

*A cross-border region where rivers  
connect, not divide*



**SEPIaM-CC \* Raising capacity of cross-border public  
institutions in sustainable energy planning and  
management and climate change mitigation**

**Methodology on strategy planning**

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## Executive summary

Today's climate change and existing energy challenges include the need to promote greater energy efficiency and use of renewable energy, reduce greenhouse gas emissions, and prepare for and adapt to a changing climate. To address these complex issues, local and regional planners must understand the scientific basis for taking action and utilize the most effective planning tools and techniques for the specific challenges they face. Taking action could help reduce reliance on non-renewable energy sources, help local communities better meet their energy needs, improve environmental quality, and generate other benefits such as improved health, quality of life, and increased investment in the local economy.

Since local and regional planners have an important role to play with regard to energy and climate change challenges, their additional education and experience in the field of energy and climate planning affords them a new skill set particularly useful for analyzing complex problems and opportunities, for establishing efficient strategy energy and climate planning process and for developing quality planning and strategic documents. In practice, local and regional governments often lack capacity since they do not have a structured decision-making process which could allow them to drive the implementation of energy efficiency and climate adaptation measures.

In addition to the lack of capacity of local and regional governments, a few other challenges can be identified with regards to energy and climate planning issue. In order to overcome all challenges and to use all available sources of funding, additional capacity building is needed as well as networking for the purpose of knowledge and experience exchange and gaining support from national authorities and other experts from relevant fields. One way to support local and regional governments in the process of energy and climate planning is to develop relevant documents such as programmes, plans, methodologies and/or guidelines to facilitate overall energy and climate planning process.

In accordance with the goal of providing professional and advisory assistance to local and regional governments, the project partners as relevant experts in the field related to energy and climate planning within the project SEPlAM-CC – Raising capacity of cross-border public institutions in sustainable energy planning and management and climate change mitigation developed this methodology on strategy planning. The main goal of this document is to provide guidance to local and regional governments on how to include energy and climate strategic goals in their future strategic and planning documents. This methodology on strategy planning is a quality tool which will ensure local and regional governments to set and implement an effective energy and climate planning process at their administrative area and will be used as an educational material during the development of strategic and planning documents, i.e., in development of sustainable energy and climate action plans and other relevant strategies and implementation programmes in their administrative area.

This methodology elaborates legislative, administrative, methodological, technological and financial aspects of energy and climate change mitigation planning on local and regional government level which will be evaluated through four main

chapters of this document. By developing this document, it can be concluded that the overall energy and climate planning process cannot be carried out in the short-term. One of basic requirements to establish a quality energy and climate planning process is a renewal of management models and governance, a strong political commitment, and extensive investments in research of applied technologies and energy infrastructures. It also requires development and implementation of integrated energy and climate policies and legislative norms that give support incentives to public and/or private energy and climate sector initiatives. It requires, above all else, a “cultural” shift in the collective minds of the community, in habits, lifestyles, and the general way people live their lives.

Finally, in order to face the challenge of developing and implementing energy and climate change actions, the next four elements are essential:

- the planning process is more effective if it has strategic elements;
- good planning process incorporates local community values and objectives;
- engaging various stakeholders beyond local and regional government staff and leaders in energy and climate planning process helps to ensure choosing and implementing more coordinated and appropriate actions;
- the realization of energy and climate policies, programmes and projects are often more effective and achievable if they are implemented or mainstreamed through existing plans, strategies and processes.

## 1. Introduction

Energy and climate planning and management are the most challenging tasks with whom local, regional and national governments face nowadays. Croatia and Hungary consider energy, climate and climate change to be critical factors in development so it is very important to set rules in order to regulate this fields. They also recognized the need to develop a national energy and climate policies and bring them to the regional and local level, where concrete measures will need to be implemented. It is important to know that the overall energy and climate policies need to adapt to dynamic changes in the energy sector and should include new entities and their needs.

Decentralization of energy generation, transmission and distribution, on one hand, and the opportunities for improvement of the efficiency of energy consumption, on the other hand, has nowadays changed radically the attitude towards energy planning and climate change. For this reason, an increasing number of people and institutions in Croatia and Hungary are paying special attention to energy and climate planning as a significant element of their energy policy, but also of the policy regarding climate change.

Given that energy and climate planning must take into account different territorial units and their specifics and must be based on the development of detailed data bases and complex methodological and model processes that prepare scenarios for the development of energy and climate sector, it is necessary to apply strategy planning. Strategy planning is a process used by institutions to identify their goals, the strategies necessary to accomplish those goals and the internal performance management system used to monitor and evaluate progress. Applying this definition to work of local and regional governments would mean that strategy planning is a multi-dimensional process within which it is important to consider different general territorial characteristics and their particularities with a given time frame. The main goal of strategy planning should include building consensus among county, municipal and city leaders and all relevant stakeholders. Strategy planning is an integral part of any business success and it ensures that the implementation is heading in the right direction.

Considering, strategy planning is a complex and time-consuming process it should be prepared, improved and constantly updated in accordance with the requirements and changes that are happening in relevant sectors. Basic elements of strategy planning are development direction, strategic and specific goals, measures, activities and projects and related indicators. In order to materialize the strategy planning process, it is important to develop relevant strategic plans and/or programmes. In times of rapid changes and competing needs for public resources, a strategic plan creates some stability and certainty for government efforts regarding the duration of the planned period. In practice, strategic plans often cover five years or longer, to provide some certainty over multiple years. During the implementation process, it needs to be reviewed regularly to assess effectiveness, make further adjustments and adapt in an iterative way. Due to rapid technology and market changes, it is advised to review the strategy at least every three years.

The main goal of strategy planning is to clearly determine the nature and character of the sector to which it refers and to manage its development in the future. Through the process of strategy planning, goals, priorities and strategies are determined, and measures to assess the success of achieving these goals are defined.

Strategy planning is carried out through development and implementation of strategic plan and/or strategy which is defined as an integrated set of strategic and operational goals and activities, which are needed to achieve the desired result in the future (often defined as the "mission" or "vision" of the organization). The strategy plan is usually accompanied by the development of annual work plans, which define in more detail the responsibility for the execution of the plan, deadlines, necessary resources and possibly organizational and operational steps that need to be done to achieve the goals defined in the plan.

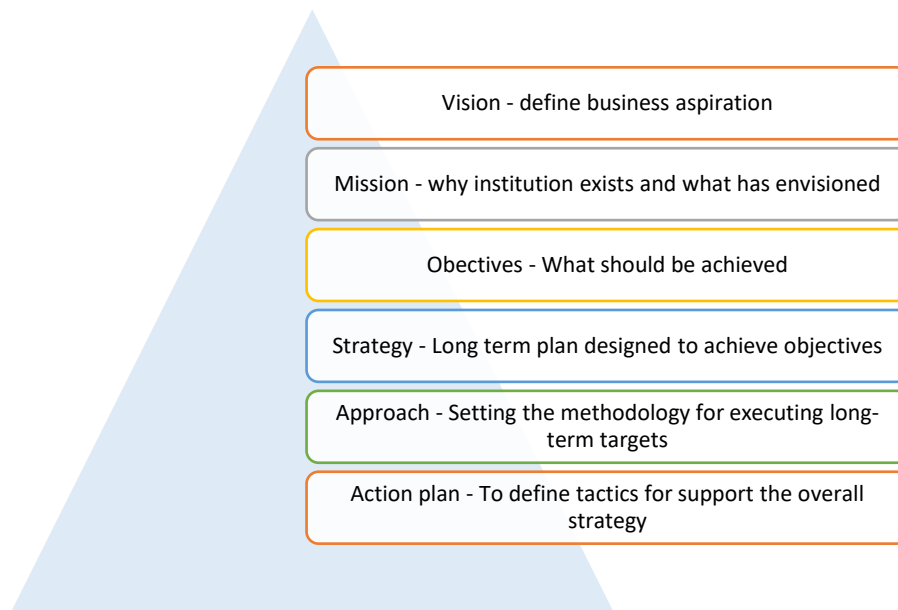


Figure 1.1 Elements of quality energy and climate strategy planning<sup>1</sup>

Looking at energy and climate sector which is transforming rapidly it is crucial to apply the elements of strategy planning. This sector is a key in economic stability and inclusive growth and in the past few years energy and climate planning were integrated into one field of action so the strategy component in the overall planning process is necessary.

As it increasingly affects lives of people in countries around the world, combating climate change has become a key global development priority. The increasing intensity and frequency of extreme climate events such as severe droughts and flooding has had negative socioeconomic impacts on almost all sectors of developing economies, including the energy sector, mainly in hydropower generation. The seriousness of the problem has made it imperative that policymakers begin to mainstream climate change in development policies and strategies.

The energy sector, which is particularly critical to national development, both contributes to and is affected by climate change in the short and long term. For example, sectoral actions are essential for enhancing power generation capacity,

<sup>1</sup> Available at: <https://www.thespurgroup.com/blog/the-6-elements-of-effective-strategic-planning>.



reinforcing and expanding transmission and distribution networks, enhancing regional trade through interconnection of regional networks, enhancing access to electricity, and promoting renewable energy and introduction of new technologies in electricity generation.

The basis for effective energy planning and climate change mitigation as well as for development of relevant strategic and planning documents in the cross-border area is the development of a common cross-border methodology that includes the specifics of project partner countries, defines the activities and relevant stakeholder engagement during the whole process of energy and climate change mitigation planning.

Methodology on strategy planning in the field of energy and climate planning is a roadmap to achieving energy and climate goals in both the near and long term. The goals are determined by stakeholder input, so methodology should be inherently local/regional and have stakeholder buy-in, leading to a greater likelihood of success of the methodology over time.

The main purpose of this document is to define and develop joint methodology for strategy planning for HU-HR cross-border area in the field of energy and climate planning. With the quality methodology for strategy planning in place, the implementation of planned activities will be proactive as opposed to being reactive. Good methodology will increase operational efficiency with proper strategy planning and will result in increased profitability and market share.

Since the main goal of SEPlAM-CC project is raising capacity of cross-border public institutions in sustainable energy planning and management and climate change mitigation by exchange of experience, knowledge and best practice examples the idea of this document is to develop and provide a quality tool which will ensure local and regional governments to set and implement an effective energy and climate planning process at local and regional level.

This methodology will be used as an educational material by local and regional governments during the development of strategic and planning documents, i.e., in development of sustainable energy and climate action plans and other relevant strategies and implementation programmes in their administrative area. This methodology will deal with legislative, administrative, methodological, technical and financial aspects of energy and climate change mitigation planning and management activities on local and regional government level which will be evaluated through four main chapters of the document.

## 2. Relevance of strategy planning in energy and climate change mitigation planning and management on local and regional government level

The transition towards low-carbon economy which is characterized by increased use of renewable energies and improved energy efficiency is guided by different energy planning approaches around the world. The strategy energy planning approach has gained increasing attention during the last decade and it is considered to be the most effective while dealing with energy and climate planning at local (cities and municipalities), regional and national level.

The energy and climate sector plays a key role in socio-economic development in many countries nowadays. The sector is facing many challenges, including the escalating demand on energy, the high cost of fuel, importing energy or fuel from external markets, the unreliable energy supplies, climate change and global warming. Moving towards renewable energy and improving energy efficiency are also meeting difficulties, especially in terms of delivering the energy needed with reasonable costs.

Accordingly, strategy planning approach is utilized to guide moving towards renewable energy in the countries. Strategy planning in the aspect of energy and climate planning brings desired energy and climate future into clear focus, considers current reality and leverages local/regional resources, considers challenges before reaching them, maps out efficient path to achieve desired energy future, clarifies progress indicators and documents the implementation plan for short- and long-term success.

Local and regional governments in their role as public resource managers and public interest protectors, need to mainstream energy efficiency, renewable energy use and climate change mitigation in their operations and investments and be a model to the residential and business sector. Strategy planning for local and regional governments is necessary and beneficial for multiple reasons:

- engages various stakeholders and raises the awareness on energy efficiency among them,
- creates a common understanding of energy efficiency, renewable energy use and climate change mitigation actions,
- creates certainty and enables long-term investments.

To effectively coordinate actions to tap into the enormous opportunities for energy efficiency improvement, use or renewable energies and climate change mitigation in local and regional governments, it is necessary to carry out strategy planning for energy efficiency, renewable energy use and climate change mitigation actions at county, municipal and city level.

According to Bryson and Edwards (2017)<sup>2</sup> the following features make energy and climate planning at local and regional government level strategic (Figure 3.1):

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<sup>2</sup> Bryson, J. and Edwards, L. H., 2017. Strategic Planning in the Public Sector. Oxford Research Encyclopedia.

- **alignment with the context** – paying close attention to context and even though the planning typically aims to change the context. At a local and/or regional level this could refer to demographic development, local employment, pollution, renewable energies use potential, etc.;
- **specific purposes and goals** – careful thinking about purposes and goals, including attention to situational requirements (e.g., political, legal, administrative, ethical and environmental requirements). For instance, cities and municipalities should ensure sustainable development of their jurisdiction from an environmental as well as social perspective;
- **prioritization** – an initial focus on a broad agenda and later moving to a more selective action focus. Some municipalities or cities might face pressing issues on particular topics, such as local job creation, meet energy demand;
- **emphasis on systems thinking** – strategy planning is based on understanding the dynamics of the overall system being planned for as it functions – or ideally should function – across space and time, including the interrelationships among constituent subsystems. To ensure energy efficiency improvements or renewable energy use, it is important to take into consideration the complete energy system perspective;
- **stakeholder engagement** – multiple levels of government and multiple sectors are explicitly or implicitly involved in the process of strategy formulation and implementation. Key stakeholders at local and regional level are local and regional administrations, financial suppliers/investors, energy suppliers, sector representatives, citizens, etc.;
- **SWOT analysis** – focus on strengths, weaknesses, opportunities and threats, and focus on competitive and collaborative advantages. In the context of energy efficiency at municipal or city level this needs to assess what is most beneficial for most civilians without taking any risks for future generations;
- **future-oriented thinking** – focus on thinking about potential futures and then making decisions in light of their future consequences. Particularly at a national, regional and local level, it is important to not lose perspective and outlook on any relevant prospects;
- **emphasis on implementation and operability** – the strategy needs to be operable. To this end, a solid analysis of necessary and available resources needed to implement the actions should be undertaken at a very early stage in the process;
- **pre-determined strategy and flexibility in implementation** – strategy combines both stability and flexibility in goals, policies, strategies and processes to manage complexity, take advantage of important opportunities and advance public purposes, resilience and sustainability in the face of an uncertain future. At a municipal or city level there are many variables that need to be covered. Not every plan can be implemented as initially conceived and some flexibility will be required, especially during the implementation phase.



*Figure 2.1 Elements of strategy energy and climate planning in local and regional governments*

Although many of above-mentioned features are applicable for a national level, they can still be applied on local and regional scale. Considering the importance of strategy planning in energy and climate change mitigation planning and management on local and regional government level while developing joint methodology for strategy planning in HU-HR cross-border area it is important to address legislative environment and administrative aspects, methodological aspects, technical aspects and financial aspects.

### **3. Legislative environment and administrative aspects of energy and climate change mitigation planning and management activities on local and regional government level**

Energy and climate change are two terms which have in recent years been integrated into national, regional and local strategic and planning documents. While energy plays a key role in mitigating climate change, both climate change and climate change policy are salient to the energy sector. The sector bears considerable, yet not exclusive, responsibility for climate change associated with greenhouse gas (GHG) emissions from fossil-fuel-based production facilities. Activities within the energy sector can thus be understood in the context of both problem and solution, where the sector's heavy reliance on fossil fuels makes the sector a target of remedial policies designed to limit and mitigate greenhouse gas emissions. These include rigorous permit processes, emissions targets and carbon capture methods as well as renewable portfolio standards. Consequently, the pattern of response and adaptation within the sector may be driven as much by climate change policy as by actual and anticipated climate change attributable to energy demand and production.

Accordingly, tackling climate change and effective planning in energy sector are priorities for European union, which has set ambitious short and long-term emissions reduction targets, i.e., to reduce greenhouse gases (GHG) emissions by 20% by 2020, 55% by 2030 and 80% by 2050 compared to 1990 levels. Meeting these targets will increase the likelihood that the aims of the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC, 2015) can be met. The central aim of the Paris Agreement is to keep global temperature rise this century well below 2 °C above pre-industrial levels, and to pursue efforts to limit the temperature increase even further, to 1.5 °C. Furthermore, the agreement aims to strengthen the ability of countries to deal with the impacts of climate change.

Decades of investment in research have produced well-established technology solutions to reduce the energy sector's GHG emissions. A low-carbon agenda moving away from fossil-based energy production, increasing renewables' share of the energy mix and pushing economies along sustainable pathways is now being adopted globally. In order to achieve the above-mentioned targets for 2020, 2030 and 2050 a large number of legislative actions were approved at EU level, including the emissions trading system, renewable energy sources, highly energy efficient buildings and products, standards for car emissions and emissions from fluorinated gases. Within the framework of the Paris Agreement, the European Commission also submitted, in November 2018, a Strategy for a climate neutral economy by 2050, providing a cost-efficient trajectory towards the attainment of the target of net-zero emissions adopted in the Paris Agreement.

Accordingly, in order to establish an effective strategy planning process in the field of climate and energy, it is necessary to take into account European legislation, which has been translated into national strategies and action plans of the Member States.

### 3.1. Legislative environment of energy and climate change mitigation planning and management activities

The process of strategy energy and climate planning (which has the goal of having defined strategic directions and a series of actions to be apply) needs to respect and integrate numerous constraints: from technical, economic, ecological, and social, to county-, city- or municipality-planning. In order to be effective, local and regional energy and climate strategy planning needs to be coherent and in synergy with superior level plans. The legislative environment, within which the activity of local and regional energy and climate planning needs to be inserted, is divided into three fields:

- **area planning** – county, city and municipality planning regulations: these are norms that regulate the evolution of the area on a local, regional, and on national level;
- **superior energy planning** – local and regional programs need to be integrated harmoniously with energy policies on a higher level, and therefore with energy plans on a municipal, regional, and national level;
- **other ordinances** – planning needs to obviously be consistent with all other norms governing the area.

While setting effective methodology for strategy energy and climate planning it is important to assess the legislation on all government levels, from European to national, regional and local legislation environment.

#### 3.1.1. European Union legislative environment

The EU faces nowadays major challenges from the increased threats of climate change, with serious consequences in the energy sector, where urgent issues are arising concerning the national production mix of each Member State. The renewable energy share needs to be increased, whereas energy efficiency needs to be improved. In order to prevent dangerous consequences of climate change, the EU is working to reduce the GHG emissions it produces and at the same time encourages other nations and regions to do the same. The EU, which is responsible for approximately 10% of global GHG emissions is playing a leading role with regard to the shift to an economy with net-zero GHG emissions.

In recent decades it has managed to decouple GHG emissions from economic growth in Europe, through better energy efficiency, policies for a transition to other forms of fuel and the penetration of renewable energy sources, which had a major effect on reducing these emissions. The EU's policies related to climate and energy are based on Articles 191-194 of the Treaty on the Functioning of the European Union. Under Article 191, combating climate change is one of the objectives of the EU's environment policy, while under Article 194 the EU promotes energy efficiency and energy saving and the development of new and renewable forms of energy.

Table 3.1 Development of EU legislative environment on energy and climate planning

Date	Organization	Description of activity
01.2008	European Commission	The EU had proposed to gradually intensify the reduction of its emissions, from 20% to 30% by 2020, on the condition that other major economies undertook to do their part in the global attempt to reduce emissions.
03.2011	European Commission	Published an energy roadmap up to 2050 on how to reduce GHG emissions in order to keep global warming caused by climate change at less than 2°C. In its analysis, the Commission stated that the most economically efficient way of achieving the overall target is to reduce domestic emissions by 40%, 60% and 80% below 1990 levels by 2030, 2040 and 2050 respectively.
10.2014	European Council	EU set domestic GHGs reduction target of at least 40% below 1990 levels by 2030, along with the other main building blocks of the 2030 policy framework. The EU also set targets of at least 27% for renewable energy and energy efficiency by 2030.
02.2015	European Commission	Framework Strategy for the EU was published. It is based on three long-term objectives: security of supply, sustainability and competitiveness. Its foundations are the 2030 energy and climate framework and the 2014 strategy for energy security, and it integrates a series of policy areas into one unified and cohesive strategy.
10.2018	European Parliament	Supported updating the EU's target to reduce GHG emissions to 55% below 1990 levels by 2030 which was finally adopted in July 2021 as new GHG emission reduction target.
05.2018	EU	EU adopted the Regulation on land use, land-use change and forestry (LULUCF), which incorporates emissions and removals from land into the 2030 climate and energy framework. The LULUCF Regulation establishes the EU's commitment for 2021-2030 to produce net-zero emissions from the described scope of the Regulation.
05.2018	European Parliament	Revised Directive on Energy Performance in Buildings was adopted. This includes measures that will accelerate the rate of building renovation towards more energy-efficient systems and improve the energy performance of new buildings, with the use of intelligent energy management systems.
06.2018	European Parliament and European Council	Reached an agreement on the revised Directive on Energy Efficiency, which sets an energy efficiency target of 32.5% for the EU by 2030, with a clause for upward revision by 2023 and the Renewable Energy Directive, which sets a binding renewable energy target of 32% for 2030, including a 2023 review clause for upward revision of the EU level target.
06.2018	European Parliament and European Council	Reached an agreement on the Regulation on the governance of the EU. The new governance system will help to ensure that the EU and the Member States achieve their 2030 goals as regards GHG emissions reductions, renewables and energy efficiency. Member States will prepare national energy and climate plans for 2021-2030 and report on their progress in implementing the plans, mostly every two years, while the Commission will monitor the progress of the EU as a whole. The EU and Member States will also prepare long-term strategies, covering a period of at least 30 years from 2020 onwards.



07.2021	European Commission	Published proposal for recasting the EU Directive on Energy Efficiency aimed at further stimulating EU efforts to promote energy efficiency and achieve energy savings in the fight against climate change. This initiative forms part of the Commission package of proposals "Delivering on the European Green Deal", with a view to reducing net greenhouse gas emissions by at least 55% by 2030 and the ultimate objective of becoming climate neutral by 2050.
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According to all mentioned above it could be concluded that EU is at the forefront of efforts to tackle the root causes of climate change and should further reinforce its capacity for climate diplomacy and strengthen its geopolitical relations by shaping accordingly its foreign policy, but also trade, development, aid, security and conflict prevention. By doing so, EU spends a large part of its budget on expenditure to support climate and energy policy while EU's research programmes emphasize affordable, secure and sustainable energy technologies and other scientific solutions for an economically efficient transition to a society with net-zero emissions that is climate-resilient and efficient in terms of management of natural resources. With regard to renewable energy technologies, their cost must be further reduced and their performance must be improved, as well as their incorporation into the energy system.

### 3.1.2. Hungarian legislative environment

Hungary was the first country in the European Union to ratify the Paris Agreement with full parliamentary unanimity and harmonized the national targets and strategies to the EU commitments, and thus undertook, together with the European Union and its Member States, to reduce its emissions by at least 40% by 2030 compared to the 1990 base. In this regard, through daily lives and consumption habits, Hungarian citizens have a significant impact on environment, both in its resource-side and carrying capacity. Therefore, the responsibility of individuals and decision-makers is just as crucial as that of economic actors in mitigating the risks to energy supply due to climate change and the increasingly scarce resources available to them.

With a change in consumer attitudes and the advancement of conscious consumer behavior, all of these risks can be reduced. Aspects of sustainable development must become a social norm, a long-term goal of which is to create an economic and social system that consciously utilizes natural resources. In order to achieve the above, targeted awareness-raising measures affecting all actors in society must be implemented, from which civil society, economic and state actors alike must play their part.

In line with the call of the Paris Agreement, and given that Hungary is one of the few countries in the world that has been able to reduce its GHG emissions by increasing their economic performance (GDP), the present governmental policy intends to ensure a sound implementation of the agreed climate commitments. Along the strategic lines, Hungary can gradually become a climate-neutral country by 2050 without the transition jeopardizing economic growth and social welfare. In order to achieve climate neutrality by 2050, Hungarian GHG emission is expected to be reduced by 95%. To the best of



their knowledge, the remaining emissions can be neutralized by domestic sinks (land use sector, mainly forests).

Although there is research into the design of artificial sinks, their potential future applicability is very uncertain. Achieving this goal requires intervention in all emission sectors (energy use, industry, agriculture, waste) and steps must be taken to maintain absorption capacities. It is important for Hungary that the innovations and energy efficiency measures necessary for the transition to a low-emission economy be implemented as soon as possible, as these will significantly help to achieve the goals.

In order to reach the 95% overall emission reduction target, which will require technologies that are not yet known today, certain sectors (e.g., electricity and district heating, oil refining, coking, energy efficiency, agriculture, fisheries, and forestry, complete elimination of the use of fluorinated greenhouse gases and solvents in product use) it is necessary to reduce emissions to absolute zero. However, there will be sectors (agricultural emissions, industry, fugitive emissions, residual impact of old landfills) for which greenhouse gas emission is expected to persist at much lower levels than at present.

In 2020 the Hungarian Government passed two sets of documents, namely the National Energy Strategy 2030, with an outlook to 2040 and the National Energy and Climate Plan, both of which will be vital in meeting Hungary's goal of becoming climate neutral by 2050. The documents rely on the guiding principle of clean, smart and affordable energy and aim to strengthen the security of Hungary's energy supply, making the energy sector more climate-friendly and promoting innovation and economic development.

Regarding the forthcoming strategic targets, from 2020, the Hungarian government is intended to achieve strategic goals along four programs by focusing on consumers, strengthening the security of energy supply, transforming the energy sector in a climate-friendly way and supporting energy innovations. The implementation of the goals is supported by thematic programs through 40 sectoral projects.

As the Hungarian National Energy Strategy emphasizes, climate change is one of the major challenges of our time. Moreover, a wide range of institutions and stakeholders – from the global to the local level – consider as a primary task to address these issues as the climate change has become more complex, fragmented and decentralized.

Based on the above, the regulations and strategies elaborated by the Hungarian government should be examined along the following key governmental principle enshrined in the National Energy Strategy 2030: "With the creation of the National Energy Strategy 2030, the Government aims to harmonize energy and climate policy with economic development and environmental sustainability, to determine acceptable energy demand and future directions of energy developments, and to develop a vision for Hungarian energy involving energy market participants."

In this regard, it must be mentioned that at the end of November 2016, the European Commission published the so-called "Winter Energy Package", which, in addition to several new climate and energy policy proposals, called on Member States to develop

a National Energy and Climate Plan (NECP), using a common methodology and with a standardized content. In this respect, during the preparation of the NECP, Hungary carried out extensive professional, civil and social consultations in order to implement the plan with the support of residents. Integrated design of the document involves decarbonization, energy efficiency, energy security, internal energy market, research, innovation and competitiveness dimensions of the Energy Union.

The most important strategic goal of the Hungarian renewable energy policy is to optimize the joint implementation of security of supply, competitiveness and sustainability as the primary goals of the national economy, taking into account the long-term aspects as well. Accordingly, the country aims to increase the share of renewables to 21 percent of its gross energy consumption, whereas their promotion goes hand-in-hand with the reduction of conventional energy sources (e.g., natural gas, coal, etc.).

It can be concluded that Hungary still has a lot to do in order to achieve energy and climate goals. This will also require a change in the attitude of the population to pursue a more environmentally friendly lifestyle. It is also important to increase corporate social responsibility. All in all, there is increased global awareness to change the structure and extent of energy use.

### 3.1.3. Croatian legislative environment

Basic support for the construction and organization of the energy sector in Croatia consists of legal acts and other appropriate regulations. They determine the principles of energy policy, prescribe the conditions for performing energy activities and adopt rules relating to the operation and regulation of the energy sector, energy planning, construction, operation, maintenance and supervision of energy facilities, taking into account energy efficiency, use of renewable energy sources and environmental protection. Croatian government considers energy, climate and climate change to be critical factors in development so it is very important to set rules in order to regulate this fields. Croatia also recognized the need to develop a national energy and climate policies (including strategies, programs and plans) and bring them to the regional and local level, where concrete measures will need to be implemented. It is important to know that the overall energy and climate policies need to adapt to dynamic changes in the energy sector and should include new entities and their needs.

Decentralization of energy generation, transmission and distribution, on one hand, and the opportunities for improvement of the efficiency of energy consumption, on the other hand, has nowadays changed radically the attitude towards energy and climate change. For this reason, an increasing number of people and institutions in Croatia are paying special attention to energy and climate planning as a significant element of their energy policy, but also of the policy regarding climate change. Agreement between top-down planning and bottom-up planning is presently one of the most important tasks, whose implementation will ensure realism and efficiency of the efforts of national, regional and local authorities. Due to all mentioned above, energy and climate policies in Croatia are important basis for development and implementation of

measures in order to achieve energy savings, reducing GHG emissions and dealing with the increasingly frequent consequences of climate change.

Overall energy policy framework in Croatia is determined by the signed international agreements and political determination to join the EU on 1 July 2013. Following the EU regulations on energy and climate, the Croatian government published multiple regulations on overall energy and climate planning. These regulations are crucial for a long-term change and improvement of energy sector, the economy and the overall ecology of the country. Croatia already transposed mayor European regulations on energy and climate in national legislation but a lot of actual work still has to happen and it will happen locally.

Following the EU regulations on energy and climate, the Croatian government published multiple regulations on overall energy and climate planning. These regulations are crucial for a long-term change and improvement of energy sector, the economy and the overall ecology of the country. Due to the constant development of the energy sector, the Republic of Croatia had to develop and adopt a Strategy for the energy development of the Republic of Croatia (OG 130/09). The first Strategy for the energy development of the Republic of Croatia was developed in 2009 for the period until 2020. The second Strategy for the energy development of the Republic of Croatia until 2030 with an outlook to 2050 (OG 25/20) (Energy development strategy) was enacted in March 2020. The key objectives of the Energy development strategy are:

- ensuring sustainable energy production in Croatia over the next 10 years, with projections until 2050;
- reducing import dependence,
- and strengthening the security of energy supply through the development of strategic infrastructure.

The main purpose of Energy development strategy is to ensure energy independence, a safe and sustainable supply, as well as the development and competitiveness of the energy system, in the context of accomplishing the vision of a common energy-climate policy in Croatia and at the EU level. The implementation of Energy development strategy will enable a transition to low-carbon energy through two types of activity – increasing energy efficiency and utilizing renewables as much as possible.

Speaking about increasing energy efficiency in the context of lowering overall energy consumption in the next 10 years, as well as in the period until 2050, CO<sub>2</sub> emissions are expected to be reduced by about 36%. These objectives will require significant investment in renewable energy production as well as in the energy efficiency of buildings. Energy development strategy is based on growing, flexible and sustainable energy production, development of new infrastructure and alternative energy supply routes, and greater energy efficiency, the purpose being the accomplishment of the EU's climate neutrality by 2050.

It can be said that climate policies in the Republic of Croatia are most often linked to certain climate and energy planning segments, and there is a lack of cross-sectoral and integrative climate-energy development planning. Croatia has been a country with

an active policy when it comes to international commitments. Preceding the Paris Agreement, the country fulfilled its obligations under the Kyoto Protocol.

Two main strategies for regulating climate are Low carbon development strategy of the Republic of Croatia by 2030 with a view to 2050 and Climate change adaptation strategy in the Republic of Croatia for the period to 2040 with a view to 2070. with five-years action plans for their implementation. The Republic of Croatia started to prepare The Low-carbon Development Strategy of the Republic of Croatia by 2030 with a view to 2050 (Low-carbon development strategy) in 2012, whereas the draft version of the new Low-carbon development strategy was proposed in June 2017 and adopted in June 2021.

The Low-carbon development strategy is a multi-sectorial development strategy and a base for defining the actions in emission reduction by sectors in line with European strategic guidelines and UNFCCC commitments. Low-carbon development strategy provides a transition towards a low-carbon and competitive economy whose growth is based on sustainable development.

In 2015, Croatia proposed a Draft version of Climate Change Adaptation Strategy in the Republic of Croatia for the period to 2040 with a view to 2070 (Adaptation strategy). The Adaptation strategy was adopted in April 2020 and it is a fundamental and crucial document which establishes a framework for implementing all climate change adaptation measures at the national level in Croatia. The Adaptation strategy aims at:

- reducing the vulnerability of social and natural systems to negative effects of climate change;
- gathering all relevant institutional, political, economic and social stakeholders in order to create strong support for joint actions when implementing adaptation measures;
- integrating the adaptation process into existing and new policies, programmes, plans and other strategic activities carried out at national, regional and local levels of governing;
- implementing and promoting scientific research in all vulnerable sectors in order to reduce the degree of uncertainty associated with the effects of climate change significantly;
- raising the level of awareness of the importance of climate change and the inevitability of the adaptation process in decision-makers, in the public and in the wider circle of citizens, who are also the main beneficiaries of the positive effects of the process of adaptation to climate change.

Another relevant document important for regulating energy and climate related activities in the country is Integrated National Energy and Climate Plan for the Republic of Croatia for the period 2021-2030 (Energy and climate plan) which was adopted in 2019. Energy and climate plan is based on existing national strategies and plans and provides an overview of the current energy system and the energy and climate policy. It also provides an overview of the national targets for each of the five key dimensions

of the EU and the appropriate policies and measures to achieve those targets. In the Energy and climate plan, particular attention is paid to the targets to be achieved by 2030, which include the reduction in GHG emissions, energy from renewable sources, energy efficiency and electricity interconnection.

As a final remark it could be said that Croatia is continuously working on the harmonization of its national legislative framework with the European legal framework through the adoption of new acts, but also through the amendment of existing acts and other regulations. While laws and bylaws are aimed at defining obligations, strategies and plans are more implementing documents that define concrete measures and steps to increase energy efficiency, encourage the use of renewables and reduce GHG emissions that need to be achieved over a period of time. By developing the legal framework in regulating energy sector, Croatia promotes efficient and rational use of energy, entrepreneurship in the energy sector, investments in the energy sector and environmental protection.

### 3.2. Administrative aspects of energy and climate change mitigation planning and management activities

Local and regional governments often lack capacity since they do not have a structured decision-making process which could allow them to drive the implementation of energy efficiency and climate adaptation measures. They are usually limited to subsidy schemes, resulting in poor value for money and a lack of long-lasting impacts. Furthermore, climate change issues are merely addressed superficially, if at all, especially those related to climate change adaptation. Energy and climate are broad, horizontal topics, which influence, and are influenced by, a wide variety of sectors as well as decisions made at all levels. While establishing an effective of energy and climate change mitigation planning and management processes it is important to identify the challenges and obstacles that need to be overcome in order for implementation to result in positive effects for citizens and local and regional governments.

The first and the most important challenge is the motivation and awareness of local and regional government leader (mayors, prefects, etc.) for defining and implementing relevant energy and climate policy. He is a person who should make his employees aware of importance of energy and climate planning and encourage them to increase their knowledge in this area in order to become an authority which cares about energy efficiency and encourages the use of renewables.

Another challenge is the lack of professional staff. When talking about local and regional governments, they usually have staff who do not have knowledge relevant to this topic, which makes it difficult to collect all relevant data and implement actions to start overall energy and climate planning process. Likewise, they are very unlikely to be competent enough to participate in the creation of local and regional policies aimed at energy planning and climate change mitigation and to provide quality advice to community on energy efficiency and the use of renewables. Accordingly, they should be ready to further improve their knowledge and competencies and achieve close

cooperation with relevant experts in the observed field (energy agencies, institutes, ministries, other national bodies, etc.).

The next key challenge is the possibility of financing projects and activities with energy and climate component. Co-financing projects of this nature can be a challenge for most local and regional governments, as they find it difficult to obtain the funds available through European Union funds. This challenge can be overcome by stronger capacity building efforts and networking and support activities from relevant experts.

Once the challenges are identified and overcome, some organizational elements should be clarified. The main questions which should be answered are as follows:

1. Who will be entrusted with preparing and developing overall energy and climate planning process at local/regional level?
2. What administrative procedures are to be employed in the preparation and approval of the energy and climate planning process?
3. Who will be responsible for executing the energy and climate process at local/regional level?

In order to analyze these administrative factors, it is not enough merely to describe those bodies which, in various capacities are responsible for the preparation and execution of the process. A wide range of structures exists in the various countries and even an exhaustive inventory would provide very few indications of general significance. If we are to appraise administration as the instrument of a policy, we must first define its functions.

### 3.3. Experience with legislative environment and administrative aspects of energy planning and climate change mitigation planning and management activities

Climate change and energy planning are two serious environmental, security and socio-political challenges. Their impact is already visible at national, regional and local level throughout Europe and beyond. Tackling these challenges requires urgent action with the engagement of local and regional governments and communities needed. Local and regional governments are, in practice, the ones implementing national and European regulations and directives, especially those related to energy efficiency, the utilization of distributed renewables as well as dealing with the evermore important issues related to climate change. If not responsible for the implementation, they are at minimum in charge of enabling it through the removal of administrative barriers and the creation of favorable local conditions connected with the national governments.

The lack of integration and communication between the various governance levels and sectors results in contradictory policies and strategies that are not in synergy with one another, plans which lack focus, and finally a lack of implementation of energy efficiency and climate adaptation related measures and a sub-optimal use of public spending.

Local and regional governments need to take over more responsibility for strategy energy and climate planning that is in line with European climate and energy objectives. This is crucial because the utilities and grid operators are not responsible for these objectives, nevertheless they need to take them into consideration. Operative energy planning will be done by the utilities accompanied by the local and regional governments.

A city has to define a framework for energy planning. Therefore, a keeper (responsible unit or group of individuals) within the administration is needed. This could be a new department/division or it could be integrated as a new task in an existing unit. This responsible unit needs a clear mandate, support and resources. The department/unit should also closely collaborate with other departments such as environmental, planning and building department. This cooperation and the related tasks could be established through a document such as a development agreement.

Finally, the most effective actions in energy planning and climate change mitigation planning and management activities are those who combine holistic, integrated and long-term approach, addressing both climate change mitigation and adaptation, based on citizen, stakeholders and local governments involvement. The climate actions on local government level means addressing different sectors, from buildings to waste, but also involving the industry and business sectors. Local governments, together with other actors, play an essential role in this regard: creating a vision for the community, developing relevant strategies, implementing effective policies and rolling out actions. They lead citizens, act in an exemplary manner, and improve energy use in services.

#### 3.4. Recommendations in relation to legislative environment and administrative aspects of energy and climate change mitigation planning and management activities

Legislation environment strengthens countries' commitment to policy continuity because it is more difficult to change than executive policy instruments such as decrees, regulations, plans, and strategies. The legislative process entails broad stakeholder engagement, deliberation, and debate, which can help build long-term commitment. Although the national legal frameworks of EU Member States stipulate that local and regional governments adopt certain planning documents in which they define their energy and climate policy, it is important that they are aware of the importance of energy and climate planning in order to achieve national goals in terms of reducing GHG emissions. It is important not only to invest in the implementation of energy efficiency, renewables and climate change mitigation measures defined in these documents, but also to get involved in additional initiatives such as the Covenant of Mayors for Climate and Energy to further contribute to the ambitious energy and climate goals and thus increase the quality of life and standard of the citizens in their administrative area.

In order to provide support to local and regional governments in launching and implementing energy and climate related projects in their administrative area, national authorities should make sure their cities and municipalities have the right human

resources, legal competences, technical expertise and financial leverage to usher in new forms of governance models in the energy system.

By setting a high-level target for local energy ownership of renewable energy capacity, they will ensure that the corresponding framework is put in place. National Energy and Climate Plans in the future should provide the perfect opportunity to plan future energy scenarios with due consideration of all local movements, i.e., energy and climate related projects and in cooperation with them.

Also, national authorities should develop relevant professional handbooks and guidelines which local and regional governments can use to develop robust climate and energy programs that incorporate complementary energy and climate strategies. For example, local and regional governments can combine efforts to improve energy efficiency in local/regional government operations with energy-efficient product procurement, combined heat and power, on-site renewable energy generation and green power procurement to help achieve additional economic, environmental, and social benefits. Local and regional governments can also reduce their own transportation-related energy use and GHG emissions by implementing transportation control measures.

In addition, due to the complexity of the process itself, climate and energy planning requires a strategic approach since it deals with public, non-profit and private sector and requires stakeholders buy-in to long-term vision, political commitment to mobilize authority and resources and identification of energy usage and future needs so it is important to take into account all the principles of quality strategy planning which will enable the development of relevant strategic energy and climate plans in the given time framework and in accordance with EU and national energy and climate targets. It is also important to ensure a high degree of participation and involvement of a wide range of relevant actors in the strategic process and provide a step-by-step process that local and regional governments may wish to use as a road map for discussion and decisions related to strategy energy and climate planning and project prioritization.

Finally, in order to implement efficient energy and climate planning process on local and regional level it is crucial to ensure:

- **capacity building, training and awareness raising** – it is necessary to determine the level of competence of persons responsible for energy and climate planning process; develop and implement a training plan, occasionally attend relevant seminars and educational workshops related to the issue, use online courses for employees or participate in specialized courses organized by external experts and thus be endorsed with knowledge in energy and climate planning field;
- **multi-level coordination** – plays an important role in facilitating or constraining local adaptation and more broadly help ensuring greater policy coherence but also coordinated and complementary action between the different levels of government. Governments are free to choose how they put this framework in place, but they must follow certain aims similar to the requirements for renewable energy communities;



- **continuous communication** – establish an appropriate system of internal communication and communication with key stakeholders whereas staff in charge of energy and climate planning issues should receive timely information and be able to give specific comments, suggestions or recommendations to improve the overall energy and planning process, but also involve all relevant stakeholders in the implementation of the energy and climate planning process.

## **4. Methodological aspects of energy and climate change mitigation planning and management activities on local and regional government level**

For the creation and the development of an effective energy and climate planning process, at its very base, the methodological approach and engaging all key stakeholders who act and interact in a certain region are crucial. The skillful launch of a system of various interactions and interests will lead to the creation of governance and processes that will be able to freely move within a shared value set, making it easier in the medium and long-term to define strategic choices and to implement projects connected to those choices.

Also, it is important that, when tackling energy and climate planning process, whatever choice and project capable of influencing the social, economic, and environmental balance in an area should be made whilst sharing and interacting with various stakeholders who have a stake in the process. Therefore, innovative decision-making processes need to be activated. These processes will develop through a dialogue between different interested stakeholders in a complete and transparent way, the various implications, the interests at play, and the pros and cons of different alternatives. This will in turn enable common beliefs and shared solutions.

The primary objective is reaching a multi-disciplinary vision of the area by involving all stakeholders as much as possible. With deliberation and democracy, these stakeholders will be able to create a shared model of sustainable energy local and regional development with included climate change mitigation activities.

### **4.1. Development of conceptual framework of local and regional energy and climate change mitigation planning and management policy**

Integrating the energy and climate issue to regional and local planning depend upon the development potential in the area, which identifies energy consumption statistics, existing energy sources and potential of renewable energy sources.

Also, all the scenarios that will be developed in the subsequent planning stage as well as the implementation stage need to be added to the existing conceptual framework which includes planning, implementation and evaluation process. A prerequisite for development of conceptual framework is the assessment stage which includes the acquisition of all data for the planning, implementation, evaluation and reporting processes. The resulting database can be used to set targets and priorities (planning process), to define the project actions (implementation process) in a concrete way, to evaluate the evolution of the system through time and the target/objective achievements (evaluation and reporting process).

Gathering data is important and quite delicate. It is evident that a database cannot be limited to simply exploring the energy profile of the relevant area and it should include all the useful information to have a complete conceptual framework.



Figure 4.1 Conceptual framework for local and regional energy and climate planning and management policy

#### 4.1.1. Planning phase

When talking about planning at national, regional and local level, when referring to an entire area or a simple organization, the key words that are inevitably used are: strategy, objectives, policies, tools and stakeholders.

These terms should therefore be clearly defined. An objective is a precise target to attain. A strategy is the general frame of reference within which one or more objectives are set. A policy is a group of actions set in place by private and public organizations, who all have a stake in a collective issue. Tools are instruments that drive policy, making it concrete and finally, actors are the various players able to influence and govern the implementation process. Strategies, objectives, policies, and actions are, conceptually, developed on different hierarchies but are strongly interconnected. For each strategy, there are precise objectives that need to be reached, there are actions that must be performed via specific projects, tools to use, and stakeholders that need to be willing and able to participate.

The planning phase requires development of an **action plan for sustainable energy planning and climate change mitigation on local and regional level** which includes general and specific objectives, actions the local and regional authorities intend to perform and priorities that they intend to set in place. All of these need to be set out for and applied to the whole. This action plan should be a long-term programming tool that defines and organizes the actions and the operations of an institution as well as the adequate resources. It is consistent with the strategic axes and the objectives that have been set.

The plan defines the future path that local and regional administration has to take in real terms, so the whole energy and climate planning process can improve. For this reason, the plan needs to list priority actions, tools, and necessary stakeholders who will implement the general energy and climate policy. The plan must be consistent, substantial, and widespread so that the strategy contained within can be successfully implemented. Feasibility depends on whether social and economic power sets of an area are willing and able to cooperate to improve sustainable energy and mitigate climate change as well as quality of life.

The plan needs to be fully merged with various county, municipal and city policies and therefore the intents need to be shared within the municipal and city administration which means that different departments, be they political organs, technical, or functional staffs, need to all work together. The content needs to be shared also with the local community because getting consensus and sharing what kinds of programming and implementation choices have been made will make the implementation and project definition easier. The action plan, after consultation and sharing with the public, needs to be formally validated and approved by municipal and city government.

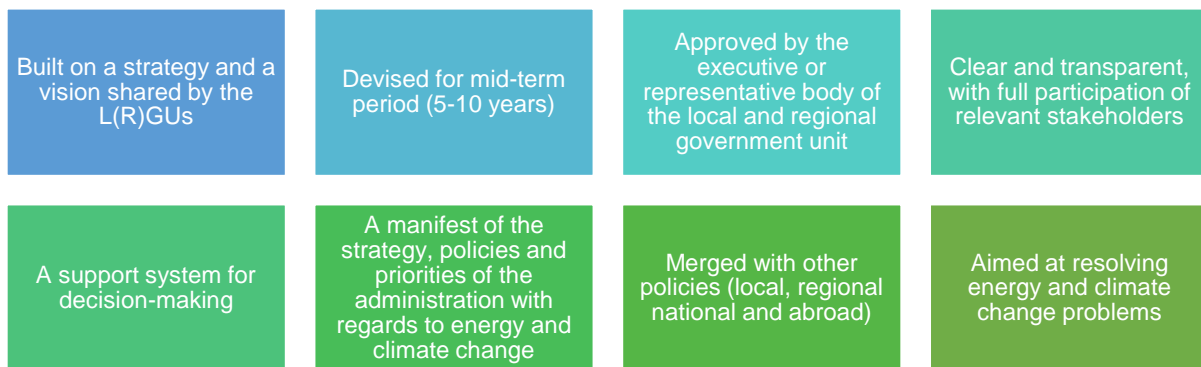


Figure 4.2 Characteristics of action plan for sustainable energy planning and climate change mitigation on local and regional level

#### 4.1.1.1. Defining political strategy for sustainable energy planning and climate change mitigation

Defining political for sustainable energy planning and climate change mitigation is an important step that the administration needs to take. During this process the administration specifies its commitment, leading to the definition of main strategic axes and policies. The key points that should be addressed are as follows:

- **defining the vision** – description of what the administration hopes to gain in the near future for the area. The definition of the vision can be connected to policy documents that have already been written or to higher level policies (national, regional or local), and needs to be able to summarize the fact that it needs to be accepted and shared by all important stakeholders on the local and regional level;
- **ability to merge** – merging needs to be horizontal with the other area policies and vertical with upper level and international policies. The concept of merging is of utmost importance because the energy and climate policy cannot be confined to a single area or sector. It needs to be included into a framework and a system and connected to other local and regional development policies;
- **involvement of relevant stakeholders** – the definition of sustainable energy planning and climate change mitigation policy needs to be developed within participatory approach;
- **diffusion** – the strategy should be brought to the community’s attention with communications channels that have the ability to inform as well as strengthen the system of relations in the area. Communications need to keep the vision alive, bringing about feasibility, stakeholder participation and steady value sets.

#### 4.1.1.2. Defining strategic axes

Once the main points of the sustainable energy planning and climate change mitigation policy are defined, it is important to separate it out into specific strategic axes. Each strategic axis should have assigned objectives and concrete temporal targets.

The creation of strategic axes is an important step in the definition and development of the institution's political energy and climate strategies because they will lead to directives that need to be followed in the mid- to long-term period. Once the key aspects related to energy and climate issues that need to be resolved are identified, the strategic axes will help create a pathway that needs to be followed. Each strategic step needs to contain a set of specific objectives that are measurable and that have a set deadline.

The strategic axes can feature macro-objectives that are general or by sector, which in turn will contain more detailed objectives. The level of detail in the objectives depends on the needs and the issues resulting from the Assessment stage. Creating macro-objectives and then dividing each macro-objective into micro-objectives actually facilitates the work that needs to be done in many ways. While defining strategy axes the following needs to be considered:

- **axes need to be integrated with the environment** – all stakeholders need to be aware of their part in the environmental context. This is of the utmost importance to be able to produce benefits with the energy and climate policy. Each strategic axis needs to take into account all impacts generated on a social and an environmental level;
- **axes need to improve energy efficiency and reduce energy dependence** – special attention needs to be given to the type of energy required and where it is acquired so that an alternative system can be put in place;
- **axes need to be multi-purpose** – the various axes need to be comprised of different issues and provide multi-purpose solutions, paying attention to any effects that could come about;
- **axes need to be complementary** – the different strategies need to complement each other. Connected axes ensure not to lose sight of the general scenario, affording the energy and climate policy and stability;
- **axes need to create clarity** – the definition of a strategic path, with concrete, clear and easily measured objectives, will generate a sense of common knowledge, render the administrations more reliable, generate dynamics of consensus and participation, or simply create conditions necessary to reach objectives.

#### 4.1.1.3. Defining specific and priority action

Actions are the core of the plan, while each action presupposes there is a project with specified accomplishments, responsibilities, operational and managerial objectives, and project characteristics. All actions should have a description of size as well as related costs affecting the balance sheet and the territory. During this stage, the participative approach plays a central role because an effective local and regional energy and climate policy hinges on wide consensus and strong community cohesion. In this stage the strategy will find its implementation. The more the planning process is shared and participated in, the more it will be effective and implemented afterwards.

To find and select actions, it is important to start with the issues that were found scientifically during the assessment process; trying to intercept needs and requirements, and problems and concerns that were expressed by the community during meetings, debates, and dialogues.

#### 4.1.2. Implementation phase

The first step in the implementation phase is deciding on implementation of projects that will govern the actions defined within action plan for sustainable energy planning and climate change mitigation on local and regional level. Each project will either represent the synthesis of a number of actions, even those connected to different strategic axes, or have only one correlated single action. It depends upon the scale of the project and the objectives that each project needs to reach. A project can function by itself or it can be included in a system along with other projects. Projects actually bring the overall planning process to realization. Project identifies the combined and correlated activities that will develop products or services, which are in turn connected to specific objectives.

A project needs to include the following stages: formation of the work group with definition of each role, database development, detailed analysis of technical, technological, managerial, and financial issues and evaluation of parameters for the project, and expected results.



Figure 4.3 Elements of the project

The implementation stage actually has various projects in a system, which are all a part of a series of “cascade” scenarios. These scenarios are programmed according to ascending complexity criterion complexity and for each scenario a prospective analysis should be implemented.

The prospective analysis should account for many factors like the potential for energy savings associated with different alternatives, the ability to substitute fossil fuels in various sectors, the opportunity to carry out projects locally (depending upon whether public or private resources would be available). Accordingly, each scenario needs to be assessed according to possible outcomes from the following points of view:

- **energy** – analysis of how the energy system in the area would be modified when implementing the scenario. This analysis is then compared to the percentage of



energy efficiency that has been attained and the percentage of local energy produced from renewable resources;

- **environmental** – analysis of environmental mitigation and climate changes derived from the scenario;
- **financial** – analysis that measures the financial elements of the scenario and requires accounting for various variables for each single measure taken. The succession of scenarios, which include more and more projects, will therefore have more complexity and difficulty there will be more accounting entries to examine (possible costs, income, benefits from green certificates, incentives, etc.);
- **temporal** – analysis of timing of various projects within a scenario which is partially evaluated both for single project phases and for entire projects. This could be due to one project being a preliminary step to another project or due to the need to take advantage of economies and opportunities associated with carrying out two complementary projects.

#### 4.1.3. Evaluation and reporting phase

Evaluation and reporting activities are defined as decisive stage because they give precise indications regarding results that were obtained compared with objectives and with the general impact on the local and regional level. For successful implementation of energy and climate planning process, it is necessary to establish an appropriate system for monitoring and evaluation of the implementation of action plan for sustainable energy planning and climate change mitigation on local and regional level.

Although we are talking about two separate processes here, monitoring and evaluation together provide the necessary data to guide the planning process as well as the design, implementation of projects and measures and the allocation and redistribution of available resources for their implementation in better ways.

Within this stage, the efficiency of the energy and climate strategies that were defined during the planning stage should be evaluated. During the planning stage objectives were introduced and actions were prioritized, whereas the targets were also set and a system of indicators on which to base an evaluation was put into place. The final output of this stage is a sustainability report which will then be an important tool for local and regional administrators, who will need to decide whether to adopt corrective actions or to redirect objectives and/or to start a new energy and climate planning cycle, etc. This report could also be a tool that facilitates the communication activities towards the community because the community should be kept informed about all activities and results. The sharing of results with the community will strengthen the participation process, which is a large step toward improving the local and regional energy and climate policies.

In order to evaluate the effectiveness of energy and climate planning process it is important to set relevant indicators that are connected to strategic objectives defined during the planning stage and project outcomes. The selected indicators will form a



measuring system that is coherent and which allows the evaluators to be as unbiased as possible when evaluating. There needs to be a definition of what each indicator will do, how it will be calculated, at what intervals, and what data is necessary to measure it. Some of general indicators classified by analysis areas which can serve as an example are available in Figure 4.4. They can further be reproduced and utilized for any type of projects.

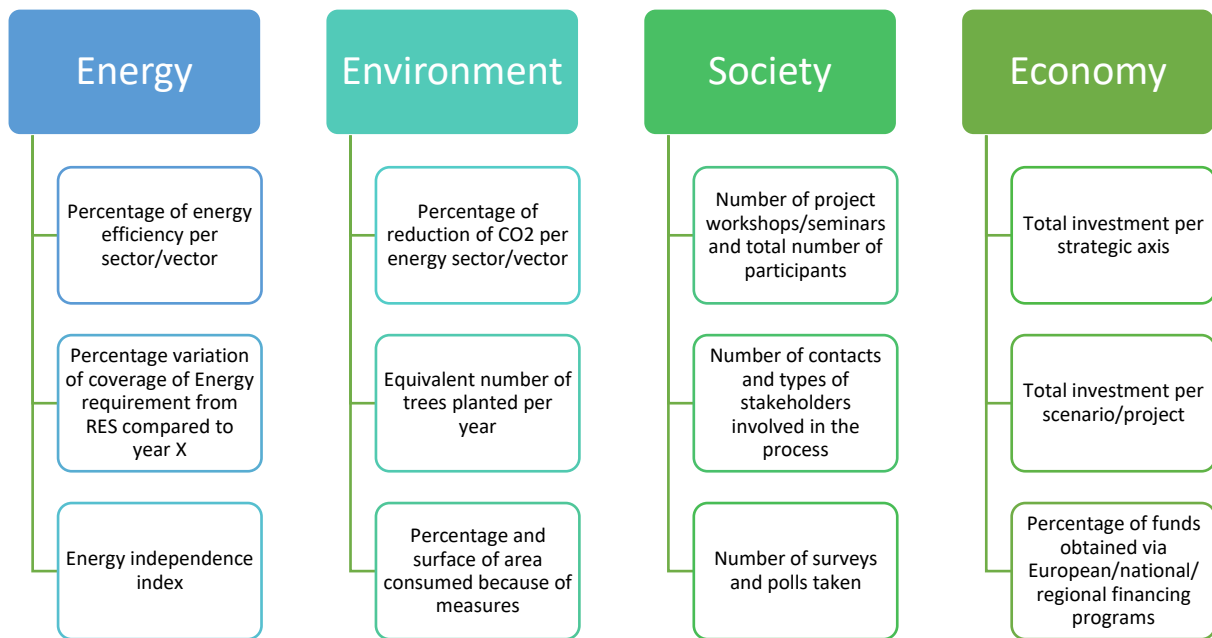


Figure 4.4 Indicators for evaluation of efficiency of energy and climate planning process

Setting relevant indicators is a prerequisite for accurate monitoring of the effects of individual projects and actions and identifying the necessary changes so that the implementation itself has better effects in the future. Well-defined indicators are crucial for monitoring the implementation of energy and climate planning process and enable an objective assessment of the implementation of projects. Which indicators will be chosen by local and regional governments depends solely on them and they are more likely to choose the indicators which can be easily monitored.

Furthermore, all the results obtained on a regular basis should be presented to decision makers (prefects and mayors) in order for them to be aware of the situation and to be able to make quality decisions in the future that will result in long-term positive effects. Also, the success in the implementation of projects should be presented to the general public, especially to create a positive image of local and regional governments work and of their general care for their inhabitants. In addition to informing the heads of local and regional governments, an important element of the energy and climate policy is the exchange of experiences, both good and bad, which is considered a strong mechanism to support local and regional authorities in energy transition to low-carbon neutrality.

The source of improving the implementation of existing energy and climate planning process are the data on the achievement of indicators that are the starting point for defining corrective and preventive actions to implement them in the future, or to improve the implementation of individual projects. By applying corrective and preventive actions, it is possible to eliminate the causes of non-realization of certain

energy and climate related projects or potentially eliminate possible causes of their non-realization.

#### 4.2. Recommendations in relation to methodological aspects of energy and climate change mitigation planning and management activities

Dealing with methodological aspects within energy and climate planning process it is important to adopt to new conditions brought by sustainable energy planning and climate change which requires demand strategic and creative thinking from various stakeholders. To help those stakeholders and local/regional planners who are facing the challenge of developing and implementing their energy and climate change actions four important themes should be taken into account:

- **strategic** – the planning process is more effective if it is strategic. Whatever the type of planning, all of it is ultimately about making the best decision possible with the resources available;
- **values-based** – good planning process incorporates local community values, or objectives, in addition to the objectives that may be present in existing county, city or municipality plans and strategies. Such an approach helps to ensure that the city's particular social and economic challenges – like poverty, population health, water and sanitation – frame the planning process, and that local objectives are used in the planning process;
- **participatory** – engaging various stakeholders beyond county/city/municipality staff and leaders in energy and climate planning process helps to ensure more coordinated and appropriate actions are chosen and implemented. Participatory planning helps to ensure that the implementation actions that come out of the planning process have the support of key county/city/municipality partners and stakeholders, are responsive to local community interests and values, and help to achieve a broader range of local development objectives;
- **integrated** – the realization of energy and climate policies, programmes and projects are often more effective and achievable if they are implemented or mainstreamed through existing city plans, strategies and processes.

The main element of success in developing efficient energy and climate planning process is establishment of a strong governance structure within local and regional governments. This is possible achieve only with broad participation and stronger coordination across different government institutions on all level of government. This makes overall energy and climate planning process trustworthy, inclusive and multi-institutional.

Finally, to increase the quality of energy and planning process at local and regional level it is crucial to implement the following steps:

- work towards the integration of vulnerability and climate change impact assessment and the adaptation measures into key relevant sectors' policies,

strategies, and legal framework, in particular energy, water, agriculture/food security, health, biodiversity, combating desertification, and tourism;

- work towards the integration of energy planning and climate change mitigation objectives into key relevant sectors' policies, strategies and legal framework, in particular energy sector, transport, and waste;
- ensure that the interests of vulnerable groups, with emphasis on the poor, youth and gender are adequately addressed in energy planning and climate mitigation and adaptation policies and strategies and integrate climate change mitigation and adaptation aspects into local and regional sustainable development and green growth policies, strategies, and legal framework taking into account gender mainstreaming and the role and needs of youth and elderly people;
- provide a ground to secure sufficient financial support, and strengthen institutional and human resources capacities to achieve the objectives advanced herewith, including providing access to regional and international financing resources and capacity building initiatives and programs.

## 5. Technological aspects of energy and climate change mitigation planning and management activities on local and regional government level

While examining technological aspects of energy and climate change mitigation planning and management activities on local and regional government level the first step is to analyze the energy system of observed area. The energy analysis is the heart of the overall energy and climate change mitigation planning and management process and includes research of the energy needs in the area (energy demand) and the analysis of the local energy production (supply).

Data collection can be carried out through direct procedure (direct acquisition of data) and indirect procedure (capture and completion of the data when direct acquisition is impossible).

*Table 5.1 Examples of data collection procedures*

Examples of direct procedure for data collection	Examples of indirect procedure for data collection
<ul style="list-style-type: none"> <li>– Acquisition of data on consumption with the help of companies who supply energy and water supply services.</li> <li>– Acquisition of consumption statistics directly from consumer invoices.</li> <li>– Visits and visual inspections to capture data regarding buildings and plants.</li> <li>– Consumer questionnaires to acquire information on thermal and electric data, on seasonality.</li> </ul>	<ul style="list-style-type: none"> <li>– Use of GIS (Geographical Information System), in order to obtain information on the spatial characteristics of the area, on the geometric characteristics of the buildings, on their location in the region, and on use destination.</li> <li>– Use of property data, from which one can gather information about the utilization of the area and/or other important information regarding buildings.</li> <li>– Use of simulation software and mathematical modeling to bridge the gap of lacking consumption data.</li> </ul>

### 5.1. Energy requirements and environmental and territorial characteristics of local and regional governments

While defining energy requirements the supply data regarding the current energy needs of the area should be identified. Knowledge of sole global annual consumption is not significant by itself. The availability of a wider database is essential to help define strategies and priorities of the future activities.

The fields of study that are usually identified are those that refer to the following macro-sectors: civil/residential, tertiary/services, industrial, transportation, and agricultural. Fields are identified based upon the availability and the consistency of the data, the peculiarity and the characteristics of the area, and the actual need for

research about specific territorial issues. It is also possible to focus on the research in detail, directing the data capture and analysis toward a specific aspect. For example, the measurement of energy consumption in municipally-owned buildings.

After analyzing the area's energy demand, the supply (region's energy production) should be evaluated. In this stage it is important to gather information specific to the quantity of energy produced locally and on the manner in which it is produced (fossil resources, renewable energy resources). Within the first aspect the capacity of the region to be self-sufficient in covering its own energy requirements should be evaluated. Within the second aspect it should be evaluated how much of this requirement is covered by other systems that are supplied by renewable resources and how many by fossil fuels. The analysis of the energy production needs to have the list of the plants that are locally present and in which way are they able to affect the energy dependence of the region.

When we talk about energy demand and supply it is crucial to evaluate the greenhouse gas emissions. They depend on the nature of the consumption and on the manner in which the consumed energy is produced. There are different methodologies of calculating emissions, with various degrees of accuracy and complexity. In any case, during the stage of database updating, the same methodology of calculation should be used so that results can be compared through time.

Within the technological aspect, the territorial characteristics are also important because it is functional and addresses the entire assessment, highlighting the specifics of the area and its social and economic status. It is evident that the content of the entire energy and climate mitigation planning and management process varies greatly depending upon whether we talk about industrial area or natural area for tourism, which can be bound by environmental protection norms, which can make the process of energy requalification more difficult. The main information that needs to be collected are: location of the area (geographical coordinates), geomorphology of the territory (plain, hilly, mountains, coastal, interior, island areas, etc.), demographics (number of residents, population density, etc.), environmental specifics and socio-economic arrangements (industry, tourism, etc.). The identification of such characteristics of the area can be very useful to plan precise dissemination and information actions on energy issues.

When analyzing environmental characteristics, it is important analyze climatic parameters as well. The main useful data are minimum, maximum, and average temperature of the dry bulb (°C), relative humidity (%), anemometric map of the territory, etc. The data can be gathered from nearby measuring stations. The precise number is not important; rather the average monthly number and the yearly trends are the most interesting facts that need to be considered.

## 5.2. Potential and limits of renewable energy sources in local and regional government unit area

The main objective of identifying the potential and limits of renewable energy sources in local and regional government area is the evaluation of the potential implementation of renewable resources in the region. For each resource taken into account, the study should include identification of implementation feasibility and the limits that could condition or block the same following is the main useful information for each single renewable energy source: sun, wind, water, biomass and geothermal.

Solar energy can be used to generate electricity or heat and is considered to be the best resource to develop solutions for energy production to be distributed to the area. The primary information that needs to be considered when analyzing solar resources and their possible implementation refers to estimation of the available surface to install solar panels (with the help of property maps, areas that are possibly available (parking lots, roofs, etc.). During that, various restrictions should be considered (presence of vegetation, legislation, technical obstacles, etc.) since they influence to reduction of the amount of surface that is effectively available. The second information is related to evaluation of solar radiation that has an incidence on the area. In the presence of an irregular geomorphology, a solar map should be made. The solar map will show the value of solar radiation for every point on the map.

In order to exploit energy from water mini plants and micro hydroelectric plants could be developed. The mini plants are more appropriate for a distributed implementation in the area. They require a smaller investment, have a low ecological impact and their power is flexible to the needs of smaller users. The micro hydroelectric plant can be viable with shorter waterfall drops found in aqueduct channels.

Wind energy can be used to produce electricity. The production of wind energy is based on the principal of transformation of kinetic energy from the mass of moving air at a given velocity into mechanical energy (it is then turned into electricity) by means of aerogenerator wind turbines.

Biomass combustion releases a quantity of CO<sub>2</sub> into the atmosphere that is almost equal to that absorbed by a plant when it is growing. Therefore, the carbon dioxide that is produced is considered null. In reality, this is not exactly correct because other factors in the process of biomass management influence climate change. In this stage of evaluation of the potential of energy from biomass the analysis regarding the following should be included: availability in quantity and quality of the biomass so that it guarantees constant supply, possible presence of problems due to movement and transportation of the biomass from production location to usage location and finally pace availability necessary for material storage.

Geothermal energy can be used to produce electric and thermal energy. It is considered to be a marginal energy resource, to be used only in limited territorial contexts. In the winter months, thermal energy is produced for hot water and heating buildings, while for the summer months it is used to cool buildings, by means of absorption and transfer of heat from the surface to the underground. The information that needs to be collected include identification of ideal consumers (new buildings or

renovation of old buildings) and analysis of the geomorphological characteristics of the ground.

### 5.3. Possible technological solutions and their environmental impact

While identifying possible technological solutions it is important to analyze the state of the energy infrastructure, evaluate energy storage problems and the state of the main technology on the market as well as any other integration issues. The evaluation of the energy infrastructure needs to be conducted by involving the managers and the local energy distributors who are amongst the essential stakeholders in the energy planning process. Within the realm of the investigation for knowledge aimed at energy planning, energy storage on the local and larger scale needs to be evaluated. To complete the data on possible technological solutions, examination of the state of technology currently available on the market must be made. Technology should be targeted toward the development of renewable energy and dedicated to the increase of energy efficiency.

Aspects that should be evaluated first include maturity of technology, the methodology of installation and general adoption and management costs, the incentives that are provided, the environmental impact and finally the willingness of the local and regional authorities.

It could be said that technical and technological aspects directly influence the quality of the project and are true-core for its development and implementation. Within this it is important to identify possible/optimal technical solutions. The choice of an ideal technical solution will be at first approximated with the help of numerous variables such as quantity of energy produced or saved (comparing the variable with a predetermined target will generate data that indicates whether objectives were reached), research and development timing, possibility of future use (possibility that system can be implemented and then updated to satisfy future fluctuations of demand and supply), characteristics and functional conditions (identifies the most suitable technology for the context) and maturity and development of the selected technology.

The second stage include the evaluation on how technology will merge with area, and the possible impact on the environment and local ecosystem. Environmental impact assessment is often mandatory by law and should be coupled with an assessment of the localization of selected technology in a certain territorial context. This is not always simple to do, especially when working in historical landmarks or protected areas that have special and strict restrictions governing them.

### 5.4. Recommendations in relation to technological aspects of energy and climate change mitigation planning and management activities

Technological aspects of energy and climate planning which can help in clean energy transition should encourage disruptive innovation within the energy sector and in all other sectors of the economy. Innovation in decentralization, digitalization and electrification of the energy system are the key to a renewable-powered future and

need to be better accounted for in clean energy transition scenarios. Due to that the future energy system could look entirely different from that of the present, with a vast expansion of low-cost renewables, a smarter and much more flexible electricity grid, and considerable increases in the numbers of vehicles and other products and processes that run on electricity.

Planners at local and regional level can endorse overall energy and climate planning process through actions such as:

- supporting and leading more sustainable, compact urban design;
- encouraging and facilitating new green building technologies and development (buildings are major energy consumers and greenhouse gas emitters in both their construction and operation);
- improving transport networks with options that both reduce urban traffic congestion and support greener modes of transport (public transport, bus transport, cycling, walking, etc.);
- encouraging new technologies and development for the treatment of liquid and solid wastes (wastewater treatment plants and landfills are sources of energy that can reduce the reliance on other, higher emissions energy sources by using a powerful greenhouse gas, methane, that otherwise escapes into the atmosphere);
- supporting sustainable energy production and distribution systems (e.g., urban solar and wind power, district energy systems);
- supporting the conservation and rehabilitation of ecosystems for the mitigation services they provide (e.g., carbon sinks provided by forests).



## 6. Financial aspects of energy and climate change mitigation planning and management activities on local and regional government level

The role of budget is clearly central to energy and climate change mitigation planning and management activities on local and regional government level since it is reflection of whether the activities are implementing in terms of existing strategies and other relevant planning documents at local and regional level.

Due to relatively small budgets, local and regional governments, it is difficult for them to be financially independently involved in the implementation of such activities, which is why they need to explore external co-financing opportunities for implementing them (preliminary verification of the economic and financial opportunities that would support the project) and seek support from national authorities, development and energy agencies and other relevant institutions dealing with energy and climate planning processes on a daily basis.

It happens quite often that promising projects do not get the green light because of lack of funds. This happens often in administrations who suffer from a persistent lack of funds which is the case in cities and municipalities and some cases regional governments so financial analysis needs to be undertaken along with all the other project activities. The project could be modified based on the results of financial analysis (for example, activities could be scheduled to coincide with a funding or grant).

Main financing methods available on the market are: self-funding, access to grants for energy and climate sector related projects which are numerous and many times they are subsidized by European finances, access to banking credit, third-party funding (TPF) by the Energy Service Company (ESCO), mixed financial approaches (Public Private Partnership – PPP) and new innovative and alternative funding opportunities (crowdfunding, etc.).

### 6.1. Experience in financing energy and climate change mitigation planning and management activities

The lack of favorable and stable sources of funding, leads to the implementation of exclusively commercial projects at the local and regional level. This lack of public funding as well as reallocation of available public funding to energy and climate planning activities is a result of insufficient awareness of the problem. This is a key obstacle in the wider implementation of energy and climate related projects.

In addition to the existing budgets available to them, local and regional governments should ensure an additional inflow of financial instruments to launch projects/activities/measures aimed at energy planning and climate change mitigation in their administrative area. Financial instruments are a type of financing often characterized by the combination of EU funds and public or private sector finance, above all banks, but also credit unions, savings, and loans associations or investment companies. Such a cooperation aims to trigger investments on the ground to deliver policy objectives,

such as economic, social and territorial cohesion and support environmental policy, such as climate action.

But due to the continuous confrontation with the problem of finding appropriate sources of financing, but also insufficient knowledge of new innovative and alternative sources, public administrations need to look for new financial sources in financing energy and climate change mitigation planning and management activities.

Therefore, it has been shown that in order to increase the use of alternative and innovative financial sources, a significant reduction in the domain of bureaucratic requirements is needed, but also greater help and encouragement of public administration in the form of mentoring, education and easier access to various other information. Doing that, an increasing number of public administrations would be encouraged to use alternative sources of financing, both in starting and implementing their activities.

#### 6.1.1. Ability to invest own financial resources for implementation of energy and climate change mitigation planning and management activities

Sustainable energy development and climate change are the global problems and to solve them, the actions should start on local and regional level. To effectively implement energy and climate policies at local and regional level, concerted and strong action is needed. Local and regional governments often have ambitious goals and political will, but lack the harmonized, interdepartmental and long-term structures to successfully implement their climate and energy strategies and thus reach their goal.

The main obstacle to prepare and implement energy and climate related projects and also to set an efficient energy and climate planning process at local and regional level is ability/inability to invest own financial resources for implementation of energy and climate change mitigation planning and management activities. Due to existing small budgets of local and regional governments, they need to seek access to external mechanisms for financing energy and climate action, as these might require the availability of co-financing from other sources or ensuring the 'bankability' of the potential investments.

Accessing external energy and climate financing opportunities is a key for meeting the investments needs required to transition to a low-carbon economy in general which is then reflecting the role of local and regional governments as well. Nonetheless, local and regional governments still face significant challenges in learning about and successfully applying for different funding mechanisms and financing opportunities as evidenced in practice. Therefore, actions to address these challenges need to be strengthened at all levels of governance.

### 6.1.2. External mechanisms in financing energy and climate change mitigation planning and management activities

To address the challenges of energy planning and climate change over the coming decades, significant additional resources will need to be made available for integrated energy and climate action. For local and regional governments, who are often central to sustainable energy planning and both climate mitigation efforts and adapting to climate impacts, external financial mechanisms are crucial as they can kick-start investments in energy sector as well as in mitigation and adaptation measures and leverage additional private investments.

When using external energy and climate finance mechanisms several obstacles were identified:

- lack of awareness about the different energy and climate finance options available;
- insufficient administrative capacity and technical knowledge to prepare successful applications;
- challenges in meeting the requirements of EU or international funds, for instance in relation to co-financing from other sources;
- budgetary and regulatory constraints that can limit the availability of own resources for climate investments;
- ensuring the ‘bankability’ of potential investments, for example in relation to accessing financial instruments, technical assistance or Project Development Assistance (PDA);
- political constraints and other policy priorities limiting energy and climate investments.

It should be noted that, even when aware of the different possibilities to finance energy and climate action with external funding mechanisms, local and regional governments often have insufficient capacity to prepare successful applications and/or to manage the funding and the subsequent reporting. This issue requires additional mechanisms and support dedicated for funding technical assistance especially for local and regional governments.

Accordingly, it is important that local and regional governments make use of the available support tools, guidance and possibilities to identify the different options available and select those most suitable to their particular local and/or regional needs.

### 6.1.3. Preparation and implementation of relevant energy and climate change mitigation planning and management activities

Financing energy and climate action is one of the key elements of the international discussions addressing climate change mitigation and adaptation activities in the medium and long term. The scale and size of the challenge that is associated with sustained reductions of GHG emissions on a global scale requires rigorous solutions

and robust financing mechanisms that will be needed to develop and deploy mitigation technologies and to adapt to the impacts of climate change at local and regional level. In particular, significant financial and human resources will be required to ensure that developing countries are able to meet the challenge of climate change while growing their own economies in a sustainable manner.

Key barriers to preparation and implementation of relevant energy and climate change mitigation planning and management activities remain: weak enforcement of existing measures and regulations, lack of knowledge by energy users of the benefits of energy efficiency, lack of coordination between stakeholders in developing energy efficiency projects, lack of capacity to evaluate energy efficiency and low-carbon investments and develop adequate investment/financing approaches; inability to integrate climate considerations in investment planning, high initial implementation cost and high perceived risks, lack of suitable financing mechanisms, and lack of consistent institutional frameworks.

In order to overcome all above-mentioned barriers, local and regional governments should ensure capacity building of all employees in order to have sufficient internal capacity to prepare, manage and monitor relevant energy and climate related projects and use all advisory services and collect information about available national funds for energy and climate action which could be then enhanced by actions at international level. Using advisory services could in addition provide more concrete advices on how to support investments necessary in the given local and regional government and its socio-economic and geographical characteristics.

To support these actions, national authorities need to play a key coordination and monitoring role to ensure they have an up-to-date understanding of the energy and climate finance landscape in their country.

## 6.2. Recommendations regarding financing energy and climate change mitigation planning and management activities

To benefit fully from the variety of funds and financial instruments, local and regional governments must be aware not only of the different options available but also of the different actions and priorities related to energy and climate action which external financing instruments can support in order to identify the most appropriate opportunities for their local and regional climate and financial needs.

The complexity of the rules and procedures for accessing additional funds together with a perceived mismatch between the local and regional needs and the way in which funding programmes operate remain one of the main obstacles for local and regional governments when accessing the funding. This requires a clear strategy for communicating the rules and objectives of different programmes while providing advisory services and clarifying how different instruments can be combined to meet the local and regional needs of each county/city/municipality which again depends on the bodies providing additional funding mechanisms.

In case of local and regional governments in using different external financing mechanisms for implementing energy and climate related projects two main recommendations should be mentioned:

- **make use of the available support tools and guidance** – there is a range of EU and national financing options available to invest in sustainable energy projects, climate and the low-carbon transition accompanied by a number of support tools and platforms aimed to provide information and advice how to access these funds. In addition to grants, finance for energy efficiency investments may be available through energy service companies (ESCOs);
- **be creative when using the available options for energy and climate financing** – due to availability of a range funding mechanisms (EU funds, national funds, financial instruments and other forms of financing) that can be used to invest in climate action and meet the specific local needs related to the low-carbon transition. Many of these sources can be blended to support investments. Local and regional governments should explore all possible options and even combine different financing mechanisms, when possible, in order to maximize the budget available to invest in climate action.

### 6.3. Best practice example on financing and implementing energy and climate actions from existing Sustainable Energy and Climate Action Plans

#### 6.3.1. Installation of a photovoltaic powerplant on the roof of Kindergarten “Fijolica” in Town of Prelog

Town of Prelog, one of the three biggest towns in Medjmurje County is participating as a partner in implementation of the project ENES-CE – Collaboration between public bodies and citizen energy groups in implementing local energy strategies in Central Europe financed through Interreg Central Europe. The main goal of the ENES-CE project is to motivate citizens on the local level to participate in energy planning and implementation of planned energy investments in their communities. One way to trigger such cooperation is enhancing communication activities from local and regional authorities towards their citizens through workshops, educations, printed material distribution, online marketing activities and other.

Town of Prelog in cooperation with Medjmurje Energy Agency Ltd. (MENEJA) has implemented several workshops from year 2019 until the finalization of creation of citizen energy association “Green Energy Club Prelog” in year 2021. These workshops combined with other relevant communication activities have triggered involvement of interested citizens in process of revision of existing Sustainable Energy and Climate Action Plan, development of new upgraded and improved Sustainable Energy and Climate Action Plan (SECAP) and identification of most relevant measures to be implemented in Town of Prelog. Once the SECAP was developed and approved by Town Council, it was published and all interested parties can download and study it. Measures that were defined within are in line with the real needs of the local community



of Town of Prelog and funding options are also listed. This served as a starting point in triggering ideas from wider community on possible energy and climate investments in their town. Besides communication activities oriented towards citizens, to determine most relevant measure to be implemented and create an atmosphere of acceptance, several tools to engage citizens have also been used. Through this process, three most relevant measures for implementation in Town of Prelog have been identified: installation of photovoltaic powerplants on public buildings; organization of workshops for local entrepreneurs on financing energy projects and bike sharing project and construction of bike lanes.

During the communication with citizens and newly established energy association, it has been determined that within ENES-CE project as a pilot investment a photovoltaic powerplant will be installed on the roof of Kindergarten "Fijolica" in Town Prelog.



Figure 6.1 The building of Kindergarten "Fijolica" in Prelog

The building of this kindergarten has been energy refurbished within last two years and is now in energy class B for the specific annual needed heat energy and A+ for the specific annual primary energy. It has flat roof and there are already installed solar collectors for hot water. The rest of the roofs free area will be used to install photovoltaics. The rest of the roof is 550,00 m<sup>2</sup> on which a solar power plant is planned to be installed.



Figure 6.2 Roof area of the Kindergarten "Fijolica" in Prelog

It has been agreed with all involved relevant stakeholders that the new PV powerplant will have the power of 50 kW. The cost of such a plant exceeds the budget allocated in projects' Application Form for implementation of pilot activities (15.000,00 €), so the rest of the funds will be covered from the budget of Town of Prelog. Total cost of the investment has been estimated at around 49.000,00 €. Town of Prelog and MENEA have completed the process of preparing project design documentation for the construction and installation of the PV power plant and have obtained all necessary permits for its implementation. The plan of the town administration is to apply for additional financing through the public call which will be published by the Environmental Protection and Energy Efficiency Fund. In case the call will not be published by end of the project implementation (end of June 2022), Town of Prelog will finance the investment and cover the rest of expenses within its own budget.

### 6.3.2. Development of a geothermal heating system in the public institutions of Town of Lenti

In recent years, the settlement has started the preparation and implementation of several energy and energy efficiency projects, but among them the program aimed at the development of heating systems in public institutions on a geothermal basis should be highlighted. The program provides a basis for the future expansion of the existing system, not only for public buildings, but also for residential and commercial buildings by including additional sources of financing. As this development can play a key role in achieving the municipal energy goals set out in this documentation, it is important to briefly present it.

Hungary is also often referred to as a geothermal power, as the geothermal potential of the country is greater than that of most countries in the world due to its favorable geological conditions. The utilization of geothermal energy is still low in Hungary, but more and more local governments are trying to prepare and implement projects aimed at utilizing geothermal energy.

There is also a significant geothermal asset in the Lenti area, which can be well mapped due to the fact that the wells (production and barren) drilled in previous decades as a result of oil mining activities provide sufficient geological information for professionals. Taking advantage of this situation, the Town council decided to implement a project to develop a geothermal heating system.

Prior to the project, only thermal water was used for heating in the Lenti Spa, but thanks to the development, several public institutions were able to provide renewable energy instead of natural gas, which significantly resulted in reducing GHG emissions in the area. The project will reduce CO<sub>2</sub> emissions by around 520 t per year.

As part of the project, a geothermal system consisting of a production well and an injection well was developed. This system provides heat on a geothermal basis to the following municipal institutions:

- Lenti Arany János Primary School and Primary School of Art;
- Dr. Ferenc Hetés Specialist Medical Clinic;

- City Cultural Center;
- City Library;
- Lenti Mayor's Office;
- Ferenc Gönczi Grammar School and Vocational High School;
- The headquarters of the Lenti Day Care Home Kindergarten and the Petőfi út site;
- Lenti Vörösmarty Primary School.

The map under Figure 6.3 shows the wiring system developed and the location of the affected public buildings within the city. The total length of the developed wiring network is approx. 3 km.

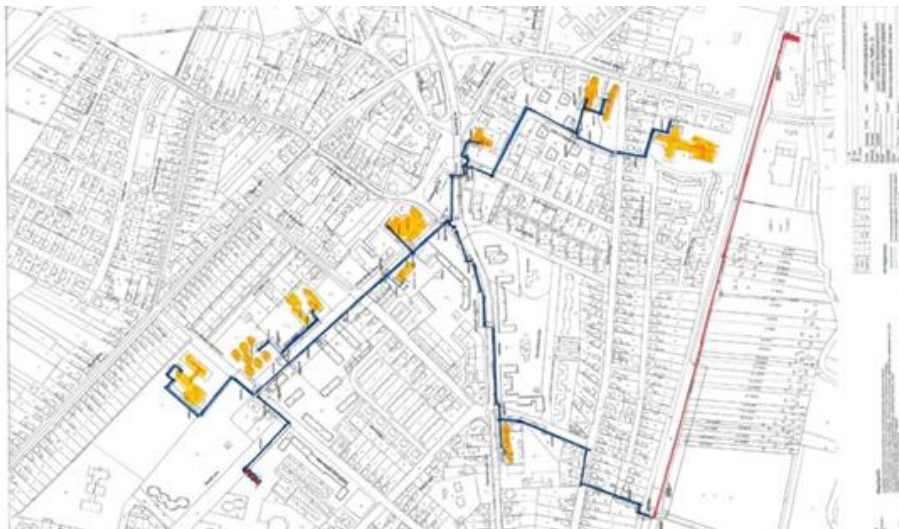


Figure 6.3 Map of the pipelines and the location of municipal institutions

The main activities of the project include the following:

- Drilling of a production well with a basic depth of 1480 m, from which the thermal water is extracted. The wellhead temperature is 69 °C and the water volume is 32-35 m<sup>3</sup>/h. From the well, the thermal water is delivered to the heating center using installed booster pumps;
- Direct connection of heat consumers (previously listed public institutions) to the two-pipe heat transmission network;
- The supply is ensured by a heat exchanger installed in the boiler rooms of the municipal institutions;
- The automatic operation of the system is supported by a dispatcher central computer and telemechanical remote monitoring;
- The thermal water used for heating is injected back into the injection well with a basic depth of 1450 m;
- The system produces 8344 GJ of renewable heat per year. The rated power is 1860 kW.



Given that the planning and permitting phase of geothermal energy projects is time consuming, the biggest challenge has been the rise in investment prices. For example, in the years prior to the start of the project, the cost of drilling wells increased significantly.

Drilling of wells was absolutely necessary, as although the local thermal bath has a functioning thermal well, the current legal regulations do not allow the use of thermal water classified as medicinal water for heating purposes.



*Figure 6.4 Ceremonial commissioning of the thermal water well*

### **Perspectives in geothermal energy utilization**

As the project is supported by the Regional Development Operational Program, at this stage the system can only be used for heating public institutions. During the planning of the project, the city also paid attention to the fact that it will be possible to connect new consumers with the expansion of the system at a later date. This is made possible by the two-pipe system, so that not only can the number of public institutions connected to the network be increased, but also newer segments, such as the population and businesses, can be targeted. The continuation and expansion of the geothermal utilization project in the 2021-2027 programming period may play a key role in achieving the settlement climate goals.

## 7. Overall conclusions and future recommendations

Strategy planning is a process of building consensus among county, municipal and city leaders and all stakeholders. In order to materialize the strategy planning process, it is important to develop relevant strategic plans and/or programmes. In times of rapid changes and competing needs for public resources, a strategic plan creates some stability and certainty for government efforts regarding the duration of the planned period.

In practice, strategic plans often cover five years or longer, to provide some certainty over multiple years. During the implementation process, it needs to be revised regularly to assess effectiveness, make further adjustments and adapt in an iterative way. Due to rapid technology and market changes, it is advised to review the strategy at least every three years. An agreed and well-formulated strategic plan can help to improve the understanding of available resources and enhance support from key stakeholders. Like other planning processes, a good plan is only useful when it is implemented. There should be corresponding resource allocation, authorization, and other enabling and motivation mechanisms so that the relevant government bodies can carry out the implementation activities.

Clear division of roles and responsibilities, sufficient allocation of resources, as well as a strong commitment and effective support from the local and regional government leaders are key to the successful implementation of local and regional strategies. Strategy planning is a key element of sustainable energy planning and climate change mitigation which are the two main problems of today. In order to successfully overcome the challenges arising from them, it is necessary to develop and adopt quality strategic and planning documents at local, regional and national level and successfully implement measures defined in these documents. A good basis for implementation of effective energy planning and climate change mitigation activities as well as for the development of relevant strategic and planning documents lies in the development of a methodology for strategic planning that includes specifics of project partner countries, defines activities to be implemented throughout the energy planning and climate change mitigation planning process.

The implementation of SEPlAM-CC project is carried out in the HU-HR cross-border area and covers the area of two counties: Međimurje County and Zala County. Local and regional governments in covered area are facing with many challenges when preparing and implementing energy and climate related projects, so the main idea of this document was to provide local and regional governments with relevant steps that need to be taken in order to establish an effective energy and climate planning process. This methodology provides guidelines on the main aspects that need to be analyzed and taken into account while preparing energy and climate related documents or setting a quality strategic energy and climate planning process at local and regional level. The main aspects that should be taken into account are legal, administrative, methodological, technological and financial aspects. While analyzing these aspects the relevant framework for future action was identified. The framework is available in the Figure 7.1.

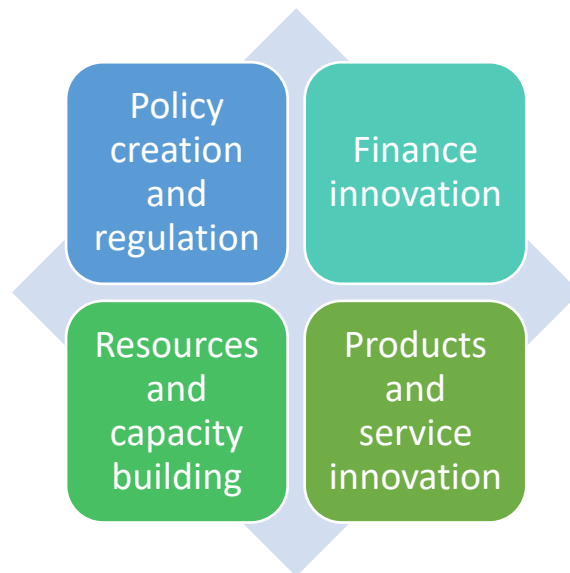


Figure 7.1 Framework for future action

This framework could help national government in taking actions that will help local and regional governments achieve global energy and climate targets in the following years in setting energy communities in cities, islands and rural areas, as well as corporate sourcing practices. Some of concrete actions within every field of this framework are listed in Table 7.1.

Table 7.1 Concrete actions within proposed framework

Framework element	Concrete actions
<p><b>Policy creation and regulation</b></p>	<p>Promote continuous assessments in available national and international programmes and initiatives in order to foster alignment of existing local and regional policies and initiatives from relevant institutions to incorporate renewable energy solutions</p> <p>Develop effective market frameworks for investment and create equal market access for all participants</p> <p>Engage with utilities to adjust and simplify aspects related to energy distribution, licensing and permitting requirements</p> <p>Establishing relevant community energy authorities with the sole purpose of supporting community energy projects through providing advisory services</p>
<p><b>Finance innovation</b></p>	<p>Ensure access to long-term and affordable financing for end-users</p> <p>Improve financial institutions' knowledge and understanding of available renewable energy and energy efficiency solution</p> <p>Design and set up innovative financing solutions in partnership with multilateral agencies</p> <p>Allow current funds to lend and invest in renewable energy development</p> <p>Ensure government support to develop alternative business models</p>

<p><b>Resources and capacity building</b></p>	<p>Define and set up training courses, educational programmes and other educational approaches which should target consumers and citizens involved in energy communities, as well as policy makers and sector experts</p> <p>Set up specific certification programmes for relevant skills development</p> <p>Build the human capacity to incorporate renewable power options</p> <p>Build capacity within public and financial institutions to support the implementation of the national energy access strategies</p> <p>Create groups for exchanging knowledge and expertise</p>
<p><b>Products and service innovation</b></p>	<p>Create a dedicated platform and network of experts for the discussion and exchange of knowledge and best practices in renewable energy usage, energy efficiency and climate change mitigation</p> <p>Ensure applicability of various renewable energy solutions and promote specific funds for innovation for islands, rural areas and cities, including setting up pilot projects</p> <p>Set up a mapping and showcase platform for renewable energy innovation solutions to enable replicability and facilitate entrepreneurial access</p> <p>Encourage the production of appliances with embedded solutions, such as batteries that increase resilience and flexibility</p>

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