situation assessment phase, then we have laid the foundations for the following vision and objective system planning – this was also true in the case of Kazincbarcika.

4.2. Preparing a narrative situation assessment

The different elements of the situation assessment – the SWOT analysis, the problem tree, the objective tree, and the narrative situation assessment that provides a summary of these in an easily comprehensible form – are based on the situation analysis's abundant descriptions of the environmental, social, and economic situation. The narrative situation assessment, like the whole situation assessment chapter, **is kind of a summary, a synthesis of the facts that have already been "distilled" from the situation analysis and structured by the SWOT analysis.** The purpose of this latter description is to identify and highlight again the most prominent challenges and **breakout points** for effective adaptation to climate change, facilitating the formulation of the strategy's objectives and actions at a later stage of planning.

The essence of the narrative situation assessment is already in its name: it is narrative, i.e. descriptive: a **textual summary** after the SWOT table with bullet points, and the figures of the problem and objective trees. Its essential features are the short volume and summarizing approach. It is not necessary to explain our views and experiences in detail here, **but to briefly summarize what has been described so far**, grouping it around the positive breakout points and the more negative challenges.

In terms of format, we are talking about a few short paragraphs with a clear separation of positives and negatives, but we can also choose two bullet point groups or indentations. Concerning the challenges, the weaknesses and threats listed in the SWOT analysis, and the elements of the problem tree help to identify the **priority climate problems** affecting the region, which are of particular importance for the municipality or company. The main

challenges affecting both the municipality and the company reflect **the most vulnerable social groups, economic sectors and local values** identified by previous vulnerability assessments.

To address the challenges, breakout points can be identified based on the situation analysis, the strengths and opportunities of the SWOT analysis, on which we can focus to adapt more effectively to climate impacts. The **adaptation directions** are areas on which it is necessary to focus in order to develop the adaptation possibilities, the objective system containing them and the specific measures.

What happened in Kazincbarcika?

Main climate change related challenges affecting the Municipality and BorsodChem and their immediate environment as a result of the impacts of changing climate factors and their socio-economic consequences were identified by summarizing the thematic chapters of the situation analysis and the conclusions of the SWOT analysis that synthesize the contents of the situation analysis.

Összegző helyzetértékelés Kazincbarcika, a BorsodChem és térségük klímaterheltségéről és adaptációs lehetőségeiről

A helyzetelemzés tematikus fejezeteinek és az azok tartalmát szintetizáló SWOT analízisnek a konklúziót összegezve azonosíthatók azok a főbb, klímaváltozással kapcsolatos kihívások, amelyek a Önkormányzatot és a BorsodChem-et, valamint közvetlen környezetüket érintik a megváltozó éghajlati tényezők és az ezek következtében fellépő közvetlen és közvetett hatások és azok társadalmi-gazdasági következményei eredményeként. Ugyanígy a SWOT erősségek és lehetőségek pontjaira építve kijelölhetők olyan kritériumi pontok, amelyek a létező adottságokra, sajátosságokra építkezve a későbbi fejlesztések, beavatkozási területek alapjait jelentik – a Stratégia későbbi részeiben megjelenő célkitűzések és intézkedések kiindulópontjaként.

Kockázatok

A várost és a vállalatot, valamint környezetüket számos, a klímaváltozáshoz közvetlenül vagy közvetve köthető hatás, kihívás éri. Ezek közül a terepi interjúk és a helyszíni látogatások, valamint a több körben lezajlott forrásfeltárások és statisztikai adatelemzések alapján a következő főbb csoportok különíthetők el:

- **Éghajlati tényezők változása:** az évi és ezen belül a nyári átlaghőmérséklet és emiatt a forró napok és hőségiáradások számának növekedése, a szélsőséges csapadékmintázatok és időjárási extrémítások további fokozódása a száraz során tovább erősítik a medencehelyzetből fakadó, eleve szélsőségeket mutató lokális éghajlati sajátosságokat.
- **Mindezek következményeként** időben előre haladva a **hőhullámok, extrém viharok és károkozások, villámárvák és belterületi csapadékvíz-elöntések, árnyhullámok és erdő-/boszorkútvek gyakoriságának és intenzitásának** növekedésével és a biológiai sokféleség csökkenésével kell számolni.
- **A nyári hőségiáradások** a térség egészét érintik, igaz, differenciált módon. A **hőhullámokra leginkább érzékeny kazincbarcikai településrészek** (Újkazinc, szocialista realista városközpont, Herbolnya) sérülékenységét tovább súlyosbítja, hogy jelenleg és várhatóan a jövőben is a klímaváltozás hatásaival szemben **érzékeny** (rosszabb anyagi helyzetű időskorú) társadalmi csoportok koncentrációinak esetében.
- A Kazincbarcikai Mentőszolgálat és a Kazincbarcikai Kórház tapasztalatai alapján a légzőszervi betegségek mértéke jelentős a városban, amely számos egészségügyi probléma okozója. A WHO és a WHO által jegyzett tanulmányok is alátámasztják, hogy a hőhullámos időszakok nemcsak a szív-, és érrendszeri betegségeket, hanem a légzőszervi megbetegedésekben szenvedőket is megviselik (WHO, 2011; WHO-WHO, 2015). A helyben alapvetően magas – a térség földrajzi adottságából és ipari hatásaiból, illetve az erőteljes nári széllel való felakadó – légzőszervi betegségek értékek következtében így az eleve magasabb légzőszervi betegségszámokkal jellemezhető lakosság jelenléte miatt a hőhullámok időszakában megnövekedett terhelés jelentkezik a helyi egészségügyi ellátórendszerben.
- A térség jelentős részén **előregedő, fogyó népesség** jellemző. A Kazincbarcikai Mentőszolgálat tapasztalatai alapján a hőségiáradatok jobban megviselik az idősebb korosztályoknál gyakrabban jelentkező szív- és érrendszeri betegségek miatt a lakosságot. Az említett népesség és a BorsodChem szabadtéren dolgozó, idősebb munkásainak körében a forró nyári időszakokban fokozódó számú rosszullétekkel, utóbbi csoport esetében az üzemi balesetek számának növekedésével is számíthatunk.
- A városban az extrém csapadékeseményekhez kapcsolódó belterületi elöntés, a környező településeken a klasszikus villámárvák jelentik az egyik legnagyobb kihívást. A vízárási szélsőségek várható fokozódásával extrémebb nyári aszályokra (az ivó- és öntözővíz-igény, ipari vízigény problémásabb kielégítésével) és ezzel párhuzamosan szélsőségesebb villám- és folyóvíz áradásokra (a lakóiroi társulási származó víz szűrési nehézségei miatt ebben az esetben is ipari vízigény kielégítési problémákkal) számíthatunk. A BorsodChem maximális vízigénye ráadásul ennek körülményei közötti időtartamokban jelentkezik.

Figure 25.: Risks in the narrative situation assessment.

Source: The joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

The city, the company and their region are affected by several impacts and challenges directly or indirectly related to climate change. Among these, the Strategy's situation assessment identified several main groups based on field interviews and on-site visits, as well as several rounds of resource and statistical data analysis. These problems and their impacts are summarized in a table grouped by the affected parties. With the help of the legend below the table, it is possible to identify in the case of which risk and stakeholder a similar impact may occur.

Hatás/Hatásviselő	Kazincbarcika Város Önkormányzata	BorsodChem Zrt. és ipari vállalatok	Környező települések	Lakosság	Környező természeti értékek
Szélsőséges szárazsággal járó vízhiány	Háztáji kiserőtermelés kiszáradása; Zöld és kék felületek sérülékenysége; mikroklima hőhatásának mérséklődése	Viharvesztés korlátozások kerülhetnek bevezetésre; A hűtési mennyiségével kapcsolatos problémák kialakulása; Gazdasági teljesítmény visszaesése	Megjévi zöld és kék felületek sérülékenysége növekszik; Gazdasági tevékenység visszaesése (zavar a halastavak üzemeltetésében);	Vízigény nő; Vízfelhasználás korlátozása (autómosás, medence feltöltése); háztáji gardálkodás visszaesése	Kék- és zöld felületek kiszáradása; Biodiverzitás csökkenése; Vízfelületek ökológiai állapotromlása; szomszédos vadállomány
Szélsőséges csapadék hullás rövid idő alatt	Belterületi elöntés esélye nő; Közlekedési fennakadások; Csatorna-hálózat túlterhelése	ipari víz ellátása akadályos; energiagigény nő; Földcsuszamlás kockázata nő	Villámárvíz kialakulásának esélye nő; Termékek; Árnyék kialakulásának esélye növekszik	Termékek; Közlekedési fennakadások; Pince elöntések	Nő a talajdegradáció; A talaj- és rétegvíz nem tud visszatelódni; Földcsuszamlás kockázata nő
Szélsőséges viharok	Az épített környezetben és a vonalas infrastruktúrában keletkező károk; rendezvényintenzitás kitértége nő	Villámcsapás és szélrobbanások okozta károk növekedhetnek	Növekedhetnek az épített környezetben, a mezőgazdaságban és a létesítményekben keletkező károk.	Balesetek számának növekedése; Anyagi károk növekedése	Erdőkben okozott kár növekedhet (fák sérülése, szélviharok)
Szélsőséges hőhullám	Energiagigény nő a hűtési adósság csökkentése miatt; Vízigény nő	Üzemi balesetek számának növekedése; hűtési hőmérsékletével és energiagigényével kapcsolatos problémák kialakulása	Vízigény nő; Termékek; Hűtési adósság növekedése	Egészségügyi problémák növekedése (pl. rosszullétek, szív- és érrendszeri betegségek kitértége)	Vízhiányos romlás; Élővilág nehezebb túlélés; Erdőkben gyakorisága növekszik

5. táblázat: A különböző hatásviselő csoportoknál jelentkező klímahatások csoportosítása.

Forrás: saját szerkesztés.

Jelmagyarázat:

- Vízminőséggel és vízminőséggel kapcsolatos problémák
- A hirtelen megnövekedett mennyiségű víz felszíni lefolyásából adódó problémák
- A folyamatok energiagigénye növekszik
- Épített és a természetes környezetben jelentkező károk
- Egészségügyi problémák

Figure 26.: Impacts (e.g. extreme storms, extreme heatwaves etc. in the left column) grouped by affected parties/objects (e.g. BorsodChem Inc. and industrial companies, the public etc. in the top row). (Columns from left to right: impact/affected parties/object, Municipal Government of Kazincbarcika, BorsodChem Ltd. and industrial companies, surrounding settlements, local public, surrounding environmental assets; rows from top to bottom: water scarcity associated with extreme drought, extreme rainfall over a short period of time, extreme storms, extreme heatwave)

Source: The joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

Based on the strengths and opportunities of the SWOT, breakout points were designated, which – based on the existing features and characteristics – form the basis of subsequent developments and areas of intervention, as the starting points for the objectives and measures displayed in the later parts of the Strategy. Based on the experiences of the on-site visits and field interviews, several starting points and guidelines outlined in connection with the responses to the listed challenges. The following figure displays breakout points identified (e.g. it is an important future task to transform the municipal stormwater system to a climate resilient one by applying water retentive and nature-based solutions) in the narrative situation assessment of the joint city-company Climate Adaptation Strategy.

Kitörési pontok

A felsorolt kihívásokra adandó válaszok kapcsán több kiindulási pont, irányvonal is körvonalazódni látszik a helyszíni terepbejárások, helyi interjúk tapasztalatai alapján. Ezek közül is kiemelhetők:

- A város és közvetlen környéke az ország északi, dombvidéki felvidéki területeinek egyikeként **relatív hűvösebb vidék, országos összehasonlításban** jelenleg és várhatóan a jövőben is viszonylag gyengébben kitett a növekvő hőmérséklet hatásainak.
- Az **árny- és belterületi előtér- és védelem** infrastrukturális háttere, a közlekedési és a kritikus infrastruktúra hálózataik alapvetően jól kiépültek. A jövőre nézve a települési csapadékvíz-gazdálkodás rendszereinek klímabiztos ki- vagy átalakítása fontos feladat, melynek során nagyobb hangsúlyt kell kapjanak a **vízvesztést, természetközeli megoldások** a szűkebb infrastruktúra fejlesztésével járó beavatkozások helyett. A BorsodChem esetében megfontolandó a **csapadékvíz-gyűjtése és a technológiai víz és szennyvíz visszaforgatására alkalmas technológiák** alkalmazása a kisvízes időszakok problémáinak kivédése érdekében.
- A térség alapvetően sem előregedett épületállományán belül az **épületek, településrészek felújításával és új építkezések** a viharokkal szemben leginkább sérülékeny elemek, helyszíni azonosításával lehetőség nyílik megfelelő választások tervezésére minél szélesebb körű elterjesztésre.
- A városban alapvetően (a központban és a déli településrészekben kiemelkedően) **megfelelő, a környező településeken pedig kifogástalan a zöldfelületekkel való ellátottság**: a létező és jövőbeni városi zöldfelületek tervezési és városrész-specifikus bővítése és minőségi fejlesztése kiemelt irány kell, hogy legyen. Kazincbarcika községének területén és környékén NATURA 2000 mag- és puffer területek, nemzeti parki területek, tájvédelmi körzetek és kiterjedt erdőségek találhatók. Ezek ökológiai szolgáltatásokat, biodiverzitás megőrzést, villámárvíz elleni védekezést is szolgálnak.
- Jelenleg **stabil ivóvízellátással** rendelkezik a térség, az ivó-, öntöző- és ipari vízigény kielégítése megoldott, ami (szükség esetén történő továbbfejlesztésével) kellő alapul szolgálhat a jövőbeni térségi ivóvízbiztonság megteremtéséhez.
- A **gazdasági és társadalmi adottságok** megyei léptékben kedvezőek: kevés az igazán leszakadó, szegregálódó település(rész); megyei összehasonlításban a munkalehetőség-hozzáférés a BorsodChem miatt kiemelkedő; a város és környéke nem része válságterületnek, az **iskolázottság és a jövedelmek** is javuló tendenciát mutatnak. Ugyanakkor magas a kvalifikált munkaerő-kivétel a térség vonzási.
- Épített értékekben** (templomok, hűtőházak, szociális realista városépítészeti emlékek, ipari műemlékek), **helyi és kisebb térségi hatókörű** aktív és rendezvényintézkedések, **attrakciókban relatív gazdag a környék**, ezek klímazilens megőrzése, rehabilitációja kiemelt irány kell, hogy legyen.

Figure 27.: Breakout points in the narrative situation assessment.

Source: The joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

In addition to the narrative description, a summary table was also prepared here, displaying the consequences of the main environmental problems in Kazincbarcika and its region. The table also summarizes the objectives to be achieved by problem management, building on these (illustrated with examples) it identifies nature-based solutions to mitigate the impacts. An example is the lack of precipitation (as the risk/cause in the first column), causing drought (problem/consequence in the second column). The objective of managing this problem (third column) is e.g. reducing temperature and evaporation by different potential tools (fourth column) for instance by growing less water-intensive crops.

Kockázat / Kiváltó ok	Létrehozott probléma / Kialakult okozat	A probléma kezelésének célja	Lehetséges eszközökre példa
Magas hőmérséklet	Hőhullám	<ul style="list-style-type: none"> A Napból érkező hő-/fényenergia minél nagyobb részét visszaverni Környezet hűtése Várható hatásokra felkészítő szemléletformálás 	<ul style="list-style-type: none"> Zöldfelületek arányának növelése Városerőssítésben az átszellőzés biztosítása Aktív és passzív épülethűtési megoldások Egészségügyi ellátórendszer felkészítése a várható többletterhelésre Figyelemfelhívó kampányok Az épített környezet (pl. burkolt felületek) tagoltságának növelése Vízterelés a bioszféra elemekben (fák, talaj, vízfelületek) Településrendezési tervekben és az épített környezet kialakítása során a hőhullám, hősziget hatás elleni védekezés kiemelt megjelenítése.
Csapadék többlet/intenzív csapadékhullás	Árvíz Villámárvíz Belvíz	<ul style="list-style-type: none"> Lefolyás mértékének csökkentése Lefolyás ütemének lassítása Lefolyó víz szétterítése Lefolyó víz beszívóztatása A bioszféra elemek vízfelvételeknek segítése A talaj megfelelő állapotban tartása 	<ul style="list-style-type: none"> Többszintű erdők telepítése Természetes vízmegtartó elemek építése (pl. rönkgátak) Talaj állapotának javítása Vízfolyásokon mederkanyarulatok kialakítása Növényi vegetáció kialakítása Megfelelő talajművelés Vízgyűjtő szintű vizes hálózat kialakításának támogatása Adottságokat figyelembe vevő területhasznosítás
Csapadékhány	Aszály	<ul style="list-style-type: none"> A Napból érkező hő-/fényenergia minél nagyobb részét visszaverni Párolgás csökkentése Hőmérséklet csökkentése 	<ul style="list-style-type: none"> Az aszályt megelőző időszakban a vízkészletek (felszín alatti, felszíni) feltöltése A táji adottságokhoz illeszkedő növényborítás kialakítása Kiseb vízigényű növények termesztése szabadföldön Megfelelő árnyékolás kialakítása

Figure 28.: Problems and their proposed solutions. (Columns from left to right: risk/root cause, problem created/established cause, the objective of problem solving, examples of potential tools)

Source: The joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

4.3. Mistakes to avoid

The longer, more time-consuming situation analysis is followed by the shorter, more straightforward situation assessment. As its name suggests, **it plays an assessing, summarizing, synthesizing role following the extensive sub-chapters of the situation analysis.** It is an important element of the genre that **we should make evaluative, synthesizing, brief, factual statements** in case of both its tools (SWOT, problem tree, objective tree) and its textual parts (narrative situation assessment with breakout points and challenges). In contrast to the situation analysis, the situation assessment cannot be so extensive, it must briefly summarize the contents of the situation analysis. Since **this chapter will be part of the final strategy**, it is not possible to expand the ratio within the entire document with the solution "if it is too long, we will edit it into an appendix".



The internal logic must apply "forwards and backwards": the findings of the situation assessment must be rooted in the situation analysis; at the same time, they must later serve as a basis for planning the vision, objectives and measures, and the guidelines set there.

In our case, **an approach that promotes the unified management of the city-company is important.** The tools of the situation assessment, such as the thematic breakdown of SWOT, the structure of the problem and objective tree, **should not contain separate challenges/objectives in a visible company/city breakdown/separation**, but should synthesize the common and different challenges and responses into a unified system.

The SWOT analysis deserves a separate paragraph within this section, as it is now used in almost every planning process, but not always correctly. **It is a common mistake that the SWOT analysis contains objectives instead of statements**, although this is not its task - that will be the function of the objective system. For example: *"Encouraging water-retentive solutions"* should not be included in the opportunities, because it is an objective. Among the opportunities, at most, *the spread of this approach in public administration* can be included. **The "opposites of each other", "basically the same" or "I can't decide" problematics should also be avoided.** An example of the first case is when *"expected shortage of EU funds"* and *"expected abundance of EU funds"* are listed next to each other, one in the weaknesses column and the other in the opportunities column. The planner must decide which scenario is more likely to occur and display it, avoiding the *"either this will win and that will be bad; or that will win and that will be good"* solutions. An example of the second case is if we mention *"high employment rate"* and *"relatively low unemployment rate"* among the strengths. The two statements are practically the same. An example of the third case, when we add *"the unemployment rate in the city is relatively low on a national scale"* to the strengths and *"the unemployment rate in the city is relatively high on a county scale"* in the weaknesses. We must decide between the two statements.

Just like the whole situation assessment, **the SWOT must build on the situation analysis, and not contradict what was described in it before** (if the situation analysis indicates a low number of sunshine hours, the possibility of solar power plants on fallow fields should not appear in the SWOT). Similarly, **the SWOT cannot invent new things.** If the analytical sections have described that we can count on water, wind and solar energy as potential renewable energy sources in the region, then the SWOT should not be speculating on the possibility of biomass power plants based on a fresh idea. Or, if the latter intention is well-founded then –after sufficient research – it should also be included in the narrative of the situation analysis afterwards.

For both the problem tree and the objective tree, it is important that they are well hierarchized, so objectives and challenges on different levels should not get mixed up. **The logic of the "SWOT weaknesses & threats → problem tree → objective tree" should be clearly applied** to the 3 main assessment tools: the lowest hierarchical level of the problem tree should be built on the strictly fact-based SWOT statements, completed by other findings that can be extracted from the situation analysis and sorted into a hierarchy. Similarly, the objective tree should transform the already hierarchized problems of different levels into objectives of the appropriate hierarchical level.

The SWOT-analysis, the problem tree and the objective tree should all optimally be based on participatory planning and extensive partner involvement, preferably involving local stakeholders (even based on a stakeholder meeting adopted from the Settlement Adaptation Barometer questionnaire methodology) during the development phase. If this is not possible, then the preliminary planner/expert versions, drafts should personally be consulted with local actors.

5. Vision creation

5.1. Developing the vision

After the situation analysis and situation assessment are finished, the planning team can turn to **the work phase that connects the situation analysis/assessment and the objectives-measures**: developing the vision. In any planning document, but especially in the case of a joint city-company adaptation plan, the Vision is a key element of the partnership approach. On the one hand, because of its strong commitment to partner involvement and interactivity, in which a well-defined vision plays a key role; and on the other hand, because of its role in raising local and regional climate awareness, which also requires a sufficiently ambitious and attractive vision for the local community at the centre of the strategy.

The vision practically means a medium- or long-term idea, vision, which is the "Great Common Goal" for the affected community (in our case, the company and the city), but at least for the majority of the stakeholders, and which is worth working towards. With this "lowest common denominator" approach, the vision is an essential element for **the "presentation and acceptance" of the climate strategy**. A vision is a main objective that the city/company (and regional) stakeholders can identify with, **a desired state, which they wish to achieve together, reflecting the ultimate outcome of the objectives set out** in the document.

Concerning its format, **the Vision is a separate chapter in the Strategy, which can take many forms**: a unified formulation, a thematically structured description, a short summary or just a catchy slogan - **it is advised to mix these forms**. Optimally, a Vision is a short, maximum 2-3 page long, essay-format description of the mentioned, desired state, as a brief "status description" of the envisioned situation. Often, these few pages are briefly summarized in one or two paragraphs, or, optimally **a short, catchy slogan** is also formulated, on which further objectives and communication elements can be based. **The vision always builds on the situation assessment and form the basis of further objectives of adaptation, preparation and awareness-raising**. It can emphasize, for example, the protection and maintenance of the city's and the company's recognized strengths, but it can also move in an active direction (e.g. innovations, active damage prevention, reduction of environmental impact). It is important to align the vision with the other strategic objectives of the city.

What happened in Kazincbarcika?

After creating the SWOT, then the problem tree and objective tree based on it, the **Vision was developed** in a similar way, **in an internal planning workshop**. The experts participating in the situation analysis and assessment sat down to create a common vision, **which finally took shape after a one-day workshop, first in the form of a draft and two or three pages explaining it, then a slogan and a framed paragraph were also formulated**. Before the chapter took its final form, the draft version was discussed with the leaders of the Municipality and the Company both online and in a climate platform meeting.

The vision of the Strategy emphasizes that Kazincbarcika is one of the most important chemical industrial centres in the country, where the social and economic life of the City intertwined over the decades with the BorsodChem company, which has a significant industrial tradition. The climate strategy bases its climate adaptation vision and the adaptive objective system to achieve it on this successful city-company relationship.

Based on the challenges and breakout points identified in the situation assessment, a target state is outlined that the Municipality aims to achieve by 2030 as a result of the adaptation and awareness-raising interventions implemented in the framework of the LIFE-CLIMCOOP project (and other related developments). **This will be implemented in close cooperation between the Municipality and BorsodChem, where possible with the involvement of the public, other companies, and the local civil society**, in order to make Kazincbarcika a greener, more sustainable and climate resilient city, while also improving the quality of life and climate awareness of the local population, making Kazincbarcika an even more liveable and attractive city. **The City can serve as a model for other municipalities thanks to the adaptive solutions** and nature-based best practices applied. It is clear: the Vision is based on internal characteristics and sets an ambitious vision for the City and the Company.

Kazincbarcika and BorsodChem Inc.: together for climate adaptation, as an outstanding example of adaptive cooperations for a climate-friendly, water-conscious, adaptive, liveable city-region.

Building on the assets of Kazincbarcika and the close cooperation between the municipal government and the Company, on top of the improvement of their own position relative to climate change, serves as a best practice in municipal climate adaptation and awareness raising in the whole Sajó catchment area, meanwhile it puts special emphasis on nature-based, water-retentive solutions and the creation of a harmonic and liveable city region.

Figure 29.: The slogan of the Strategy's Vision.

Source: The joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

5.2. Mistakes to avoid

Due to the narrative characteristic of the vision and its early-middle position within the planning process, there are possible errors that should be avoided.

- Because of the first characteristic (narrative character, a brief description of the envisioned situation, usually a few pages long) there is a need for a **comprehensive character** similar to the situation analysis and assessment, and **it is important to cover all the relevant topics**.
 - A climate adaptation vision should therefore **cover all vulnerability topics, vulnerable sectors and social groups, areas, districts of municipalities and sites identified in the situation analysis and assessment**.
 - It is important to note that, **after weighing, the most important points should be highlighted** due to the limited range of the vision and the importance of the emphasis.
- From the second characteristic (early middle position), arises the importance of **internal coherence requirements: the vision builds on the SWOT and the narrative situation assessment** (and indirectly on the situation analysis), so this chapter should



neither invent new directions not mentioned before without justification, nor should it suggest development ideas that contradict the previous work phases.

Ensuring internal coherence is not just an unnecessary requirement: we also make our own situation easier and improve the chances of future realization by ensuring that the whole planning process consist of stable, interdependent building blocks.

It is also true here, that the vision cannot contradict the previous chapters, for example if they identified high geothermal potential and a low number of sunshine hours on a national scale as characteristics, then the planning team should not base the desired target state on the establishment of a solar park.

It is also not a rule for its own sake that the vision should not suggest anything new that has no basis in the situation analysis and assessment.

Let's think about it: if the situation analysis and assessment, for example in the context of the water management's climate challenges, have analysed in detail the flood and flash flood risk, the vulnerability of drinking water bases, and the damage caused by the more frequent municipal rainwater inundation, but there was no mention of damage caused by inland water inundation, then the construction of inland drainage networks and sewers should not form the core of the vision.

Similarly to the three main tools of the situation assessment, it is also crucial here that **the adaptation vision of the city and the company are not separated**. On the contrary, the desired target state should focus on vulnerability topics that affect both entities, common objectives, jointly achievable adaptation outcomes and joint activities.

A **vision can also be diverse in appearance**, as we saw in the previous sub-chapter. If the planners choose the narrative, one- or two-page long description, then it is essential that the textual situation assessment – that presents the SWOT statements and strict facts in a more detailed way – should not get lost in the details either. In Hungary, there are several planning documents where the vision lists the sub-visions of sub-areas of the given field in 10-15 pages (for example the National Development and Spatial Planning Concept in 2014). This is not an example recommended to follow, in contrast, **the substantial visions of county and municipal-level climate strategies in Hungary can certainly be considered best practice**.

6. Planning the objective system

6.1. Planning the climate adaptation objective system

After outlining the vision as a desired target state, we arrive at the concretization of the steps leading to this state: planning the objective system. The guide supporting the planning of county-level and municipal climate strategies says: *“based on relevant problems presented in the situation assessment, the SWOT analysis and the problem tree, specific climate adaptation objectives should be set”*. The objective system, as its name indicates, is a system, i.e. **multi-level, complex system characterized by internal connections**. According to this, it contains different objectives on several hierarchical levels, which can be grouped in different ways.

- **The overall goal/goals typically cover a long or longer-medium term and can be directly derived from the vision.** In case of a municipal or micro-regional strategy it is usually sufficient to formulate one overall goal, in case of regional, sectoral or national strategies we can formulate more goals on this hierarchical level.
- **Specific or strategic objectives are typically set for the medium term (5-10 years), and they break down the overall goal into thematic units.** Complex climate strategies usually contain three strategic objectives in accordance with the three main climate policy pillars; in the case of an exclusively adaptation-focused strategy, one medium-term objective should be dedicated to a given challenge per vulnerability topic.

In addition to these mandatory elements, it is also possible to plan other types of objectives. These can be:

- **horizontal goals**, which are kind of an overall aspect that affects all the other elements of the objective system, validating holistic principles, for example *sustainability, equal opportunities, territoriality, climate protection, or the polluter pays principle*, etc.
- the employment of **regional objectives** may be justified by the focus on a special type of region or a specific sub-region in strategies of classical territorial development or development policy. A topic strongly related to the geographical space, such as climate (adaptation) policy can also make use of this opportunity, if – to mitigate the exclusive sectoral organizing principle – decision-makers wish to formulate specific objectives for a particular type of region/sub-region/site/district within a settlement.
- Medium term objectives are followed by **sub-objectives/areas of intervention/priorities** at the lowest objective level. At an operational, practical level, these are divided into a set of measures that can be implemented, which are described in the

- 7. Action planning.

When planning the objectives, the planners of the Strategy should keep in mind that **specific measures and interventions should be planned for the specific city/company adaptation objectives later** – so they must focus on challenges relevant to the city/region. If possible, the objectives can even be planned with a timeframe and a specific target value, but this is not an expectation: **the level of the objectives is a more general, strategic guidance. The specifics will appear in the form of measures.**

What happened in Kazincbarcika?

During the planning of the joint adaptation strategy of Kazincbarcika and BorsodChem, the **vision and the preceding situation assessment concluded** that the negative effects of climate change are already present today and will only intensify in the coming years. **The main challenge areas that require priority responses are outlined:** these are locally *the dual problems caused by periods of water scarcity and water abundance, the vulnerability of the drinking water base of Kazincbarcika and its region; storm damage to municipal and company infrastructure; and the increasing frequency and intensity of heatwaves which are harmful to human health*. All this justifies, according to the Strategy, **the elaboration of a long-term climate adaptation objective system** based on strategic thinking.



Figure 30.: The climate adaptation objective system of the City, the Company and their region.

Source: *The joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.*

To achieve what is described in the vision, the **Adaptation Strategy set an overall goal** based on the situation analysis, the situation assessment and the objective trees (the latter are included in the Appendix of the Strategy) building directly on the summarized version of the Vision: *“Reducing the climate exposure of the Municipality, BorsodChem and their region, increasing their adaptive capacity, thus creating an exemplary, green urban area in the field of climate adaptation and water awareness cooperation.”*

According to the plans, the close cooperation between the Municipality and BorsodChem forms the basis for the realization of the overall goal of the strategy based on the internal resources of the Municipality and the region. In addition to improving their own climate protection position, their close and effective cooperation in climate adaptation and awareness-raising should set a good example for the whole of the Sajó water catchment area and, in the longer term, for Eastern-Central Europe and even the whole continent. Emphasis should be placed on creating a harmonious, liveable, water-conscious and green urban environment, by the Municipality and BorsodChem responding to the challenges identified through complex management of water abundance and water scarcity and reducing the vulnerability of the drinking water base. In cooperation between the municipality and the company, the degradation of natural ecosystems should be reduced as much as possible. Progress is also needed in terms of protection against heatwaves and reducing vulnerability to storm damage. The effectiveness of all these responses must be ensured by the

Municipality, the region and the Company together through adaptive, effective action and targeted awareness-raising.

A total of six specific objectives contribute to the overall goal (*Developing sustainable responses to address the challenges of periods of extreme rainfall or water scarcity; Protecting human health from heatwaves and other climate impacts; Reducing regional storm damage vulnerability for both BorsodChem and Kazincbarcika; Improvement and territorial expansion of natural areas and municipal green areas; Strengthening the climate awareness of the city, the region and the company, increasing the effectiveness of responses; Maintenance and further development of cooperation mechanisms between Kazincbarcika and BorsodChem for climate adaptation*), **and these are each supported by two to five sub-objectives.** The elements of the objective system were first developed by the planning team, then the partners from Kazincbarcika and BorsodChem reviewed the objective package in several rounds, which they finally found acceptable.

6.2. Prioritizing adaptation options

The step indicated in the chapter title is primarily recommended by the methodology of the *Urban Adaptation Support Tool*, but it can also be perfectly integrated into the recommendations of the Methodology for supporting the preparation of Hungarian county and settlement climate strategies prepared by the National Adaptation Centre to the request of the Association of Climate-Friendly Municipalities. The point is that, **when developing the objective system, we identify the possible directions of interventions and prioritize them** based on local relevance, potential benefits, feasibility, risks involved, etc.

Regarding its place in the planning process – after we have identified the challenges and breakout points ahead of us based on the SWOT and other tools of situation assessment (e.g. problem tree) and the hierarchical relationships of objectives to address them, based on which we can create our strategic objective system – at the same time we have another task: **to think about our adaptation options.**

There are basically two main directions of adaptation:

- adaptation to the changes that have already occurred and prevailing trends,
- and preparation for further expected and probable changes.

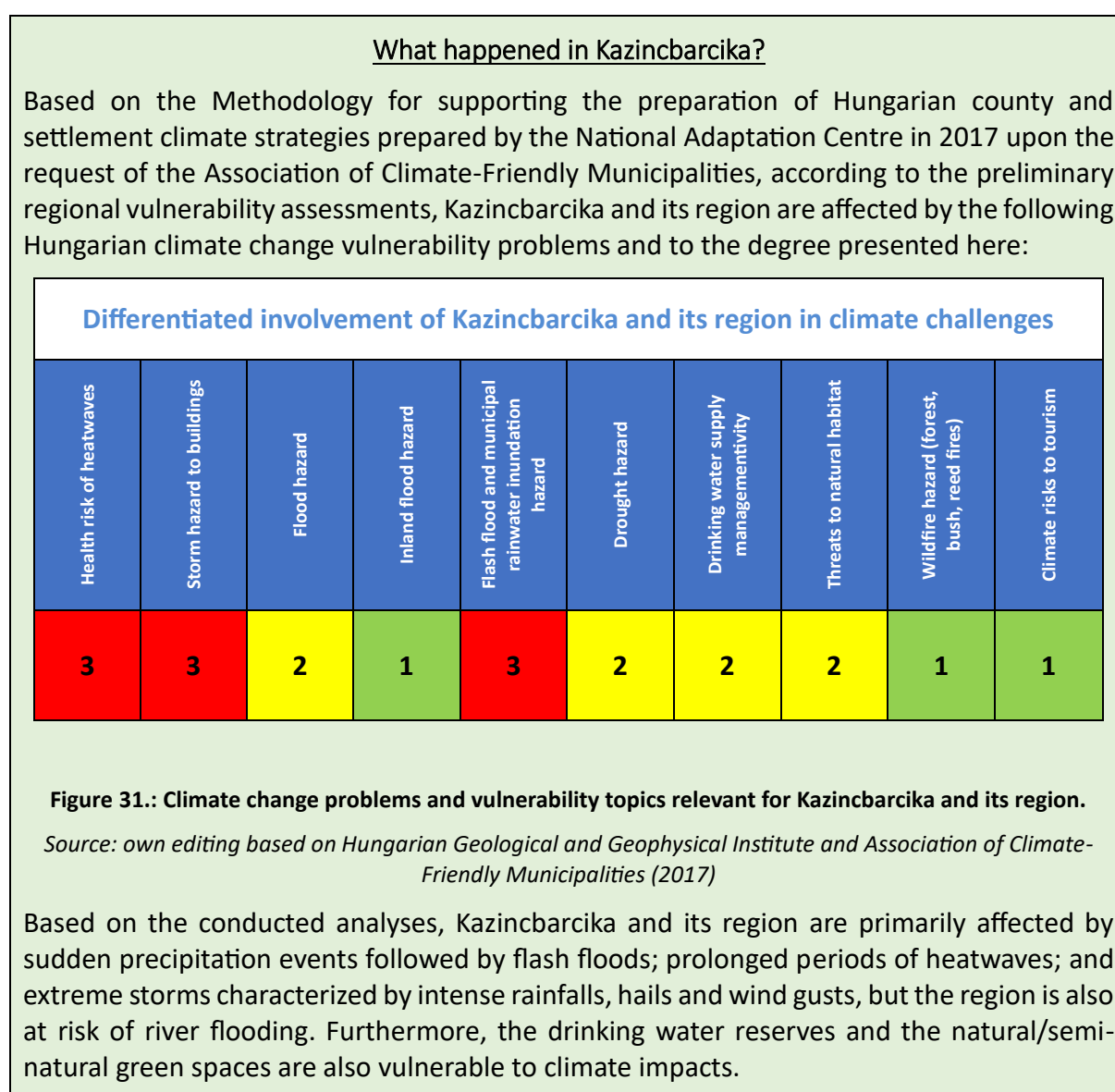
Prioritization has two levels:

- **First, we need to clarify the emphases between these two directions** in the case of a joint city-company adaptation strategy: which one should be given more emphasis and which one perhaps slightly less; or do we value the importance of the two directions equally?
- **The second step is to prioritize within the vulnerability topics** (which emerge from the vulnerability assessments of the situation analysis and situation assessment phase and are also confirmed by the structure of the objective tree). What is the most important sub-area, which requires intervention?

The National Adaptation Centre's Methodology for supporting the preparation of Hungarian county and settlement climate strategies already approaches in a revealing way, organizing vulnerability topics into a three-level hierarchy:

- the lowest value represents low risk in the municipality/region and therefore "only" requiring average attention;
- medium value indicates medium risk, therefore a need for general strategic responses;
- while the highest value represents high risk vulnerability topic in the municipality/region, that requires specific, targeted intervention.

Given this hierarchization, the objective tree should be structured and simplified further: merging related sub-topics, possibly separating the naturally distinct sub-topics from a larger unit, giving priority areas a specific/strategic objective and more intervention; giving less emphasis to the less relevant areas, or even not including them among the objectives/measures.



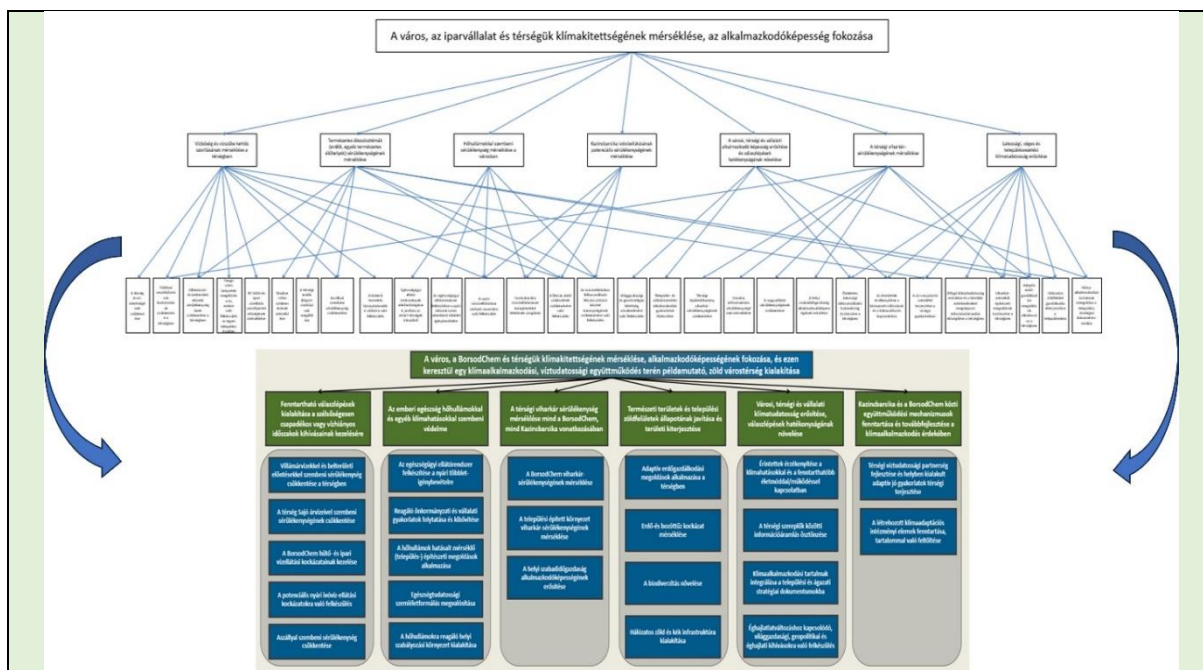


Figure 32.: The climate adaptation objective tree of Kazincbarcika and BorsodChem Inc. and the objective system based on it.

Source: The joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

The consideration of these main key topics is naturally also reflected in the objective tree prepared during the situation assessment, since most of the elementary, medium-level and the most general problems outlined in connection with them during the objective planning workshops. Based on the objective tree, the even more structured and rationalized objective system merged the water topics, presented all three key areas as separate medium-level strategic objectives, complemented by a fourth, ecological topic; and finally, it also named two objectives in the Municipality-Company relation, responding to the City-Company nature of the adaptation strategy.

6.3. Mistakes to avoid

Within the planning process, setting the objective system can be considered a relatively simple task, if the previous phases (situation assessment, problem tree and objective tree setting) have been completed in a satisfactory quality and their results are available, as this task requires a thoughtful approach and insight. This work phase also has key aspects and possible mistakes that must be paid special attention to. These include:



Multilevel nature: the multilevel nature of the objective system presented in the previous sub-chapter is one of these important aspects. **Looking at the structure, the logic should be immediately visible.** Confusing structures and representations should be avoided.

In terms of **complexity**, it is important that the objective system covers all the key areas involved in the situation analysis and assessment, reflecting all the relevant findings, breakout points and challenges of the situation assessment.

In terms of the development method, the internal planning team should create the first version of the objective system, then discuss it in detail interactively with the client in several rounds. **The other option is to prepare the first draft in a joint workshop with the client.** The advantage of the first option is the relatively faster progress and the more convenient and time-saving review possibility for the client. Although the second option is more time-consuming, it can further increase the acceptance of the objective system.

We must strive for internal coherence in this work phase, or more precisely in connection with this: **the long-term overall goal or goals must evolve from the vision in a clearly identifiable way**, practically transforming it into a goal, translating it from a desired state into a goal to be achieved. Likewise, specific – or also known as strategic – objectives must serve this top-level goal. If a complex climate strategy is being prepared, one strategic objective should be assigned to each of the three major climate policy pillars (mitigation, adaptation, awareness-raising); if we prepare “only” an adaptation strategy, then a separate medium-level objective should be dedicated to each of the main vulnerability topics. In the case of a joint city-company strategy, the cooperation between the two actors is also worth an objective. Of course, both the company and the municipality can have their own medium-term objectives, but this is less recommended as it only preserves the separation during the implementation.

Interventions and measures should not yet be formulated in this work phase. When setting objectives, we should avoid naming too specific tasks. Even the lowest objective level, sub-objectives or intervention areas are not operative, concretized elementary interventions, those will be the measures in the next work phase.

Despite what is described above, we are not saying that we encourage lengthy generalization when formulating the objectives. **It is recommended to avoid emphasizing empty phrases**, “production of commonplaces”, using trite statements from other strategies (for example *“increasing competitiveness”, “sustainable development”, “adaptation to climate change”* objectives named on their own, without context), i.e. we must find the right balance between the general nature of setting objectives and the inclusion of regional specificities.

The case of regional objectives is an interesting question: in the case of a regional or municipality-focused adaptation strategy, it is recommended to **formulate either medium-level or lower-level objectives for each sub-region or district within settlement**. It should be noted that this unfortunately did not happen in the case of Kazincbarcika and BorsodChem, due to the lack of client demand, but it is certainly advisable in the case of other city-company joint planning actions, responding to the highly region and locationspecific nature of climate action, with locally relevant answers to locally relevant problems.

Visualization is also extremely important in the objective-system planning work phase, **supporting the chapter with a clear, illustrative figure**. We can dedicate an entire A4 page (possibly a fold-out A3 page) to **the figure of objectives**, since **this is one of the key communication elements of the strategy**, alongside the vision. Prepared in a sophisticated, colourful design, it helps decision-makers and stakeholders to understand and identify with it.

7. Action planning

7.1. The process of planning actions

The methodology for supporting the preparation of Hungarian county and settlement climate strategies also states that interventions should be planned for all elements of the objective system. The guide recommends the following content breakdown of interventions in the context of general, complex climate strategies: **proposals for mitigation measures; adaptation measures; awareness-raising measures**. A purely adaptation-focused document will, of course, only plan interventions concerning adaptation and awareness-raising, in the case of a joint city-company document, it will particularly focus on those that can be implemented in a cooperative way.

Referring to the guidelines of the guide, it is important to note that since adaptation interventions aim to reduce the risks associated with climate change, **when planning specific interventions, we should ensure that adaptation and mitigation objectives do not conflict with each other**, so no adaptation measure leads to an increase in energy use/emissions of GHGs.

For example, one of the main means to combat heatwaves is the air-conditioning of buildings, which results in additional electricity consumption and heat production, not exactly acting in the direction of decarbonization. **It is therefore recommended to plan interventions that, in addition to adapting to climate change, have a positive social, environmental, or economic impact, are low cost or can be implemented without external resources** (e.g. shading of buildings, north-south orientation of new buildings). Improving the efficiency of water use (both in agriculture and in households), for example, is not only important because the available water resources may become scarcer as a result of climate change, but also because of the economic benefits for consumers. The development of green spaces not only makes urban shrubs and trees more resilient and adaptable; it also captures excess carbon-dioxide, creates habitat, captures dust, reduces noise pollution, and somewhat reduces the population's exposure to heatwaves with its shading and evaporating effect.

As indicated in the previous chapter, **the more strategic, comprehensive objective planning is directed towards real, tangible results by the planning of measures**. This operational, practical work phase involves the **careful planning of specific interventions**. **We should give brief titles** to measures, avoiding four or five-line, hard-to-follow extended sentences. Measures should also be provided with a code for easy identification.

The specifics must be defined in full detail, so we must present the planned measure's:

- **actual subtasks** in clear, explicit and sufficiently detailed terms;
- precise **deadlines** for their completion, broken down to years/half years;
- **target audience, the precise definition of which** helps to clarify the justification and purpose of the measure, identifying local stakeholders who may be affected;
- **specific responsables for the implementation:**
 - the actual owner(s) of the task, who can be held accountable for the results;
 - as well as the partners to be involved in the implementation;
- **financial background of the implementation:** presenting how much funding is needed to carry out the measure and where it will come from;
- **necessary human resource background** requirements: outlining what skills, professionals, live, mechanical and intellectual labour are needed to carry out the task.

There are three requirements for measures: ***well-foundedness, feasibility and verifiability/accountability.***

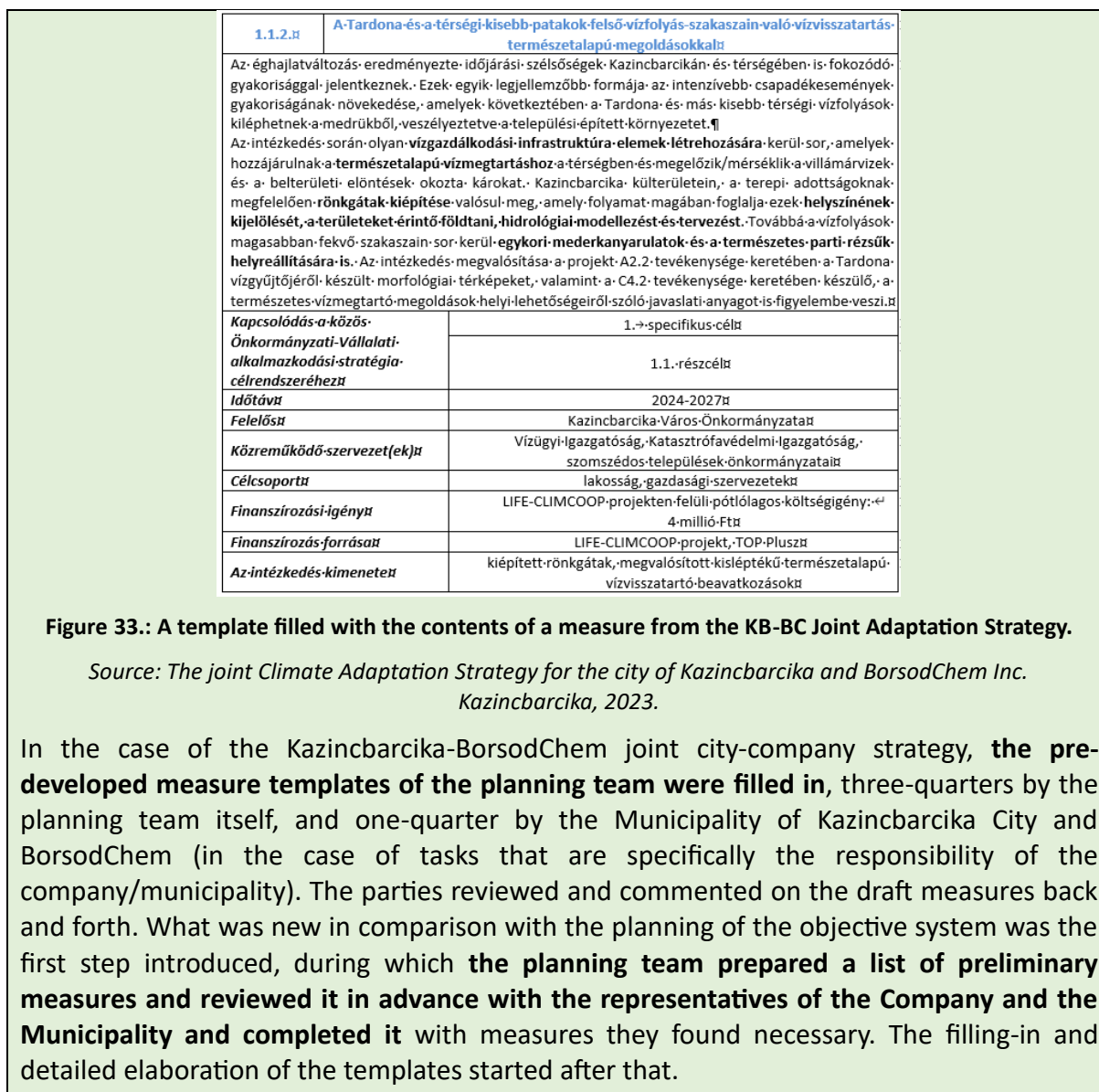
- Well-foundedness can be ensured by its **connection to the objective system** (and, retrospectively, to the vision and the facts stated in the situation analysis and assessment), which should be clearly indicated for each measure (for example indicating in a rubric the objective system element to which the measure can be linked). It is important that an intervention can connect to several objectives, moreover, **the “best” interventions are those that serve multiple objectives at the same time** (such as green infrastructure developments, flash flood protection solutions, climate-proof renovation of buildings, protection and promotion of natural and cultural values, etc.)
- Feasibility is guaranteed by realistic resource planning and the allocation of tasks according to responsibilities and competences.
- And verifiability can be ensured by specifying measurable, monitorable results assigned to measures.

As step zero, **the planning team should develop an intervention planning template** to plan the measures. For each measure, the necessary planning information must be provided here. It is essential that at least one measure is proposed for each objective in the Strategy, but of course a proposed measure can serve more objectives, and any number of measures (although a comprehensible number, in a transparent amount) can be assigned to one objective.

What happened in Kazincbarcika?

Based on the climate adaptation objective system, at the beginning of November 2022, **measures (58 in total)** per sub-objectives were defined in the planning process in Kazincbarcika. These interventions are **intended to serve what is set out in the objective system**. In the Measure chapter of the Strategy, the justification of the need for the measure and a description of the specific activities to be carried out are set out in a table. In each action-table after the narrative description of the action itself further related information can be read such as

- the connection to the specific and sub-objectives of the Strategy;
- the timeframe of the given measure;
- who is responsible for the implementation of the given measure and the other organizations involved in the measure;
- the funding need of the measure and its possible sources;
- and the output of the given measure.



7.2. The approach applied during the planning of the measures

The measure structure to be developed is based on the objective system, especially on the medium and lower-level objectives (in the terminology of the joint city-company adaptation strategy: strategic objectives and sub-objectives). In our case, this means that **for each sub-objective of the given specific or strategic objective, x number of measures are prepared**, which basically covers the sub-area, sub-thematic with detailed description of the characteristics presented in the previous chapter (precise task description, responsible persons, contribution, planned implementation schedule, planned outputs).

The measures – if the objective system has a complex climate policy coverage – include decarbonization, adaptation and awareness-raising directions as well. If an adaptation strategy is prepared, the measures typically focus on the latter two pillars. Like the structure of the objective system, **the thematic breakdown of the measures should reflect the key vulnerability topics that emerge in the situation analysis/assessment and the objective system planning.**

It is important to **involve the local decision-makers and stakeholders in the development of the measures from the very beginning**, as they will be responsible for the implementation of the planning document. This can be achieved by consulting the committee deciding on strategic planning directions at the beginning and the end, and optionally in the middle of the planning process. Optimally, the stakeholders are already involved in defining the initial range of measures. If this is not required and the work is left entirely to the planning team, then the clients should carefully quality-assure the prepared measure drafts.

What happened in Kazincbarcika?

The measure planning phase began in November 2022, based on the areas of intervention of the accepted objective system. **As a first step, the planning team composed an indicative list of measures (titles)** completed by hypothetical descriptions, indicating the range of possible measures.

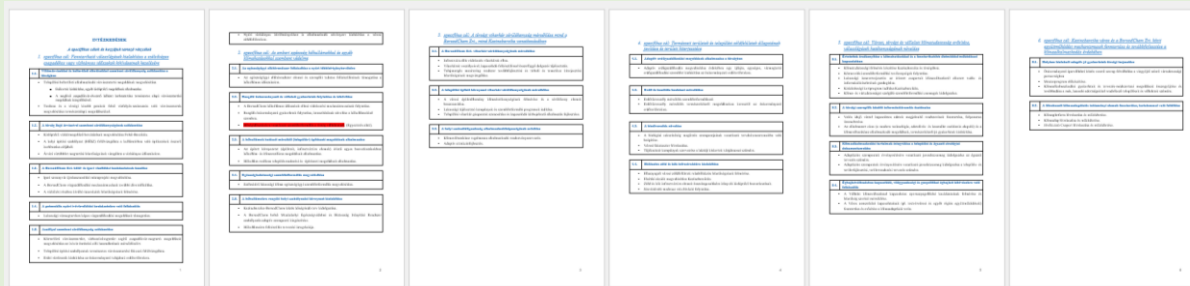


Figure 34.: The preliminary, indicative list of measures sent to the Municipality and the Company.

Source: WBGC (2022).

The Municipality and the Company reviewed this list, they crossed out some elements and proposed some new ones, **then they wrote the points that fall within their competence**. The additional measures (roughly 75% of the total set) were prepared in a draft form by the National Adaptation Centre. After the cross-checking of the set of measures (the measures of the WBGC were quality assured by the Municipality and the Company, and the measures of the Municipality and the Company were quality assured by the WBGC) the Company and the Municipality re-reviewed the finalized list. The planning team sent the planned final version to the Municipality and BorsodChem for verification in early January 2023. **After a final round of comments** from the latter, **the final versions of the chapters were finalized in January 2023**. By the middle/end of February, the practical development of the whole Strategy was completed, by the middle of April only the final rounds of comments and feedback from the City and the Company were transferred to the Strategy.

7.3. Mistakes to avoid during the measure planning

The previous sub-chapters have outlined the practical and specific requirements of measure planning. The mistakes to be avoided are essentially the same as those described for the objective system, with the addition that other conditions arising from the degree of concreteness must also apply.



- Similar to the objective system planning, it is recommended as a first step to develop **an initial indicative list of measures in an internal planning workshop** along the principles above. **Then, this can be discussed interactively** in several rounds **with the client**, or – in the case of city-company cooperation – with **clients**. The other option is to prepare a first draft in a workshop with local stakeholders (mainly municipal and company decision-makers). As already mentioned in the case of the objective system, the advantage of the first option is that it is relatively fast, and the fact that giving “only” their opinion is also more convenient for the client. The second option, although more time-consuming, has the advantage of strengthening the acceptance of jointly adopted measures.
- The importance of **internal coherence** has already been emphasized in the situation analysis-situation assessment; situation assessment-vision; and vision-objective system relations. It is particularly true in the **objective system-measures relation**: the level of measures is below the lower-level objectives, they translate the sub-objectives/intervention areas into practice, **covering each sub-objective/area of intervention**. **The set of measures is also expected to cover all key areas** involved in the situation analysis and assessment phases AND in the objective system – thus responding to all relevant findings, breakout points and challenges of the situation assessment AND all key priorities of the objective system.
- Similarly, in the case of a **joint city-company strategy**, the **cooperation between the two parties** should optimally appear in the form of a medium-level objective and lower-level sub-objective, so **a whole package of measures should specifically address this issue**.
- We have mentioned **regional objectives** in the objective system, which we also promote in relation to the measures. When preparing a regional or settlement-focused strategy, in line with the formulation of **medium and lower-level regional objectives**, **measures should be named with regional (or district-level) focus that implement them**. Although this was not the case for Kazincbarcika and BorsodChem, for other joint city-company measure planning, this regional approach is strongly recommended – it reflects the **highly region and location-specific nature of climate adaptation**.
- Contrary to the objectives, **in the case of measures**, the general, merely well-sounding, but not **precise title and content description** is considered a mistake. **We should aim for specifics:**
 - a detailed description of sub-tasks,
 - those responsible for the implementation and collaborators,
 - financial background and funding needs,
 - and the presentation of actual outputs.
- **Well-foundedness is a basic requirement for measures, that is why it is important to ensure a transparent connection to the objective system**. For this reason, in the tabular display of the measures, it is recommended to dedicate a rubric to the presentation of the objective system connection using at least one objective system code.
- **Feasibility is an essential requirement** for the objectives, but even more so **for the measures**, because their realization is the fundamental key to the implementation of the Strategy.

- It is necessary that **the given measure "shoots" for real funding**, not for a financial background that is difficult or unavailable (e.g. exhausted OP funds or no longer existing, expired calls at the end of a programming period).
- **The reality of responsibilities is also essential.** Particular attention should be paid to "allocating" tasks to stakeholders who are responsible for the given competence or field of expertise. **Joint measure planning with the stakeholders** can help with this, which **really makes sense here**.
- **Verifiability** is also an essential requirement for measure planning. A measure must not only look good when written on the planning board, it must also stand the test of reality. **By continuously monitoring a given measure, we can make sure** that the implementation is progressing well, and whether it has lived up to the expectations. For this, **we need to define the planned outputs in advance**, always thinking in terms of measurable, traceable actions.

8. Implementation framework planning

8.1. Clarifying the implementation framework concepts

Based on the county and municipal climate strategy planning methodology, planning the implementation framework is a separate phase in the planning process. The underlying logic is that the tasks associated with an upcoming climate adaptation strategy, like those associated with any other strategic planning document, do not end with the completion of the actual planning: completing the strategic cycle and then starting a new cycle is always a multi-step, continuous management exercise. In terms of implementation, it is essential that the objectives set in the planning process are successfully met. **For the completed strategy to actually serve as a compass for the joint city-company climate adaptation activities in the following years, it is necessary to lay down the implementation framework precisely.**

In terms of its conceptual background, the terms implementation and management are concerned with the organisation and management of resources. They aim to successfully meet the milestones of the planning process within a given time and budget. More broadly, running the strategic planning cycle itself can be seen as a kind of broad management activity. It consists of four main phases:

- **initiation and situational analysis and assessment**
 - the emergence of development ideas and needs,
 - the creation of a management organisation,
 - carrying out more detailed situation analyses,
 - conducting a situation assessment;
- **planning**
 - objective system planning,
 - action planning,
 - resource planning and scheduling,
 - administration;
- **implementation**
 - putting plans into practice,
 - monitoring and follow-up of activities,
 - (periodic) review and evaluation of progress;
 - and revision as necessary.
- **closure**
 - administrative closure of the process,
 - handing over the results of the development,
 - ex-post evaluation of implementation,
 - providing feedback for the next planning cycle.

In a narrower sense, the elements of the post-planning implementation phase can be classified as implementation management tasks, which municipalities/regions/city-industrial company partnerships should also follow when defining the implementation framework:

- the **identification and scheduling** of specific **tasks and climate adaptation measures** up to the end of the implementation period;

- identification and clarification of the institutional framework of development:
 - the appointment of a body/professionals to coordinate and make strategic decisions related to the climate strategy, while setting directions,
 - involving stakeholders and ensuring information exchange between them,
 - and setting up organisations to inform the public;
- defining the financial background:
 - mapping available own resources, calculating the amount to allocate for each activity, identifying funding opportunities, budgeting, identifying types of costs, and if possible, setting aside a specific climate adaptation budget in the city's/company's budget;
- **monitoring and evaluation:** setting up a monitoring system to regularly collect data providing the basis for various indicators, and to evaluate the implementation of the strategy at various intervals, as well as to revise the document on the basis of these evaluations;
- **stakeholder involvement:** identification of the relevant stakeholders (social, economic organisations, NGOs, the public, etc.), developing ways to contact and involve them on this basis, ensuring constant communication, drawing up a partnership plan for the implementation phase, not only limited to the planning process.

8.2. Specification of immediate tasks

For a finished climate adaptation strategy to serve as a feasible development guideline, a compass and an umbrella document for city-company climate adaptation activities in the coming years, **a clear framework for implementation needs to be established**. As a first step, **it is necessary to identify specific tasks** (with proper deadlines and responsible persons) that will be needed to translate the strategy's actions into practice on the short term.

At the beginning of the implementation phase, **without the completion of the tasks to be performed immediately, the entire implementation may be put in jeopardy**. These tasks can generally be classified as:

- **the administrative closure of the planning process;**
- in the case of longer-term projects, the delivery of the **development results to date;**
- **the scheduling of further tasks;**
- **finalising and actually setting up the institutional framework for the implementation;**
- **concrete launch of current elements of the various municipal and company tasks.**

What happened in Kazincbarcika?

The final phase in the planning process of the joint City-Company Climate Adaptation Strategy was the development of the *Implementation Framework* chapter. Within this, the first sub-chapter served to clarify the short-term, concrete tasks for implementation. It listed the points which should be implemented within a **short timeframe, maximum a few months after adoption**, and **which are prerequisites for further effective implementation** – without which the actual implementation of the objectives and measures in the target framework cannot start.

These tasks included the administrative completion of the planning process, i.e. the preparation of relevant reports within the tender and, as part of this, the preparation of the Strategy and its supporting documents and appendix for formal adoption by the relevant bodies of the City and the Company. A further task was to hand over the developments

made to date (e.g. water treatment plant) and to prepare as a scheduling as accurate as possible for those still in progress. In the months following the adoption of the Strategy, the institutional framework for implementation (the three-tier system) was finalised and put in place, and the due tasks undertaken by the Municipality of Kazincbarcika and BorsodChem were launched.

8.3. Scheduling the implementation

One of the fundamental cornerstones of implementation is the establishment of an accurate timetable for the various planned steps and tasks – usually covered in the scheduling section of a Strategy. This involves the planning of specific adaptation and project development **measures and tasks, with deadlines and responsables, to ensure that the strategy can be implemented in practice.**

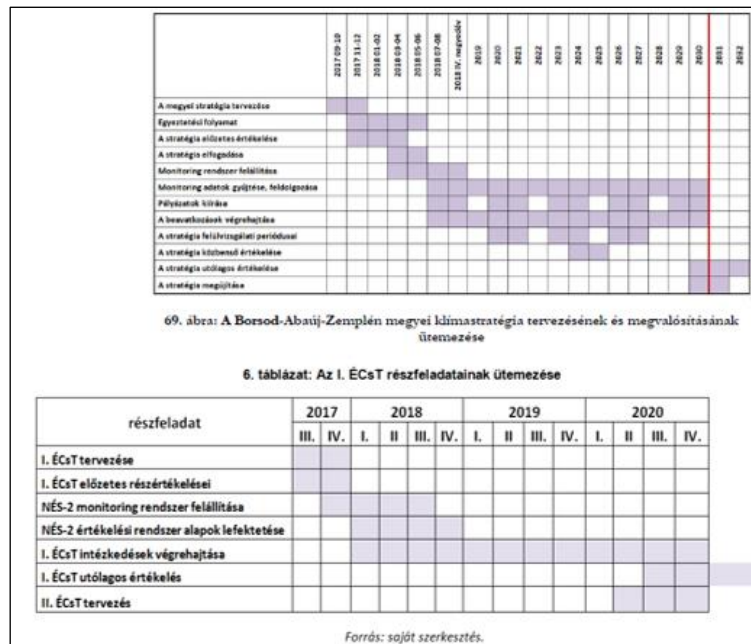


Figure 35.: Gantt charts used to illustrate the scheduling for the BAZ County Climate Strategy (top) and the 1st National Climate Change Action Plan (NCCAP) (bottom). (First chart: the top row indicates the timeline, the first column indicates scheduling with subtasks e.g. establishing a monitoring system; Second chart: the top row indicates the timeline, the first column indicates subtasks e.g. planning of the 1st NCCAP, implementation of the measures of the 1st NCCAP)

Source: Attila Sütő, BCE, 2022.

Scheduling elements and tasks of implementation includes several steps. First, it is necessary to identify the key tasks of implementation and break them down into smaller subtasks. This is followed by establishing their temporal (*which task comes after which task*) and logical (*which is built on which, which assumes the completion of which*) relationships, thus determining the order to achieve the objectives. Once the whole timetable is drawn up, it is important to identify the relevant milestones and associated work packages. This is complemented by specifying the expertise required to carry out the sub-tasks of the work packages.

The actual **scheduling** will unfold in detail afterwards. In line with the structure of the milestones and technical phases identified, **the scheduling should be reconsidered following the completion of each planning/technical phase**, to assess compliance.

Related tasks beyond:

- allocation of identified subtasks within work packages among team members,
- clarifying responsibilities,
- precise definition of activities,
- defining the logical sequence of the sub-activities,
- defining their duration.

The various methodological recommendations often propose the use of a **Gantt chart** to assist the scheduling phase: visualising the overall logical and temporal structure of the tasks to be carried out, thus supporting the creation of effective project teams within the work plan.

What happened in Kazincbarcika?

The joint City-Company strategy also declares that scheduling the activities in advance facilitates smooth planning and implementation. Therefore, the Strategy also includes a Gantt chart that records and schedules planning and implementation, monitoring and evaluation tasks and work phases, thus helping to understand the exact sequence of tasks.

The narrow planning process for Kazincbarcika and BorsodChem consisted of the following phases:

- *Preliminary studies* (01.06.2021-31.06.2021);
- *Field research* in two phases (14.09.2021-23.09.2021; 14.04.2022-14.04.2022);
- *Vulnerability assessment and risk analysis work phase* (01.10.2021-30.03.2022);
- *Launch of concrete planning activities* (01.04.2022-14.05.2022);
- *Situation analysis and assessment phase* (15.05.2022-15.07.2022);
- *Vision and objective system-setting phase* (16.07.2022 - 15.11.2022);
- *Action and implementation framework planning* (01.11.2022-15.01.2023);
- *Closure of planning, partnership and quality control phase* (16.01.2023-30.04.2023).

The table was completed by including events that are more closely related to the planning of the Strategy or are important milestones of the project. The immediate planning work phases are indicated with green in the first column; the items without highlighting are the major milestones of the LIFE-CLIMCOOP project, which help to identify the temporal positions of the listed tasks.

emissions. *The second largest budget item, following regional development and cohesion aid (€442.4 billion, 34%), is related to natural resources and environment (€378.9 billion, 30%).* The calls for proposals linked to these funds can greatly help to implement the various adaptation concepts.

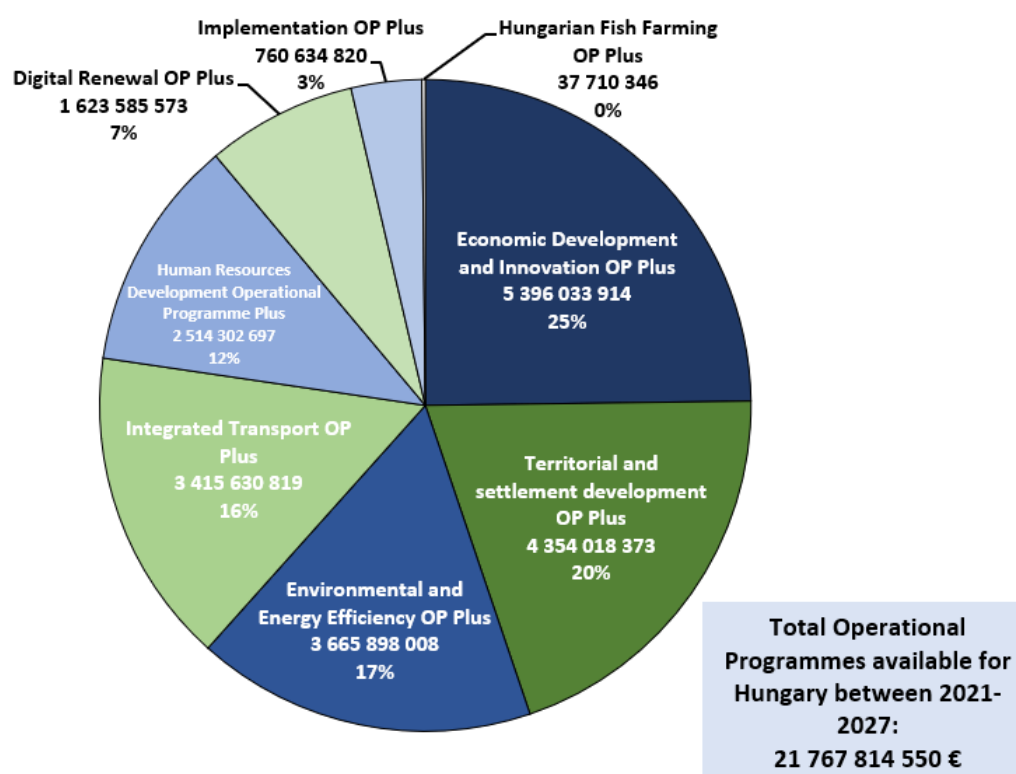


Figure 37.: Indicative resource plan for domestic Operational Programmes 2021-2027 (€).

Source: T/152. bill on the central budget of Hungary for the year 2023, based on own editing.

The European Green Deal, adopted in 2019, is also a sign of the EU's greater emphasis on sustainability, the circular economy, and the fight against climate change. Several of the Green Deal's objectives are directly or indirectly linked to climate policy (e.g. *clean, affordable, and secure energy supply, green and circular economy, sustainable and smart mobility, common agricultural policy that enables fair and healthy food supply*) in the 2021-27 budget. The main objectives of the EU's climate policy are to achieve carbon neutrality by 2050 and to prepare EU Member States collectively for the challenges of climate change in the coming decades across all policy areas⁶. The Green Deal's points are a major contribution to these objectives.

Under Hungary's Partnership Agreement, **Operational Programmes (OPs)** determine how the country will use European Structural and Investment Funds during the current programming period. Based on the 2023 budget figures, **Hungary is eligible to draw down more than €21.7 billion for the 2021-2027 EU cycle**. The OPs will provide significant resources to meet climate adaptation targets. Of the eight OPs, **TOP Plus** and **EEEOP Plus** may provide the most extensive funding opportunities for adaptation.

⁶ Source: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_hu

The **TOP Plus** (Territorial and settlement development OP Plus) programme provides support for the developments of local and regional authorities in the fields of economic development, local tourism, employment, municipal infrastructure, municipal management and local public services, provided that the project aligns with the development objectives and other existing strategies of local and regional authorities. Similar principles apply to the energy modernisation of municipal buildings.⁷ In the field of climate adaptation, topics such as *nature-based protection against flash floods, small-scale semi-natural water retention solutions, green infrastructure development, the development of a more heatwave resistant municipal environment, the reduction of forest fire risk, small community garden programmes or awareness-raising projects* are typical topics (also) eligible for TOP Plus funding.

The **EEEOP Plus** (Environment and Energy Efficiency OP Plus) has five priority axes: 1) Water Management and Disaster Risk Reduction, 2) Circular Economy, 3) Environment and Nature Conservation, 4) Renewable Energy Economy and 5) the Just Transition Fund⁸; and **indirectly addresses climate adaptation in its priority axis 1**. Accordingly, applications under the **EEEOP Plus** may also provide funding for adaptation interventions. In our case, their relevance is somewhat reduced by the fact that the programme's grants primarily support adaptation actions of national/regional relevance, while local, municipal in- and outdoor interventions are more under the remit of the TOP Plus. However, larger flood and disaster management interventions of regional importance and nature conservation concepts could potentially also benefit from EEEOP Plus funding. Within the area of climate adaptation, for example, *interventions to reduce the risk of flooding and flash floods in rural areas, nature conservation measures that also help adaptation, and awareness-raising programmes* **could be considered for EEEOP Plus funding**.

The **CAP⁹ (new Common Agricultural Policy) resources** to be announced between 2023-2027 should be considered, too. The new CAP, like other EU policies, will put more emphasis on rural regeneration in the current budget, in the framework of the European Green Deal, as well as in the implementation of the "*farm to fork strategy*" and the "*biodiversity strategy*".¹⁰ **Hungary is expected to be eligible for approximately € 1.563 billion in funding¹¹** and, in the light of more ambitious environmental and climate targets, member states should allocate at least 25% of the programme budget to the conservation and enhancement of ecosystems and 40% to biodiversity conservation. In the area of climate adaptation, measures such as *green infrastructure development, related reforestation and conservation projects, and solutions to improve ecological corridors* could all receive funding.

In the context of **direct EU funding**, the experience of the LIFE-CLIMCOOP project illustrates that so-called direct EU funding such as **LIFE programmes** can provide excellent opportunities for cities and their regions to strengthen climate resilience. Nearly a third of the 2021-2027 LIFE budget is earmarked by the European Commission for nature and biodiversity conservation. The LIFE programme for the period 2021-2027 has four categories: *nature and biodiversity; circular economy and quality of life; climate change mitigation and adaptation;*

⁷ Source: <https://palyazateu.hu/palyazatok/onkormanyzati-epuletek-energetikai-korszerusitse-top-plusz-2-1-1-21-2/>

⁸ Source: https://www.palyazat.gov.hu/kornyezeti_es_energiashatekonysagi_operativ_program_plusz

⁹ Source: https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/new-cap-2023-27_hu

¹⁰ Source: https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/new-cap-2023-27_hu

¹¹ Source: <https://www.parlament.hu/irom42/00152/00152.pdf>

and *clean energy transition*¹². One of the four directions has a strong climate policy focus, but the other three are also indirectly linked to the field. For the LIFE Nature and Biodiversity proposals, the EU funding intensity can reach 67% or 75%, while in the other cases the funding intensity is 60%.

In the context of **other international funds** for energy and environmental projects and measures, the EEA and Norway Grants also publish calls for proposals that can help adaptation interventions, but recent developments have made their availability uncertain, and the calls are currently on hold.¹³ Would the situation change, *small-scale adaptation solutions for water management and green spaces*, as well as *small-scale renewable energy investments* could be eligible for support under this heading.

Regarding **domestic budgetary resources**, the subsidies provided by the **central budget** (e.g. Hungarian Village Programme, family support benefits, vis maior funds) should be highlighted. According to Chapter XVI, point 10 of the 2023 budget, the Ministry of Construction and Transport is responsible for development management appropriations, which include **tasks of construction, urban planning and spatial planning** – for these, a budget of HUF 863.4 million is allocated.¹⁴ Among the municipal support appropriations, it is relevant for the adaptation strategies that the subsidy for **municipal management – green space management** – is HUF 26,000 per hectare in 2023, which could also be important for the operation of green infrastructure. The maintenance of green spaces may also be linked to the budget for the **maintenance of public cemeteries**. The **Hungarian Village Programme** can also contribute to certain infrastructure projects in small rural settlements. Such developments can indirectly help to achieve climate adaptation objectives.¹⁵ In the context of central support for extreme weather events, the **force majeure fund** can also be mentioned, which provides financial support to mitigate the damage caused by flash floods, storm damage and invasive species¹⁶. It is important to note that these funds do not help prior preparation. In addition to the central budget, **local government budgets** can also play a key role, depending on the financial situation of the municipality and its position in the municipal hierarchy.

Among **private sources**, local businesses and entrepreneurs can provide financial support for small-scale adaptation projects. Among economic actors, the industrial company can usually play a prominent role in a city-company partnership, providing a significant part of the resources of a potential climate adaptation fund. It is also generally important during the financial planning process that a given municipality/ partnership of a municipality and a company considers the possibility of setting up such a financial fund to support adaptation investments. If the partnership refrains from doing so, it should be justified in the financial chapter of the strategy in preparation.

¹² Source: <https://termeszetvedelem.hu/life-program/>

¹³ Source: <https://www.norvegalap.hu/hu/>

¹⁴ Source: <https://www.parlament.hu/irom42/00152/00152.pdf>

¹⁵ Source: <https://magyarfaluprogram.hu/>

¹⁶ Source: https://www.allamkincstar.gov.hu/hu/nem-lakossagi-ugyfelek/vis_maior

8.4.2. Estimation of costs and resources

After identifying the sources and selecting potentially relevant ones to a given municipality/region/city-company partnership, **the costs associated with the climate strategy measures should be collected**. Firstly, the location of these [within the aforementioned areas (direct and indirect EU, other international, national, central, and local budgets, private sources, etc.)] must be specified, followed by **a calculation of the estimated costs of the action or intervention in question**. It is recommended that these are published in a table down to the level of the measures to ensure transparency.

What happened in Kazincbarcika?

The financial plan of the document included a detailed indicative resource map, which listed the resource categories presented above. This overview was also used as the basis for planning the **estimated funding needs and possible sources of funding**, allocated to specific and sub-objectives, as well as to measures.

The financial planning was essentially carried out by the planning team, with regular input from the decision-makers of the Municipality and the Company. For some of the measures planned by the stakeholders, the financial implications were sent to the planners by the person responsible. Once the financial chapter was finalised, it was reviewed and checked again by the decision-makers and experts of the Municipality and BorsodChem.

Figure 38.: Part of the financial tables of the joint City-Company Adaptation Strategy. (The columns from left to right: specific objective, sub-objective, action, funding need, funding source, responsible and contributing organisations, time period)

Source: The joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023., own editing

In the relevant chapter of the document, a large summarizing financial table was prepared by the planners. The tables show the six specific objectives of six different topics of the Strategy in different colours, with additional data that are related to each specific objective in a lighter shade of the same colour. The specific objectives are made up of further sub-objectives and specific actions are linked to these sub-objectives. The financing needs for

the measures are based on estimates and can vary significantly depending on global market developments and national economic conditions, given that some of the measures have a multiannual duration. Additional elements may be added to the funding sources in the future; this document collects currently available options per measure. Where the responsible and contributing organisations are mentioned, the responsible organisation is highlighted in bold in the cells. In the timeframe column, the dark cells indicate the implementation scheduling of the planned measures, with the planned timeframe of 2023-2030. Where the table indicates the TOP Plus programme as the source of funding, the following statement is true: the programme may provide support for the development activities of local and regional authorities, provided that the call for proposals is consistent with the development objectives and other existing strategies of the local and regional authorities.

8.5. Institutional frameworks

In planning and implementing adaptation strategies, a stable, hierarchical institutional structure is needed to coordinate processes and make the right decisions so that work can proceed in the smoothest possible way. As in other areas, the focus is on **close cooperation between the city and the company**, as the two main actors, and it is no coincidence that **they need to be represented at all levels of the hierarchy. The number of levels in the hierarchy of the institutional system** can vary greatly from one municipality/region/city-company partnership to another depending on the planning situation (usually from three to five) and **depends largely on the number of partners involved in the strategy and their professional competences.**

The general institutional hierarchy levels of adaptation strategies according to the Hungarian County/Local Climate Strategy Planning Methodology Guide are the steering/decision making group; the climate working group or platform; the wider stakeholder group and the broader society. In the case of a city-company partnership these are:

- **The members of the steering and decision-making group** are senior decision-makers of the city and the company (e.g. mayor, deputy mayor, notary, chief architect, senior company representative, head of sustainability and environmental tasks). The group is an operational body, so it is important that its size is relatively small, which helps to maintain closer contact and practical decision-making. Its most important task is to set the main strategic and development directions for planning.
- **The Climate Change Working Group** brings together the most relevant actors in the field of climate change (e.g. public services, higher education, public administration, managers of large companies, major business organisations). The working group has two main tasks: firstly, to channel different local interests and views into the Strategy and secondly, to regularly comment on the material produced and make recommendations.
- **The partners to be approached in a guided manner** are local/regional actors who are not included in the narrower Climate Working Group but whose opinions and views are important for the development of the Strategy (e.g. representatives of regional municipalities, representatives of other regional companies, NGOs, professional organisations, churches). They will have the opportunity to comment on technical material at a specific point in the planning process.

- Informing **local society** is key to the planning and implementation of the Strategy, as the plan to be prepared primarily serves their interests, so they should also be given the opportunity to comment on the document before it is adopted and, where appropriate, propose amendments.

What happened in Kazincbarcika?

The institutional structure supporting the work processes has also played a significant role in the planning and implementation of the **joint City-Company Climate Change Adaptation Strategy**, prepared in the framework of the **LIFE-CLIMCOOP** project in cooperation between Kazincbarcika and BorsodChem Inc.

During the project, three hierarchical levels of institutions were developed. At the top of the hierarchy, the "**Steering and Decision-Making Group**" is made up of the top management (responsible for environment and climate) of the City and the Company. It makes the key decisions on the Strategy and is responsible for setting strategic directions. The Group meets several times a year, depending on the frequency of the issues to be discussed and dealt with. Optionally, and by prior arrangement, staff of professional organisations participating in the consortium (e.g. KÖVET, Energy Strategy Institute) may be invited to the meetings.

A "**Climate Platform**" operates under the Steering and Decision-Making Group to ensure coordination between the two parties and monitor implementation. The Platform, composed of **City and Company decision-makers, project consortium members and operational experts**, was also involved in the development of the joint Strategy. The Platform can take on several other functions, such as contributing to awareness raising or assessing and coordinating local and regional adaptation needs. **It also provides an opportunity for key local decision-makers to monitor the planning process and inform the public about the results of the Strategy.** The Platform may meet at least twice a year, or more times in specific cases.

The lowest and broadest level of implementation cooperation are the **regional information forums**, to be held several times a year. It is envisaged that **events** aimed at involving partners (local/regional population, economic and other organisations) in the adaptation processes will be organised jointly by the City and the Company. **The events will be open to civil, economic and professional actors, providing a space for professional dialogue and for the public to express their views.**

It is important to mention that the **Municipality of Kazincbarcika and BorsodChem Inc.** have **undertaken to maintain the Climate Platform** as the operational body implementing the Strategy in the joint City-Company cooperation and **to provide it with content in the period after the project closure.**

	Task	Members	Frequency
Steering and decision-making group	<ul style="list-style-type: none"> Definition of strategic directions; decision-making. 	<ul style="list-style-type: none"> BorsodChem's climate and/or environmental manager; The Deputy Mayor of Kazincbarcika and his/her direct staff; other invited persons on a case-by-case basis 	several times a year (depending on decision situations), but at least once a quarter.
Climate Platform	<ul style="list-style-type: none"> discuss the impacts of extreme weather conditions and consider ways of disseminating information to the public and local stakeholders; assessing and coordinating local and regional adaptation needs; commenting on, monitoring and, where necessary, coordinating the revision of the forthcoming Heatwave Action Plan and other related urban and corporate strategy documents; broad participation in awareness raising: <ul style="list-style-type: none"> identifying and organising conference opportunities; collecting and disseminating good practices 	<ul style="list-style-type: none"> University of Miskolc; Kazincbarcika City Municipality; BorsodChem; Vasvári-Balázs Green Centre; GeoGold Kierparty Ltd.; KÖVET Association for Sustainable Economy; other invited guests depending on the topic 	convened ad hoc, if necessary, at any time and any number of times a year; at least 2 times a year in normal operation
Regional climate forums	<ul style="list-style-type: none"> informing local/regional populations and economic and other organisations with a regional role about the current and future challenges of climate change; demonstration/dissemination of good adaptation practices; providing information on the implementation of the LIFE-CLIMCOOP project 	<ul style="list-style-type: none"> local population; economic operators; civil society organisations; critical infrastructure network operators; experts from regional and county government agencies; nature conservation, water management, disaster management experts. 	several times a year if necessary (but at least once a year)

Figure 39.: Institutional framework for the implementation of the joint climate adaptation strategy in Kazincbarcika.

Source: The joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

8.6. Monitoring, evaluation, and reporting issues

One of the prerequisites for the success of a strategy, its ideas or any other development intention is to collect and evaluate information on the quality, pace, efficiency, and effectiveness of its implementation and, on this basis, to decide on the necessary changes. An important mean of ensuring that the objectives and interventions identified in the adaptation strategies are met is to link appropriate monitoring and evaluation activities to these objectives and measures.

According to the 2017 Climate Strategy Planning Methodology Manual of the National Adaptation Centre, in strategic planning, related to the classical planning-implementation-monitoring-feedback cycle, planners *"need to continuously monitor the implementation of set objectives, to collect and evaluate data on the evolution of effectiveness of related measures, and periodically review the document in this light. The basis for this is precise monitoring and regular evaluation, in which systematic organisation is essential, i.e. providing decision-makers and planners with the right information at the right time, with a precise definition of where feedback is channelled"*. This feedback can be used to feed the information obtained during the actual development and implementation back into the constantly evolving planning process. This is ensured through monitoring, or follow-up, and periodic evaluation, which provides the basis for regular review.

If we want a precise definition of these activities,¹⁷ the following definitions can be given:

- **monitoring** is the tracking of the achievement of the objectives set, the implementation of the measures by indicators, and to this end the development, continuous collection, processing, and provision of these indicators, thus monitoring the state of implementation and the progress of the strategy.
- **evaluation** is the assessment of the achievement of objectives of a given development concept/programme/project, based on monitoring information, according to a defined methodology, analysed from time to time to assess the effectiveness and compliance of the objectives/measures.
- **revision** as the result of the monitoring data evaluation activity, using the information obtained as a basis for subsequent updates of the material.

Both the **monitoring and the evaluation activity**, examining the data collected, identifies, and analyses the impacts on the environment and target groups, the economy and society, and **aims to improve the quality of development activities** and optimise implementation. Revisions and evaluations support the improvement of the effectiveness of strategies by providing information on the evolution of results achieved, the contribution to the achievement of objectives and the obstacles to implementation. This can lead to the updating of strategies, possibly allowing for the development of new interventions – thus ensuring that responsible decision-makers intervene to improve effectiveness.

8.6.1 Monitoring

Monitoring of the planning-implementation cycle is also a priority for the joint City-Company adaptation strategy. Monitoring involves the regular collection of data: these are called **indicators**. In practice, an indicator is an index/indicator laid down in the legislation/planning documents that measures the outputs, outcomes, and social, economic, and environmental impacts of the development. Several levels of indicators are distinguished. International development policy planning, as well as national, county, and municipal climate strategies in Hungary, basically name two types of indicators, which are also good starting points in our case.

At the operational, practical level, measures are linked to output indicators. These are the tangible outputs, the "products" of any development or action, which contribute to the longer-term results of the action. The concrete outputs of the measures are monitored through the output indicators.

For example, the outputs of the action on small-scale interventions for natural water retention in outdoor areas will be the number of log dams constructed, with the related output indicator being the number of log dams delivered (unit: number of pieces); the output of the action on strengthening institutional preparedness for heatwaves will be the development of a joint city-company heat alert plan, with the output indicator being the number of plans completed (number of pieces).

¹⁷ The introductory, general ideas in this chapter apply comprehensively to all strategic planning processes, regardless of the topic or sector. This handbook basically talks about the whole process from the perspective of climate adaptation strategies - as the examples used later for indicators are all related to this topic and make sense in the context of climate adaptation planning and interpretation.

At the strategic level, targets are linked to result indicators. The **outcome** in this case is the intended goal of the interventions intended to achieve. Rather than specific physical results, the associated indicators show the movement from the baseline through these results. Outcomes are then represented by **outcome indicators** in name, which provide measurable information about the expected outcome.

Continuing with the previous examples, the purpose of the log dam building measure is to reduce drought damage and to retain run-off water, the result being the amount of water retained. The result of the intervention can be expressed as an indicator of results: the amount of water retained per year (unit: cubic metre). The aim of the measure to strengthen preparedness for heatwaves is to improve the population's adaptive capacity and preparedness, and the result will be the number of inhabitants reached by the measures of the heat alert plan after its entry into force. As an outcome indicator, this can be expressed in terms of the number of people (in headcount) affected by improved institutional preparedness.

Although international development policy planning and the methodology of county and municipal climate strategies typically refer to the above mentioned two types of indicators, a third type is also worth mentioning, which may be of particular interest in the context of climate change processes, although it is difficult to measure. Its application can be particularly useful when one wishes to develop an adaptation strategy on a larger scale, whether at the macro-regional, national, border region or water catchment area level, independent of administrative boundaries. These are impact indicators that **quantify the actual socio-economic-environmental impacts of interventions** (e.g. reduced inland flood damage in the municipality; reduced sickness in municipal institutions and businesses, proportion of population/workers aware of what to do during heatwaves).

Objective system element	Indicator name	Measurement unit	Data source	Base year	Base year value	Target year	Target value
general adaptation objective 1							
specific adaptation objective 1							
specific adaptation objective 2							
specific adaptation objective 3							
...							

Measure	Measure name	Measurement unit	Data source	Objective system linkage	Collection frequency	Indicator type (output / outcome / impact)	Target year	Target value	responsible for collection
Measure 1									
Measure 2									
...									
Measure n									

Figure 40.: Tables to help plan indicators for the strategy's objectives (top) and measures (bottom)

Forrás: Own editing based on MBFSz NAK (2017).

The output and result indicators developed in the 2017 methodology volumes suggested to be presented in a tabular form during the planning process, thus facilitating transparency and traceability. The planning process in Kazincbarcika also used this approach.

8.6.2. Evaluation

A strategy is not made for eternity, as a collection of maxims set in stone for centuries. **It should therefore be regularly evaluated whether its objectives are being met**, to see if things are going well or we need to intervene in the development process as originally envisaged. The results of this evaluation can be used as a basis for revising and updating the document. Evaluations range from pre-planned studies to be carried out on a regular basis during the programme period, to studies that respond to unexpected needs requiring intervention. **A**

fundamental way of grouping evaluations is to classify them according to the timing of the activity and the different phases of the programming cycle. **These are ex-ante evaluation; in-process evaluation (on-going and mid-term); and ex-post evaluation.** Out of these, the first type is recommended, the second two are required in the case of climate strategies in Hungary, according to the county and municipal climate strategy planning methodological guides.

The current in-process evaluation of the strategies is the basis for revisions. In such a mid-term review, it is important to consider the following aspects:

- the progress made in achieving the objectives set;
- the adequacy of the Strategy's instruments to achieve the initial objectives;
- the coherence and internal logic of the content of the strategy;
- the evolution of the value of the output (and possibly result) indicators (direction and pace).

After the end of time horizon of the strategy (typically two to three years after), **an ex-post evaluation should also be carried out**, the lessons of which can be fed back into the renewed strategy in the future. Such an ex-post evaluation will review

- the efficiency and effectiveness of the use of resources;
- the implementation of the adaptation strategy's objectives;
- the factors that help/hinder the achievement of results;
- the evolution of outcome indicators, looking at the achievement of their targets.

Ex-post evaluation is recommended as an optional element in relation to the proposal of the handbook, depending on the resources available to the local/regional authority and the partner industrial company; however, the benefits of this type of evaluation are undeniable.

8.6.3. Revision

The **revision** is an analysis of the data and information generated by the monitoring or evaluations for decision-preparation purposes, to determine the need and extent of intervention in the implementation or to amend the strategic planning document under implementation, which, according to the Hungarian municipal/county planning practice, should be carried out at least every five years and at most every seven years.

What happened in Kazincbarcika?

In the Kazincbarcika Joint City-Company Climate Adaptation Document, outputs have already been identified by the planners within the action tables; the monitoring sub-chapter of the implementation framework chapter specifically lists monitoring indicators for the objectives and measures.

The achievement of each measure of the Strategy will be monitored through **output** indicators, following the logic described above, tracking the surpluses generated and achieved with the support. The annexed complex table sets out the unit of measurement, data source, collection frequency and the person responsible for the collection of the output indicators. The different coloured cell groups indicate measures for different specific objectives. The "total performance" of the measures presented gives the result for each specific and sub-objective. The latter are measured – again following the logic above – by outcome indicators, showing the status change brought about by the outputs of the interventions. The **outcome indicators** are also assigned a target value at the planning stage against which the change can be measured, and hence the success of implementation. Out

of the many sub-objectives and measures associated with specific objectives, these result indicators represent the results of the sub-objectives/actions with the greatest weight and impact; each sub-objective was not assigned its own result indicator. As the results are influenced by several factors beyond specific measures, and the frequent difficulties in obtaining statistical data also hamper the monitoring activity, in the case of the pilot strategy in Kazincbarcika, the result indicators stopped at the level of one overall goal and six specific objectives, to simplify the evaluation activity.

[illegible]

Figure 41.: A series of tables showing the output indicators of the monitoring chapter of the City-Company Joint Adaptation Strategy (excerpt). (Columns from left to right: action e.g. adaptive attraction development, related sub-objectives, output indicator, unit of measurement, target value, data source, collection frequency, responsible for collection)

Source: The joint Climate Adaptation Strategy for the city of Kazincbarcika and BorsodChem Inc. Kazincbarcika, 2023.

It is recommended that the revision and evaluation tasks are carried out according to the national methodology of municipal and county climate strategies, at least five, up to seven years after the adoption of the adaptation strategy; in our case, the unique joint City-Company initiative in the framework of the LIFE project is exemplary on a European scale and is in a special situation in this respect. In view of the uncertainties regarding resources and expertise available, the planners considered sufficient to carry out only a mid-term evaluation and update the Strategy, if necessary. **Given the adoption of the Strategy in mid-2023 and its time horizon until 2030, a date of 2026 might be appropriate. The evaluation should therefore be carried out in the second half of 2025/2026.** The updated document could be ready for re-adoption (ratification) by the end of 2026, followed by a further review/renewal every five years, if the Strategy lives up to its expectations and the Municipality and the Company takes charge of it in the long term, institutionalising this document genre in their own operations as a depository of their climate-adaptation-oriented forward thinking and preparation of a regional scope.

8.7. Building a partnership for strategy development

The development of climate-conscious attitudes and behaviour can be most effective at the community level. To ensure that society takes ownership of and is committed to adaptation, it is recommended that local actors are involved in all relevant steps of the climate strategy planning and implementation.

During the climate strategy planning and implementation process, this involvement takes place at two levels:

- firstly, the involvement of stakeholders in the **planning process**,
- then in the **implementation** of the planned objectives and actions.

In the first case, **community-based participatory** planning techniques are used; in the second case, **the cooperative skills of those managing the strategy's implementation are crucial**.

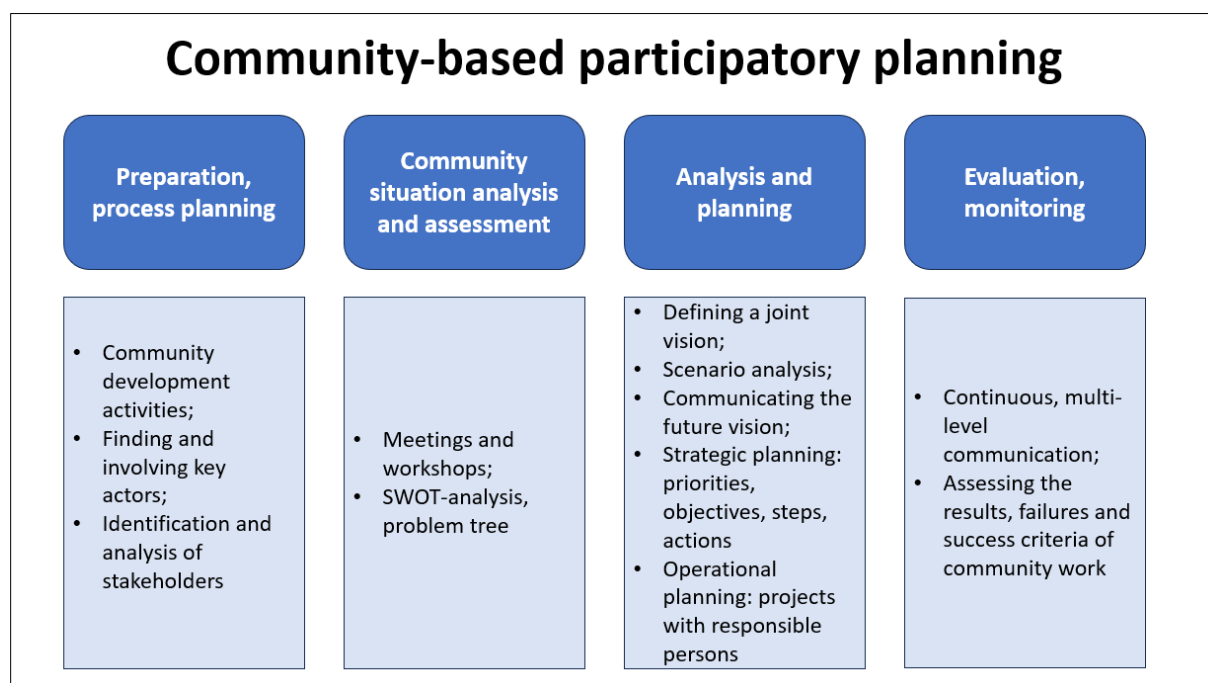


Figure 42.: The steps of participatory planning.

Source: Sain M. (ed.) (2010): Segédlet közösségi tervezéshez

Community planning involves the widest possible range of stakeholders, representing different perspectives. This allows both the identification of relevant issues affecting the community and decision-making based on knowledge sharing and the validation of different perspectives. Thinking and acting together towards a common goal has a **community-building power**, making participants more likely to commit to climate change adaptation and to take ownership of planned improvements.

One example of community-led development in Budapest is the regeneration of the green spaces of Vérmező. Rather than carrying out improvements without consulting the local public – which may not be needed or guaranteed to be used - they channel their opinions to decide where improvements are needed. Useful insights will help to ensure that the renewal of green spaces results in a more liveable green space, building on the existing ecosystem.

Stakeholder involvement in later stages of the strategy's implementation (implementation, monitoring and evaluation) can be achieved **through the development of a climate partnership**. This will be a bottom-up and top-down process, involving different local stakeholders in the implementation through institutional, financial and event management arrangements that support stakeholder involvement. The climate partnership contributes to a more effective preparation for climate impacts affecting the community and facilitates lifestyle change.

An excellent example of a climate partnership is the **transformation of an abandoned former high-speed railway track section in Rotterdam, the Netherlands, into a park and community garden**. The success of the project is due to the close cooperation with the local public, involved in **organising joint cultural programmes and events**, to the extent that **a waiting list had to be created due to the large number of local volunteers to maintain the community garden**. Encouraged by the success of the project, the municipality is planning to convert further sections of the railway into green spaces in the future.

The range of partners to be involved is already defined by the responsible persons and potential contributors identified by the action planning: their involvement is essential. Tools to facilitate cooperation between local stakeholders during the implementation are:

- **a climate platform**, which is usually established as a consultation forum for planning, but can also be used to involve other stakeholders during implementation;
- **a financial fund** to support the development of small-scale adaptation responses and finance projects in cooperation with local business organisations, larger companies, local governmental and possibly other organisations;
- **regularly organised awareness-raising and information events and forums** on climate and energy awareness.

What happened in Kazincbarcika?

The two levels of partnership mentioned above were also implemented in Kazincbarcika.

A consortium was set up before the project started to achieve the project's objectives, in which the partners involved helped and supported each other professionally in carrying out the tasks for which they were responsible. **Partnership, the involvement and contact of local knowledge and community were emphasised from the outset**. As part of the preliminary assessment of the adaptation strategy under the LIFE-CLIMCOOP project, e.g. in autumn 2021 and spring 2022, several semi-structured professional interviews were conducted by the National Adaptation Unit in Kazincbarcika and its region. The interview rounds in autumn 2021 and spring 2022 focused on four major target groups (municipalities; economic organisations; educational/health/social institutions and NGOs; operators of critical infrastructure networks, natural resource managers).

However, the cooperation and extensive stakeholder engagement within the consortium during the project's development was only the first step. **Maintaining this partnership will become more important after the project is completed**, as it will then enter its implementation phase. **The two lead partners are the main actors responsible for the implementation of the joint City-Company Climate Change Adaptation Strategy**, because of the LIFE-CLIMCOOP project between Kazincbarcika and BorsodChem Inc., **who therefore appear at all levels of the implementation institutional system**. **In addition to maintaining the cooperation between the Municipality and the Company, it is necessary to establish and maintain the institutional elements and links established during the project, to keep them operational and to provide them with content** – through continuous active participation, by defining and updating the relevant topics of the platform meetings. On the financial side, the partnership will be further strengthened by the *Climate Fund*, a financial instrument set up by the Company and the Municipality to support local small-scale climate adaptation investments. This could also be a practice to be sustained after the

implementation phase is completed, as an institutionalised practice in the life of the Municipality and the Company.

Partnership with a broader regional or macro-regional scope is an objective to be maintained long-term, according to the Strategy. This is facilitated, among other things, by this methodological Guide, which sets out the key steps for planning joint City-Company adaptation strategies, illustrating the techniques used here from a practical aspect and making them applicable to others. It also collects best practices identified and/or applied during the project, which can be effectively and easily replicated by municipalities and companies in other regions.

The **City and the Company** will play a key role in the wider dissemination of the results achieved and best practices, as, given their size and administrative role, their position in the municipal hierarchy and their economic weight, they are natural leaders in the area. They must help the actors in their immediate and wider region to develop stronger and more diversified regional climate adaptation cooperation by their **leadership and proactive attitude**.

8.8 Mistakes to avoid when planning the implementation framework

The implementation framework chapter is a multifaceted strategy section, as the previous sub-chapters show from the scheduling, financial planning and outlining the monitoring/evaluation work packages, to the institutional background and the planning of potential partnerships. The range of mistakes to be avoided is therefore also wide, for each work phase having its own set of potential pitfalls and principles to follow.



Related to financial planning, it is important that:

- the strategies prepared respond to actual needs; not because of a legal obligation to continue their career as a document to be prepared for the drawer after adoption, with financially unfeasible ideas, but to initiate real developments, providing them with existing financial frameworks. In this way, it is possible to implement the ideas contained by the documents and implement planned developments.
- A fundamental condition is actual and realistic cost planning focusing on existing resources: that is to say a real financial background is to be assigned to individual objectives, then to projects, and planning the costs must also be based on realities and feasibility.
- Financial over-planning of projects is dangerous, unrealistically high amounts can make the material seem frivolous, or later, during implementation, impose unfulfillable burdens on the executors. Similarly, a too narrowly tailored financial background unnecessarily ties the hands of implementation. All extremes should be avoided.

Most of the pitfalls to be avoided during planning arise in relation to indicators along the lines of **monitoring and evaluation issues**.

- Unclear and imprecise naming of the indicators (e.g. if the indicator is simply named "*reduction of air pollutants*", it is not clear what substances we are referring to and where the reduction is being investigated; if the indicator is only "*moderation of tidal waves*", it is questionable whether it is a river, or we are thinking of flash floods) should be avoided. It is important that the designation means the same thing to everyone (planner, user, decision maker, monitoring specialist, etc.).

- The direction of the intended change must be specified and indicated in the name of the indicator. It is not enough to simply write that "*change in the extent of flood damage*", it is also necessary to indicate that we are thinking of their mitigation and reduction.
- It is important that the data is collected, available (with exact source definition) and consistent over time (collectability must be ensured both retrospectively and looking forward for years).
- We emphasize the importance of alignment to the EU's common set of indicators (indicators found in the OPs) wherever possible, thus facilitating the comparability of different shifts at the national level, between settlements and climate strategies, and the aggregability of development results. Since OPs are the main source of domestic development interventions, alignment is especially justified.
- It is important that the indicator adapts to the topic and volume of given development and maps it accordingly.
- As with financial frameworks, setting unrealistic target values and unfulfillable expectations for outputs/results should also be avoided. It is also necessary to avoid target values that only aim for minimal progress, which the strategy easily achieves, but in practice does not result in any development in the city.

Important points regarding the **evaluations**:

- Like the SWOT or problem tree tools, these activities should not be viewed as a "necessary evil", as items to be completed in an inventory-like way, but as an element that helps planning and implementation, reveals any problems that may arise and ensures the fine-tuning and orientation of the implementation, so it will fulfil its actual function.
- Exploiting the advantages listed above, the evaluation activity can increase the efficiency and effectiveness of the entire planning-implementation process, so it is recommended to carry out the listed evaluation steps accurately.
- It is advisable to consider the spectrum of planned evaluations in advance - during the planning of the implementation framework - by presenting a schedule that can feed the right information back into our strategy-related decision-making processes at the right time.

The institutional system of implementation is also a critical point. Connected to this, it is particularly important:

- The system of the implementing organizations – whether we build on existing entities or completely newly established units – must be tailored to the given region/settlement/company/city-company cooperation. A system alien to the decision-making and relational culture of central actors involved does not become functional, or only very slowly.
- It is also important to take stock of existing bodies and involve them in the implementation as much as possible, so that we can avoid the provision of redundant tasks and the development of parallel capacities. If e.g. there already exists a unit dealing with city-company developments at the two contributing partners, it is unnecessary to create a "green field" body just for the sake of implementing the Strategy, it is better to set up the group making strategic decisions from the members of the existing organizations, building on the existing organizational frameworks.

- It is essential that the system to be developed encourages performing tasks. We should not set it up only because it is required by some vague manual or planning "checklist", but to create a structure that really ensures the fulfilment of the contents of the Strategy and encourages those working in it to be continuously active.

The **partnership dimension** is similarly crucial. Important in this regard:

- Striving for completeness of involvement, by finding all potentially available and key partners. All this must be done on two levels:
 - The **internal partnership between project partners** must be sought already during the planning of the project (this is realized by definition); and for the planning of connections with external partners during future implementation.
 - This **external partnership** is formed during implementation. In doing so, attention must be paid to maintaining relationships with potential partners already indicated in the action planning tables.
- It is essential that the involvement of partners and stakeholders takes place right at the beginning of the planning/implementation process, i.e. as early as possible. The earlier we reach potential partners, the more the acceptance of the project increases, and the involved partners feel ownership of the result.
- During these involvements, attention should be paid to reach/involve all stakeholders in the process in a manner appropriate to their level.
 - Decision-makers in key positions, representatives of exposed/sensitive sectors, operators of critical infrastructures should be included in the process through continuous consultation and solicitation of opinions, included at all important stages of participatory planning (joint SWOT planning, problem and goal setting, objective system and measure planning);
 - Important but not unavoidable partners are more likely to be contacted through less frequent consultation or merely informational activities.

9. Conclusions

In this methodological guide, it has been demonstrated that action focused on joint climate adaptation in the city-company relationship system can greatly promote the rapid and coordinated adaptation of settlements and industrial companies operating in their areas to the increasingly threatening climate challenges. As indicated by the climate adaptation strategy prepared in the framework of the cooperation of the Kazincbarcika City Municipality and BorsodChem Inc., which was the first in Hungary to be developed as a flagship of joint city-company climate adaptation cooperation in the framework of the LIFE-CLIMCOOP project, there is a need and an openness on the part of both the settlements and the companies, to act together against the local/regional effects of climate change by harmonizing their resources and competences.

In the field of such cooperation, our country and its wider region have significant untapped potential for the time being. This is precisely why the methodological guide was developed, giving input to help similar initiatives thinking in a city-company relationship. All the general experiences and impressions that our planning team gained during the more than one year of planning work are summarized below, serving as a lesson, and providing input for similar initiatives thinking in a city-company relationship.

9.1. Data and information factual background, analysis foundation

Each strategic planning task begins with the preparation of the outline content of the output document – in this case the climate adaptation strategy – and mapping of the input data and background information for each content element. It is common practice in strategic planning to process existing databases and information contained in existing relevant local, regional and national documents. However, based on experience, the poor availability of vulnerability data at the settlement and district level causes problems during planning. In many cases, the social and economic statistical data required for environmental exposure studies and the basis for sensitivity/adaptation studies are only available at the county or district level. The situation is further nuanced by the fact that the NAGiS system contains climatic and exposure data with a maximum resolution of grid points; in the case of sensitivity and adaptive capacity indicators, the district level represents the highest resolution. The datasets at the settlement/district level and the map layers showing them are not yet available in the system. The database of the NAGiS system, which specifically contains climate adaptation data, is not updated every year, in contrast to other large statistical databases (e.g. National Regional Development and Spatial Planning Information System, Hungarian Central Statistical Office), which can be disadvantageous when developing adaptation strategies. Another complicating factor in relation to the temporal limits of data freshness is that the various settlement-level planning documents (e.g. integrated settlement development strategy) usually define the environmental, social and economic processes of the settlements for several years. However, these documents are reviewed and renewed every several years, due to which it may happen that certain previous characteristics (e.g. the extent of green areas, the number of areas affected by segregation) are present differently today.

Consequently, secondary data and document analyses are not sufficient, primary research and data collection are also necessary. This can be done in the form of professional interviews, local field trips, field mapping and photo documentation, or even remote sensing data analysis.

The method of field interviewing has many advantages, making it useful and even necessary to perform it during the preliminary situation analysis and assessment phase of the strategy. With its help, it is possible to obtain "soft" data and information about the local appearance of climate effects that cannot be obtained elsewhere, which nuances and supplements the data obtained from statistical data analysis and climate projections. We can gain an insight into the life of settlements, institutions and organizations and get to know their attitude towards climate change and their related development intentions. With the help of this information, the results of the secondary investigation can be validated, correlations can be recognized, and relationship-building can be started with relevant local actors.

During the interviews and field trips, the traces of damage related to climate change events, as well as the geographical location and operation of best practices can be experienced personally. At the same time, the method has several disadvantages: it is relatively expensive, it requires sufficient time and a suitable team of professionals, and the outcome of interviewing can be influenced by the subjectivity of the interviewer/evaluator or the interviewee, as well as the less relevant nature of the interviewee's answers, and in some cases, their dishonesty. It is also important to note that several approached potential interviewees (primarily economic organizations, local governments) refrained from the conversation, thus narrowing the range of interviewees for each target group.

During the interviews, the phenomenon arose several times that although the various local/regional actors are committed to remedying climate change problems, they are not always able to cooperate effectively in this regard. The reason for this is that in many cases the professional conceptual frameworks and definitions do not match, they are driven by different professional interests, which makes difficult to reach a common ground.

As already mentioned, in addition to preparing the interviews, it is worth spending time on local field trips, during which we can also get personal impressions about statements of the interviews. By creating photo documentation, we can also further strengthen the evidence base of the strategy being prepared. The photo documentation itself can be part of the strategy in the form of an appendix, but certain selected images can be included in the strategy, adding colour to the drier text parts of each chapter.

9.2. Challenges, risks

Climate policy planning is a complex "game" involving many stakeholders, sectors, and organizations. Coordination of their interests requires a strong facilitation and coordination role from the planners, in which the toolbox of participatory planning provides significant help.

During the development of the strategy, the planning team must face with many challenges. It often happens that the circle of employees participating in the project changes from the city, the company (or even from the planning team). This can hamper work from time to time, since the new colleagues must pick up the thread relatively quickly regarding the tasks assigned to them in the project, and they also need to align with other colleagues belonging to the project consortium as soon as possible. Related to this, one should be prepared to face with unexpected technical problems (e.g. relocation, IT background shutdown), which can cause technical shutdowns for any side, resulting in large delays compared to the original schedule.

Another difficulty in planning can be that, while the methodology of strategic planning is better known in the case of cities, the individual conceptual frameworks or the different planning methodologies are less novel to the professionals of the municipality, while the professionals

of a large company think based on a completely different logic, which may lead to professional differences of opinion. To avoid this, it is recommended to give preference to personal consultation during meetings and discussions with partners, because although online organization is less time-consuming and documentation is better, personal interactions are much smoother and more direct, and problems can be solved sooner. Experience shows that chapters with stronger personal partner involvement are burdened with much less conflict.

Among the challenges, we must mention the dynamically changing external circumstances, high-impact social and economic events (e.g. coronavirus crisis, rising energy prices, war), which the planners/decision-makers have no influence on, but at the same time greatly affect the development and implementation of the strategy. In general, these events can result in both the city and the company reassigning resources, infrastructural disruptions, the possibility of personal contact becoming more difficult, and the gradual progress of the climate adaptation strategy, or the subsequent implementation rendered impossible along the originally planned resource allocation, may fall victim.

When planning adaptation strategies, the financial possibilities of both the city and the surrounding settlements should be considered – the lack of resources is one of the biggest obstacles to the implementation of the planned climate adaptation interventions. In this regard, it should be noted that it is less elegant if most of the measures planned in the strategy have already been implemented in the framework of an existing development project. It is also important to develop new measures not included in the project description, representing added value in the planning process. For this reason, small-scale, cheap, but effective semi-natural climate adaptation solutions (e.g. log dams, rain gardens, drainage ditches, community gardens, awareness-raising events, knowledge sharing, revision of local documents and the integration of climate adaptation aspects into them) are becoming more and more appreciated, because they can be implemented at a relatively low cost, but bring spectacular results, so their planning and their presence in the Strategy represent a lower risk.

Accurate and careful planning of implementation is another unavoidable element of the strategic planning cycle. A planning document acquires its final meaning when its contents are implemented – and the precise identification of the implementation framework is a fundamental prerequisite for this. This implementation-planning process includes the thoughtful, realistic identification and determination of financial resources free of extremes (under- and over-planning); output and result planning that establishes follow-up based on available, realistic, collectable indicators; description of scheduled evaluation and revision tasks based on monitoring information; the definition of the institutional and partnership background that is adapted to local conditions and supports implementation; a sufficient and well-planned schedule of tasks and sub-tasks; and the identification of feasible, well-founded and verifiable goals and measures.

9.3. Lessons learned, suggestions

And what lessons can we learn from the whole planning process as a whole? These are briefly listed below.

Planning team: requirement of diverse knowledge – when establishing and operating a planning team, **it is crucial to ensure full coverage of expertise** (water management, meteorology, geography, regional and settlement development, development policy, agriculture/rural development, nature protection etc.) **and competences** (project management, financial planning, participative planning, facilitation, awareness-raising). Climate policy is a horizontal field, involving various sectors and professions – thus, planners of this area should develop knowledge of a broad spectrum.

Planning is time-consuming – the planning process is complex, compact, and therefore, it requires time. At the beginning of the process, ***planning the steps carefully is vital***, and calculating with wider time frames is suggested. Piling up of tasks should be avoided by making decisions with farsighted, but strict and manageable deadlines.

Involving partners? As soon as possible! We recommend ***identifying stakeholders as soon as possible and contacting potential organisations and subjects on time***, because several unforeseen circumstances can arise. Not only external partners, but the planning team could also face difficulties, unexpected staffing, or technical problems, hence it is key to discuss tasks and organize meetings on time.

Flexibility in analysis and planning – a learning experience is that ***statements should not be set in stone about schedules and the financial background***, primarily for the leaders of local settlements, but also for other regional actors like the company. We recommend being cautious as failed, or incomplete implementation of too specific and definite statements could negatively influence the reputation of the whole strategy.

Methods aligned with local characteristics – by all means, it is useful applying a ***similar methodological base*** for different strategic planning initiatives. This supports on the one hand the comparability of strategies with each other, on the other hand a new strategy can be built on the experience of another existing one. Apart from easing workload, using a similar base facilitates comparing initiatives. One of the functions of this Guide is to establish these common professional foundations. Central and unified methods are only useful until we can adapt them to local conditions: existing foundations are already in place, but even local characteristics are considered.

Building on local strengths – ***The city's existing regional organizing role – originated from its size and central functions – combined with the company's regional employer role*** offers a long-term opportunity for a climate adaptation cooperation. Based on these, ***the city-company partnership can set a good example for other settlements in their smaller or wider region***. This requires demonstrating the proactive attitude of the two main partners by organising awareness-raising or knowledge-sharing conferences, events, or through the production of specific adaptation cooperations and investments. Dissemination of the results of the city-company cooperation on regional level can generate other similar projects in the area, even on a national or Central European scale.

Do not hesitate to rely on existing practices – it is highly recommended (especially when planning objectives and measures) ***exploring national and international best practices, well-adaptable, progressive, and innovative adaptation examples*** through online search or if

possible, on field trips. In this way, the strategy can become up-to-date and ambitious, creating the possibility of its brand-like dissemination to a wider audience.

Balanced mix of methodologies – different methodologies can be applied when conducting the situation analysis, planning the objectives and measures or the monitoring and assessment actions. Among these are **primary research** – producing and collecting own data, self-obtained information; and **secondary research** – the usage of existing data sources and information bases. Depending on the type of research methods, we can use **quantitative** (data analysis) and **qualitative** (field mapping, interviews, planning document analysis) methods, that prove effective during risk assessments and monitoring. Instead of exclusive use of a given method, a combination of different tools is recommended, utilizing advantages of each type: time- and cost-effectiveness of the first type, less labour-intensity in the case of the second one, quantifiability of the first type; easier access to special local information in case of the second.

Attitude – the base to build on – besides the difficulties and hardships listed until now, a lot of positive experience have been gained while preparing the strategy of Kazincbarcika. It turned out during the interviews that there is an adequate foundation on which we can build: **most interviewees living in the region recognize diverse climate change issues** (e.g. intensifying heatwaves, growing frequency of flash floods, etc.) **and the need to respond to them**. For now, not everybody links these issues with climate change; and their attitude towards the interviews also varied, along with the credibility of the received information. Nevertheless, the fact that **local actors becoming more climate conscious** and showing enthusiasm is welcomed. People are interested in changes happening around them, and they show a growing sense of responsibility towards processes in their narrower environment. This attitude proves to be helpful when preparing and implementing local climate strategies.

Key role of communication – **ensuring and continuously practicing proper communication skills** are crucial both within **the project consortium** (among project partners), **and among** leaders, implementing organisations and partners **to be involved in implementation**, governmental, civil and industrial organisations and eventually, the local public. During this process, it is essential to establish the right connections and cultivate personal relations.

To conclude the Methodological Guide, we can summarize as follows: the entire planning cycle was a great learning process for the participants, the planners and the target groups as well. We encountered many difficulties, which is not a surprise due to the uniqueness and pioneering nature of the project. For the first time, an industrial company and a local municipality attempted a joint adaptation action and the joint planning of these action elements. Accompanying this process as a planner was a real first experience. However, priority always carries with it the possibility of a series of teething problems - we did run into several of them ourselves. The lessons of the Conclusions chapter try to establish the possibilities of avoiding pitfalls during a subsequent planning process. At the end of planning, the prepared Vulnerability Assessment Study, the Strategy, its Appendices and the Methodological Guide summarizing the lessons learned together can make you forget the difficulties experienced. According to our hopes and professional expectations, this project and its listed products can also serve as a kind of springboard for other city-company partnerships and projects in the future. Our Manual, presenting and instructing the entire process in detail, can also play a key role in this utilization.