

# LC Districts

Interreg Europe



European Union  
European Regional  
Development Fund

## [METHODODOLOGY FOR THE REGIONAL DIAGNOSIS]



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## INTRODUCTION

This document has been designed as an easy to follow methodology for conducting regional diagnosis, in the frame of an Interreg Europe project: LC Districts: “Towards low carbon city districts through the improvement of regional policies” project (Acronym: Low Carbon Districts project → [LC Districts project](#))<sup>1</sup>.

The overall objective of the LC Districts project is to improve regional development policies and programmes, in order to facilitate the transition to low-carbon districts and municipalities. The interregional learning process takes place in three thematic areas:

- i) Raising awareness, development of assessment methodologies and provision of services for the design and implementation of low-carbon districts and municipalities;
- ii) Municipal or regional authorities, organizations and other similar structures that provide information on activities related to the reduction of greenhouse gas emissions;
- iii) Policies and programmes for high-quality governance and management.

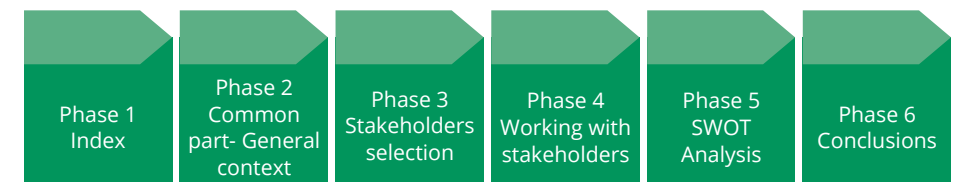
This Method Guide intends to provide other regions pursuing similar goals to ours, with some guidance in the elaboration of a Regional Diagnosis in the areas of building renovation and construction of energy-efficient buildings, creation and renovation of district heating systems and other urban renovation actions.

The methodology has been written down after the experience of conducting our partnership’s 5 regional diagnoses, which has led to a process of arranging contents and methodologies. We believe that having access to a document like this might have helped us reaching our goals in a more straightforward way. Our main goal was obtaining a diagnosis report for each of our 5 regions that could serve as a clear and objective overview of the point of departure of the region for the search of improvement of our policies.

The regional diagnosis allowed us to identify the existing support measures, methods and programmes (“Good Practices”) as well as needs in the above mentioned three thematic areas and potentially other areas according to partners’ and stakeholders’ interests.

Another relevant part of this methodology is the fact that the organization in charge of conducting the diagnosis needs to identify all the stakeholders and interact with them to gather a maximum of valuable information from them.

The elaboration of the 5 regional diagnoses has gone through an iterative process that goes through the next phases:



<sup>1</sup> <https://www.interregeurope.eu/lcdistricts/>

# 1 HOW HAVE LC DISTRICTS' PARTNERS DEVELOPED THEIR REGIONAL DIAGNOSIS?

During the exchange of experience period the partners of LC Districts project developed a regional diagnosis for each region, following the phases mentioned. The approach and the elaboration on each phase have been done in different ways: while phase 1 and 2 were elaborated with the contribution and agreement of all partners, phase 3 to 6 were developed individually, per region.

The next lines describe in depth the phases followed by LC districts partners in order to reach a regional diagnosis:

## 1.1 Phase 1 Index

During the first semester of the project, the lead partner (Navarra Government) proposed to its partners an index to follow with the aim of elaborating a Regional diagnosis. Some queries were resolved, and finally an index was agreed:

### 1) Introduction

*This section gives an overview of the reasons for the regional diagnosis to be done, as well as the objectives pursued and the expected impacts on the sector.*

### 2) Context of reference

*This section is meant to provide a broad overview of the contexts on reference. "From global to local". This section will provide the partners the main objective or challenge to consider for the starting point of their regional diagnosis.*

#### a) Global context

*This section explains the role and weight of the building construction sector in the global economy, how it affects the development of the cities, and its consequences in energy consumption and gas emissions.*

#### b) European context

*In this section, information will target a description of the European context. Main figures to consider European population, cities development, energy consumption, energy sources used, and gas emissions.*

#### c) National context

##### i) Overview

*This section explains national context in relation to its Low Carbon transition strategy. In this case, the main figures regarding energy consumption (ktoe) are important.*

##### ii) National policy background

*This section describes in detail the background of the national policy concerning construction and building sector, not only new construction, but also retrofitting. In addition, it is important to take energy sources into account.*

##### iii) Energy efficiency in buildings

###### (1) Energy efficiency trends

*In this point, information will target main figures regarding energy consumption in national building sector. It would be useful if we could explain also residential sector and services sector.*

###### (2) Energy efficiency policies and public funds

*In this point, information will target the energy efficiency policies regarding European directives. The main topic will be new construction, retrofitting, district heating and urban planning. In addition, public funds regarding energy efficiency and renewable energy sources will be described.*

#### d) Regional context

##### i) Overview

*This section explains regional context in relation to its Low Carbon transition strategy. In this case, the main figures regarding energy consumption (ktoe) are important.*

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*This section describes in detail the background of the regional policy concerning construction and building sector, not only new construction, but also retrofitting. In addition, it is important to consider energy sources.*

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###### (2) Energy efficiency policies and public funds

*In this point, information will target the energy efficiency policies regarding European directives. The main topic will be new construction, retrofitting, district heating and urban planning. In addition, public funds regarding energy efficiency and renewable energy sources will be described.*

### 3) Programmes and initiatives supporting LC transition in the regional sector

*This section describes the programmes and initiatives put in place at regional level to boost Low Carbon Transition.*

*This section should be completed by each partner. The aim is to explain the programs and initiatives that are being developed in your region to boost energy transition.*

### 4) Map of stakeholders in the regional LC transition sector

*This section provides a complete map of all actors involved in the regional LC transition sector, as they have a role in the the regional diagnosis and reaching the goals.*

### 5) SWOT analysis of the regional LC sector

*This section centers the diagnosis of the sector, which should be made in a participatory way, with the participation of regional stakeholders coming in last section. SWOT analysis brings together all the issues (internal or external, positive or negative) that define the sector perspectives.*

### 6) Conclusions

*Thanks to all these participatory sessions, a SWOT analysis per main LC lines could be done. Those SWOT analyses will point to the main conclusion to consider for the regional diagnosis.*

*This section summarizes main ideas brought by the regional diagnosis exercise. It provides an overview of the process followed, and exposes key findings in LC Districts logic. Challenges should be identified for each project line.*

## 1.2 Phase 2 Common part – general context

In order to fill in the index agreed, Navarra region's partners (Navarra Government and NASUVINSA) summarized the main ideas and a set of variables that would be the basis and constant in all the contexts: population and their way of living, the size of the cities and main figures about energy, housing and construction sector, in a document.

After some discussion, comments and corrections, the consortium reached a unique document with global and European context.

Generally speaking, the main points to take into consideration (date 2020)<sup>2,3</sup> at global scale were:

- World's population has risen exponentially.
- 55.3% of the world's population lives in urban settlements.
- The growth of the cities causes a need of adaptation to the climate change.
- The housing and construction sector represents 36% of the final energy consumption and 39% in CO<sub>2</sub> emissions.

Furthermore, it was necessary to highlight the **European Directive 2018/844**<sup>4</sup>, as the common directive which has to be the guide of each member state, and as a consequence the regions considered in LC Districts project:

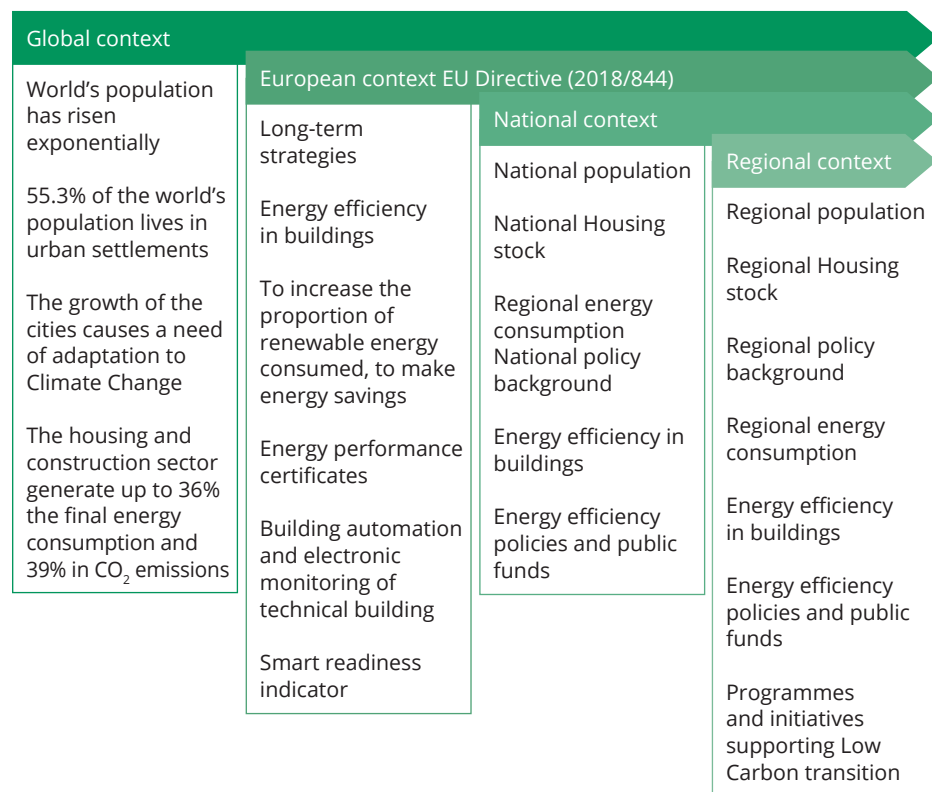
- The transition to a highly energy efficient building stock in the European Union.
- To reduce the energy needed to meet the energy demand associated with the typical use of buildings.
- To increase the proportion of renewable energy consumed, to make energy savings in accordance with European Union level ambitions, and to alleviate energy poverty.
- To ensure that the long-term renovation strategies deliver the necessary progress towards the transformation of existing buildings into nearly zero-energy buildings, in particular by an increase in deep renovations.
- The transparency of energy performance certificates should be improved.
- Building automation and electronic monitoring of technical building systems have proven to be an effective replacement for inspections.
- The smart readiness indicator should be used to measure the capacity of buildings to use information and communication technologies and electronic systems to adapt the operation of buildings to the needs of the occupants and the grid; and to improve the energy efficiency and overall performance of buildings.

<sup>2</sup> <https://ourworldindata.org/world-population-growth>

<sup>3</sup> <https://www.iea.org/reports/world-energy-outlook-2017>

<sup>4</sup> <https://eur-lex.europa.eu/eli/dir/2018/844/oj>

As a concept idea, the main points to take into account with which LC districts projects drafted their regional diagnosis can be summarized in the following graphic:



### 1.3 Phase 3 Stakeholders selection

In the LC Districts project, the final commitment of the first period is to elaborate 5 Regional Action Plans (RAP), where it is necessary to include the contributions of the main regional stakeholders and also the lessons learned and gathered in an interregional exchange of experience among project partners.

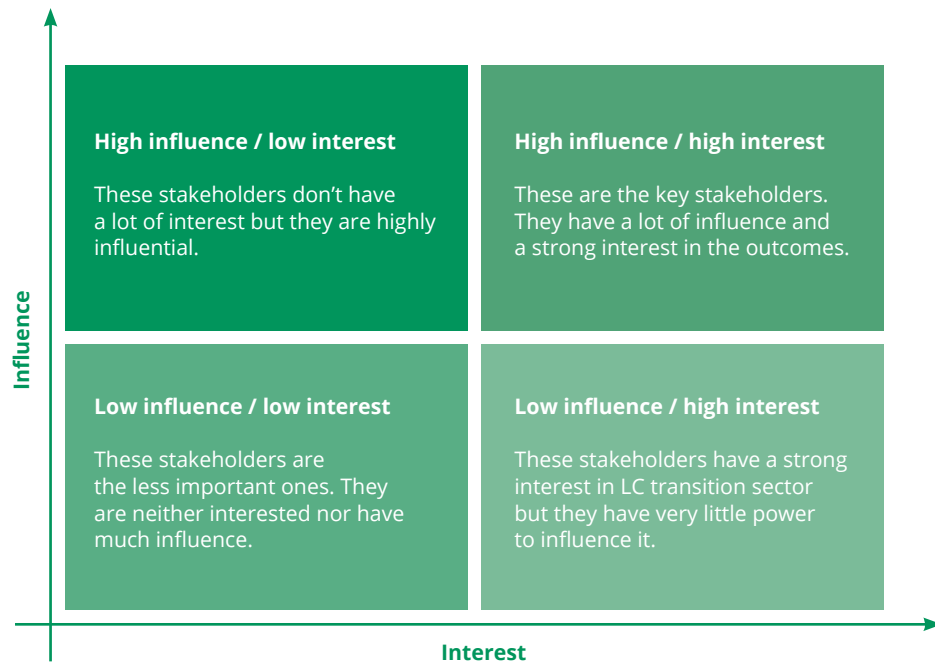
During the LC Districts project, each partner identified and mapped their own regional stakeholders.

A quadruple helix approach helped the partners to warrant that no key stakeholder was left behind. With this approach, the process of stakeholder search is organized according to a helix, and a list of main actors comes under each group.

Transition to Low carbon Districts	Public sector	Private sector	Academia	Civil Society Organizations
Renovation and construction	Renovation offices one-stop-shops	Construction companies Architects Certification companies	Technological centers	NGO Homeowners Associations
Energy sector	Regional Government Energy Agencies	Industrial companies ESCOs	Research centers, Universities	Energy Communities
Urban management	Municipalities Regional administrations	Architects	Research centers, Universities	Consumers associations
Financing	Public Funds	Banks		Energy Communities

Despite considering all the stakeholders involved, they could be grouped by the level of influence they have in LC transition sector, and the level of interest they have.

In this sense, it is very important to do a stakeholder analysis, in order to identify, evaluate and prioritize who can influence or have an interest in low carbon transition in our region. A simple but effective stakeholder analysis technique is stakeholder mapping. Interested parties (stakeholders) are plotted against two variables, most commonly **Interest and Influence**. The resulting stakeholder matrix clearly identifies key players who can have the greatest impact on the success of an initiative. This map assists with prioritization of resources and provides a foundation for a communications and engagement plan.



The process of positioning the stakeholders in the map can be done individually or in small groups, then combined. Regarding LC transition, LC Districts partnership has identified three main groups (according to the point of view/ the phases in which they enter the process of work with the OPE instrument):

1. Administration: policy making institutions or those with enough influence to make policy changes.
2. Supply: technical services such as construction companies, architects, intermediate organizations such as refurbishment offices which assist citizens... etc.
3. Demand: social frame. This group includes end customers (represented by associations or communities of owners' administrators), banks and other professionals, all of them critical in the decision-making process.



## 1.4 Phase 4 Working with the stakeholders

The approach used with the regional stakeholder group was based in regional workshops aiming at:

1. Dissemination of the project
2. Examination of all best practices known or implemented by local actors at regional level
3. Obtaining a broader analysis of the current situation of LC transition in each region
4. Ensuring stakeholder involvement and participation

### 1) Dissemination of the project

The workshops gave opportunity to the project team to disseminate the reasons to participate in such a programme as Interreg Europe, the objective of LC Districts project, the steps made so far, future plans, as well as the expected outputs.

### 2) Examination of all best practices known or implemented by local actors at regional level

One chapter in the index of the Diagnosis report was *"Programmes and initiatives supporting LC transition in the regional sector"*. This list functions as an inventory of existing support measures, methods, programs, management and governance models in the areas of renovation and construction of the regions.

Stakeholder workshop provided an excellent opportunity to screen all Good Practices known or performed by local actors at the regional level. Simple brainstorming could be used to make the participation wide and open. Once a first broad list including all participant contribution made, a critical analysis by the project team (or stakeholder local groups) can be conducted in order to assess upon several criteria and select *best practices*.

Assessment can be according to:

**1 Size:** This aspect comprises the territorial influence of the Good Practice (GP), the number of actors involved, the timescale, the amount of activities or financial resources put in place in order to evaluate its dimension.

**2 Involvement:** This aspect explains the involvement of institutions in the GP, the number of local branches that take part in it, and whether it is part of an Interreg Europe project or other program, in order to evaluate the involvement of actors in the GP.

**3 Background:** This aspect refers to the problem addressed by the practice and the context which triggers the introduction of the practice. The evaluation should check if these have a connection with questions identified in the SWOT analysis of the Regional Diagnosis.

**4 Objective:** This aspect describes the objective of the GP, the target group, and specific needs that the GP aims to satisfy. It should be evaluated considering whether it is solving key issues addressed by LC DISTRICTS project.

**5 Description:** This aspect comprises the content of the GP, the implemented activities and the process followed for the practical implementation of the GP. Evaluation should focus on specific and innovative methodologies put in place.

**6 Alignment:** The alignment of the GP with the overall LC DISTRICTS project (objective, actions, partners, etc.) is to be evaluated here. Similarities with project partners, activities, topics, or lines should be highlighted.

**7 Results:** Achieved results of the GP are considered in this section: type and number of beneficiaries, stakeholders, lessons learnt, and challenges faced. The evaluation should focus on the capacity of the GP to make an impact or change a situation.

**8 Success factor/s:** Reason/s why results are achieved are evaluated here.

**9 Replicability:** The degree of replicability and transferability should be evaluated. It can be taken into account that it has already been replicated. The reasons for the GP to be of interest for other partners/regions should be highlighted.

**10 Policy aspects:** Several aspects related to a specific policy are analysed here: degree and type of innovation (technical, environmental, social, economic innovation), most successful improvement introduced by the policy, link between the policy and the GP, type of support (technical, economical, subsidized financing, non-repayable financing, others, etc.).

### 3) Obtaining a broader analysis of the current situation of LC transition in each region

The workshops are meant to have a participatory spirit to gather as many valuable information as possible to get a complete overview of the current situation in the region regarding the transition to low carbon districts.

Before the workshops, the body responsible of the diagnosis would prepare a context analysis of the construction-renovation sector to focus the meetings and frame the regional diagnosis report.



The working sessions are intended to identify which were the main challenges that the region must overcome.

Depending on the context of the region, and therefore the concrete objective pursued, the Local Stakeholder Group was composed differently among the regions. This influenced the working process indeed, yet the common output would be a *SWOT analysis* obtained from the regional challenges found and solutions brought to table.

### 4) Ensuring stakeholder involvement and participation

It was proposed to have different working sessions, where a participatory plan was held. The contacts with the LSG (local/regional stakeholder group) should be ongoing during all the project life, and as a base for future collaborations.

The following lines describe the different ways developed by the regions to work with the stakeholders:

#### 1.4.1 Option 1 – Navarra region (Navarra)

First Workshop with LSG (Local Stakeholder Group) to discuss regional challenges:

This session might be structured in three sections:



1. Explanation of the overall context and focus of the project (if this haven't been made in a previous session identifying the initiatives and programmes).

2. In three different groups, as it was explained in stakeholder map, people will discuss the challenges identified by regional team: This methodology is based on giving each group a number of challenges and aspects that hinder the transition to low carbon districts previously identified to work on them. The groups will analyse and discuss them and new challenges shall arise. Each person within the group will sort the priority levels of each challenge in a personal sheet once listened to the other participants' arguments. The arithmetic mean of the individual sheets will be the final prioritization of the group.



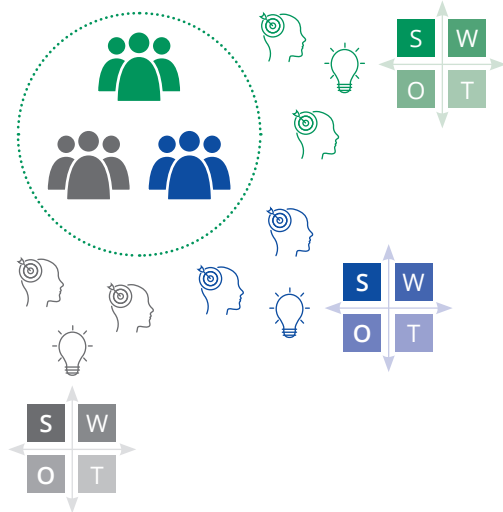
3. Finally, all the points discussed around the groups would be summarized in the last part of the session following these steps:

- Collecting all the summaries and the sheets filled by all the participants. Work on a final document.
- Share each group document with the participants of the group so that they can add information and make some points clear.
- Call for a second working session to work on the possible measures should be deployed to boost the transition to a low carbon economy in this sector.

#### Second Workshop with LSG (Local Stakeholder Group) to discuss possible solutions

The second working session will be organized once all the challenges have been prioritized and possible solutions have been identified. In this part possible solutions will be discussed among the three stakeholder groups. Once again, the working session will be structured in two main sections. First, a sheet with 5 previously prioritized challenges with possible solutions will be presented.

The last part of the session will be devoted to a round table, where a group solution summary will be discussed and a final document will be drafted. It is important to have active groups where participants can expose their point of view, give new ideas and try to collaborate. The groups will select the most appropriate solution for each challenge.



#### **1.4.2 Option 2 - Marche region (Italy)**

Due to the health emergency it was not possible for the Marche Region to meet the various stakeholders identified in person. For this reason, it was decided to proceed by identifying a smaller pilot group consisting only of public stakeholders who are experts in the sector of sustainability of buildings and interested in the issues of the LC Districts project. Two online meetings were held with the pilot group identified.

#### First Workshop with LPSG (Local Pilot Stakeholders Group) to discuss regional challenges

The first meeting took place in two parts: the invited stakeholders were asked to reflect on three issues proposed by the team of the Marche Region that deals with the project.

The meeting took place in two parts:

- in the first part, the LC Districts project was presented to the stakeholders and three issues were raised where it was considered important to have their opinion;
- in the second part the stakeholders freely provided their contribution in terms of skills and experiences on the three proposed themes.

The three issues that the LC Districts team of the Marche Region had identified as priorities of interest were:

- a) ITACA and Urban ITACA protocol
- b) Regional Sustainable Development Strategy
- c) Environmental assessments

After a constructive debate that lasted a couple of hours, an appointment was made for the second Workshop.

#### Second Workshop with LPSG (Local Pilot Stakeholders Group) to discuss SWOT analysis

In preparation for the second meeting, the Region team worked to synthesize the contributions of the stakeholders into a SWOT analysis matrix. From this work, the need to expand the second theme of the Regional Sustainable Development Strategy and broaden it more generally to the planning of all entities in relation to the calls on energy efficiency drawn up by the Marche Region emerged.

In the second Workshop the SWOT analysis was then shared with the stakeholders

who were thus able to add further contributions and, for each proposed topic, challenges on which to direct efforts in future regional programs were highlighted. Thanks to these two participatory sessions, it was therefore possible to carry out a SWOT analysis for the main LC lines identified by the Marche Region team. Such SWOT analysis will indicate the main conclusions to be considered for this regional diagnosis.

### 1.4.3 Option 3 – Småland region (Sweden)

#### First Workshop with LSG (Local Stakeholder Group) to discuss regional challenges

Linnaeus University had organised a workshop to specify stakeholders’ needs in terms of transition towards low carbon districts. The stakeholders represented regional construction and renovation companies, Kronoberg County, Kalmar County, Jönköping County, Energy agency for southeast Sweden, Energy agency for north Sweden, EU Policy officer for Småland Blekinge Halland South Sweden, and Linnaeus University. A brief questionnaire had been sent to the stakeholders prior to the workshop. The questionnaire was sent to 26 individuals. The rate of response was 73%. The questionnaire aimed at specifying strengths, weaknesses, opportunities, and threats of adopting the sustainability and decarbonisation policies (figure 1 to 4). Analysing the results of the questionnaire showed that:

1. The major strength for adopting the sustainability and decarbonisation policies is their positive responsiveness to environmental issues and concerns, followed by social benefits, technological and economic benefits, and knowledge generation.

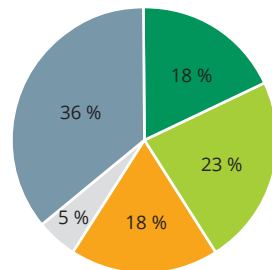


Figure 1. Key strengths of adopting the sustainability and decarbonisation policies

2. The major weaknesses for adopting the sustainability and decarbonisation policies is the lack of adequate knowledge in exploiting available solutions, followed by social, political, economic, and technological weaknesses. The technological weaknesses referred to the lack of new technologies.

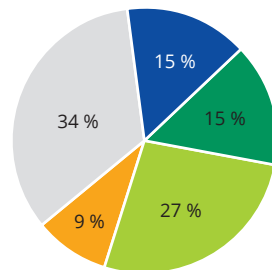


Figure 2. Key weaknesses of adopting the sustainability and decarbonisation policies

■ Policy ■ Economy ■ Social ■ Technology ■ Knowledge & awareness ■ Environment

3. The major opportunity for adopting the sustainability and decarbonisation policies is the development of new innovations and technologies, followed by social, economic, environmental benefits and knowledge generation.

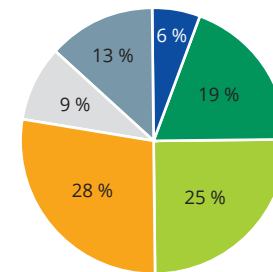


Figure 3. Key opportunities of adopting the sustainability and decarbonisation policies

4. The major threat for adopting the sustainability and decarbonisation policies is the lack of clear policies, followed by social and economic threats. In addition, adopting these strategies may reduce one’s intention to develop new technologies and generate new knowledge.

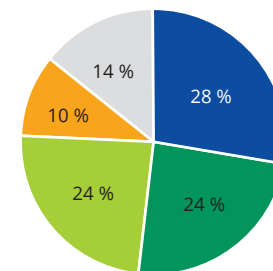


Figure 4. Key threats of adopting the sustainability and decarbonisation policies

■ Policy ■ Economy ■ Social ■ Technology ■ Knowledge & awareness ■ Environment

When performing the workshop, stakeholders were grouped into five teams, discussing and rating the main needs to benefit from strength to create opportunities and overcome the weaknesses to manage threats. The stakeholders specified three main needs:

- First need: Developing new methods to analyse the life-cycle performance of buildings;
- Second need: Clarifying the energy and climate policies;
- Third need: Improving collaborations between academia and industries.

#### Linnaeus Universities approach to response these needs

Research was conducted to investigate how simultaneous changes in energy prices, interest rates, future climate conditions, and lifespan affect the techno-economic performance of renewable energy supply systems. For this purpose, different climate data files based on Special Report of Emissions Scenarios, A2 storyline were generated. In addition, sensitivity analyses were performed to determine how the techno-economic performance of renewable energy supply systems was affected based on changes in energy prices, interest rates, future climate conditions, and lifespan. The output was published as two open-source journal publications in top quality journals (Q1; SJR citation index).

1. Jalilzadehazhari, E., Pardalis, G., Vadiiee, A. (2020). Profitability of various energy supply systems in light of their different energy prices and climate conditions. Buildings. 10.

2. Jalilzadehazhari, E., Vadiiee, A., Johansson, J. (2020). Subsidies Required For Installing Renewable Energy Supply Systems Considering Variations In Future Climate Conditions. Journal of Building Engineering.

Furthermore, Linnaeus University built a consortium for Horizon 2020. The project answers the call “Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal [H2020-LC-GD-2020]” by supporting climate resilient pathways for sustainable buildings, thereby promoting sustainable city development. The main objective of this project is to test, in the light of ramping up and broad replication, the sustainability performance of new and innovative technologies through the whole value chain and operate it to new practices. The consortium includes 22 partners from 12 different countries. Along with these activities, Linnaeus University works with regional and local small and medium size companies to proceed towards sustainable growth, practically in the areas of forest bio economy, energy and built environment.

#### 1.4.4 Option 4 – Zlín region (Czech Republic)

First Workshop with LSG (Local Stakeholder Group) to discuss regional challenges:

There were 2 workshops organised to discuss regional challenges in the Czech Republic with the presence of relevant stakeholders identified in the earlier stage of project implementation and enlisted in the part 3 of the developed regional diagnosis. Both workshops were focused mainly on discussing following issues that are closely related to the LC DISTRICTS project goals.

1. Presentation of the current state of preparation of OP Environment 2020-2027
2. Main parameters of the new OP Environment - changes from the current state
3. Combination of grant and EPC - possibilities and pitfalls
4. Financial instruments, possibilities of co-financing
5. Comprehensive preparation of complex projects

It was proposed to make the OPE more attractive for municipalities. The issue of today is that there are many subsidy programmes available to municipalities with differing level of funding as they support a variety of measures.

The group was informed that in the new programming period, there will be one fund for public buildings retrofit, strictly defined.

As it stands now, OPE strategic aim 5.1. public buildings retrofit, money still available in the allocation, a new call was opened in March 2021, budget per project is around 2.5-3mld CZK and projects have to be completed by 2023. Some modifications will be introduced, including an increase of unit costs, new categories of eligible expenditure in shielding, lighting, and acoustics. For new-builds in passive standard, strategic aim 5.2. a Programme change is anticipated. Strategic aim 5.3. TBC has low uptake.

#### ***Main parameters of the new OP Environment - changes from the current state***

New Programming Period – financing scheme still to be approved on EU level, anticipated during German EU presidency. Some aspects of framework definition are still being negotiated, however it is anticipated a more or less same amount would be allocated into OPE as it was in the current programming period. An effective use of funds is viewed as a major challenge. Public buildings will remain within the OPE, apartment building will be transferred to the New Green Savings Programme.

On a national level a partnership agreement, a new unified framework and an upgrade of MS 2014+ system are being discussed. The definition of a new OPE had already started, technical working groups have been established. It is foreseen it will be eligible to combine measures from different strategic aims, if these make up to 25 % of another strategic aim. There is no standing draft, just documents of intervention logic. The next meeting of a Platform for the preparation of a new OPE took place mid-January 2020.

#### ***Combination of grant and EPC - possibilities and pitfalls & Financial instruments, possibilities of co-financing***

Its added value is a continuous management of the building and monitoring of energy savings. Several years after implementation the owner knows the current condition of its assets. A combination of EPC and subsidy supports complex projects and has proved popular among beneficiaries. It is crucial to resolve an issue with payment of invoices, which needs to be discussed with the Ministry of Finance.

#### ***Comprehensive preparation of complex projects***

It was revealed two additional measures are being planned: a) state communication campaign to all types of beneficiaries, and b) systematic support of project preparation. Ministry of Industry and Trade programme EFEKT is to increase its allocation; to improve support and assistance – to citizens: energy consultation and information centres, and to municipalities: energy manager positions, and to prepare investment actions thoroughly.

Main finding mentioned above would be considered in development of the regional diagnosis as well as the following LCD action plan.

## Second Workshop with LSG (Local Stakeholder Group) to discuss possible solutions

Due to the pandemic situation, it was not possible to organize seminars and workshops in person for a large number of participants, so the format of meetings in small stakeholder groups was chosen. In particular sessions representatives of EAZK met with various stakeholders. Each meeting started with a detailed acquaintance with the current version of regional diagnostics. Then the attention of the participants was focused on part 5 of the document, which summarizes the main ideas that regional diagnostics brings. It provides an overview of the monitored process and reveals key findings of the LC Districts project. Last but not least, this part forms the basis for the creation of systemic regional action plans, which will be developed in the next part of the implementation of the LC Districts project. Minutes from all the meetings were recorded and findings and recommendations were incorporated into regional diagnosis.

### 1.4.5 Option 5 – North-West Croatia

The stakeholders of the process have already been identified, they participated in several meetings and they are acquainted with the LC Districts project and its goals and envisaged deliverables. Nevertheless, some process parts will relate to the ones already taken to some extent. We plan to have 2 major sessions broken up in smaller thematic focus groups:

#### Session 1:

1. Explanation of the overall context and the focus of the project with emphasis on what has been done globally (on the level of the project) and locally in Croatia – group work;
2. Thematic focus of smaller groups is to present actual project cases with all integral parts, followed by the discussion on the activities, identified barriers and steps needed to overcome them;
3. Local coordinator will collect all the inputs and synthesize the concerned issues, as a baseline for the second session.

#### Session 2:

Session 2 is a high-level session with decision makers as a follow up on the workshop organized as a session 1. The idea is to connect the identified barriers and solutions on the actual project development and execution with the needed connection towards legislative changes and inputs for the programming of the EU structural funds usage.

1. Explanation of the overall context and the focus of the project with emphasis on what has been done globally (on the level of the project) and locally in Croatia – presentation;

2. Presentation of the synthesized outputs of the session 1 to the decision makers and representatives of the high-level authorities responsible for policy making and operational programmes programming;
3. Discussion and collection of feedback for stakeholders that took part in the session 1.

Local coordinator will facilitate both workshops and serve as a harmonizing body to ensure synergies will be drawn and both ways communication is smooth.

## 1.5 Phase 5 SWOT analysis

Thanks to the participatory approach followed up with the stakeholders, LC Districts regional teams elaborated internally a SWOT analysis per each region. The SWOT analysis consists on classifying all the issues gathered during the workshops and other interactions with the stakeholders in: internal or external, and positive or negative.

	Positive/useful	Negative/aware
Internal	<b>Strengths</b> S	<b>Weaknesses</b> W
External	<b>Opportunities</b> O	<b>Threats</b> T

This is a broadly used and known tool that, in our case, will show the positioning of the region to achieve low carbon urban areas and the sector perspectives in a quick and easy overview.

In general terms, in all the regions, there is a lack of social awareness, which is the main weakness. In addition, the lack of coordination between different actors can be emphasized among regions, where a holistic approach to achieving a low-carbon policy could be developed. On the other hand, all region partners perceived future Regional Action Plans as an opportunity to adapt national and municipal strategies and policies to the new environmental requirements.

## 1.6 Phase 6 Conclusions

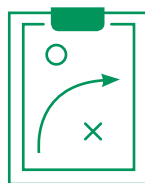
Finally, during the project the partners ended their regional diagnosis drawing main conclusions. This section summarizes main ideas brought by the regional diagnosis exercise which will be used to draft the first version of the future Regional Action Plans (RAP). It provides an overview of the process followed and exposes key findings in LC Districts logic. Challenges were identified for each project line and will be solved thanks to the regional action plans, by changing the regional policies.



Regional diagnosis



Regional policies



Action Plan

In this case, our project aims at facilitating the transition to Low Carbon Districts through improving low carbon economy policies and thus, present the overall reasons why administrations should take an active role in achieving a decrease in energy demand for residential building through:

1. renovation and construction of energy efficient buildings,
2. creation and renovation of district heating,
3. other urban renovation actions.

## 2 MAIN FINDINGS AND CONCLUSIONS OF THE 5 REGIONAL DIAGNOSES DEVELOPED

In this section, main findings and conclusions of the 5 regional diagnoses are going to be summarized.

Thanks to this methodology, all the regions involved in LC Districts project have developed their regional diagnosis. The following annexes contain an abstract of the 5 Regional Diagnoses, giving a general overview of them.

In addition, a template has been drafted to have the same structure and information in each regional diagnosis.

### 2.1 Navarra region (Spain)

#### 2.1.1 Abstract

Navarra is no stranger to the global challenge affecting the sustainability of its cities. The solution consists of the use of renewable energies and, in particular, of improving energy efficiency in various sectors, including that of construction.

The Navarra Community has placed great effort into promoting the energy renovation of its buildings and the region is one of the forerunners in Spain in this regard. However, there is still a long way to go. The global intervention plans of the European projects Lourdes Renove and Efidistrict are among the most noteworthy initiatives, and have served as a model for many other undertakings in other places, in addition to the aid managed by the Navarra Government Housing Department and the renovation offices (ORVE in Spanish) network through an open call, thereby ensuring a stable framework.

The Government of Navarra leads the LC Districts project. It was created to analyse the initial situation in which the region finds itself and the difficulties it faces from the point of view of governance, information resources and technical management to promote the decarbonisation of its cities. This project consists of an exchange of experiences with other European regions, experiences that are analysed and assessed as a means of inspiration in the search, together with the key regional stakeholders involved in the process, for solutions to improve our policies.

#### 2.1.2 General national vision

The Spanish population is growing and tends to migrate to cities with the consequent increase in housing stock.

Final energy consumption has again begun to increase after a period of 7 years in which the crisis caused it to drop slightly. In 2018, 18% of this consumption came from renewable energies, a percentage similar to the European average.

The main energy consuming sectors are transport, construction, and industry.

The consumption of buildings has been on the increase and now accounts for 31% of the total. However, it should be pointed out that energy consumption in Spanish homes is between 25% and 30% lower than the European average due to a lower demand for heating due to our country's climate. In contrast, consumption of electricity in homes is increasing due to the use of air conditioning, among others.

The laws on buildings have evolved in line with the implementation of community guidelines, more specifically:

- The Technical Building Code (a regulatory framework that establishes the requirements buildings are required meet in relation to basic safety and habitability criteria) has been tightened up to meet the sustainability criteria required by the EU.
- A long-term strategy for energy renovation in the construction sector in Spain has been drawn up, an energy inventory of government buildings with the obligation to renovate 3% of the surface of these buildings annually to set an example, in addition to the obligation to take into account high energy performance requirements in the acquisition of buildings, the leasing of buildings for administrative use and contracts resulting in the construction of a building in certain cases.
- Various plans and programmes have been launched with funds to promote the improvement of energy efficiency and the sustainability of buildings.

### 2.1.3 General regional vision

The population of Navarra is no different to the global trend and is growing, as is its housing stock, with an increase of over 50% in the last 30 years.

As is the case at national level, the transport, industry and residential sectors are the main final consumers of energy. However, the relative weight of the industrial sector is greater and that of the residential sector registers a lower percentage.

Navarra is aligned with the European strategy for 2030, drawing up plans to achieve energy transition (a reduction in energy consumption, energy conversion and a reduction in GHG emissions):

- 'PEN 2030 - 2030 Horizon Energy Plan' to move towards an energy mix, guaranteeing supply security, reducing energy poverty, and leading the way in renewable energy innovation.
- 'Roadmap: Climate Change in Navarra 2017-2030-2050' (HCCN in Spanish) with the aim of implementing measures to combat climate change in the region.
- Efforts have also been made to raise the awareness of citizens through workshops and guides developed in projects such as SustainAVility.

Regarding buildings, Navarra is subject to Spanish regulations, however it has its own regulations at the urban level. Likewise, it has its own laws on housing matters. As for housing, 'The Navarra Housing Plan 2018-2028' includes, among its objectives, the improvement of energy efficiency in residential buildings. So far, the main measure geared to achieving this goal has been the improvement of their thermal envelopes. Navarra is a forerunner in this area and more than 100,000 homes have been retrofitted since 1985 through grants from the Government of Navarra and with the support of the network of renovation offices (ORVE) assisting developers in the process. The criteria for improving energy efficiency in homes have been specifically included in the decree for this aid since 2008. In the area of new construction, the region's commitment to sustainability also stands out, and has led the way in the construction of social housing in compliance with almost zero consumption standards.

### 2.1.4 SWOT analysis

We worked with the local group of stakeholders in Navarra, creating three groups to analyse each of the 3 thematic areas from three different points of view.

i. Information and assessment methodologies and services for the design and implementation of low-carbon districts and municipalities;

Name assigned to this group of stakeholders	<ul style="list-style-type: none"> <li>• "Social Framework"</li> </ul>
Who this group represents	<ul style="list-style-type: none"> <li>• Developers and beneficiaries of active and passive actions to improve energy efficiency and supply</li> </ul>
Perspective in the analysis of the challenges	<ul style="list-style-type: none"> <li>• The point of view of demand</li> </ul>

The first group conducted an analysis and debate of several challenges that prevent rapid energy transition in buildings, thereby concluding the standpoint of our region in relation to the information and guidance available to the public:



ii. Information and assessment structures at the municipal and district level;

Name assigned to this group of stakeholders	<ul style="list-style-type: none"> <li>• "Services Framework"</li> </ul>
Who this group represents	<ul style="list-style-type: none"> <li>• The technical parties that design, develop and implement actions to improve efficiency and energy supply</li> </ul>
Perspective in the analysis of the challenges	<ul style="list-style-type: none"> <li>• Point of view of supply</li> </ul>

The analysis and debate of 8 challenges by this group served to conclude the standpoint of our region in relation to information and management structures at the municipal and district level:



iii. Governance and management policies and programmes.

Name assigned to this group of stakeholders	<ul style="list-style-type: none"> <li>● “Strategic and regulatory framework”</li> </ul>
Who this group represents	<ul style="list-style-type: none"> <li>● Local government authorities in charge of creating policies to incentivise private-public collaboration initiatives for the transition to carbon-free cities</li> </ul>
Perspective in the analysis of the challenges	<ul style="list-style-type: none"> <li>● Institutional point of view</li> </ul>

The analysis and debate of 7 challenges by this group served to conclude the standpoint of our region in relation to the governance and management of policies and programmes.



### 2.1.5 Main findings and conclusions of the abstract

The work conducted with experts and key stakeholders regarding the transition to low-carbon cities reveals that our community requires a plan of action with a series of measures we could group in 3 types, geared to overcoming the current barriers to this transition:

- Education, training, information, and awareness-raising: a lack of social awareness is a clear weakness in all areas and is a challenge that will need to be dealt with in the short, medium and long term.
- Organisation, coordination, and services provided: until now the government authorities have executed isolated initiatives in an attempt to achieve sectoral decarbonisation.
  - The definition of a common line of strategy.
  - The creation of a centralised body will help to convey a clear message to the public, in addition to comprehensive guidance.
  - The creation of communication channels and multidisciplinary teams between the different bodies.
- The development and adaptation of the regulatory framework: the need for the government authorities to assume a proactive role is evident.
  - *Regulating*: the implementation of certain mandatory minimums in relation to energy efficiency and renewable energies pursuant to a schedule.
  - *Facilitating*: amending the regulatory framework to promote the creation of renovation cooperatives and energy service companies; creating a guarantee fund to facilitate financing for developers. Municipalities can also incentivise the renovation of residential complexes in municipal ordinances.
  - *Incentivising*: conditioning aid to the objectives achieved, in addition to support for projects that use local resources.

The 3 work groups have analysed challenges the solution to which is to improve these three aspects.

Moreover, the opportunity Navarra now has to design its own future through a coordinated and consensual strategy among all the different stakeholders is seen in an extremely positive light. The region has a network of offices which are a major asset and provide great potential with regard to promoting the implementation of the one-stop-shop principle, as well as regional aid and the Global Intervention Project (GIP), which has gained widespread acceptance due to the fact it promotes the regeneration at urban scale, although it would need to undergo further development in order to be comparable throughout the region.



To conclude, Navarra's housing stock, even though it registers considerably lower CO<sub>2</sub> emissions than the European average, also needs to be transformed to render the region's urban districts carbon neutral. Nevertheless, the different local authorities are clearly determined and the region has a sturdy structural base and the experience to achieve this in the long term.

## 2.2 Marche region (Italy)

### 2.2.1 Abstract

The general objective of the LC Districts is to facilitate the transition to Low Carbon Districts through improving low carbon economy policies and thus, present the overall reasons why administrations should take an active role in achieving a decrease in energy demand for residential building through:

1. renovation and construction of energy efficient buildings,
2. creation and renovation of district heatings,
3. other urban renovation actions,

Among the main results of the project are the Regional Diagnosis Reports (Housing, district heating systems and urban regeneration practices/procedures/processes/policies, Guide to Good Practices, Road Map of policies, Summary of regional policies and Regional Action Plans with recommendations for integration into RIS<sub>3</sub>.)

Main start points:

1. Regional policy background
2. Energy efficiency in buildings
3. Programmes and initiatives supporting LC transition in the regional sector
4. Stakeholders map of the regional LC transition sector
5. SWOT analysis of the regional LC sector

The stakeholders who will benefit from the project will be all the actors in the real estate sector and in the management of structures, construction, renovation of buildings, district heating and urban regeneration at regional, national and community level, such as regional, national and multinational industrial and service companies, industrial associations and federations, clusters, specific associations of SMEs, Universities and RTO, national representatives, regional and local building and housing authorities (ROP MA).

The participatory section with the stakeholders is important because it will give us the main challenges that we will have to face in the near future. These conclusions will be used to design the RAP.

### 2.2.2 General national vision

Italy is pursuing the widest use of instruments that improve energy security, environmental protection and accessibility of energy costs, contributing to the European objectives in the field of energy and environment.

The content of the New Green Deal is expressed in various forms and directions, including the transposition of the Community Directives implementing the Energy and Climate targets.

The *National Integrated Plan for Energy and Climate* (PNIEC in Italian) sets binding 2030 targets on energy efficiency and reduction of consumption equal to 43% of primary energy (39.7% in terms of final energy), on renewable sources and on the reduction of CO<sub>2</sub> emissions.

The analysis and results of the energy efficiency policies of our country, return the figure of gross domestic consumption of primary energy in slight growth: fossil sources cover about 80% of primary energy demand, however, the share of renewable sources is constantly growing.

The only sector with significant growth is the civil sector, which becomes the main actor of efficiency interventions, which also contribute to the achievement of emission reduction targets.

The energy consumption of the residential sector is due to:

- a high degree of energy inefficiency of utilities;
- a high degree of thermal dispersion in winter and summer.

The Ministry of Economic Development promotes energy efficiency in buildings through regulatory measures (energy certification APE) and facilitation (deductions, incentives) and other planning tools: *Plan for the increase of nearly zero-energy buildings* (Panzeb).

### 2.2.3 General regional vision

The Marche region is characterized by the presence of 239 small and medium-sized cities: 70% of population growth is concentrated in urban systems. Currently these areas suffer from numerous elements of imbalance and require complex response strategies. In addition, 87 municipalities were affected by the 2016 earthquake, which damaged a large part of the housing stock and public (especially schools) and private energy-intensive facilities. Historical data show a trend in terms of a significant reduction of new buildings compared to the past.

Also in the Marche, the civil sector (residential and services) is the most energy-intensive.

Assessing its potential - the presence of part of the obsolete heritage and its contribution in the Regional Energy Balance - a significant reduction in the growth of energy consumption is possible through energy policies aimed at efficiency. Public Building Stock will certainly play a key role in this process of energy upgrading. The sample analysis of the regional Energy Performance Certificates (APE) archive shows that most of the buildings evaluated have low energy classes.

The objectives and strategies of the Regional Environmental Energy Plan 2020 (PEAR in Italian):

- Reducing the gross final energy consumption. Strategy: Environmental-energy efficiency of buildings through the refurbishment of existing buildings or demolition and reconstruction, public lighting, production processes.
- Increasing the production of heat and electricity from renewable sources.

The energy transition in cities is led by the Covenant of Mayors whose signing Signatories endorse a shared vision for 2050: accelerating the decarbonisation of their territories, strengthening their capacity to adapt to unavoidable climate change impacts, and allowing their citizens to access secure, sustainable and affordable energy.

#### 2.2.4 SWOT analysis

The three issues that the LC Districts team of the Marche Region had identified as priorities of interest were:

- a) ITACA and Urban ITACA protocol
- b) Regional Sustainable Development Strategy
- c) Environmental assessments

On these three issues, the stakeholders discussed to carry out the SWOT analysis.

- a) ITACA and Urban ITACA protocol

From the debate, it emerged how the ITACA protocol is already widely introduced in the energy issues of the Marche Region and how it has the strength of being a fundamental tool for verifying the energy efficiency of planned interventions. It also allows to indicate which interventions should be financed with more benefits.

There remain some doubts about the technical application of the tool which therefore has the weakness of still being little tested, also because it is still voluntary.

These problems can be overcome by the simplification that is being done at a national level and which can be a great opportunity to spread the use of the tool more and more among the technicians of public and private bodies.

#### b) Regional Sustainable Development Strategy

One of the strengths that has emerged is that the overall planning allows for clearer identification of the interventions that can deliver the greatest benefits in terms of energy efficiency. This also allows to optimise resources with respect to other parameters such as environmental, social and economic parameters.

The biggest shortcoming identified in the use of calls are the administrative and technical barriers for call beneficiaries, who often do not respond to the requirements of the call itself. This is both because of the administration process of calls and because they do not always have sufficient technical knowledge of the energy sector.

In the Marche region, also thanks to the initiative of the Covenant of Mayors, work has started with small municipalities (CIS experience), which provides a great opportunity for the creation of energy communities that are a good example of low-emission districts.

Some threats remain, such as the need to protect the cultural heritage in many areas of the Marche, which is therefore not always suitable for technological innovation.

#### c) Environmental assessments

The strength of the environmental assessments is their linkage to regional legislation on sustainable construction, but weaknesses remain, particularly in relation to the monitoring of plans and the lack of specific indicators.

It is also an opportunity to obtain the information needed to promote the sustainability criteria for land-use and urban transformations, which make it possible to ensure that the impacts themselves are mitigated. While the main threat is the possibility of ignoring them without the possibility of intervention. An interesting challenge is the possibility of setting clear concrete sustainability targets to be included in effective monitoring plans.

## 2.2.5 Main findings and conclusions of the abstract

### 2.2.5.1 ITACA and Urban ITACA protocol

The Marche Region is one of the first Italian regions to apply the ITACA Protocol and is the ITACA National Coordinator, which is why it is a virtuous example in the use of this tool. The table below shows the main challenges that emerged in the debate with stakeholders.

Data from the regional analysis	Challenges and possible solutions identified
<b>Difficulty in the technical application of the protocol by the technicians of public and private bodies</b>	Simplify the ITACA tool (align the regional tool with the PDR UNI 13/2019)
<b>Need to have an overall planning and not a single punctual intervention</b>	ITACA URBANO tool can become a tool for evaluating the energy planning of entities
<b>Cultural, and sometimes technical, distrust of the effective application of the protocol also due to its voluntary nature</b>	Give more space to the training of technicians, both private and public bodies, in relation to the instrument

### 2.2.5.2 Regional Sustainable Development Strategy

The use of regional funding calls is the theme that was most interesting for the audience of stakeholders. The table below shows the main challenges that emerged in the debate with stakeholders.

Data from the regional analysis	Challenges and possible solutions identified
<b>Need to have an overall planning and not a single punctual intervention</b>	Conceive financing of interventions in a system logic and no longer per single intervention
<b>The importance of a Sustainable Development Strategy that takes into account not only energy matrices in planning</b>	Possibility of including environmental, social and economic criteria in the tenders to have an increasingly integrated design
<b>Highlight the administrative and technical barriers for which the beneficiaries of the calls are unable to respond to requests</b>	Strengthen preventive training and technical-administrative support to the beneficiaries of the calls

### 2.2.5.3 Environmental assessments

The last point analysed was one relating to environmental impact assessments which brought out some interesting challenges. The table below shows the main challenges that emerged in the debate with stakeholders.

Data from the regional analysis	Challenges and possible solutions identified
<b>The Strategic environmental assessments are already included in the urban planning legislation</b>	Identification of addresses for urban planning at the municipal level
<b>In the application of environmental assessments, specific indicators and reference targets are lacking</b>	Identification of a set of indicators for monitoring environmental effects
<b>The importance of a Sustainable Development Strategy that takes into account not only energy matrices in planning</b>	Greater synergy with the regional strategy of sustainable development

## 2.3 Småland region (Sweden)

### 2.3.1 Abstract

Sweden's climate with cold winters together with its stretched shape, where energy production is mainly in the north and consumption in the south set specific requirements on the energy system concerning transfer capacity. The increased urbanisation and need of buildings in urban areas intensifies this need. The on-going shift to renewable resources also adds on the need of flexibility of the system.

The region Småland and Islands has a priority to support the shift towards a low-carbon economy in all sectors. Building sector is prioritized due to its large climate impact together with regional potential with access to bio-based building materials and unexplored potential as resource for bio-based energy purposes.

All four counties in the region (Gotland, Jönköping, Kalmar, Kronoberg) have high ambitions concerning energy use. During last years a positive trend is shown in the region. To reach the set-up targets there are still several things to be done. Through LC Districts data has been collected to improve understanding of regional energy perspectives in building sector. Three needs are considered critical to solve. First need developing new methods to analyse the life-cycle performance of buildings. This occurs since several stakeholders with various preferences are involved in constructing new buildings or renovating existing ones. Second need concerns the energy and climate policies, regulations and instruments that should be introduced more clearly. In addition, their impact should be described. Third need is improved collaboration between academia and industries. Such collaboration is important to develop products and services for the future.

### 2.3.2 General national vision

The geographical location together with the shape of the country sets specific demands on the energy system in Sweden. Cold winters require efficient heating systems and well insulated buildings. This gives the building a large climate impact in the building phase with large material consumption. The stretched shape of Sweden is another issue. Electricity production is located to a large extent in the North and consumption is mainly in the South. This requires efficient power grids with large transfer capacity. Transition to renewable energy production puts high demand on flexibility of the system. The length of the country is also challenging from the transport point of view. Flexible production, energy storage, increased transmission and flexible users are all possible future paths. Probably a combination of several techniques is needed and is all part of future development.

The building and service sector in Sweden stands for the largest consumption of energy corresponding to 39% of the total energy use. Future targets for Sweden are:

- By 2045, net zero emissions, of which at least 85% of the reduction of emissions will take place in Sweden.
- Greenhouse gas emissions should be 63% lower in 2030 compared to 1990 (applies to activities that are not covered by the EU Emissions Trading System).
- Emissions from domestic transport excluding domestic flights should be 70% lower in 2030 compared to 2010.
- Energy use should be 50% more efficient by 2030 compared to 2005 (through reduced energy intensity).
- Electricity production will be 100% renewable in 2040 (but it is not a deadline that prohibits nuclear power).

### 2.3.3 General regional vision

Småland and the islands covers the four counties: Jönköping, Kronoberg, Kalmar and Gotland. The region consists of 34 municipalities, with a total population of over 800,000. The Småland and the island region faces problems regarding sparse population structure. Urbanisation is on-going with focus towards a few urban areas in the region. The region faces challenges in terms of business structure with a focus on manufacturing industry. The rate of growth among the many small and medium-sized enterprises is low. There are few knowledge-intensive enterprises and low level of investments in research and development. An overall benefit for the region is its large biomass resource from forest and agriculture that can be used for efficient energy production.

The amount of the total energy use in the region was nearly unchanged during the past decade. The share of non-renewable energy resources for producing electricity and supporting heating and domestic hot water demands has, however, significantly decreased. A large positive impact has been received from the building sector through increasing amount of building stock connected to biomass-based district heating systems.

Regionally each county within sets up its own energy and climate policies in relation to national targets. Overall high ambitions are set up. A guiding example is that by 2050, Kronoberg County will be a plus energy county. This means that renewable energy and biofuel production will cover total energy use in the county. In addition, the county will have the possibility to export energy produced by renewable energy sources.

### 2.3.4 SWOT analysis

We worked with our stakeholders in a workshop format. The workshop was based on questions answered beforehand related to the SWOT analysis. In total the workshop included 26 participants with a well-balanced mix of companies, institutes and governmental organizations.

*i. information and assessment methodologies and services for the design and implementation of low-carbon districts and municipalities;*

#### Strength

- Use of local materials
- Healthy indoor environment
- Improves indoor comfort and occupants' health
- Low operation costs
- Increased value

#### Weakness

- Lack of knowledge even when new methods are available
- Expensive solutions
- Lack of a holistic approach
- Difficult to implement energy efficiency measures for owners with low income
- No clear rules regarding financial aids
- Low energy cost
- Lack of information for beneficiaries
- High investment cost

### Opportunity

- More digitalized industries to cope with costs
- More automatized industries to cope with costs
- Collaborations between actors
- Contributing in national economic growth

### Threat

- Profitability

*ii. information and assessment structures at the municipality and district level;*

### Strength

- Use of local materials
- Health indoor environment
- Improves indoor comfort and occupants' health
- Low operation costs

### Weakness

- Bureaucracy
- No political decisions to stimulate energy efficiency measures or energy efficient constructions
- Fire and moisture risks with timber buildings
- Lack of knowledge even when new methods are available
- Expensive solutions
- Lack of a holistic approach
- Difficult to implement energy efficiency measures for owners with low income
- Need for a better education
- Availability of research centre
- Lack of a tool to evaluate cost, comfort, CO<sub>2</sub> emissions
- High complexity
- Lack of information for beneficiaries
- Reluctance of designers to leave their comfort zone and adopt new technologies or methods
- Lack of national and municipal strategies
- Lack of norms
- Insufficient training of specialist

### Opportunity

- More timber buildings
- Modern technology development to use traditional materials
- Developing alternative materials

### Threat

- Profitability
- Too much transport may be needed
- Risk of low energy saving or poor indoor comfort after renovations

*iii. policies and programmes governance and management.*

### Strength

- Has benefits in global level
- Improves indoor comfort and occupants' health
- Low operation costs
- Increased value
- Reduced emissions of greenhouse gases

### Weakness

- Difficult to change norms in construction industry
- Difficult to implement energy efficiency measures for owners with low income
- Need for a better education
- Availability of research centre
- High complexity
- Low energy cost
- Lack of information for beneficiaries

### Opportunity

- Possibilities to exchange experience and knowledge between actors
- More timber buildings
- Collaborations between actors
- Contributing in national economic growth
- Modern technology development to use traditional materials
- Positive environmental balance

### Threat

- Risk of low energy saving or poor indoor comfort after renovations

### 2.3.5 Main findings and conclusions of the abstract

In the discussions with our stakeholders three main needs were specified according to them:

- First need: Developing new methods to analyse the life-cycle performance of buildings since several stakeholders with various preferences are involved in constructing new buildings or renovating existing ones.
- Second need: The energy and climate policies, regulations and instruments should be introduced clearly. In addition, their impact should be described.

- Third need: Improving collaborations between academia and industries as research work in universities are taken up by the industry and turned into products and services.

*To meet and learn more about these needs we have on-going related activities serving as starting point for future work within the LC districts project.*

- First need: Developing new methods:

A decision-making method was previously developed at the University in 2018. The method allows to compare tens of thousands of design alternatives and selecting a design with lowest energy consumption and cost, while improving indoor comfort. The decision-making method was developed further to reduce the carbon footprint of the design as well. The method will be presented at the 2020 MITAB Applied Energy Symposium (virtual conference, August 13-14, 2020). Title of the conference paper: Expanding the application of a decision-making method to proceed toward sustainable buildings.

- Second need: Analysing the economics of energy policies

The implications of different energy prices, interest rates, lifetimes and climate zones on the profitability of renewable energy supply systems were analysed. Results were published in:

Jalilzadehazhari, E., Pardalis, G., Vadiie, A. (2020). Profitability of various energy supply systems in light of their different energy prices and climate conditions. Buildings. 10. The effects of future climate conditions on subsidies required for installing renewable energy resources in a detached house were evaluated. A paper was submitted in the "Energies" journal. Currently, it is under review. Title of the paper: Subsidies required for installing renewable energy supply systems considering variations in future climate conditions

- Third need: collaborations between academia and industries. In collaboration with the regional Forestry and Wood strategy, a strategic development work lead by the regional county boards of Kronoberg, Kalmar and Jönköping A thematic school with industrial participants about building issues was initiated and conducted as a number of on-line workshops. Several topics has been included to cover energy and climate aspects. The workshops are open to all interested.

## 2.4 Zlín region (Czech Republic)

### 2.4.1 Abstract

The overall objective of the "Towards low carbon city districts through the improvement of regional policies" project (LC Districts project) is to improve regional development policies and programmes in the areas of building renovation and construction of energy efficient buildings, creation and renovation of district heating and other urban renovation actions, in order to facilitate the transition to low-carbon districts and municipalities.

Regional Diagnosis is one of the main outputs - besides Method Guide, Diagnosis reports of the regional building stock, district heating and urban renovation sectors, Good Practice Guide, Policy Road Map, Regional Policy Briefs and Regional Action Plans which include findings and recommendations for integration into RIS3 and other sectorial strategies. Stakeholders benefiting from the project will all be actors in the real estate and facility management, construction, buildings' renovation, district heating and urban renovation sectors at the regional, national and EU level.

Regional diagnosis follows the proposed methodology and has been developed in close collaboration with the Local Stakeholder Groups. The report followed the pre-defined template and included a thorough analysis of the existing support measures and policies (Good Practices), regulatory framework, policy gaps, etc. in the three thematic areas proposed. The analysis facilitates the identification of suitable Good Practices, their matching with existing measures as well as the identification of synergies and complementarities between them for the development of systemic Regional Action Plans for the improvement of policy instruments in the three thematic areas proposed.

### 2.4.2 General national vision

In 2016, the Czech building stock consumed 408.5 PJ of energy (final energy consumption including cooking and household appliances) and was responsible for 34.6% of national CO<sub>2</sub> emissions (source: [www.tzb-info.cz](http://www.tzb-info.cz)).

In national concept, the Czech Republic is obliged by Energy Performance of Buildings Directive (EPBD) to achieve defined EU goals and implement own strategies to fulfil requirements. The main target of EPBD is to challenge the member states to meet the 2020, 2030 and 2050 targets to reduce greenhouse gas emissions, achieve a higher share of renewable energy in final energy consumption and increase energy efficiency. The National Energy and Climate Plan declares strategy to meet the EPBD target. National plan goal for carbon reduction in 2020 was already achieved in 2013. Next strategy to meet carbon target in 2030 is based on increasing energy efficiency, which implies reduction of the final energy consumption and also achieving the ratio of renewable energy sources in gross final energy consumption

for 2030. The national indicative long-term goal for 2050 is to reduce the national emissions of greenhouse gases by 80% compared to 1990, which represents 75% reduction in CO<sub>2</sub> intensity of the national building stock. Nowadays, there is a constant reduction of energy performance of the buildings. This trend is supported by financial resources (public funds) for the reduction of final energy consumption and carbon emissions.

Specific parts of the diagnosis deal further with deeper insight into national policy background, energy efficiency in buildings in the Czech Republic as well as programmes and initiatives supporting LC transition and energy efficiency policies and public funds at national level.

### 2.4.3 General regional vision

The Zlín Region is located in the eastern part of the Czech Republic as the administrating authority on the NUTS 2 level, with the population of 582 555 inhabitants (2020). As the administrating authority, the Zlín Region approves strategic documents, provides methodological support to its organizations and representatives of 292 municipalities (local governments). Between the regional and municipal level, there are still 15 towns (ORP, municipalities with an extended competence – market towns) performing activities associated with an extended power of municipalities.

The Zlín Region has the opportunity to influence the transition to low-carbon technologies through strategic documents and its own organizations (e.g. the Energy Agency of the Zlín Region), not only in all towns and municipalities of the Region, but also in its own organizations and organizations established and founded by local governments.

Basic characteristics:

Name of the region: Zlínský kraj (Zlín Region)

Population: 582 555 inhabitants

Area size: 3 963 km<sup>2</sup>

GDP 2018: 9.656 mil. EUR

GDP per capita 2018: 16 566 EUR



Picture – Zlín Region and its position within the Czech Republic

Specific parts of the diagnosis are dealing further with deeper insight into regional policy background, energy efficiency in buildings including energy efficiency trends and energy efficiency policies and public funding.

In this context, examples of projects administered by Energy Agency of the Zlín Region (EAZK) with the support of the OP Environment are introduced as well as other activities the Zlín Region implements through EAZK.

### 2.4.4 SWOT analysis

This section focuses on the sector diagnosis, which was carried out in a participatory way with the participation of regional stakeholders, who also have their own structured section in the document. SWOT analysis brings all the issues (internal or external, positive or negative) that define the sector perspectives. The results of the SWOT analysis are presented in the line of division of stakeholders according to the phases in which they enter the process of work with the OPE instrument into:

1. the level of the strategic and policy framework and the managing authorities
2. the level of service groups, facilitators, designers, architects, engineers, auditors etc.
3. the social level, users, citizens, public etc.

Among most important or challenging cross-sectional features are the following:

#### Strengths

- Upgraded developed district heating systems in cities producing electricity and heat
- Wide range of energy-saving technologies and equipment on the market
- Support for energy management and care for the environment by regional authorities
- Own regional energy agency with established and experienced team with many years of experience in the field of energy efficiency measures and projects

#### Weaknesses

- A long process for issuing a building permit for RES and energy recovery of waste
- Oversizing of some energy systems in relation to the current or future energy demand
- Reluctance of the public to accept the importance of energy savings measures

#### Opportunities

- Information campaigns for the population focused on energy savings and the use of renewable energy sources
- Modernization of energy equipment towards highly efficient technologies
- High use of RES and secondary energy sources and considerable potential for their use

## Threats

- Risk of energy price volatility
- Reluctance in cooperation between private and public sector
- Risk of failure to implement energy efficiency measures due to lack of funding
- Uneven size of energy demand in different parts of the region
- High share of one energy source in the energy balance - the threat of a possible attack

The whole comprehensive SWOT analysis is the part of the section 4 of the regional diagnosis.

### 2.4.5 Main findings and conclusions of the abstract

Main findings are summarized in the section 7.4.5 of the regional diagnosis. It provides the overview of the process followed and reveals key findings in LC Districts logic. Among key findings in each analysed level belong:

Level of strategic and policy framework and managing authorities

- The need to develop a methodology for the introduction of low carbon technologies
- The need to incorporate principles for the implementation of low-carbon technologies in the municipal planning of cities and municipalities, regions and in all strategic documents
- The need to introduce a system of evaluation of the development of cities, municipalities and regions in accordance with the trends of sustainable development
- The national level often gives the impression of a remote centre with a lack of ability to understand the real needs of municipalities and cities.
- There are massive changes in the area of operational programmes
- Targeted support of RES
- Regional energy concepts are often developed in a non-conceptual way and the responsible ministry does not consult its model for the national energy concept

Level of service groups

- The need to raise awareness among political representatives
- The need to develop cooperation between the public and private sectors, including individuals
- Training of office workers and municipality staff
- LAGs do not have a very forward-looking approach
- Targeted support of RES
- Community energy offers great opportunities for development

Social level, users, citizens, public

- Potential for the development of educational platforms
- Expanding funding opportunities for citizens
- The potential for the development of energy advisory services for citizens
- User-level planning process
- Community energy offers great opportunities for development

Challenges are identified in this chapter for each line of key actors, summarising the main ideas that regional diagnostics brings. It provides an overview of the monitored process and reveals key findings of the LC Districts project. Last but not least, this part forms the basis for the creation of systemic regional action plans, which will be developed in the next part of the LC Districts project implementation.

## 2.5 North- West Croatia

### 2.5.1 Abstract

Given the fact that the building sector is the largest energy-consuming sector, appropriate and systematic energy efficiency measures are necessary to carry out large-scale renovations in order to achieve European Union's energy and climate targets. In most cities, especially in the Urban Agglomeration of Zagreb (UAZ), buildings are often supplied by district heating systems that generate and distribute necessary heat energy.

Since most regional / local public authorities have already put large effort in improving development (and energy) policies, regional diagnosis is conducted in order to review building renovation programmes (in Croatia) with the aim of renovating both the building stock and heat distribution networks.

The regional diagnosis has been performed in three steps (thematic areas) to assess innovative low-carbon districts and municipalities, methodologies and services, structure at municipality and district level, as well as to revise policies and programmes governance and management. Parallely, as a core of regional diagnosis, stakeholder meetings have been organized to gather target groups (public authorities, industry, housing renovation sector, service companies, academia...) to put a joint effort into creating a synergy between future building renovation waves and modernization of district heating systems.

The reason for combining these two sectors within the regional diagnosis is to identify and connect energy efficiency measures and decarbonisation in urban areas, where district heating systems can significantly (in a coordinated way) integrate renewable energy sources within each building stock sector. At the initial



phase, overview of existing legislation has been given in both sectors, from national to regional (UAZ) level, alongside future policies such as low-carbon development strategy, energy strategy and national climate and energy plan (NECP). Also, two important aspects have been included (long-term strategy on mobilizing investments in Renovation of the National Building Stock and Operational Programme Cohesion and Competitiveness).

### 2.5.2 General national vision

Low-carbon development strategy sets a clear path for transition towards sustainable economy in line with both European and Croatian goals for 2030 and 2050. It consists of around 100 measures for different sectors (electricity and heat generation, fuel production, transport, households, services, industry, agriculture, etc.). These measures are integrated into three main scenarios – reference scenario, scenario of gradual transition and scenario of ambitious transition. Apart from the Strategy, the Action plan for implementation is created for 2021-2025 period and gives detailed description of measures, leaders, sources of financing, expected results, monitoring and verification, as well as the timeframe.

On the other hand, Energy Strategy of the Republic of Croatia gives top-down approach in analysis of different scenarios for the development of energy sector alongside with mandatory steps of reducing carbon footprint and increasing the share of renewable energy sources.

Furthermore, National climate and energy plan focuses on the principles of integration of strategic planning and reporting on the implementation of climate and energy policy between responsible actors. Among given measures, several of them are directly relevant for the national building stock:

- Charter of Cooperation for the Decarbonisation of Buildings by 2050
- Improving sustainability of urban areas
- Promoting the RES use for production of electricity and thermal energy
- Energy efficiency obligation scheme for suppliers
- Promoting NZEB standard in construction and refurbishment
- Energy renovation programme for multi-apartment buildings, family houses, public sector buildings, heritage buildings
- Energy management system in the public sector
- Energy management system in business (service & production) sector

On a three-year basis, the Republic of Croatia defines long-term strategy on mobilizing investments in Renovation of the National Building Stock as a part of National Energy Efficiency Action Plans. This strategy is based on:

- Very high long-term objectives for the national building stock renovation
- An overview of the national building stock to include all buildings in Croatia
- Clear and practicable financial models by 2050
- Three impacts of proposed policies and measures
- Expected energy savings for the purpose of better planning and monitoring of results
- Propose new long-term funding mechanism, as well as the plans and perspectives to ensure a stable investment climate for all market participants

Lastly, Operational programme Competitiveness and Cohesion in Croatia (OPCC) has strongly fostered the shift towards a low carbon economy in all sectors (thematic objective 04) including both building stock and district heating which has been included through specific mechanism of integrated territorial mechanism in urban agglomerations.

### 2.5.3 General regional vision

Operational Programme Competitiveness and Cohesion in Croatia (OPCC) does not have a regional context, as its applicability is national, no regional OPs have been implemented. Certain degree of decentralization is present in the form of implementation of so called integrated territorial investment mechanism (ITI). The mechanism assumes delegation of authorities to cities that are centres of urban agglomerations. In terms of LC District project, focus is put on the Urban Agglomeration Zagreb (UAZ). UAZ consists of 29 local self-government units and the city of Zagreb which is spread over two NUTS3 levels (the Zagreb County and the Krapina-Zagorje County) including 11 cities, 19 municipalities and 599 settlements.

Energy efficiency and renovation are an essential part of UAZ development strategy alongside green infrastructure, synergy of regional and spatial development, public spaces and facility management, waste management and many others.

The 2014-2020 regulatory provisions to EU Cohesion policy gave Member States new opportunities to use ESIF for sustainable urban development and other territorial strategies, particularly using Integrated Territorial Investment. Article 7 of the ERDF Regulation allows that approach. This mechanism allows certain degree of decentralization as cities that are centres of Urban agglomerations are given the role of Intermediary bodies in the ESIF systems. That means that they are taking part in the selection of projects to be funded, together with the relevant ministry in form of managing authority. In the first tranche of the implementation of the ITI mechanism in Croatia, 7 cities formed Urban agglomerations and some of them

opted to implement specific goal 4c3 – Increase of energy efficiency in the district heating systems from the OPCC. The only possible way to utilize the funds available for DH systems refurbishment was through the ITI mechanism.

City of Zagreb and some other cities in the UAZ have additionally expressed their vision and commitment through Sustainable energy and climate change adaptation action plans. These plans are prepared to serve as ex-ante analysis for new Operational programme programming in the domain of energy and climate change adaptation.

#### **2.5.4 SWOT analysis**

Regarding the building sector, SWOT analysis has shown that the majority of residential buildings (in almost all periods of construction) correlate with poor energy performance of buildings and would go under the lowest category of the energy certificate. On the other hand, Croatian legislation has been aligned with the European Directives in order to achieve national targets and goals. Therefore, programmes define investments, subsidy mechanisms and focus on energy efficiency as an investment priority.

Given the fact that majority of beneficiaries are still inexperienced in project preparation and implementation of public procurement procedures, especially in alternative procurement procedures, a threat of low rate of refurbishment presents a significant issue, especially if combined with raising prices of materials and fuel. Also, recent national disaster (earthquakes) furtherly put a strong emphasis on proper energy renovation of buildings which have become the main target in the UAZ. If one considers that next OP will also focus on reduction of energy consumption in both public and residential buildings, there is a strong will from all stakeholders to create a systematic and quality energy strategy.

Since UAZ is a strongly urban area, presence of sustainable district heating systems is inevitable with the aim of having centralized production of heat which is delivered through distribution network. However, current efficiency and financial structure has been identified as a major weakness – large number of leakages and higher costs for pipeline recovery. Also, current methodology for billing has to be adjusted to European Union's standard which will be a complex issue. This presents a major threat since current performance of district heating sector requires high temperatures which correlate with high energy losses. Also, very competitive individual heating options (especially natural gas) are creating a negative attitude toward district heating.

The share of the heat sector is expected to increase over the next few years as new incentives (and mechanisms) are revised and proposed (feed-in tariffs and a bonus scheme to promote the use of renewable energy in electricity generation and high efficiency cogeneration to promote the use of renewable energy and energy efficiency through CBRD and EPEEF). This approach should continue in the MFF 2021-2027.

#### **2.5.5 Main findings and conclusions of the abstract**

Operational Programme Competitiveness and Cohesion has significantly contributed to the increase of energy performance in the buildings and district heating sectors. The modality of running the projects in two aforementioned sectors was somewhat different in terms of management (national vs. regional/local (via ITI)). There are places for improvement in both sectors, but also generally in extracting synergies via comprehensive and joint planning and execution of project in both sectors. In the process of new OP development, crucial thing will be to properly address both sectors and devise synergies for maximal benefits. Alternative models of project financing (blending) and innovative procurement models will have to be more present.

Despite the different backgrounds of the five partners regions in terms of climate, energy sources, organizational structures and even social structure and cultures, we can draw some common main conclusions from the 5 regional diagnoses developed:

First, citizens need to be involved in the transition to low-carbon technologies. Citizens are the main stakeholders who need to be given special attention in the implementation of low-carbon activities, due to their lack of awareness of the benefits of energy efficiency. This is why regions are willing to make efforts in this area, such as educational platforms in the Czech Republic or one-stop-shops in Spain.

The second requirement, that the regions have drawn from their SWOT analysis, is a monitoring plan that brings together milestones and targets. For example, Marche region is about to develop the ITACA protocol, where the implementation of projects can be planned and monitored.

As part of the process to achieve a low carbon transition in the regions, a successful coordination between all the involved parties is required. In order to have synergies and benefit from them a public-private cooperation is essential. There is also a clear need for a coordinating body to promote common approaches and criteria and to play a leading role in action plans for the low carbon transition. For example, Navarra is about to create a new public energy agency, so in the context of exchanging experiences in LC districts, the energy agencies in Zlín and Northwest Croatia are good examples to consider.

In addition, each region stresses the need to train officials as well as technical staff to improve their skills with a focus on renewable energy and energy communities.

Another issue highlighted by the Regional Diagnostic is plans for the transition to a low-carbon economy. Long-term strategies are identified by all the regions as an opportunity to achieve this goal. These strategies are designed to achieve ambitious energy targets that address the issues raised by the regional diagnoses.

Taking all this into account, we can conclude that new laws and policies need to be introduced in the five regions to support the transformation and to achieve the European targets for reducing emissions, reducing energy consumption and using renewable energy sources, for which the future regional action plans will be very useful.





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