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DISSERTATION

Visioneering Low-Carbon Futures, a Case in the Central Dolomites

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Abstract .de

Diese Doktorarbeit beschäftigt sich mit Visioneering als Planungsinstrument in der italienischen Alpenregion Cadore. Dabei wird der Fokus auf den Beitrag von Visioneering-Prozessen für strategische Planungsansätze, die eine *Low-Carbon* Zukunft anstreben, gelegt.

Low-Carbon Bestrebungen stellen alpine Regionen, die Auswirkungen des Klimawandels bereits spüren, vor großen Herausforderungen. Die globale Erwärmung beeinflusst sowohl den Umweltschutz als auch gewöhnte Klimamuster, die eine wesentliche Grundlage für die ökonomische Entwicklung von alpinen Regionen sind. Der Abdruck des wirtschaftlichen, industriellen und tertiären Sektors gefährdet alpine kulturelle Strukturen aufgrund der wenig nachhaltigen Nutzung von natürlichen Rohstoffen.

Ein Planungsansatz, der eine *Low-Carbon* Zukunft als neue Möglichkeit berücksichtigt, könnte Handlungsalternativen stimulieren. Unter Visioneering kann ein Planungsansatz verstanden werden, der zukünftige Entwicklungsprozesse als verschiedene Möglichkeiten versteht. Er wurde an der Fachbereich für Regionalplanung und Regionalentwicklung an der Technischen Universität Wien eingeführt und vereint sowohl den *Envisioning-Prozess*, die Vorstellung von Visionen für die Zukunft als auch den Prozess, Wege aufzuzeigen, wie diese Visionen umgesetzt werden könnten. Der Begriff Visioneering verbindet die Wörten *envisioning* und *engineering*. Unter *envisioning* versteht sich die Fähigkeit, ein geistiges Bild über die Zukunft in Zusammenarbeit mit lokalen Entscheidungsträgerinnern zu entwickeln; *engineering* steht für die Verwendung der Fähigkeiten des Ingenieurs um das Bild in Handlungen umzusetzen. Visioneering berücksichtigt partizipative Prozesse, in denen lokale Akteure teilnehmen und so an der Gestaltung von möglichen zukünftigen Entwicklungen beteiligt sind.

Das Gebiet Cadore bietet sich deshalb gut für eine Untersuchung hinsichtlich einer *Low-Carbon* Zukunft an, weil es hier an einer klaren Energiestrategie fehlt, diese Region stark von fossilen Energieträgern abhängig ist und sie gleichzeitig vielfältige und wertvolle natürliche Ressourcen aufweist. Das Gebiet befindet sich im nördlichen Teil der Veneto-Region und schließt auch den zentralen Teil des Dolomiten UNESCO-Weltkulturerbes mit ein. Sie setzt sich aus 22 Gemeinden zusammen.

Die grundlegende Annahme hinter der Forschungsfrage ist, dass der Visioneering-Ansatz die *Low-Carbon* Zukunft eines Territoriums, wie sie das Gebiet Cadore darstellt, ganzheitlich untersucht und so neue Anreize in Richtung alternative

Zukunftsstrategien setzt. Diese Forschungsarbeit versucht darzustellen, inwiefern Visioneering zu strategischen Planungsansätzen, die eine *Low-Carbon* Zukunft verfolgen, beiträgt.
Deshalb wird die Forschungsmethode ‚Action Research Through Design', angewendet, denn es wurden territoriale bzw. lokale Handlungsoptionen ausgearbeitet, um mehr Wissen über dieses Gebiet zu entwickeln. Die aktive Teilnahme der Forscher an lokalen Prozessen ermöglichte eine wissenschaftliche Begleitung, die auch zu Entwicklung von theoretischem Wissen führt.
Abschließend kann festgestellt werden, dass im Rahmen dieser Arbeit ein Planungsprozesses stimuliert wurde: Der Visioneering-Ansatz wurde insofern auf freiwilliger Basis durchgeführt, als die aktiven Akteurinnen und Akteure sich freiwillig am Planungsprozesses beteiligten. Die Ergebnisse dieser Arbeit zeigen, dass Visioneering zu effektiven Lösungen von komplexen Herausforderungen führen und regionale Lösungen in einer gefährdeten alpinen Region finden kann. Visioneering trägt zur Stärkung des Bewusstseins von lokalen Entscheidungsträgerinnern und Entscheidungsträgern bei, die Rollen der unterschiedlichen Akteurinnen und Akteure für eine *Low-Carbon* Zukunft besser zu verstehen.

Abstract .en

The doctoral research consists in the application of the Visioneering planning mode in the Cadore Alpine region (Italy). The research evaluates Visioneering as a mode of doing strategic spatial planning committed to low-carbon futures.
Nowadays, a focus on carbonized energy systems is the center of several attempts to plan our cities and regions as places where to reduce carbon emissions. The transition to a low-carbon future particularly challenges the Alpine region, which is already confronted with climate change. There, an increase in temperature impacts the environmental safety and the seasonal climate patterns on which the economy is based. Meanwhile, today's economic, industrial and tertiary imprint endangers Alpine culture by mistreating natural resources. A planning approach that explores Alpine low-carbon futures as new possibilities might be the trigger for envisioning diverse opportunities, and not a merely decarbonized energy system.
Visioneering is a mode of planning that explores futures as diverse possibilities. The mode was introduced by the 'Department of Regional Planning and Development' at the Vienna University of Technology, and the term was coined to combine the words envisioning and engineering. *Envisioning* concerns the ability to have a mental picture about the future developed in collaboration with local agents. *Engineering* concerns the application of the engineer's skill in translating the mental picture into a spatial vision to be pursued. In the Alpine context, the Cadore region emerged as an interesting case to apply Visioneering for low-carbon futures since it lacks an energy strategy, it is dependent on fossil fuels, and it has a high amount of natural resources. Cadore is composed of 22 municipalities in the northern part of the Veneto Region, and it includes the central part of the Dolomites UNESCO Natural Heritage.
The basic assumption behind the research question is that Visioneering holistically explores the low-carbon future of a territory such as Cadore, motivating a reaction toward new and diverse futures. The emerged research aims to clarify the contribution of Visioneering in strategic spatial planning toward low-carbon futures.
In order to apply Visioneering, the research method used was 'Action Research Through Design', which means working out territorial possibilities for the local context in the form of design exercises, and then developing the related knowledge. The involvement of the researcher in the local context provided both scientific support for actionable knowledge in, and for, the local context, and led to the development of theoretical knowledge. Visioneering was informally applied in

Cadore and the participants contributed voluntarily. Despite this limit, the findings demonstrated that it can effectively deal with complexity and uncertainties, characteristics of a long-lasting global challenge, and stimulate the regional response of a vulnerable Alpine region. They demonstrated that Visioneering is beneficial to strengthening the awareness of local decision-makers, and to better understanding of each agent's role in the path toward diverse low-carbon futures. Finally, the Visioneering mode of planning can accompany a local context along the journey toward a low-carbon future by attempting to merge its many spatial and temporal scales.

Abstract .it

La ricerca di dottorato consiste nell'applicazione del Visioneering, modo di fare progettazione territoriale, rivolto particolarmente al disegno di futuri *low-carbon* della regione alpina Cadore (Italia), e successivamente nella valutazione di tale modo.
Attualmente la progettazione territoriale presta particolare attenzione al sistema energetico delle nostre città e regioni, con lo scopo di progettarli come luoghi in cui è possibile ridurre le emissioni di diossido carbonio. In particolare nella regione alpina, la transizione verso futuri low-carbon è una sfida primaria. La regione risulta infatti già minacciata dai cambiamenti climatici a causa dei quali un aumento delle temperature mette a rischio la sicurezza ambientale e il clima stagionale su cui l'economia locale si basa. A ciò si aggiungono fattori che hanno portato ad una crisi della cultura alpina, come l'attuale sviluppo economico dedito solamente al settore terziario e allo sfruttamento delle risorse naturali.
Un metodo di pianificazione territoriale che esplora i possibili futuri *low-carbon* delle Alpi non solo come futuri con nuovi sistemi energetici, ma come futuri diversi dal presente, può essere lo stimolo per attivare nel territorio differenti opportunità di sviluppo. Visioneering è un modo di fare progettazione territoriale che effettivamente esplora il futuro cercando nuove e diverse opportunità di sviluppo.
Visioneering è stato introdotto nella disciplina della progettazione territoriale dal 'Dipartimento di Pianificazione e Sviluppo Regionale' della *Technische Universität* di Vienna. Il termine Visioneering risulta essere l'unione tra la parola *envisioning* and *engineering*. La prima si riferisce all'immaginazione di futuri eseguita in collaborazione con attori locali, la seconda all'applicazione dell'abilità degli ingegneri di convertire tali immagini future in indirizzi di sviluppo perseguibili.
Nel contesto alpino, la regione Cadore emerge come un caso interessante in cui adoperare il modo Visioneering rivolto al disegno di futuri *low-carbon*. Ciò è dovuto ad alcuni fattori tra cui: la regione è sprovvista di una strategia energetica, è fortemente dipendente dall'uso di combustibili fossili, ed ha una grande quantità di risorse naturali. Il Cadore è una regione storica composta da 22 comuni, è collocato nella parte settentrionale della regione Veneto, e le Dolomiti che ospita sono riconosciute come UNESCO Patrimonio Naturale dell'Umanità.
L'ipotesi alla base della ricerca è che il Visioneering esplora in modo olistico i possibili futuri *low-carbon* del territorio cadorino, stimolando una reazione regionale verso nuove opportunità di sviluppo. La tesi di dottorato si propone quindi l'intento di chiarire quale può essere l'effettivo contributo di tale modo di

fare progettazione strategica rivolto a disegnare futuri *low-carbon*.
La ricerca di dottorato consiste nel valutare Visioneering esaminando il processo di progettazione intrapreso in Cadore. Il metodo di ricerca usato è 'Action Research Through Design' che consiste nell'elaborazione di soluzioni per e sul territorio in forma di esercizi di progettazione. Il coinvolgimento del ricercatore nel contesto locale fornisce delle conoscenze teoretiche correlate alla progettazione strategica, alla ragione di progettazione e utili al territorio esaminato.
Nella parte empirica della ricerca il Visioneering è stato usato come simulazione di un processo di progettazione territoriale in cui i partecipanti hanno contribuito volontariamente. Al di là di tale limite, i risultati della ricerca dimostrano che Visioneering può effettivamente affrontare una sfida globale a lungo termine caratterizzata da complessità e incertezze, e stimolare una risposta regionale di un'area alpina vulnerabile. Visioneering è in grado di rafforzare la consapevolezza degli attori locali sul tema energetico e sul ruolo che ognuno di essi può avere nel cammino verso futuri *low-carbon*. In conclusione questo modo di fare progettazione può effettivamente contribuire a gestire un cambiamento globale cercando di unire le dimensioni spaziali e temporali che esso coinvolge.

To my family, my heart,
to my homeland, my soul,
to you and the young, my hope

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Preface and Acknowledgments

The research was done in the framework of a Doctoral college activated in March 2014 at the Technical University of Vienna, and called *EWARD – Energy and Resource Awareness in Urban and Regional Development*. The college involved nine doctoral students and seven professors who worked on the theme of energy awareness in urban and regional planning throughout different topics. Particularly this research refers to the topic *Low-Carbon Strategies in Urban and Regional Planning* that clearly drove the research question and the doctoral proposal.

The doctoral research emerged as an assemblage of knowledge and experiences I had in the field of spatial planning, architecture, and mountain environments.
Visioneering is a spatial planning mode on which I was already working with in my master thesis, and at that time this investigation allowed me to become fascinated with the discipline of strategic spatial planning. After this experience, I was keen to connect my architecture background to this discipline. Particularly I was interested on how the creative part, typical of architectural design processes, could effectively be integrated in planning all the spaces where we live our everyday lives.
During these professional and educational experiences, I have always travelled throughout the Alps and Cadore, the region where I came from and where I lived my childhood. I feel at home among the peaks of the Alps, but sometimes I have the impression that this territory is not relevant enough for some institutions or certain scientific literature. It was therefore interesting for me to underline but also to explore how an Alpine environment can be relevant in a European context and within the discipline of spatial planning.

As a result of the doctoral research that involved those three experiences, I wrote this thesis that is divided in four chapters. Chapter 1. is the introduction on the low-carbon concept, the Alpine environment, and the research question. Chapter 2. is a theoretical background of the discipline and the Visioneering mode of planning, and the research method. Chapter 3. is the application of the Visioneering mode in the local context Cadore, it starts with an overview of Cadore and then a narrative about the empirical research. Chapter 4. reports the contributions and limits of Visioneering as a strategic spatial planning mode.

Working on a doctoral research was a lonely endeavour, and an elaboration of personal experiences, but it would have not been possible without the help of many others. First and foremost, I would like to thank my supervisor Prof. DI Sibylla Zech for her straightforward support whenever I needed it, throughout these three and a half years, and for pushing me to explore the knowledge and capabilities I didn't know I had. I am also grateful for the support of my second supervisor Prof. Sandro Fabbro who gave me outstanding and deep-thinking comments during the final phase of the research. I want to thank the colleagues of the EWARD college, and all the PhD colleagues I encountered during conferences and lectures around Europe. They gave me the power and the motivation to keep fighting for the topic I believed in. I am also grateful for the support from the colleagues in the office at the Vienna University of Technology – *Fachbereich Regionalplanung und Regionalentwiklung* that hosted me giving me all that I needed. I also thank BA Giulia Perucchio that went through the thesis with patience and enthusiasm proofreading and improving my language skills!

A special thanks goes to the Magnifica Comunità di Cadore and their stakeholders, that accepted the challenge to host a doctoral research and participate voluntarily in it.

This work would not be possible without all of them, and unbearable without my family and my nearest friends that supported me with their heart and soul in this enthusiastic but sometimes troublesome time.

Glossary

This glossary collects a series of terms that are often used in the research, and gives a brief definition. The definition is based on the findings and use of the term in this research.

Act is a particular time in preforming the Visioneering mode. The acts intersected and overlapped between each other, like different performances taking place at the same time. The four acts are Grasping, Grounding, Spreading, and Moving (chapter 2.3). The planner guides the planning arena across the four acts that do not occur in a linear sequence.

Action Research through Design is the research method used in this doctoral research. It sees the assemblage of the Action Research approach, And Research Through Design Method (chapter 2.4).

Design Aspects are particular design domains related to both the local context in which the planning process occurs, and the matter of concern that causes the planning process. The design aspects of this empirical research derive from the Cadore Region and the design of its low-carbon futures. They are: Regional grasp, Visions Contents, and Visual Materials (see chapter 2.5).

Dimensions of Social Learning refers to the sphere of learning and knowledge that belongs to the individuals or social units. In the empirical research four social learning dimensions have been identified and are strictly related to the Low-carbon futures and the Cadore region. They are: Cognitive Knowledge, Mutual Understanding, Complexity, and Joint or Single Actions (see chapter 2.5).

Local Context is where the practice of planning takes place, with its local characteristic, and tangible and intangible boundaries (defined in chapter 2.4).

Low-Carbon Future is used here to mean a future in which the anthropogenic carbon emissions are minimized thanks to strategies that reduce CO_2 release through coherent social and economic development, which is attentive to cultural and environmental alpine strengths (see chapter 1.1).

Magnifica Comunità di Cadore is a public institution, composed of 22 municipalities of the historical region Cadore. It promotes the economic growth and the development of cultural value of local communities by identifying and supporting the common unifying characteristics of the area that can contribute to the overall progress of Cadore.

Mode of planning is in this doctoral research understood as a way of performing strategic spatial planning. Therefore it is not a specific method or procedure, but rather a manner of acting during the planning process it instigates (chapter 2.3).

Path is a set of determinate local and content specific actions and milestones fixed on a timeline that can be both short and long term. The term milestone refers to a significant step or event toward the visions. Action refers to the fact or process of doing something (chapter 2.3.2).

Regola is an ancient self-governed institution that is represented by the autoctonous families. Founded in the XIII century to control the use of commonly owned high pasture lands, forests, and infrastructures, along with fields surrounding the hamlets. The role of the Regola is now to respect their vocation to conserve, enhance, and manage the agro-silvo pastoral properties. This consists in the common ownership of certain lands and requires active participation to manage that ownership (see in chapter 3.1.2 the evolution of this institution).

Renewable Energy Source (pl. same) is an energy source that is collected from resources which are naturally replenished on a human timescale The RES cited in this research are Hydropower, Biomass (from wood), Biogas (for waste, from livestock), Geothermal, Solar power (thermal and electric), and wind power.

Vision is a comprehensive vivid image of a possible future representable in a map. Maps in Visioneering contributes to a better understanding of futures through the illustration of their spatial assets (defined in chapter 2.2.2).

Visioneering is a mode of doing strategic spatial planning introduced by the 'Department of Regional Planning and Development' at the Vienna University of Technology. The term Visioneering was coined to combine the words *envisioning* and *engineering*. The first word concerns the ability to have a mental picture developed in collaboration about the future; the second concerns the application of the engineer's skill in translating the picture into feasable actions (defined in chapter 2.2). Visioneering is, in this text, written with a capital letter to distinguish it from other specific nouns emphasized in Italic, and to easily identify it within the text.

List of Abbreviations

CO_2	Carbon Dioxide
CW	Children's Workshop
FORSU	Organic Solid Urban Waste
MCC	Magnifica Comunità di Cadore
OS	Online Survey
RES	(pl. same) Renewable Energy Source
SWI	Stakeholder Workshop I 'disegnare futuri – CADORE'
SWII	Stakeholder Workshop II 'disegnare futuri – CADORE II'
SWs	Stakeholder Workshop I and Stakeholder Workshop II


Hey?

1. Low-Carbon Futures in the Alpine Region

1.1. Looking for Low-Carbon Futures

The current carbonized energy system is responsible for the phenomenon of climate change, but the implications of carbon emissions are wider then climate change itself. Carbon emissions have led to increasingly negative consequences throughout the world, including air pollution and habitat degradation, with a direct effect on global quality of life. Spatial planning can have a leading role in rethinking the energy system and transitioning to a future with less carbon emissions, a low-carbon future.

An international recognized definition of what the expression **low-carbon future** indicates and implies is missing. The institutional and scientific literature discusses a broad selection of related issues, which are naturally rooted in the concept of 'low-carbon futures', for instance low-carbon development, low-carbon technologies, and low-carbon society. Certainly the excess of carbon dioxide (CO_2) in the atmosphere is produced by the anthropogenic uses of fossil fuel and the consumption of solid, liquid gas (CEC, 2008; EUROSTAT, 2014b; OECD, 2005; UNFCCC, 1997, 2015).

The global goal of reducing the anthropogenic carbon emissions has been defined in a series of documents among which the Kyoto Protocol (UNFCCC, 1997), the European Commission 20-20-20 targets (CEC, 2008), and the Paris Agreement (UNFCCC, 2015). According to the Kaya Identity formula, recognized by the International Panel on Climate Change (IPCC) carbon emissions **can be reduced** by decreasing one or all of the following: population, GDP per capita, energy intensity, or the carbon intensity of the economy (see Table 1.1). The reduction of CO_2 emissions can therefore be achieved through rethinking our society's lifestyle and economic system.

$$CO_2\ \text{Emissions} = \text{Population} \times \frac{\text{GDP}}{\text{Population}} \times \frac{\text{Energy}}{\text{GDP}} \times \frac{\text{CO2}}{\text{Energy}}$$

Table 1.1. The Kaya Identity formula can be used to shape discussion of the primary driving forces of CO_2 emissions. The first variable of the formula is population; the second is the GDP per capita; the third is the carbon intensity of economy; the fourth is the carbon intensity of energy. The variables are not independent from each other, and are not driving forces in of themselves (Emmanuel & Baker, 2012; IPCC, 2001).

Spatial planning can act to reduce CO_2 emissions within the field of renewable energy plants, local mobility patterns, industrial and agricultural land-use, waste production and management, new building construction, and redesign of existing buildings and cities just to name a few (Emmanuel & Baker, 2012). Acting within these fields involves environmental, social, political, and economic processes, and results in a complex situation filled with uncertainties. It is defined as **complex** because it is an assemblage of things, like places, flows, activities, values that co-exist and interact always evolving into something new. The **uncertainties** are given by the unpredictability of those things in a **long-term** perspective (Graham & Healey, 1999).
In this research the expression low-carbon future therefore not only refers to a future with a new energy system but also to the complex situation that it involves. It is used here to mean **a future in which the anthropogenic carbon emissions are minimized thanks to strategies that reduce CO_2 release through coherent social and economic development.**

Spatial planning as a discipline has explored a wide range of issues related to the concept of low-carbon futures for several years. The output is a range of documents that vary from global agreements, national and regional roadmaps, to community handbooks for the implementation of a decarbonized society. Many European countries have adopted plans to address this societal shift at multi-levels of governance, as well as through the promotion and production of green energy by business and energy-generators (Alpine Convention, 2011; Boot & Van Bree, 2010; CEC, 2008; City of Zurich, 2011; EC, 2008; Emmanuel & Baker, 2012; ENEA, 2013; Ruffini, 2011; UNFCCC, 2015; Vordenken Für Osttirol, 2014). These documents and plans refer to energy targets that must be reached in given times, and offer a set of measures and activities that can be implemented at various spatial scales. Thus, within the named documents and plans, a low-carbon future is attainable through the application of energy measures and interventions, for instance the design of transmission grids, the disposition of solar farms, and regulations for wind turbine implementation. Beside those measures and interventions, these documents rarely give a comprehensive look at the space where we will live our daily life in a low carbon future, rarely investigate spatial potential futures at the local scale, and often use the concepts of low-carbon and sustainability interchangeably (cf. City of Zurich, 2011; Marketing FWTM Freiburg Managemnet, 2017).

Exploring a low carbon future through a comprehensive look and by emphasizing local potential means envisioning the spatial setting of regions, cities, and environments to come.

Envisioning is a future oriented approach that transforms fragmentary ideas and knowledge into structured and meaningful possible futures (Albrechts, 2010; Kunzmann, 2013; Olesen, 2013; Zonneveld, 2005; Sheppard, 2012 ; Wilson & Piper, 2010; Nadin, 2002). It consists in reacting to the challenge in a proactive way by designing possible futures rather than adapting to existing dynamics or preparing for predefined ones.

Visioneering is a mode of doing strategic planning which adds engineering skills and abilities to the envisioning process. It was developed for regional planning practices by the Department of Regional Planning and Regional Development at the Vienna University of Technology (Fachbereich Regionalplanung und Regionalentwicklung). Visioneering aims to draw visible pictures of future territories and to subsequently design the path towards them (Salzmann, 2013; Zech, 2013). It is a future oriented mode of planning that properly fits with the low-carbon challenge, since it explores and designs futures in a comprehensive way.

Visioneering has already been applied in few circumstances with a clear application procedure, but its theoretical base, applicability, and added values should be identified to enhance the mode itself and explore the potentiality of strategic spatial planning for low-carbon futures.

1.2. Cadore Calls for Low-Carbon Futures

It is recognized that climate change and the prospective of a low-carbon future is a global challenge. At the same time, all emissions come from the local level, from the most remote villages as well as from the biggest metropolis, and it is at the local level that the effects of climate change are experienced (EC, 2008; ECF, 2010a; Guptaa et al., 2007).

The Alpine region is one of the areas that faces the most challenges as a result of climate change and the transition to a low-carbon future. Effectively over the last century, the Alps have been affected by an increase in temperature of almost +2°C, more than twice the rate of average warming in the Northern Hemisphere (EEA, 2005; PLANALP, 2008). Furthermore, a wetting trend in the northern Alpine region and a drying trend in the southern have been observed. It results that the Alps are one of the most vulnerable spots in Europe because climate change causes an increase in natural hazards and threatens an economic system based on geographical setting, natural resources, and climate pattern.

The Alps are suffering not only from an **environmental crisis** due to climate change, but also from an **economic** and **cultural crisis**. The transformation between the XX and XXI centuries, with industrialization and the expansion of the service industry, has affected the social structure and values of the Alps' inhabitants. With the fall of an economic system based on traditional use of the land, Alpine cultural has been influenced by the modern values of an industrial and tertiary imprint with private property and consumerism (Bätzing, 2005). Despite this crisis, the Alps are an important area to maintain and enrich because of their cultural value and because they ensure goods and services to the surrounding low-lands. For instance they provide a continuous supply of water and wood, farm based products, hydro-power and biomass energy, or they are the locus of recreation and ancient traditions (Alpine Convention, 2010, 2012; EEA, 2005; Tinner & Ammann, 2005). Such strengths play a key role in a future in which the energy system will be based on renewable resources, and on the capacity to create a new economic system. The same strengths make this mountain territory extremely vulnerable to any resource and land management that might lead to highly undesirable, but possible, futures.

In the Alps a low-carbon future is therefore a matter of concern because it is a transition to a decarbonized energy system, an implementation of a series of technical adaptations, and above all it can be the trigger for imagining new ways to develop the territory based on its vulnerabilities and strengths. The expression **low-carbon** future referred to the Alpine area signifies a **future in which the anthropogenic carbon emissions are minimized thanks to strategies that reduce CO_2 release through coherent social and economic development, which is attentive to cultural and environmental alpine strengths.**

In the Alpine region, the Cadore area emerges as an interesting case to study due to its geographical position and its energetic configuration. Formerly recognized as a region, Cadore is now the northern part of the Veneto Region (Italy) embedded between two autonomous Regions, Friuli Venezia Giulia and Trentino-Alto Adige/Südtirol, and bordering with Austria. It is composed of 22 municipalities with a low-density population settled in small towns and hamlets along two main crossing valleys – Boite and Piave Valleys. Cadore has a high amount of natural resources and is partially within the Dolomites UNESCO Natural Heritage, these render it vulnerable to the exploitation of its natural resources and of the landscape. (UNESCO, 1992, 2016).
Cadore has an energetic configuration strongly linked to fossil fuels in the mobility sector, and to the customary use of renewable sources in the household sector, lastly it lacks a solid energy strategy for the future (ARPAV, 2012; Balbi et al., 2011; Regione Veneto, 2013). As far as its economic system, besides tourism, which involves all the Dolomite area, Cadore has a handicraft culture with clusters of specialized manufacturing industries that are suffering from a profound depopulation (Bätzing, 2005; Elmi & Perlik, 2014; Ferrario & Price, 2014). Despite the relevant environmental and economic appeal Cadore is facing a challenge in attracting new inhabitants and maintaining locals. Surely, there, the low-carbon future challenge can be a turning point for the development of alternative futures. The Visioneering mode of strategic spatial planning can play a role for the low-carbon future of this area.

1.3. Research Question and Research Design

The basic assumption behind this doctoral research is that a low-carbon future is a challenge that does not only concern the technical aspects of a new energy system, but it also involves cultural, social, and economic processes. It is assumed that Visioneering is a mode of planning that properly fits the low-carbon challenge since it explores futures in a comprehensive way, through envisioning, and it designs strategies to reach that future, through engineering. The research question emerges therefore with the aim of clarifying the contribution of Visioneering in the spatial planning discipline committed to low-carbon futures.

What can be the contribution of Visioneering in strategic spatial planning toward low-carbon futures?

The question becomes particularly relevant in areas that lack an energy plan or future strategy, and that are vulnerable to the transition to a low-carbon future because of their high quantity of exploitable natural resources and the threat of climate change to their economic and environmental setting.
From the reserach question, three discussion points emerge:

- What is the theoretical base of Visioneering?
- How to evaluate the Visioneering mode of planning?
- Which is Visioneering's impact on low-carbon future, or better on carbonized present?

To respond to these, Visioneering was first identified as a mode to practice strategic spatial planning, where the latter provides the theoretical framework. Second it was applied in a vulnerable Alpine region where its impact in facing a low-carbon future was critiqued and evaluated.
The doctoral research is consequently structured in three main constitutive pillars show in Figure 1.1. First the **strategic spatial planning** theory behind Visioneering; second **Visioneering** as a **spatial planning mode**, that requires the Action Research Through Design method in order to be applied; third the **low-carbon future as a matter of concern** for a vulnerable Alpine region.

The doctoral thesis answers the research question through a narrative that develops along the next three chapters. **Chapter 2** is a theoretical exploration of strategic planning as the basis of the Visioneering mode, its definition, and how to evaluate it. This chapter ends with the description of 'Action Research Through Design' method that was tailored to the research question. **Chapter 3** reports each stage of the empirical research carried out in Cadore and their findings. Finally **chapter 4** uses eight statements to summarize the conclusion of the doctoral work.

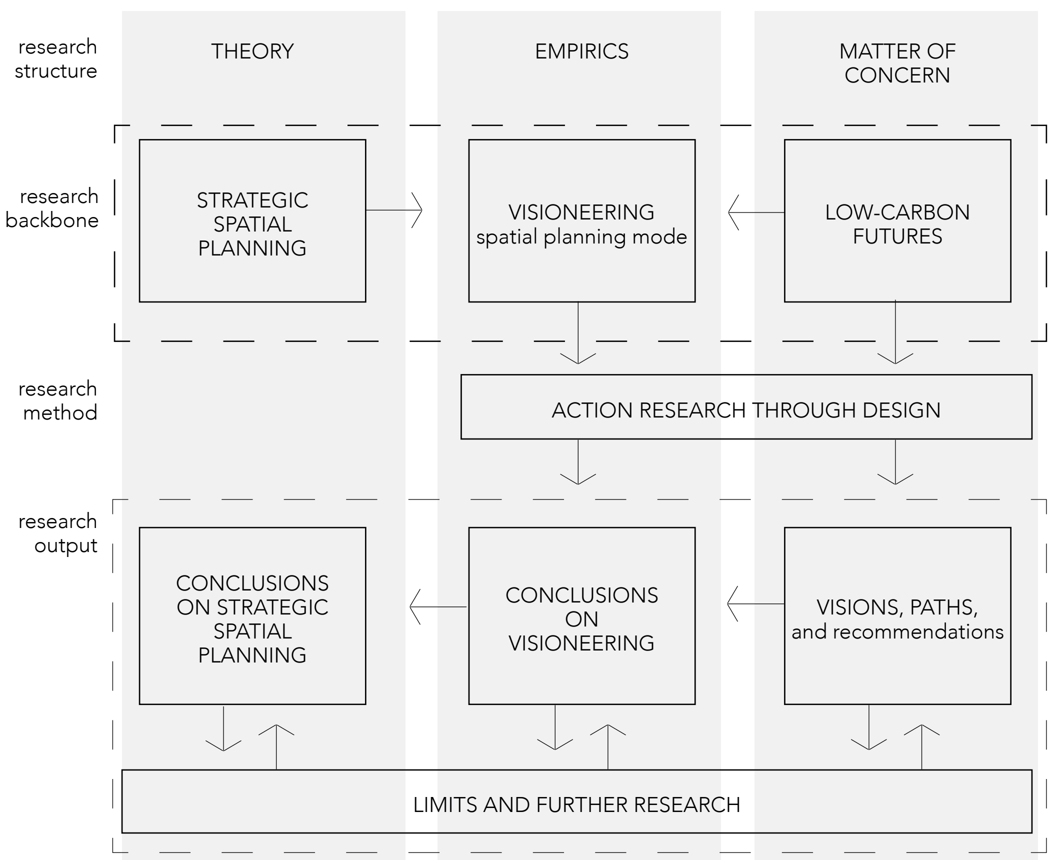
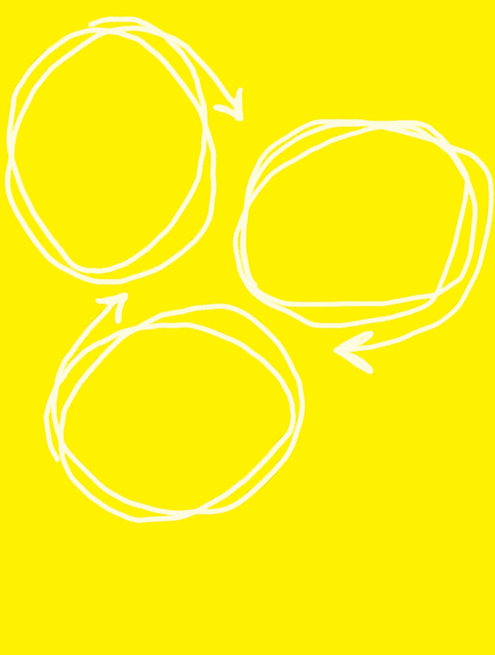


Figure 1.1. The doctoral research is based on three pillars. The central one concerns the application of Visioneering as a spatial planning mode, or rather the empirical part of the research. The left one is the theory behind Visioneering, or rather strategic spatial planning. The right one addresses low-carbon futures as a matter of concern for the vulnerable Alpine region. The doctoral research outputs are: conclusions on strategic spatial planning, conclusions on Visioneering, and the visions, the paths and the recommendations for Cadore.



2. The Theory Behind Visioneering and its Antecedents

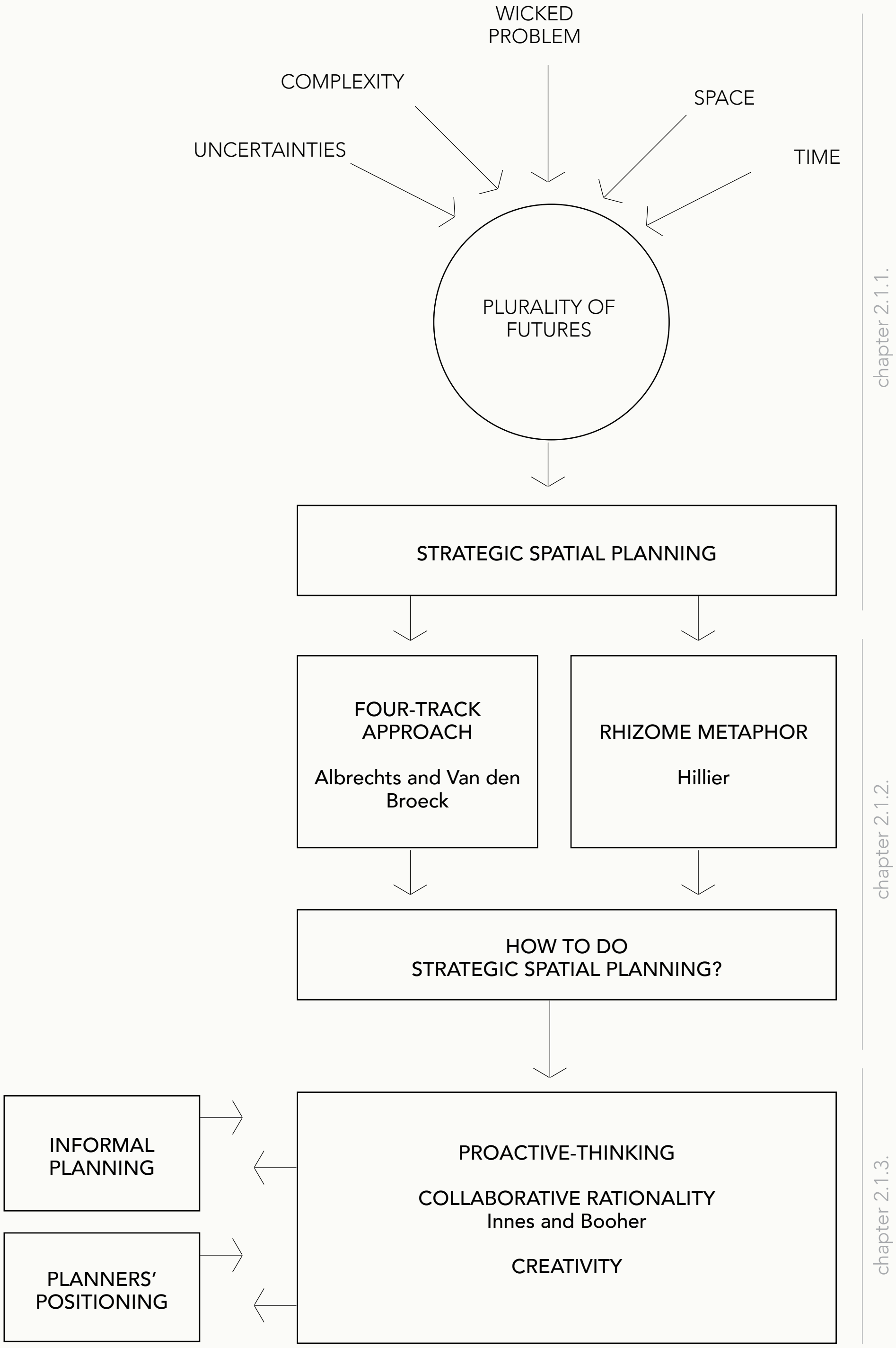


Figure 2.1. The figure shows the structure of this chapter (2.1): the strategic spatial planning theory behind the Visioneering mode of planning (author's own design).

2.1. Exploration of Futures

This chapter presents the relevant theoretical aspects of strategic spatial planning that constitute the base of the Visioneering mode. The chapter starts with an introduction on the acknowledgement of complexity and continues by addressing the duality of land-use planning and strategic planning. Subsequently two theoretical frameworks are presented, frameworks within which strategic spatial planning operates or is supposed to operate. The first refers to the 'four-track approach' by Albrechts and Van den Broeck, and the second to the 'rhizome' metaphor by Hillier. These theories come from different planning cultures and attitudes, nonetheless they overlap and show a general trend in interpreting strategic spatial planning, its main elements, and the need to further explore it (the structure of the chapter in Figure 2.1).
The assumptions present in the theoretical exploration are followed by the chapter tha describes the Visioneering mode of planning (chapter 2.3) and on the research method 'Action Research Through Design' tailored for this doctoral research (chapter 2.4).

2.1.1. A Plurality of Futures

The modernist and scientific spatial planning approaches of the 1950s to the 1980s were based on an object-centered conception of the built environment, or rather space as a series of objects where to apply direct actions at a given time (Graham & Healey, 1999) . Planning theory and practice has moved far from these objectifying and environmental determinist conceptions. Since the 'communicative turn', spatial planning looks to the built environment as the space characterized by not only **diverse and heterogeneous driving forces**, but also by fragmented actuality of social, environmental, and economic processes that influence each other ►. Thus, planning the built environment needs to be concerned with **both its material** and **meaningful** form (Bertolini, 2010; De Roo, 2010; Friedmann, 1994; Graham & Healey, 1999; Healey, 1992, 2007; Innes & Booher, 2010). The material form of space refers to the Euclidean conception that assumes space is an unmoving 'container' for objects or relations, determined by its geometrical characteristics. The meaningful form of planning subsumes that the practice of planning itself is embedded in continuous changing processes by which society creates the world, and therefore also the material form of space (Friedmann, 1994; Graham & Healey, 1999).

► Patsey Healey (1992) with the 'communicative turn' described the new and evolving type of strategic spatial planning based on communicative processes. This type of planning refers to the democratic process of making sense together while living differently.

Thinking with the 'non Euclidean' form of planning leads to acknowledging the existence of 'many time-spaces' for each place where the notion of space and time cannot be separate. Massey, in her book *For Space* (2005), widely eviscerates the relation between time and space and their inescapable dependence. '*Thinking of time and space together* [...] *means that the imagination of one will have repercussions* [...] *for the imagination of the other and that space and time are implicated in each other*' (Massey, 2005, p. 18).

Space becomes therefore the locus of possible multiple contemporaneous human and non-human stories[i] , '*from the immensity of the global to the intimately tiny* [...]. *Without space, no multiplicity; without multiplicity, no space*' (Massey, 2005, p. 9) ►. The conception of space in such form of planning, as expressed by Massey,

► *'Multiplicity concerns coexistences at a single moment'* (Hillier, 2012, p. 49), and it is a concept further used in chapter 2.1.2, to explain the necessity of multiple visions in strategic planning processes.

[i] Massey underlines that time '*presents us with the opportunities of change*', while space *'presents us with the social in the widest sense: the challenge of our constitutive interrelatedness'*. Such challenge for Massey involves '*our collective implication in the outcomes of that interrelatedness; the radical contemporaneity of an on-going multiplicity of others, human and non-human; and the on-going and ever-specific project of the practices through which that sociability is to be configured*' (Massey, 2005, p. 195). For Massey it was therefore interesting to describe also the notion of time-spaces also in non-human and *'the natural world'* usually perceived as something static. She sustains that also in those time-spaces are involved in an every changing multiplicity of sorties: even mountains '*on average drift a few centimeters a year: about the rate at which our finger nails grow*' (Massey, 2005, p. 137).

entails two other points: space as the product of **interrelations**, and space as always under **construction**. The first underpins the Lefebvre's concept[ii] of '*(social) space as a (social) product*' (Lefebvre, 1991, p. 26). The second implies that the relations that constitute space embed material practices that are always in the process of being made, therefore in a continues constructing process (Massey, 2005). Thus space is the outcome of a sequence of operations, it includes things produced and the simultaneous coexistence of their interrelationship and happening through irreversibly moments (Hillier, 2012; Lefebvre, 1991). Space emerges therefore through '*active material practices*' or happening[iii] and cannot be grasped without the variable of time (Massey, 2005, p. 118).

After the recognition of places as actual many time-spaces, scientific literature at the beginning of the current century defines the territory of cities and regions as subject to many processes, i.e. social, economical, cultural, political, and environmental. Healey defines the territory: '*not just as a container in which things happen, but as a complex mixture of nodes and networks, places and flows, in which multiple relations, activities and values co-exist, interact, combine, conflict, oppress and generate creative synergy*' (Healey, 2007, p. 1). Such mixture of processes constantly in evolution generate a situation of **complexity** (Bertolini, 2010; De Roo, 2010; Graham & Healey, 1999; Healey, 2007; Innes & Booher, 2010).

Complex situations such as shrinking regions, urban poverty, climate change and the transition towards an energy system base on renewable sources, dominate

[ii] Martina Löw (2008) describes the three 'moments' in the production of space identified and used by Lefebvre as conceptual tools: spatial practices, representations of space, and representational space. By 'spatial practice' he means space-related modes of behaviour, everyday practices for the production and reproduction of spaces and for the bodily experience of spaces. By 'representations of space' Lefèbvre means conceived space, the space of planners, urbanisms, scientists, and technicians. It is the ideological, cognitive aspect of space, its representation as mathematical and physical models and plans, which enable space to be read. Third 'representational space' stands for spaces of expression, conveyed by images and symbols, which complement spatial practices and cognition. These are, on the other hand, the space of representation: lived spaces produced and modified over time and through use. '*It is this aspect of space that can undermine prevailing orders and discourses and envision other spaces*' (Löw, 2008, p. 28).

In the Lefebvre conception of space, '*social space will be revealed in its particularity to the extent that it ceases to be indistinguishable from mental space (as defined by the philosopher and mathematicians) on the one hand, and physical space (as define by practico-sensory activity and the perception of nature) on the other.*' What Lefebvre tries to demonstrate is '*that such a social space is constituted neither by a collection of things or an aggregate of (sensory) data, nor by a void packed like a parcel with various contents, and that it is irreducible to a "form" imposed upon a phenomena, upon things, upon physical materiality*' (Lefebvre, 1991, p. 26).

[iii] Hillier underlines that '*Space is a verb: to take place. It is a process of action or happening.* […] [S]*pace can no longer be considered static, infinitely extended* […] *regular, amenable to gridding, to co-ordinates, to geometric division* […]. *It is not an existing, God-given space, the Cartesian space of numerical division, but an unfolding space, defined, as time is, by the are of movement and thus a space open to becoming, by which l mean becoming other than itself, other than what it has been*' (Hillier, 2012, p. 54).

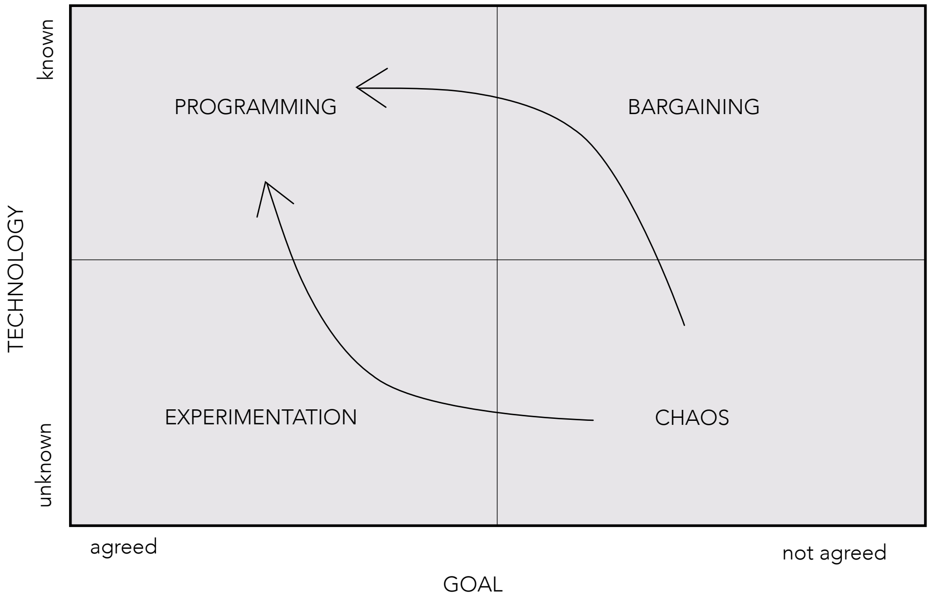


Figure 2.2. Christensen's matrix of technologies and goals of planning for a complex situation. The term *technology* refers to the uncertainties based on *technologies* (e.g., economic trends, forecasted population growth) for achieving the *goals* (e.g., street regeneration, social capital investments) (figure source: Balducci, 2010).

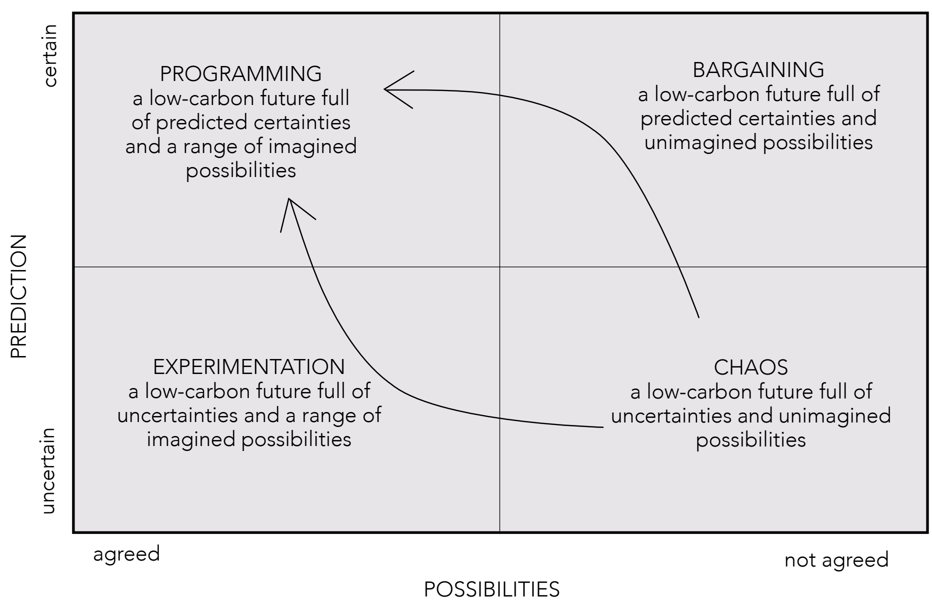


Figure 2.3. The figure is the matrix of complex conditions adapted to the low-carbon matter of concern. The term *prediction* in the matrix refers to the *uncertainties* (e.g., data on the climate, forecasted energy prices) for achieving goals (e.g., RES implementation, and railway construction). If we treat low-carbon futures as a matter of concern, it is possible to move out of a chaos condition, and enter into *experimentation*, by agreeing on the goals (e.g., environment protection, a low-carbon economy, a low-carbon society). Predictions, de facto, cannot be known over the 15-plus year lifetime of a strategic plan, therefore when goals are agreed upon, *experimentation* is appropriate. Goals should nonetheless be flexible to adapt to uncertainties (author's own design).

current spatial planning agendas. Planners need to cope with the uncertainties of such complex issues in day-to-day practice.

The matrix of *goals* and *technologies* designed by Karen Christensen proposes four types of conditions in which planners can find themselves when planning in complexity (Figure 2.2). From the four conditions different planning responses emerge, depending on whether there is an agreement on *goals* (what are we dealing with?) and on the degree of uncertainties of *technologies*, i.e., data (how do we deal with it?) (Hillier et al., 2011). The **chaos** condition is a condition of planning for complex situations in which there is no agreement on *goals,* and the *technologies* are always unknown. It is possible to move out of the *chaos* by either increasing the level of certainties on *technologies,* or by increasing the level of agreement on *goals*. The condition of **bargaining** occurs when *technologies* are known - forecast and data - but there is no agreement on *goals* (which kind of future we want). The result is an attempt to accommodate multiple preferences in a single view. The condition of *bargaining* with high certainties, is unexpected in spatial planning due to the impossibility of having certainties on the 15 or 30 year lifetime of a plan. The **experimentation** condition occurs when there is agreement on *goals* but unknown *technologies*, therefore a situation of unpredictability but a shared wished future. In *experimentation* the agreement on *goals* is higher, but *goals* have to remain open and adaptable due to low certainties. It is also possible to move out of the *chaos* condition and into *experimentation* by **framing and reframing** the strategic mission of the planning process, and thus by looking at the mission as a new diverse issue. Reframing consents planners to overcome a unique and rigid answer to **a** complex problem, transforming it in one, **or more**, opportunities (Fabbro, 2015). In the ideal situation in which there is agreement on *goals* and known *technologies*, the process of planning is in the **programming** condition. Working on simulations of spaces and times, as 3D modeling, is an expedient that can contribute to increasing the level of known *technologies,* thus it contributes to move the planning process to the **programming** condition (Bertolini, 2010; Yamu et al., 2015; Voigt et al., 2003)**.**

In all four cases, to strengthen the capacity of a complex situation to adapt to changes the planning process should be focused on the **relations** inside the complex situation, rather than its **components.**

The relations between agents, and among spaces and agents, permit the planner to understand how the system works, therefore how planning can deal with it (Innes & Booher, 2010) ►.

Figure 2.3 represents Christensen's matrix adapted to **low-carbon** futures as a matter of concern. It is possible to leave the *chaos* condition of planning for low-carbon future, where there is no shared vision of the future and uncertainties are high, and move toward an *experimentation* condition. In the latter uncertainties on climate change, energy consumption, and economic growth are high, but it is possible to pursue an agreement on a **plurality** of imagined low-carbon possibilities.

▶ In this doctoral research the terms actor, actant, and agents assume the same connotation that refers to the concept of agency as *'the capacity to make a difference'* i.e., to act in a way which produces outcomes. An agent is therefore one who makes choices and decisions (Abrahams, 2013).

During the practice of spatial planning, the planner moves out of the *chaos* situation and pursues a plurality of shared imagined futures for one and the same territory. Such practice leads to a plurality of imagined futures that show '***conflicting** issues instead of covering them up*' under an agreed single possibility (Zonneveld, 2005). When we are looking at the future with different viewpoints, without focusing on one predicted solution, **conflicts** are inevitable. In the spatial planning arena, conflicts emerge, and they increase awareness about a possible plurality of futures and allow for a **collaborative** response.

Strategic planning is a type of spatial planning that encourages the development of multiple 'trajectories', away from the positivistic type of planning that fixes a goal and ensures one and only one strategy to reach it (Hillier et al., 2011). The latter type of planning has produced land-use planning experiences based on the ability to understand, predict, and control changes in regions and cities. This planning has effectively ensured, and continues to ensure, that undesirable land-use development does not occur. Conversely, it prevents desirable development from being explored and from happening where and when it is wished (Albrechts, 2015).

2.1.2. A New Strategic Spatial Planning

The private sector initiated the production of strategic projects in the 1950s, and in the following decades strategy making became the means through which planners tried to overcome the inadequacies of land-use planning in dealing with an ever changing context, in Europe and beyond it (Albrechts, 2015). In those decades, strategic planning had been focused on urban and regional practices driven by economic and demographic growth. The failure of solely land-use planning was evident in its struggle to address wicked and social problems such as climate change or shrinking regions with merely physical solutions. Since the acknowledgment of complexity it became evident that a type of planning that looks at a plurality of time-space is an adequate methodology to face these problems (Wilkinson, 2011). In response to such acknowledgments, throughout the world there has been an increase in the number of new strategic planning practices and methods (Balducci, 2010; Khakee, 2003; Olesen, 2011; Salet, 2016; Sartorio, 2005; Wilkinson, 2011; Yamu et al., 2015; Zonneveld, 2005) ►. This suggests that strategic spatial planning may be an approach that is able to cope with the challenges of our contemporary society.

► Further examples of strategic spatial planning are reported later in this chapter, and chapter 2.2.2.

Strategic planning has a long tradition and it has been defined in many different ways (see Albrechts, 2017, p. 18 for different definitions). In the last decade, experiences of strategic planning in different parts of Europe have emerged through various processes and procedures, fueling the debates on *what* strategic spatial planning *is* and *how* it is *done*. Healey (2007) argues that those experiences underline that strategic planning activities must be understood as a **situated practice** with their effects deeply structured by the specificities of time and place. These contextual factors of time and place lead to a planning process that is appropriate to the specific situation, and not to others. Recently Albrechts defined strategic spatial planning as a: '*socio-spatial process through which a range of people in diverse institutional relations and positions come together to design plan-making processes and develop contents and strategies for the management of spatial changes*' (Albrechts, 2017, p. 19).

Both the above mentioned views imply that strategic spatial planning is not a single concept, procedure, or tool, but it is a set of concepts, procedures or tools '*that must be* ***tailored*** *carefully to whatever situation is at hand*' (Albrechts, 2004; Balducci, 2010). So defined, strategic spatial planning is about the process of coming together and planning and does not define a product or an output.

To bridge the reflections on complexity and uncertainties, and on the time-space factors, I focused my attention on two theoretical frameworks of strategic spatial planning: they derive from two different theoretical reflections and planning cultures, overlap in some of their elements, and are at the basis of the Visioneering mode of planning. The first is the **four-track approach** by Albrechts and Van den Broeck, the second is the '**rhizome**' **metaphor** by Hillier.

Albrechts and Van den Broeck constructed a **four-track approach** as a framework

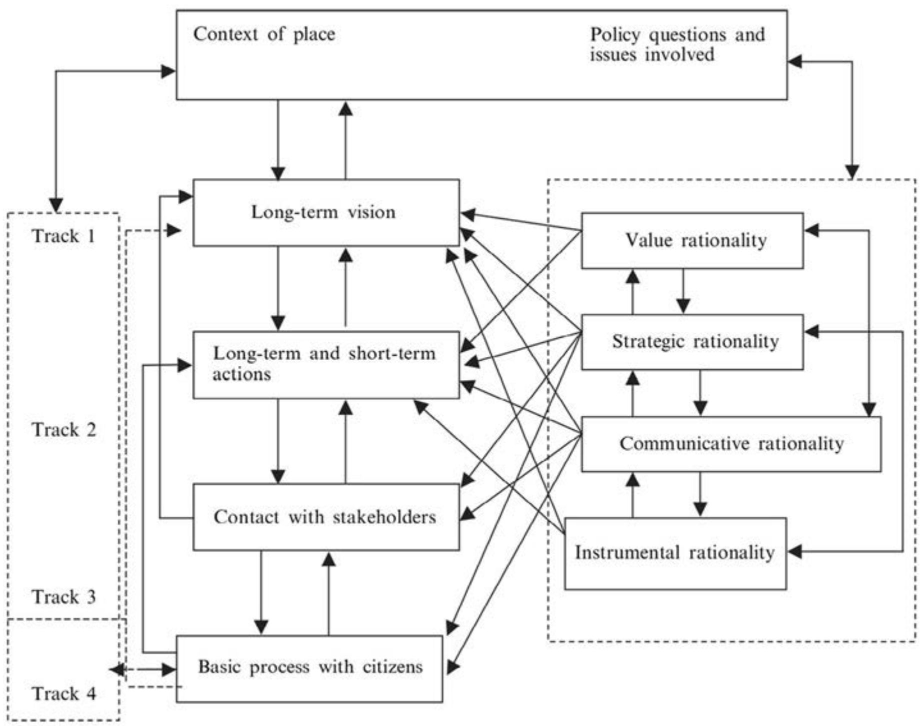


Figure 2.4. The four-track approach by Albrecht and Van den Broeck (figure source: Albrechts, 2004, p. 753).

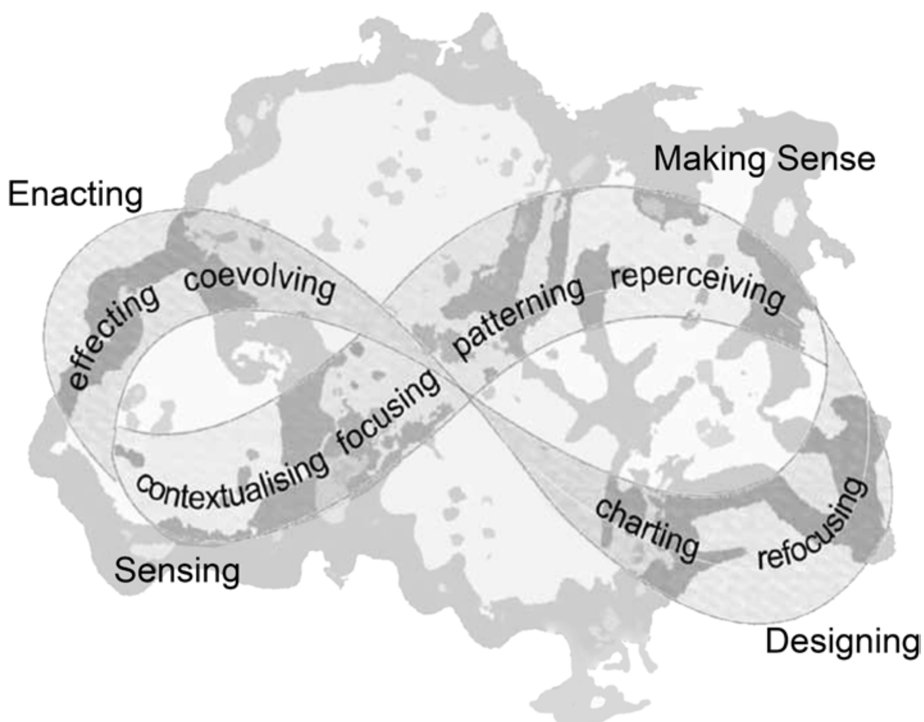


Figure 2.5. The figure shows the 'rhizome' metaphor used by Hillier. A rhizome is a 'map' of networked, relational, and transversal processes; the rihzome is in constant transformation as relations change through new encounters or ruptures. In the same why 'strategic navigation' is not a linear procedure, but a continuous process of evolving relations between the components and elements of the rhizome (figure source: Hillier, 2011, p.518).

within which to organize strategic spatial planning processes (Albrechts, 2004, 2010). Together, each of the four tracks can be seen as a working guide, but do not need to be applied chronologically (see Figure 2.4).
The four tracks are:
1. the production of a **long-term** vision;
2. thinking and allowing for immediate **actions**;
3. reaching the relevant **actors**;
4. trying to reach **public** opinion, for a more permanent process.

The four-track approach involves the use of four types of rationalities, '[which are] *needed to counteract the pure instrumental rationality that encourages an analysis of trends and extrapolates them in order to arrive at conceptions of social and economic futures*' (Albrechts, 2004, p. 749).
The adoption of these rationalities leads to new ways of looking at the future and dealing with its design. Thus they focus on the act of designing the future rather than basing it on the projection of the present, which is forecasting. The four rationalities are:
1. value rationality as the design of alternative futures;
2. communicative rationality as the involvement of a growing number of actors in the process;
3. instrumental rationality as the search for the best way to solve the problems and achieve the desired futures;
4. strategic rationality as a clear and explicit strategy for dealing with power relationships.

These rationalities are fundamental to enter into the condition of *experimentation* described in the matrix in Figure 2.3, where alternatives are explored and not forecasted.
This approach leads to the development of **long-term visions** based on a plurality of values and interests given by communicative rationality, and, simultaneously, it leads to **short-term actions** thanks to strategic and instrumental rationalities. Individuals in the planning process use **values** as principles that govern their decision-making process and stem from their judgment of what is important in life. As Faludi theorized (1973), values in the planning process might be communicated as moral statements, the 'future ought to be…', or as statements of preference 'I would like such future' (Faludi, 1973, p. 19).

Hillier gives another important theoretical contribution on strategic planning as the process for producing long-term visions and short-term actions. '[S]*trategic spatial planning should consider the distribution of longer-term alternative potential futures that may, or may not, be actualised* [while] *working towards beneficial short-term goals*' (Hillier, 2011, p. 506).

In this theoretical contribution, a strategic planning process does not end with the set up of a plan that has specific targets to be achieved, but with a long-term strategy that indicate a 'trajectory', that may be continually (ideally infinitely) revised. The **plan**, then, should always be incomplete, responding to the unpredictable unfolding moments *'that open up onto new histories, new paths in the "complication" of our ways of being'* (Abrahams, 2013, p. 55). In other words the plan has to be flexible because of the typical uncertainties of complex situations.

Hillier, inspired by Deleuze and Guattari, interprets the plan through the conceptualization of the French term **plane**, that can refer both to plane (or plateau) and plan. A plane is, in this interpretation, a 'cinematic shot': a long-shot or a close-up of the future (Abrahams, 2013; Hillier, 2011, p. 506). The first, called '**plane of immanence**', consists in several, preferably one, long-term trajectories. This plane has to include concepts (e.g., sustainable tourism, low-carbon futures) towards which actant's (e.g., stakeholders or agents) desire to navigate ►. The long-term trajectory is defined *'by the forces that intersect it and the things it can do'* (Hillier, 2011, p. 506). The second plane introduced by Hillier is called '**plane of organisation**', and it is a collection of shorter-term, location-specific, detailed projects. This plane presents tangible collaborative goals to pursue in the imminent future (Hillier, 2011, p. 507).

► An actant is a person, a creature, or an object (human or not-human) that plays any set of active roles in a narrative. Networks of actants generate agency and strategy (Hillier, 2011, p. 508). In this research the terms actants, agents, and actors are used as synonymous.

While the four-track approach of Albrechts and Van den Broeck clarifies, in its rationalities, how strategic spatial planning can effectively be done, Hillier's approach requires further explanation.

Hillier affirms that the 'multiplanar' practice may complete, or better yet, goes alongside Richard Hames' methodology of 'strategic navigation' (Hames, 2007). '**Strategic navigation**' is the mode of '*confidently and ethically finding viable paths into the future, negotiating unknown terrain and unprecedented complexity while retaining integrity and relevance*' (Hillier, 2011, p. 517).

In this definition strategy-making is an unfolding process that deals with uncertainties, while looking simultaneously to the future, present, and past. The proposed methodology entails four components that comprise eight elements: 'sensing', 'making sense', 'designing' and 'enacting' (Figure 2.5). They do not form a linear process of strategy making, but rather a strategic-learning 'rhizome', in other words an ensemble of intersecting and networking components and elements that emphasize the non-linear connectivity between them (Abrahams, 2013). A more detailed explanation of the **four components** is beneficial to grasp how they can be used in strategic planning ►.

► In chapter 2.3 the four components and their eight elements are used to explain the basic theoretical assumptions behind each of the four acts of the Visioneering mode of planning.

- '**Sensing**' offers a grid of references for understanding what has taken place and re-perceiving issues in light of this information. This component entails the 'contextualising' and 'focusing' elements.
- '**Making sense**' is the component in which planners become more aware of what has happened and have a clearer understanding of how and why. 'Making sense' integrates different perspectives and new knowledge into planners' understanding of what is happening and might happen in the future; it gives a new perspective to already perceived issues. This component includes the 'patterning' and 're-perceiving' elements.
- '**Designing**' consists in mapping; in this approach plans are not a question of land use per se, but of the relations between different actants. 'Designing' consists therefore in mapping out a range of circumstances, situations, and relations that could be more or less likely to take place and could be more or less strategically important. This component entails the 'refocusing' and 'charting' elements.
- '**Enacting**' consists in testing out relations previously mapped, recognizing the limitations of particular constraints and attempting to work through them. It is the implementation of plans and their constant revision in the context of contemporary changes (Abrahams, 2013; Hames, 2007; Hillier, 2011). This component entails the 'coevolving' and 'effecting' elements.

'*Deleuze and Guattari's work* [and here I add Hillier's work] *is of potential importance in helping planning researchers and practitioners to understand our worlds and environments. Moving from understanding [...] to practical action is inevitably challenging*' (Abrahams, 2013, p. 65). This citation confirms that the 'rhizome' approach has firstly potential in evaluating processes and events of 'strategic navigation', and secondly, with more effort, it can become a strategic planning method ►.

► This statement is relevant because effectively Hillier's theory helps to comprehend the Visioneering mode of planning as a process that unfolds through the components and elements of the rhizome. See chapter

In this doctoral research the term strategic spatial planning refers to the type of planning defined by Hillier. Strategic spatial planning is *'strategic navigation [...] along the lines of the investigation of "virtualities" unseen in the present; the speculation about what may yet happen; the inquiry into what, at a given time and place, we might think or do and how this might influence socially and environmentally* *just spatial form*' (Hillier, 2011, p. 505). It refers nonetheless to the type of planning that, from the Albrecht definition (2004), must be '*tailored carefully to whatever situation is at hand*'. **How** the two theoretical frameworks, the four-track approach and the rhizome metaphor, can become strategic planning procedures or tools is not clear, and probably not relevant to the extent of comprehending the frameworks themselves.

2.3 on how to perform the Visioneering mode of planning.

Strategic spatial planning experiences, in various European and international settings, proposed 'strategic visions' as procedural tools (Balducci, 2010; Healey, 2007; Nadin, 2002; Olesen, 2013; Sheppard, 2012; Zonneveld, 2005, 2008). In those experiences the 'strategic vision' was used as a framework for organizing the future from fragmentary information and ideas into structured meaningful images of 'times to come'. It was a framework that could organize projects or actions for a region or city. One of the most brilliant examples of strategic vision, of which long-term impacts are now analyzable, is carefully described by Olesen (2013). Known as '**Loop City**' it is the vision of Copenhagen's urban region and its transportation network (Olesen, 2013). The vision was born in 1959 to support different investment in infrastructure and, after decades and different administrations, it has maintained its ability to support the realization of the transport system. Hence a vision may carry a development process and may play an important role in legitimizing, and building civil and political support for 'times to come', even if it is not achieved as initially designed.
The case of a strategic plan for the city of Milan (Italy) is reported by Balducci (2010), and shows that strategic planning happens also in countries where it is not statutory. The Provincial Government of Milan de facto proposed to develop a strategic plan (in 2004) that was intended to be different from the statutory territorial plan. The Government did not have a precise idea of which kind of plan it wanted; it could have been centered upon infrastructure, or new development poles, or a more comprehensive vision. Nonetheless, the ambiguity of the idea was irrelevant because it allowed the informal process to cope with a plurality of intentions. The result was a new vision that treated 'habitability' as the main strategic objective. This vision activated competition for projects that required a wide range of actors, implementation of some pilot projects, and a series of exhibitions throughout the city (Balducci, 2010).
Nowadays 'strategic visions' are present in the literature that deal with shrinking regions and cities (Daly & Rob, 2013; Kühn & Liebmann, 2012). Here 'strategic

visions' are seen as activators of new perspectives necessary to strategically embrace the depopulation issue and a fragile economy, and are not exclusively based on city and regional growth as in the above mentioned Danish and Italian experiences. This is a **shift in acting** of the strategic planning discipline itself, no more solely called to operate within growth and its complexity, but in the opposite situation of economic decrease and unpredictability.
An exemplary case is the one of the shrinking cities in Eastern Germany (Kühn, 2010). In this case 'strategic visions' were planned to transform cities and regions by opposing negative images of decline with positive ones focused on urban regeneration. Thus it was a type of planning not dedicated to reversing the decreasing demographic, social, and economic dynamics. It resulted in 'strategic visions' that empowered a local community through positive imagery and provided short-term achievable projects and actions.

2.1.3. The Proactivity and Creativity Ingredients

When it comes to imagining long-term visions of complex situations, that both Hillier and Albrechts propose, spatial planning experiences report two ways of acting. On one side **preparing** for the future through quantitative analysis and projection that lead to an idea of the future based on predictions. In Christensen's matrix (Figure 2.2) would correspond to moving toward a *bargaining* situation. It is a way of imagining the future rejected by both the theories in as much as based on trend rather then on foresight. On the other hand **designing** the future and making it happen with a *proactive* approach is perceiving the future as something not yet decided where it is possible to implement the most desired developments (Albrechts, 2010). In this case proactive thinking invites the planner to perceive the future as immanent, dynamically created, with potentially radical alternatives to the present.
Proactive thinking focuses on long-term visions of preferred futures, possibly to be created, and not of the future as an extension of the here and now, a typical mentality of the planning process based on forecast. The result is a **discontinuity** between the 'long-term vision' and the present. In such proactive practices futures symbolize some '*goods, some qualities and some virtues that presents lacks*' (Albrechts, 2010).
The long-term visions entail **values**, rather than trends and data, because they

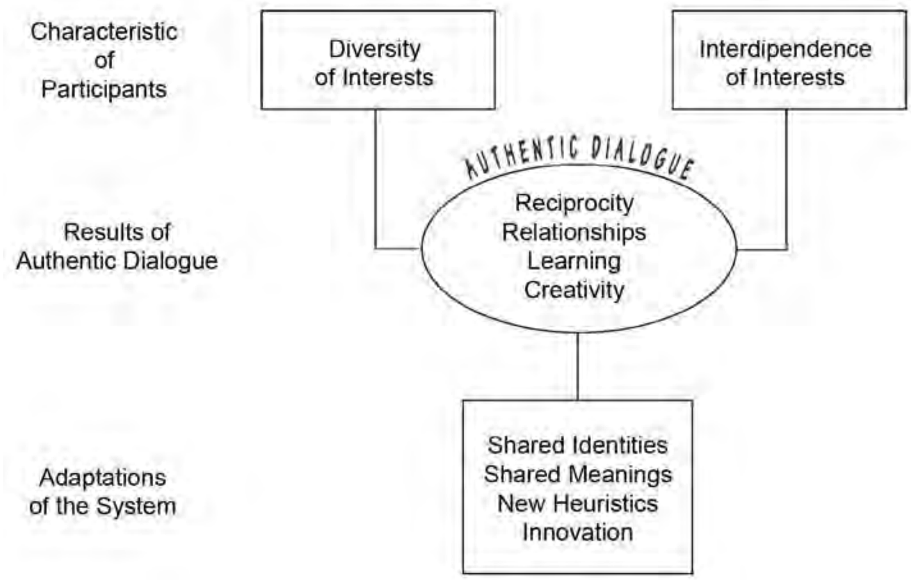


Figure 2.6. In the DIAD (Diversity, Interdependence, Authentic Dialogue) Network Dynamic, Innes and Booher show how the collaborative process unfolds. The first two indispensable variables in order to have an 'authentic dialogue' are 'diversity of interests' and 'interdependence of interest'. The dialogue in the planning arena brings reciprocity and creativity, structuring the base of a learning environment, and new relationships between the participants (figure source: Innes & Booher, 2010, p. 35).

represent something that is creatively imagined, envisioned. Those long-term visions should therefore not be generated in isolation but imagined and reviewed through the participation of involved agents that express their opinion and wishes. It is what Albrechts calls 'communicative rationality' in the four-track approach as the place in which communication between the involved parties takes place.

In this research the 'communicative rationality' is understood as the Innes and Booher's 'collaborative rationality' theory, based, in turn, on the work of Habermas on communicative rationality (Innes & Booher, 2010) ►. A process involves '**collaborative rationality'** when all the parties involved in the planning arena:

- are **affected** by the same problems,
- are jointly engaged in **dialogue**,
- have brought their **various** perspectives, with the aim of making decisions.

► Communicative rationality *'focuses on the interactions leading to decisions, rather than the decision itself'* (Alexander, 2006, p. 48). Chapter 2.3.3 reports how 'collaborative rationality' is focused on collaboration not for the seek of consensus but as base and generator of proactive thinking.

Innes and Booher sustain that 'collaborative rationality' has to take place together with the scientific method where data and analysis ensure accuracy in the process and support the power of proactive thinking (Innes & Booher, 2010).

There are nonetheless three other main elements in the logic of 'collaborative rationality' that are crucial in proactive thinking. The first is that 'collaborative rationality', in collective processes, produces individual and **collective learning** that help to work out effective options for how to move forward together. The options can be plural because Innes and Booher state that for wicked problems there is no single optimal solution to be found, the challenge lies in jointly imagining options that improve the current situation. The second element of 'collaborative rationality' is that it matters how the collaborative process **unfolds**. During the process, participants delve into issues and other interests that they transfer to their private or professional lives, always bringing new options to the arena. The third element is that 'collaborative rationality' brings changes in the

largest system that might lead to a more adaptable complex system.
In the DIAD Network Dynamics scheme (Figure 2.6), Innes and Booher discuss how 'collaborative rationality' occurs in a planning process. First of all 'collaborative rationality' stresses the importance of a '**diversity of interests**' as a source that brings together diverse ideas, values, interests and knowledge in the planning arena ►. Second the '**interdependence of interests**' among the participants is what holds the involved parties in the collaborative arena, otherwise they would pursue their interests outside of it. '*People do not participate in collaborative efforts because they are selfless altruists or because they are searching for the common good. Participants are involved because they have become aware that their interests are dependent in some way on the actions of others and there is a kind of reciprocity among them*' (Innes & Booher, 2000, p.17).

► On this detail more information is given in the Visioneering chapter (2.3), which talks about the involvement of stakeholders and agents, where local knowledge and scientific knowledge mutually complete themselves.

An 'authentic dialogue' occurs then in the arena, to which the involved parties participate. The 'authentic dialogue' is the dialogue in which an exchange of ideas, information, knowledge, give rise to creativity and that can bring to agreement or disagreement ►. If the dialogue in the collaborative process is *authentic* (all the parts are sincere) the process will result in a shared identity and meanings, and hopefully in new ideas for the issues discussed.

► The authenticity of the dialogue is a fundamental concept to understand the social learning dimensions of Visioneering in the empirical research, and the competitiveness in the dialogue of the SWs (see the findings of the chapter 3.4.4).

Proactive thinking for the future brings **creativity** in the 'authentic dialogue'. Creativity depends on a human capital able to generate new ideas or different combinations of ideas by communicating or exchanging them (Girard, 2010). De Roo et al. (2016) argue that a process of creativity in which long-term visions are built concerns the ability to: '*superimpose an imagined world in which we are able to replace our image of the "real" world with alternative ones. And this leads to conclusions regarding our image of the "real" world and to actions with regard to how to deal with it or, more precisely, how to improve it*' (De Roo et al., 2016, p. 7).
If human exchange and networks stimulate creativity, a crucial element for developing it is the way in which people are included in the planning arena. To build a long-term vision of a future imagined through proactive thinking requires a **planning arena** that stimulates relationships between the parties involved, whom in turn articulate their values, ideas, local, scientific knowledge, and identities ensuring the '**authentic dialogue**'. The scientific knowledge that has to be accommodated in the arena '*is always partial and sometimes partisan, and* […] *the search for enhanced knowledge is endless rather than exhaustive*' (Albrechts, 2015, p. 515). Thus the 'collaborative rationality' for long-term futures is driven

Figure 2.7. A ginger rhizome (figure source: Abrahams 2013, p. 22).

more by value and desire of proactice thinking, rather then by scientific or professional knwoledge.

From 'collaborative rationality' originates a type of strategic planning far from the 'planning as control' typical of statutory planning (Balducci, 2010; Kušar, 2010). It lets emerge a type of planning in which the arenas are effectively a way of learning, creating network, and generating a real sense of collective concern for the future. Statutory planning, and institutionalized modes of planning, respond principally to governmental action, as it has been in Europe throughout most of the last century. The majority of new strategic spatial planning experiences, and their voluntary, or private and informal character, demonstrate the necessity to position such planning (Albrechts, 2015, 2017; Kühn & Liebmann, 2012; Kunzmann, 2013; Olesen, 2013; Salet, 2016; Sartorio, 2005). These experiences are considered an informal planning process because they are not the result of a legal binding effort ►. Experiences of strategic planning therefore ground their position '*not on* [a] *legislative or statutory act, not in an original founding act, but in a future to be brought about*' (Albrechts, 2015, p. 519). The consequent relations of the strategic planning to statutory planning of the places in which it operates remain a question to be tailored on a case by case basis (Healey, 2007; Kušar, 2010).

► *Who decides when and where to activate the process? How is strategic spatial planning linked to statutory planning?*
Those questions touch upon how statutory planning can be integrated in the Visioneering mode of planning, or vice versa.

It becomes evident that **planners** play a key role in making the 'authentic dialogue' possible in the arena. Planners become, in such an arena where strategic planning happens, active **generators** of collective becoming. They are the navigators, necessarily involved with formulating the course of the planning process (Albrechts, 2015). Planners participate in the arena, shape its form and direction, provide the opportunities for it, and the opportunities to the other involved parties to re-shape and use it. Planners have both the power as part and initiator of the arena, of the network of relationships, and of the 'collaborative rationality'. They must be aware that their planning action, exercised through proactive thinking, (should) enable effectiveness in real possibilities of action.

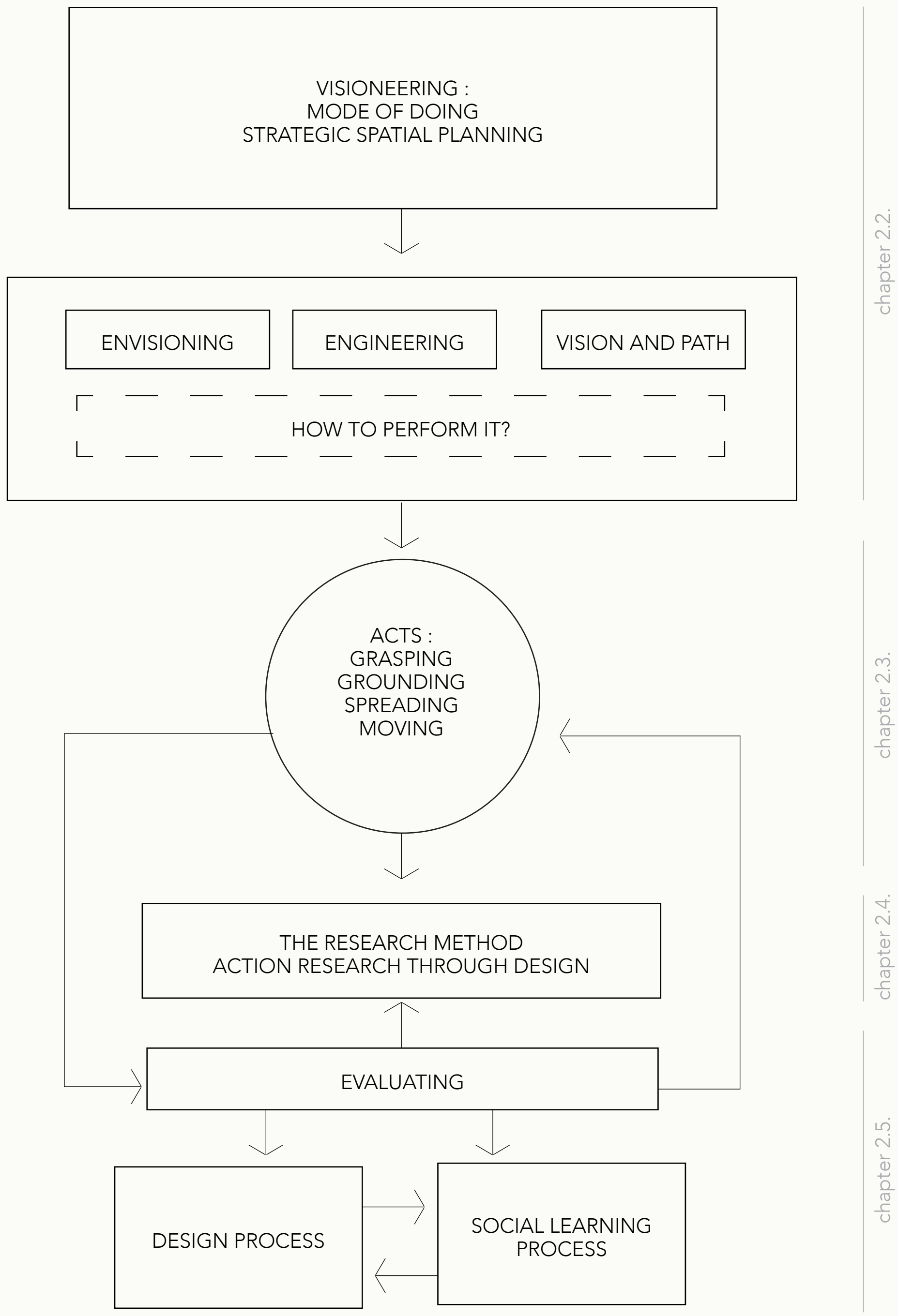


Figure 2.8. The figure shows the structure of: chapters 2.2, 2.3 that discuss the strategic spatial planning mode Visioneering, its main components, and the way to perform it; and of chapters 2.4, 2.5 that discuss the method and the evaluation scheme employed in this doctoral research (author's own design).

2.2. Visioneering, a Mode of Doing Strategic Planning

Visioneering is a **mode of doing** strategic spatial planning, the term mode is used to define a procedural frame within which the strategic planning **practice** is applied, experienced or investigated.

Visioneering was introduced into the spatial planning discipline at the 'Department of Regional Planning and Regional Development' at the Vienna University of Technology (Fachbereich Regionalplanung und Regionalentwicklung), and it was applied in few occasions with different results (Salzmann, 2013; Zech, 2013; Zech & Andreotta, 2015).

The **term** Visioneering was coined to combine the words **envisioning** and **engineering**. The first word concerns the ability to have a mental picture, developed in collaboration, about the future of a given local context, a future that may exist or that could be realized ►. The second word concerns the application of the engineer's skill in translating the mental picture into long-term spatial **visions**, drawing them on **maps** and creating a **path** toward them. '[Visioneering] *challenges spatial planners to translate stakeholders´ views into a suitable "language" which is understandably quick and prompt for plural addressees, e.g. for politicians, citizens, planners*' (Salzmann, 2013, p. 57).

► The term 'local context' is used to express where the practice of planning takes place, with its local characteristic and boundaries, see chapter 2.4.
The term collaboration refers to the involvement of 'collaborative rationality', see chapter 2.1.3.

The three important components of the Visioneering mode are therefore: the **envisioning** process, the **engineering** process, and the **vision** and **path**. While the historical background of Visioneering was largely explored in my Master's thesis 'The Visioneering Approach For The Urban Regions' Future: The Case Of The Ljubljana Urban Region On The Mediterranean Corridor', the three basic components of Visioneering as interpreted for this doctoral research are better here described in chapters 2.2. Then chapter 2.3 explains how to perform strategic planning with the use of the Visioneering mode.

Figure 2.8 shows the structure of this chapter 2.2 and the followings. They constitute a narrative that draws from Visioneering as a mode of doing strategic planning, therefore its main components, and then how to perform it in chapter 2.3. The chapter 2.4 shifts the reader's attention on the method used for this doctoral research and on the ways to evaluate it in chapter 2.5.

2.2.1. Envisioning and Engineering

The use of the **envisioning** process as a way to create and imagine images about future cities and regions, has seen its first attempts already in the utopian thinkers of the XVIII and XIX centuries, from the *Garden City* by Sir Ebenezer Howard (1898), to Antonio Sant' Elia (1888) contributions to the Futurism movement, or the *Broadacre City* project by Frank Lloyd Wright (1932).
More recent experiences are driven by the 'communicative rationality' (see chapters 2.1.2 and 2.1.3) involved in the envisioning planning process of cities' and regions' futures and the attempts to realize them. Two of the first examples are the *Oregon Model* with its community visioning (Ames, 2010), or the *Atlanta Vision 2020* experience (Helling, 1998). Oregon was one of the first places in the United States to pioneer the use of community visioning experiments, which resulted in *A Guide to Community Visioning* in 1993. In the Oregon Model visioning is conceived as the exercise that produces a statement describing the community's preferred future. The statement in turn is a vision that represents the desired community's long-term future. The process called *Vision 2020* for Atlanta city, aimed to produce a long-range, comprehensive planning effort to build consensus on the future of the city. The main goals of its visioning process was to break the tradition of decision making by the small *elite* and include the community, thus building initiatives where the community would become involved (Helling, 1998. In those years **Agenda 21** (1992) was written: a voluntarily implemented action plan for community development that deliberatively talks about strategies for local community development.

> **'***Each local authority should enter into a dialogue with its citizens, local organizations and private enterprises and adopt "a local Agenda 21". Through consultation and consensus - building, local authorities would learn from citizens and from local, civic, community, business and industrial organizations and acquire the information needed for formulating the best strategies.***'** (UNSD, 1992 Chapter 28)**.**

The envisioning practice has also evolved in the European context due to relevant experiences. Since the first *INTERREG* at the end of the XX century, transnational spatial visions were prepared (Dühr, 2007). In this framework, the designed strategies were usually non-binding, and carried out an informal planning process. Two examples of strategies developed in this period and at the cross-country scale are *Vision Planet* and *NorVision*. The *Vision Planet* was a strategy for an integrated spatial development of the central European Danubian and Adriatic area, while in the North Sea Region, *NorVision* was a key advisory document that strongly influenced territorial cooperation (Zonneveld, 2005).

► Recent experiences of strategic spatial planning for the development of long-term visions are reported in the theoretical chapter 2.1.2.

Currently at a city and regional level different experiences of 'strategic vision' for the production of long-term plans are taking place. They operate on the process of imagining long-term visions (i.e., envisioning) through devices (i.e., planning tool) that instigate strategic development for more competitive regions and cities, or that create discontinuity with the present ►.

The **envisioning** process has therefore had a long-lasting role in the planning discipline. Research by Shipley and Newkirk (Shipley & Newkirk, 1999) reveals that there is no one clear meaning of the word (en)visioning [iv], but as many as twenty different and distinct meanings. The literature refers to current practices of envisioning, as a creative process that involves many participants (Albrechts, 2010b; Gaffikin & Sterrett, 2006; Kunzmann, 2013; Olesen, 2013; Shipley & Newkirk, 1999). This research stands with the Albrecht definition of envisioning as '*a collective process* [with proactive thinking] *that concerns* [a] *future for which citizens are themselves responsible*' (Albrechts 2010a, p.12). In this conception, envisioning is the process through which groups of individuals create images – long-term visions – about futures that do not yet exist (Albrechts, 2010a; Nadin, 2002; Shipley & Newkirk, 1999; Zonneveld, 2005). These futures must therefore encourage changes that embody some qualities that the present does not have (Albrechts, 2010a; Andreotta, 2013; Salzmann, 2013; Shipley & Newkirk, 1999). Proactive thinking, typical of envisioning, uncovers how things can be different without assuming that the future is solely based on forecast and prediction, but rather on values and norms. This process creates the necessary discontinuity with the present for the development of creative and innovative new solutions ►.

► The role of proactive thinking in strategic spatial planning is explained in detail in chapter 2.1.3.

The Visioneering mode adds an additional component to Albrechts' definition of envisioning: the engineering process. If envisioning corresponds to the collaborative process of proactive thinking through which possible futures are imagined, the engineering process completes it by making those images visible on maps.

[iv] In his research, Shipley always refers to the term 'visioning' (and sporadically to the term 'envisioning') as the practice or procedure used in planning to obtain visions or projects. In the dictionary 'visioning' and 'envisioning' have two different connotations, while visioning is '*the action of developing a plan, goal, or vision for the future*', envisioning is to '*imagine a future possibility: visualize*'. (Oxford Dictionary, n.d.) This research refers to envisioning in order emphasize the proactive power of such activity, and its connection with the component of visualizing.

Engineering refers to the process of transcribe long-term visions (the result of envisioning) into maps, or better to convert the comprehensive picture of the future into actions that are spatially identifiable, and that have spatial impacts. Engineering refers to the problem-solving mechanism where the problem is the future of the long-term vision (in this context the term 'problem,' does not have a negative connotation) and solving is 'how to go there' (Andreotta, 2013; Salzmann, 2013; Zech, 2013; Zech & Andreotta, 2015). Engineering is not the mere translation of a long-term vision in an image, but the unfolding process that transforms the long-term vision in a spatially visible future and a feasible path to reach such future. It sees the application of the engineer's skills and serves to identify current strategic actions to be carried out during the **trajectory** of the vision ►.

► More details on the definition of 'path' and 'action' in chapter 2.3.2.

2.2.2. Long-term Visions and the Paths Toward Them

The term **long-term vision**, or vision, has already a predominant role in strategic spatial planning. The term is used both as a synonym of 'possible' or 'desired' futures, or as a pure device (tool) to steer strategic spatial development ►.

► The current use of long-term visions as a tool for strategic spatial planning is also reported in chapter 2.1.2. The same chapter reports also the definition of 'plan of immanence' given by Hillier.

Hillier suggests, in her theoretical framework of 'strategic navigation', a type of long-term vision called 'plan of immanence' (Hillier, 2011, p. 506). In this type of long-term vision, all possibilities for potential presents and futures are sketched, and new connections are made and unmade continuously, in an ever-evolving process. The long–term vision is, in Hillier's conception, not something closed or the end of a process that reports specific targets to be achieved, but instead indicates a 'trajectory' or direction to move in.

The concept of a vision as a **direction** is also mentioned by Shipley & Newkirk (1999) while talking about desirable visual images of the future, as sets of values to be used as criteria for the implementation of the planning process. In this conception a vision is a statement of direction that will guide future planning tools. Vision as direction is also cited by Albrechts.

> '*Visions provide actors with views of the future that can be shared. The vision gives a clear sense of direction, a mobilization of energy, and a sense of being engaged in something important*'. And '[w]*ithout an appropriate vision, a transformation effort can easily degenerate into a list of confusing, inconsistent, and time-consuming projects that move in very diverse and*

often incompatible directions or nowhere at all […]' (Albrechts, 2010b, p. 1122).

The long-term vision is seen, in those definitions, as the expression of a desired direction of development for a given territory expressed through statements or guideline but lacking in **maps**, an essential ingredient of spatial planning (Helling, 1998; Nadin, 2002; Robert Shipley, 2002; Zonneveld, 2005). In Visioneering, making direction **visible** on a map is a crucial characteristic. It bases its understanding of what a vision is by considering it as a map that guides a territory toward possible futures showing a series of actions that can be drawn (Salzmann, 2013; Zech, 2013; Zech & Andreotta, 2015). In Visioneering, maps are a communication tool that steer the process of strategic planning and not a normative picture of the future with closed end objectives (Dühr, 2007; Zech, 2013).

In Visioneering, the vision tool contributes to a better understanding of futures through the illustration of their spatial aspects that not only discuss the spatial objects of futures but also presents what is happening in the illustrated spaces ►. To this end, Visioneering and its mapmaking are collaborative processes that lead to an understanding of the variables, priorities, and ideas for possible futures. The plurality of visions for a single local context makes visible many overlapping priorities without hiding conflicts (Zonneveld, 2005, 2008). The conceptualization of visions through maps can be integrated with different communicative means to overcome the perceptual barriers of all the involved parties. Written texts, graphs, photomontages, and storytelling, make the visions vivid and explicit. The plurality of these means of communication must nonetheless support the **map's key** message. In conclusion, within Visioneering, a vision is a vivid picture about possible futures represented in maps and generated through envisioning, or rather collaborative processes of proactive thinking. The vision involves the possible shared directions of development and therefore the willingness to pursue them ►.

► Spaces conceived as explained in chapter 2.1, is characterized by a fragmented actuality of processes, e.g. social, environmental, political and economic.

► 'Collaborative rationality' theory is presented in chapter 2.1.3.

Mapping choices and actions support both the long and short-term development of a territory. Hillier suggests, in the theoretical framework of 'strategic navigation', the presentation of location-specific short-term actions in the 'plan of organisation' (Abrahams, 2013) ►. This plan reports tangible collaborative goals and can be comparable to the **path**, a Visioneering tool. The path is a set of determinate local and content specific short and long-term actions. The path is thus a series of actions, and milestones, such as accomplishments, that indicate the trajectory toward the long-term vision. Table 2.1 shows how the Visioneering

► 'Plan of immanence' and 'plan of organization' of the Hillier theory are introduced and explained in chapter 2.1.2

components are present in the Hillier theory.

The specificity of the elements of the Visioneering mode - milestone, actions, agents, scale of action, and path and vision - is explored in the following chapter (2.3) where the four acts of the mode of planning are explained.

What Is a Map in Visioneering?

Even in the planning discipline itself the definition of a map can vary from culture to culture and from planning mode to planning mode (Dühr, 2007; Tyner, 2010; Zech, 2013; Zonneveld, 2008). In the framework of this doctoral research two definitions of maps are noteworthy. They are reported by Dühr (2007) and typical of the planning process.

1. **Base maps** *'are often analytical maps showing topographic and geographic information. Base maps provide the starting point for the planning process and possibly a compilation of results of other planning exercises, though they do not include policy objectives. Base maps are often of a thematic nature, and represent information relevant to the planning procedure, such as geology, demography, infrastructure or nature protection areas'* (Dühr, 2007, p. 57).

2. Cartographic **representations for participative purposes** result in maps that *'clarify specific statements towards the resolution of conflicts, co-ordination and evaluation, consideration of alternatives and variations, elimination of deficiencies, attention to the state of planning as well as presenting a link to other plans or planning approaches.'*

In such type of representations the imperfect appearance given by hand-drawing, sketching and the design process can in fact *'be the intention of the plan author, as signs of "non-finish" demonstrate that the process of visualization is still underway, and that this is a reflection of work in progress'* (Dühr, 2007, p. 57).

For the Visioneering mode of planning a map is a cartographic representation *'that shows spatial relationships'* (Tyner, 2010, p. 6). The shown relationships are those between heterogeneous parts that characterize and act in a spatial area, for instance objects, agents, nodes of power, and processes in development. The map in Visioneering is therefore *per se* not only defined by what it graphically contains in cartographic terms, but also by the forces and relationships that it graphically calls into being.

During the application of the Visioneering mode of planning, a continuous process of revision leads to 'imperfect' maps and their ever evolving appearance.

Plane of Immanence	Plane of Organization	Vision	Path
relation 'in'	relation 'to'		
becoming(s)/ emergence	transcendence	priorities and values e.g. sustainable use of resources	milestones e.g. a platform for carbon free entrepreneurships
open-ended trajectories	closed goals	possible futures e.g. high economic growth	actions e.g. guidelines for forest management
multiplicities of meshworks	hierarchical relations of power	multiplicity of futures e.g. centralized or decentralized energy system	scales of action e.g. regional, municipalities
chance/aleatory	planned development	proactive-thinking not forecast	foresight and planning
chaotic smooth space	regulated striated space	comprehensive vision of possibilities	situated actions (locally)
(with some regulation/ striation)	(with some chaos/ smoothness)		
unstructured	structured	foresight and planning	foresight and planning
dynamism of unformed elements	stability of judgment and identity	futures 'to come'	identified actions and actants
flux and fluidity	inertia or sluggish movement	the vision might change	the priorities or order of action could change
power to/ puissance	power over/ pouvoir	what is possible	how it is possible

Table 2.1.The table shows a schematic descriptors of the 'plane of immanence' and 'organization' given by Hillier. The schematic descriptors can help interpret and construct the vision and path, components of the Visioneering mode of planning (table adapted from: Abrahams, 2013, p. 44).

2.3. How to Perform the Visioneering Mode

Three main acts of application were identified in the first Visioneering experiences in the Lubljana Urban Region: **Grasping**, **Grounding,** and **Spreading** (Salzmann, 2013; Zech & Andreotta, 2015). After the empirical part of this doctoral research, I added a fourth act to the application of the Visioneering mode: **Moving.** The acts compose the process of planning, and overlap and intersect in different moments of the Visioneering application like different performances taking place at the same time. Essentially the Visioneering mode of planning serves to guide the performance in the planning arena across its four acts that do not occur in a linear sequence.

The understanding of the word **act**, used in the Visioneering mode, comes from improvisational theatre. There is relevant scientific literature on how improvisational theater can be useful for the strategic organization of companies and complex situations (Crossan et al., 1996; Dusya & Crossan, 2004; Sawyer, 2000). Some elements of this literature might be useful to understand the Visioneering mode of planning - and probably any strategic spatial planning approach. An improvisational theatre performance is about to embrace the uncertain '*adapting to circumstances, and working as a group in a process of creation. Improvisational actors are encouraged to focus on the process and suspend judgment of the outcome*' (Dusya & Crossan, 2004, p. 732).

In the same way the Visioneering mode of planning - and strategic planning itself - is a process in which different actors embrace uncertainties on the future 'to come' with proactive thinking, in a collaborative planning arena. In the Visioneering planning performance, the planner becomes an improviser that navigates the performance, thus the arena, across the four acts of the mode. Improvisation does not refer to the 'anything goes' kind of improvisation, instead it always occurs within a structure, and all improvisers draw from their previously acquired skills (Dusya & Crossan, 2004; Sawyer, 2000). In the same way the four acts of Visioneering shape a structure within which skilled planners play improvised scenes that belong to one of the four acts.

In this improvisational theater metaphor one can find that improvisation, as strategic planning, is not about doing one previously decided right thing (output view), but about continuously doing things right, as best as we can, as best as the contextual circumstances allow (process view).

The four acts of Visioneering are named Grasping, Grounding, Spreading, and Moving; each act encompasses the pursuit of an output (visions, paths, actions; see Figure 2.9).
Through the **Grasping** act, planners gather the spatial knowledge and a spatial insight about the local context, and, together with the involved parties, envision long-term visions for its future. In the **Grounding** act planners walk through the chronology of the long-term vision with a back-casting approach, from the future until now, and discover the path toward the vision. The **Spreading** act consists in the involvement of different stakeholders or actors in the planning process, and their influence on other agents. The latter is due to the fact that the involved parties take actions visible also outside the planning arena; they talk about the planning process and disseminate the values expressed in the arena. Finally the **Moving** act is the one in which actions take form, moving the local context along the path of the vision.

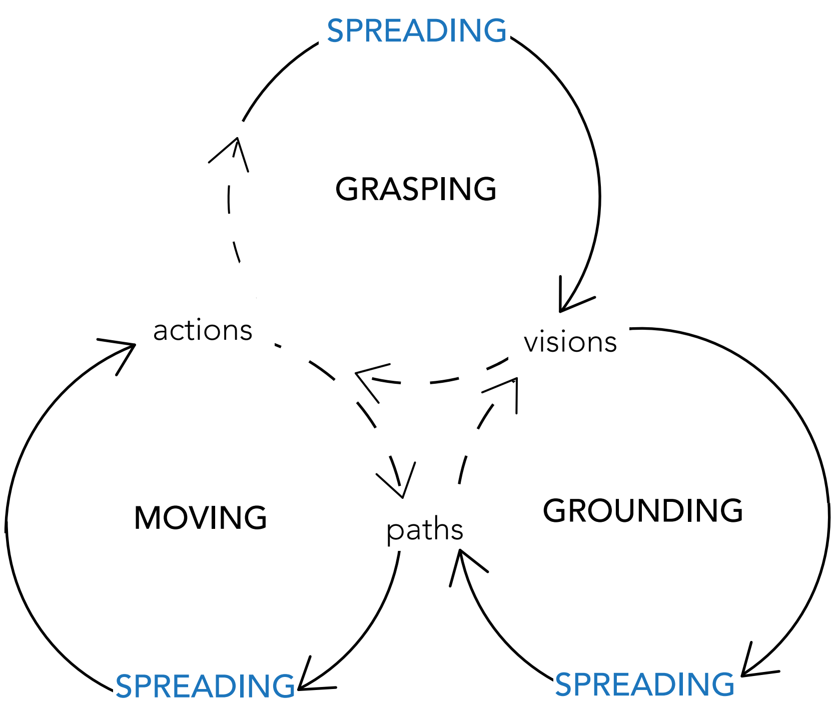


Figure 2.9. Each act of the Visioneering planning process pursues an output: visions, paths, and actions. The visions emerge in the planners' and participants' mind in the Grasping act. This already involves some Spreading, the act where stakeholders and different parties participate in designing the vision, and spreading the information. During the Grounding act, which also involves some Spreading, the path is designed. During the Moving act, stakeholders, actors, and agents take actions. From here on, the process might require a review of the vision since new knowledge could enhance the vision, or the path, during the Moving act (author's own design).

2.3.1. The Grasping Act

The planning process starts with the Grasping act that consists in exploring the region from several different perspectives, getting a mental hold of the local context. The aim in this act is to interpret a region in a comprehensive mode, as the space broadly characterized by not only diverse and heterogeneous driving forces, but also by fragmented actuality of social, environmental, political, and economic processes (Healey, 2007). Grasping arises questions related to the role of the physical space in the region, its transformation throughout time, and its potentialities for the future ►.

► The definition of space also as 'physical' is given in chapter 2.1.1.

Grasping is what Hillier, in the 'rhizome' metaphor, calls 'sensing' and 'making sense' (Table 2.2). It consists in building a shared understanding of the context in which strategic planning is to take place, what is going on and how things came to be. While it integrates different perspectives and new knowledge into planners' understandings of what is happening and might happen in the future, it also finds new ways to view issues. Grasping therefore, requires the involvement of many parties beside the planner, and turns on the Spreading act.

Sensing
Contextualizing creates understanding of the context in which strategic planning is to take place; a sensing of what is going on and how things came to be.
Focusing arrives at an initial, shared understanding of critical issues.
Making-sense
Patterning integrates different perspectives and new knowledge into planners' understanding of what is happening and might happen in the future.
Re-perceiving involves deepening awareness and understanding through finding new ways to view issues. Fore-sighting or prospective exercises can offer multiple perspectives on alternative futures. Outcomes can significantly change beliefs about what is important to actants.

Table 2.2.The table shows the components and elements from the rhizome metaphor by Hillier (Figure 2.5) that are involved in the Grasping act. The table's elements should be considered rhizomically interlinked (table source: Hillier 2011, p.520).

The act of Grasping ends when the planner and the involved parties have a first draft idea of how the future might be, how the visions might look like. The following chapter reports the Grasping act as applied in the doctoral research, thus **learning** about the region through **trips** to the local context, with the final development of **flash visions** ►. This also involves the Spreading act through **colloquiums** with locals, **interviews** with stakeholders, and a Children's Workshop ►. This doesn't rule out the possibility of performing the Grasping and Spreading act, in other local contexts, with different or additional activities.

► The term 'local context' is used to express where the practice of planning takes place, with its local characteristic and boundaries, see chapter 2.4.

► The activities done in the local context of Cadore for the Spreading of the Grasping act are reported in chapter 3.3. Specifically the interviews and colloquiums are in chapter 3.3.1; the Children's Workshop is in chapter 3.3.2; Checking the Documents is in chapter 3.3.3.

Learning

Understanding the local context consists in acquiring information about the local planning **system**, administrative **tools**, already active projects, and **challenges** that the region is tackling and its **future** ambitions. Such information concerns spatial roots and variables, and can be acquired consulting the competent administrative bodies, through documents or media, and by debating with local stakeholders and actors. This information does not come from/add to statistical analysis or data, but shapes a comprehensive understanding of the region.
Learning about the local context provides an outline of the **governance** system and of the power relations within the context itself and with the surrounding regions. It provides an outline of the **physicality** of the local context and therefore knowledge concerning the environment, its natural resources, the configuration of the territory, and its modes of using the territory itself.
The research methods I used to learn about Cadore's local context are semi-structured **interviews** and **colloquiums**, **trips** to the region, and a **Children's Workshop**. These methods, which involved stakeholders and actors, concerned both the Grasping and Spreading acts. Furthermore a series of **documents** concerning both the local statutory planning, and the low-carbon matter of concern for the Alps, were examined through content analysis.

Trips

Trips to the local context permit a direct contact with the territory, and give the planner the opportunity to physically explore it and to talk with the local citizens in-situ.
Colloquiums are a good research method to use during the trip, they serve to gather the information described in the previous learning activity. It is possible to draw up, during the learning phase, a short list of questions, which could be answered by locals to clarify feelings about the present and future, and how the region is perceived. They provide **local knowledge** that originates from common sense, casual empiricism, or thoughtful speculation and analysis, and not from

certificated expertise (Corburn, 2003). This type of knowledge considers the importance of life-styles in the local context. Thus local knowledge can complete professional knowledge and fills gaps by providing information about local context from those who know it first-hand (Corburn, 2003; Innes & Booher, 2010) ►. Local people often offer professional knowledge, being specialists themselves or accustomed to representing their interests on a volunteer basis.

► The local knowledge was important in the empirical part of the research which explored inhabitants' energy consumption patterns and their way of moving throughout the territory. Local knowledge is also reported among the elements of 'collaborative rationality' in chapter 2.1.3.

During a trip in the area I also conducted a **Children's Workshop** with the aim of gathering insights on the future of the region from 'eyes' different from those of adults ►.

► More details on colloquiums and interview in chapter 3.3.1, and on the scope of the Children's Workshop in chapter 3.3.2.

Flash Vision and Vision

Once the planner has a comprehensive understanding of the region, it is possible to identify the present issues, and future ideas, that affect the territory. They can be classified as qualitative and/or quantitative data and categories with a code or label. In the doctoral research I clustered them in qualitative data with four different categories: energy, social, environment, and economic. I presented them in **network graph** (Figure 3.45 in chapter 3.3.4). The graph shows the issues belonging to the four categories that concern the local context, their interrelation, and their level of importance in the face of low-carbon futures. This doesn't rule out the possibility of organizing the acquired data in other ways and in other contexts.

At this point in the Visioneering mode application **flash visions** emerge in the mind as brief, short, concise and sudden ideas about futures, on a fixed time, which need to be represented in some way. The flash vision can be represented as a cloud of words, sketch or statements. In the doctoral research, they emerged as three statements from the network graph, statements that refer to three possible energetic assets of the local context in 2050.

After the flash visions, the first sketches and ideas can be marked on maps, in order to explore the various aspects of those futures. Mapping visions requests planners to illustrate interconnections among options of the futures 'to come', to experiment with them, and to foresee potential tensions amongst options. Here the first real limits and challenges of the visions are articulated.

During the doctoral research the first versions of visions were tested and adjusted in a **Stakeholders Workshop** during the Grasping act ►. There the 'collaborative rationality' of the planning arena was steered by the maps. Stakeholders sketched, made collages, and designed in order to make the visions more consistent and anchored to the local context.

► The three first version of the visions of the empirical research referred to three possible energetic assets in 2050, see chapter 3.3.4. The Stakeholder Workshop I is reported in chapter 3.4.1.

Grasping Outcome and Output

The outcome of the Grasping act is a comprehensive understanding of the territory, its present, and its future. With Grounding, the Spreading act is already activated ►.

The outputs of the Grasping act are the flash visions, already strongly linked to the local context, and sketched on a map. The Grasping act remains present as long as the planner is acquiring new knowledge for the further revision of the visions.

► The differences among output, outcome, and process are explained in chapter 2.5.

2.3.2. The Grounding Act

With the Grounding act, the engineering process begins: the visions become maps, and the paths of milestones and actions are delineated along the trajectory of the vision. In addition, such act permits the exploration of the relation between Visioneering and statutory planning, or other active planning tools in the local context. Grounding can be described by Hillier's rhizome component 'designing' (see Table 2.3). 'Designing,' in Hillier's theory, corresponds to examining what could take place and could be important, and to drawing the 'plan of immanence' and the 'plan of organization' ► .

In the Grounding act, other parties beside the planner are involved. In this act the back-casting approach serves to draw maps that represent visions and paths. Similarly to the Grasping act, Grounding turns the Spreading act on.

In the following paragraphs, the Grounding elements of the **back-casting** approach and the **path,** including its **actions** and **milestones,** are described. In the doctoral research, this act also involved the activities of **colloquiums** with stakeholders, expert **interviews**, and a **Stakeholder Workshop**. This doesn't rule out the possibility of performing the Grounding and Spreading act, in other contexts, with different or additional activities.

► The 'plan of immanence' and the 'plan of organization' are explained in chapter 2.1.2. The first, consists in several, or one preferred, vision or 'trajectories' on long-term, the second reports tangible collaborative goals.

Designing
Refocusing examines what, from the prospective investigated, could be more or less likely to take place and could be more or less strategically important and why.
Charting involves preparing appropriate plans.

Table 2.3. The table shows the component of the rhizome metaphor by Hillier (Figure 2.5) that is involved in the Grounding act (table source: Hillier, 2011, p. 520).

Back-Casting

The Visioneering mode of planning, in order to unfold the path that shows the way toward the long term-vision, involves the back-casting approach. This approach helps to identify what needs to be done to connect this **present** to the envisioned **future**. The back-casting approach consists of tracing the route toward the vision, starting from the long-term vision and walking backward until nowadays (Albrechts, 2010a). This technique underlines the discontinuity between the visions and the present, refusing to see the future as an extension of now.

Some main questions which the path toward the visions should answer are:

- How might the local context look like in three decades, in two, or in one?
- Which kinds of actions are required to accomplish the future of the long-term vision?
- Who could initiate those actions?
- In which stage of the path does/should Visioneering interrelate with statutory planning or other planning tools?

In this doctoral research the back-casting approach was supported by the following methods: **questionnaires**, **surveys,** and a **Stakeholders Workshop**. The first two methods offered the chance to understand the aspects, variables, and characteristics of desirable futures in the local context, redefining the vision. The third method gave stakeholders both the chance to redefine the vision through their point of view and to draw paths toward the visions ►.

► In the research back-casting was done differently during the revision of the Visions. In the first design attempt, it was focused on the energy system, therefore answering questions on the envisioned energy production (chapter 3.3.4). In the second attempt it exclusively concerned the reduction of CO_2 emissions. In this second case back-casting was more accurate and consistent (chapter 3.4.3).

The Path, the Milestone, and the Actions

The **path** is the traced trajectory that leads to the visions, and is composed of milestones and actions. The term **milestone** refers to a significant step or event on the path toward the visions; **actions** refers to processes of doing something. If the milestone is an objective to pursue, the actions are the groups of activities through which it is achieved. Table 2.4 shows various example of milestones and their actions.

The outcome of back-casting is a set of milestones that are fixed at a suitable time which allows them to be achieved. Each milestone has to be clear, not necessarily detailed, in order to identify the actions involved in it, and the stakeholders and agents related to it. A plurality of actions in the milestone helps, because when one of them does not work, other possibilities float around. The necessity to use other planning tools could be an action and it could emerge through setting a milestone. In the doctoral research, the paths were traced during a Stakeholder Workshop

(SWII, chapter 3.4.4) in which visual materials allowed the stakeholders to construct and deconstruct them. Those paths are the trajectories toward the visions adjusted in a previous Stakeholder Workshop (SWI, chapter 3.4.1).

	Milestone	Action
2020	Decreasing the space for cars in the city, in order to introduce more lanes for buses, carpooling, and cyclists.	Introducing a cycling lane. Introducing a city-bike system . Transforming a park lot into another functioning area.
2030	Building a tram around the city center and connections to the railway lines.	Promoting public transport use. Finding the missing connections in the city. Implementing and realizing the project for the tramline. Implementing and realizing the connection with railway lines.

Table 2.4. Brief example of milestones and their actions (table source: Andreotta, 2013).

Grounding Outcome and Output

The outcome of the Grounding act is an enhanced awareness of who participates in the planning process, the future of the region and how to implement it, and a list of feasible actions and their interrelated involved parties ►. The Grounding act also sees the involvement of the Spreading act, thus outcomes are also expected in the latter.

► The differences among output, outcome, and process are explained in chapter 2.5.

The outputs are vivid visions and paths that follow the visions' trajectory, and are strongly linked to the local context. The Grounding act does not end yet, it is involved in the revision of the visions and paths.

2.3.3. The Spreading Act

The Spreading act is the most challenging to identify in the use of the Visioneering mode of planning. Spreading refers to both **involving** the interested parties in the planning arena, and **disseminating** the vision and the path on a wider scale, with other agents that can influence or implement them. In the first case Spreading occurs in the 'collaborative rationality' of the planning arena and it is steered by visions and paths; in the second case it involves actors also from outside the arena that might influence or implement the visions and paths. The Spreading act overlaps with the other three acts, since the involvement of different stakeholders and agents, beside the planner, is necessary from the beginning of the Grasping act.

The following paragraph explains 'collaborative rationality', and the contribution of Spreading outside the planning arena. Subsequently this chapter presents a series of techniques that were used in the Spreading act of this empirical research, such as **interviews and colloquiums**, **workshops**, **focus groups**, **storytelling**, **sketching** and **collaging**, **questionnaires** and **surveys**, **study tours**, and **media** (Figure 2.10). This list doesn't rule out the possibility of performing the Grounding and Spreading act, in other contexts, with different or additional activities.

'**Collaborative rationality**' has been already presented within the theoretical chapter 2.1.3. Here are some more details from the Innes and Booher (2010) theory which are described with the aim of clarifying its relation to the Spreading act. In this theory, a process that involves 'collaborative rationality' requires: diverse **participants**, a matter of **concern** recognized by all participants, and that **everything** is on the table. '[The resulting] *process is rational because it considers a full range of views, depends on well-vetted information, and reaches conclusions that stand up to scrutiny from many perspectives*' (Innes & Booher, 2016, p. 9).

An effective 'collaborative rationality' works differently case by case, but the ingredients that fill up this rationality are recurrent: values, interests, perspectives, skills, and various types and sources of knowledge ►. This heterogeneity of ingredients leads to the designing of a multiplicity of visions and paths. To build a 'collaborative rationality' able to include this level of variety, all those who have pertinent knowledge and a stake in the matter of concern have to be engaged. Along this dialogue it might happen that dominant stakeholders exclude other perspectives, resulting in an uninformed or unjust dialogue. The planner that engages in collaboration builds on their intuition and previous experiences on

► Look at chapter 2.1.1, where the necessity of a plurality of futures in strategic spatial planning is discussed.

how to proceed.
It is difficult to achieve a 'collaborative rationality' when the stereotypes or prejudices of certain involved parties permeate the subject of the conversation and the relationship with the participants.
This impacts the involvement of certain parties and the discussion of certain subjects. By understanding and uncovering what those social or individual constructs hide, the stakeholders who dominate the arena might be disempowered, and finally contributions from all parties, and on all subjects, emerge (Coaffee & Healey, 2003; Corburn, 2003; Healey, 2007; Innes & Booher, 2010). In many cases, when such constructs are too strong to be unfolded in the arena, new approaches or modes of participation may be needed ►.
In addition to such construct some stakeholders in the arena might censor themselves, not saying what they are thinking because they are too shy, or because

► In the SWII there was unbalanced stakeholders' participation. In the event, an age difference between stakeholders played a role in the 'authentic dialogue'. This finding, reported in chapter 3.4.4, refers to some cultural and social aspects of the local context.

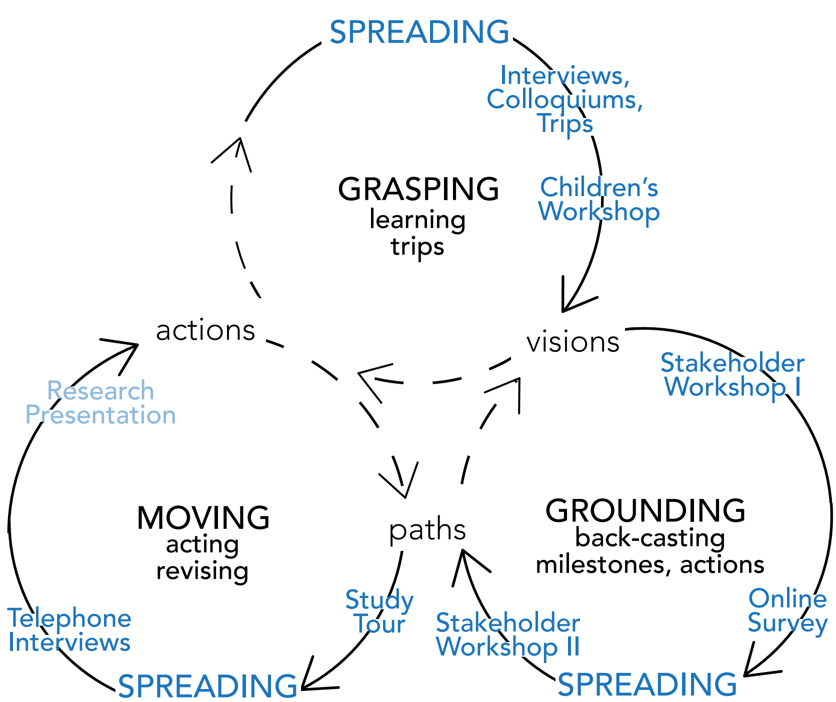


Figure 2.10. Each act of the Visioneering mode involves moments of Spreading. The ones reported in the figure are the ones used in the empirical research (author's own design).

they fear it is not relevant (Innes & Booher, 2010). Some participants might think that since collaboration is about finding common ground, they should not bring up anything controversial. But without giving new knowledge and assumptions, a dialogue cannot be collaborative. An internal tension, **agonism**[v], helps participants to move out of their self-referential discussion revealing the multiple sides of a problem or idea. Since it is not possible to eliminate conflicting interests, values, and attitudes (of the parties involved in the arena, but also of the external agents), the planner has to hold the participants in a condition of agonism. In agonism the parties are constructively mobilized towards consensual - or non-consensual - decisions, accepting unresolvable disagreements (Hillier, 2002). Such **tensions** make managing the arena challenging, but they are an essential source for the creative process that forces and breaks conventional ideas of the future based on projections of the present.

The unfolding risk of agonism is a thin and fragile agreement that hides different points of view. This is a further reason why a **plurality** of visions is necessary to address different possible futures (Hillier, 2002; Innes & Booher, 2010) ►. 'Collaborative rationality' therefore lets contradictions and differences emerge pushing the arena to come up with feasible, **partially agreed upon**, ideas or actions for the long-term visions.

► The dialogue is supposed to be authentic when all the involved parties are sincere. For the definition of 'authentic dialogue' look at chapter 2.1.3. During the empirical research, external constrains were mentioned in the SWs, e.g., the participants were strongly influenced by the national political condition, which generated mistrust in the future, and a 'fatigue' for new ideas.

'Collaborative rationality' with its agonism and partial agreement, relies on what participants know from their everyday life and not just on specialized, scientific expertise. The resulting 'authentic dialogue' jointly constructs knowledge through interaction and social learning. Innes and Booher (2010) state that a collaborative process might fail to meet the conditions of 'authentic dialogue' when it is not inclusionary, or when there are constrains by external powers, e.g., media or political. Those constrains have to be spoken about in the 'authentic dialogue' making all of the arena **aware** of them.

The Spreading act stimulates a 'collaborative rationality' in the planning arena where stakeholders are actively and directly involved, but it also affects **agents** that are out of the arena. Those agents might be connected to the arena, or know about it, through the participating stakeholders, moderators, or professional

[v] Hillier describes the differences between agonism and antagonism in a democratic process: '*Since we cannot eliminate antagonism, we need to domesticate it to a condition of agonism in which passion is mobilized constructively (rather than destructively) towards the promotion of democratic decisions which are partly consensual, but which also respectfully accept unresolvable disagreements. While agonism is generally construed as a struggle against, it may also be construed as a struggle for.* […] [O]*ne must not be for consensuality, but one must be against non consensuality*' (Hillier, 2002, p. 122).

practitioners. Those agents interact dynamically, exchanging information with others, letting the outcomes of the planning process propagate in the local context. This level of Spreading effects both behavioral changes of the agents, and also an awakened interest in the future and in the matter of concern. In this level, the participants of the arena become the most important 'advertisers' of the process, while the media plays an important role ►.

► The doctoral research saw the spread of the research on radio and Facebook by the involved stakeholders. Particularly the use of internet for the OS led different point of views - from the one of the stakeholders - to enter in the arena.

Different communication channels and media attract different agents and stakeholders. For example a channel can require a high level of information, such as a complex written paper, and can be of interest for some professionals of the arena (Shipley & Michela, 2006). While an announcement in the local radio focus on the storytelling of the vision, or on the planning process, and can capture the attention of agents normally not involved in planning processes.

In Visioneering the **visual material**, such as the map or the path, is fundamental to steer and keep anchored 'collaborative rationality' on the matter of concern, and on the local context not only verbally. Maps are the main message bearer: different from other visual material, e.g., graphs and photomontage, they help to complete and clarify the vision ►. **Maps** provide, in the Visioneering process, a holistic picture of a local context illustrating social, economic or environmental features, or combinations of these. They are useful in discussing the location of *things*, for instance resources, flows, activities, and values, that co-exist and interact in the local context. Sketching and collaging on maps brings to light artifacts that indicate the important variables, for the participants, of the various features on the map (Conde & Lonsdale, 2004).

► The definition of 'map' as interpreted in the Visioneering mode of planning is in chapter 2.2.2.

In the SWs of this doctoral research, maps were the main message bearer. Nonetheless, other visual material helped to clarify the visions and paths, specifically graphs, written texts, and photomontage ►.

► Sketching and collaging on map was the focus activity in the SWs when the use of stickers, see chapter 3.4.1 and 3.4.4, helped to see the necessary local actions. Translating the decision-making process in pictures helped visualize the variables implied in the process.

To spread the visions and paths it is necessary to use the adequate tools for each target group. The following paragraphs describes the Spreading tools and activities used in this doctoral research with stakeholders, local citizens, children, and external experts. This doesn't rule out the possibility of performing the Spreading act with different or additional activities and tools in other contexts.

Interviews and Colloquiums

Interviews and **colloquiums** are a good method to gather professional local knowledge and information in the local context.

An interview is a research method that consists in asking a series of questions to obtain knowledge, it can be carried out face-to-face, over the telephone, or through the internet. The interviews can vary from a spontaneous conversation, called colloquium in this research, to semi-structured or structured interviews. In the semi-structured interviews, researchers are often aided by an interview **guide**, a set of questions that contains the topics, themes, or issues to be covered (Bryman, 2012; Silverman, 2015). Interviews are usually recorded and then transcribed to produce texts that can be analyzed as qualitative data. **Colloquiums** are, on the other side, a result of a face-to-face dialogue between the research and – usually – a local, and provide a more free and informal atmosphere than with interviews. Colloquiums are usually not recorded but, during them, the researcher takes written note in order to memorize the acquired knowledge and information (Bryman, 2012).

Interview and colloquium methods are particularly useful for the researchers to understand the way in which individuals interpret and assign meaning to their local context, or to a matter of concern, and they generate unfolding processes of knowledge discovery. The trip to the local context is a perfect opportunity for researchers to carry out interviews and colloquiums on-site.

Storytelling

In the 'collaborative rational' planning arena, participants work out what they think through a sort of stories that produce a sense of cause-effect events, or rather reasoning through **storytelling**. Innes and Booher (2010) address storytelling as a device for learning and reasoning. in the context of 'collaborative rationality' during the planning process,

> '[The participants in the planning arena] *tell stories about how they see the problems and about what they think will be the consequences of particular actions. They tell stories which bring in moral issues as well as practical ones, which tap into community values. The stories give both experts and citizens an equal chance to contribute and understand one another as well as to persuade each other. Stories carry emotions and evoke values which are necessary to motivate joint or single actions*' (Innes & Booher, 2016, p.9).

Storytelling is the techniques used by humans to unfold or reveal the narrative of a story, of the past, the present, or the future. These stories also reveal the specific positionality of the narrators, with implications for notions of inclusivity in the dialogue that the narrators have with themselves or the other involved parties (Bulkens, et al., 2015).
Communities in general tell stories about themselves, their history, how they are different from others, as a way of building individual and community identity for the past, present, and future ►. These stories give them **justifications** for what they do or haven't done, while they also uncover moral values, values of preferences, and emotions. Storytelling is in fact not concerned with turning the content of the story into something 'objective', but it is built on the contextual world.

► The participants of the consultative (colloquiums, interviews) and participatory events (SWs and OS), have built their narratives comparing the Cadore region several times to the nearest Trentino-Alto Adige/ Südtirol Region (see findings in chapter 3.3.1).

The participants and the planner should always bring on the arena more than **a single story**. Since a story plays a big part in framing a problem or solution, when there are dominant stories, the planner should ask: *who wants this story to be true, and why?* (van Hulst, 2012). Storytelling is therefore an important instrument also in proactive thinking, because it can reframe a situation, predict a result, allow free flow of speculation, and explore what would happen 'if' part of the 'story' missing from professional knowledge was known ►. Furthermore, stories are fundamental in proactive thinking because they replace the dependence on professional knowledge as a basis for action.

► An example of reframing is reported in chapter 2.1.2, and concerns the topic of the shrinking region that can be seen as a problem of depopulation or a chance to make quality of life the priority in the planning process.

Storytelling is present in 'collaborative rationality' from the beginning of the planning arena, when planners initiate it by describing the situation and outlining their understanding of it through data, graphs, or cited statements. In fact, planners offer an overall story line to show the matter of concern, and the local context. Then stakeholders talk about their reasons for coming to the arena and their interests, by telling stories about what is happening from their point of view, about the institution they represent, and about their experiences with the matter of concern.

Sketching and Collaging

Sketching and collaging is how a story moves beyond verbal expression and allows for possible futures to emerge in pictures. Sketching and collaging happens when the visual material of Visioneering is brought into the 'collaborative rationality' arena. A **collage** engages participants in a dialogue thanks to a collection of printed material. The participants choose what is relevant for them from among

the provided material, and then formed a new combination, a new story.
'[The collage allows the participant to] *interrogate all the heterogeneous objects of which his treasury is composed to discover what each of them could "signify" and so contribute to the definition of a set which has yet to materialize*' (Innes & Booher, 2010, p. 136).
The completed collage represents a group of objects (and therefore ideas) that take shape and meaning during the assemblage [vi] itself. The collage's characteristics are determined by the available visual material, such as stickers, and how it can be assembled. Storytelling is the process of moving from a collage, or sketch, to a coherent and meaningful combination of elements, e.g., actions, objects, agents ►.

► In the Children's Workshop, reported in chapter 3.3.2, the given visual material for collaging refers to local landscapes and RES plants. The material provided in the SWI, reported in chapter 3.4.1, was post-it notes and monochrome stickers. This choice allowed for a free interpretation of the 'objects' to assemble in the visions, allowing missing variables to emerge.

In 'collaborative' dialogues, discussions on collages and sketches usually start with reading the map, which reports the existing conditions of the local context, and then the group moves to a more creative stage led by the planner, or by the moderator. When the 'collaborative rationality' arena has an 'authentic dialogue' (see Figure 2.6), group members gain energy from others' ideas and draw upon them. A high level of comfort among participants enhances creativity and agonism.

Workshop

A workshop is a method to engage different parties in a place, making them work on a matter of concern, it is used to address a particular topic, and usually it involves brainstorming or discussion to achieve a certain outcome. **Workshops** are usually part of a larger meeting, such as conference or planning processes, encourage an informal atmosphere, and shape team-working (Conde & Lonsdale, 2004).
A moderator steers the workshop where all involved parties, including the moderator, are supposed to actively collaborate with the help of manual activity such as collaging and sketching. During the workshop, key words, concepts, and relations among forces are explicitly spoken, revealing information of the local context and the involved parties (Conde & Lonsdale, 2004).
Workshops and their manual activities are also a suitable method to involve children in planning. There is an increasing amount of literature that demonstrates

[vi] An assemblage is an entity constructed from heterogeneous parts, it can refer to human and non-human entities. What is particularly important about an assemblage is the relation (especially the power or force relations) between the heterogeneous parts or elements. Relational interaction and connectivity are vital, especially if the assemblage is to develop agency, that is the capacity of individuals or group of individuals to act and make decisions (Abrahams, 2013; Hillier, 2011).

children and young people's abilities to participate in planning processes, explaining what benefits might emerge (Day et al., 2011; Haider, 2006; Oestreich, 2012; Scoppetta, 2014). Despite the benefits of this practice, planners must note that every 'collaborative rationality' in a workshop depends on that workshop's aim (e.g., map designing, construction of models, bargaining), and on the involved target group (e.g., children, decision-makers, scholars) (Day et al., 2011; Innes & Booher, 2010). Children's competences in planning and understanding the built environment are different from the adults' ones. A real and effective involvement of children in participatory practices requires an understanding of their own distinctive language and thinking. Children, in fact, do not draw from what they 'know', but they draw from their daily experience, without a clear distinction between reality and fantasy (Scoppetta, 2014). Their representations, especially at the level of nursery and primary school, '*consist of a non-structured non-hierarchical dis-homogeneous whole of objects and events – also including a dream or a nightmare, a desire or a fear, a sketch from a television program or a landscape from a video game*' (Scoppetta, 2014, p. 588).
Their artifacts are more organized through a cultural and experiential process. Thus artifacts that do not describe 'real' objects, but that classify those objects in relation to the children's experience with the surrounding environment ►.
The children's participation leads to various benefits: the planner gathers an increasing number of different points of view to be included in the process, and the stakeholders who experience the children's process are exposed to a new mode of perceiving familiar spaces.

► The main benefit of the Children's Workshop, described in chapter 3.3.2, was a shift in the perception of the role of spaces different from the adults' one.
For the children, this role was based on playing and spare time activities, rather than on efficiency and mobility. For instance, in their imagination the main street should become a place where to run and bike.

Focus Group

The focus group is a method of interviewing that includes more than one interviewee, it is a planned discussion with a small group of stakeholders, from 4 to 12 members, facilitated and guided by a skilled moderator. As in the interview, the moderator in the focus group might follow a guide made of questions or topics to treat.
In the focus group the moderator is interested in the way in which individuals discuss the matter of concern both as members of the group, and simply as individuals (Bryman, 2012). Usually in a focus group, the topic is introduced, and in the unfolding discussion group members influence each other by responding to reciprocal ideas and comments. The focus group thus enables viewpoints that might not emerge in single interview, stimulating agonism (Conde & Lonsdale, 2004; Innes & Booher, 2010).

Study Tour

The **study tour** involves a visit to one site, other than the local context, with a practical example on a matter of concern similar to the one discussed in the planning arena. This enables the participants to see how a resolved, or matter of concern that is under management, may look like, and to ask questions to the stakeholders of the visited site. Study tours emphasize experiential learning and enable a network to be built among the participants and with the visited site (Conde & Lonsdale, 2004; UNEP, 2014).

Moderators' Role

The **moderator** provides crucial support in a collaborative planning arena where **workshops**, **focus groups,** and **study tours** happen, and they build trust during the planning process. The same planner is often a moderator in the planning arena. A major job of the moderator is to keep participants **informed** about, **and involved** in, the arena. Moderators can make agreements happen by providing support, encouragement, and information, and keep the planning process on track since stakeholders often deviate from the matter of concern (Bryman, 2012; Innes & Booher, 2010). The moderator must encourage the emotional individuals, e.g., angry or shy ones, to speak up regarding the matter of concern, without avoiding agonism ►.

► During the SWII, described in chapter 3.4.4, it became clear that some of the stakeholders were not speaking as representatives of institutions, but rather as emotional individuals.

Questionnaire and Survey

Questionnaires and **surveys** are methods commonly used for collecting information about a target group. They provide a relatively quick and efficient way of obtaining large amounts of comparable data from a large sample of involved parties. The questions in the questionnaire and survey can trigger thoughts and ideas in the parties that might slowly bring to actions.
With the **closed self-completion questionnaires** the respondents are given a list of predetermined responses from which to choose from (Bryman, 2012). In the doctoral research, pre and post event questionnaires were used as key techniques for obtaining and detecting participants' changes in opinions and priorities on the events themselves (SWI and SWII) and between events (from the SWI to the SWII).
As far as the survey, I set an **online survey** to gather people's perceptions and priorities on the low-carbon future of the region.
When the survey and questionnaires present the same queries and ranking scale,

the gathered data can be compared. In the research, the Likert scale permitted a comparison of the SW questionnaires, which were completed by stakeholders, and the OS, which residents filled out.

Media

A planning process in a local context is likely to receive coverage from local newspapers, radio or television, and social networks. The participants of the planning process themselves use media to present or discuss the process and the output. This can be highly useful for communicating key messages to the community and to create consensus or agonism ►.

► While I was carrying out my doctoral research I wrote an article in the local magazine 'Cadore' about the visions and the SWs, see Appendix 5.3. Furthemore one stakeholder was interviewed via radio to talk about the SWs. These activities made it possible to spread the research and its aim, and led to a considerable response to the Online Survey.

Spreading Outcome

The final results of an efficient Spreading act are, first of all, a 'collaborative rationality' in the planning arena with an 'authentic dialogue', thus the presence of aware and collaborative involved parties. An additional result is an effect on many agents not directly involved in the planning process.
The Spreading act begins with the planning process and involves many parties other than the planner. Spreading occurs therefore not in one specific moment of the Visioneering mode of application, but in many moments that entail the Visioneering acts, in an ideally infinite co-evolution toward the vision trajectories.

2.3.4. The Moving Act

When visions and paths are vividly designed in the Grounding act, the involved parties, or influenced parties, start to **move** toward the visions through the realization of actions. Moving is the act of Visioneering that entails the 'effecting' and 'co-evolving' components of Hiller's theory (see Table 2.5). They consist in the implementation of short-term actions designed in the 'plan of organization' or the path, and the continuous adaptation of the planning process and the path in the light of changes. The latter is the continuous revision and consultation of the visions and paths.
In the following paragraph the Moving activities of this doctoral research, **acting** and **revising,** are described. This doesn't rule out the possibility of performing the Moving act, in other local contexts, with different or additional activities and tools.

Enacting
Effecting implements the plans.
Co-evolving enables an adaptation of practice and plans in the light of changes caused by those practices and plans.

Table 2.5. The table shows the elements of the rhizome metaphor by Hillier (Figure 2.5) that are involved in the Moving act (table source: Hillier, 2011, p. 520).

Acting

The paths and visions defined during the Grounding act become useful tools in the Moving act. Specifically the path reports the actions to take in both a short-term, and long-term prospective, e.g., the realization of an energy plant, or the setting of a stakeholder platform.
In the empirical research, the major action of the Moving act was the **study tour.** The tour interested a best practice in the field of energy, and involved stakeholders and citizens ►. The empirical research did not have the chance to go forward, but it received many expression of interest from the participants to go further and start an educational tour in **schools**.

► In the empirical research, the study tour was a part of the SWII. It let the stakeholders collect data and experiences on a similar local context, where a long-term energy vision was implemented. See chapter 3.4.4.

Revising

It is likely that the local context develops and the surrounding circumstances change, e.g., political, technical. Thus the actions designed in the path require

revision and adaptation to the on-going changes (Andreotta, 2013; Salzmann, 2013). Presumably at each milestone it will be possible to check that intermediate actions have been achieved, or that further actions need to be added.
When the vision and path are not revised and consulted periodically, time may be wasted, losing the effects of the 'collaborative rationality' built during the vision and path design. **Tracing** progress will ensure that any problems are redefined at the earliest possible moment. Such activity includes periodic meetings with stakeholders, or target group, involved in the planning process. Due to time constraints, in this empirical research there was no revision of the visions after the paths' design.

Moving Outcome and Output

In this act it is more appropriate to talk about outcomes as the long-term impact of the Visioneering planning process ►.

► The differences among output, outcome, and process are explained in chapter 2.5.

The outcome of the Moving act is an enhanced awareness of the future of the region and how to implement it. Tangible effects of the enhanced awareness, such as the effective implemented trajectory of the vision, are visible on a longer term. The outputs of the Moving act are the realized actions that follow the visions' trajectory, and, when necessary, the revised visions and paths.

2.3.5. Improvements to the Visioneering Mode

During the application of the Visioneering mode in this doctoral research, few improvements were made in respect to the application in the Ljubljana Urban Region (Andreotta, 2013). The latter was one of the first experiments with the Visioneering mode, and concerned a bigger local context – the urban region of Ljubljana – than the one of this doctoral research – Cadore. The improvements done to the mode of planning are listed below as findings of the empirical research for future applications of the mode.

- The planning arena has to stimulate agonism and propose a **plurality** of visions – maps – and not a sole point of view that covers up conflicts and ideas.
- Proactive thinking induces discontinuity with the present and 'cheers up the participants' in regards to possible different futures. The **engineer's skill** is fundamental to translate these into short-term actions while keeping visible the discontinuity with the present.

- In the 'collaborative rationality' a **minimum** of data and forecast is necessary to support the accuracy of the visions and the paths. This knowledge is employed in the Grounding act, where the engineering process transforms spatial insight into actions. Thus the engineering process might need some forecast and data to be carried out accurately.
- Back-casting is not a linear procedure that starts from the future and goes until the present, it is a continues revision of milestones. Once a milestone is fixed, actions for that milestone can be found. This might lead to the discovery that the imagined milestone is not feasible, and therefore requires a different definition. Back-casting results in a procedure that continuously redesigns **segments** of the path.
- In the Grounding act, the empirical research demonstrated that **decisions** (agreements) most likely regard **short-term** or medium-term actions, while in the long-term milestones are fixed.
- The Spreading act **overlaps** the Grasping thanks to interviews, colloquiums, and trips in the local context with the involvement of many parties, who then spread the research, its matter of concern, the visions and the paths. The Spreading act also **overlaps** the Grounding thanks to workshops and interviews that let many parties participate in the research, shaping the 'collaborative rationality' in which the plurality of long-term visions and paths develop. **In turn**, those parties spread the research, its matter of concern, and the visions and the paths.
- De facto the Spreading act overlaps the other three acts, being a constants performance composed by several **moments** embedded in the other acts.
- A fourth act, **Moving**, was added and takes place when the Grounding act provides vivid defined visions and paths.
- The Grasping act overlaps Grounding and Moving as the learning process, the values, and norms that influence the visions are in a continuous **re-assessment**, that should bring to a continues revision of the visions and paths, thus of the Grounding act.

2.4. Action Research Through Design, the Doctoral Research Method

The doctoral research discusses the application of the '**Action Research Through Design**' method with the aim of testing Visioneering, a strategic spatial planning mode. 'Action Research Through Design' allows the research to understand the local context's dynamics by engaging with it, and including local knowledge and participants. The involvement of the researcher in the local context provides both scientific support of actionable knowledge in, and for, the local context, and leads to the development of theoretical knowledge (Van Buuren et al., 2014). 'Action Research Through Design' is an ensemble of two approaches for doing research in, and for, a local context: '**Action Research**' and '**Research Through Design**'. Before further explaining the two approaches in the following paragraph, a few common core concepts must be clarified. The term **local context** refers to the specific location where planning is practiced, with its characteristics, and its tangible and intangible boundaries. Defining the local context's boundaries is to craft and enact *'the necessary boundaries between presence, manifest absence and Otherness'* (Law, 2004, p. 162). Objects or actors are examples of *presence*; *manifest absence* refers to the things recognized and relevant to presence, for example the influence of statutory planning on the context; *otherness* refers to what is neither *presence*, nor manifestly *absent* but which nevertheless creates presence. This concept recognizes that presence is incomplete in research. The representations, objects, and processes the researcher selects, are embedded in socio-economic-cultural-political-environmental assemblages. These assemblages may be recognized in doing research, but some parts of them, may not be taken into account in the analyses for various reasons. It is therefore required, for the researcher, to acknowledge the *presence*, *absence*, and *other*, in order to comprehend the boundaries of the context within which the planning research occurs ►.

► The boundaries are both physical, e.g., the administrative borders, and intangible, e.g., the level of governance actively involved.

The **local context** within which the doctoral research occurred is the cultural institution **Magnifica Comunità di Cadore** (MCC), composed administratively by 22 municipalities belonging to the historical region Cadore. The *presence* in the research is therefore the 22 municipalities belonging to the MCC with its administrative borders, its agents, and the researcher. The *manifest absent* is the Province and Regional presence, which has been recognized but not involved

in the planning process. *Other,* in this doctoral research, stands for the grant that supports the research itself, and other similar elements through which the *presence* can be manifested.
The direct influences produced by the research are related to the institutional level of the MCC, the 22 invited municipalities. Indirect **influences** on the research were expected in, and from, the manifest *absence*, namely the Veneto Region agents, the Belluno Province, and its citizens. The local context within which the research happened has therefore precise administrative boundaries, but vague boundaries in its indirect influences.

Characterizing Action Research

'Action Research' is a research approach of living inquiry that aims to link practice and ideas in the service of human flourishing (Reason & Bradbury, 2008). It is a practical research approach that involves a **matter of concern**, situated in a **local context**, that is explored with partecipation by the researcher and other involved parties (Swann 2002; Van Buuren et al. 2014; Andersen & Bilfeldr 2013; Reason & Bradbury 2008).
The 'Action Research' approach aims to support collective actions in a living environment while at the same time producing new knowledge. In doing 'Action Research', the researcher is itself a co-producer of knowledge with the involved parties. Their relation is based on reciprocal trust and a **free agreement** to participate (Andersen & Bilfeldr, 2013; Reason & Bradbury, 2008).
The roots of 'Action Research' go back to Kurt Lewin (1890 - 1947), who is considered one of its founding fathers. He described the approach as the moment in which to link the production of knowledge with real social change, '*the best way to understand things is to change them* […]' (Andersen & Bilfeldr, 2013, p. 321). Once those changes are instigated, 'Action Research' contributes to an empowerment process that strengths **trust**, commitment, and networks between the parties involved in the action research, similarly to the 'authentic dialogue' of the 'collaborative rationality' ►. Secondly, the empowerment process strengthens the possible **influence** on multilevel governance, both **outwards and upwards**. For example the relationship of strategic spatial planning with statutory procedure ►.

► The 'authentic dialogue' of the 'collaborative rationality' theory is explained in chapter 2.1.3.

► This is also a chance to explore possible formal and informal settings in which the Visioneering mode can work, questioning the legitimacy of the strategic spatial planning process itself. See chapter

2.1.3 and the informality of the strategic spatial planning processes.

Characterizing Research Through Design

The 'Research Through Design' approach has become broadly used with a huge range of interpretations (Klaasen, 2003; Roggema, 2016; Swann, 2002). In this research, 'Research Through Design' is meant to be both the **designing process**, and the process of **knowledge production** that occurs through the act of design. It is a research approach with the intent of proposing new design solutions that support and impact learning and developing a local context (Barab & Squire, 2004). The 'Research Through Design' implementation consists of three phases: 'pre-design', 'design' and 'post-design'.

- The **pre-design** phase provides a theoretical and normative base for the design process, investigating the qualities and problems of a local context, from spatial potentials to the morphology of the territory.
- The **design** phase is a problem-solving performance, that with the use of creativity, leads to the production and then evaluation, of an artifact or project (Klaasen, 2003; Roggema, 2016; Swann, 2002; Bertolini, 2010). Designing is therefore aimed at finding context consistent problems and solution combinations, a loop of reflection occurs in redefining the features of a problem for moving toward the preferred solution (see Figure 2.11). In planning, reflection needs to take into account more and diverse actors, more and diverse problems, and must address different scales (Bertolini, 2010; Cross, 2001; Rittel & Webber, 1973).
- The **post-design** phase requires both an artifact or project for the local context, and that the researcher generates knowledge about the design process and the problem, knowledge that transcends the local context (Barab & Squire, 2004; Klaasen, 2003).

'Research Through Design' is to practice the design process as the way to generate scientific knowledge.

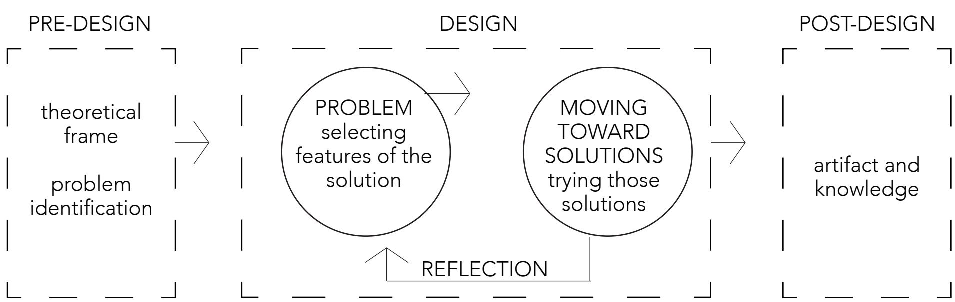


Figure 2.11. The 'Research Through Design' process is composed of three phases. The 'pre-design' phase is the one in which the research takes form; the 'design' phase consists in a problem-solution loop with the use of creative skills, and it provides an artifact; in the 'post-design' phase the artifact is defined, and the knowledge produced through its design is finally explored (figure adapted from "The mechanism of reflective practice": Valkenburg & Dorst 1998, p.254) .

Characterizing Action Research Through Design

The 'Action Research' and the 'Research Through Design' approaches constitute the 'Action Research Through Design' method utilized for the doctoral research. They are both concerned with the same matter of concern – a low-carbon future – and the same local context – Cadore – and they served to apply the Visioneering mode of planning.
Visioneering calls for 'Action Research' inasmuch as **many parties** need to be involved in order to design visions and paths for the local context. It also calls for the 'Design Through Research' approach inasmuch as it is a design process from which knowledge on the matter of concern, on the mode itself, on the local context, and on strategic spatial planning can be deduced.

In the 'Action Research' multiple parties are involved in the **planning arena** to explore a low-carbon future as a matter of concern. In this setting, I was the researcher, the shaper of the arena, and also a participant in the process, providing technical support when possible. With the 'Research Through Design' approach, visions and paths of the low-carbon futures of the local context were **designed**. The 'pre-design' phase saw the investigation of the low-carbon matter, and of the local context, on the basis of participatory and consultative events ►. In the 'design' phase, the involved parties and I designed, discussed and adjusted possible future solutions in visions and paths. This process was repeated multiple times with the aim of making the visions and paths more consistent, creating a knowledge **loop**. The 'post-design' phase corresponds to the examination of the data gathered during the previous phases, from which the conclusions of the thesis are drawn.

► The 'pre-design' phase can be compered to the Grasping and Spreading act of Visioneering described in chapter 2.3.1.

The 'Action Research Through Design' method is the union of two contemporaneous processes represented in Figure 2.12. First the 'Action Research' process that leads to learning effects, on the participants and on the researcher, about the matter of concern, about Visioneering, and about strategic spatial planning. Second the design process leads to knowledge related to the matter of concern, to the local context, and it aims to produce visions and paths. The result is a **loop** between 'Action Research' and the design process that generates knowledge.

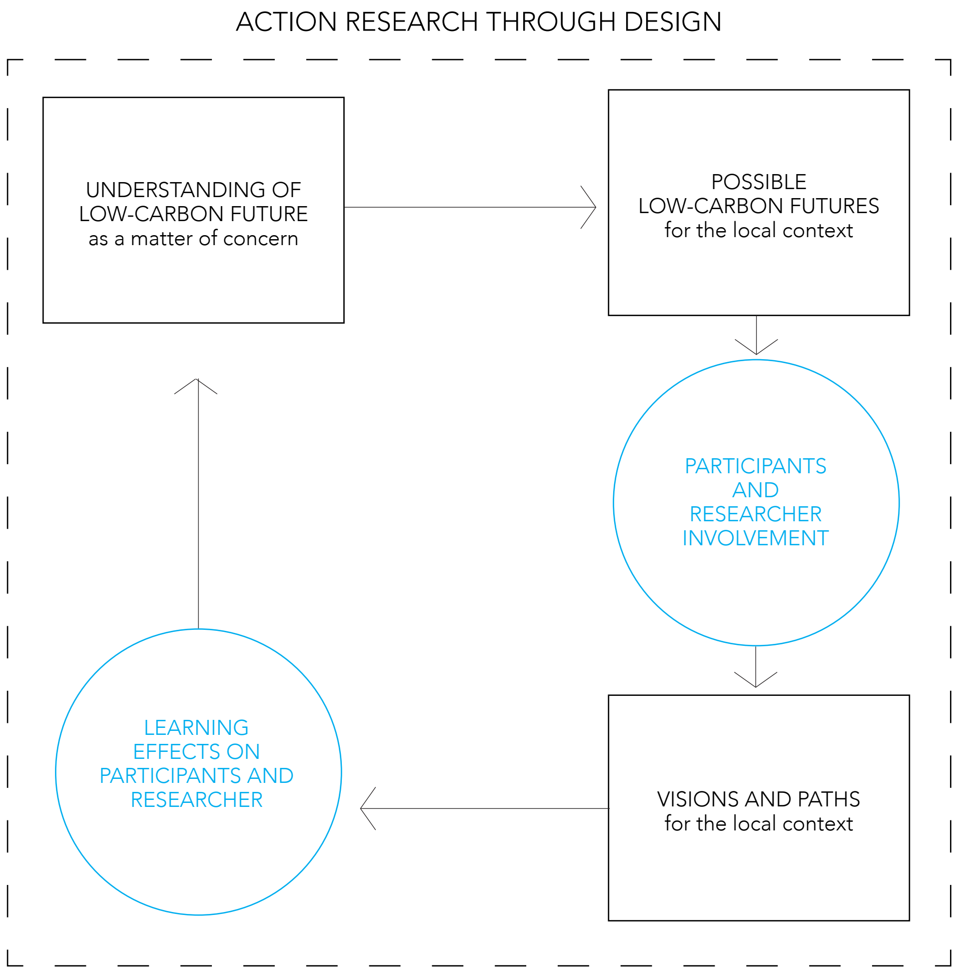


Figure 2.12. The diagram represents the 'Action Research Through Design' method, and how 'Action Research' and the design process are related to a low-carbon future as the matter of concern, and to the local context (author's own design).

2.5. Evaluating the Visioneering Mode

This chapter describes which criteria was used to tailor a specific **evaluation** scheme for the **Visioneering mode** of planning, for the specific doctoral research **local context,** and on the low-carbon future **matter of concern**. In the past few decades spatial planning theorists have supported more deliberative, or discursive, modes of planning that emphasize inclusive dialogue, mutual learning, and collective problem-solving (Faludi, 2000; Healey, 1992; Innes & Booher, 2010; Laurian & Shaw, 2009). Thus the evaluation of spatial planning became more comprehensive, it moved from how to rank plans or programs, to how to trace values or understanding during the entire planning process in which values, dialogue, and mutual learning occur (Albert et al., 2012; Alexander, 2006; Faludi, 2000; Garmendia & Stagl, 2010; Khakee, 2003b).

The same nature of strategic planning itself is nowadays not so much concerned with producing effective outputs, but effective processes of strategic planning, in which to gain awareness of the future and current problems, and to make better decisions for the *now* (Albrechts, 2010a, 2010b; Hillier, 2011; Kunzmann, 2013; Olesen, 2013) ►. The planning modes and the evaluation of methods associated with them are linked to different kinds of rationalities, among which the ones nominated by Albrechts in the four-track approach (explained in chapter 2.1.2) for strategic spatial planning: instrumental, strategic, value, and communicative rationality [vii](Albrechts, 2010a; Alexander, 2006).

► More detailed information on strategic spatial planning and its nature in chapter 2.1.2.

[vii] Hillier and Gunder (2009) describe rationality in spatial planning as the term that derives from the Latin word of 'ratio' and that means *'the balancing of facts, so as to act with reason'*. They continue, specifying that in the case of spatial planning *'rationality is traditionally deployed as instrumental, or purposive, rationality: a process of practical reasoning by which 'subjects' choose the best means to achieve their pre-given ends. Instrumental rationality does not question the ends, but only how to achieve those ends'* (Hillier & Gunder, 2009, p. 182). Alexander (2006) gives a further and clear explanation of what rationality is in spatial planning: '*the application of reason to purposeful action, and it is impossible to think of planning that, in this sense, is not rational. Reason here has two different but related meanings, both relevant. One has to do with having reasons for deciding on what action to take: rationality as the logic linking means to ends. The other relates to accountability: rationality in the sense of giving reasons for intended decisions and actions'* (Alexander, 2006, p. 39). Therefore once again rationality in spatial planning is about deciding and taking actions.
Exploring the theory of 'communicative rationality' developed by Haberman, Hillier and Gunder (2009) describe this rationality as the '*contrasted instrumental rationality with other form of rationality concerned with promoting understanding and with improving the human condition. His notion of communicative rationality, was predicated on the logic of argument to reach consensus based on agreed norms and values associated with communication.'* And then they continue saying that the object of such communicative rationality, that the planner desire, *'is the creation of an ''ideal speech situation'' where ''complete'' and ''whole'' distortion-free communication and reciprocal understanding occur'* (Hillier & Gunder, 2009, p. 184). Therefore the 'communicative rationality', of the planning process, is not so much a rationality of deciding and taking actions with demonstrable facts, but rather deciding on desirable actions through means of communication.

The 'instrumental rationality' is the logic of choosing the best means to achieve a clearly predefined or given goal. 'Strategic rationality' assumes that there are autonomous decision-makers interdependent with other intentional actors, it explicitly recognizes strategy for dealing with their power relations. The 'value rationality' is the capacity of actors to choose ends, perceived as permanently right in themselves, therefore decision of an ideal long-term future (Albrechts, 2010a). 'Communicative rationality' considers the interaction in the planning process, rather than the alternative planned goals as 'instrumental rationality' does (goals decided by decision-maker). 'Communicative rationality' does not address actions and their consequences but the quality of communication and its outcomes.

'Communicative rationality' is in the research interpreted through the '**collaborative rationality**' theory of Innes and Booher ►. Such rationality does not deal, as the other mentioned forms of rationality, with making good individual decisions, but it focuses on the actors collaboration in developing new ideas. The 'collaborative rationality' shifts the aim of the planning process from made-decisions to social interactions (Alexander, 2006; Innes & Booher, 2010).

► The 'collaborative rationality' theory by Innes and Booher (2010) is widely explained in chapter 2.1.3.

Giving such importance to 'collaborative rationality' in the strategic planning process, its evaluation is essential to improve the practice (Faehnle & Tyrväinen, 2013; Hassenforder et al., 2016). 'Collaborative rationality' is a mode of doing participation, and its evaluation methods need to be adapted to each participatory event, in which the **process**, **output** and **outcomes** are distinct things (Faehnle & Tyrväinen, 2013; Garmendia & Stagl, 2010; Hassenforder et al., 2016; Khakee, 2003b). The three are presented in Figure 2.13.

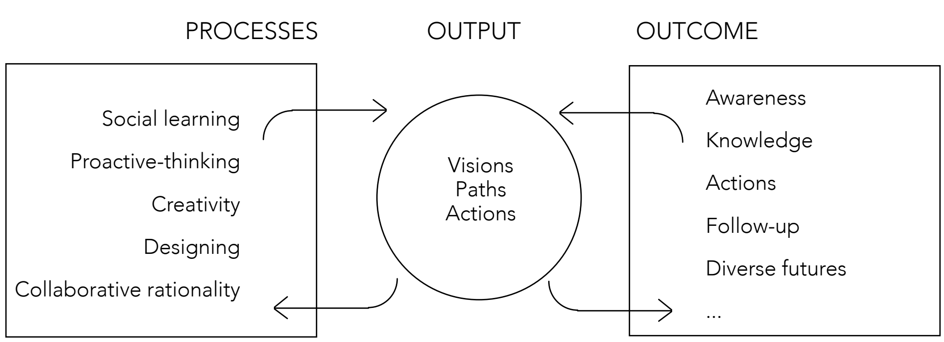


Figure 2.13. The diagram shows the relations among the process of Visioneering, its outputs, and its outcomes. The outputs are the vision, the path, and the actions taken . The outcomes of the planning process are the changes in collaborative adaptation, new knowledge, and a better awareness of the future (author's own design).

- **Process** is the way in which the participatory planning event is operationalized and evolves, in the case of the research it refers to the 'collaborative rationality'.
- The **outputs** are the results that are achieved immediately after or during the process, they are tangible and immediate products of the participatory event, like plans, project, agreements, short-term actions. In Visioneering the outputs are the vision, the path, and short-term actions.
- The **outcomes** are in a short-term less tangible than outcomes, e.g., behavioral changes, learning, or social capital. They are the not visible results after the end of the planning process, but that in a long-term perspective can become tangible, for instance when reaching the envisioned future or part of it.

A 'collaborative rational' planning process of participation should be meaningful for stakeholders, besides serving planning outputs and outcomes. Proactive-thinking, mapmaking, agonism occur in a collaborative process as Visioneering, these are practices that make the involved parties learn from each other, recognizing explicit changes in values, conflicts and ideas, and inventing new solutions. The evaluation of this planning process should therefore be focused on the learning phenomena, making the participants the center of the evaluation scheme (Faehnle & Tyrväinen, 2013; Hassenforder et al., 2016).

In the light of these considerations, the doctoral research proposes a scheme to evaluate the Visioneering planning mode that is focused on the learning phenomena provoked by the planning process itself. Such scheme of Visioneering evaluation has to consider the matter of concern on which the arena, and therefore the learning process, is focused – the low-carbon future – and the peculiarity of the local context therefore the environment in which the learning process takes place – Cadore.

Evaluating 'Action Research Through Design'

The basic assumption behind the doctoral research is that the low-carbon future is a challenge that does not only concern the technical aspect of a new energy system, but that it embraces cultural, social, and economic development. It is also assumed that Visioneering is a mode of doing planning that properly fits the low-carbon challenge since it explores and designs the development of futures in a comprehensive way. The research question emerges therefore with the aim to clarify the contribution of Visioneering in the spatial planning discipline committed to the low-carbon future. To answer this question two lines of thought

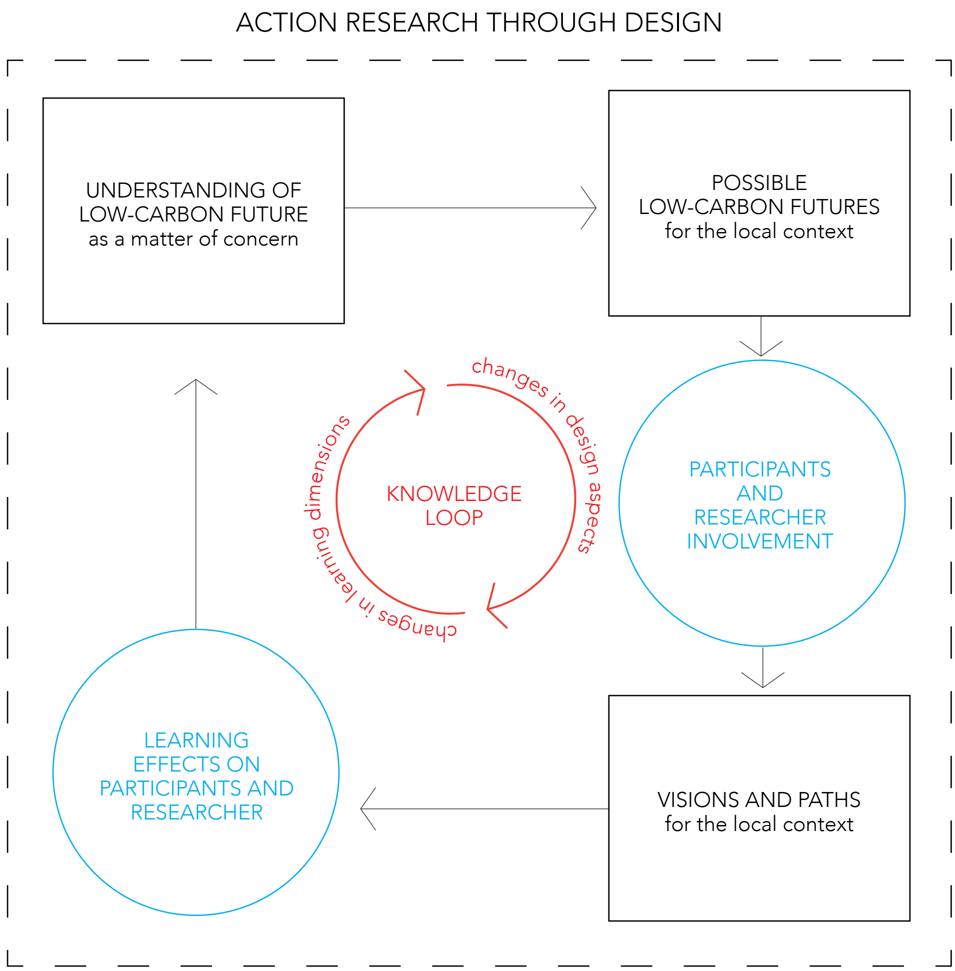


Figure 2.14. The diagram represents how the evaluation process is related to 'Action Research Through Design'. While the learning happening in the collaborative arena is evaluated through the changes in the social learning dimensions, the design of the visions and paths brings to the table different design aspects that evolve designing visions and paths. The social learning dimensions are therefore connected to *how* and *what* the participants learn, while the design aspects reflect how and *which* variables are present in the visions and paths (author's own design).

on evaluation need to be addressed:
1. measuring *how* the Visioneering mode of planning, through its process, enhances the commitment for a low-carbon future of the participants;
2. recognizing to what extent the designed visions and paths are effectively low-carbon solutions.

This chapter explains the first line of thought, to evaluate the planning process and its outcomes, namely learning and designing. The second line, which concerns the output, namely the visions and paths, is explored in the findings of the SWII (see chapter 3.4.4).

Visioneering fosters **learning** through the 'collaborative rationality' that occurs in participatory and consultative events where individuals dialogue, meet, interact, and explore maps and visual material. The literature refers to this phenomena with the term **social learning** or **collaborative learning** (Albert et al., 2012; Elbakidzea et al., 2015; Garmendia & Stagl, 2010; Innes & Booher, 2010; Reed et al., 2010). To evaluate the social learning process means measuring the learning dimensions, rooted in it, in different research-stages in order to detect their developments. While with the dimensions it is possible to measure the social learning process, the design aspects serve to categorize the themes in which the design process for the visions and the paths is focused. During the social learning process data and knowledge are gained, collected, and exchanged (see Figure 2.14).

2.5.1. Social Learning in Visioneering

With the term **social learning,** or collaborative learning, the literature refers to the phenomena in which the parties involved in a process learn from each other, both acquiring new knowledge and reframing their views. This type of learning is gathering interest as a means to cope with complexity and its uncertainties in processes of spatial planning (Albert et al., 2012; Albrechts, 2010; Elbakidzea et al., 2015; Garmendia & Stagl, 2010; Reed et al., 2010; Wilson & Piper, 2010;). Social and collaborative learning have been defined in multiple and sometimes confused ways. This research refers to the learning phenomena that occurs in the 'collaborative rationality' with the definition given by Reed et al. (2010). Social learning is a collaborative process where two phenomenon occur:

- changes in understanding appear in the **individuals** involved;
- changes occur that go beyond the individuals and become situated within wider social **units** or community.

Both the phenomenon occur through direct or indirect interactions among actors within a social framework, given by the 'collaborative rational' planning arena.
Evaluations of the social learning process have recently received considerable attention, nonetheless appraisals of the potentiality of the learning process and its outcome in spatial planning are still missing (Garmendia and Stagl 2010; Albert et al., 2012; Khakee, 2003). Further evaluations are still needed to understand where social learning occurs in planning processes, the dimensions that it touches, and how to improve it. The evaluation of Visioneering through social learning provides insight into the Visioneering mode of planning and its structural aspects, giving feedback for the enrichment of the planning mode and for how to face the matter of concern that the process explores.

The Social Learning Dimensions

Visioneering fosters social learning thanks to its 'collaborative rational' arena where individuals dialogue, meet, interact, and learn collaboratively, exploring visual material such as maps, graphs, and pictures. It provides an arena within which the interested parties talk and discuss about a specific topic, clearly conducting a process of social learning. It is not clear *how* the design of visions, and of their paths, foster social learning for future outcomes, and it is not clear *how* potential social learning processes could positively impact the search for a low-carbon future.

During the Visioneering mode of application for the low-carbon future, social learning embraces different dimensions of values, norms, and modes of interaction. The term **dimensions** refers to the domain of social learning that belongs to the individuals or social unit.

Analyzing the complex challenge of low-carbon future and the topics that emerged from the Grasping act ►. The identified learning dimensions for the low-carbon future of the local context refer to: the knowledge participants have, whether they are willing to take collaborative or individual actions, and how the participants perceive the low-carbon future. Following this assumption, partially based on the work of Garmendia and Stagl (2010) for sustainable development of three case studies in Europe, **four dimensions** of social learning have been identified. The four dimensions are strictly related to the matter of concern and derive from the following four hypotheses.

► The Grasping act is explained in chapter 2.3.1. The first collection of ideas on the low-carbon future for the local context was developed from the data gathered with the colloquiums and interviews, Checking the Documents, and the Children's Workshop.

1. During the use of the Visioneering mode of planning the participants and/or the social unit undergo a change in cognitive knowledge. The **Cognitive Knowledge** dimension originates from this hypothesis.
2. During the use of the Visioneering mode of planning the participants and/or the social unit undergo a change in understanding the others' priorities, ideas, and values. The **Mutual Understanding** dimension originates from this hypothesis.
3. During the use of the Visioneering mode of planning the participants and/or the social unit better comprehend the complexity of the low-carbon concept and how to cope with it. The **Complexity** dimension originates from this hypothesis .
4. During the use of the Visioneering mode of planning the participants and/or the social unit find or suggest ways for individual or collaborative actions in the face of low-carbon futures. The **Joint or Single Action** dimension originates from this hypothesis.

The assessment of the social learning process happening during the Visioneering implementation consists in measuring the four dimensions in different research-stages, obtaining quantitative and qualitative data. A fifth **information dimension** has been added with the goal to evaluate the Visioneering mode of planning through the participants' opinions. This latter dimension inquires how the participants find the visual materials used during the process, how the social learning dimensions are effectively enhanced by maps and visual materials, and

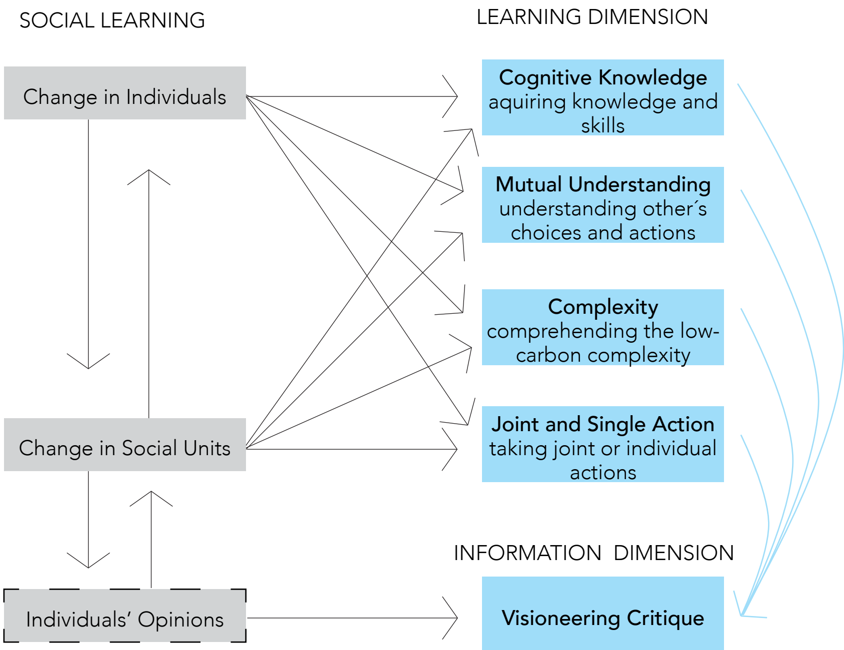


Figure 2.15. The diagram shows the relation among the concept of social learning from Reed et al. (2010), and the social dimensions investigated in the Visioneering mode of planning. Social learning for the low-carbon future of the local context entails four dimensions strictly related to the matter of concern. A fifth dimension of information detects *how* Visioneering, with its visual material used during the collaborative process, is effectively useful (author's own design).

how the participants find the planning process.

The evaluation of the Visioneering process through social learning in this doctoral research does not aim to evaluate certain predetermined goals of social learning, instead, it aims to investigate **how** and **when** those dimensions change or evolve. These are therefore the components of a Visioneering mode of planning committed to a low-carbon future that stimulates changes and guides the direction of those changes ►.

► An example of the questions answered by the findings of each consultative or partecipatory events (chapter 3.2): *does Visioneering help to understand the need for collaborative actions in the face of a new transport strategy? If yes, what material helped arrive at this conclusion, and what evidence is there that it was useful?*

The Design Aspects

Behind the changes in the learning dimensions, during the Visioneering mode application the designing process advanced. While the dimensions measure the social learning process, the **design aspects** are the themes around which data, knowledge, and ideas were collected to design the long-term visions and paths. The Figure 2.14 shows how 'Action Research' and the design process interrelate. Both are held together by the low-carbon future as a matter of concern. While the contents of 'Action Research' are embedded in the social learning process, the contents of the design process are related to the specificity of the local context, and are describable in three design aspects.

- The **Regional Grasp** aspect refers to what is going on in the region, how the region is perceived, and the pre-conditions already present before starting the design process. It answers to the question: *what is going on in the region*?
- The **Visions´ Content** aspect refers to the ideas for the future, related to specific actions for the low-carbon future, the scale of those actions, and agents and stakeholders involved. It answers the question: h*ow will the region be in the future?*
- The **Visual Material** design aspect refers to the use of visual material and how to draw, design or represent the two previous mentioned points. It answers the question: *how to draw this future?*

The differentiation between **social learning dimensions** and **design aspects** permits an analysis of the data gathered during the planning process and allows the planner to discern what was relevant for the visions and the paths from what was relevant for answering the research question (Figure 2.16).

The following chapter 2.5.2 explains the specificity of the four social learning dimensions, the information dimension, and its relation with the three design aspects.

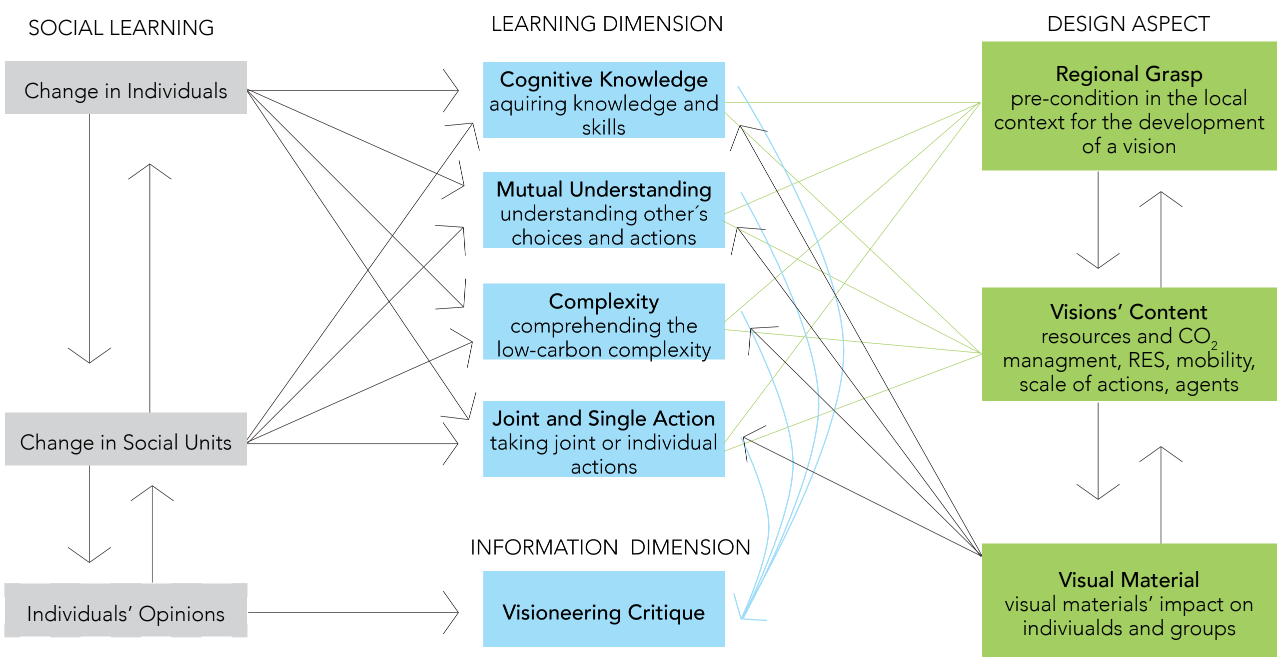


Figure 2.16. The scheme shows the relation among the social learning dimensions in Visioneering committed to low-carbon futures, and the design aspects of the low-carbon future in the local context. The Regional Grasp consists of the pre-condition in the local context for the development of visions. The Visions' Content concerns what can effectively be designed in the visions and path. The design aspect of Visual Material concerns how individuals and groups work on maps, where they effectively sketched or collaged new ideas (author's own design).

2.5.2. The Interplay Between Learning and Designing

The social dimensions and the design aspects are strongly **dependent on** each other. The following paragraphs describe the four dimensions of social learning and on dimension of information individuated in this empirical research, and the role that the design aspects occupy in each of them.

Cognitive Knowledge Dimension

The Cognitive Knowledge dimension refers to the simplest mode of learning or rather the acquisition of new knowledge or skills. In this learning dimension there is a change in the knowledge of the individual or group which merely involves the adoption of new facts, knowledge, and skills (Garmendia & Stagl, 2010). In this dimension the knowledge of participants are gathered in order to potentially compare them, or complete them with, demonstrable facts (see Figure 2.16).
The changes in Cognitive Knowledge regarding the design aspect of **Regional Grasp** concern how the region is, how it is perceived and which projects are already in place. In the **Visions' Content** aspect, the Cognitive Knowledge dimension relates to what can be done in the region, e.g., the knowledge related to the low-carbon future concept, the perquisites for new RES plants, and the regulations that could enhance a regional response. In the Cognitive Knowledge dimension the **Visual Material** design aspect refers to the ability and skills of the participant to use visual material, like the capacity to read a map.

Mutual Understanding Dimension

The Mutual Understanding dimension refers to changes in values and assumptions due to the increased understanding of others' perceptions and needs, developing a sense of solidarity and team-work (Garmendia & Stagl, 2010).
In this social learning dimension, the **Regional Grasp** concerns the participants' ability to perceive and judge the project already activated by others, and also the participants' ability to understand the state of neighboring villages (see Figure 2.16).
The Mutual Understanding dimension involves the **Visions' Content** design aspect when the participants see their reciprocal role within low-carbon futures. The **Visions' Content** design aspects involved in this dimension serve to explore the participants' willingness to initiate discussions on a regional collaboration. Mutual Understanding involves the Visual Material design aspects when judging

others' choices in mapmaking, sketching, collaging and dialogue, and when agonism takes place due to the visual material.

Complexity Dimension

The Complexity dimension is how the participants perceive the low-carbon future complexity and its uncertainties. In this learning dimension the participants refine their views about the complexities and uncertainties of their territory and of the low-carbon matter of concern (Garmendia & Stagl, 2010).

In this dimension the design aspects **Regional Grasp** and **Visions' Content** are related, being both part of the complexity of low-carbon (see Figure 2.16). They refer to the participants' ability to perceive the low-carbon subject as not only an energy matter, but as a framework in which all the regional development aspects are involved. Dealing with Complexity means understanding the **reason** for implementing a low-carbon future (e.g., climate change adaptation and mitigation, national safety), and the **need** for it (e.g., resources and sources, and the choices' impacts).

The **Visual Material** design aspect is focused on verifying how the participants think that Visioneering and its visual material can contribute to the understanding of complexity.

Joint or Single Action Dimension

The dimension of Joint or Single Action refers to the participants' disposition to realize more and better joint or single actions, at different scales, from regional to individual.

This dimension refers to the **Regional Grasp** aspect when it comes to talking about decisions and projects already active in the area. It refers to the **Visions' Content** aspect when it concerns the participants' willingness to implement actions for low-carbon futures. In the latter case it is partly related to the Mutual Understanding dimension, therefore to how different participants can ask for help from one another. Finally, the **Visual Material** design aspect serves to collect opinions on the usefulness of Visioneering and its visual material in fostering Joint or Single Action.

Visioneering Critique Dimension

The Visioneering Critique dimension aims to structure a critique of the Visioneering mode of planning based on the participants' experience.

This dimension expresses the extent to which the maps and other design materials are effective in enhancing Mutual Understanding, increasing the disposition toward Joint or Single Action, and demonstrating the Complexity. Here Visioneering is judged as the basis for the 'collaborative rational' process, therefore as method to boost the regional response to the low-carbon challenge.

2.5.3. Data Collection and Analysis

The data regarding the social learning dimension, and the design aspects, were collected during the doctoral research, and are both qualitative and quantitative. A general overview of how the data have been gathered and analyzed is described below, more details on the data set of each specific participatory or consultative event are reported in the designated chapters (from 3.2 to 3.5).
The design aspects on which it was necessary to gather data, were clear already in the participatory and consultative events of the Grasping act, i.e., the colloquium and interviews, the Children's Workshop, and Checking the Documents ►. On the other hand, the hypothesis behind the social learning dimensions emerged after those first events, when the challenge of the low-carbon future was contextualized to Cadore. Therefore the social learning dimensions were assessed in the participatory and consultative events of the Grounding and Moving, i.e. the Stakeholder Workshops, the Online Survey, and the telephone interviews ►. The events are listed below with a short description on the research methods used to gather data on the learning dimensions, and are summarized in Table 2.6.

► The partecipatory events of the Grasping act are reported in chapter 3.3.

► The partecipatory events of the Grounding and Moving acts are reported in chapter 3.4 and 3.5.

In **Checking the Documents** (see chapter 3.3.3), written documents have been analyzed through thematic and content analysis in order to provide the basis to comprehend the social learning dimension and the design of the visions.
The **stakeholders and experts interviews and colloquiums**, chapter 3.3.1, enriched the content of the design. Further stakeholder's interviews have been carried out in an advanced stage of the doctoral research in order to enrich the second version of the visions.
The **Children's Workshop,** chapter 3.3.2, had the aim of gathering data on the design aspects through the content analysis of designed sketches, collages, and maps in a workshop organized in three different afternoons. The data enriched the visions.

Events	Research Methods	Data Type	Data Analysis
Interviews and colloquims Chapter 3.3.1	Interviews Colloquiums	Written note Recorded Audio	Content Analysis
Children's Workshop Chapter 3.3.2	Storytelling, drawing and collage making	Drawing Written Note Collage	Content Analysis
Checking the Documents Chapter 3.3.3	Content Analysis	Written note Network graph	Content Analysis
Stakeholder Workshop I Chapter 3.4.1	Observations	Recorded Audio Photos	Content Analysis
	Focus group	Recorded Audio Notes	Content Analysis
	Pre and post questionnaires	Returned sheet	Likert scale From 1 to 5 (mean);
	Map making	Sketches Drawings Strikers	Content Analysis
Online Survey Chapter 3.4.2	Questionnaires	Returned forms	Likert scale From 1 to 3 (mean); Content Analysis
Stakeholder Workshop II Chapter 3.4.4	Observations	Recorded Audio Photos	Content Analysis
	Focus group	Recorded Audio Notes	Content Analysis
	Pre and post questionnaire	Returned sheet	Likert scale From 1 to 5 (mean);
	Map making	Sketches Drawings Strikers	Content Analysis
Study Tour Chapter 3.4.4	Post questionnaire	Returned sheet	Likert scale From 1 to 5 (mean);
	Observations	Photos	Content Analysis
	Colloquiums	Written note	Content Analysis
Telephone Interviews Chapter 3.5.1	Interviews	Written note Recorded Audio	Content Analysis

Table 2.6. Overview of the data collection during the participatory and consultative events of the empirical part of this doctoral research.

The **Stakeholder Workshop I**, see chapter 3.4.1, served to assess, for the fist time, the social learning dimensions with pre and post event questionnaires that provided further quantitative data for the enrichment of the visions. The qualitative data gathered during the focus groups and the thematic analysis enriched the visions, the Visioneering process, and the evaluation scheme.
The **Online Survey**, chapter 3.4.2, open to all the citizens, served to assess the social learning dimensions in a different target group, and it served to gather qualitative data to enrich the visions and confront the priorities of the decision-makers and citizens.
The **Stakeholder Workshop II**, see chapter 3.4.4, served to further assess the social learning dimensions with pre and post event questionnaires. The qualitative data gathered during the focus groups enriched the second version of the visions and the designed paths. During the **study tour** of the workshop an additional questionnaire provided data on the Visioneering mode of planning and on the dimension of Mutual Understanding.
A series of **telephone interviews**, see chapter 3.5.1, served to validate the assessment of the social learning dimensions and consolidate the network among the participants and the researcher.

3. Visioneering Low-Carbon Futures of Cadore


Cadore
Alpine Space
Alps' Regions
NETHERLANDS
BELGIUM
GERMANY
POLAND
LUXEMBURG
CZECH REPUBLIC
SLOVAKIA
AUSTRIA
SWITZERLAND
LIECHTENSTEIN
HUNGARY
SLOVENIA
CROATIA
BOSNIA AND
HERZEGOVINA
ITALY

3.1. Cadore, the Local Context of the Research

► Chapter 2.4 reports the limits of 'Action Research Through Design' in the local context.

This doctoral research employed the 'Action Research Through Design' method involving Cadore, the local context, in the application of the Visioneering mode of planning ►. A portrait of the local context makes it possible to fully comprehend the empirical study and its results. In this respect, the chapters 3.1 is a geographical and historical portrait of the region Cadore inside the Alpine framework. This description shows the evolution and role of some of the variables that have emerged during the application of the Visioneering mode of planning, e.g., the role of the Magnifica Comunità di Cadore (MCC), the importance of the Regola and their properties, and the current tourism crisis.

Within this research, Cadore is defined as a region yet it is in fact a historical region, and not an administrative one, represented by the MCC and composed of 22 recognized municipalities. This permits one to easily find exhaustive literature concerning the historical development of the entire area. On the contrary, contemporary historical literature and recent data can be found at the provincial level (e.g., energy consumption) or at the municipal level (e.g., inhabitants/km^2).

3.1.1. Geography of the Region

Cadore is situated within the Belluno Province in the Veneto Region (Italy), and is composed of 22 administrative municipalities (see map in Figure 3.1, Table 3.1). It is located on the southern side of the Eastern Alps, and borders the Trentino-Alto Adige/Südtirol Region (Italy) and Osttirol Bundesland (Austria) to the northeast, the Friuli Venezia Giulia Region (Italy) to the southeast, and the uplands of Belluno - Agordo and Zoldo areas - to the southwest.

Cadore's borders follow two morphological lines formed by two river basins: on the east the Piave River and on the west the Boite River (see map in Figure 3.3). The basin of the Piave River borders Friuli Venezia Giulia to the east and the Gail Valley (Carinthia, Austria) to the north. The basin of the Boite River borders Trentino-Alto Adige/Südtirol Region to the north, and Zoldo and Agordo (in the Belluno Province) to the southwest (Fini 1981, p.30).

Figure 3.1. The map shows Cadore, highlighted in gray, in the perimeter of the Alpine Space Programme, highlighted in blue. Cadore is in the northern tip of the Veneto Region on the southern side of the Eastern Alps (author's own design).

Municipality	**Inhabitants** 2015*	**Population** Percentage Change 2001**-2015*	**Area*** km²	**Density*** Inhabitants/ km²
Auronzo di Cadore	3350	5,9	220,7	15,2
Borca di Cadore	781	0,9	26,8	29,2
Calalzo di Cadore	2085	-13,8	43,5	47,9
Cibiana di Cadore	393	-18,6	21,6	18,2
Comelico Superiore	2238	-8,5	96,2	23,3
Dante di Cadore	463	-16,1	8,00	58,2
Domegge di Cadore	2441	-7,7	50,40	48,5
Lorenzago di Cadore	549	-5,0	27,40	20,1
Lozzo di Cadore	1383	-14,3	30,40	45,5
Ospitale di Cadore	292	-20	39,80	7,3
Perarolo di Cadore	380	4,9	43,90	8,6
Pieve di Cadore	3794	-1,6	67,20	56,5
San Nicolò di Comelico	406	-4,6	24,20	16,8
San Pietro di Cadore	1624	-11,6	52,10	31,2
San Vito di Cadore	1857	8,09	61,60	30,1
San Stefano di Cadore	2609	-10,1	100,60	25,9
Sappada	1317	-3,0	62,10	21,2
Selva di Cadore	520	-7,6	33,30	15,6
Valle di Cadore	1964	-3,3	40,60	48,3
Vigo di Cadore	1440	-12,7	70,10	20,6
Vodo di Cadore	853	-8,8	46,90	18,2
Zoppé di Cadore	229	-24,4	4,30	52,9
Cadore	**30968**	**-7,8**	**1171,7**	**29,9**

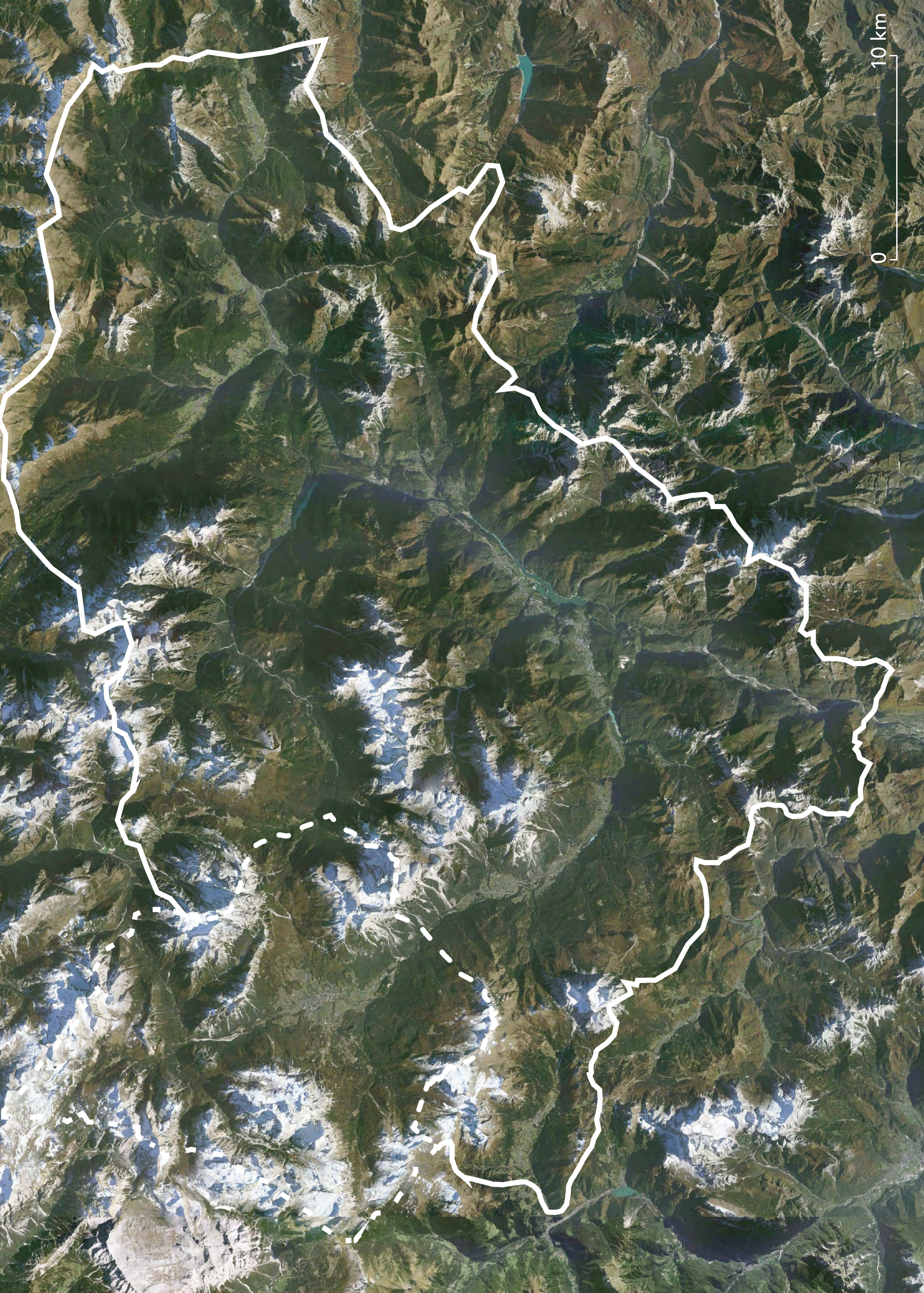
Table 3.1. The 22 municipalities of Cadore, their inhabitants, and their surface area (data source: *Provincia di Belluno 2015; **ISTAT, 2001).

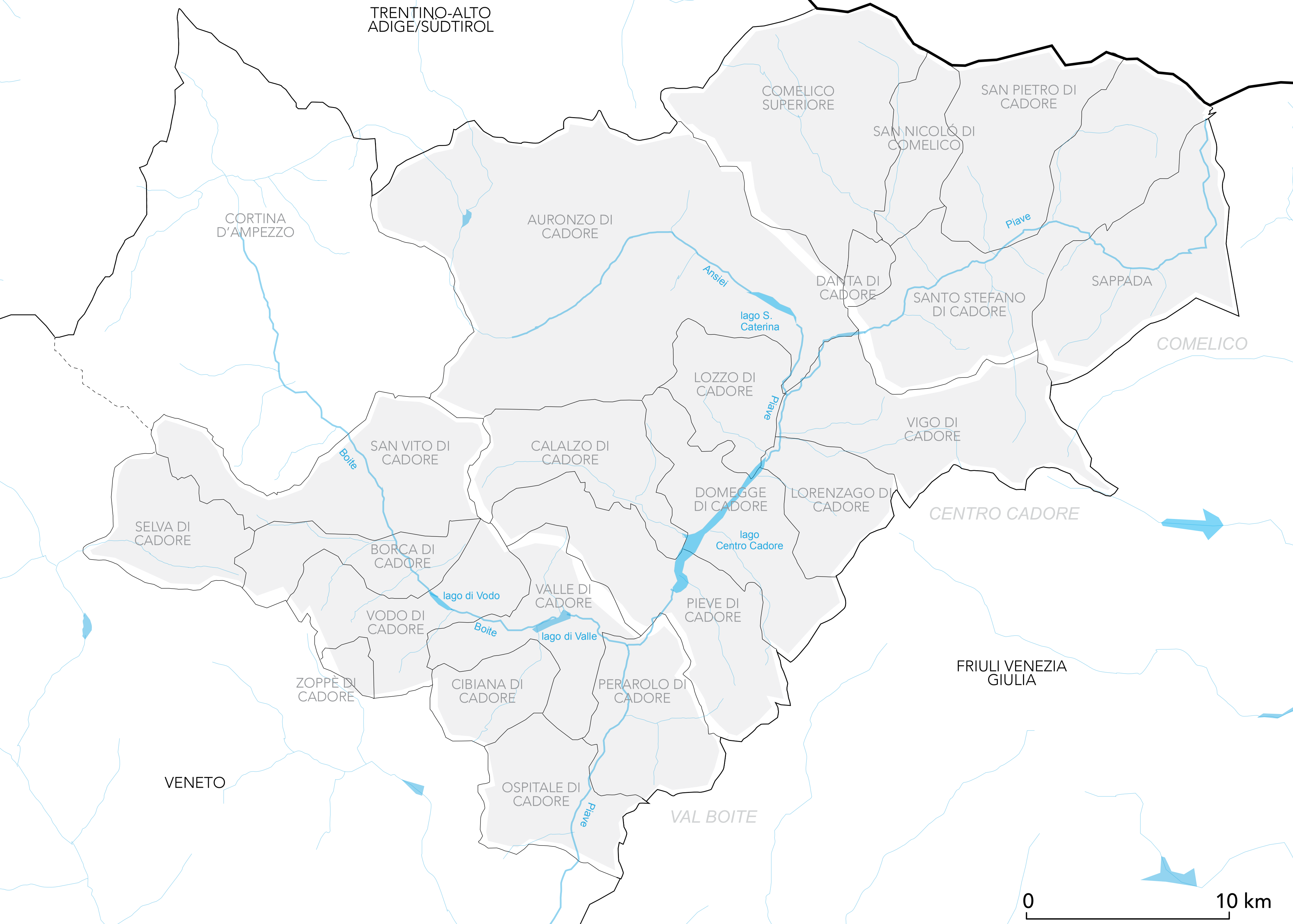
Figure 3.2. View of Monte Antelao, the highest mountain in the eastern Dolomites, from the Venice lagoon (figure source: Gilbert 1869, p.47).

Figure 3.3. In the following pages: on the left a satellite image of Cadore, and on the right a map of Cadore with its municipalities. The three main clusters are the Comelico valley on the east, Centro Cadore in the middle, and the Val del Boite on the west side. In a dashed line, Cortina d'Ampezzo that was part of the MCC until 1511 (author's own design).

Cadore	
Administrative border	22 Municipalities
Area*	1171,7 km^2
Inhabitants (2015)*	30968
Density (2005)	average 29,9 inhabitants/km^2
Altitude**	from 500 – 3264 m.a.s.l.
Highest peak**	Monte Antelao 3264 m.a.s.l.
Main environmental protected area	Natura 2000; Dolomites UNESCO World Heritage; Natural Reserve of Somadida.

Table 3.2. An overview of Cadore in facts (data source: *Provincia di Belluno, 2015; ** Fini 1981).


10 km
0


TRENTINO-ALTO ADIGE/SÜDTIROL
CORTINA D'AMPEZZO
AURONZO DI CADORE
COMELICO SUPERIORE
SAN NICOLÒ DI COMELICO
SAN PIETRO DI CADORE
SAPPADA
DANTA DI CADORE
SANTO STEFANO DI CADORE
COMELICO
Piave
Ansiei
lago S. Caterina
LOZZO DI CADORE
VIGO DI CADORE
SAN VITO DI CADORE
CALALZO DI CADORE
DOMEGGE DI CADORE
LORENZAGO DI CADORE
CENTRO CADORE
Boite
SELVA DI CADORE
BORCA DI CADORE
lago Centro Cadore
VALLE DI CADORE
lago di Vodo
VODO DI CADORE
PIEVE DI CADORE
lago di Valle
FRIULI VENEZIA GIULIA
ZOPPÈ DI CADORE
CIBIANA DI CADORE
PERAROLO DI CADORE
VENETO
OSPITALE DI CADORE
VAL BOITE
0
10 km

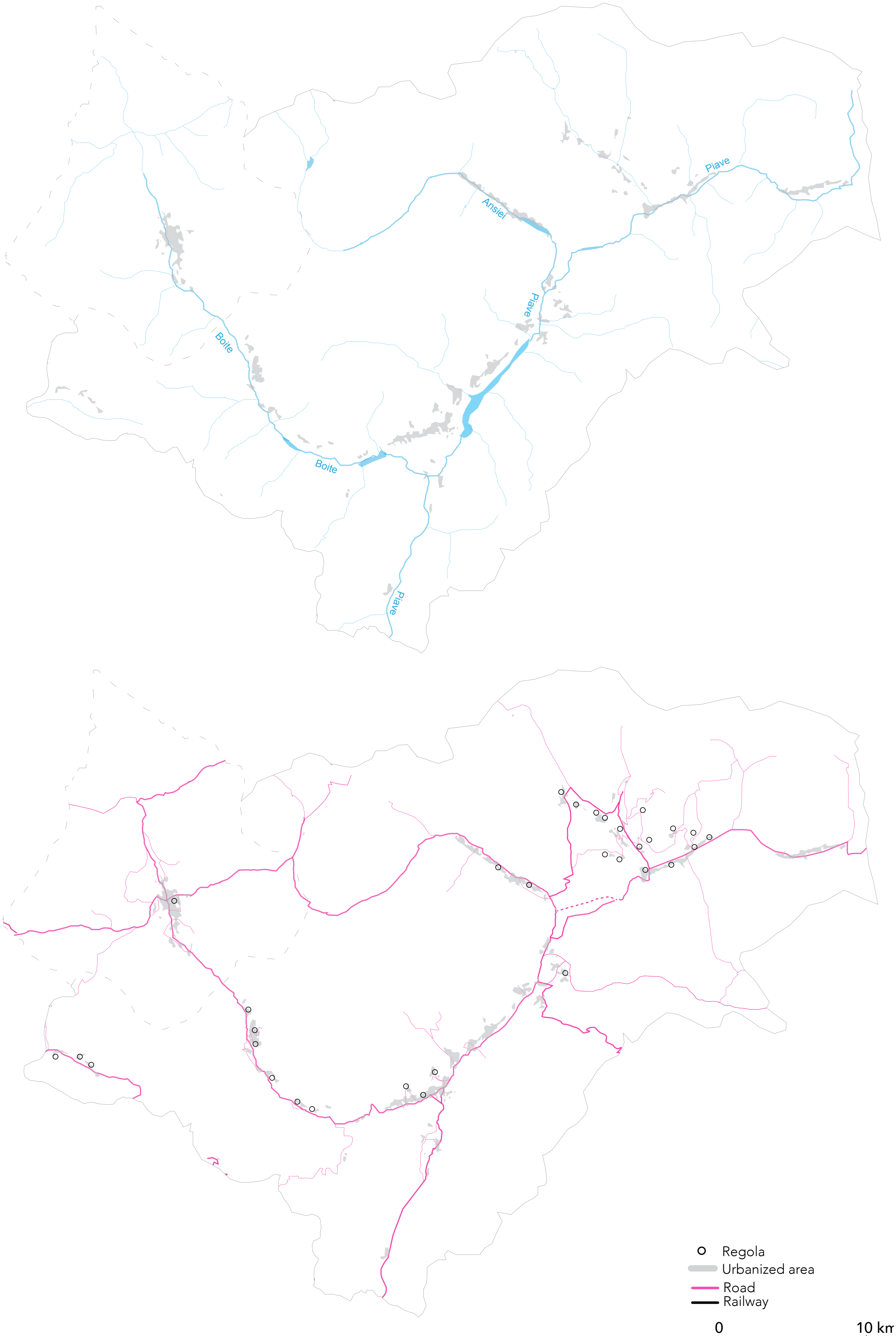
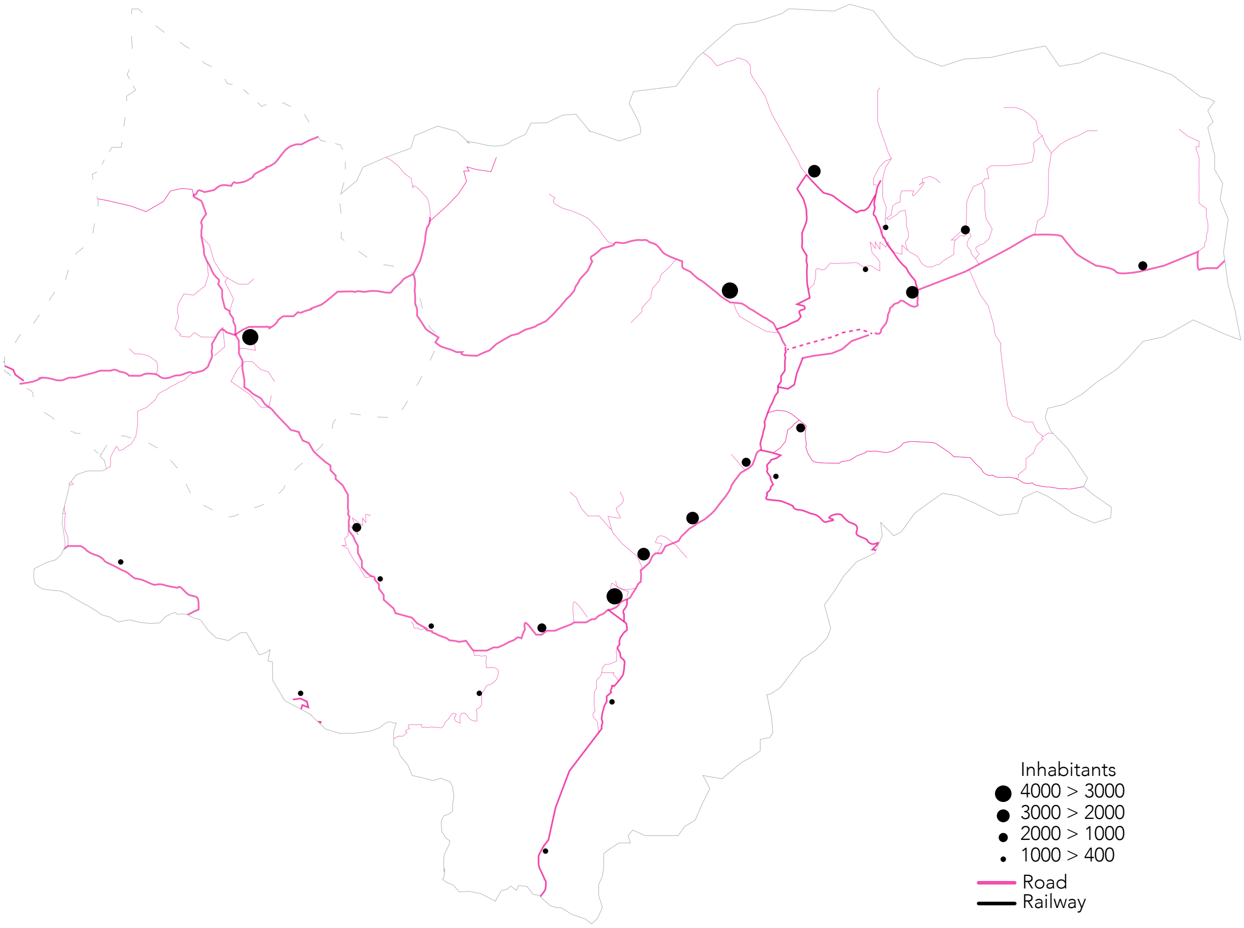


Figure 3.4. On the top, a map of Cadore with its built-up areas (Provincia di Belluno, 2016). On the bottom, the Cadore built-up areas and the centers of the Regola now active in the territory (data source: Regione Veneto, 2016). In a dashed line, Cortina d'Ampezzo that was part of the MCC until 1511 (author's own design).



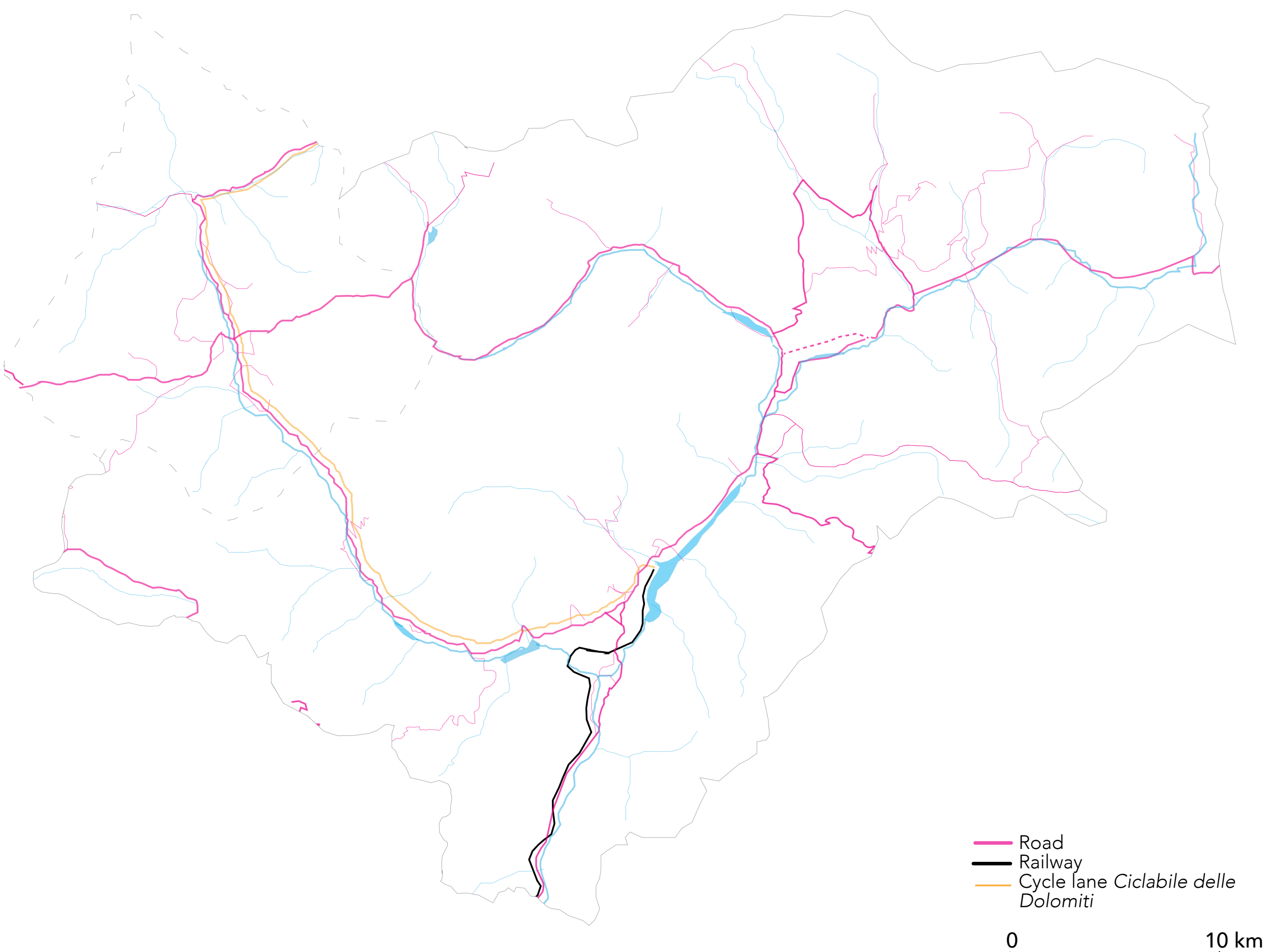


Figure 3.5. On the top, a map of Cadore with the amount of inhabitants (data source: Provincia Di Belluno, 2015). On the bottom, Cadore with its main streets, and the railway connection. In a dashed line, Cortina d'Ampezzo that was part of the MCC until 1511 (author's own design).

Figure 3.6. On the top, a view from Borca di Cadore toward the Monti Rocchette (author's own figure, 2nd of Feb. 2014). On the bottom, a view of Cibiana di Cadore (author's own figure, 23rd of Jul. 2015).

Figure 3.7. On the top, a view from Costalissoio, hamlet of Santo Stefano di Cadore (author's own figure, 1st of Jan. 2017). On the bottom, a view of the Centro Cadore lake from Domegge di Cadore. In the background on the right Pieve di Cadore (author's own figure, 23rd of Jul. 2015).

3.1.2. History of the Region

The history of the Alps has been strictly related to their evolving climate conditions, which link the local economy to the availability of certain natural resources and the capacity of the territory to produce specific products. Until two centuries ago, climate had a strong impact on the economy, while in the present day the contrary is happening.

The Alpine territory and its economy have had a fluctuating relationship to the surrounding lands based on the reciprocal economic benefits or disadvantages. In the essay 'The Alps Changing Between Risks and Opportunities', Enrico Borghi (2011) describes the Alps' history and relationship to the surrounding lands in six phases of development. Each of the six phases recalls the essence of the relationship to the surrounding lowlands and its spatial repercussions, e.g., closed fortified settlements, an increased connectivity to the lowlands, a shared pattern of urbanization, the competition for land use amongst the three main economic sectors - tourism, agriculture, and industry.

The six phases of development are briefly summarized as:

1. The **Closed Alps –** from prehistory and the first isolated human settlements until the fall of the Roman Empire and the Barbaric Invasions (till XI);
2. The **Half-Closed Alps** – from the development of local agro-silvo-pastoral systems to the creation of 'rural communities' after the XI century (to xviii);
3. The **Open Alps –** from the Alps as an important area of transit to the plague of the XVI century;
4. The **Marginalized Alps** – from the presence of Mediterranean commerce and the end of the Alps as an area of transit, to the Alps of the XVIII century as a physical barrier between political powers;
5. The **Two-Faced Alps** - from the Napoleonic territorial reorganization, to the fragile territory of the XX century marked by the two World Wars;
6. The **Conformed Alps** - the phase in which tourism became a mass phenomena that invaded the mountains at the end of the XX century.

This analysis excludes the present and the future of the Alps, historical phases mostly influenced by the necessity to use natural resources for energy production, the presence of green economic models of sustainable tourism, and an endangered cultural identity. In order to describe this period I have added a seventh phase of development to Borghi's model called the 'Utilized Alps'.

7. The **Utilized Alps** - from the decline of tourism and industries due to globalization at the end of XX century, to the exploitation of natural resources of this century.

I applied these seven historical phases to the history of Cadore, and found an equivalent pattern of development. The following historical reconstruction draws mainly from three publications in Italian language: Fabbiani (1992); Zanella (1999); Bolcato et al. (1998). In Figure 3.8 a scheme of the seven phases of the Alps and Cadore's history and their relation with the evolution of the anthropogenic consumption of energy.

The Alps

Utilized Alps
XXI cen. - ...

¬ The decrease of tourism and industrialization with the depopulation of the highest areas, and European funds for rural areas.
¬ The rise of the sustainability concept, the green economy, and the low-carbon future.

Conformed Alps
XX cen. - XXI cen.

Global Warming**
XIX - XXI cantury AD

¬ Mass tourism and intense urbanization at high altitudes.
The rise and fall of industrialization and the establishment of small manufacturers.
¬ The Alps as battlefield of the two World Wars and emigration.

Two-Faced Alps
XVIII cen. - XX cen.

¬ The Napoleonic age, the organization of the territory in municipalities and provinces.
¬ Industrialization and the use of hydropower.

Marginalized Alps
XVI cen. - XVIII cen.

Little Ice Age*
1350 -1860 years AD

¬ With the development of sea transport on the Mediterranean, the Alps are no longer a trade route.
¬ Further urbanization of the largest agglomerations.
¬ The stabilization of the Alps as physical barrier between political powers.

Open Alps
XIII cen. - XVI cen.

Mediaeval Warm Period*
950 - 1350 years AD

¬ The stabilization of agriculture and rise of pastoralism.
¬ The Alps as a trade route.
¬ The Alps provide resources to the surrounding low-lands.
¬ The plague.

Half-Closed Alps
XI cen. - XIII cen.

¬ The Middle Ages and the consolidation of agriculture with the feudal system.
¬ The rise of local rural communities represented by self-governed entities.
¬ The urbanization of agglomerations on the low-lands of the Alps.

Closed Alps
6000 BC - XI cen. AD

Atlantic Period*
6000-3500 YEARS BC

¬ From prehistory to civilization.
¬ The use of iron and the first settlements.
¬ The Romanization and Christianization lead to the development of a network of roads and settlements.

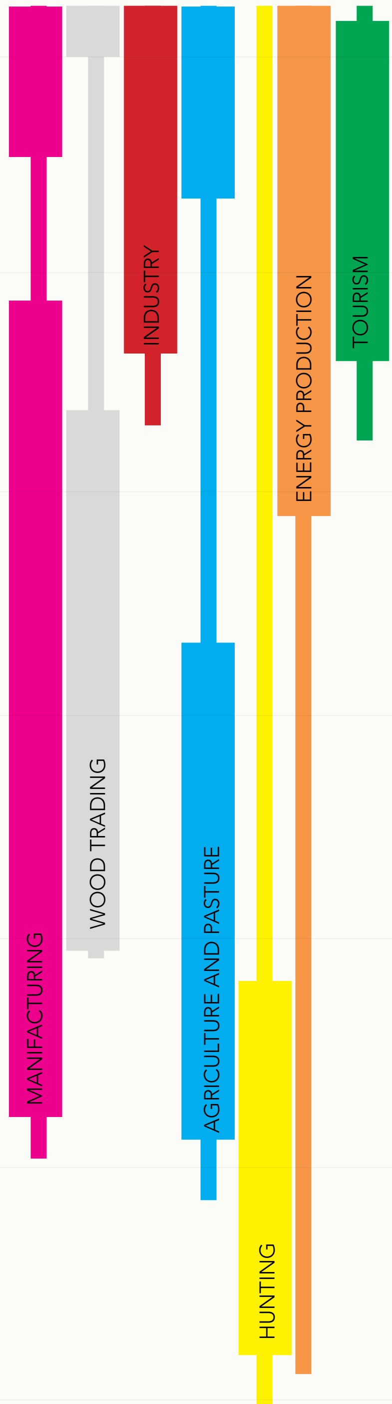
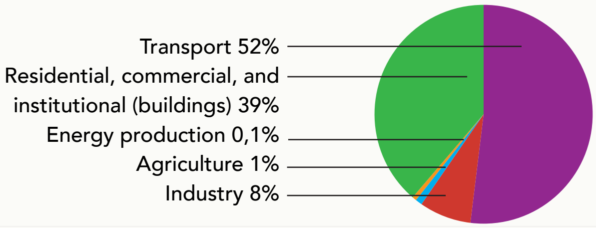


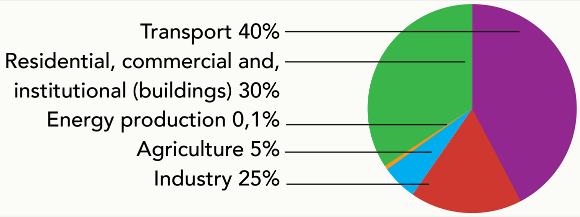
Figure 3.8. In this page a graph shows the history of the Alpine context in seven phases. On the right page it shows the history of Cadore and the related CO_2 emissions. An estimate of the CO_2 emissions of our ancestors and their energy resources can only be speculative. The evolution of the size of the CO_2 emissions graphs along the seven phases is only representative and not proportional to the amount of emissions (data source: *Bätzing 2005, p. 60; ** PLANALP 2014, p. 4; figure source: author's own design).

Cadore



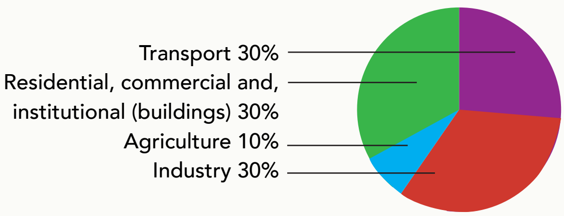
¬ The rediscovery of the agro-pastoral economy and the European projects.
¬ The Dolomites UNESCO Heritage.
¬ The crisis of human capital and the exploitation of natural resources.

Utilized Alps
XXI cen. - ...



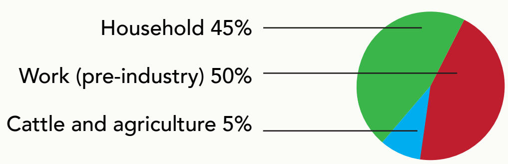
¬ Mass tourism and the Olympics.
¬ The construction of amenities for the tourism industry.
¬ The rise and fall of the eyewear industry and the related migration-emigration.

Conformed Alps
XX cen. - XXI cen.



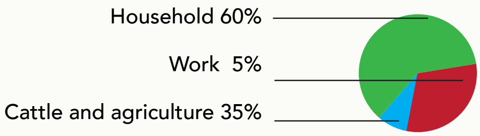
¬ The establishment of the Belluno Province and its municipalities.
¬ The discovery of Dolomite rock.
¬ The Risorgimento, the two World Wars, and Cadore as a battlefield.
¬ The construction of infrastructures.

Two-Faced Alps
XVIII cen. - XX cen.



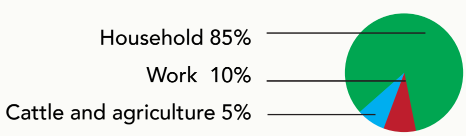
¬ Cadore contested between Germany and Venice.
¬ Botestagno Castle and Cortina ceded to Maximilian I.
¬ Wood and iron trade with Venice increases.

Marginalized Alps
XVI cen. - XVIII cen.



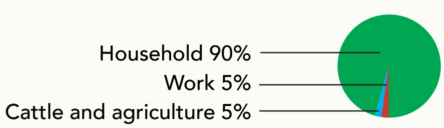
¬ The trading of wood and manufacturing of products with Venice.
¬ The construction of the MCC building.
¬ The establishment of the *Consiglio di Pieve*.

Open Alps
XIII cen. - XVI cen.



¬ The Longboards and the 10 *decana*.
¬ Cadore as a border between Aquileia and Tyrol.
¬ The Da Camino era with the first *Statuti* of Cadore.
¬ The recognition of the Comunità di Cadore (MCC) with its *Statuti*.

Half-Closed Alps
XI cen. - XIII cen.



¬ The Gauls and Veneti, and the first agricultural settlements.
¬ The Romanization of Cadore.
¬ The village of Pieve as a central component and the Claudia-Augusta road.
¬ Christianization and the first religious buildings.

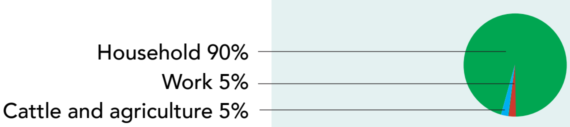
Closed Alps
6000 BC - XI cen. AD

6000 BC - XI century AD
The Closed Alps

The **Closed Alps** phase has its origins in prehistory and in the first human settlements. In prehistoric times humans were most likely using mountain areas as a space to hunt and harvest. The Mondeval man, a well-preserved Mesolithic burial, of circa 8000 years ago, with human remains and tools, which was found in San Vito di Cadore, is evidence of prehistoric human life in the Cadore valley. The first stable inhabitants of Cadore were presumably the **Ligures**, an ancient Indo-European population from the northwest of the Alps.
The **Veneti** arrived in Cadore in the XI century BC, while escaping from the Gauls and moving north along the Piave (Fabbiani 1992, p.27). They brought with them the use of iron and lead; the votive ditch found at Lagole - Calalzo di Cadore - is proof of their presence. The **Gauls**, a Celtic population, presumably merged peacefully and gradually with the Veneti; some words of the locally spoken Ladino still reflect Celtic influences (Bolcato et al. 1998). Also the name Cadore derives from the Celtic words 'Catu' - battle, and ´Brigum´ - stronghold; the name later became Catubrium with the arrival of the Latin language (Fabbiani 1992, p.21).
Agriculture, pastoralism, and forestry began in Cadore after the X century BC. Evidence of cultivated lands can be found in the Val del Boite and Centro Cadore, while the Comelico area was probably still uninhabited (see Figure 3.3 the three areas of Cadore).
After the year 27 BC the **Romans** colonized the *Regio X Venetia et Histria,* an area that is now split amongst modern day Veneto, Friuli Venezia Giulia, and Istria, and chose the city of Aquileia as the capital of this region. Coins found in Cadore and the remains of a Domus of the II century AD in Pieve di Cadore are further poof of the Roman presence. At this time the same villages that are now within the Cadore area were Roman, except for Zoppé, Comelico, Pozzale and Sappada, which were surely founded later (Fabbiani 1992, p.30). The villages were small and formed by compact settlements; beech, larch and spruce tree forests surrounded the small agglomerations of buildings and the cultivated fields.
The Romans realized the first network of roads in the Alpine area, connecting the north with the south of the mountain range (Borghi 2011). The Roman road that connected Altino (today Quarto d'Altino in Veneto) with Littamum (today San Candido/Innichen in Trentino-Alto Adige/Südtirol) was built in the III century AD (see Figure 3.10). It most likely crossed Comelico, therefore connecting Cadore and the Pustertal Valley to the Venetian pre-Alps (Fabbiani 1992, p.34). A second hypothesis suggests that this road may have crossed instead the Val Boite.

Under Roman dominion, between the II and III century AD, Cadore was **evangelized**. The spread of Christianity brought the vulgar Latin language to these remote valleys.
After the fall of the Roman Empire (476 AD) and the Barbaric Invasions, the Alpine territory underwent many transformations. While Northern Italy was occupied by the Eruli and then by the Byzantines, Cadore remained isolated. Alternatively, it saw the presence of many residents from the Pustertal Valley, who were escaping the Baiovari Invasion and probably founded the Comelico and Zoppé areas (Bolcato et al. 1998).

CO_2 Emissions in the Closed Alps Phase



Energy Sources

¬ Wood - biomass for fire
¬ Edible goods - for animal or human labor
¬ Water - for mills

Comments

An estimate of the CO_2 emissions of our ancestors and their energy sources can only be speculative. The evolution of the CO_2 emissions of the seven historical phases as indicated by the graphs (Figure 3.8) show how the produced CO_2 emissions radically changed throughout the centuries. The amount of CO_2 emissions produced by humankind before the industrial revolution was in fact not as relevant as it is now (IPCC, 2007; Malanima, 2014).

During the Mesolithic, fire was the only energy provider, along with edible goods for human and animal labor. Towards the end of the Roman Empire (472 AD), the use of the water mill spread widely throughout Italy and Gaul, and presumably also in Cadore (Dal Mas, 2000).

XI century – XIII century

The Half-Closed Alps

The Half-Closed Alps is the historical phase in which former Roman settlements became organized territory with the expansion of farmed fields. The organization of the territory in Cadore started earlier, with the **Longboards**, in the VII century. At that time Cadore formed a *sculdascia*, a military area given in custody to 120 warriors with their family. The *sculdascia* was divided in 10 *decana*, this subdivision remained in Cadore until the fall of the Serenissima Republic of Venice in the XVIII century. The toponyms and borders of the 10 *decana* partly refer to hamlets within the modern day municipalities (Fabbiani 1992, p.41).

1. **Ampezzo** part of Cadore until 1511 when it became part of Austria. Afterward Pescul and Selva became the 10th *decana*;
2. **San Vito** with the hamlets Chiapuzza, Resinego, Serdes, Borca, Taulén, Merceana, Cancia;
3. **Venas** with the hamlets Cibiana, Vinigo, Peaio, Vodo, Zoppè;
4. **Valle** with the hamlets Suppiane, Vallesina, Perarolo, Caralte, Ospitale, Davestra, Termine, Nebbiú, Tai, Damós;
5. **Pieve** with the hamlets Pozzale, Calalzo, Sottocastello, Grea e Rizzios;
6. **Domegge** with the hamlets Lozzo, Vallesella;
7. **Oltrepiave** with the hamlets Vigo, Laggio, Pelős, Pinié, Lorenzago;
8. **Auronzo**
9. **Comelico Superiore** with the hamlets Candide, Casamazzagno, Pàdola, Dosoledo, Costa, San Nicolò, Grea, Danta;
10. **Comelico Inferiore** with the hamlets Santo Stefano, Trasàga, a part of Danta, Casàda, Ronco, Costalissoiò, Campolongo, San Pietro, Stavello, Costalta, Valle and Presenaio.

During the Longboard period the urban organization in the northwest of Cadore probably followed the Longboard planning scheme for areas located near borders. The scheme consisted in small inhabited centers of 10 buildings that formed a *decana* and operated as defensive blocks (Bolcato et al., 1998). In the late VII century **Franks** arrived in Cadore, bringing two major innovations: the subdivision of land into 10 *centenaro*, that in Cadore corresponded to the Longboard's *decana*, and the citizens' assemblies of each *centenaro* called the *placiti generali*.
Cadore became part of the **Patriarchy of Aquileia** under Patriarch Sigeardo in 1077, after the brief dominion of Otto I Duke of Saxony and King of Germany. This patriarch ceded Cadore to the **Da Camino** Counts. Sappada was probably founded in this century when some families who came from Villgraten (Osttirol)

settled down with the authorization of the Patriarch of Aquileia.
After the X century the Oriental Alps saw a radical change in the expansion of the occupied territory through the management of open fields and forestry. Local inhabitants of the Alps organized their territory into institutionalized 'rural communities'. At the time, the mild climate of the Alps permitted the stabilization of agriculture and pastoralism (Bätzing, 2005; Borghi, 2011). In Cadore, the economy was sustained by the revenue from small size livestock, dairy, and wool, while a minor contribution came from agriculture and the cultivation of rye, wheat, oats, barley, beans, and turnips. Hemp and linen were cultivated for fabrics. Cadore traded with Venice and used Venice´s currency (Fabbiani, 1992, p.47).
Cadore organized its territory into a confederation of villages called the Comunità di Cadore. It was founded in the XIV century and formalized through the *Statuti*, a collection of rules and customs. While the *Statuti* served to administrate all of Cadore, the Regola institution administered the separate *centenaro*.
The **buildings** in the Comunità di Cadore were almost entirely made of wood; only the kitchen was surrounded by stones. The windows were small and few, and during the winter were covered with thin leather. The barn and dwellings were beneath the same roof, while the lavatory was in a hut outside of the main building. The streams near the houses served as fountains for each hamlet.
The Da Camino era ended in 1337 and Cadore returned under the Aquileia Patriarchy yet self-governed through a pact of independence signed by its inhabitants. This official act founded the **Magnifica Comunità di Cadore** (MCC), uniting the 10 *centenaro* in a unique administrative region under the guidance of the *Consiglio di Pieve*. Despite a brief Bavarise dominion with the Count of Tyrol Ludwig of Brandeburg (1342-1347), Cadore remained with the Patriarchy of Aquileia until 1420, the year in which the Republic of Venice ended the secular power of the patriarchs (Bolcato et al., 1998).

The *Statuti* of Cadore

The *Statuti* of 1338 are a collection of documents that form the basis of the civil, penal, constitutional, and administrative rights of Cadore. The *Statuti* were written by the Vicar, head of the *Consiglio di Pieve*, along with 12 notable inhabitants of Cadore who represented each *centenaro* (Bolcato et al., 1998).
Each *centenaro* was composed of few hamlets also known as *villas*, and each *villa* was administered by a Regola. The former controlled the use of the commonly owned high pasture lands, forests, and infrastructures, along with the fields surrounding the *villas*. Each Regola had its *Laudo*, a collection of laws that followed the *Statuti* rules.

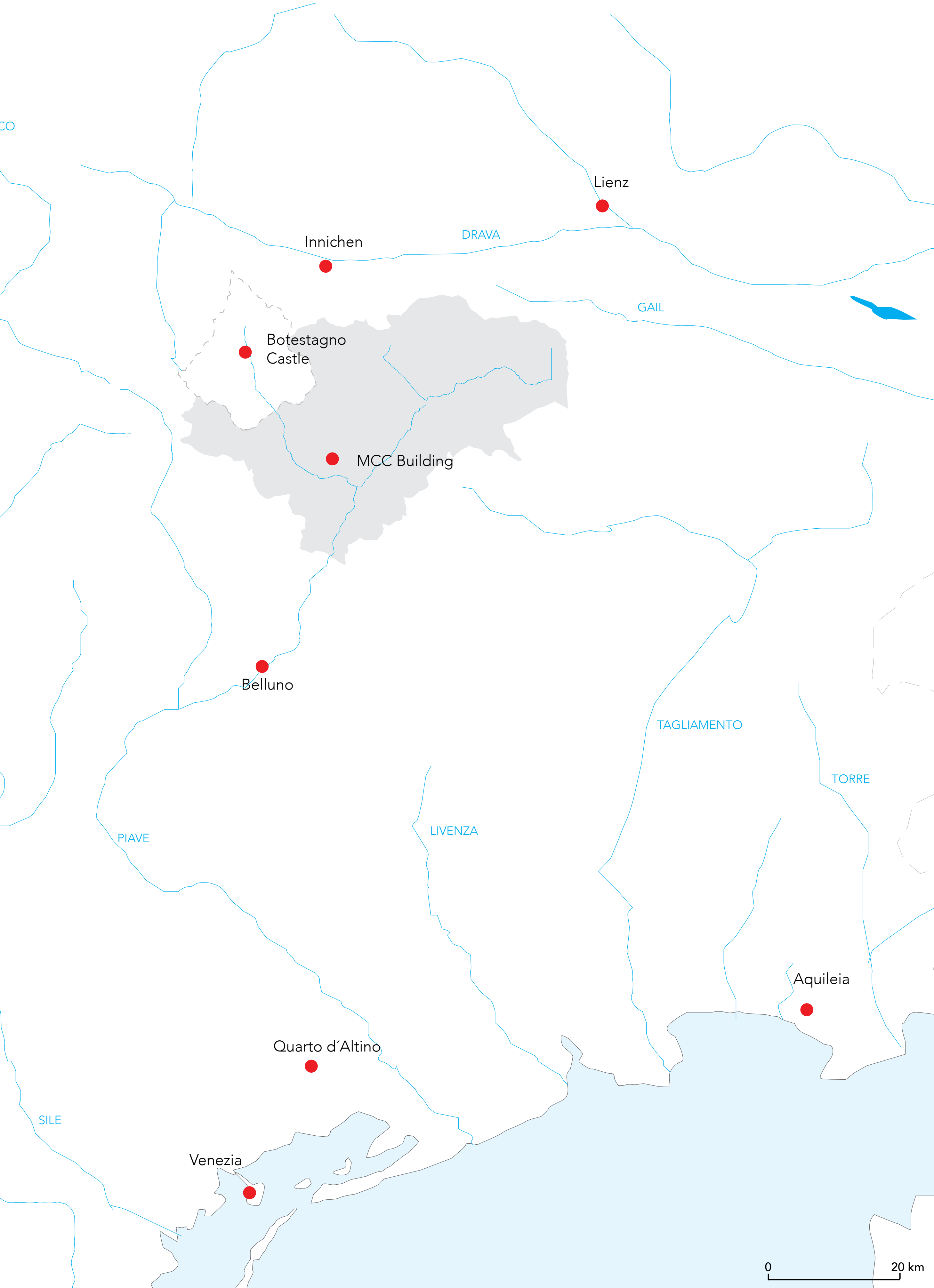
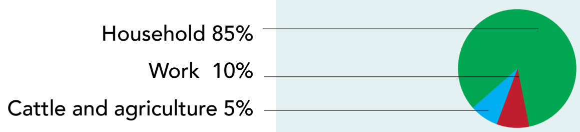

CO
Lienz
Innichen
DRAVA
GAIL
Botestagno
Castle
MCC Building
Belluno
TAGLIAMENTO
TORRE
PIAVE
LIVENZA
Aquileia
Quarto d´Altino
SILE
Venezia
0
20 km

Figure 3.9. A portrait of Sappada by J. Gilbert dated circa 1871 (figure source: Gilbert 1869, p.241).

CO_2 Emissions in the Half-Closed Alps phase



Energy Sources

¬ Wood - biomass for fire
¬ Edible goods - for animal or human labor
¬ Water - for mills and *opificio*

Comments

An estimate of the CO_2 emissions of our ancestors and their energy sources can only be speculative.

During the Middle Ages the mills served other activities than merely grinding flour. The rudimental watermills called *opificio* were used for forges, to extract vegetable fibres for fabrics, or as sawmills (Dal Mas 2000). *Opificio* is the ancient name for a hydropowered mill located along the river. The *opificio* handled edible goods, forges, timber, and fibers.

Figure 3.10. On the left a map that shows Cadore and the nearest urban areas that played an important role in its development (author's own design).

XIII century - XVI century

The Open Alps

The Open Alps phase saw a further development of the agro-silvo-pastoral system that was able to sustain and maintain the local population. The livestock increased, with consequent higher revenue from dairy and meat, and there was also an increase in trade with the surrounding lowlands. The phenomenon of a Christian pilgrimage through the Alps led to the construction of monasteries and abbeys, and permitted some members of the population to receive a high level of instruction (Borghi, 2011).

In this phase Cadore was controlled by the Serenissima Republic of Venice: Cadore declared its loyalty to the Republic after the fall of the Aquileian Patriarchs in 1420. The MCC obtained from Venice a high level of administrative autonomy and the possibility to continue to use the *Statuti* of Cadore. The population reciprocated by gifting the Somadida Forest, from which the Serenissima obtained the wood for the city's foundations and for its fleet. Later, the same forest was named San Marco Forest, and nowadays is a protected natural area owned by the Italian State. Parallel to the lumber trade with Venice, many mechanical sawmills which produced timber for infrastructure, furniture, and manufacture were built (Zanella, 1999). The construction of the **MCC building** with an adjacent bell tower began in 1447 (Figure 3.11).

In 1508 Maximilian I of the House of Habsburg occupied Cadore during the plague that had impoverished and devalued the area.

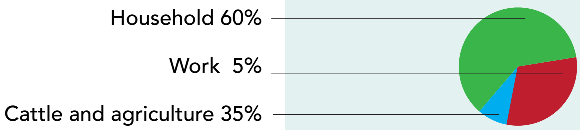
The *Consiglio* of the MCC

The *Consiglio* di Pieve – the governing body of the MCC – was composed of 29 council members elected by the 10 *centenaro* (Fabbiani 1992, p.62). The *Consiglio*, and later the Serenissima, nominated the Vicar. The archdeacon, head of the Cadore churches, took part in the *Consiglio* and was chosen from the local priests (Bolcato et al. 1998).

The *Consiglio* elected important figures: 10 *comandandori* as judicial officers, 27 *giurati* as policeman, six *guardiaboschi* as forest guards, one *conduttore* as the caretaker of the main road, and one *fonticaro* that controlled the granary and the edible reserves in Pieve di Cadore (Fabbiani 1992).

Figure 3.11. The picture shows the building of the Magnifica Comunità di Cadore, in Pieve di Cadore. A statue of Titian stands in front of the building, Cadore was in fact his homeland (figure source: nuovocadore.it, 2012).

CO_2 Emissions in the Open Alps Phase



Energy Sources

¬ Wood - biomass for fire
¬ Edible goods - for animal or human labor
¬ Water - for mills and *opificio*
¬ Charcoal – obtained from wood

Comments

An estimate of the CO_2 emissions of our ancestors and their energy sources can only be speculative.
In the XIII century the wood from Cadore was transported by river through the *zattere* system, to Venice where it was used for the construction of buildings, the city's foundations, and the fleet. It was also used as fuel by glassmakers, members of the manufacturing sector of the city.

XVI century – XVIII century

The Marginalized Alps

During the Marginalized Alps phase, which took place from the XVI century onward, the Alpine territory had transformed from a center of exchange to a marginalized area, due to the increase of sea transport on the Mediterranean. Since the Alps were already an important provider of resources for the lowlands, e.g., wood, iron, and food, they maintained relations with the nearest region. This turning point in trade initiated the process that brought the Alps to be a physical boarder between different political powers (Borghi, 2011).
From the XV to the XVIII, Cadore was under the protection of the **Serenissima Republic of Venice**. It was contended between the two bordering powers of the Serenissima and the **Holy Roman Empire**. In December 1511, a peace treaty was signed between Venice and the German King Maximilian I. The agreement required Venice to cede Cortina d'Ampezzo and the castle of **Botestagno** to the archduke of Austria (Fabbiani 1992, p.105). Thus Ampezzo left the MCC, and Pescul and Selva were divided from San Vito and became the tenth *centenaro.*
In those centuries, Cadore was developed differently from other Alpine territories. While the Alps were generally suffering from the lack of technological and cultural development of the already urbanized lowlands, the MCC was highly prosperous thanks to its forests and mines, which contributed to the lumber and iron trade (Zanella, 1999). Such fortunate centuries brought about a high population growth (see Table 3.3).

Year	Inhabitants in Cadore	
1516	16000*	(without Cortina d'Ampezzo and Sappada)
1723	24000*	(without Cortina d'Ampezzo and Sappada)
1815	25001*	(without Cortina d'Ampezzo and Sappada)
1921	50410*	
2001	32990**	
2015	30968***	

Table 3.3. Number of inhabitants of the Cadore Region from the first available census (data source: *Fabbiani 1992, p. 213; ** ISTAT, 2001; ***Provincia Di Belluno, 2015).

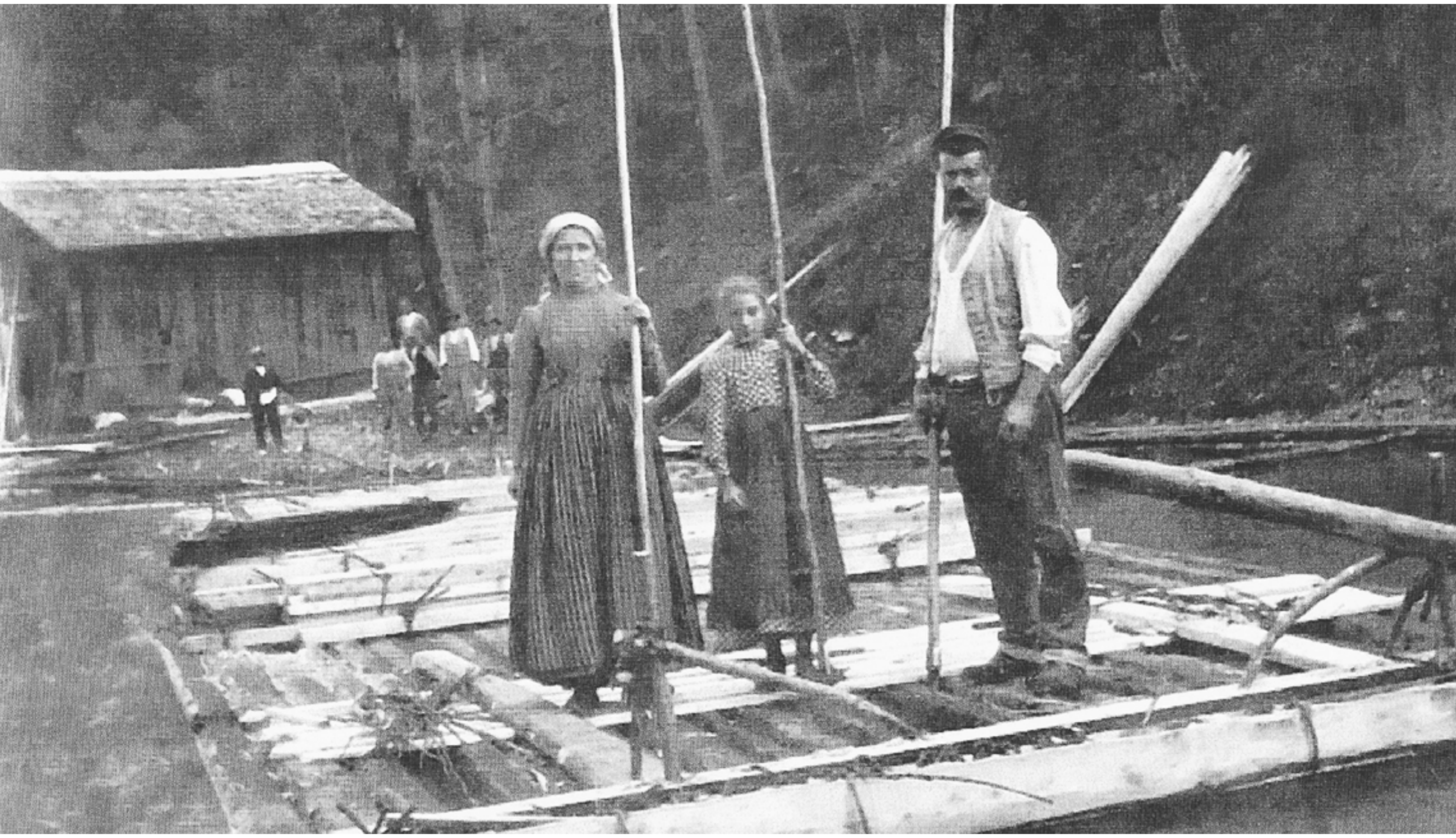


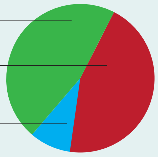
Figure 3.12. Portrait of a family on a raft for the transportation of timber in the area of Venàgo, between Perarolo di Cadore and Ospitale di Cadore, at the beginning of the XX century (figure source: Tabacchi & De Martin 2010, p.65).

CO_2 Emissions in the Marginalized Alps Phase

Household 45%

Work (pre-industry) 50%

Cattle and agriculture 5%



Energy Sources

¬ Wood - biomass for fire
¬ Edible goods - for animal or human labor
¬ Water - for mills and *opificio*, river for transport
¬ Charcoal – obtained from wood

Comments

An estimate of the CO_2 emissions of our ancestors and their energy sources can only be speculative.

In the XV century, the opening of the mines, for iron production, led to the *carbonaia* phenomenon. The *carbonaia* was a structure made of wood for the production of charcoal from beech trees. Charcoal was necessary to manufacture iron since it was used as fuel for the forges. In the same century Cibiana di Cadore began to produce keys, an activity that became a tradition and is now maintained by ERREBI, the only remaining brand in Cadore (Bolcato et al., 1998).
The mines closed circa 1750 but the *carbonaia* tradition was maintained until the end of 1800 (Zanella, 1999).

XVIII century – XX century

The Two-Faced Alps

During the Two-Faced Alps phase, after the XVIII century, the Alpine territories tried to shape their own economic system but were not able to extinguish their dependency on trading with the surrounding regions. This dualistic situation is demonstrated by the diversification between the high and low alpine territories, which led to the depopulation of the first, and the urbanization of the second. Industrialization, and then tourism, played a key role in this process causing emigration toward the lowlands, which were better connected to the industrial centers (Borghi, 2011).
In Cadore the domain of the Serenissima ended in 1797 with the Napoleonic reign. From then on Cadore has been part of the Belluno Province, and divided in administrative municipalities following the 10 *centenaro* borders. Cadore had to renounce the privileges of its autonomy when the Napoleonic Code was introduced. In this moment the *Statuti* lost their legal value and the institution of the Regola was abolished (Fabbiani, 1992). In those years the iron mines closed, and scarce trade with a declining Venice affected Cadore's economy.
In the middle XIX century the **Rifabbrico** began: it was the process of rebuilding the oldest structures with higher hygienic and safety standards. The Rifabbrico concerned entire villages or parts of villages (e.g. Lorenzago di Cadore, seeFigure 3.13) and resulted in the cancellation of a historic urban and architectural imprint. It brought with it the imposition of regular urban structures and standardized buildings (Fabbiani, 1992; Gellner, 1998).
With the fall of **Napoleon** in 1814 Cadore became part of Austria and was incorporated into the Regno Lombardo-Veneto. During the Austrian domain in Cadore several infrastructures were built and remain to this day: the new street, Alemagna, that connects Belluno to the Pustertal Valley through Cortina d'Ampezzo and Dobbiaco; the street that connects the Comelico area to Auronzo di Cadore; and the bridge that connects Cibiana di Cadore to Valle di Cadore (Fabbiani 1992, p.116). The positive effect of these new infrastructures was visible through a boost in Cadore's economy: there was an increase in the trade of locally manufactured goods and in tourism.
In 1848 Cadore actively participated in the **Risorgimento movement**, and in 1866 became part of the Savoia Regno d´Italia. In 1875 the MCC was renamed 'Consorzio della Comunità Cadorina,' and was reconstituted as a moral institution with the aim of promoting and maintaining the spiritual and culture unity of the region, while Cortina d'Ampezzo remained part of Austria until 1923 (Fabbiani, 1992, p.211).
The railway connecting Belluno to Calalzo di Cadore was constructed from

1911 until 1914; a few years later the railway connecting Calalzo to Cortina and Dobbiaco was also built. The latter was dismissed in 1964 and nowadays it is a cycle lane known as the Ciclabile delle Dolomiti.

The industrialization of the XIX century brought the construction of many hydropower plants, the employment of local people in industries and the abandonment of agro-silvo-pastoral economy.
During the **First World War** (1915-1918) Cadore was the scene of many battles that left indelible signs. While a positional warfare was fought between the Dolomities, in November 1917, the Austro-Hungarians invaded Cadore for one year. Such tragic war is remembered in many museums and open-air sites between the cliffs. The **Second World War** left less physical signs on the territory but nonetheless caused many young men to lose their lives on the battlefield. The German *Reich* briefly occupied the Belluno Province (thus Cadore too), Trento, and Bolzano/Bolzen causing the escape of many rebels who became part of the *partigiani* forces. Monuments to the fallen are present in almost each municipality.

The Dolomites and their Tourism

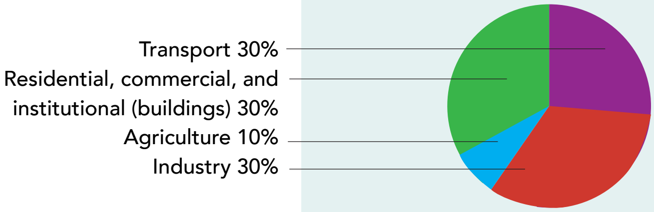
In 1791 stones from the Dolomites were analyzed for the first time and were named Dolomite Rock by the explorer Deodat de Dolomieu. At that time the mountains were a destination for tourists, both for scientific reasons and for personal enjoyment. There was a boom in mountain and European travel during this historical period as a result of Romanticism (Fabbiani 1992, p.157). The high fame of the Dolomites is related to the British publications printed at the end of the 1800's such as 'Cadore or Titan´s country' by Josiah Gilbert.

The Ice-Cream Emigrants

At the end of the XIX century the communities of Cadore and Zoldo initiated a peculiar emigration phenomena that still exists today. Initially during the long and infertile winters, the men would go to the Italian lowland to produce and sell their handicrafts, baked goods, and candied fruit. The main destinations were Venice and Bologna. In those months the women were taking care of the livestock and of their houses (Bortoluzzi, 1991). With the invention of sorbet and ice-cream, the phenomena slowly evolved; nowadays entire families are migrating in the summer seasons to countries and cities were ice cream is sought for by popular demand. One element of this phenomenon is the seasonal summer emigration of two thirds of Zoppé's population (Museo Etnografico Zoppè di Cadore, 2008).

Figure 3.13. Map of the Gortina area in Lorenzago di Cadore before and after the *Rifabbrico* (figure source: Guzzon & Guzzon 2008, p.60).

CO_2 Emissions in the Two-Faced Alps Phase



Energy Sources

¬ Water - for mills, river for transport; hydropower plants *opificio*
¬ Charcoal – obtained from wood
¬ Fossil fuel – for transport and industry
¬ Natural gas – for industry and residential
¬ Wood – biomass for residential
¬ Edible goods – for animal and human labor

Comments

An estimate of the CO_2 emissions of our ancestors and their energy sources can only be speculative.

The economic growth that took place from the XIX century has marked a sharp rise in both the energy sources utilized and in the efficiency of their utilization. De facto, with the technological invention of the steam engine, fuel was no longer utilized only for heating, lighting, and melting metals. From the XIX century until today, there has been a constant increase in energy use and population growth except for a stable period between the two World Wars (Malanima, 2014).

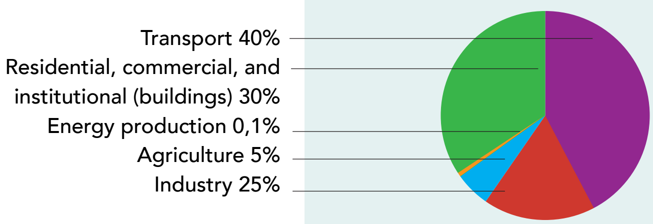
XX century – XXI century
The Conformed Alps

The Conformed Alps is the phase in which this extraordinary territory was subject to homogenization due to industrialization, the massive use of natural resources for energy production, and mass-tourism.
Cadore, part of Italy since the formation of the Italian Republic (1946), and part of the Veneto Region since 1970, saw a slow process of industrialization. Since the end of the XIX century, eyewear factories were born in Central Cadore, which emerged from the experience of black-smiths, the energy given by hydropower plants, and the abilities of artisans from Cadore trained as glassmakers in Venice (Zanella 1999). Famous factories such as Safilo and Marcolin were born in this context.
In 1948 the MCC and the Regola was recognized as a legal entity, together with the MCC. Since then, the role of the Regola has been to respect the *Statuti* and their vocation to conserve, enhance, and manage the agro-silvo pastoral properties. The MCC is now a public institution, composed of 22 municipalities of the Cadore area. It promotes the economic growth and the development of cultural value of local communities by identifying and supporting the common unifying characteristics of the area that can contribute to the overall progress of Cadore (Magnifica Comunità di Cadore, 2013). The 22 members of the *Consiglio della MCC* are the mayors of each town and are elected by the municipalities of Cadore. In addition there are seven technical councilman and the Archdeacon of Cadore. Nowadays the territory of the MCC numbers 31 Regola, each with its *Laudo* (a collection of rules) however, this institution has been not reconstituted in all the municipalities (see Figure 3.4).
During the postwar period, the construction of new streets and tunnels along all of the Alps together with an increase in privately owned vehicles led to the phenomenon of mass-tourism during the winter and summer seasons. An import event that boosted Cadore's economy for a few years and advertised the beauty of the Dolomities, was the winter Olympic games of 1956 in Cortina d'Ampezzo. Afterwards, the tourism industry slowly shifted from the use of hotels to the ownership of second-homes, see Figure 3.14 . The problems connected to second-home tourism in the Alps range from urban sprawl, loss of valuable landscapes and rural architecture, traffic congestion, to the exclusion of local people from the housing market (Sonderegger & Bätzing 2013).

Dolomites UNESCO World Heritage

In 2009 UNESCO listed the Dolomites as a World Natural Heritage, which consists of 9 mountain systems located in 3 Italian regions. Cadore is part of 3 of the UNESCO Dolomite systems: Pelmo, Croda da Lago (Valle del Boite); Northern Dolomites (Val del Boite and Comelico); Dolomites of Friuli and Oltre Piave (Centro Cadore) (UNESCO, 2016).

CO_2 Emissions in the Conformed Alps Phase



Energy Sources

¬ Water – hydropower plants
¬ Charcoal – obtained from wood
¬ Fossil fuel – for transport and industry
¬ Natural gas – for industry and residential
¬ Wood – biomass for residential
¬ Edible goods – for animal and human labor

Comments

An estimate of the CO_2 emissions of our ancestors and their energy sources can only be speculative.

From the mid XIX century until nowadays there has been an almost constant growth rate of CO_2 emissions with brief deviations due to the two World Wars (Malanima, 2014).

CO_2 emissions have grown due to human activities such as the burning of oil, coal, and gas. In Cadore the vast amount of trees create a natural CO_2 sink; nonetheless, on a global scale, anthropogenic emissions have upset the natural balance by adding too much CO_2 to the atmosphere without removing any.

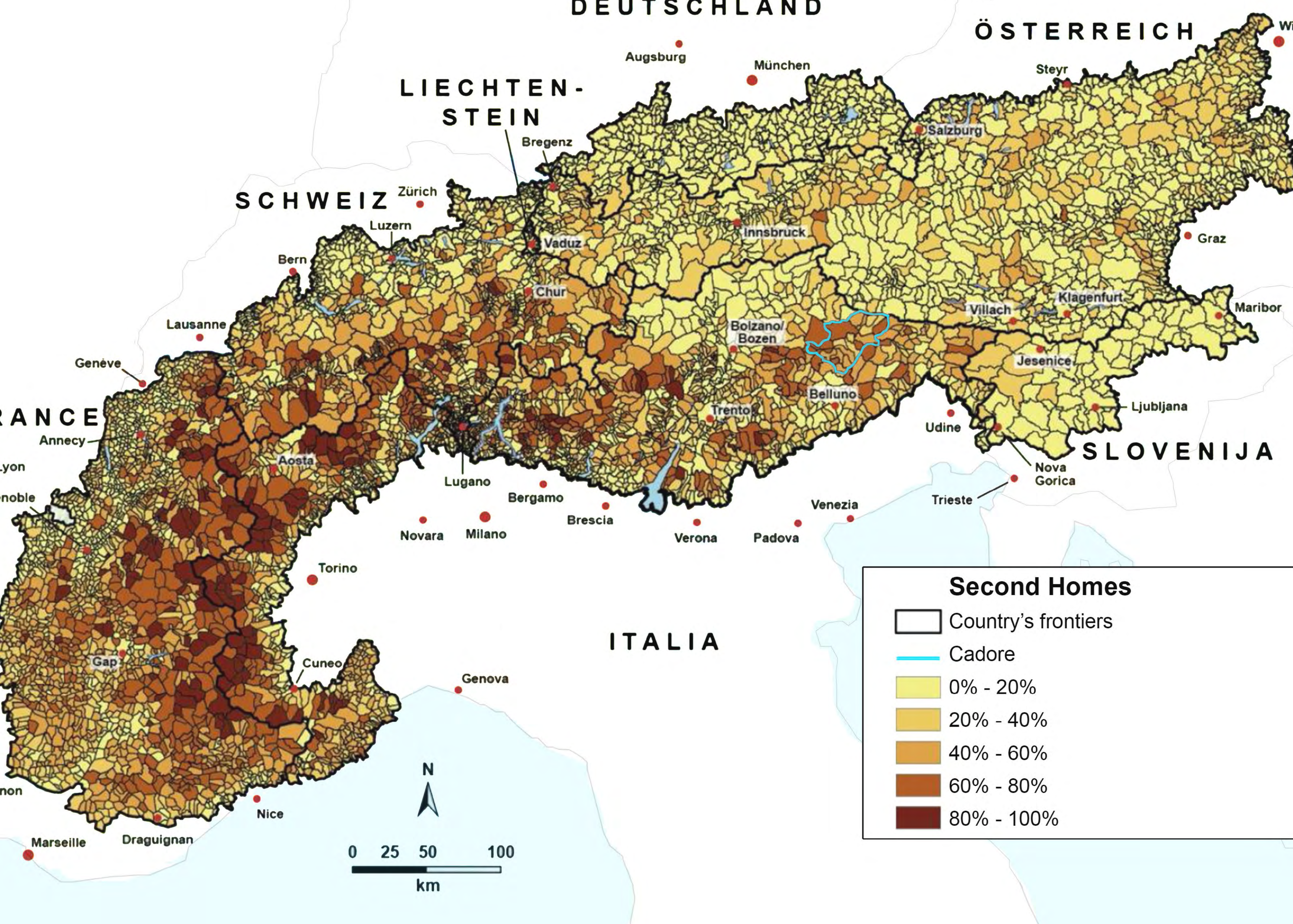
In Cadore this is the historical phase in which the main hydropower plants are built:

- 1901 Barnabò, a hydropower society, opened a small dam on the Molinà river (Zanella 1999, p.202).
- 1930 ** A dam on the Ansiei river created the artificial lake of Santa Caterina at Auronzo
- 1931 ** A dam on the Piave River created the artificial lake of Santo Stefano di Cadore.
- 1946-1949 ** A dam on the Piave River creates the artificial lake of Centro Cadore.
- 1951 ** A dam on the Boite River creates the artificial lake of Valle di Cadore.
- 1960 ** A dam on the Boite River creates the artificial lake of Vodo di Cadore.

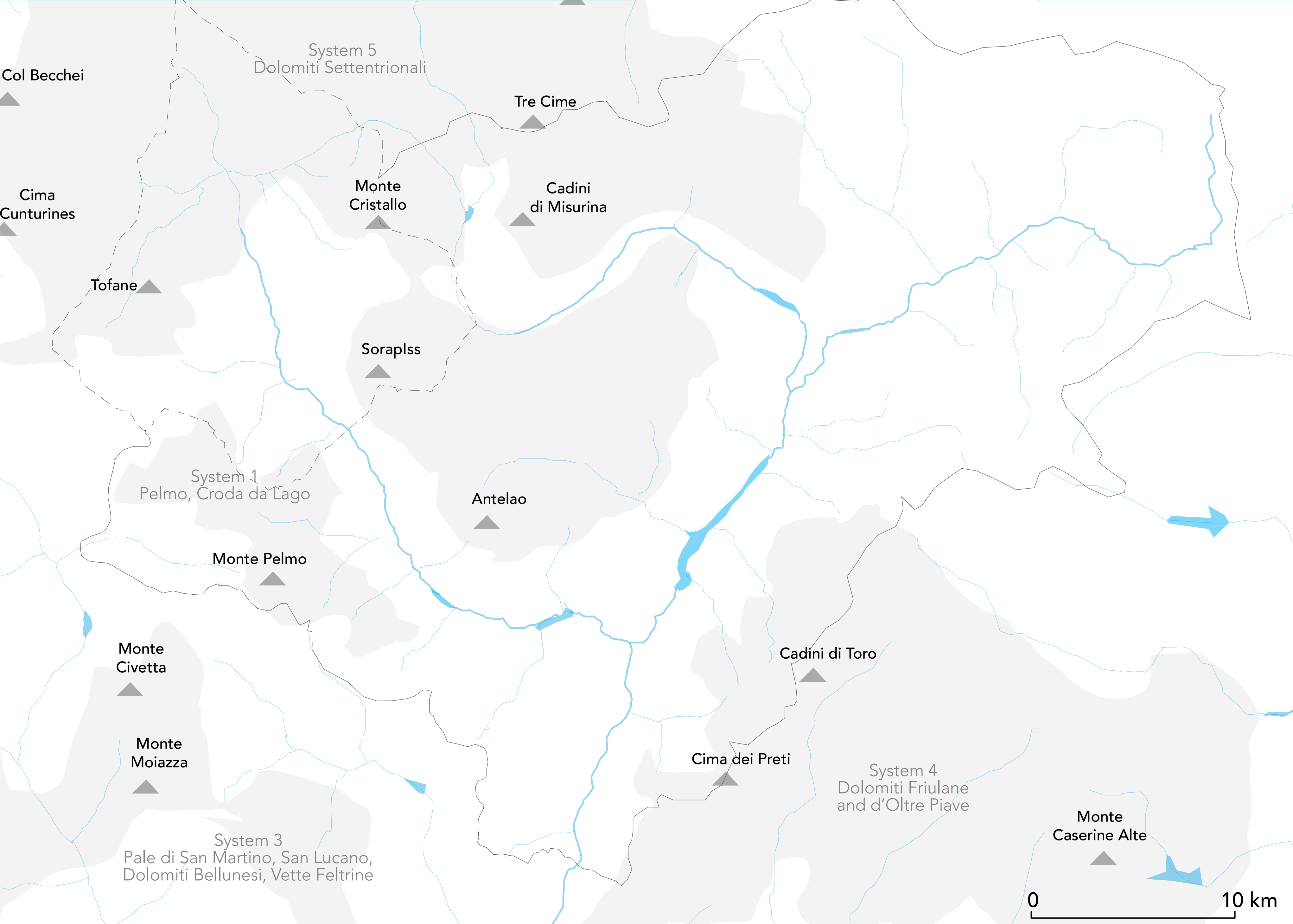
In 1929 electrical energy is adopted by the railway system (Calalzo - Dobbiaco) and arrives in homes and public buildings (Zanella 1999, p.207).
(Data source: **Progetto Dighe 2005).

Figure 3.14. In the following page, on the left, a map shows the percentage of second homes in the Alpine Region – on the perimeter of Alpine Convention. The data refers to the national census of approximately 2000 (data and image source: Sonderegger & Bätzing 2013, p.7).

Figure 3.15. In the following page, on the right, a map shows the UNESCO Dolomiti Natural Heritage systems in Cadore (data source: Fondazione Dolomiti UNESCO, 2016; author's own design).



DEUTSCHLAND
ÖSTERREICH
LIECHTEN-
STEIN
SCHWEIZ
SLOVENIJA
ITALIA
Augsburg
München
Steyr
Salzburg
Bregenz
Zürich
Luzern
Vaduz
Innsbruck
Graz
Bern
Chur
Lausanne
Villach
Klagenfurt
Maribor
Bolzano/
Bozen
Genève
Jesenice
Belluno
Trento
Ljubljana
Annecy
Aosta
Udine
Lugano
Nova
Gorica
Bergamo
Trieste
Brescia
Venezia
Novara
Milano
Verona
Padova
Torino
Gap
Cuneo
Genova
Nice
Marseille
Draguignan
Second Homes
Country's frontiers
Cadore
0% - 20%
20% - 40%
40% - 60%
60% - 80%
80% - 100%
N
0 25 50 100
km


System 5
Dolomiti Settentrionali
Col Becchei
Tre Cime
Cima
Cunturines
Monte
Cristallo
Cadini
di Misurina
Tofane
Soraplss
System 1
Pelmo, Croda da Lago
Antelao
Monte Pelmo
Monte
Civetta
Cadini di Toro
Monte
Moiazza
Cima dei Preti
System 4
Dolomiti Friulane
and d'Oltre Piave
System 3
Pale di San Martino, San Lucano,
Dolomiti Bellunesi, Vette Feltrine
Monte
Caserine Alte
0
10 km

XXI century - today

The Utilized Alps

The Utilized Alps is a historical phase in which the Alpine Territory is frenetically used: its resources are exploited for the production of energy, its landscape is a wide recreational park for short-term tourism, its second-homes are inhabited in increasingly shorter periods, its land is treated by the inhabitants as source of revenue. In addition to the management of natural resources for the production of energy, and the development of an economy that does not damage the natural environment, the Alps now needs to rebuild a new cultural identity desegregated from mass-tourism, second-home markets, and the offshoring of local industries caused by globalization (Bätzing 2005).
The Belluno Province has identified similar challenges and a few other issues that concern its mountain territory (Provincia di Belluno 2010c, p.14):

- depopulation and the consequent decrease of services to highest mountain territories threaten their local cultural and historic traditions.
- The increase of second homes together with depopulation have caused the reduction of potential investments and adequate rates within the tourism industry.
- Besides the second-home phenomenon that largely involves Cadore, a small range of permanent migration toward the Alps occurs. It is called Amenity migration and is the process by which people move to amenity rich areas, i.e., mostly rural areas, due to the search for 'new lifestyles.' This kind of migration may play an important role in the development of semi-abandoned rural areas (Sonderegger & Bätzing 2013).
- A restrictive bureaucratic system has blocked the difficult transition of an industry based on the eyewear sector, toward new modes of economy.
- De facto, during the beginning of the XXI century, Cadore's eyewear district suffered a high rate of unemployment as a result of globalization and offshoring.
- The difficulties of internal mobility and connection with external areas.

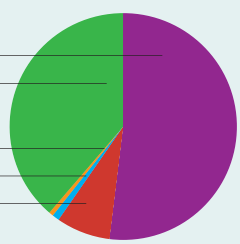
Nowadays, Cadore has a vast handicraft culture of highly specialized manufacturing SMEs (e.g., black-smith, carpenter, bio agriculture-pastoralism, sawmill, eyewear). In the last decade examples of agro-silvo-pastoral industries have been registered thanks to the LEADER programme, and other initiatives of the European panorama such as the INTERREG projects. The local economy is nonetheless still based on scarce tourism, which despite the high quality of nature and environment is unable to propose a competitive touristic rate on the global market. In the last decade, a general disagreement with the regional administration, and the nearby autonomous regions of Trentino-Alto Adige/Südtirol and Friuli

Venezia Giulia, prompted two main episodes. In 2007 a referendum in Cortina d'Ampezzo obtained the majority for joining Trentino-Alto Adige/Südtirol Region (La Redazione, 2007). In 2008 a referendum in Sappada obtained the majority for joining the Friuli Venezia Giulia Region (La Redazione, 2015).

The GAL *Alto Bellunese* and the *Unione Montana*

The GAL Alto Bellunese - Gruppo di Azione Locale - is a consortium composed of public and private stakeholders which include the MCC and the Unioni Montane (GAL, 2013). GAL's aim is to promote local development in the rural area, pursuing the general objective of contributing to the promotion of sustainable development of the territory. It operates within the framework of regional and transnational cooperation initiatives.
The Unione Montana is a territorial institution composed by a group of mountain municipalities, identified by the Region that pursues the development of its areas in their specific common needs and functions. The representative body and executive body of the Unione Montana are composed of local mayors and councilors. Cadore is divided into 5 Unione Montana: Val Boite, Centro Cadore, Comelico-Sappada, Cadore-Longarone Zoldo, Agordina.

CO_2 Emissions in the Utilized Alps Phase



Energy sources

¬ Water - hydropower plants
¬ Fossil fuel - for transport and industry
¬ Natural gas - for industry and residential
¬ Wood - biomass for residential
¬ Sun - for solar and photovoltaic panels
¬ Edible goods - for animal and human labor

Comments

The CO_2 emissions in Cadore are mainly due to transport along the road and the heating of buildings. The CO_2 emissions from transportation are primarily produced by burning fossil fuel for our cars, trucks, and trains. CO_2 from industries are also produced by burning fossil fuels for energy and by certain chemical reactions necessary to produce goods from raw materials (e.g., steel). CO_2 emissions from the commercial and residential sector are produced from fossil fuels burned for heat and the handling of waste. CO_2 from agriculture and forestry are produced by livestock such as cows, agricultural soils, and the use of specific means of transport (e.g., trucks) (data source: ARPAV, 2012). More detail on the CO_2 emissions in Cadore in chapter 3.1.4.

Figure 3.16. On the top, a view of Centro Cadore from Monte Rite, in the center the lake of Valle di Cadore (author's own figure, 15th of Aug. 2016). On the bottom, a view of Monte Cridola, part of the UNESCO system 'Dolomiti Friulane and d'Oltre Piave' and located on the border between the provinces of Belluno and Udine (figure source: De Lorenzo, 2015).

Figure 3.17. On the top, a view of Val del Boite from Monte Rite with Monte Antelao on the right (author's own figure, 15th of Aug. 2016). On the bottom, Monte Pelmo is part of the UNESCO system 'Pelmo, Croda da Lago' (author's own figure, 1st of Apr. 2015).

3.1.3. Spatial and Energy Planning in Cadore

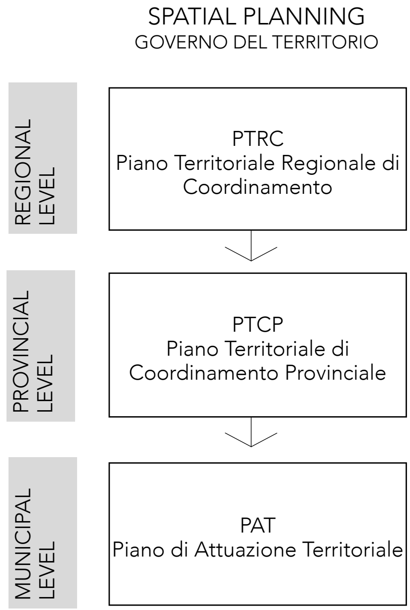
This chapter discusses the planning system that could influence the transition to a low-carbon future of Cadore. The Region is not administratively recognized therefore it is not subject to the formal planning instruments that a region must adhere to. The planning system that affects these areas is implemented by Veneto Region at the regional level, Belluno Province[i] at the provincial level, and each municipality at the municipal level. Two types of formal planning, present at the aforementioned levels, have the potential to shape a low-carbon future of the area. The first concerns the management and organization of the territory; the second concerns energy development. However, in the national Italian planning framework, there is only one document that directly addresses the complexity of territorial management and energy development in the name of a possible low-carbon future. This document, developed by the ENEA (Italian National Agency For New Technologies, Energy And Sustainable Economic Development) presents an energy scenario elaborated through a technical-economic model (see 'Checking the Documents' in chapter 3.3.3).
This chapter is not an in depth description of the planning system and of the current instruments, but an overview of these and their potential to influence the low-carbon future of Cadore and consequently the application of the Visioneering mode of planning.

Spatial Planning

In Italy spatial planning is referred to as **Governo del territorio**. It affects Cadore at the regional, provincial, and municipal levels. These levels constitute a hierarchical system of plans that create binding regulations for lower levels and determine the consequent requirements of each level. This pyramid of plans is not meant to pursue concrete political agendas, but to address long term transformation processes of the territory (Regione Veneto, 2004 ; Haselsberger, 2010).

[i] The law n. 56 (7th April 2014) '*Disposizioni sulle città metropolitane, sulle province, sulle unioni e fusioni di comuni*' (Regulations for Metropolitan Cities, for Provinces, and for the Unification and Fusion of Municipalities) has radically changed the structure, the composition, and the responsabilities of the province, now called 'Enti di Area Vasta'. In this research, the term Province is used, while the current legal term is 'are vasta' that refers to the administrative level of planning and management of the territoriy between the region and the municipalities. The "area vasta" is controlled by a council whose main tasks are: to propose the Statuto to the mayors assembly, to approve new regulations, plans and programs, and the financial scheme. The president of the 'area vasta' is the president of the council. The council of the Belluno Province is now composed of the president and 10 members elected every two-years by second level elections. The mayors and the municipalities' councilors are eligible (Provincia Di Belluno, 2014).

Figure 3.18. The figure shows the organization of the spatial planning levels 'Governo del territorio' (author's own design).



The spatial planning discipline promotes the **Piano Territoriale Regionale di Coordinamento** at the regional level, the **Piano Territoriale di Coordinamento Provinciale** at the provincial level, and the **Piano di Attuazione Territoriale** at the municipal level (see Figure 3.18).

The territorial regional plan **Piano Territoriale Regionale di Coordinamento** (PTRC) is the regional tool for territorial planning. It indicates the objectives of development and organization of the territory together with the strategies and actions necessary to reach them.
The Cadore area is involved in the PTRC of the Veneto Region, the section 'energy and environment' of the plan might be the more influential for the implementation of a low-carbon future in Cadore. It advocates for the energy redevelopment of the urban centers, or rather the enhancement of the energy efficiency of buildings with a specific focus on schools and public buildings. It also suggests the implementation of thermo-electric plants and district heating, and of solar and photovoltaic panels preferably in industrial areas with an adequate landscape impact. It limits the use of new land for aerial electrical networks (Regione Veneto, 2009a, p. 13). As far as a general overview of the RES management, the map (*Tav. 03 Energia e Ambiente*, Figure 3.19) of the plan reports already existing facilities such as the main hydropower plants, the waste disposal plant of San Vito di Cadore, and the power line that connects the city of Belluno to Austria (220 kV). The latter might be upgraded in the near future to carry 380 kV.
As far as the topic of mobility, the map of the regional plan shows a possible railway that would cross the Val del Boite connecting Belluno to the Trentino-Alto Adige / Südtirol Region (*Tav. 07 Montagna del Veneto,* Figure 3.20).

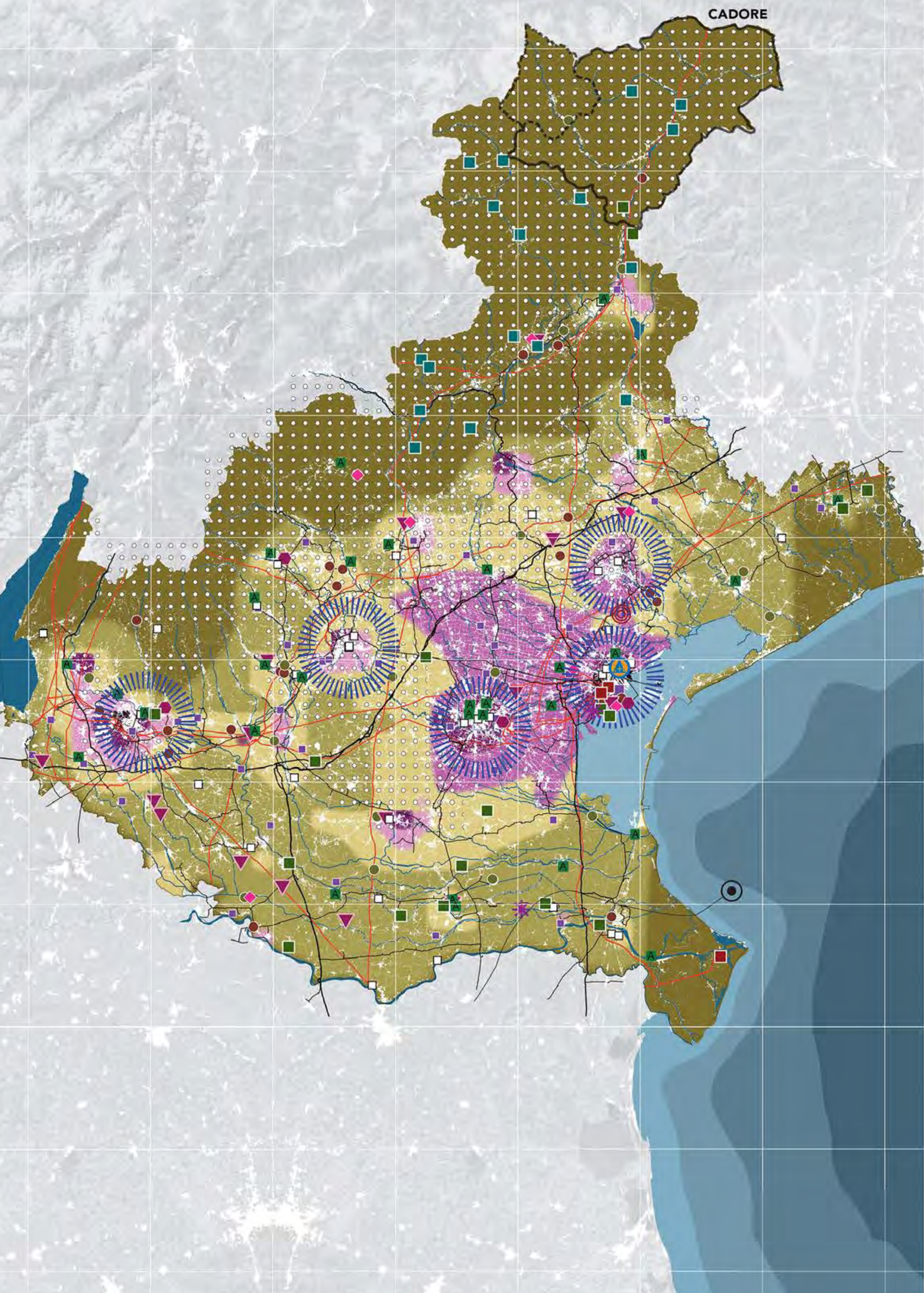

CADORE

Figure 3.19. The figure is one of the PTRC maps *(Tav. 03 Energia e Ambiente)* focused on energy and environment (figure source: Regione Veneto, 2009a).

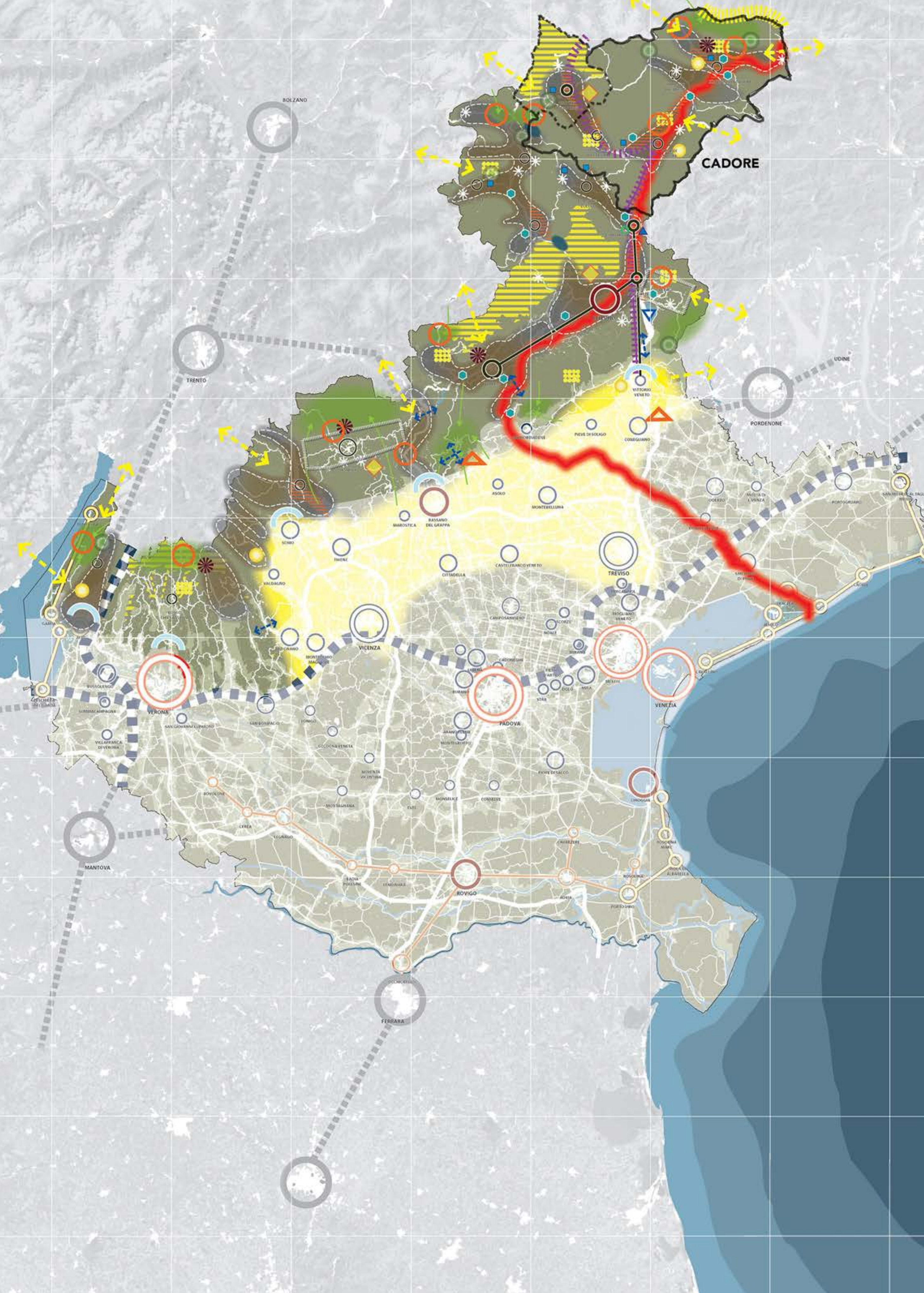

CADORE
BOLZANO
TRENTO
UDINE
PORDENONE
VITTORIO VENETO
CONEGLIANO
PIEVE DI SOLIGO
ASOLO
MONTEBELLUNA
MAROSTICA
BASSANO DEL GRAPPA
SCHIO
THIENE
VALDAGNO
CITTADELLA
CASTELFRANCO VENETO
TREVISO
ODERZO
PORTOGRUARO
VICENZA
CAMPOSAMPIERO
NOALE
VERONA
PADOVA
VENEZIA
MESTRE
STRA
DOLO
MIRA
SAN BONIFACIO
LONIGO
SAN GIOVANNI LUPATOTO
SOMMACAMPAGNA
VILLAFRANCA DI VERONA
PIOVE DI SACCO
CHIOGGIA
MONSELICE
CONSELVE
ESTE
MONTAGNANA
BOVOLONE
CEREA
LEGNAGO
CAVARZERE
ROVIGO
ADRIA
BADIA POLESINE
LENDINARA
PORTO VIRO
ROSOLINA
MANTOVA
FERRARA

Figure 3.20. The figure is one of the PTRC maps *(Tav. 07 Montagna del Veneto)* focused on the mountain area. In Cadore, a railway connection that crosses the Val Boite is represented (figure source: Regione Veneto, 2009a).

The PTRC contains the strategic project for the Dolomiti area called 'Progetto strategico Dolomiti e Montagna Veneta'. The strategic project insists on the development of a new economy related to the sectors of industry and tourism; the maintenance of indispensable services; and the preservation of the agro-silvo-pastoral cultural identity (Regione Veneto, 2009b). Such strategic project does not have specific energetic aims.
All the above-mentioned energy related points of the plan are translated into initiatives at a provincial level or in the **Piano Energetico Regionale** (chapter 3.1.3).

The provincial plan **Piano Territoriale di Coordinamento Provinciale** (PTCP) is the tool for spatial planning and programming of the provincial territory. It has to be coherent with the territorial vocation, the socio economic situation of the Province, and with the regional PTRC plans.
The Cadore area is involved in the PTCP of the Belluno Province. In relation to the possible low-carbon future of the Cadore area, the provincial plan proposes cooperative development among the many institutions and stakeholders operating in the territory. It would like to implement development that avoids a strong top-down imprint (Provincia Di Belluno 2010a, p.81). In the specific focus on the mountain environment, the provincial plan underlines the necessity to safeguard the natural landscape, linking it to the economic setting with a strong focus on agricultural products and agriculture as a touristic activity (Provincia Di Belluno, 2010b, p. 49).
In prefiguring a possible energetic future, the provincial plan aims to foster the local development of energy production that satisfies the local demand. To realize such energetic future the plan proposes the following interventions: implementation of RES projects in private entrepreneurships and public institutions; a correct use of local RES to safeguard the environment, focusing on the timber industry along with hydro resources and their environmental flow; spreading a culture of rational use of energy based on reduced energy consumption in families, schools, and public institutions; enhancing the environmental comfort of buildings; and implementing energy efficiency in buildings through the municipalities' building codes 'norme tecnice comunali'.
As far as the mobility topic, the plan aims to enhance the internal and external accessibility of the provincial territory (Provincia Di Belluno 2010b, p.75). It proposes the following interventions: the enhancement of the integration between

the various public transport systems; a valid solution to attain sustainable mobility in the marginalized area; the enhancement and requalification of the railway network. Particularly interesting for Cadore, the plan proposes the realization of a railway that connects Venice to Cortina through the Val del Boite (as the PTRC proposes) or through Auronzo di Cadore. The plan promotes an enhanced connection between Belluno and Austria also through an extension of the highway A27, which now ends in Longarone, that would reach the municipality of Ospitale di Cadore (see the map *Tav. C4 Sistema Insediativo e Infrastrutturale,* Figure 3.31) (Provincia Di Belluno, 2010c, p. 213). Nonetheless, the plan states that it is the duty of municipalities to identify the spots where to increase public transport and the intermodal road-railway nodes (Provincia Di Belluno, 2010a, Art. 51).
The plan encourages the development of additional cycling lanes and supports municipalities in defining an adequate intra-municipal connection through their planning instruments (Provincia Di Belluno, 2010a, Art. 55).
Where buildings are concerned, the provincial plan urges the municipalities to provide incentives for the enhancement of the energy efficiency of buildings, to control the application of the EU rules on new buildings, and to control and program energy projects that interact with more municipalities. The PTCP addresses de facto the municipal planning and their **Piano di Attuazione Terriotriale.**
To involve the many stakeholders (private and public) for the implementation and management of RES, the provincial plan asks for a **Piano Energetico Regionale** (PEP). The PEP should manage the following interventions: the dissemination of an efficient energy culture; the realization of RES plants with the objective to form a local cycle of energy production and consumption; and a sustainable harmonization of the local energy cycle with the landscape. The PEP has never been published in the Bellluno Province, yet the Province is working toward such interventions with other formal and informal instruments (see Figure 3.21)
The monitoring and environmental impact assessment of the plan is done through the indicators that mainly refer to: greenhouse emission, soil and land-use, RES production and consumption, and mobility data (Provincia Di Belluno, 2010a, Art. 67).

The action plan **Piano di Attuazione Territoriale** (PAT) is the municipal tool for the planning and development of the territory. The PAT fixes the objectives and the conditions for the intervention and the land transformation on a 10 year span.

The plan describes the municipality profile and regulates the following points: the area of geological, hydrological, environmental, historical, and architectonic value; the areas that need to be redeveloped; and the agricultural land and the territorial indicators for the construction of buildings.

Together with the PAT, the municipalities provide the **Piano degli Interventi** (PI), which is the instrument that reports the interventions for the implementation of the PAT (Regione Veneto, 2015a). The decisions that the municipal level can make in the field of RES implementation depend on the capacity of the energy plants and are described in the following paragraphs.

Energy Planning

To comprehend the transition of the Italian territories toward a low-carbon future, it is necessary to move from spatial planning 'Governo del Territorio', reviewed in the previous paragraphers, to the energy planning system.

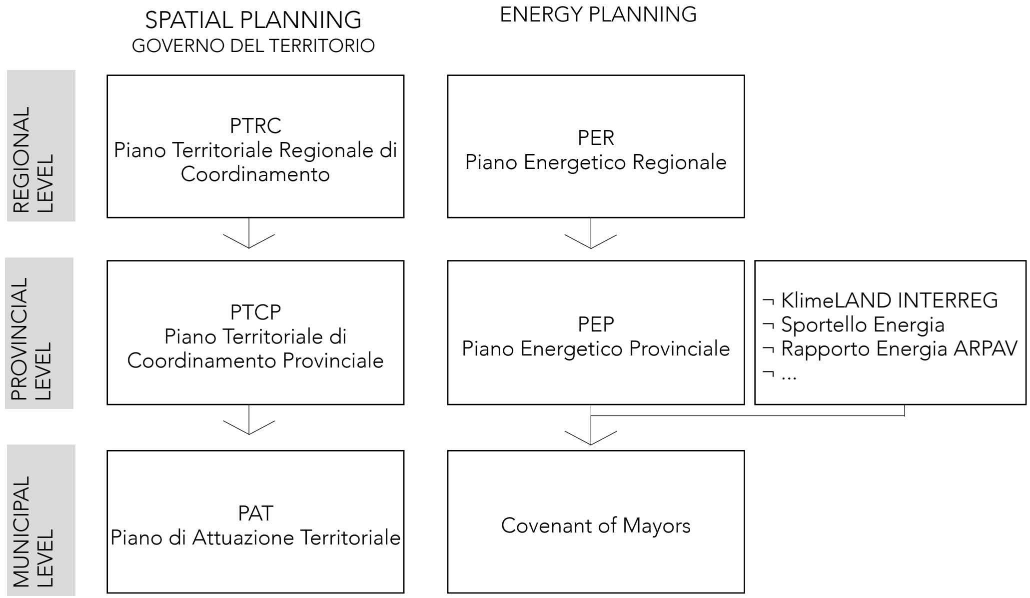
The main planning and programming in the energy field are done at national and regional level. At the national level, Italy adopted the National Energy Strategy (Ministero dello Sviluppo Economico, 2013). With this strategy, the Italian government embraced the EU 2020 package, or rather the set of binding legislations that ensure that the EU will reach its climate and energy targets by the year 2020. The package sets three key targets: a 20% cut in greenhouse gas emissions (from 1990 levels); a 20% of EU energy gained from renewables; and a 20% improvement in energy efficiency. The main objects of the Italian energy strategy, developed in consideration of the EU 2020 package, are: to enhance the provision of local energy and a secure provision of imported energy; to reduce greenhouse gas emissions; and to enhance competitiveness in the industry.

The regional 'burden-sharing' objective is fixed at the national level, defined as the percentage of energy provided by RES on the final gross consumption of the region.

The Veneto Region approved the **Piano Energetico Regionale** (PER) in October 2015, that delegates the provinces to write and adopt, on a voluntary basis, a PEP for the promotion of RES and energy efficiency, and to control the efficiency regulations for buildings.

After the publication of the regional plan, the Belluno Province started the process for the redaction of the PEP; this process is not yet complete due to the reorganization of the provincial body. Nonetheless, the Belluno Province stated its commitment in the energy field through: raising the local administrations'

Figure 3.21. The figure shows the level of the 'Governo del territorio' (spatial planning) and on the right, the level of energy planning (author's own design).



awareness on the Covenant of Mayors and participating in several INTERREG projects (financed by the Alpine Space Programme).

Veneto's Regional Energy Plan

The Veneto Region, in accordance with the state and local authorities, presented and approved the regional energy plan **Piano Energetico Regionale** (PER) in 2015. It contains the directions and cooperation guidelines for the planning and promotion of RES and energy efficiency in the region. The plan is subordinate to a strategic environmental assessment, and spans the time necessary to reach the established objectives and strategies (Regione Del Veneto 2015, p. 1). In its entirety, the regional plan stresses the sustainable use of natural resources, and environmental and landscape protection, which are important points for the pursuit of an energy future (Regione Veneto, 2015b, p. 4).

The plan contains the RES targets defined in accordance with the European objectives on the burden-sharing framework, and it presents the regional regulatory framework, the regional energy infrastructures, and the main funds at European, national, and regional scale. The plan also describes the analyses of the regional energy consumption, supply, and production, along with the energy balance. Thus, the plan presents a 'trend' scenario, and an 'energy efficiency and RES' scenario. Finally it defines the strategies for the plan's implementation and monitoring.

In order to reach the burden-sharing objective (see Table 3.4), the plan proposes 3 possible energy efficiency and RES scenarios: minimum, middle (the one desired by the region), and maximum.

$$\frac{\text{final gross consumptions supplied by RES}}{\text{total final gross consumption}} = 10{,}3\%$$

Table 3.4. The table reports the Veneto's 2020 burden-sharing objective.

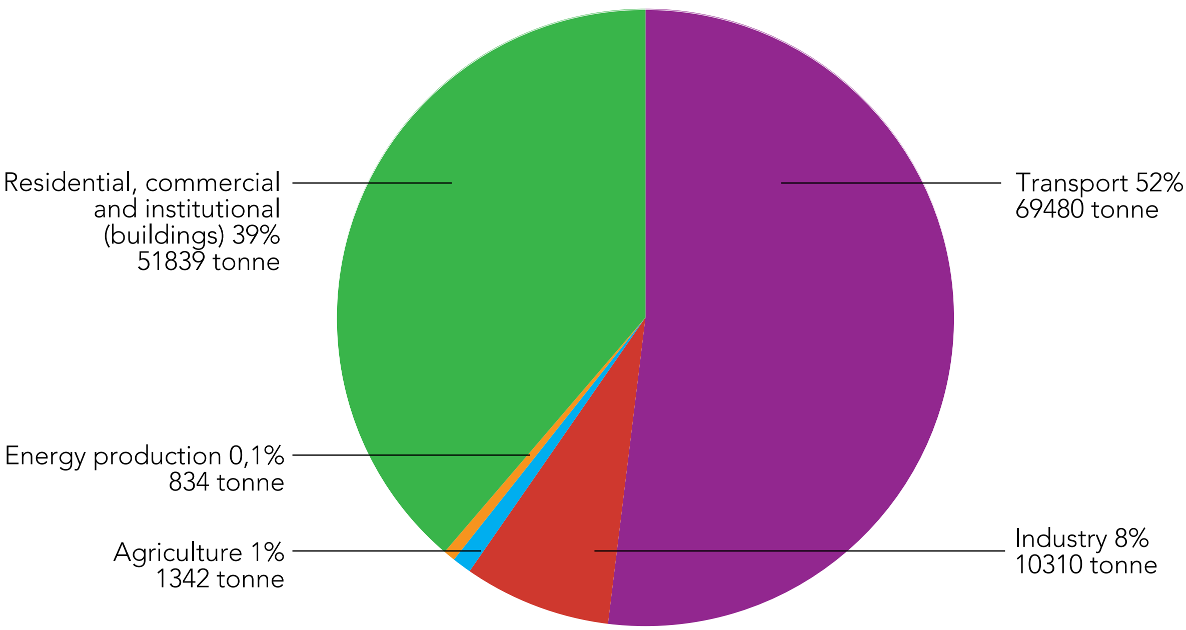
The strategy to reach the middle scenario proposes various areas of intervention, besides the actions already active within the regional territory. The more influential interventions for Cadore are: the promotion of sustainable mobility; the transition to sustainable systems of production; the energetic renovation of public and private buildings; the distribution of energy production and management throughout the territory; the management of European and regional funds; the promotion of the Covenant of Mayors; education and communication; and the relationship among stakeholders (Regione Veneto, 2015b, p. 203). All the areas of intervention are meant to be implemented through the distribution of **funds** at a regional, provincial, and municipal level, or through **educational** courses for professional practitioners from various sectors, and finally through new regional **laws**, and **agreements** with third parties.
To monitor the implementation of the burden-sharing objective the plan asks for a regional registry of the RES plants, and an archive of best practices replicable throughout the territory.
The authorization for new RES has been regulated through the energy capacity of such plants. The plants are under the municipalities' control if their capacity is: less than 1 MW for photovoltaic located above the building; less then 100 kW for Hydropower; less then 200 kW for biomass; and less than 250 kW for biogas (Regione Veneto, 2017). When the energy capacity of the plants is larger, the region and/or different institutions that safeguard the environment give the authorization for their implementation. When the RES plant is classified of 'public interest' the authorization is given directly by the Region.

3.1.4. Carbonized Cadore

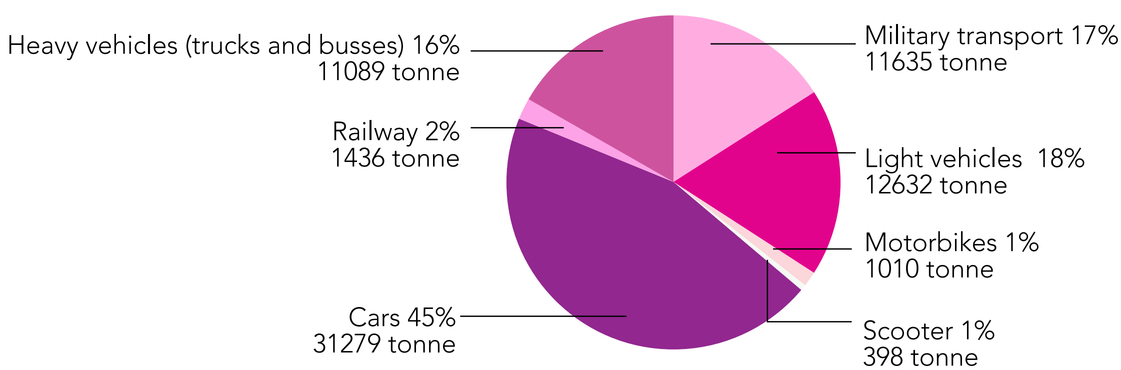
In this chapter, I report noteworthy information regarding the **energy setting** and the consequent **CO_2 emissions** of Cadore, information necessary for the understanding of the empirical research and research findings.
There are no specific data on the energy consumption and production of the Cadore area, an overview of the energy setting and the RES already there utilized is given by the provincial and regional data. The Veneto Region, as in all of Italy, strongly depends on the import of primary fossil fuel, the consequence, beside a high production of CO_2 emissions (see Figure 3.22; Figure 3.23, Figure 3.24), is the lack of a secure continuous supply and a high rebound cost on the civil and productive system. The **energy setting** in the Belluno Province, that does not differ from the Italian and Veneto situation, is well reported by ARPAV (ARPAV, 2012) and in Yuri Natalini's master thesis 'Analisi del Potenziale delle Risorse Rinnovabili in Provincia Di Belluno' from the University of Padova (Natalini, 2010).
In the Belluno Province the energy consumption is divided in the following manner (data from 2009): 34% oil products, 27% methane, 22% wood (in domestic application), and 17% electricity (ARPAV, 2012, p. 44). Despite this consumption, all the energy produced in the Belluno Province comes from RES, namely hydropower, biomass from wood, and a small production of geothermal. Throughout the provincial territory, the production from these sources is variable, due to the different geographical assets and the seasonal trends (ARPAV, 2012, p. 12). It is difficult to rank the RES contribution[ii] of Cadore due to the lack of a provincial register that comprehends private and public plants. It is possible to estimate that the main contribution of electricity generated from **hydropower** plants happens in the Soverzene Basin, which collects water from the artificial lakes of Cadore, anmely Lago di Vodo di Cadore, Lago di Valle di Cadore, Lago di Centro Cadore (Natalini, 2010). The energy generated from **geothermal** and **solar** energy, is still not particularly significant in the entire province and represents an important field for improvement. Locally, the **biomass** from wood is mainly used for the heating of private and public buildings. The production of **wind** power is absent due to low speed and inconstant wind.

[ii] More precise data of RES energy production and on the provincial register in the Veneto Region was published only in 23/02/2017 when the research and the visions where already in an advanced level of development (Regione Veneto, 2017).

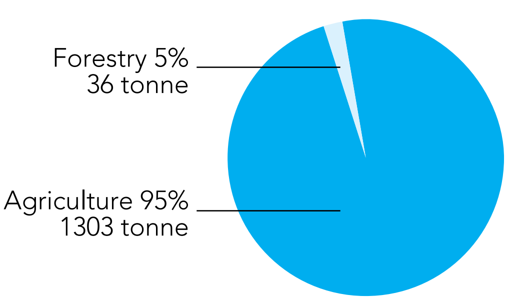
CO_2 EMISSIONS IN CADORE PER YEAR



TRANSPORT



AGRICULTURE



RESIDENTIAL, COMMERCIAL, AND INSTITUTIONAL (BUILDINGS)

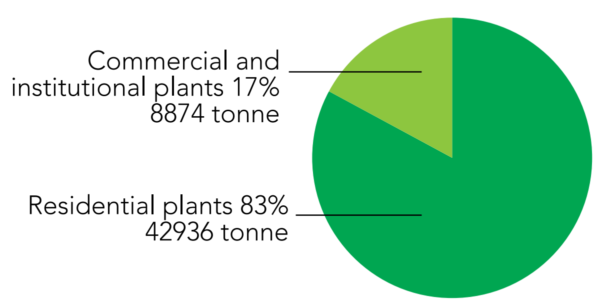


Figure 3.22. The figure shows the emissions in Cadore in the year 2010 and refers only to CO_2 (data source: ARPAV, 2015; author's own design).

The energy production and consumption data reported suggests that the majority of carbon emissions are due to the use of oil products. A more detailed estimate of the CO_2 emissions of Cadore have been elaborated from the inventory provided by ARPAV, on air pollution in the Belluno Province in the year 2010. I extracted from this inventory the data related to the 22 municipalities of Cadore.
When speaking about **carbon emissions**, this research refers to the definition given by the European Union, where CO_2 emissions are only **Carbon Dioxide Emissions** and not the greenhouse gasses.

> '*Carbon dioxide (CO_2) is a colourless, odourless and non-poisonous gas formed by combustion of carbon and in the respiration of living organisms and is considered a greenhouse gas. Emissions mean the release of greenhouse gases and/or their precursors into the atmosphere over a specified area and period of time. Carbon dioxide emissions or CO_2 emissions are emissions stemming from the burning of fossil fuels and the manufacture of cement; they include carbon dioxide produced during consumption of solid, liquid, and gas fuels as well as gas flaring.*' (EUROSTAT, 2014a).

The results of the Cadore data indicate that 52% of CO_2 emissions are released by the *transport* sector. 39% of CO_2 emissions come from *residential, commercial and institutional* (therefore mainly from heating those buildings), 8% is produced by *industry* (data that probably decreased due to the economic crisis), and 1% by *agriculture*. There is only one case of CO_2 emissions connected to energy production, and it is related to the thermal-central in Ospitale di Cadore (see details in Figure 3.22).
It is relevant to report that, inside the *transport* sector, 45% of the emissions are related to cars, the remaining are related mainly to heavy vehicles. As far as the *residential, commercial, and institutional* sector, household heating creates 83% of CO_2 emissions.

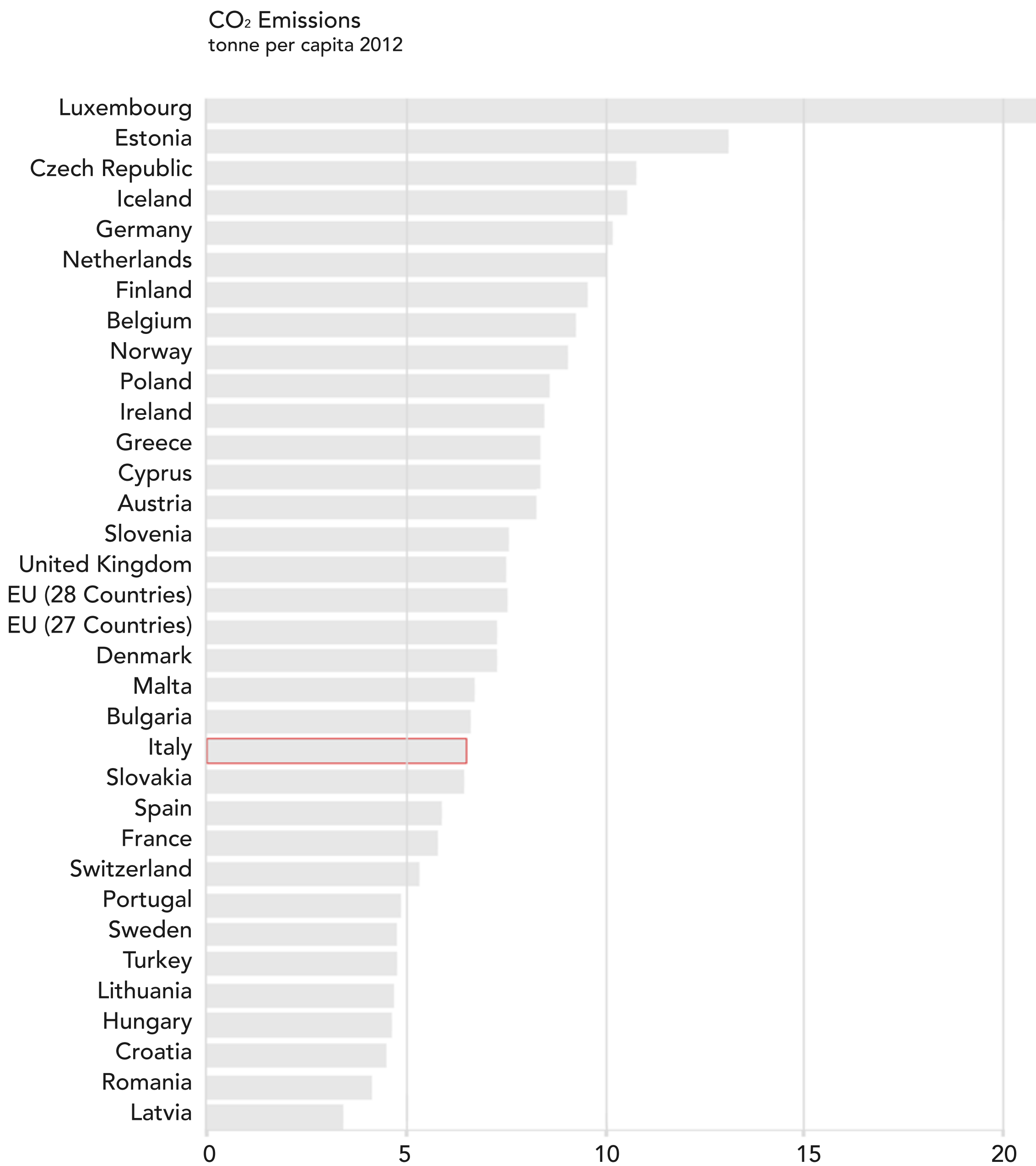


Figure 3.23. The figure shows the level of CO_2 emissions in tonne per inhabitant. This indicator is compiled using the data on CO_2 emissions (excluding the land-use change and forestry sector) provided in the official submission of the European Commission to the UNFCCC (data source: EUROSTAT, 2016).

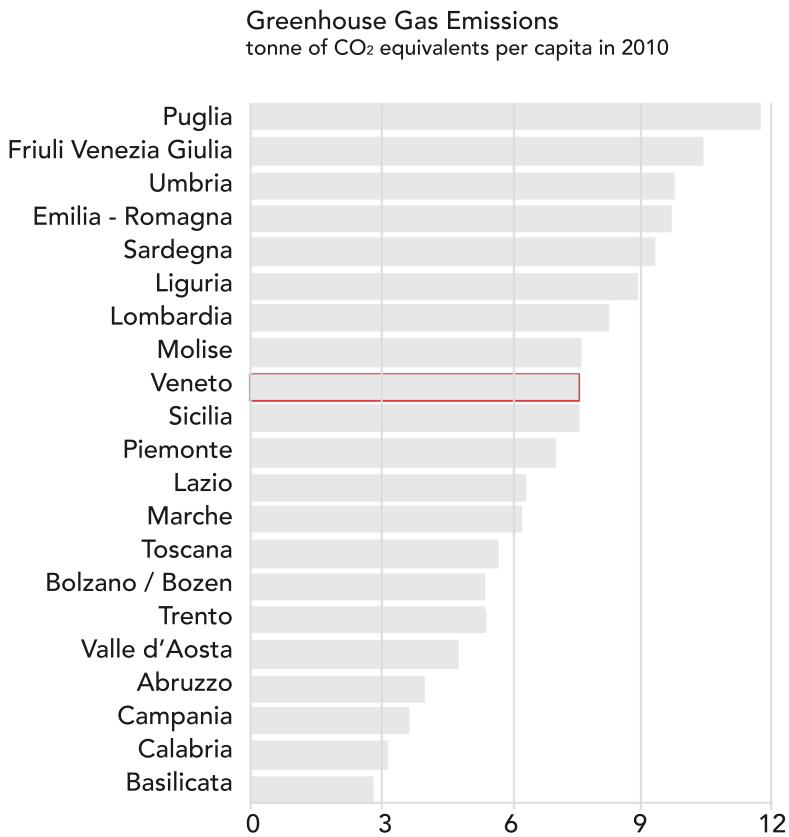


Figure 3.24. The graph shows the greenhouse gas emissions of the Italian regions per capita in the year 2012. Data for Italy and for specific regions include emissions and absorption of greenhouse gasses from the land-use and land-use change and forestry sectors. Emissions from maritime traffic, cruising, in-flight aircrafts, and oil and gas extraction facilities located in the sea are excluded from the calculation. To calculate the overall effect of greenhouse gas emissions, the amounts of each pollutant is converted into CO_2 equivalents (data source: ISTAT, 2014).

Figure 3.25. On the top, a view of the last train station on the railway connection between Belluno to Calalzo di Cadore, with a diesel locomotive (image source: Cortina Ski 2021, 2016). On the bottom, a view on the road SS 51 that connects Cortina d'Ampezzo to Belluno; San Vito di Cadore is on the right (author's own figure, 17th of Apr. 2014).

Figure 3.26. On the top, the forest that surrounds Padola in Comelico Superiore (author's own figure, 21st of Aug. 2015). On the bottom, a view of the Santa Caterina lake and its dam in Auronzo di Cadore (author own's figure, 1st of Jan. 2017).

3.2. Performing Visioneering in Cadore

The four acts of the Visioneering **mode** were used in Cadore as a procedural frame within which to conduct the planning **practice**, the empirical research.
Preforming Visioneering in Cadore led to a specific unfolding of the four acts – Grasping, Grounding, Spreading and Moving – that evolved as a narrative along the three years of empirical research, from April 2014 to October 2016. At the same time the parties involved in the process, and the required multidisciplinary contributions, evolved. The next chapter, 3.2.1, reports a summary of how the four acts unfolded along the timeline of the empirical research in the local context; chapter 3.2.2 presents the involved parties in each act; finally the chapters '3.3 Grasping and Spreading', '3.4 Grounding and Spreading', and '3.5 Moving and Spreading' describe in detail how the four acts where performed in the local context, and their findings.

3.2.1. The Unfolding of the Four Acts

The Visioneering and its acts, **Grasping**, **Grounding**, **Spreading** and **Moving**, were used in the empirical research during the three years of doctoral research, from April 2014 to October 2016 (showed in Figure 3.27), following three main stages of application.

1. During the Grasping act, I gathered the spatial knowledge and spatial insight about the local context, and, together with the involved parties, envisioned the long-term visions for its future. The participatory and consultative events of the Spreading act, involved in the Grasping act, namely the **Children's Workshop** and the **interviews** and **colloquiums,** were fundamental to gain knowledge and a wide-ranging view about the current condition of the region. They complete the knowledge acquired through **Checking the Documents** and **trips** to the region.
2. The Grounding act started approximately in the spring of 2015. In this act, the visions were defined, the paths toward the visions were discovered with a back-casting approach. The participatory and consultative events of the Spreading act, along with the Grounding act, concerned the involvement of different stakeholders and experts in the planning process into two **Stakeholder Workshops**, a **study tour**, and additional experts' interviews**.** These events

strengthened the envisioning process, assisted the design of the paths, and were fundamental to gain new multidisciplinary knowledge for the engineering process. Due to narrative constrains, these interviews are reported together with the interviews and colloquium done in the Grasping act.

3. Finally the Moving act, started approximately during the summer of 2016, when the visions were well defined and the stakeholders drew the paths toward them. This act is the one in which the actions take form, moving the local context along the paths toward the visions ►. The participatory event of the Spreading act, along the Moving act, was the **telephone interviews**. Due to the time constraints of the empirical research that ended in October 2016, it was not possible to work further with the stakeholders, or other agents, in taking actions.

► For the definition of each act see chapter 2.3.

Substantially, the Spreading act was applied from the beginning of the planning process in order to be present in the entirety of the Visioneering implementation ►. This is a focal point in the understanding of the empirical research and its unfolding. From the beginning of the doctoral research, it was clear that Visioneering requires the participation of stakeholders in order to give comprehensive points of view of the regional complexity, to design plausible visions and paths, and to bring accurate multidisciplinary knowledge to the arena. Second, the Grasping act continues throughout the Grounding act, because the exchange of knowledge necessary for the design of the paths toward the visions continues even in this act. This overlap was facilitated by participatory and consultative events of the Spreading act.

► The improvements of the Visioneering mode in respect to its first application attempts are reported in chapter 2.3.5.

The Figure 3.27 in the following page shows the link between the different participatory and consultative events, and the Visioneering acts. The application of the Visioneering mode constitutes a unique **linear narrative** reported in the following chapters.

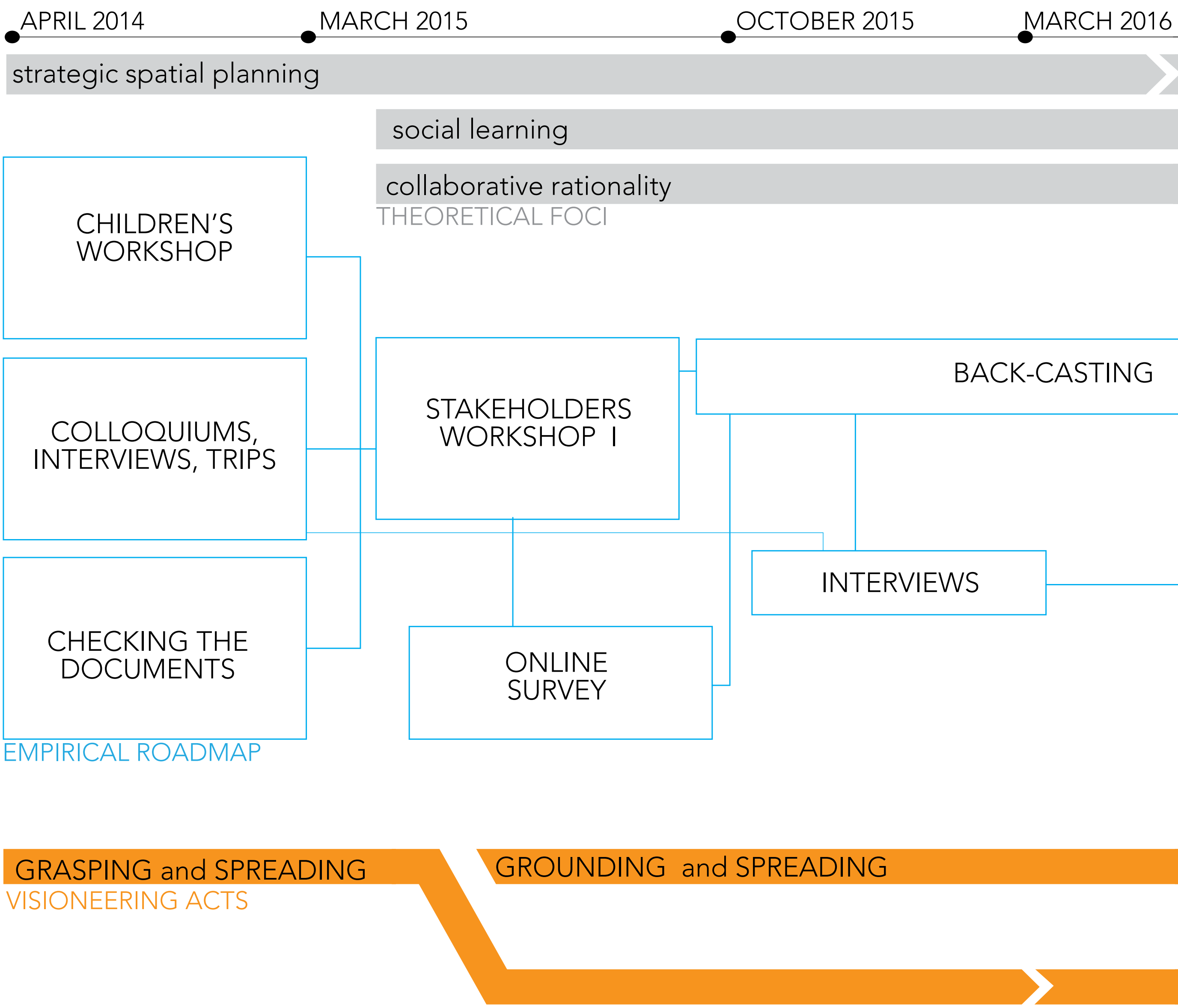
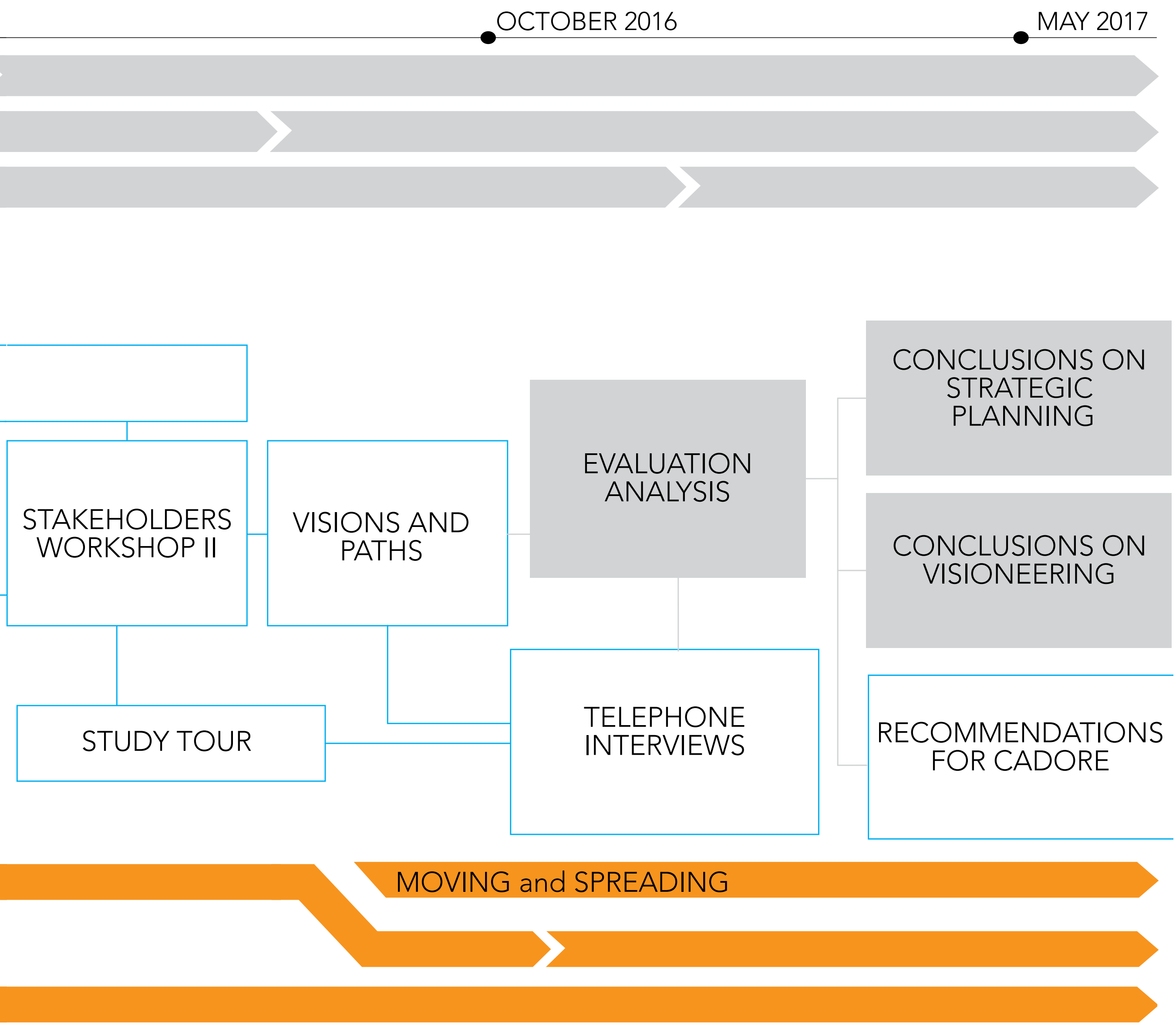


Figure 3.27. Graph of the application of Visioneering during the time of the doctoral research. The four acts are in orange; the empirical, participatory, and consultative events in light blue; and the theoretical foci in gray (author's own design).


OCTOBER 2016
MAY 2017
CONCLUSIONS ON STRATEGIC PLANNING
EVALUATION ANALYSIS
STAKEHOLDERS WORKSHOP II
VISIONS AND PATHS
CONCLUSIONS ON VISIONEERING
TELEPHONE INTERVIEWS
RECOMMENDATIONS FOR CADORE
STUDY TOUR
MOVING and SPREADING

3.2.2. The Involved Parties

From the beginning of the Visioneering mode application, the participants that contributed to the empirical research through many participatory and consultative events involved the three parties shown in Figure 3.28. They are: **civil society** with citizens, children, and experts on different fields; members of the **political** and **administrative sphere**, with local-decision makers; and members of the **economic sphere**, with local citizens that actively participated in the local economy. Along the research path, nonetheless, a predominant emphasis was given to the participation of local political and administrative representatives, or rather **decision-makers**. This choice happened because, to fulfil the research question, it was convenient to focus the attention on a target group that already had a framework within which to meet, without forcing the doctoral research to shape a stakeholders platform. Shaping a stakeholders platform is a practice expected in a planning process but not relevant to the research question of this doctoral project. In addition, the focus on the decision-makers was influenced by the necessity to involve parties that already had knowledge about the concept in the planning process for the low-carbon future. Thus keeping the arena anchored to the matter of concern, and enabling stronger findings for the research question. This assumptions resulted from the first Grasping explorations in the local context, which led to the acknowledgment that greater energy awareness could be increased at the municipal level. De facto many decisions regarding the implementation of actions concerned with the low-carbon future are made at that level. On a higher level the Province is already working with different instruments in order to foster actions, but it has a weaker role ►.

►The role of the municipalities, the Veneto Region and Belluno Province in the implementation of the low-carbon future in Cadore are widely described in chapter 3.1.3.

Following these three conditions, partially forced by the resource constraints of the doctoral research, the **Magnifica Comunità di Cadore** (MCC) emerged as the optimal platform within which to implement the Visioneering mode. The parties of the MCC that participated in the empirical research were: its representatives such as the President and councilmen; its 22 municipalities represented by mayors and municipal councilman designate at this level; its local partner Gruppo di Azione Locale (GAL) ►.

► The MCC is a public institution composed of 22 municipalities of Cadore. It promotes the economic growth and the development of cultural value of local communities by identifying and supporting the common

The main target group involved in Visioneering were the **decision-makers** of Cadore, belonging to the MCC. They have prior knowledge of the low-carbon topic, and the skills to plan or look ahead thanks to their political or administrative positions. The MCC is already a platform within which to meet and whose cultural unifying characteristics. For a wider explanation on MCC and GAL see chapter 3.1.2.

identity is recognized. Lastly, they are decision-makers used to being responsible for making decisions in an evolving environment that embraces social learning, as in to the planning arena.

To adjust the envisioning process, the research also included other parties, despite the evidence that the decision-makers in the framework of the MCC where the group most likely to increase energy awareness. The envisioning process effectively began in the Grasping act with the involvement of **children**, representing the civil society (explained in chapter 3.3.2). The same group was represented in the research by the **citizens** that participated in an online survey during the Grasping and Grounding acts. Then, **experts** of the energy topic and alpine area, a provincial representative, and some decision-makers were consulted during the same acts with interviews and colloquiums. The consultation of all these stakeholders served to enrich the knowledge in the planning arena, and consequently facilitated the Grounding act. All the parties involved in the Visioneering mode of planning for Cadore are shown in Table 3.5, together with the related participatory and consultative events.

► The term local context refers to the specific location where planning is practiced, with its characteristics, and its tangible and intangible boundaries. The concept is described in chapter 2.4.

A core challenge of 'Action Research', and in involving many parties in the local context, regards the physical and then intangible boundaries of the context itself ►. The MCC with its 22 municipalities is the local context – and the stakeholders' platform – used for the application of the mode of planning. Nonetheless, indirect influences of the planning process were expected in the interrelated governance levels, namely at the regional or provincial level, and also from citizens. The administrative boundaries of the local context within which the research happened are given by the MCC, therefore its 22 municipalities and the specific decision-making target group, but it has fuzzy boundaries in its indirect influences.

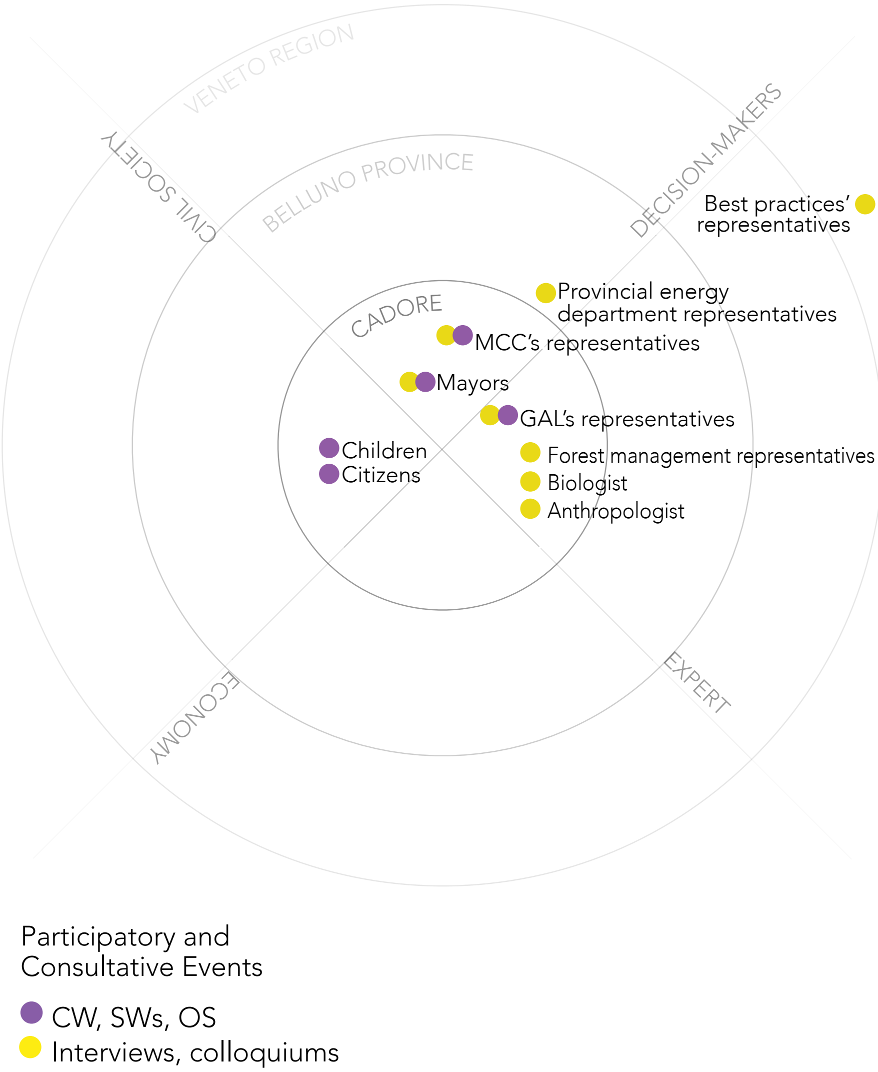


Figure 3.28. The graph shows the parties involved in the Visioneering mode application in Cadore (author's own design).

Timetable	Participatory Events	Target Group Involved
April-October 2014	Stakeholders and Experts Interviews and Colloquiums	Citizens – living in Cadore Experts – living or not living in Cadore Local decision-makers
August 2014	Children's Workshop	Citizens - children
July 2015	Stakeholders Workshop I	Local decision-makers
November 2015	Online Survey	Citizens – living or not living in Cadore
May 2016	Stakeholders Workshop II	Local decision-makers
	Study Tour of the Stakeholders Workshop II	Local decision-makers Citizens – living in Cadore
September 2016	Telephone interviews	Local decision-makers

Table 3.5. The table reports the participatory and consultative events, and the parties involved in the Visioneering mode of planning in Cadore. The right column highlights the major focus on the target group of local decision-makers.

3.3 Grasping and Spreading

► The Grasping act as interpreted in this doctoral research is widely explained in chapter 2.3.1.

► The design aspects are the themes on which data and information were collected in order to start the envisioning process. They are widely described in chapter 2.5.2.

The application of the Visioneering mode of planning started in the summer semester of 2014, with the Grasping and Spreading acts. The aim of the **Grasping** act was to understand the region gathering knowledge and spatial insights of the territory ►. The act did not require digging into the statistical analysis or data, but to have a comprehensive picture of how the region performs on the energy field, how locals perceive it, and how it could be in the future. It sees therefore the involvement of different parties, activating the Spreading act.
With the Grasping act, I inquired about two design aspects: **Regional Grasp** and **Visions' Content** ►. The Regional Grasp aspect answered the question *what is going on in the region?* While the Visions' Contents aspect answered the question *how will the low-carbon future be?* The data of the Regional Grasp aspect corresponds to information on the active spatial planning and energy planning instruments, a picture about the role and interrelation of the governance levels, a region's concerns overview, and a spatial variable outline about the physical environment and its natural resources. The data related to the Visions' Content aspect referred to a collection of ideas, desires, and insights for the future of the region.
To obtain data regarding both of the design aspects, the Grasping and Spreading acts advanced through: semi-structured **interviews** with experts and best practices in the field of energy in alpine area described in chapter 3.3.1; **colloquiums** with local representatives and members of the administrations described in chapter 3.3.1; a workshop with **children** that live in the region described in chapter 3.3.2; and the analysis of a series of **documents** concerned with the future of the Alps and Cadore described in chapter 3.3.3. The obtained data about the two design aspects resulted in a cluster of concerns affecting the region, and possible ideas for low-carbon futures, represented in a **network graph**. Such graph assisted the visualization of the interactions between the cluster's concerns and ideas, and was the framework within which possible futures could be envisioned. The network graph is described in chapter 3.3.4. Then the Grasping act conduced to the first visions, described in chapter 3.3.4.

3.3.1. Interviews, Colloquiums, and Trips

The process of **learning** the region, and **envisioning** the future, involved various field **trips** in which I conducted a series of **semi-structured interviews** and **colloquiums** with local stakeholders and experts. The purpose was to identify emergent themes through relatively spontaneous conversations. The colloquium method has predominated in some circumstances, instead of the semi-structured interview method, as it permitted an informal and spontaneous dialogue with the interlocutors ►. Furthermore this type of setting facilitates the gathering of local knowledge, an important element for the envisioning and engineering processes.
The **interviews** and **colloquiums** were guided by a set of predetermined questions that touched both the Regional Grasp and Visions' Content design aspects in a comprehensive way. Treated topics were for instance the population trend or the local economy, and were always explored through the lens of the energy theme (e.g., energy habits, consumption and production of energy, already implemented RES, management of natural resources, active planning instruments, and mobility patterns). Few of those interviews took place in a more advanced state of the empirical research, nonetheless these events are here reported because they constitute a *moment* of the Grasping act, that contributed to the professional knowledge. Such continuous involvement of various forms of knowledge from many parties was indispensable to guarantee the multidisciplinary aspect of the vision ►.
The **trips** permitted to directly perceive the concerns mentioned by the interviewees, to explore the territory through its physical characteristics from the buildings to the RES plants or natural resources, and to see and experience the mobility system. Photos and notes – qualitative data – were collected during the trips.

► See chapter 2.3.1 for detailed information on the research methods used in during this Visioneering act.

► See chapter 2.2.2 for a clarification on the comprehensive picture that the vision instrument tries to communicate.

Methods	Data Type	Amount of Data
Colloquiums	Written notes	Six colloquiums with local representatives: mayors, municipal councilmen, a GAL representative, a provincial representative.
Semi-structured interviews	Written notes Recorded audio	Four interviewees with experts and best practice representatives on the energy field and on the Alpine area: anthropology, forest management, energy regional management.
Trips	Photos Written notes	Pictures of the region Travel notes

Table 3.6. The table shows the research methods and type of qualitative data of the events involved in Grasping of the Spreading act: interviews, colloquiums, and trips.

Findings from Interviews, Colloquiums, and Trips

The findings from interviews, colloquiums, and trips of the Spreading act involved in Grasping are collected in the two design aspects of Regional Grasp and Visions' Content. The findings related to the Regional Grasp design aspect answers the question *what is going on in the region?* The findings regarding the Visions' Content design aspect concern the envisioning process and answer the questions *how will the low-carbon future be?*

Regional Grasp Design Aspect

During the interviews and colloquiums the representatives and experts revealed the main **concerns** affecting Cadore. These concerns refer to the depopulation trend, a lack of economical resources in the administrative bodies, a high rate of unemployment, a perceived increase in environmental risks due to climate change, and a changed climate seasonal pattern that endangers the local economy based on tourism.

The interviewees and interlocutors persistently mentioned two additional concerns that later became important variables in the Visions' Content: the **borders' effects,** and the **transport connections**. The first refers to the **geographical position** of Cadore: the region borders, inside the Italian context, with the Friuli Venezia Giulia Region and Trentino-Alto Adige/Südtirol Region, and then with Austria (see Figure 3.31). The two neighbouring Italian Regions are recognized by the

Italian State as autonomous, Trentino-Alto Adige/Südtirol further constitutes a special case because the powers granted by its region's statute are mostly exercised by its two autonomous provinces – Trento and Bolzano/Bolzen. Italian autonomous Regions are in charge of governing their respective territories and are solely bound by the Constitution (Haselsberger 2010; Art. 116 Senato della Repubblica). These bodies have always been subject to a different fiscal regime that often resulted in migration from the ordinary regions, such as Veneto, to the autonomous one ►. The neighbouring Austrian region is the Osttirol Bundesland with its urbanized centre of Lienz. The interlocutors mentioned the Drau's valley, which connects Lienz to San Candido/Innichen, as the most innovative and developed area surrounding Cadore, with its train connection and contemporary architecture.

► See the case of the referendum in Sappada and Cortina d'Ampezzo reported in chapter 3.1.2.

The second concern that the interlocutors persistently mentioned is the lack of **public transport** connection with the nearest urbanized areas and hotspots such as Treviso, Venice, the Venice airport, the provincial capital Belluno, and Trentino-Alto Adige/Südtirol Region, and within the 22 municipalities. This condition creates a strong dependence on cars, a migration phenomenon to the nearest urbanized towns, and a marginalization of the remote hamlets. One of the interviewees underlined that the transportation on roads, that now dominates the area, is discriminatory toward the oldest and youngest, also compromising the kind of tourism that is independent from private transport.

With the interviews and colloquiums, I also gathered information about the formal **planning system** that might affect the low-carbon future of the region: the provincial energy plan PEP (which was never written), the regional territorial plan PTRC, and the provincial territorial plan PTCP ►. Together with the formal instruments the interlocutors also mentioned **other projects** active in the region that influence the transition toward a low-carbon future: few INTERREG projects both in the field of energy and culture; the LEADER programme, active in the area thanks to Gruppo di Azione Locale Alto Bellunese (GAL); the Covenant of Mayor adopted by few municipalities; and various small private or public RES projects. Finally the provincial representative mentioned the thesis by Yuri Natalini (2010) 'Analisi del Potenziale delle Risors Rinnovabili in Provincia di Belluno' as a plausible sketch for the energy future plan of the Belluno Province's mountain territory.

► Such planning instruments are widely explained in chapter 3.1.3, while explaining the planning system that may affect the low-carbon future of Cadore.
This chapter reports projects and activities that the Province is doing in the field of energy that have been mentioned by the interlocutors.

Visions' Content Design Aspect

The participants of the **interviews** and **colloquiums** recurrently mentioned three main ideas for the future of the region. The first is related to the perceived necessity to **educate** all the citizens and decision-makers on the energy topic, thus the idea of Cadore as an education hub on energy and environmental protection. The second idea is a **railway** connection both to the north and to the south, as a solution to the scarce connection between the nearest surrounding territories. The third idea refers to investments in the future of the region in the **primary economic sector** based on agriculture, farming, and the related food products, also thanks to the available European funds.

The interviewees and interlocutors mentioned furthermore that the citizens might play an important role in the next decades, in going toward a low-carbon future. They are the **social capital** that can actively address the energy transition in *every backyard*. In that respect a local decision-maker stated that the local context does have the *resources,* but it has to be *willing* to responsibly invest in them.

Figure 3.29. On the top, the figure shows one of the succesful projects for the promotion tourism carried out with the support of GAL under the umbrella of the LEADER Programme (figure source: Cadore Regno delle Ciaspe, 2013). On the bottom, a photo from an organized event for climbing on the diga of the Centro Cadore lake in Pieve di Cadore (figure source: nuovocadore.it, 2016).

Figure 3.30. On the top, a picture from a protest that took place on May 2013 against financial cuts carried out by the Veneto Region to the mountain area (figure source: nuovocadore.it, 2013). The figure on the bottom shows the Ponte Cadore, on the river Piave, that connects Pieve di Cadore to Perarolo di Cadore and Belluno. The bridge was constructed in the year 1980-1985 (figure source: Matildi+Partner, n.d.).

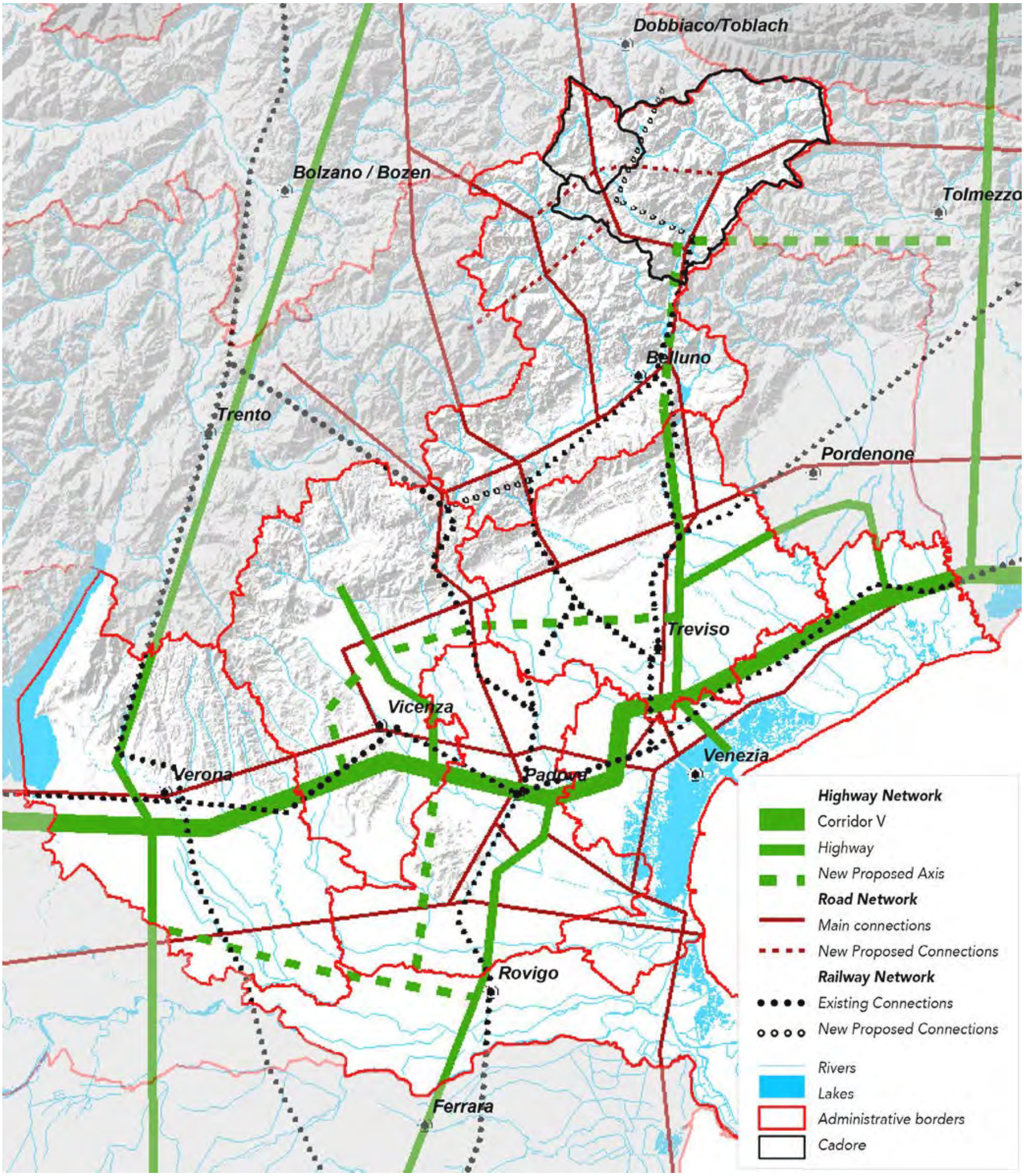


Figure 3.31. The map shows the infrastructure network in the Veneto Region reported in the PTCP - *Tav. C4 Sistema Insediativo e Infrastrutturale* (figure source: Provincia Di Belluno, 2010c).

3.3.2 Children's Workshop

To explore ideas, different from the experts and decision maker´s ones, about futures and about *how* the region is perceived, the research involved a **Children's Workshop** (CW). The main focus of this participatory event was to produce creative pictures of futures through different eyes than those of adults. After the first round of interviews and colloquiums I set up the workshop with a local NGO that organizes summer camps for children living in the region. In the workshop, the children designed pictures of the low-carbon futures with three different methods, in three days. The methods were:

1. drawing pictures about a **story** related to a high efficiency community;
2. exploring the daily mobility patterns by **drawing** maps;
3. **collaging** the RES in the local landscape.

The **participants** were 22 children, and they were from 6 to 11 years old (primary school). The **first day** they listened to a story in which they actively participated, and then they drew pictures about it. The story narrated the adventures of two siblings that live in a hypothetically low-carbon future of Cadore. Connotations of this future were the presence of a train connection in the area, the use of electrical bikes, more dense urbanized centers, rural surrounding with animals, and RES around the villages such as solar farms and wind turbines. The final activity of the first day of the workshop was the description of the drawings.
The s**econd day**, the children drew a map of a short excursion they did on foot. This method aimed to explore their capacity to perceive distances and the energy 'elements' in the environment. The final activity of the second day was again the description of their maps. The **third day** the children made collages with pictures of the landscape and stickers of RES. The final activity of the second day was again the description of their collages.
The **qualitative data** has been collected through the drawings and the collages made, and with written notes of their comments.

Findings from the Children's Workshop

The findings from the CW are collected in the two design aspects: Regional Grasp and Visions' Content. The findings related to the Regional Grasp aspect refer to the local context and answer the question *what is going on in the region?* The findings regarding the Visions' Content aspect concern the envisioning process and answer the question *how will the low-carbon future be?*

Methods	Data Type	Amount of Data
Storytelling and drawing	Drawing Written notes	22 drawings
Map Making	Drawing Written notes	22 drawings
Collage	Collages Written notes	22 collages

Table 3.7. Overview of the collection of qualitative data during the Children's Workshop.

Figure 3.32. The photo was taken during the first day of the CW (author's own figure, 4th of Aug. 2014).

Regional Grasp Design Aspect

In the first day the children showed a **decent awareness** about what energy is, they particularly grasped the concept when in the storytelling the energy supply of oil for the cars was compared to the food for the human body. They easily understood the story in which the RES, the train connection and the eclectic bikes were mentioned, and had the capability to translate them in pictures. Then they acknowledge their care for the future mentioning the several projects in the field of waste management and recycling they are doing at school.

Map making was the most **challenging method** for the children due to their young age: they had no idea about how to draw a map or an itinerary and they had difficulty in remembering the landmarks that could or could not be associated to the energy topic (see Figure 3.33; Figure 3.34).

In the third day the children **recognized** the majority of the landscape pictures used for the collage, showing that they were highly aware of the appearance of the local environment within which they live. They also recognized the function of the RES represented in the stickers such as solar panels, wind turbines, and eclectic mobility arrangements, excluding the hydropower plants and their functions (see Figure 3.35; Figure 3.34). This is ironic given that the majority of RES supply in Cadore is provided by hydropower plants.

Visions' Content Design Aspect

In the first day, the children drew the story representing the peculiarity of the low-carbon future as a place with fewer cars, a train connection, and more urbanized centers. They tried to draw different parts of the story, always adding some personal interpretations, e.g., zombie invasions, and climate variables such as snow, rain, or sun (Figure 3.33). The majority were impressed by the **train connection** and the possibility to bring a bike onto a train – modal shift. This is in fact the element of the story they drew the most, probably due to the fact that some of them have never traveled by train.

The most outstanding result of the CW was in the collage making, thus the **impacts of the RES on the landscape** proposed by the picture used as a base for the collage (see Figure 3.35; Figure 3.36). In the collage the children proposed a possible urbanization with cable-car to connect different parts of the built environments, skyscrapers where there are clusters of buildings and an incinerator near the bell tower. On the pictures used as a base, they preserved the green spaces for people, animals, and vegetables.

Figure 3.33. The children's drawings of the first day. On the top, the electric-cabins that are present in the villages, with the ENEL sign (the national company that manages electricity). In this picture the child wanted to show her knowledge of the energy field. On the bottom, the picture of a train occupied by a zombie invasion goes through the valley (figures realized by the children during the CW, 4th of Aug. 2014).

Figure 3.34. Two maps of the children after a short excursion on foot. The main landmark they remembered was the river Boite and a forest they walked through (figures realized by the children during the workshop, 5th of Aug. 2014).

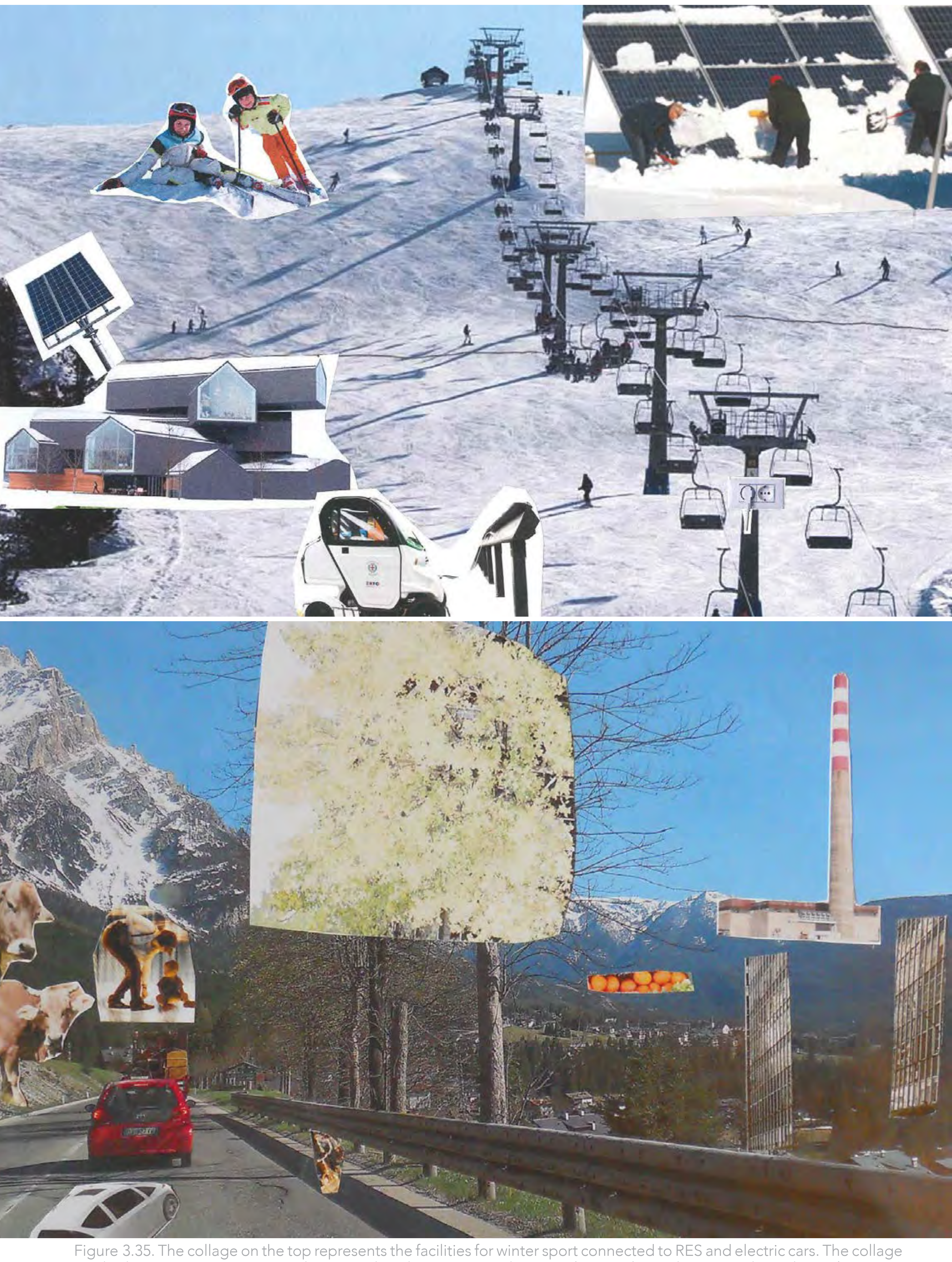


Figure 3.35. The collage on the top represents the facilities for winter sport connected to RES and electric cars. The collage on the bottom represents a road occupied at the same time by animals, people, and cars; on the right, a skyscraper completes the already urbanized area (figures realized by the children during the CW, 12th of Aug. 2014).

Figure 3.36. The children's collages represent different ways to live the village. On the top, a cable-car connects the two opposite sides of a village, while a wind turbine stands on the street side. In the second collage the humans and animals occupy the green spaces of the village, while a wind-turbine stands together with the bell tower (figures realized by the children during the CW, 12th of Aug. 2014).

3.3.3. Checking the Documents

Checking the Documents was the last Grasping activity before the development of the flash visions. This activity was fundamental to contextualize the low-carbon challenge in a global, European, national and regional scale, to have an overview of the active frameworks that address the topic, and to learn from best practices in the field. The analysis of these documents strengthened the **Regional Grasp** and **Visions' Content** design aspect, and further nurtured the envisioning process for the Cadore region started with the interviews, colloquiums, and CW. Due to resource constraints the doctoral research focused the envisioning process through these events, a broader and more intense involvement of representatives and inhabitants of Cadore would have led to a more shared envisioning process. The examined documents are dealing with the future of the Alps and are strictly related to the topics of **energy** or **climate change**. The term climate change refers both to 'climate adaptation', as the capacity to adapt the environment and society to the new climate pattern, and 'climate mitigation' as the measure to reduce the anthropogenic carbon emissions.

The Checking the Documents was done through a qualitative content analysis method, with the purpose of underlining the **direct meanings** of *things* revealed in the text by words or sentences (Bryman, 2012; Graneheim & Lundam, 2004). The method was therefore focused on the manifested content of the text, on the visible meanings. The code used for the content analysis was based on the Regional Grasp and Visions' Content design aspects, it considered four categories on which the documents conveyed their messages: **energy, society, environment,** and **economics**. The data related to the Regional Grasp answer to the question *what is going on in the region?* This data refers for example to the RES implemented, to active instruments of planning, to climate change impacts, and to an overview of the population and migration phenomenon. The data concerning the Visions' Content refers to the question *how will the future be?* They refer for example to the energy network, to environmental safety, and to an economy based on local resources.

The eight reviewed documents are in the following pages reported with a summary on the relevance for the Regional Grasp and Visions' Content design aspects on four topics: energy, society, environment, and economics.

Methods	Data Type	Amount of Data
Content analysis	Written notes	8 documents

Table 3.8. Qualitative data analyzed in the Checking the Documents phase.

Energy Roadmap 2050

European Commission, (2012). *Energy roadmap 2050.* European Commission. Luxembourg: Publications Office of the European Union.

Year of projection: 2050
Topic: Energy, the 'low-carbon' concept is directly addressed.
Mentioned low-carbon fields: low-carbon economy; low-carbon resources, low-carbon investments; low-carbon energy generation; low-carbon technologies; low-carbon investors.

The scenarios presented in the 'Energy Roadmap 2050' examine the impacts, challenges, and opportunities of the transition to a low-carbon energy system for all of Europe (Figure 3.37). They are not either-or options, but focus on the common elements, which are emerging and support longer-term approaches to investments. In combination, the scenarios make it possible to extract some conclusions and data, which can help shape the decarbonisation strategies in order to deliver their effects by 2050. The document stresses the need for a high percentage of renewable energy, the change of direction of industries toward a greener approach, a new modus of transportation, and the electrification of the energy system. The scenarios evaluate also the energy demand and consumption providing a benchmark of energy data.
Projected data on the energy consumption pro capita have been extracted from this document for the development of the visions for Cadore.

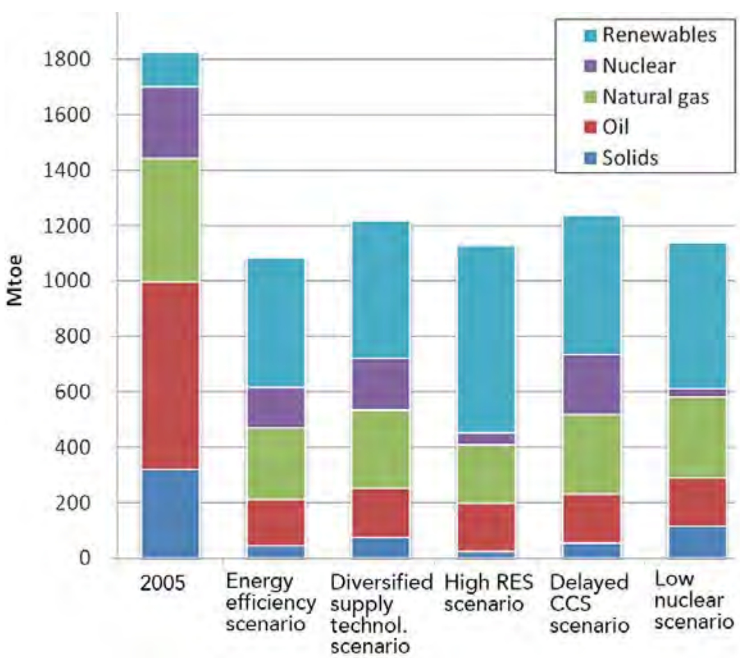


Figure 3.37. The figure on the left shows the total energy consumption as well as its composition in terms of fuels in 2050 for the various scenarios presented in the Energy Roadmap 2050 (figure source: EC, 2012, p. 118).

Figure 3.38. The figure on the right shows a possible energy future for the European territories (figure source: ECF, 2010b, p. 122).

Roadmap 2050. A Practical Guide to a Prosperous Low-Carbon Europe, Technical & Economic Analysis.

European Climate Foundation, (2010). *Roadmap 2050 - A practical Guide To A Prosperous Low-Carbon Europe, Technical & Economic Analysis.* London: European Climate Foundation; McKinsey & Company; KEMA; The Energy Futures Lab at Imperial College London; Oxford Economics.

Year of projection: 2050
Topic: Energy, the low-carbon topic is directly address.
Mentioned low-carbon fields: low-carbon energy system; low-carbon economy; low-carbon technologies; low-carbon investments.

The mission of the Roadmap 2050 project is to provide a practical, independent, and objective analysis of pathways to achieve a low-carbon economy in Europe, in line with the energy security, environmental, and economic goals of the European Union.
'Roadmap 2050' breaks new ground by outlining plausible ways to achieve an 80% reduction target from a broad European perspective, based on the best available facts elicited from industry players and academia, and developed by a team of recognized experts rigorously applying established industry standards. 'Roadmap 2050' clarifies two primary points: the technical and economic feasibility of achieving at least an 80% reduction in GHG emissions below 1990 levels by 2050, and maintaining or improving today's levels of electricity supply, energy security, economic growth, and prosperity.
'Roadmap 2050' is an initiative of the European Climate Foundation (ECF) and has been developed by a consortium of experts. In addition to the Practical Guide, the project also proposed a series of captive maps on the energy future of Europe, among which Figure 3.38 that underlines the importance of the Alps in the hydropower supply.

Integral Natural Hazard Risk Management: Recommendations

PLANALP, (2008). *Integral Natural Hazard Risk Management: Recommendations.* Bern: Natural Hazards Platform of the Alpine Convention.

Year of projection: —
Topic: Climate Adaptation
Mentioned Low-carbon fields: low-carbon is not directly mentioned

The members of PLANALP (Natural Hazards Platform) have defined four priority action areas for prevention work against natural hazards caused by climate change in the alpine environment (Figure 3.39). These areas of actions represent the key elements for the work on the future of the alpine region: (1) measures to reduce danger of climate change and natural hazards; (2) risk dialogue as a basis for preventive work; (3) how to control residual risk; (4) spatial planning as a key element in protecting against natural hazards.
In this document the role of spatial planning for the low-carbon future is mainly related to the natural hazard that climate change provokes now and in the future. The document provided an insight on the environmental impacts of climate change that clearly aggravates the safety of the alpine communities and the landscape in which they live.

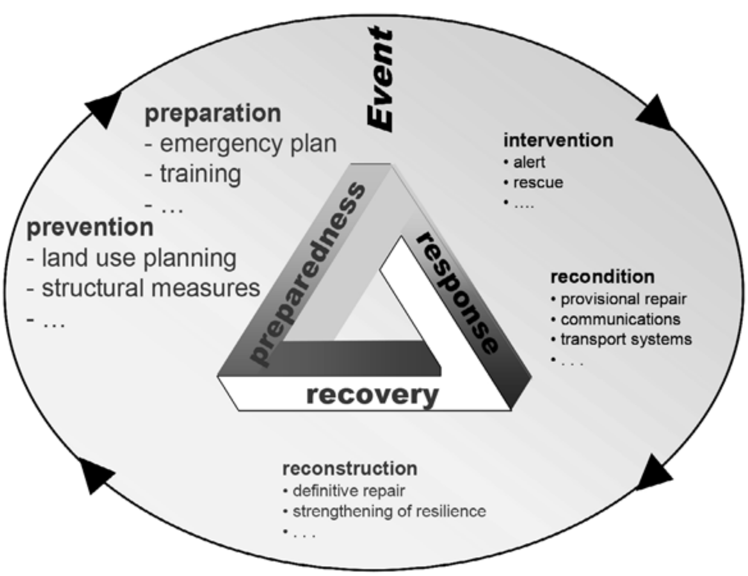


Figure 3.39. The figure shows the basis of integral risk management. All activities are necessary to maintain security with regard to risks posed by natural hazards to humans and their infrastructures. The solutions allow for an integrated approach (figure source: PLANALP, 2008, p. 2).

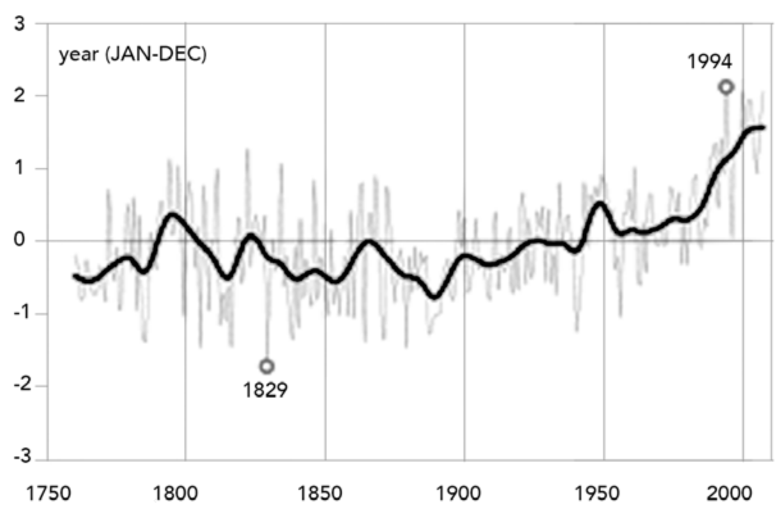
Alpine Signals 6, Towards Decarbonising The Alps, National Policies and Strategies

Alpine Convention, (2011). *Alpine Signals 6, Towards Decarbonising The Alps, National policies and strategies.* Innsbruck: Permanent Secretariat of the Alpine Convention.

Year of projection: —
Topic: Climate Change
Mentioned low-carbon fields: low-carbon is not directly mentioned, instead the word decarbonizing appears several times.

The document talks bout the vulnerability of mountain ecosystems to climate change and, explicitly says that although the Alps may not be a major contributor to CO_2 emissions, it is important that this territory reduce its emissions.
First this publication provides information about the expected developments in the climatic pattern, and exemplifies the effects of it in the Alps. Nonetheless it stresses that the effects of climate change can be quite different according to the geographical location.
The document focuses on the legal and policy framework recalling the EU strategy, the Alpine Convention, and in particular the 'Action Plan 2009' of the Alpine Convention on climate change. Then the documents present the summaries of the strategies and experiences adopted at a national or regional level on climate change mitigation and adaptation.
This publication, part of the 'Alpine Signal' series publications of the Alpine Convention, focus on the necessity for cooperation between different political and administrative levels in pursuit of sustainable development. It also asks for better information given to the general public about the regional and national measures to adopt for this development. Spreading information and enhancing awareness will contribute to the mobilization of energies for countering climate change and adapting to its consequences in the Alps (Figure 3.40).

Figure 3.40. The figure shows the increase of surface temperatures in the Alps (figure source: Alpine Convention, 2011, p. 6).



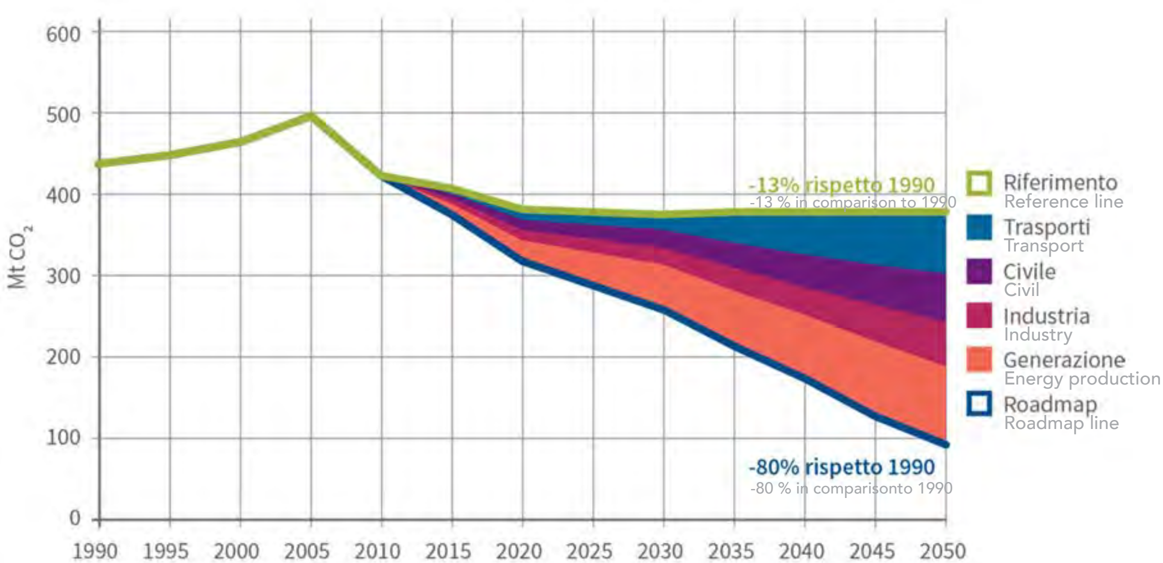
Rapporto Energia E Ambiente; Scenari e Strategie Verso un'Italia Low-Carbon.

ENEA. (2013). *Rapporto Energia E Ambiente; Scenari e strategie Verso un'Italia Low-Carbon*. Roma: Agenzia Nazionale per le Nuove Tecnologie, L'Energia e lo Sviluppo Economico Sostenibile.

Year of projection: 2050
Topic: energy
Mentioned Low-carbon fields: *futuro low-carbon, tecnologie low-carbon, econima a basse emissioni, fonti energetiche a basse emissioni.*

The document presents an energy scenario elaborated through a technical-economic model of the energy system. The steps toward the low-carbon scenario proposed by the documents require undertaking actions to decarbonize the electricity system, to increase the efficiency and the use of renewable energy, to electrify all of the industrial and mobility sectors, to implement a smart grid, and to realize the carbon capture and storage system (Figure 3.41). The latter, a relevant point in a national scale, but not relevant for the empirical part of the research and the Veneto Region. This Region sees a possible major contribution for reducing the CO_2 emissions by RES implementation and energy efficiency (chapter '3.1.3 Spatial and Energy Planning in Cadore').

Figure 3.41. The figure shows the decrease of CO_2 emissions in the various sectors (figure source: ENEA, 2013, p. 29).



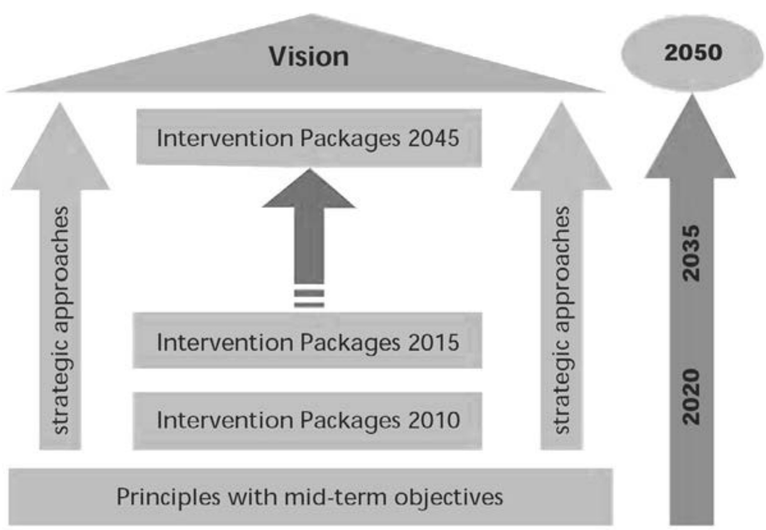
Piano Clima, Energia-Alto Adige-2050.

Ruffini F. (Ed.), (2011). *Piano Clima Energia-Alto Adige-2050.* Giunta Provinciale della Provincia Autonoma di Bolzano - Alto Adige.

Year of projection: 2050
Topic: Energy and Climate Change
Mentioned Low-carbon fields: *low-carbon, un'economia sostenibile a basse emissioni, sviluppo economico a basse emissioni, trasporto a basse emissioni, processi di produzione a basse emissioni, processo di combustione a basse emissioni.*

'Piano Clima' is the strategy of the Alto Adige/Südtirol Region to adopt a sustainable approach to the energy system. In this scenario the natural landscapes coexist with pleasant cultural landscapes where high-quality agricultural products are grown. The scenario includes a healthy environment and sound natural resources such as clean and healthy water, air, and soil. The 'Piano Clima' energy strategy fixes ambitious targets for the reduction of energy consumption and CO_2 emissions through the axes of mobility, RES implementation, and renovation of school buildings (Figure 3.42).
This document shows a best practice of energy strategy of a local context similar to Cadore, the strategy served to identify the sectors of actions required to reach a low-carbon future in this alpine context (see the back-casting process in chapter 3.4.3).

Figure 3.42. The figure shows how the Trentino-Alto Adige/Südtirol's 'Piano Clima' strategy is inspired by a vision that leads to interventions to be integrated on a periodic basis (figure source: Alpine Convention, 2011, p. 68).



Piano Energetico Regionale, Fonti Rinnovabili Risparimio Energetico Efficienza Energetica.

Regione Veneto, (2015). *Piano Energetico Regionale, Fonti Rinnovabili Risparimio Energetico Efficienza Energetica*. Venezia: Regione Veneto.

Year of projection: 2020
Topic: energy
Mentioned low-carbon fields: *economia a basse emissioni, edifici a basse emissioni, veicoli a basse emissioni.*

The objective of the Veneto Region, for the low-carbon future, implicates two types of actions: first the reduction of the energy consumption, second the increase of renewable energy production. Three possible scenarios that contain both actions are described: minimum scenarios that project today's trends; a medium one as the most favorite by the regional body; or a high efficiency and RES scenario with important interventions for implementing efficiency in the region (major detail in chapter 3.1.4). The regional plan elucidated the active instruments in Veneto for the implementation of a low-carbon future strictly related to the energy topic, and which are the activities that will soon be activated.

Figure 3.43. The figure on the left shows the electric network (380 – 220 kV) in the Veneto Region. The power-line that connects Veneto to Austria crosses Cadore (figure source: Regione Veneto, 2015b, p. 106).

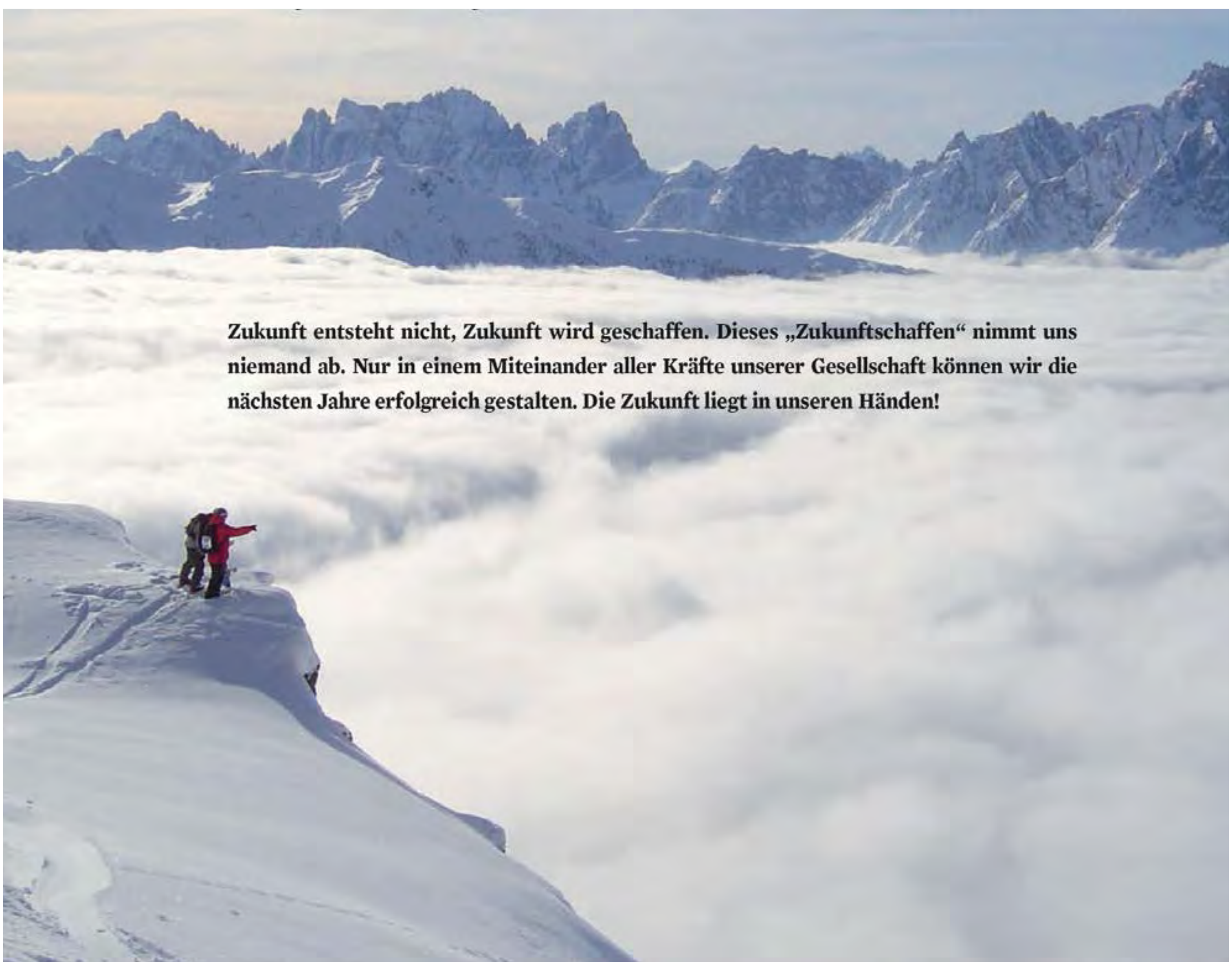
Figure 3.44. The figure on the right shows the final message given in the document (figure source: Vordenken Für Osttirol, 2014, p. 19)

Zukunftsbild Osttirol 2025 Leitlinien Für Die Nachhaltige Entwicklung Unserer Region

Vordenken Für Osttirol. (2014). *Zukunftsbild Osttirol 2025 Leitlinien Für Die Nachhaltige Entwicklung Unserer Region.* Lienz: Vordenken Für Osttirol.

Year of projection: 2050
Topic: sustainable development
Mentioned low-carbon fields: low-carbon is not directly mentioned

The document is a vision for the Osttirol region and is composed of five fields of action for reaching a slow-Alpine region. This field asks for: a competent regional institution for Alpine living space; more activate space for citizens, such as public spaces, for a growing urban society; new talents thanks to education and related infrastructures; economy and tradition as a cooperative binomial; and opens up space for people and for nurturing cultures.
This document is an example of a vision for the future of an Alpine territory similar to Cadore. The fields of actions where an interesting point for fostering the envisioning process of the empirical research, and matching the data gathered through interviews, colloquiums, and trips (Figure 3.44).



Category	**Node**
Energy	Electrification (mainly linked to the vision: ElectriCore) Natural resources Smart grid Efficient building (mainly linked to the vision: Grappolo Balsamico) Autonomy (vision: The 1555 Village)
Environment	Natural hazard (mainly linked to the vision: ElectriCore) Seasonal pattern Biodiversity (mainly linked to the vision: Grappolo Balsamico) Geology Landscape value (mainly linked to the vision: Borgo 1555) Public space / infrastructure
Society	Tradition (mainly linked to the vision: Borgo 1555) Social cohesion / cooperation (mainly linked to the vision: Grappolo Balsamico) Regional cooperation Transport mode Population resilience Regola Depopulation Amenity migration (mainly linked to the vision: ElectriCore)
Economy	Agriculture Small industry Handicraft (mainly linked to the vision: Borgo 1555) Innovation Research and education (vision: ElectriCore) Sustainable tourism (vision: Grappolo Balsamico)

Table 3.9.The table shows the list of the categories and nodes used in the network graph (Figure 3.45). They refer to the Visions' Content design aspects.

3.3.4. The Emerged Visions

With the data gathered during the **interviews**, **colloquiums**, **trips**, the CW, and **Checking the Documents**, it was possible to cluster the low-carbon Visions' Content design aspect that answers the question '*how will the future be?*' in four different categories – **energy, society, environment,** and **economy**. The four categories, that touch different fields of study, required a multidisciplinary view of the future even if the envisioned process was focused on the low-carbon as matter of concern. Each category has more specific nodes connected among each other in a network that symbolizes the future in a comprehensive way. The Table 3.9 shows the list of categories and nodes.

The data formed a framework, visualized as the **network graph** of Figure 3.45, within which possible futures are envisioned for the local context. The relation of the nodes, in the network graph, show how each topic, and each of the four fields, is dependent and related to the others in a multidisciplinary web.

The Network Graph

The network graph (Figure 3.45) indicates three nodes that emerged as the most relevant for possible low-carbon futures of the Cadore region. They emerged first in the interviews and colloquiums with local stakeholders and experts, and second they were persistently mentioned in the analysed documents.

The three emerging nodes are: municipal energy **autonomy**; sustainable **tourism**; and research and **education**. This selection does not preclude the involvement of other nodes in the future of Cadore that keep open the process of design and the possibility to propose more various futures ►. Selecting the predominant nodes does not de facto exclude the possibility of other futures in which other nodes of the network graph can have a predominant role.

► The chapter 2.1.1 stresses the importance of a plurality of futures in a process of strategic planning that involves complex situations such as the low-carbon future, and an uncertain future such as the one influenced by climate change.

Figure 3.45. In the network graph, the nodes represent the ideas for the futures. The nodes derive from the data gathered in the interviews, colloquiums, CW, and Checking the Documents. They belong to the Visions' Content and answer the question '*how will the future be?'* within the categories of energy, society, environment, and economy (author's own design).

In this phase of the Visioneering mode application, the **flash visions** stood out as a concise and sudden idea about how the future might be. A broader and more intense involvement in the empirical research of representatives and inhabitants of Cadore would have led to a more shared envisioning process.

The three nodes emerging from the network graph, are the core concept of the *flash visions*:

1. The **municipal energy autonomy** node led to the vision called Borgo 1555 (The 1555 Village); it represents energetically autonomous villages that internally manage the RES production.
2. The **sustainable tourism** node brought to the vision Grappolo Balsamico (The Healthy Cluster), and represents regional development through sustainable tourism and a collaborative management of resources, with a public management of the energy system.
3. The **research and education** node brought to the vision ElectriCore, which shows a highly innovative region with an educational center and with regional and cross-boarder management of the resources through private investors.

These three flash visions, or rather statements, have been explored in their spatial impacts obtaining three **comprehensive visions** of possible low-carbon futures. The choice to focus each of the vision on one specific node of the network graph does not exclude the involvement of the other nodes in the visions, they are certainly related and dependent on each other.

Each of the three visions is described in the following pages with a story, and the hypothesis of energy spatial impacts. It is then represented by a graph of the energy supply and a **map**. The original posters representing the visions used for Stakeholder Workshop I (SWI) are in Appendix 5.2.

Borgo 1555

(The 1555 Village)

We are in the year 2050 and living in small villages that have between 1000 and 2000 inhabitants. The amount of inhabitants changes during the tourist seasons. What we love about our villages is that we can survive without asking anything from others. In the last decades, the scarcity of public infrastructure and the privatization of the energy system has brought a complete abandonment of low access areas. Therefore we decided to plan an adequate energy system in order to be autonomous and more independent from private companies. We created jobs (hydropower plants, biomass plants, and technicians) related to energy generation and provision. Currently we sell energy to these private companies. We love to live here, even if commuting is difficult and the accessibility of the area is threatened, nevertheless we reinforce our connection with nature and traditions. Tourists come here so they can forget the chaos of cities or metropolis. We provide simple, comfortable, and practical accommodation inside our homes.

Some of the villages have become ghost villages, mainly those threatened by natural hazards. Those who remain here are more motivated to stay and develop the region. Few of the high-educated youth remain here: they appreciate the environment and the quality of life given by it.

Borgo 1555

Figure 3.46. The picture shows the village of Colle Santa Lucia close to Selva di Cadore. On the hill in front of the church is a solar panel farm; there is a wind turbine behind the village's center and a container for energy storage on the right. The forest is reduced in comparison to today's expansion.

Borgo 1555

Energy Spatial Impacts

The Borgo 1555 vision presents a **toolkit** that provides energy for 1500 inhabitants, namely an average village of the Cadore region. The economic system of the vision is based on the current system, with a relevant contribution given by local handicraft. The production and demand of energy envisioned in the Borgo 1555 is based on the 'Current Policy Initiative' scenario of the Energy Roadmap 2050 of the European Commission (2012). This scenario reflects the Current Policy Initiatives that are undertaken in the EU context and sets long-term goals that should be achieved in the year 2050. For the purpose of the engineering process, the data 'Gross Inland Consumption Per Capita' referred to the year 2050 was considered. This data provided a rough model for engineering a vision in which the productions of energy, in a model municipality of 1500 inhabitants, matches the consumption thanks to a diversified RES supply (see in Table 3.10 the data).
The amount of RES already produced nowadays has not been considered in this engineering process. As seen during the interviews and the colloquiums, the local production of electricity in the region is already high thanks to the hydropower plants (see chapter 3.1.4).

Energy Consumption		
Gross Inland Consumption Per Capita expressed in MWh for the year 2050 *	36,05	
MWh consumed by 1500 inhabitants in 2050	54079	
Supply from Renewable Energy Seources in 2050	**MWh**	**% on the Total Demand**
Hydropower	22713	42%
Biomass – from wood	21631	40%
Wind power	500	1%
Solar energy	9193	17%
Total of MWh supplied in 2050	54038	100%
* data Gross Inland Cons./Capita of the 'Current Policy Initiative' scenario (data source: EC, 2012, p. 169)		

Table 3.10. The table reports the energy consumption and supply data of the vision Borgo 1555, that refer to the year 2050. The figures here reported are rounded up.

Borgo 1555

Each of the RES present in the energy supply of the vision Borgo 1555 has a different spatial impact. The vision requires the installation of 2 mini **hydropower** plants for a capacity of circa 2,7 MW each village. It also requires 150 **co-generator boilers**, 1 every 10 inhabitants of the village, that burn wood from annually cleaning approximately 2500 ha of forest. The vision also requires the installation of a **wind turbine** of 560 kW capacity in each village.
Finally, each village consumes thermal energy and electricity provided by approximately 15300 km^2 of **thermal and photovoltaic** panels (approx. 10,5 m^2 per inhabitant).
The **storage of energy** is an important part of the low-carbon future since the production of energy from natural resources is not continuous, and storage systems maintain a constant energy flow. In the visions, various arrangements are envisioned. The **pumped-storage** system is feasible in the Cadore region through the use of water reservoirs already present and used for creating artificial snow.

Figure 3.47. The graph on the top shows an estimate of the energy production and consumption in Borgo 1555. The graph on the bottom compares the spatial impact of RES and their implemented capacity (author's own design).

Borgo 1555

Figure 3.48. The following page shows the map of Borgo 1555. The map used for Borgo 1555 is based on a painted map of Borca di Cadore, approximately from the XIX century. The map represents some additional energy arrangements, such as a solar farm, a wind turbine, and two hydropower plants. During the SWI each vision was represented in two panels (see Appendix 5.2). The first reports the story about the vision, a photomontage of Cadore in 2050, and the energy production graph. The second poster is a map that represents the spatial assets of the future.


Altezza passi n° 65
Bacino metri cubi n° 45
Distanza passi n° 79
Pulizia Bosco area passi n° 5000 x 5000


Distanza
Pasi n°. 45
Solare
area passi n° 120 x 120
Distanza
passi n° 4
0
40 passi - 40 metri

Grappolo Balsamico

(The Healthy Cluster)

Do you want to live an unforgettable holyday in the mountains? We have the right place for you: the Grappolo Balsamico. This is the region between Italy and Austria, characterized by the presence of the cental Dolomites. It is a cluster of small villages that can offer infinite possibilities to enjoy your holiday and explore life among the mountains and nature. You can find workshops focused on local handicrafts, trips with sheep, donkeys, and cows, hands on experiences helping local farmers grow potatoes and quinoa, informative events that explore nature through the bee's eyes, and information on how to take care of your body with medical plants and herbs. Among all of these activities you can find well-prepared professionals that invest in new technologies and innovation to create biological and extravagant products! Don't wait, book your holidays and sleep in one of our high-efficiency buildings, a mixture of tradition and high-tech architecture. You can arrive with your car or take the train up to a village's doorstep. From there you can travel only with local transport: a good supply of electric cars, electric bicycles, and well-marked pedestrian paths. Don't forget that in this mountain oasis you can find the pure air, no carbon emissions for the past 10 years! Help us to keep the Grappolo Balsamico a healthy place for all of us!

Figure 3.49. The picture shows the village Ospitale di Cadore. On the upper right corner the Monte Rosa Hütte, architecture icon of sustainable and passive building in the Alps (in Zermatt, developed by the students of ETH Zurich). The train is the 'Urban Light Transit', a personal rapid transit system developed by the British company ULTra Global PRT. The cars in the center are Renault Twizy, a battery-powered 2 seat electric city car designed and marketed by Renault.

Grappolo Balsamico

Grappolo Balsamico

Energy Spatial Impacts

The energy pattern of the Grappolo Balsamico vision presents an **equal distribution** of RES in the entire region. The low economic growth represented in this vision leads to less intensive industrial activities, but also to fewer investments in technology and innovation. The economic system of the vision is based on a sustainable development of tourism linked to agriculture. The consumption of energy envisioned for the Grappolo Balsamico vision is based on a population of 36000 inhabitants, and the production and demand of energy is based on the 'Current Policy Initiative' of the Energy Roadmap 2050 of the European Commission (2012). This scenario reflects the current policy initiatives that were undertaken in the EU context and sets long-term goals that should be achieved in the year 2050. For the purpose of the engineering process, the data 'Gross Inland Consumption Per Capita' has been considered. This data provides a rough model for engineering the energy consumption in the vision.

Energy Consumption	
Gross Inland Consumption Per Capita expressed in MWh for the year 2050 *	36,05
MWh Consumed by 36000 Inhabitants in 2050	1297800

Supply from Renewable Energy Sources in 2050	**MWh**	**% on the Total Demand**
Hydropower	342786	26%
Biomass – from wood	54575	4%
Wind power	2000	0,2%
Solar energy	216000	17%
Biogas - from FORSU	1798	0,2%
Biogas - from livestock	438	-
Geothermal	-	-
Total MWh supplied in 2050	617597	47,4%

* data Gross Inland Cons./Capita of the 'Current Policy Initiative' scenario (data source: EC, 2012, p.169)

Table 3.11. The table reports the energy consumption and supply data of the Grappolo Balsamico, that refer to the year 2050. The figures here reported are rounded up.

Grappolo Balsamico

The envisioned production of energy in the territory matches 47% of the consumption, through a diversified RES supply (see the data in Table 3.11). In the vision, the amount of energy nowadays produced from hydropower plants already installed in the region is considered (data available in Natalini 2010; ARPAV 2012), while the energy produced by other RES is not mentioned. The **interviews**, **colloquiums**, and **Checking the Documents** made clear that the local production of electricity in the Belluno Province is high thanks to the hydropower plants, while the provision of energy from other RES is not outstanding (see chapter 3.1.4).

The vision requires **hydropower energy**, in 2050**,** of approximately 36 MW for all of the Cadore region, corresponding to an additional plant of roughly 1 MW per each of the 22 MCC municipalities (that would be added to the current ones). The vision presents two **biomass plants** for the provision of electricity, located in Centro di Cadore and Val d'Ansiei di Cadore – current day Pieve di Cadore and Laggio di Cadore. The resource provision comes from the sawmill waste - measured through present day statistics - and woodchips from cleaning approximately 50000 ha of forest annually. In this vision a deforestation phenomenon due to the production of biomass is plausible, since the envisioned high demand of wood resource could interfere with the natural regeneration of the forest.
The vision requires the installation of 4 **wind turbines** located in Perarolo, for a total installed power of 2 MW. The **solar energy** is, in the vision, provided through thermal and photovoltaic panels for an area of circa 360000 m^2, roughly 10 m^2 per inhabitant, spread throughout all of the territory. In the vision there is also a **biogas** plant for Organic Solid Urban Waste (FORSU) and livestock located in San Vito. This plant produces electricity and fertilizer that could be used for agriculture. In addition to the FORSU, the biogas plants manage the manure of 2000 adult cattle from the entire region. The vision also shows a **geothermal** plant located in Val Grande, in Comelico Superiore, where a natural hot aquifer can be found.
The **storage of energy** is an important part of the low-carbon future since the production of energy from natural resources is not continuous, and storage systems maintain a constant energy flow. In the visions various storage arrangements are imagined: hydropower pumped-**storage** system facilities in present day Auronzo di Cadore, and **batteries** allocated in containers.

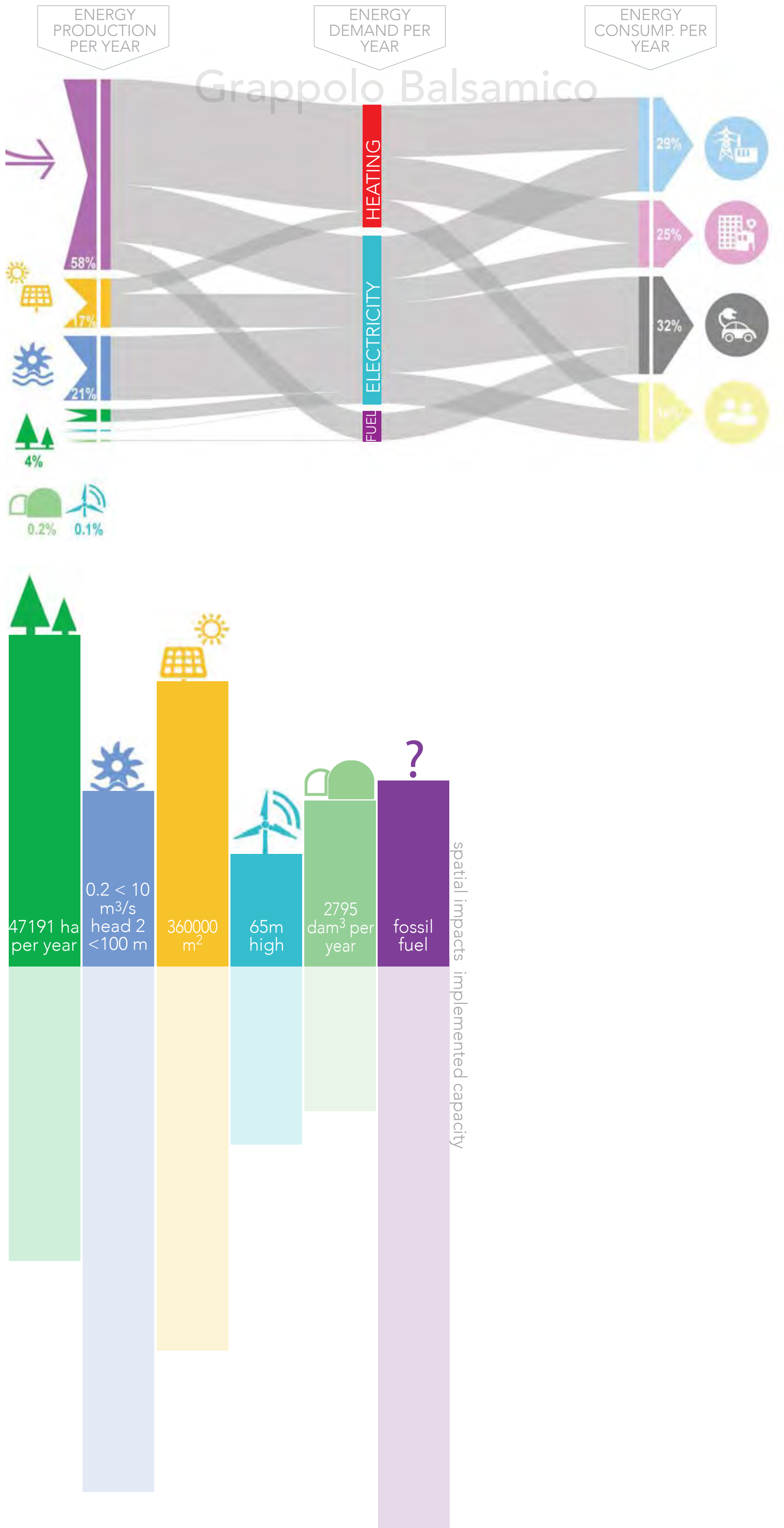
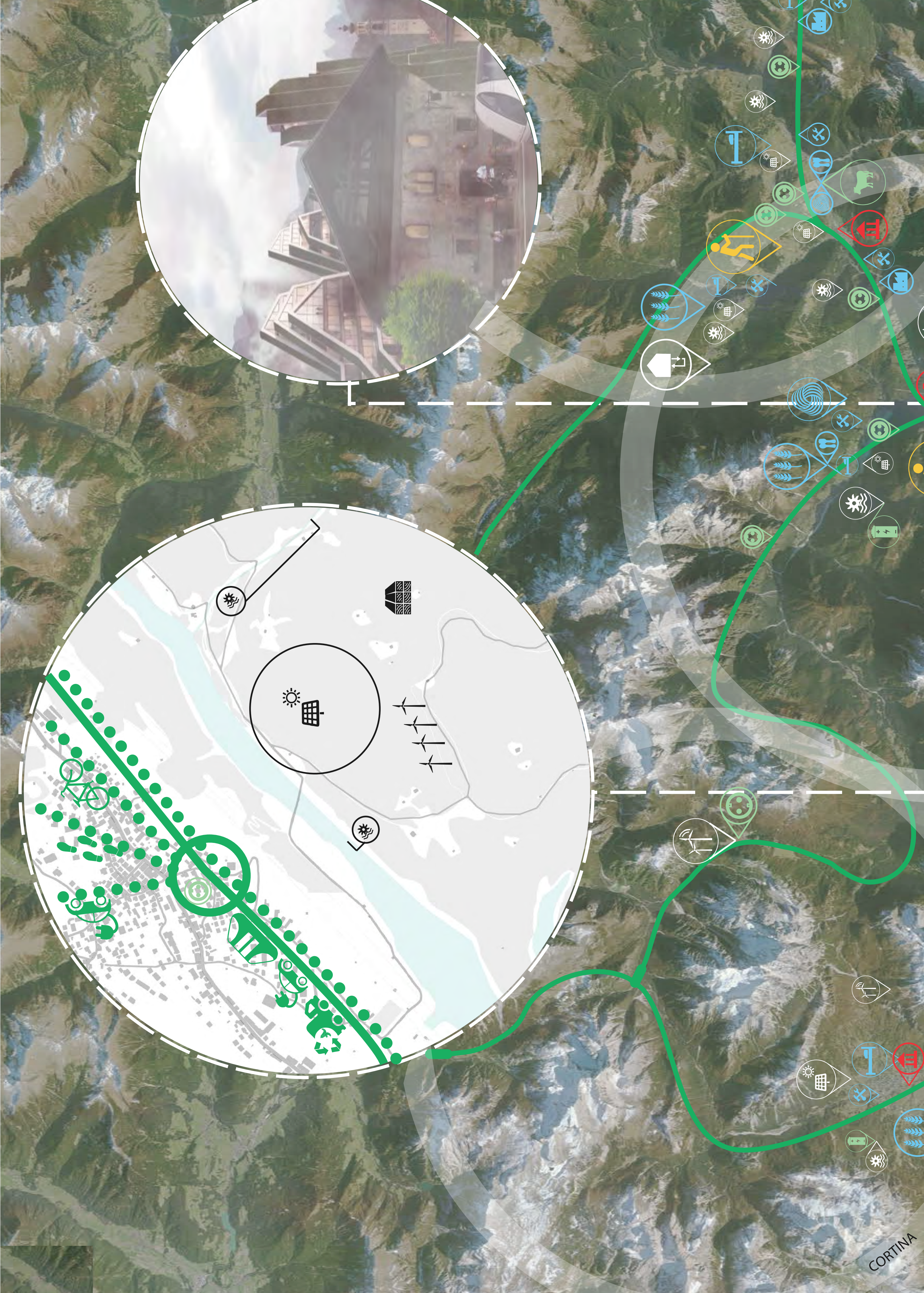


Figure 3.50. The graph on the top shows an estimate of the energy production and consumption in Grappolo Balsamico. The graph on the bottom compares the spatial impact of RES and their implemented capacity (author's own design).

Grappolo Balsamico

Figure 3.51. The following page shows the map of the Grappolo Balsamico vision. The base map underlines the richeness in natural resources of the area. The photomontage on the upper right represents the center of current day Domegge di Cadore with a typical rural building and a skyscraper behind it: architectural icon by BIG studio, the 'Hualien Residences'. The train is the 'Urban Light Transit', a personal rapid transit system developed by the British company ULTra Global PRT. The photomontage on the left corner represents the village of Cibiana di Cadore; in the center there is a Smart Fortwo, a battery powered electric vehicle with its charging station. During the SWI each vision was represented in two panels (see Appendix 5.2). The first reports the story about the vision, a photomontage of Cadore in 2050, and the energy production graph. The second poster is a map that represents the spatial assets of the future.


CORTINA


COMELICO DI CADORE
VAL ANSIEI DI CADORE
VAL BOITE DI CADORE
CENTRO DI CADORE
ENERGY
WIND TURBINE
SOLAR PANELS
BIOGAS PLANT
HYDROPOWER PLAN
BIOMASS PLAN (WOOD)
GEOTHERMAL PLANT
BASIC SERVICES
MUNICIPALITY
HOSPITAL
RESOURCE MANAGEMENT
FORSU MANAGEMENT
BATTERY
BIOMASS (WOOD)
BIOMASS (FROM ANIMAL)
ELECTRICITY DISTRIBUTION
ECONOMIC
TOURISM
HANDICRAFT
AGRICULTURE AND LIVESTOCK
PRODUCTS FROM ANIMALS
AGRO-FOOD
INDUSTRY
MOBILITY
PRIVATE ELECTRIC MOBILITY
PUBLIC ELECTRIC MOBILITY
CYCLE LANE
PATHWAY
SPARE TIME
SPORT
PLAY
PET THERAPY
SCHOOL CAMP
GUIDED TOUR
0
5 km

ElectriCore

ElectriCore is one of the most innovative areas of central Europe. It is known as the Silicon Valley of the Alps.
Two main research spots, Lienz and Centro di Cadore, collaborate for the exploration and study of the Alpine reality. Here the most innovative energy infrastructures for mountain environment have been developed. The scope of this scientific collaboration is to use the mountain resources as much as possible in order to fully supply our energy demand. High ranking professionals work in these two cities, meanwhile two smaller towns between Italy and Austria are the exchange point for information and resource management. The first one is Cortina d'Ampezzo, once famous for it's beautiful ski resorts, now it is indispensable for providing accommodation and fieldsites to whomever is researching the Dolomite rock and the environment. The second, Lienz, has become the headquarters for natural reservoir management.
The 4 spots are connected through a Smart linkage: a high tech HRB-way (high-rail-bicycle-way) in which the energy connections are embedded. The HRB-way provides 'knowledge stops', areas that make use of virtual reality. Here virtual projection of data and information on the surroundings can help visitors read the environment and the ghost villages that surround the HBR-way.

Figure 3.52. The figure shows the village of Borca di Cadore; in the center the landslide that damaged the village numerous times, while in the middle, the HRB-way connection cuts the almost abandoned village.

ElectriCore

ElectriCore

Energy Spatial Impacts

In the ElectriCore vision, the production and demand of energy is based on a regional population of 42000 inhabitants because the vision supposes an increase of population allocated in the urban centres. An envisioned **high economic** growth brings to a more intensive industrial activity, with a consequent increase in research and RES investments. The envisioned consumption and supply of energy is based on the 'Reference Scenario with High Economic Growth' of the Energy Roadmap 2050 by the European Commission (2012). The scenario provides a benchmark of the forecasted energy data related to 2050, for the purpose of the engineering process the 'Gross Inland Consumption Per Capita' has been considered. The supply of energy of the vision matches the 47 % of the consumption in the territory, through a diversified RES supply (see in Table 3.12 the data).

Energy Consumption		
Gross Inland Consumption Per Capita expressed in MWh for the year 2050 *	43	
MWh per 42000 inhabitants	1806000	

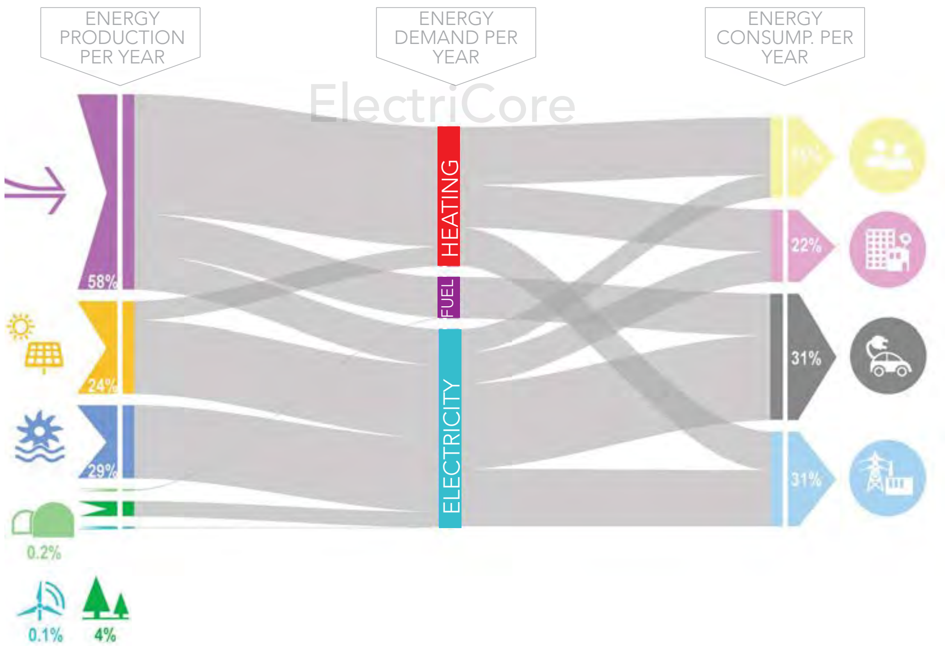
Supply from Renewable Energy Sources in 2050	**MWh**	**% of the Total Demand**
Hydropower	346266	19%
Biomass – from wood	67893	4%
Wind power	2000	0,1
Solar energy	437598	24%
Biogas - from FORSU	2720	0,2%
Biogas - from livestock	438	-
Total supplied MWh annual	856915	47,3%
*data Gross Inland Cons./Capita of the 'Reference Scenario with High Economic Growth' scenario (data source: EC, 2012, p. 165)		

Table 3.12. The table reports the energy consumption and supply data of ElectiCore that refer to the year 2050. The figures here reported are rounded up.

ElectriCore

In the vision, the amount of energy nowadays produced from hydropower plants already installed in the region is considered (data available in Natalini 2010; ARPAV 2012). The energy produced by the other RESs in not mentioned. From the interviews, colloquiums, and the check in the documents was clear that the local production of electricity in the Belluno province is todays high thanks to the hydropower, while the provision of energy from other RESs is not outstanding (see chapter 3.1.4).

The ElectiCore requires a **hydropower** installed capacity major than 40 MW spread in the entire territory. The location of new hydro plants is based on the license applications gathered from the association 'Acqua Bene Comune Belluno' (Comitato Per La Difesa Del Bene Comune Acqua, 2016). The vision requires **biomass plants** located in Pieve di Cadore – named Centro di Cadore in the vision - for approximately 20000 annual tonne of wood chips that come from cleaning the forest and additional sawmill waste. The vision shows the installation of 4 **wind turbines** located in Centro di Cadore - today Perarolo, to produce 2 MW of power. The vision requires solar energy from **photovoltaic** and **thermal** panels for a total of 630000 m^2, that correspond roughly to 15 m^2 per inhabitant, clustered in solar farms. The **biogas** plant, that works with FORSU and livestock, is located in San Vito di Cadore and it consumes Cadore's yearly production of FORSU – based on today's consumption – plus a 100% of import, and the manure from an average of 2500 adult cows owned by a few farms spread throughout the territory.
The **storage of energy** is an important part of the low-carbon future since the production energy from RES is not continuous, and the storage system maintains constant energy flow. In the visions, various arrangements are envisioned: the **pumped-storage** system, which is not identified in a specific location in the map of the vision, but is nonetheless feasible in the Cadore water reservoir already present and used for creating artificial snow. The vision also presents **batteries** allocated in containers.



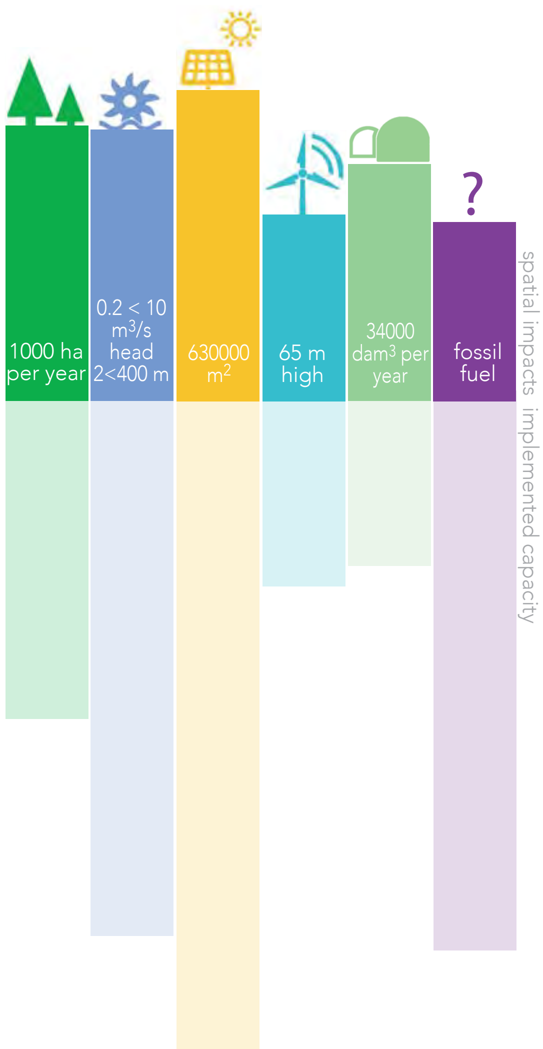
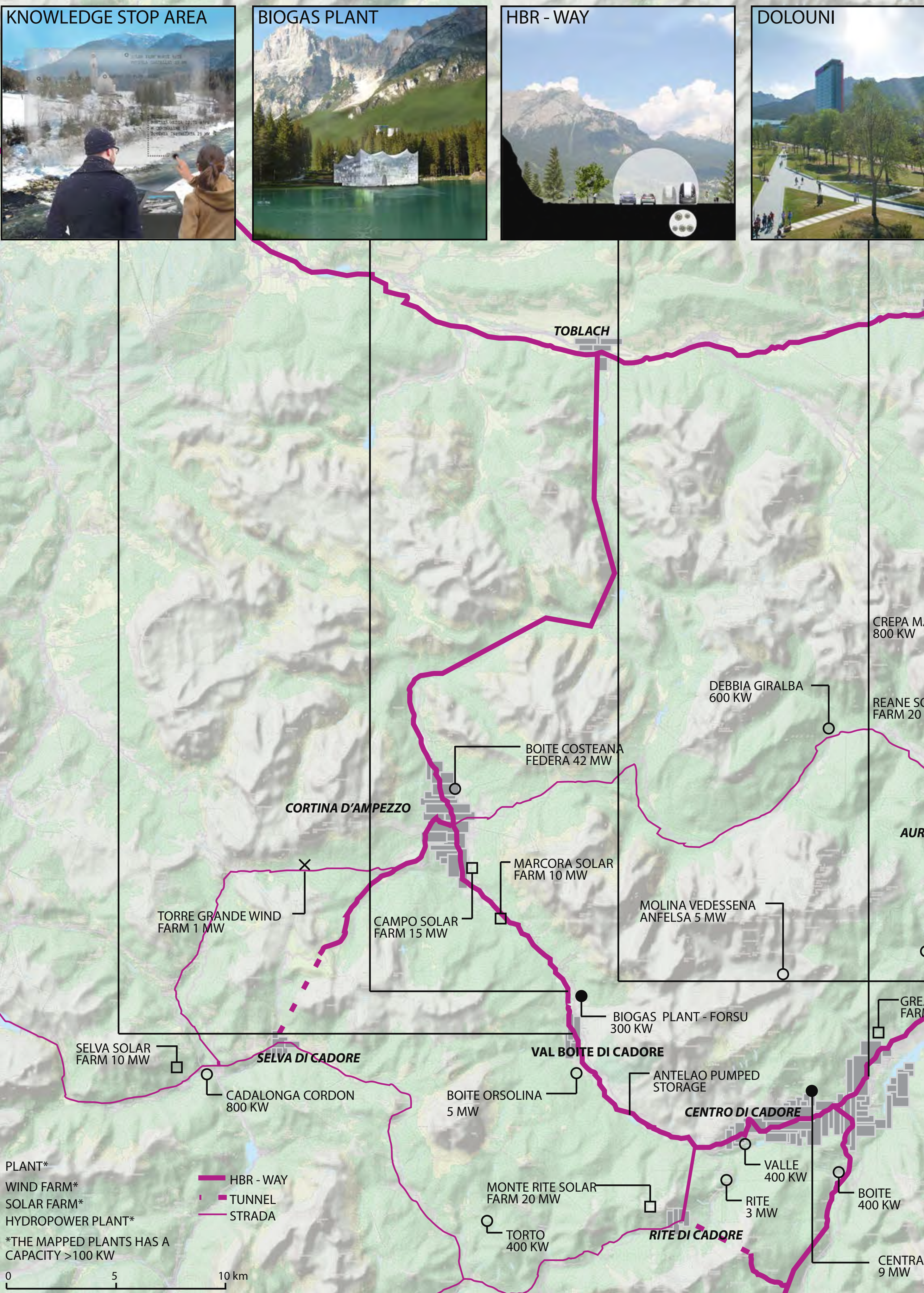
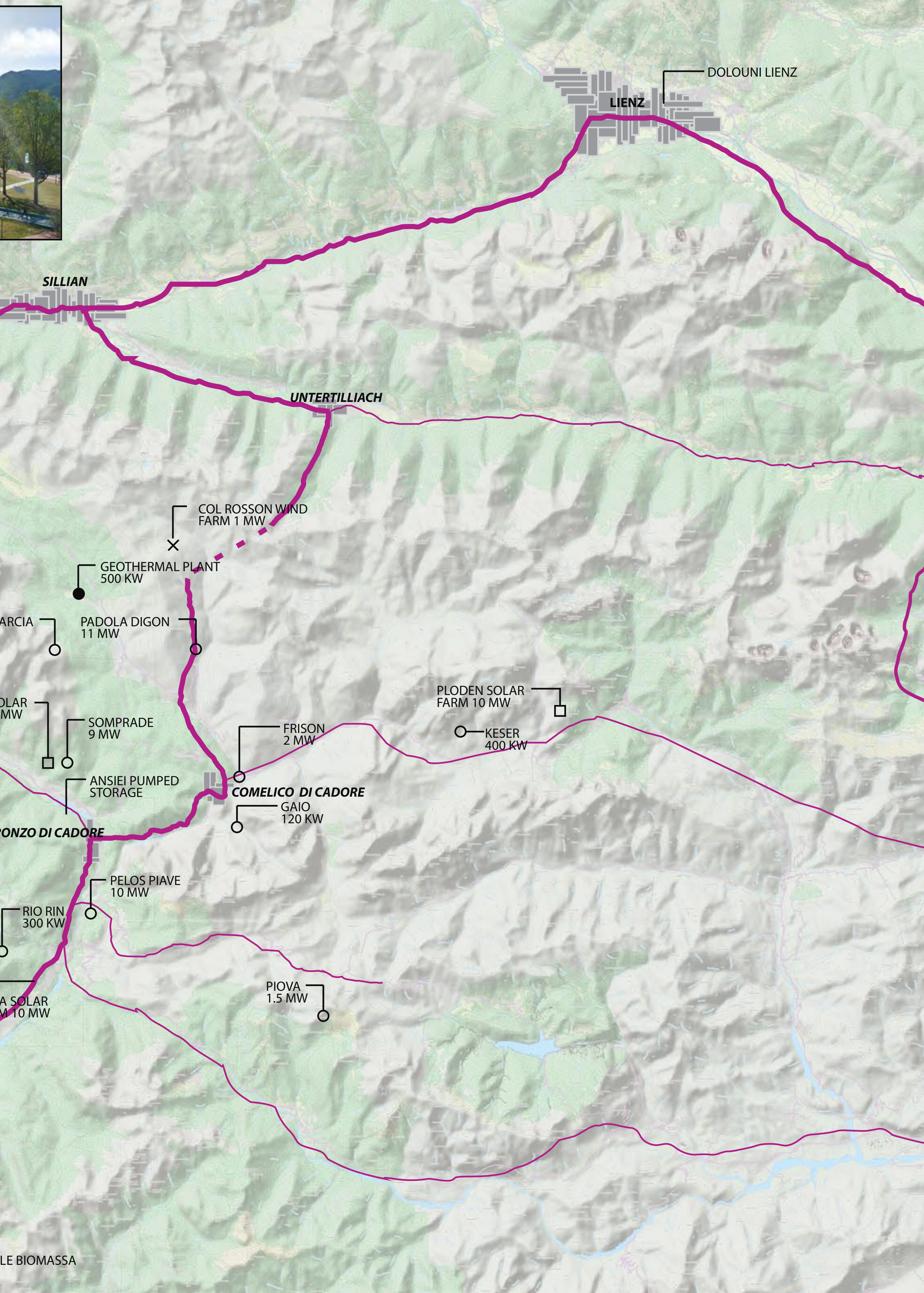


Figure 3.53. The graph on the top shows an estimate of the energy production and consumption in ElectriCore. The graph on the bottom compares the spatial impact of RES and their implemented capacity (author's own design).

ElectriCore

Figure 3.54. The following page shows the map of the vision ElectiriCore. The cartography used as base underlines the physical conncetions among the nearest urbanized centers. The photomontage in the upper left corner represents the 'knowledge stop' of the HRB-way from Borca di Cadore looking at the Boite River. The second photomontage is the Lago di Mosigo (in San Vito di Cadore) with the architectural icon of Herzog & de Meuron's Elbphilharmonie concert hall in Hamburg; in the background the biogas plant. The third photomontage shows a section of the HRB-way, while the last photomontage shows the DoloUni buildings in Centro di Cadore. The picture shows the iconic urban and architecture intervention of the Technical University of Delft, while in the background you can see the Centro Cadore Lake. During the SWI each vision was represented in two panels (see Appendix 5.2). The first reports the story about the vision, a photomontage of Cadore in 2050, and the energy production graph. The second poster is a map that represents the spatial assets of the future.


KNOWLEDGE STOP AREA
BIOGAS PLANT
HBR - WAY
DOLOUNI
TOBLACH
CREPA M
800 KW
DEBBIA GIRALBA
600 KW
REANE S
FARM 20
BOITE COSTEANA
FEDERA 42 MW
CORTINA D'AMPEZZO
AUR
MARCORA SOLAR
FARM 10 MW
MOLINA VEDESSENA
ANFELSA 5 MW
TORRE GRANDE WIND
FARM 1 MW
CAMPO SOLAR
FARM 15 MW
BIOGAS PLANT - FORSU
300 KW
SELVA SOLAR
FARM 10 MW
SELVA DI CADORE
VAL BOITE DI CADORE
CADALONGA CORDON
800 KW
BOITE ORSOLINA
5 MW
ANTELAO PUMPED
STORAGE
CENTRO DI CADORE
VALLE
400 KW
BOITE
400 KW
RITE
3 MW
MONTE RITE SOLAR
FARM 20 MW
TORTO
400 KW
RITE DI CADORE
CENTRA
9 MW
PLANT*
WIND FARM*
SOLAR FARM*
HYDROPOWER PLANT*
*THE MAPPED PLANTS HAS A
CAPACITY >100 KW
HBR - WAY
TUNNEL
STRADA
0
5
10 km


DOLOUNI LIENZ
LIENZ
SILLIAN
UNTERTILLIACH
COL ROSSON WIND FARM 1 MW
GEOTHERMAL PLANT 500 KW
ARCIA
PADOLA DIGON 11 MW
PLODEN SOLAR FARM 10 MW
OLAR
MW
SOMPRADE 9 MW
FRISON 2 MW
KESER 400 KW
ANSIEI PUMPED STORAGE
COMELICO DI CADORE
GAIO 120 KW
RONZO DI CADORE
PELOS PIAVE 10 MW
RIO RIN 300 KW
PIOVA 1.5 MW
A SOLAR
M 10 MW
LE BIOMASSA

3.4 Grounding and Spreading

During the Grounding and Spreading acts the three visions designed in the previous act, Borgo 1555, Grappolo Balsamico, and EelectriCore, were compared and adjusted with local stakeholders in the **Stakeholder Workshop I** (SWI). Successively the **Online Survey** (OS), open to all citizens, served to strengthen the visions and their peculiarities, testing their desirability in the territory. The Grounding and Spreading acts proceeded with the back-casting approach in order to find the necessary actions toward the realization of the plan. The completion of the back-casting consisted in the **Stakeholder Workshop II** (SWII) in order to draw the paths toward the visions.

3.4.1. Stakeholder Workshop I

The Stakeholder Workshop I (SWI), named 'disegnare futuri - Cadore' was organized with the aim to present and compare the visions developed during the Grasping act. The suggestion to run the event inside the context of the Magnifica Comunitá di Cadore (MCC) was given during the interviews and colloquiums with local representatives ►. The SWI took place on the 24th of July 2015 in the main hall of the MCC building. The invited stakeholders were the decision-makers of Cadore: the 22 local mayors or representatives, the president of the MCC, and the president of the Gruppo d'Azione Locale (GAL). At the event there were 10 participants: four mayors, the president of the MCC, two deputy mayors, three municipal councilmen, and the president of the GAL. The working team was composed of four people: three moderators (including myself), and a photographer that aided with the coordination of the event.

► The MCC is a public institution, composed of 22 municipalities of Cadore. It promotes the economic growth and the development of cultural values of local communities by identifying and supporting the common unifying characteristics of the area that can contribute to the overall progress of Cadore.

The workshop was divided into two parts: a presentation and a series of focus groups. The frontal presentation served to show the aim of the research and the three visions, and the focus groups allowed the stakeholders to actively participate in the design and adjustment of the visions. The **research presentation** lasted approximately 45 minutes, following the order of the panels that represented the three visions (reported in Appendix 5.2). Two **focus groups** discussed each vision for approximately 20 minutes; each group was composed of a small number of participants, 5 to 8, in order to facilitate the active participation of all parties involved. The moderators managed the discussion on the low-carbon future proficiently: one of them, specialized in community psychology, had the task of exploring the social dynamic among the participants during the discussion of the social setting of the visions; the second, an architect, was responsible for bringing creativity to the focus groups stimulating his interlocutors with several design solutions. The third moderator, myself, drove the debate on the energy issue. The event was a success and the participants asked for Stakeholder Workshop II that was organized 10 months later.

20th of May	Written Invitations
10th of July	Online Invitations
24th of July	Stakeholder Workshop I
	16:30 - 17:30 Frontal presentation
	18:00 - 19:00 Focus groups
	19:00 - 19:30 Final discussion

Table 3.13. Timetable of the Stakeholder Workshop I 'disegnare futuri - Cadore'.

► The four social learning dimensions and the fifth information dimension are part of the scheme for the Visioneering evaluation, and are widely explained in chapter 2.5.

The collection of qualitative and quantitative data in the SWI involved two research methods: questionnaire and focus group. The first was pre and post event self-completion **questionnaires** developed by following the four social learning dimensions ►. Its aim was to rank the participants' knowledge and perception of the low-carbon topic, and the features presented in the visions. The data was collected by the use of the Likert scale: 1 to 5, with 5 being the maximum. The pre-event questionnaires were sent with the invitation 40 days before the event, while the post-event questionnaires were filled out at the end of the workshop (the questionnaires are reported in Appendix 5.1).

The focus groups offered the planner the opportunity to study how participants individually and collectively made sense of low-carbon as a matter of concern, constructed meanings around it, and elaborated ideas for the future. Data was collected regarding the verbal participants' responses to questions on recorded audio, the participants' verbal and non-verbal interactions through written notes, and the participants' sketches on the maps.

Figure 3.55. Pictures from the SWI 'disegnare futuri-Cadore'.

Methods	Data Type	Amount of Data
Pre and post questionnaires	Returned sheets	10 pre-event questionnaires 8 post-event questionnaires
Focus groups	Audio Written Notes Photos	3 moderators 1 photographer
	Visual material Sketches Drawings	3 Maps (visions)

Table 3.14.Overview of the quantitative and qualitative data gathered during the SWI.

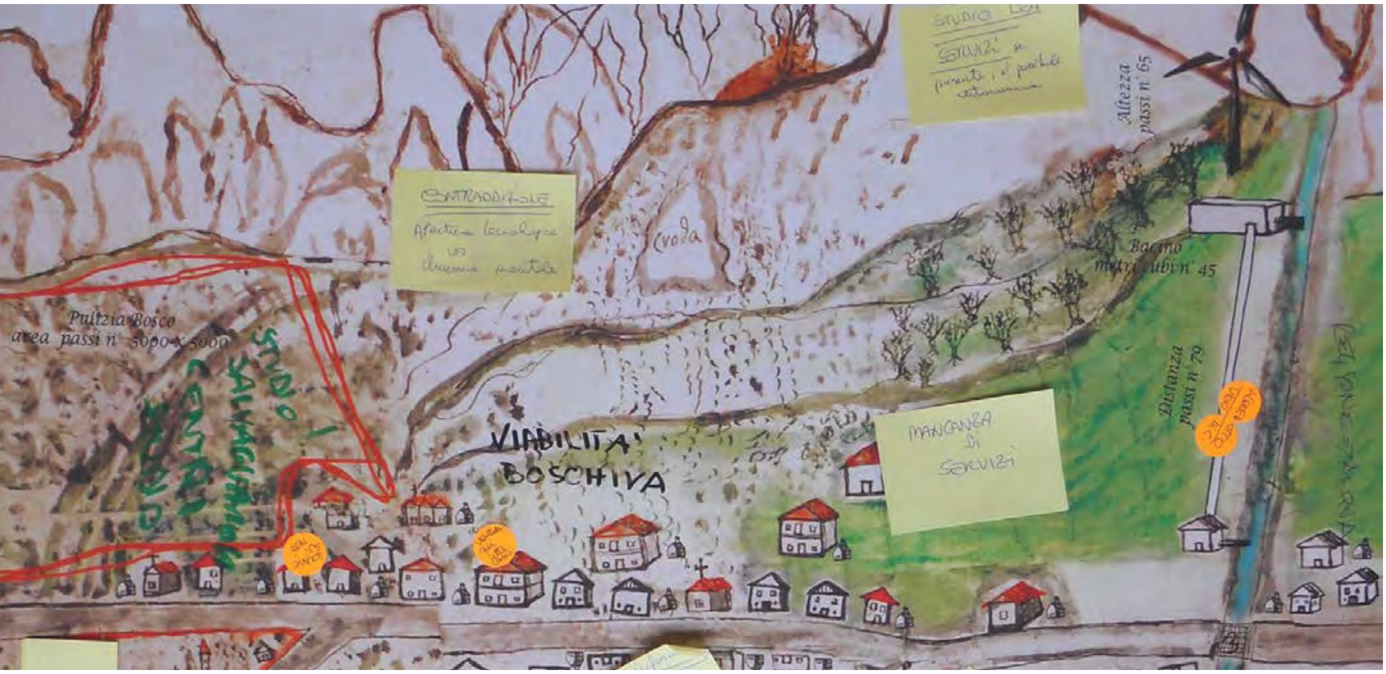
Findings from the Stakeholder Workshop I

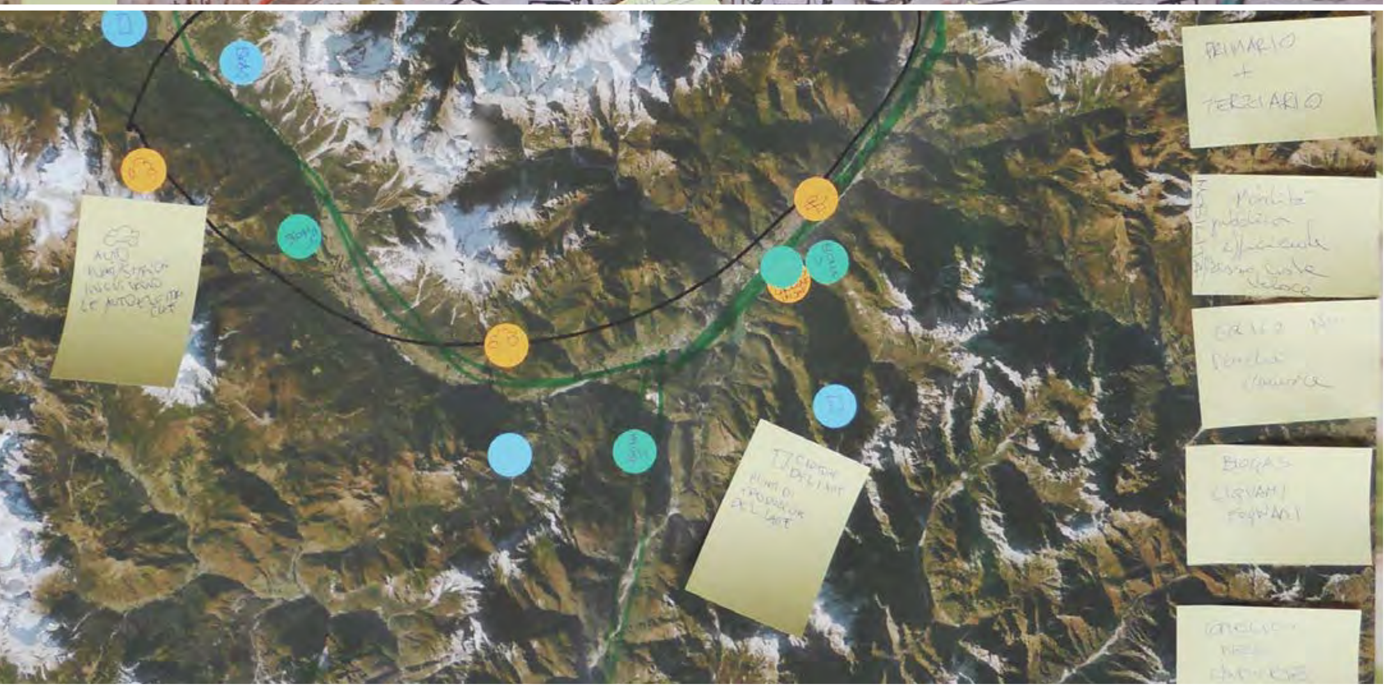
During the SWI, changes in each social learning dimension occurred, they are visible in the data gathered with the pre and post event questionnaires, and focus groups. In addition to the changes in social learning, the participants' knowledge and sketches offered new insights on the design aspect Visions' Content providing new idea on the visions. The changes identified in each dimensions, and for each the design aspects, are reported in the following paragraphs and are categorized through the five dimensions of social learning of Cognitive Knowledge, Mutual Understanding, Complexity, Joint and Single Actions, and Visioneering Critique ►. The later versions of the visions were based on those changes and insights.

► The four social learning dimensions, and the fifth information dimension, are part of the scheme for the Visionering evaluation, and are widely explained in chapter 2.5.

Cognitive Knowledge Dimension

The participants were aware of the necessity to go toward a Low-Carbon future, and were aware of the sources that produce CO_2 emissions nowadays. The knowledge of some participants are mainly related to the Covenant of Mayors and, for few of them, to their professional background (e.g. engineering). Concerning the Regional Grasp aspect, they are familiar with the resources of the territory, especially after the focus groups, but their opinions are often driven by the media (i.e. local newspapers) and not by the opinions of expertise. Their knowledge on the topics could have been more specialized, especially on the relation between the resources and the energy output. Topics on which they are concerned, are


CONTRADDIZIONE
Altezza passi n° 65
Bacino metri cubi n° 45
Pulizia Bosco area passi n° 5000 x 5000
Distanza passi n° 79
VIABILITA' BOSCHIVA
MANCANZA DI SERVIZI


PRIMARIO + TERZIARIO

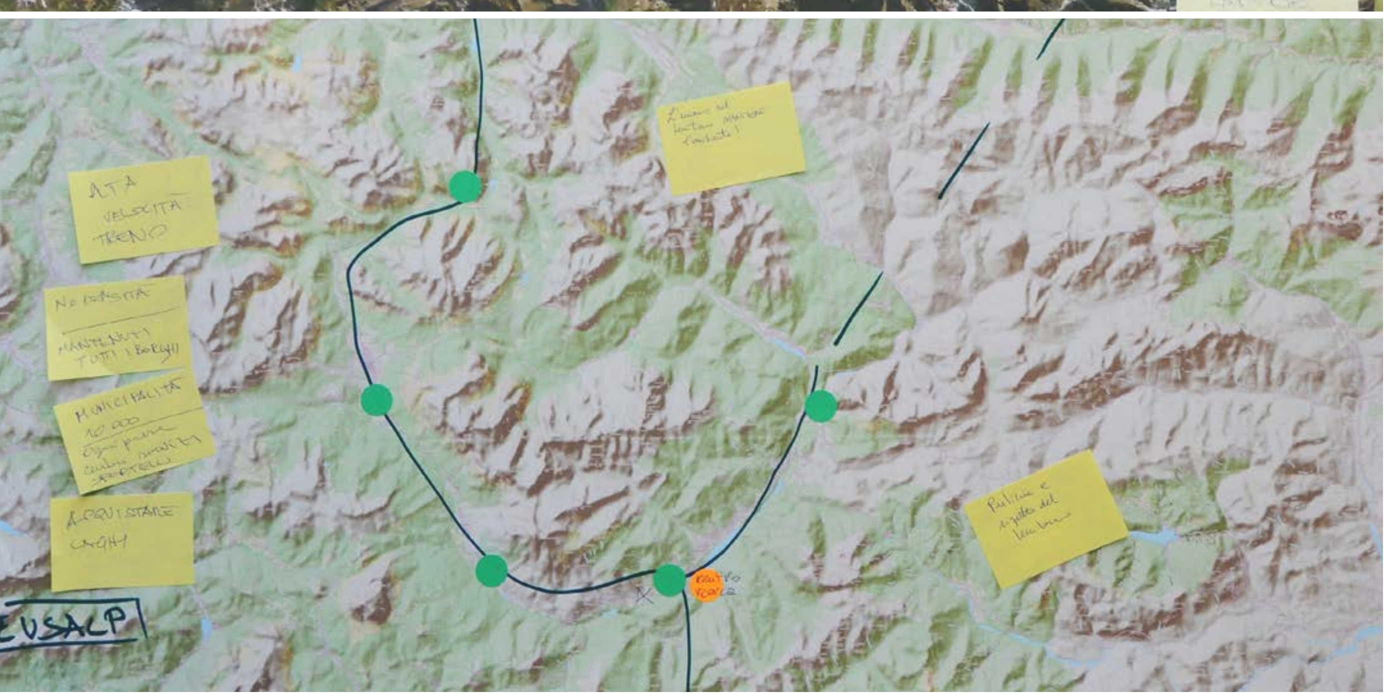

ALTA VELOCITÀ TRENO
ACQUISTARE LAGHI
EUSALP

Figure 3.56. The pictures show some details of the maps after the focus groups of SWI. On the top, the Borgo 1555 vision, in the middle, the Grappolo Balsamico vision, and on the bottom, the ElectriCore vision.

mostly the life cycle assessment of the wood resource, and the exploitation of the water resource.
As in the colloquiums and interviews, the depopulation trend was the issue of the Regional Grasp aspect in which the stakeholders were concerned the most.
As in the colloquiums and interviews, the stakeholders were mostly concerned with the depopulation trend of the regional grasp.

Mutual Understanding Dimension

During the discussion of the Visions' Content, the participants perceived the experts (e.g. engineers, planners, educators) as those who are needed to move towards a vision of the future. Instead the role of politicians and citizens was perceived as less important. After the workshop, the trust on the categories of citizens and experts for the implementation of the low-carbon future, decreased. The data collected after the meetings demonstrated that the event underlined the importance of decision-makers in taking actions. In the Visions' Content design aspect, the MCC always has a prominent role in bringing together local authorities and inhabitants. The participants blamed the Belluno Province and the Veneto Region for not acting and not giving them directions on the energy issue.
Altogether the participatory event helped the stakeholders to understand each other's point of views creating the bases for a discussion on the low-carbon future.

Complexity Dimension

The participants perceived the three visions as comprehensive pictures of the future. In each of them, the participants underlined some priorities of the Visions' Content aspect that were missing or that were perceived crucial. In Borgo 1555 the participants pointed out the necessity to keep the services on the territory without marginalizing the municipalities from the rest of the territory. In the Grappolo Balsamico vision the stakeholders stressed the importance of developing a new economic model and the need to employ resources in a sustainable way with the help of experts. In ElectriCore the participants stated that the connections to the nearest and more urbanized area is fundamental, and stressed the need to develop a new transportation model. The decision-makers considered the increase in energy production of Cadore as an achievable goal.
The participants noted that it was not possible to go in-depth with the discussion of several priorities given such a big overview. This was considered to be a limit of the visual material.

Joint and Single Action Dimension

The data from questionnaires showed that the event offered personal motivation to the participants leading them to develop strategies for common actions. The latter are seen possible in the context of the Covenant of Mayors and economic partnerships between privates. The participants claimed that the global picture of RES of the Visions' Content aspect can be the object of public investments in the field of hydropower, biomass from the forest, and solar energy. One of the main contributions of the participants regarding RES management was the possibility of purchasing the license of the **local dams** after the year 2030 in order to locally invest the profits. This idea played an important role in back-casting. The perception of the importance of private actions visibly decreased during the events, possibly due to an increased awareness on the high amount of natural resources of the territory and the necessity to manage them in a comprehensive framework.

Visioneering Critique Dimension

As highlighted from the questionnaires response, the participants found the workshop useful; the collective process was a platform for sharing knowledge, experiences, and ideas on the low-carbon matter of concern.
During the workshop the storytelling was the primary source of information on the Visions' Content. It shows the power of stories in the envisioning process. The visual material was nonetheless necessary to keep the focus group oriented on the future, and on the priorities presented in each vision. The photomontage instead clearly presented the **discontinuity** with the current status of the landscape.
Few participants found it difficult to work on maps because they were not able to comprehend them as images of potential futures. This was probably due to the institutional usage of maps done in the day-to-day practice. Only few of them sketched, wrote, and signed actions on the maps; those note are focused mainly on the management of resources as water and forest, and to the necessity to keep services, as hospitals and diary, on the territory.

Further Considerations

It was extremely important for the participants of the empirical research to have a framework in which for the first time they could exchange ideas about the future. Visioneering and its collaborative process therefore shaped an arena in which to give-and-take knowledge and opinions and to reason about possible actions. The findings gathered during the discussions and the questionnaires showed a wide unexplored potential desire for a low-carbon future in the area. However, the scarcity of experts (e.g. engineers, planners and technicians), and initiatives of the higher administrative levels, are among the causes of its neglected implementation. During the Workshop the target group strongly felt the need for initiatives coming from the higher administrative levels, such as the Region and Province.
After the workshop, it was clear that Visioneering fosters social learning. The four dimensions of social learning facilitated the understanding of social dynamics between the involved parties and the necessity to strength them in order to enforce the regional response to low-carbon.
The findings led to two main hypotheses of action-lines on which to strengthen the envision process in the Visions' Content design aspect.

1. A process of **capacity development** might frame common actions despite the low-carbon challenge. It might involve both public and private actions, but it should aim to the common objective of a low-carbon future. Capacity development stands for the '*process through which individuals, organizations, and societies obtain and maintain the capabilities to set and achieve their own development objectives over time*' (UNDP, 2009).
2. Strengthen the presence of energy **experts** (as engineers, educators and planners) in the area might be fundamental to increase the awareness on the potential of the local resources, and to a correct use of them. This process should embrace all level of society, from children to adults, from public bodies to private entrepreneurships.

3.4.2. The Online Survey

The Online Survey (OS) was aimed at gathering opinion form citizens on the three visions in order to enhance them. The OS also offered the possibility to compare the ranking of the answers from the decision-makers of the SWI with those offered by the citizens. The event was in fact open to all citizen, living in Cadore and outside, and it was available online between the 1st of November 2015 and the 10th of January 2016. The research method used was a s**elf-completion survey** structured according to the 5 social learning and information dimensions, and through the use of Likert scale (1 to 3, with 3 being the maximum). The survey was divided in a pre and post sections denoted by the presentation of the visions through a short story and a picture. You can find the result of the survey in Appendix 5.1.

Findings from the Online Survey

The data was collected through 173 respondents, of which 72% living in Cadore, 11% no longer living in Cadore, and the 17% not living in Cadore. The OS was spread mainly through Facebook, the EWARD doctoral college homepage, and e-mails. Changes in each social learning dimensions occurred between the two parts of the OS. The changes identified in each dimensions are reported in the following paragraphs and are categorized according to the five dimensions of social learning and the information dimension: Cognitive Knowledge, Mutual Understanding, Complexity, Joint And Single Action, and Visioneering Critique ►.

► The four social learning dimensions, and the fifth information dimension are part of the scheme of the Visioneering evaluation, and are explained in chapter 2.5.

Cognitive Knowledge Dimension

The participants of the OS had basic knowledge of the concept of low-carbon future, but were highly aware of the sources that nowadays produce carbon emissions. Generally the respondents were less familiar with the concept of the low-carbon future than the stakeholders in the SWI. In the Regional Grasp aspect, they could have been more prepared on the low-carbon topic, especially on the role that public buildings could play in decreasing the emissions. Additionally, they were not familiar with the natural resources of the territory that can play a role in the RES supply. For instance the respondents expected the geothermal RES to have a role in the future development of the area, but the real chances of the implementation of this solution are low.

Mutual Understanding Dimension

In the Visions' Content aspect, the participants considered the experts as the essential actors that could lead toward a low-carbon future. Nonetheless they also considered necessary the involvement of the citizens. The respondents thought that politicians have a little role in the implementation of new RESs.
For the respondents, the future generations play an important role in the Visions' Content aspect, while non-human beings play a perceived smaller role.

Complexity Dimension

The respondents considered possible, but complex, to increase the RESs production in the area. After the visions' presentation they perceived that the complexity of the process increased drastically. In the Visual Material aspect the visions that describe the complexity of the future might frighten the participants because it shows the difficulty of the challenge. In the Visions' Content aspect, the priorities for the future identified in the OS were slightly different in comparison to those expressed in the SWI. The priority of an economy based on *handicraft*, *sustainable tourism*, and the possibility of *multiple mobility choices*, and the *railway* were focal priorities in the SWI. In the OS, the most voted priorities for developing an economy based on *sustainable tourism* were the development of *railway* connections, and an increase in *agriculture* outputs. In the SWI ElectriCore and the Borgo 1555 were perceived as desirable futures with the same average on the Likert scale; the predominant choice was nonetheless the Grappolo Balsamico as in the OS. In both the SWI and OS, the **desirability** of the implementation of the visions was higher than the perceived **possibility** to realize them.

Joint or Single Action Dimension

The respondents stated that the comprehensive picture of RES could be subjected to private investments and to citizen actions. They perceived politics and local administrations as less influential for the implementation of RES. Generally, the respondents would have liked to see more common actions for the implementation of the RES than the stakeholders in the SWI, except for hydropower and wind-power that equally concerned both the target groups (see the differences between the comparable questions of the SWI and the OS in Figure 3.57).

Visioneering Critique Dimension

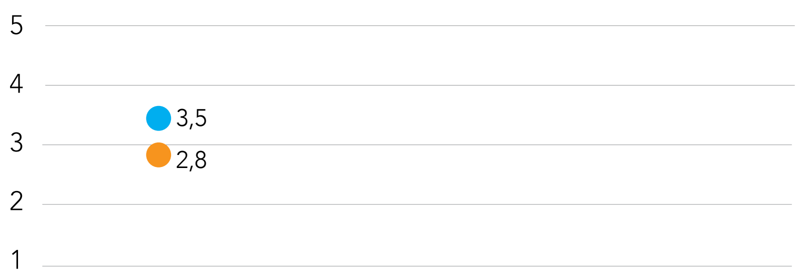
The OS didn't allow the graphical modification of visual material due to the use of Internet as survey instrument; not many data were therefore collected in the Visioneering Critique dimension. Though the respondents confirmed that the visions were perceived as comprehensive pictures: 51% of the them stated that the visions surely helped them to see a potential future, while the 66% said maybe the helped. 57% of contributors stated that the experience of the survey was useful because it made them think about the future.

Comparision on the Likert scale of the partecipatory events results.

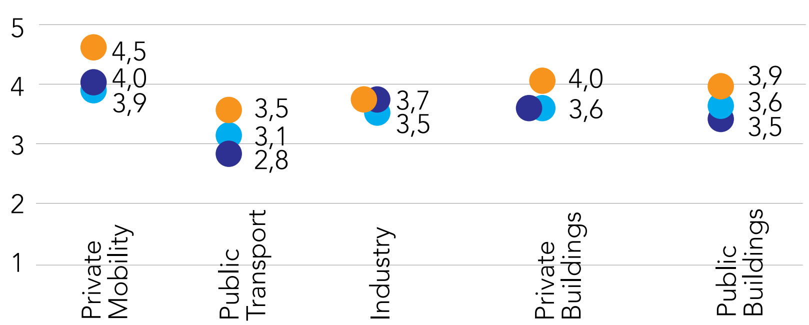
- SWI questionnaire pre - event
- SWI questionnaire post - event
- online questionnaire pre - visions
- online questionnaire post- visions

Figure 3.57. In the diagrams it is possible to see the differences between the comparable questions (on the Likert scale) of the SWI and the OS (author's own design).

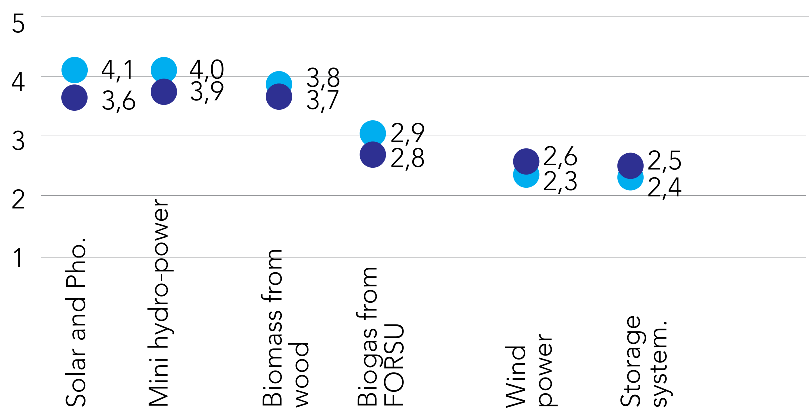
How familiar are you with the low-carbon concept?
None (1) - Very good (5)



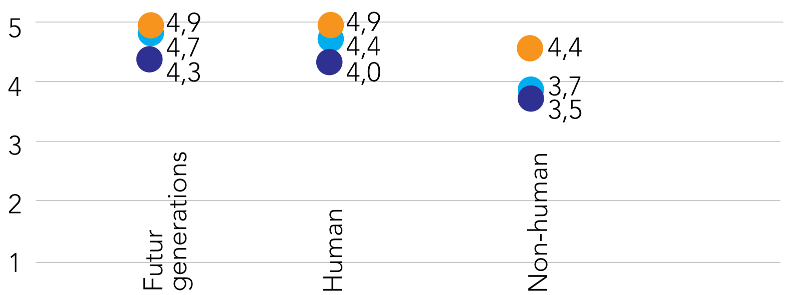
To what extent do you think the following sectors are currently producing CO_2?
None (1) - Very much (5)



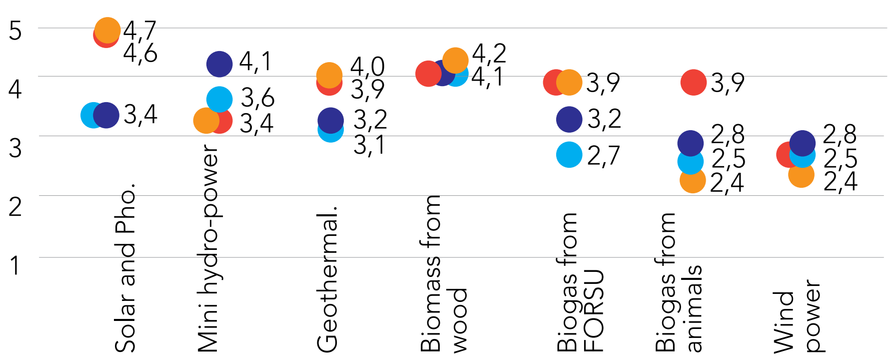
How familiar are you with the different spatial impacts of the following renewable energy sources?
None (1) - Very good (5)



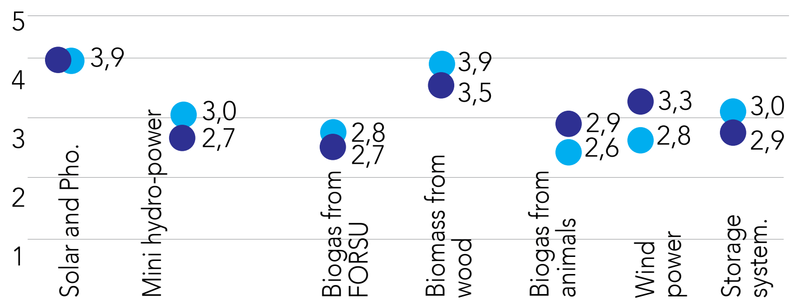
How relevant are the needs of the following categories when deciding about an increase of energy production in Cadore?
Not Imp. (1) - Very Imp. (5)



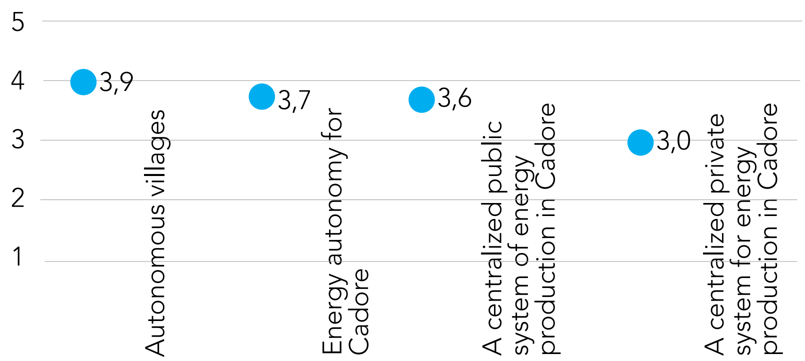
For which of the following means of energy production would you like to see common actions from public parties in Cadore?
No (1) - Yes (5)



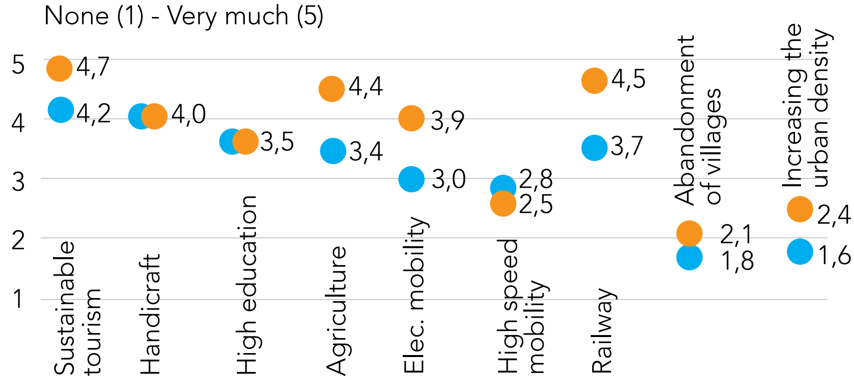
For which of the following means of energy production would you like to see common actions from private parties in Cadore?
No (1) - Yes (5)



To what extent do you think the following energy settings can represent a possible future of Cadore?
None (1) - Very much (5)

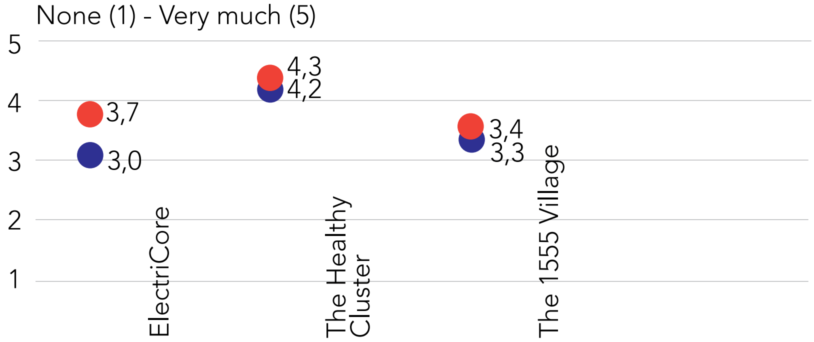


How desirable do you find the listed priorities for the transition to a low carbon future in Cadore?
None (1) - Very much (5)

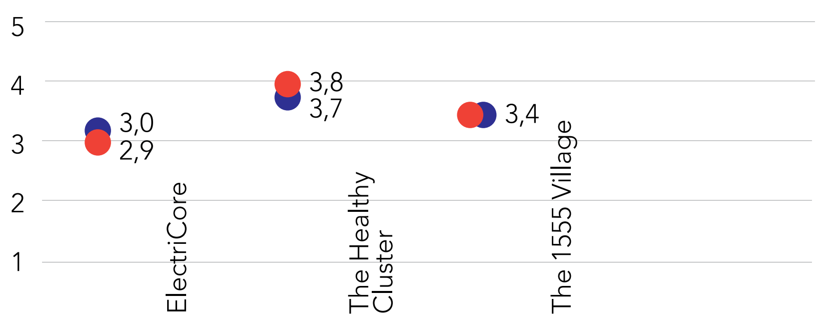


How much can the following actors contribute towards low carbon energy futures?
None (1) - Very much (5)

How **desirable** are the below listened visions for a low-carbon future in Cadore?
None (1) - Very much (5)



To what extent do you think the below listened visions can effectively be **realized** in Cadore?
None (1) - Very much (5)



3.4.3 Back-Casting and The Defined Visions

This stage of the Visioneering mode consisted in enhancing the engineering of the vision through actions and milestones. After the evaluation of the SWI and the OS, the choosen visions were two moderate visions: the first, **Grappolo Balsamico** (Healthy Cluster), was the most favourite of the participants and maintained its main characteristics. The second, **Borghi & Nodi** (Villages & Knots), suggested the fusion between the ElectriCore vision and the Borgo 1555 vision. Borghi & Nodi represents the energy development of villages in an autonomous way, an element of Borgo 1555, together with the idea of the educational center, an element of ElectriCore.

► The back-casting approach is explained in the chapter 2.3.2 that elucidate the Grounding act.

To plan the **paths** that led to the visions, Visioneering requires the use of the back-casting approach, which means working backwards to identify the moments that connect futures to the present ►. The outcome of **back-casting** is a series of milestones as stages that indicate the direction that could be taken to reach the visions, and **actions** as the set of interventions to reach the **milestones**. In the empirical research, back-casting was mainly focused on the amount of CO_2 emissions that that can be reduced in comparison to the production of today. The following paragraph is a description of how the back-casting process has been done. In the following pages, the defined visions Grappolo Balsamico and Borghi & Nodi are described through a story and the back-casting outputs.

The Back-Casting Process

Engineering the visions Grappolo Balsamico and Borghi & Nodi was focused on decreasing CO_2 emissions, and not on the production of energy, as it was in the first proposal of the visions. This is because the first proposal of the visions attempted to represent comprehensive pictures of the futures based on different energy systems, while the second proposal required an engineering process more linked to **decreasing the CO_2 emissions**, than on the consequent energy needs. Back-casting, in the Grounding act, was therefore focused on the hypothetical decrease of CO_2 caused by the actions identified in the engineering process. E.g. if the action referred to the implementation of a new railway connection that decrease 10% of the emissions from the mobility sector, the back-casting process did not consist in calculating how much energy was required to run the new train.

Present day emissions in Cadore are reported here to allow a proper interpretation of the results of the back-casting approach ►.

► The CO_2 emissions of Cadore are widely elucidated in chapter 3.1.4.

- 52% of CO_2 emissions of Cadore are produced by transportation
- 39% by residential, commercial and institutional buildings
- 8% by the industry
- and a small amount by agriculture (approximately 1%).

From this outlook on the current day CO_2 emissions in Cadore, the back-casting brought to **three sectors of actions**: *mobility*, *management of natural resources and CO_2 emissions*, and *RES implementation*. The main contribution to the reduction of CO_2 emissions can be done in the *mobility sector*, where the majority of CO_2 is nowadays emitted. Such sector concerns all the mode of moving on the territory, together with the transportation of goods.

From back-casting, three main expedients emerged as indispensable to transit into a low-carbon ***mobility***:

1. A shift toward a slower mobility that requires infrastructure such as a cycling lane, pedestrian lane, bike sharing, electrical bike, and electric charging point.
2. A shift toward collective means of transportation – sharing, that requires infrastructure as adequate parks and online platform.
3. A shift of the stock of vehicles toward green or hybrid vehicles, together with an adequate offer of public transportation to reduce the demand of private mobility and the transport of goods.

The ***management of natural resources and CO_2 emissions*** is the second potential sector, identified with back-casting, to reduce the CO_2 emissions produced mainly by residential, commercial and institutional buildings, and industry. Such sector gathers the actions that have not direct but indirect spatial impacts: actions that deal directly with the management of natural resources, e.g., guidelines for the forest managements; or actions that concerns directly the reduction of CO_2 emission through energy efficiency or direct restriction, e.g., building codes or filter on the chimney.

The third sector of actions for the reductions of CO_2 emissions is the ***RES implementation***. It refers to the installations and interventions that can be done at local level with their direct use of the natural resources. The storage of energy is an important part of all the three sectors since the energy production from RES is not continues and the storage system balances a constant energy emission, both the visions proposes the pumped-storage system in water reservoirs, built in the reservoirs for the artificial snow.

Each action defines also the stakeholders and target groups that it involves, and how they can collaborate among each other (definition in chapter 2.3.2). In that respect, during the back-casting approach, **three scale of actions** emerged beside the three sectors of actions. The first is the ***regional scale***, it refers to the Cadore region and concerns the actions that have a spatial impact on the regional scale, and that have to be managed at this scale (e.g. a new railway connection). The second is the ***municipal scale***, it refers to those actions that have a spatial impact at the municipality level and have to be managed at that level (e.g. a solar farm in a public space). The third is the ***buildings scale***, it refers to the actions that have spatial impact on buildings (e.g. a solar panels on the rooftop).

Grappolo Balsamico

(The Healthy Cluster)

Do you want to live an unforgettable holiday in the Dolomite Mountains? We have the right place for you: the Grappolo Balsamico. It is a cluster of small villages, in the region between Italy and Austria characterized by the Dolomites, that can offer infinite possibilities to enjoy a holiday and exploring life among the mountains and nature. There you can find workshops focused on local handicrafts, trips with sheep, donkeys, and cows, hands on experiences helping local farmers grow potatoes and quinoa, informative events that explore nature through the eyes of a bee, and information on how to take care of your body with medical plants and herbs. Among all of these activities you can find well-prepared professionals that invest in new and innovative technologies to create biological and extravagant products! Don’t wait, book your holiday and sleep in one of our high efficiency buildings, a mixture of tradition and high-tech architecture. You can arrive with your car or take the train up to a village’s doorstep. From there you can only travel by local transport: a good supply of electric cars, electric bicycles, and well-marked pedestrian paths. Don’t forget, in this mountain oasis you can find the pure air, no carbon emission since 10 years! Help us to keep Grappolo Balsamico a healthy place for all of us! To reach this reality, where we live, a solid network of small and private investors developed renewable energy plants. Now the promotion of local products is linked to dislocated energy production, to tourism in innovative buildings, and to energy education promoted by the Magnifica Comunità di Cadore.

Grappolo Balsamico

Figure 3.58. The picture shows the village Ospitale di Cadore. On the upper right corner the Monte Rosa Hütte, architecture icon of sustainable and passive building in the Alps (in Zermatt, developed by the students of ETH Zurich). The train is the Urban Light Transit, a personal rapid transit system developed by the British company ULTra Global PRT. The car is the model Renault Twizy, a battery-powered 2 seat electric city car designed and marketed by Renault (author's own design).

Grappolo Balsamico

Back-Casting the Grappolo Balsamico Vision

In the Grappolo Balsamico vision Cadore is divided in 13 municipalities, instead of 22: Sappada; San Pietro di Cadore; Perarolo-Ospitale di Cadore (that comprehend present day Perarolo di Cadore and Ospitale di Cadore), Centro di Comelico (that comprehend present day Danta, Santo Stefano, San Nicolò), Comelico Superiore di Cadore, Auronzo di Cadore, Vigo- Lorenzago di Cadore (that comprehend present day Vigo di Cad. and Lorenzago di Cadore), Centro di Cadore (that comprehends present day Calalzo di Cadore, Domegge di Cadore, Lozzo di Cadore), Pieve di Cadore (that comprehends present day Pieve, Valle), Selva di Cadore, Val Boite di Cadore (that comprehends present day San Vito di Cadore, Borca di Cadore, Vodo di Cadore), Zoppè di Cadore, Cibiana di Cadore.
In the vision, a population growth about of 5%, due to amenity migration and economic migrants, leads to a total of 34000 inhabitants in 2050. The vision shows that in 2050 85% of the CO_2 emissions - based off of the 2010 data – are cut down. The CO_2 emissions in 2050 will be distributed in the following manner: 65% depends on the transport; 23% depends on the residential, commercial and institutional sector; 11% depends on industry; and 1% depends on the agricultural sector.
The engineering process and back-casting approach of the visions resulted in a series of actions in the three sectors of *mobility*, *management of natural resources and CO_2 emissions*, and *RES implementation*. The actions in the *mobility* sector refer to two main spatial interventions: the construction of the **railway** that connects Calalzo di Cadore to San Candido/Innichen, and Calalzo di Cadore to Auronzo; 13 **Stop e Cambia!** (Stop and Change!) nodal points where it is possible to switch between different modes of transportation. A **nodal point** is present in each village, and from these nodal points it is possible to enter the villages only through green transport.
The intervention in the sector *management of natural resources and CO_2 emissions*, refers to three field of actions. The first is concerned with Cadore recognized as a **bio-district**, were local farmers, manufactures, citizens, tourism operators, and public actors cooperate for the management of local resources, based on organic farming principles. The low economic growth, represented by the bio-district model, consists in less intensive industrial activities. The second field is concerned with the adoption of an MCC strategy called **Magnifica Cadore** that includes a mobility strategy and a hydropower strategy. The first administers the actions in the *mobility* sector, the second administers the maintenance of the oldest plants,

Grappolo Balsamico

the implementation of the newest, and the management of the dams connected the low-land (today those dams are managed by ENEL but the licences will expire in 2030). The plan for the management of the hydro resources also incorporates a strategy for the pumped storage system realizable through the existing water reservoirs that make artificial snow. The third field of action regarding the *management of natural resources and CO_2 emissions* sector, is concerned with the foundation of the **Piattaforma Educazionale Cadore** (Cadore Education Platform), an educational platform in which citizens and decision-makers develop knowledge about the future of the bio-district. The platform organizes a yearly **day of celebration**, focused on the link between energy and agriculture. The actions in the *RES implementation* sector are reported in the following paragraph, 'Energy Spatial Impacts'. In this vision the private companies and citizens, privately or in an economic partnership, are the investors in this sector of action.

Energy Spatial Impacts

The *RES implementation* sector, and its spatial impacts, foresees an **equal** distribution of solar energy and hydropower throughout the entire region, there are biomass plants for wood and biogas – from FORSU and livestock - and there is also a geothermic plant. The consumption and supply of energy in the vision is based on the 'Current Policy Initiative' scenario of the Energy Roadmap 2050 by the European Commission (2012). It provides a benchmark of the forecasted energy data related to 2050. For the purpose of engineering, the data 'Gross Inland Consumption Per Capita' has been considered. The supply of energy of the vision matches 59% of the consumption of the territory, through a diversified RES supply.

In the vision, the amount of energy nowadays produced from hydropower already installed in the region is considered (data available in: ARPAV, 2012; Natalini, 2010), while the energy produced by other RES in not mentioned. From the interviews, colloquiums, and Checking the Documents it was clear that the current local production of electricity in the Belluno Province is high thanks to hydropower, while the provision of energy from other RES is not yet noticeable ►.

► The current energy situation of Cadore is described in chapter 3.1.4.

Grappolo Balsamico

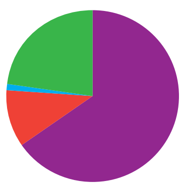
CO_2 EMISSIONS IN CADORE IN 2050

TRANSPORT 65%
13153 tonne

RESIDENTIAL, COMMERCIAL, AND INSTITUTIONAL 23%
4662 tonne

INDUSTRY 11%
2165 Tonne

AGRICULTURE 1%
133 tonne



CO_2 EMISSIONS IN CADORE IN 2016

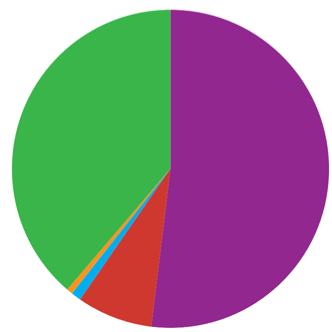
TRANSPORT 52%
69480 tonne

RESIDENTIAL, COMMERCIAL, AND INSTITUTIONAL 39%
51839 Tonnes

INDUSTRY 8%
10310 tonne

AGRICULTURE 1%
1342 tonne

ENERGY PRODUCTION 0,1%
834 tonne



SECTORS OF ACTIONS

	MOBILITY			MANAGEMENT OF RESOURCES AND CO_2			
2050 SPACE	Railway, cycle lane, walk lane	13 nodal points **stop e cambia!**	6 electric stations	Bio-district	**Magnifico Cadore** strategy: Mobility and Hydropower	Energy Education Platfrom	
	RES IMPLEMENTATION						
2050 RESOURCES	Sawmill waste, and wood chip from cleaning the forest	Small plants in aqueducts, hydropower storage	5 m² solar panels each citizen		408448 tonne FORSU per year	2000 cattle	
2050 SPACE	4 district heating systems	Refurbish-ment of old hydropower plants	On the rooftop	4 wind turbines 50 m high	1 biogas plant	4 biogas plants	4 pumps

Figure 3.59. The figure shows the CO_2 in Cadore before and after the vision. On the bottom, the sectors of actions and the respective actions are reported (author's own design).

Grappolo Balsamico

Energy Consumption	
Gross Inland Consumption Per Capita expressed in MWh for the year 2050 *	36,05
MWh Consumed by 34000 Inhabitants in 2050	1225700

Supply from Renewable Energy Sources in 2050	**MWh**	**% on the Total Demand**
Hydropower	476022	38%
Biomass – from wood	62091	5%
Wind power	90	-
Solar energy	193074	16%
Biogas - from FORSU	1358	0,1%
Biogas - from livestock	438	-
Geothermal power	527	-
Total supplied MWh in 2050	733600	59,1%
* data Gross Inland Cons./Capita of the 'Current Policy Initiative' scenario (data source: EC, 2012, p. 169)		

Table 3.15. The table reports the energy consumption and supply data of Grappolo Balsamico vision related to the year of projection 2050. The figures here reported are rounded up.

For the *RES implementation* sector, the vision requires **hydropower**, in addition to the one already installed, of roughly 1 MW per each municipality - corresponding to the current day borders. This additional power is given by the renovation of old plants, the installation of new plants in the environmental flows of already existing dams, and the realization of small plants in the aqueducts. The vision presents four **biomass plants** – district heating – and co-generation boilers in private buildings. The renewable resources for those installations comes from sawmill waste, measured on present day statistics, and woodchips from cleaning the forest for about 10 m^3/ha of wood annually.

The vision requires the installation of four **wind turbines** of 20 kW power located in Perarolo, and the installation of **thermal and photovoltaic panels** of roughly 10 m^2 per inhabitant. In the vision there is also a **biogas plant** for Organic Solid Urban Waste (FORSU) and livestock. This plant use 100% FORSU produced

LEGEND:

- 0,5%
PIEVE

scale of intervention

type of source

percentage of decreased CO_2 emissions in comparison to 2016 level

place of the intervention

INTERVENTION AT CADORE SCALE

INTERVENTION AT MUNICIPAL SCALE

INTERVENTION AT BUILDINGS SCALE

Conversion Factor for transport 0,279 tCO_2/MWh
Conversion Factor for electricity 0,483 tCO_2/MWh, for natural gas 0,202 tCO_2/MWh (source of conversation factor: Covenant of Mayors, 2015, *Technical annex to the SEAP template instructions document: The Emission Factors*)

ACTIONS IN EACH SECTORS:

MANAGEMENT OF RESOURCES AND CO_2

PLAN FOR FOREST MANAGEMENT

FILTER FOR HOUSEHOLD CHIMNEY

MOBILITY

STOP E CAMBIA!

ELECTRIC STATION

-12%
RAILWAY

-12,5%
GREEN PRIVATE TRANSPORT
car sharing, in the villages the emissions are forbidden

-2%
BIKE SHARING
car sharing, in the villages the emissions are forbidden

-0,5 %
SIDEWALK,
in the villages the emissions are forbidden

-14,5%
GREEN PUBLIC TRANSPORT
and car sharing, in the villages the emissions are forbidden

RES IMPLEMENTATION

- 0,2%
WIND TURBINES

-2% PIEVE
DISTRICT HEATING

-2% CIBIANA
DISTRICT HEATING

-4% SAPPADA
DISTRICT HEATING

-4% COMELICO
DISTRICT HEATING

-5% 62000 mq
THERMAL AND PHOTOVOLTAIC PANEL on the rooftop

-5% 62000 mq
THERMAL AND PHOTOVOLTAIC PANEL on the rooftop

- 0,2%
GEOTHERMAL PLANT

- 0,5% PIEVE
BIOGAS PLANT
biomass from FORSU

- 0,1% SAPPADA
BIOGAS PLANT
biomass from animals

- 0,1% AURONZO
BIOGAS PLANT
biomass from animals

- 0,1% VIGO -LOR
BIOGAS PLANT
biomass from animals

- 0,1% PIEVE
BIOGAS PLANT
biomass from animals

- 0,1% CIBIANA
BIOGAS PLANT
biomass from animals

- 5%
COGENERATION BOILER
biomass from wood

-2%
HYDROPOWER PLANT IN AQUEDUCT

- 1%
REFURBISHMENT OF HYDROPOWER PLANT

- 0,2% PIEVE
HYDROPOWER PLANT
in environmental flow

- 0,2% PIEVE
HYDROPOWER PLANT
in environmental flow

- 0,2% VAL BOITE
HYDROPOWER PLANT
in environmental flow

- 0,2% COMELICO
HYDROPOWER PLANT
in environmental flow

SAN VITO
HYDROPOWER STORAGE
in the water reservoir for artificial snow

PADOLA
HYDROPOWER STORAGE
in the water reservoir for artificial snow

AURONZO
HYDROPOWER STORAGE
in the water reservoir for artificial snow

Grappolo Balsamico

Figure 3.60. The figure on shows the set of actions at the three scales of intervention identified in back-casting the Grappolo Balsamico vision (author's own design).

in the region, and generates both electricity and fertilizer that can be used for agriculture. In addition 5 **mini-biogas plants** manage the manure of about 2000 adult cows. The vision also shows a **geothermal** plant located in Val Grande – todays Comelico Superiore, where a natural hot aquifer is.

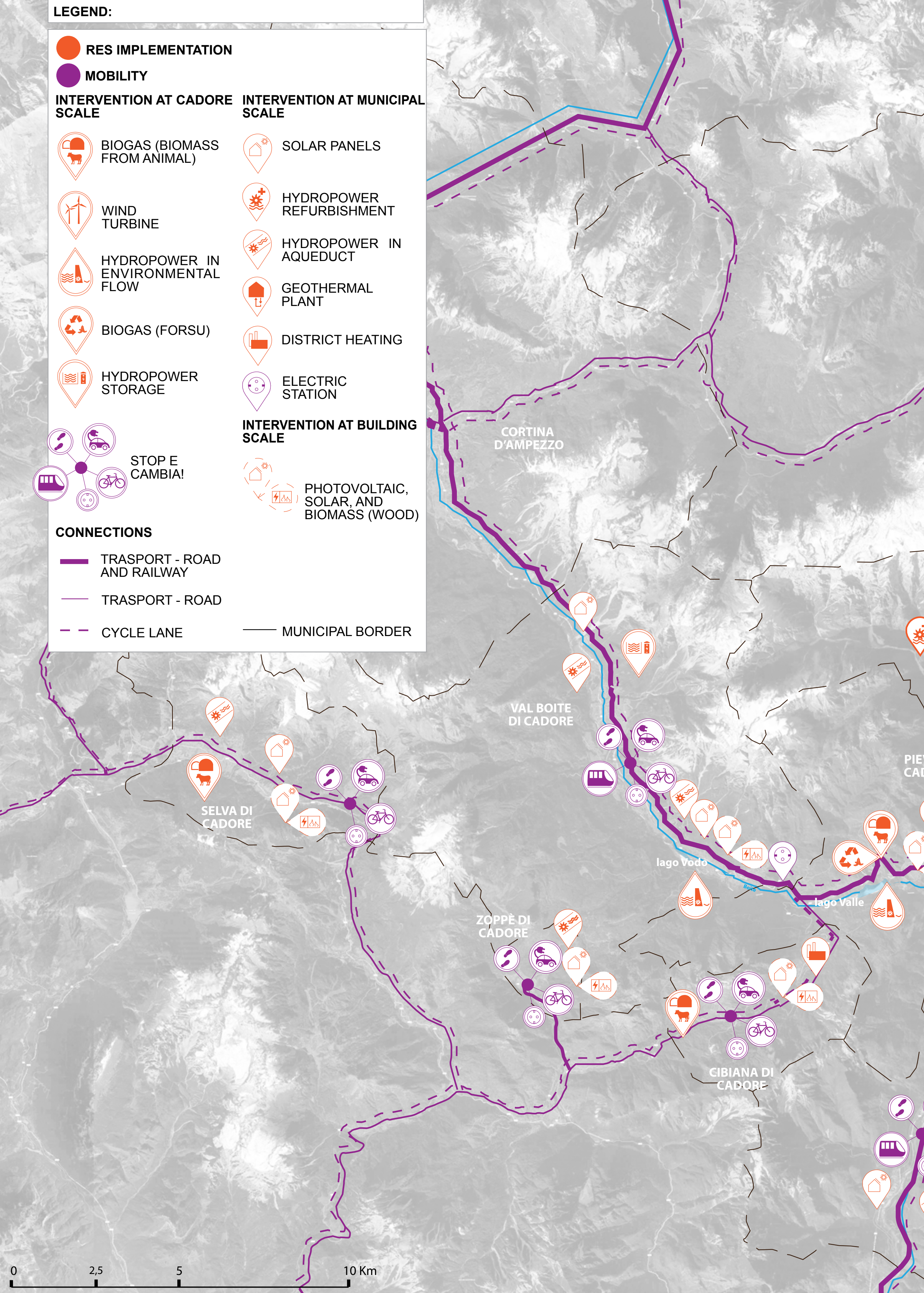
The correspondence between the different sectors and the decrease of CO_2 is shown inFigure 3.16, and it is graphically represented in the poster used in the SWII (reported in Appendix 5.3).

Grappolo Balsamico (Healthy Cluster)	**Tonne of CO_2 in 2010**	**Tonne of CO_2 in 2050**	**% Reduction of CO_2 Emissions** in comparison to the year 2016
Transport *	69480	13153	80%
Industry **	10310	2168	80%
Agriculture **	1342	133	90%
Energy production **	834	16	98%
Residential **	42936	3864	90%
Institutional and commercial **	8874	798	90%

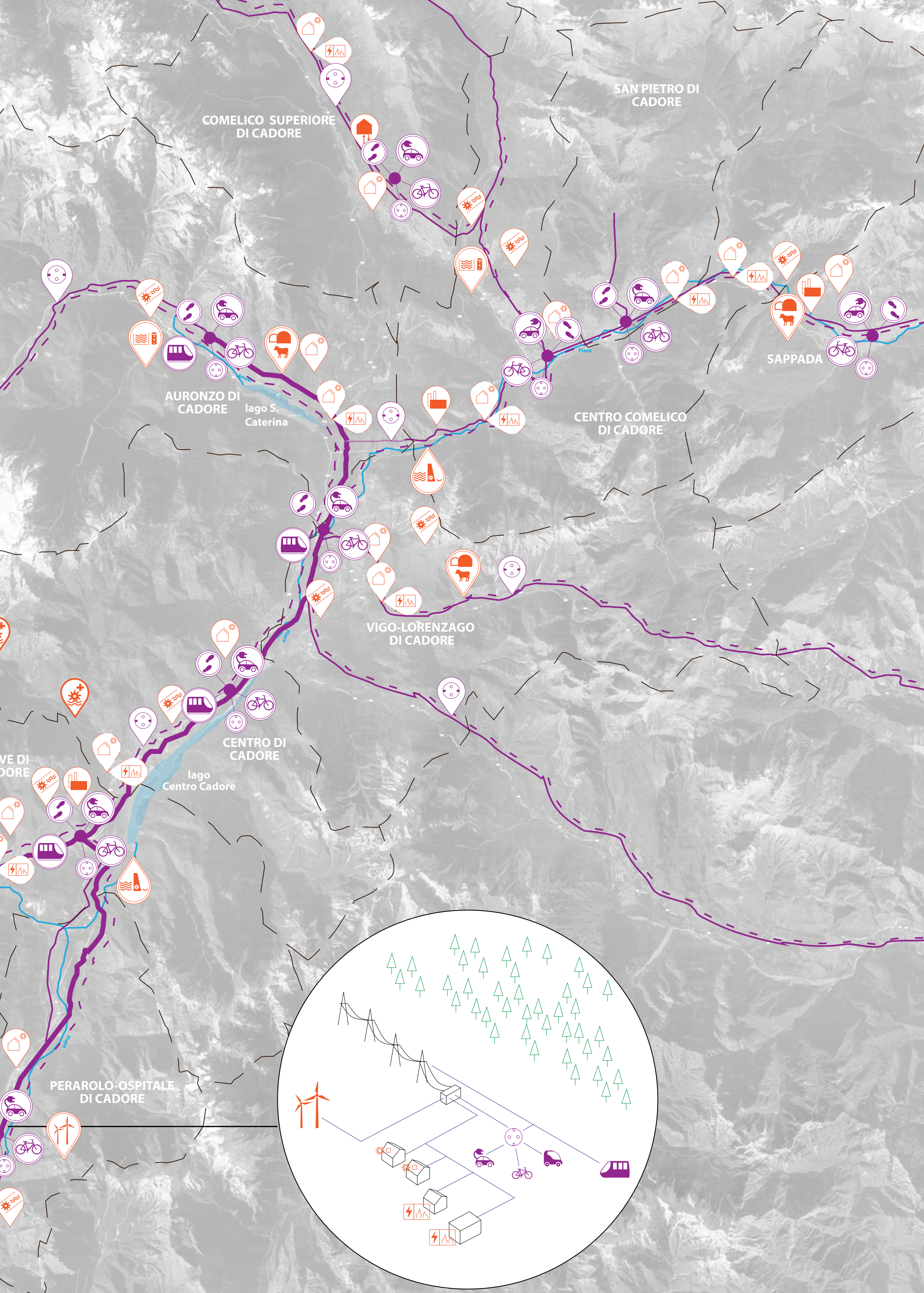
*Conversion Factor 0,279 tCO2/MWh
**Conversion factor for electricity 0,483 tCO2/MWh, for natural gas 0,202 tCO2/Mwh (source of conversation factor: Covenant of Mayors, 2015, Technical annex to the SEAP template instructions document: The Emission Factors)

Table 3.16. The carbon emissions per sectors in 2010 and in 2050 in the vision Grappolo Balsamico. The figures here reported are rounded up.

Figure 3.61. The following page shows the map of the defined vision Grappolo Balsamico. The base map underlines the richeness in natural resources of the area. The icons represent the actions identified by the back-casting process. The page after that shows the time-line used as base for the design of the path during the SWII (author's own design).



LEGEND:
RES IMPLEMENTATION
MOBILITY
INTERVENTION AT CADORE SCALE
BIOGAS (BIOMASS FROM ANIMAL)
WIND TURBINE
HYDROPOWER IN ENVIRONMENTAL FLOW
BIOGAS (FORSU)
HYDROPOWER STORAGE
STOP E CAMBIA!
INTERVENTION AT MUNICIPAL SCALE
SOLAR PANELS
HYDROPOWER REFURBISHMENT
HYDROPOWER IN AQUEDUCT
GEOTHERMAL PLANT
DISTRICT HEATING
ELECTRIC STATION
INTERVENTION AT BUILDING SCALE
PHOTOVOLTAIC, SOLAR, AND BIOMASS (WOOD)
CONNECTIONS
TRASPORT - ROAD AND RAILWAY
TRASPORT - ROAD
CYCLE LANE
MUNICIPAL BORDER
CORTINA D'AMPEZZO
VAL BOITE DI CADORE
SELVA DI CADORE
lago Vodo
lago Valle
ZOPPÈ DI CADORE
CIBIANA DI CADORE
0
2,5
5
10 Km


COMELICO SUPERIORE
DI CADORE
SAN PIETRO DI
CADORE
AURONZO DI
CADORE
lago S.
Caterina
CENTRO COMELICO
DI CADORE
SAPPADA
VIGO-LORENZAGO
DI CADORE
CENTRO DI
CADORE
lago
Centro Cadore
PERAROLO-OSPITALE
DI CADORE

Rules of the game!

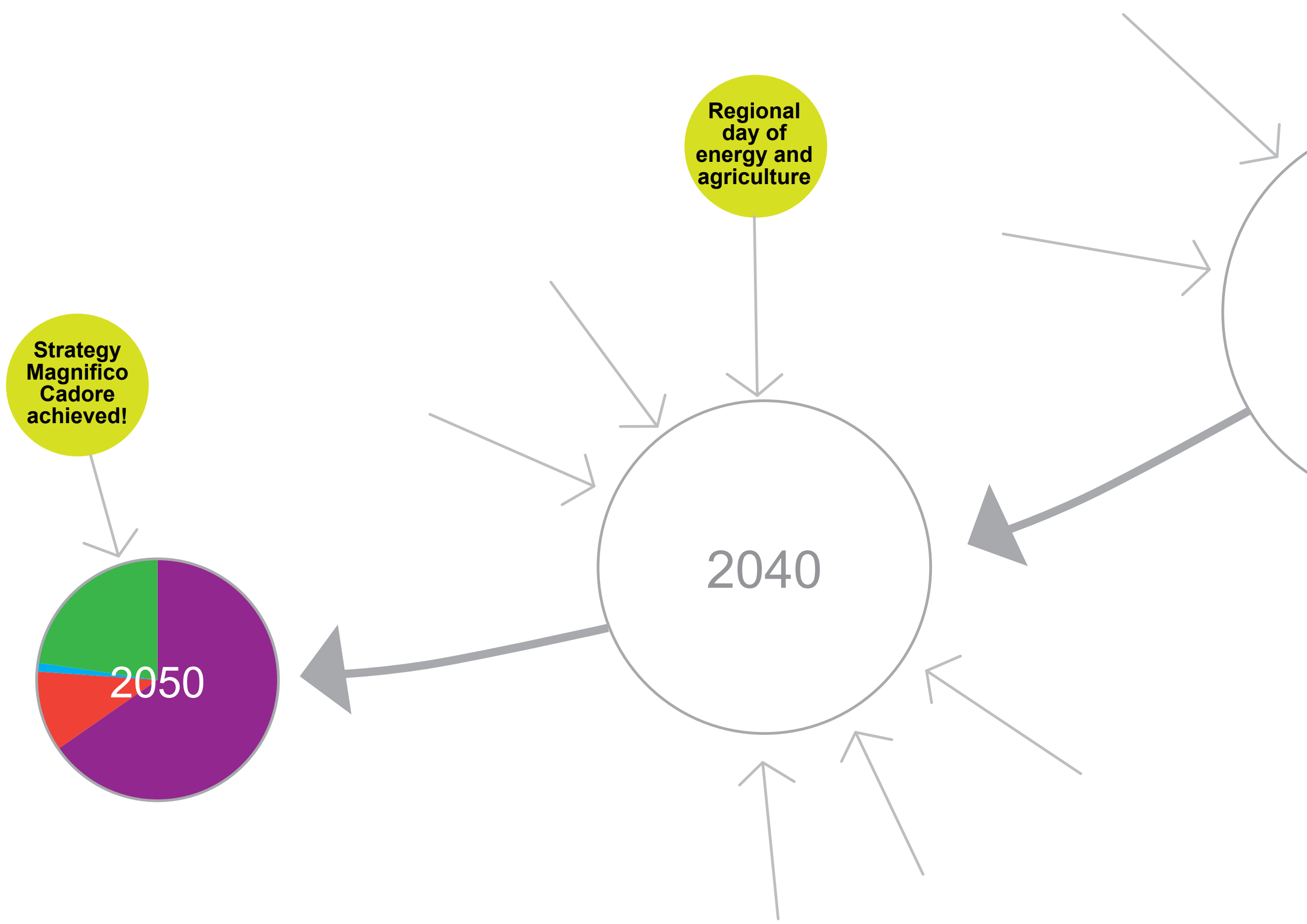
1. First stick the actions on the suitable year. The stickers refer to the achieved actions and report the percentage of decreased emissions in respect to the year 2016.

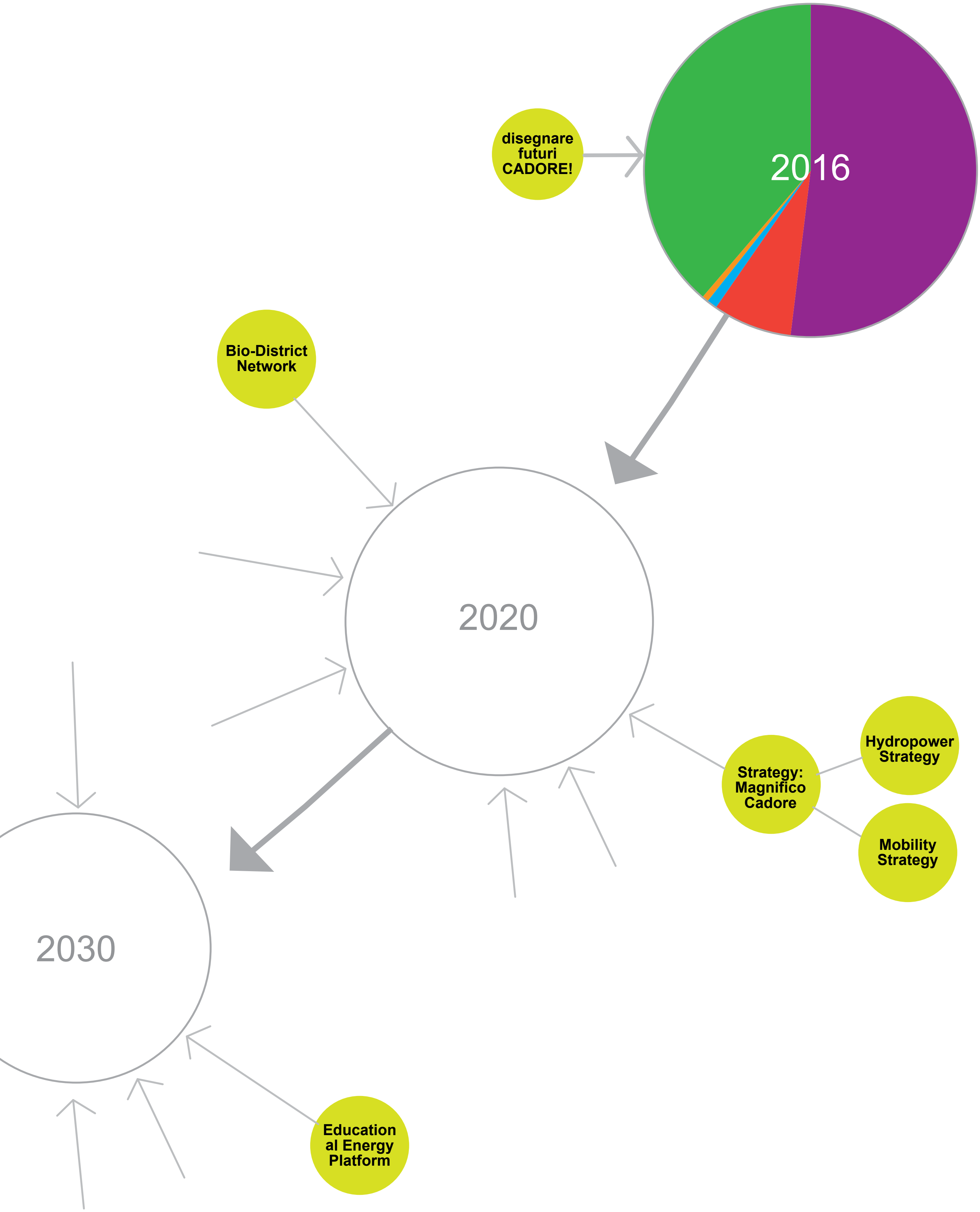
2. Then draw in the circles the quota of emissions per each different sector (Transport; Residential, Commercial, and Institutional; Industry; Agriculture; Energy Production).

3.Use all the stickers.

LEGEND:

- MANAGEMENT OF RESOURCES AND CO_2
- MOBILITY
- RES IMPLEMENTATION




2016
disegnare futuri CADORE!
Bio-District Network
2020
Strategy: Magnifico Cadore
Hydropower Strategy
Mobility Strategy
2030
Educational Energy Platform

Borghi & Nodi

(Villages & Knots)

We are living in small villages of about 1500 inhabitants. The tWe are living in small villages of about 1500 inhabitants. The two main towns, Lienz and Centro di Cadore, are connected through an overground subway line. The main energetic resources of the territory are managed from these two hubs that also host the research centers, DoloUni. Lienz and Centro di Cadore cooperate for the study and the use of the Alpine environment, here the most innovative energetic infrastructures for the mountain environment have been developed. In the last decade the locals have nonetheless again found the relation with nature that was lost during the economical boom of the 80s. The few tourists who come in search of distractions from the city, and who decide to live here, in these small villages, love the contact with nature and the calm.
In the last decade we struggled with the energy transition challenge, but now each village has few small renewable resource plants, private or public, and we are proud of it!
This situation was mainly developed thanks to the Covenant of Mayors, that each municipality signed, since it was forced to think about the future! The biggest plants are in Centro di Cadore where DoloUni is also located. DoloUni offers educational opportunities, focused on energy, for everyone, from children to practitioners. Moreover every year it organizes the mountain energy week, visited by thousands of experts.

Borghi & Nodi

Figure 3.62. The picture shows the DoloUni buildings in Centro di Cadore. In the foreground the iconic urban and architecture intervention of the Technical University of Delft, while in the background the Centro Cadore Lake (author's own design).

Borghi & Nodi

Back-Casting the Borghi & Nodi Vision

In the Borghi & Nodi vision, 17 municipalities compose Cadore instead of 22 municipalities: Sappada; San Pietro di Cadore; Perarolo di Cadore; Ospitale di Cadore; Comelico di Cadore (that comprehends current day Danta di Cadore, Santo Stefano di Cadore, San Nicolò di Comelico), Comelico Superiore di Cadore; Auronzo di Cadore, Vigo di Cadore; Lorenzago di Cadore; Calalzo di Cadore; Domegge di Cadore; Lozzo di Cadore; Centro di Cadore (that comprehends present day Pieve di Cadore and Valle di Cadore); Selva di Cadore; Val Boite di Cadore (that comprehends current day San Vito di Cadore, Borca di Cadore and Vodo di Cadore); Zoppé di Cadore; and Cibiana di Cadore. The economic model in the vision follows the present model, with small factories and manufacturing of different sorts based on the **handicraft capability**, e.g., black smith, carpenter, tailoring, small eye-glass industries, food products, and furniture industry. A slight economic growth due to more intensive industrial activities brings more beneficial investments for research in **DoloUni**. Some villages remained isolated and maintained the character of unexplored territory. The latter is the reason why the villages see a high amenity migration due to the good quality of life. A consequent demographic growth ensures the presence of 36000 inhabitants in 2050. The most urbanized towns are Centro di Cadore, where the headquarters of DoloUni is, and Lienz, the nearest Austrian town. Those two centres are connected through an over-ground subway line.

The engineering process, and back-casting approach, of the vision resulted in a series of actions in all of the three sectors of *mobility*, *management of natural resources and CO_2 emissions*, and *RES implementation*.

The visions show that in 2050 85% decrease in CO_2 emissions - based on the 2010 data. In that respect 77% of the CO_2 emissions in 2050 depends on transport; the 5% depends on the residential, commercial and institutional buildings; 18% depends on industry; agriculture decrease visibly from the activities done in the territory with a contribution lower then 1% on the CO_2 emissions.

In the sector of *management of natural resources and* CO_2 *emissions*, three fields of actions are fixed. The first is the adoption of the **Covenant of Mayors** by all of the Cadore municipalities, thus each of them has its own Action Plant to manage resources independently (represented by the **tool-kit** in Figure 3.64). The Action Plan also causes the transformation of all the inefficient public buildings into passive buildings by 2050. The second field concerns the adoption of a **DoloMobility** strategy that guides the actions carried out in the *mobility* sector. The third field

Borghi & Nodi

concerns the foundation of the platform **DoloEnergy** that will lead to the creation of the DoloUni center. The educational platform DoloEnergy organizes meetings with citizens in schools and with practitioners and experts. The *mobility* sector switches old public transport and public administration vehicles to **green vehicles** (the term green vehicles refers to electric or hydrogen). In almost each village there is also a station for charging electric vehicles. The second action is the **overground metropolitan** line that connects Centro di Cadore to Tyrol, and that involves the construction of metropolitan stations in each village. An additional action is the realization of **bike sharing** spots, an intervention carried out in a different moment by different municipalities without an integrated system. The actions in the *RES implementation* sector are reported in the following chapter 'Energy Spatial Impacts'. In this vision, the local administrations and large private companies are the investors in the sector of action.

Energy Spatial Impacts

The production and demand of energy for the region sees a high increase in the urban center Centro di Cadore. The consumption and supply of energy in the vision is based on the 'Reference Scenario with High Economic Growth' of the Energy Roadmap 2050 by the European Commission (2012), that provides a benchmark of the forecasted energy data related to 2050. For the purpose of engineering, the data 'Gross Inland Consumption Per Capita' has been considered. The calculated supply of energy of the vision matches 48 % of the consumption of the territory, through a diversified RES supply. In the vision, the amount of energy nowadays produced by hydropower is considered (data available in: ARPAV, 2012; Natalini, 2010), while the energy produced by other RES is not mentioned. From the interviews, colloquiums, and Checking the Documents it is clear that the local production of electricity in the Belluno Province is currently high thanks to hydropower, while the provision of energy from other RES is not yet outstanding ►.

► The current energy situation in Cadore is described in chapter 3.1.4.

The *RES implementation* sector of the vision requires additional energy capacity from hydropower that would supplement the already installed plants. This additional capacity is given by the **refurbishment** of old plants, the installation of new plants in the environmental flows of already existing dams, and the realization of small plants in the aqueducts. The vision presents two biomass plants – **district heating** – and separate **cogeneration** boilers in the public buildings.

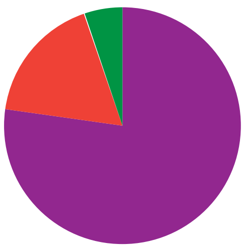
Borghi & Nodi

CO_2 EMISSIONS IN CADORE IN 2050

TRANSPORT
77%
14233 tonne

RESIDENTIAL, COMMERCIAL, AND INSTITUTIONAL
5%
952 tonne

INDUSTRY 18%
3220 tonne



CO_2 EMISSIONS IN CADORE IN 2016

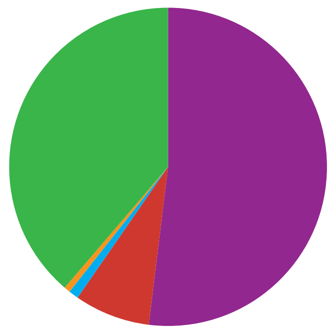
TRANSPORT 52%
69480 tonne

RESIDENTIAL, COMMERCIAL, AND INSTITUTIONAL 39%
51839 tonne

INDUSTRY 8%
10310 tonne

AGRICULTURE 1%
1342 tonne

ENERGY PRODUCTION 0,1%
834 tonne



SECTORS OF ACTIONS

	MOBILITY			MANAGEMENT OF RESOURCES AND CO_2			
2050 SPACE	Railway, cycle lane, walk lane	14 electric stations	13 metropolitan stations	Action Plans (Covenent of Mayors)	Strategy **DoloMobilità**	Platform **DoloEnergia** **DoloUni**	
	RES IMPLEMENTATION						
2050 RESOURCES	Sawmill waste, and woodchip from cleaning the forest	Small new plants, plants in aqueducts, hydropower storage	33000 m² solar panels 180 m x 180 m		7862 tonne FORSU per year	2000 cattle	
2050 SPACE	2 district heating systems	Refurbish-ment of old hydropower plants	On the rooftop and 3 solar farms	9 wind turbines 50 m high	1 biogas plant	2 biogas plants	4 pumps

Figure 3.63. The figure shows the CO_2 in Cadore before and after the vision. On the bottom, the sectors of actions and the respective actions are reported (author's own design).

Borghi & Nodi

The **wood** provision for the plants comes from sawmill waste, and woodchips from cleaning the forest, of about 10 m^3/ha of wood at year. The vision requires the installation of nine **wind turbines** of 20 kW located in Perarolo di Cadore. As far as the solar energy is concerned, the vision presents three **solar farms** of roughly 2000 m^2 each, and the installation of solar panels on the **roofs** of public buildings. There is also a **biogas plant** from FORSU and livestock, this plant uses the organic waste produced by the region with an additional import of FORSU of 100%. Two biogas plants manage the manure of about 2000 adult cows. The vision shows also a geothermal plant located in Val Grande – todays Comelico Superiore – where a natural hot aquifer is.
The correspondence between the different sectors and decrease of CO_2 is shown in Table 3.17, and it is graphically represented in the poster used in the SWII (reported in Appendix 5.3).

Energy Consumption		
Gross Inland Consumption Per Capita expressed in MWh for the year 2050 *	43	
MWh Consumed by 36000 Inhabitants in 2050	1548000	

Supply from Renewable Energy Sources in 2050	**MWh**	**% on the Total Demand**
Hydropower	479502	31%
Biomass – from wood	62091	4%
Wind power	2000	0,1%
Solar energy	202246	13%
Biogas - from FORSU	2720	0,2%
Biogas - from livestock	876	0,1%
Geothermal power	527	-
Total supplied MWh annual	240973337	48,4%
*Gross Inland Cons./Capita of the 'Reference Scenario with High Economic Growth' scenario (data source: EC, 2012, p. 165)		

Table 3.17. The carbon emissions per sectors in 2010 and in the vision Borghi & Nodi in 2050. The figures here reported are rounded up.

LEGEND:

- 0,5% PIEVE

scale of intervention

type of source

percentage of decreased CO_2 emissions in comparison to 2016 level

place of the intervention

INTERVENTION AT CADORE SCALE

INTERVENTION AT MUNICIPAL SCALE

INTERVENTION AT BUILDINGS SCALE

Conversion Factor for transport 0,279 tCO_2/MWh
Conversion Factor for electricity 0,483 tCO_2/MWh, for natural gas 0,202 tCO_2/MWh (source of conversation factor: Covenant of Mayors, 2015, *Technical annex to the SEAP template instructions document: The Emission Factors*)

ACTIONS IN EACH SECTORS:

MANAGEMENT OF RESOURCES AND CO_2

MANAGEMENT PLAN OF HYDROPOWER SOURCE

FILTER FOR HOUSEHOLD CHIMNEY

MOBILITY

ELECTRIC STATION

- 6 % PRIVATE TRANSPORT

- 20 % OVERGROUND METROPOLITAN

- 1 % BIKE SHARING

METROPOLITAN STATION

- 0,2 % SIDEWALK that connect villages

- 14 % GREEN PUBLIC TRANSPORT and green vehicles of public administrations

RES IMPLEMENTATION

-3% CENTRO — DISTRICT HEATING

- 0,2% — GEOTHERMAL PLANT

- 7% — COGENERATION BOILER biomass from wood

-3% COMELICO — DISTRICT HEATING

- 0,5% — WIND TURBINES

- 1% — REFURBISHMENT OF HYDROPOWER PLANT

-0,5% SAPPADA — SOLAR FARM 2000 m²

- 1% — BIOGAS PLANT biomass from FORSU

- 17% — NEW HYDROPOWER PLANT

-0,5% SELVA — SOLAR FARM 2000 m²

- 0,2% CENTRO — BIOGAS PLANT biomass from animals

- 0,2% CENTRO — HYDROPOWER PLANT in environmental flow

-0,5% RITE — SOLAR FARM 2000 m²

-0,2% COMELICO — BIOGAS PLANT biomass from animals

- 0,2% CENTRO — HYDROPOWER PLANT in environmental flow

-4% 27000 mq — PRIVATE SOLAR PANELS IMPLEMENTATION

TOOL-KIT FOR EACH PUBLIC ADMINISTRATION: passive buildings, solar panels on the rooftop, hydropower plant in, aqueducts, forest management plan

- 0,2% VAL BOITE — HYDROPOWER PLANT in environmental flow

Borghi & Nodi

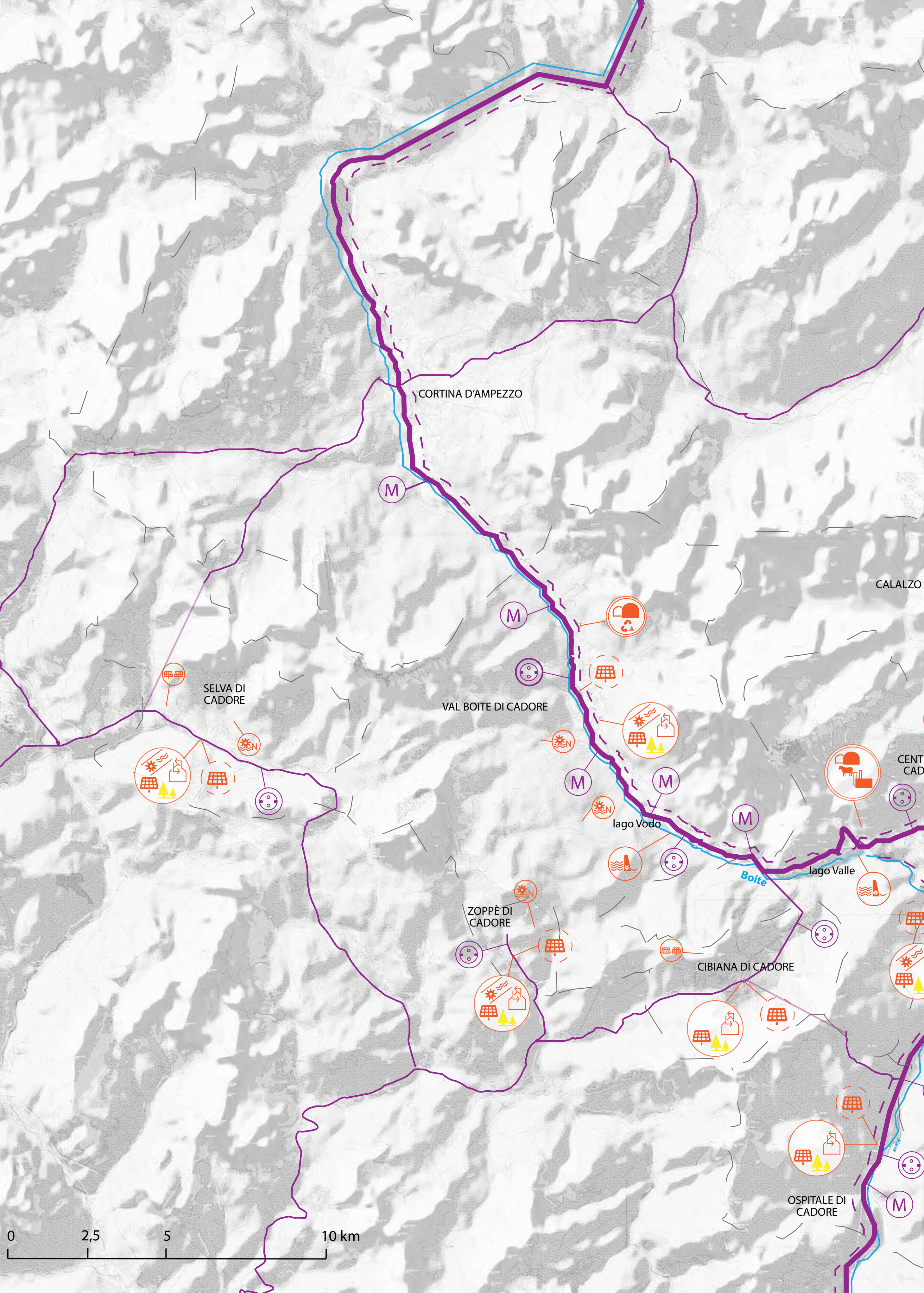
Figure 3.64. The figure shows the set of actions at the three scales of intervention identified by back-casting the Borghi & Nodi vision (author's own design).

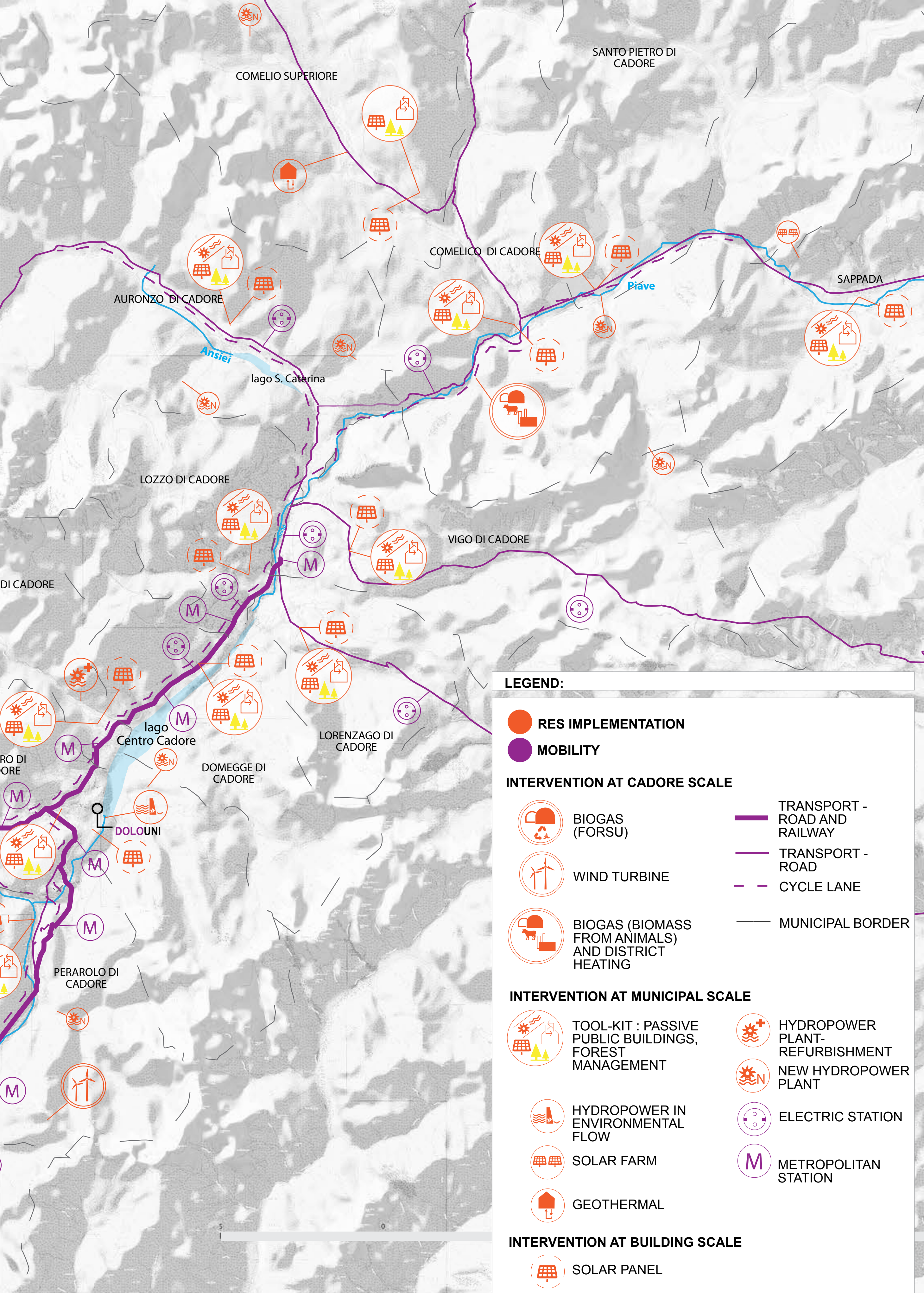
Figure 3.65. The following page shows the map of the defined vision Borghi & Nodi. The cartography used as a base underlines the physical connections among the nearest urbanized centers. The icons represent the actions identified by the back-casting process. The page after that shows the time-line used as a base for the design of the path during the SWII (author's own design).

Borghi & Nodi (Villages & Knots)	**Tonne of CO_2 in 2010**	**Tonne of CO_2 in 2050**	**% Reduction of CO_2 Emissions** in comparison to the year 2016
Transport *	69480	14233	80%
Industry **	10310	3220	70%
Agriculture **	1342	15	99%
Energy production **	834	8	99%
Residential **	42936	2146	95%
Institutional and commercial **	8874	443	85%

*Conversion Factor 0,279 tCO2/MWh
**Conversion factor for electricity 0,483 tCO2/MWh, for natural gas 0,202 tCO2/Mwh (source of conversation factor: Covenant of Mayors, 2015, Technical annex to the SEAP template instructions document: The Emission Factors).

Table 3.18. The carbon emissions in 2010 per sectors and in the vision Borghi & Nodi in 2050. The figures here reported are rounded up.


CORTINA D'AMPEZZO
CALALZO
SELVA DI CADORE
VAL BOITE DI CADORE
CENT
CAD
lago Vodo
Boite
lago Valle
ZOPPÈ DI CADORE
CIBIANA DI CADORE
OSPITALE DI CADORE
M
0
2,5
5
10 km



SANTO PIETRO DI CADORE
COMELIO SUPERIORE
COMELICO DI CADORE
SAPPADA
Piave
AURONZO DI CADORE
Ansiei
lago S. Caterina
LOZZO DI CADORE
VIGO DI CADORE
DI CADORE
lago Centro Cadore
LORENZAGO DI CADORE
DOMEGGE DI CADORE
DOLOUNI
PERAROLO DI CADORE
LEGEND:
RES IMPLEMENTATION
MOBILITY
INTERVENTION AT CADORE SCALE
BIOGAS (FORSU)
WIND TURBINE
BIOGAS (BIOMASS FROM ANIMALS) AND DISTRICT HEATING
TRANSPORT - ROAD AND RAILWAY
TRANSPORT - ROAD
CYCLE LANE
MUNICIPAL BORDER
INTERVENTION AT MUNICIPAL SCALE
TOOL-KIT : PASSIVE PUBLIC BUILDINGS, FOREST MANAGEMENT
HYDROPOWER PLANT- REFURBISHMENT
NEW HYDROPOWER PLANT
HYDROPOWER IN ENVIRONMENTAL FLOW
ELECTRIC STATION
SOLAR FARM
METROPOLITAN STATION
GEOTHERMAL
INTERVENTION AT BUILDING SCALE
SOLAR PANEL

Rules of the game!

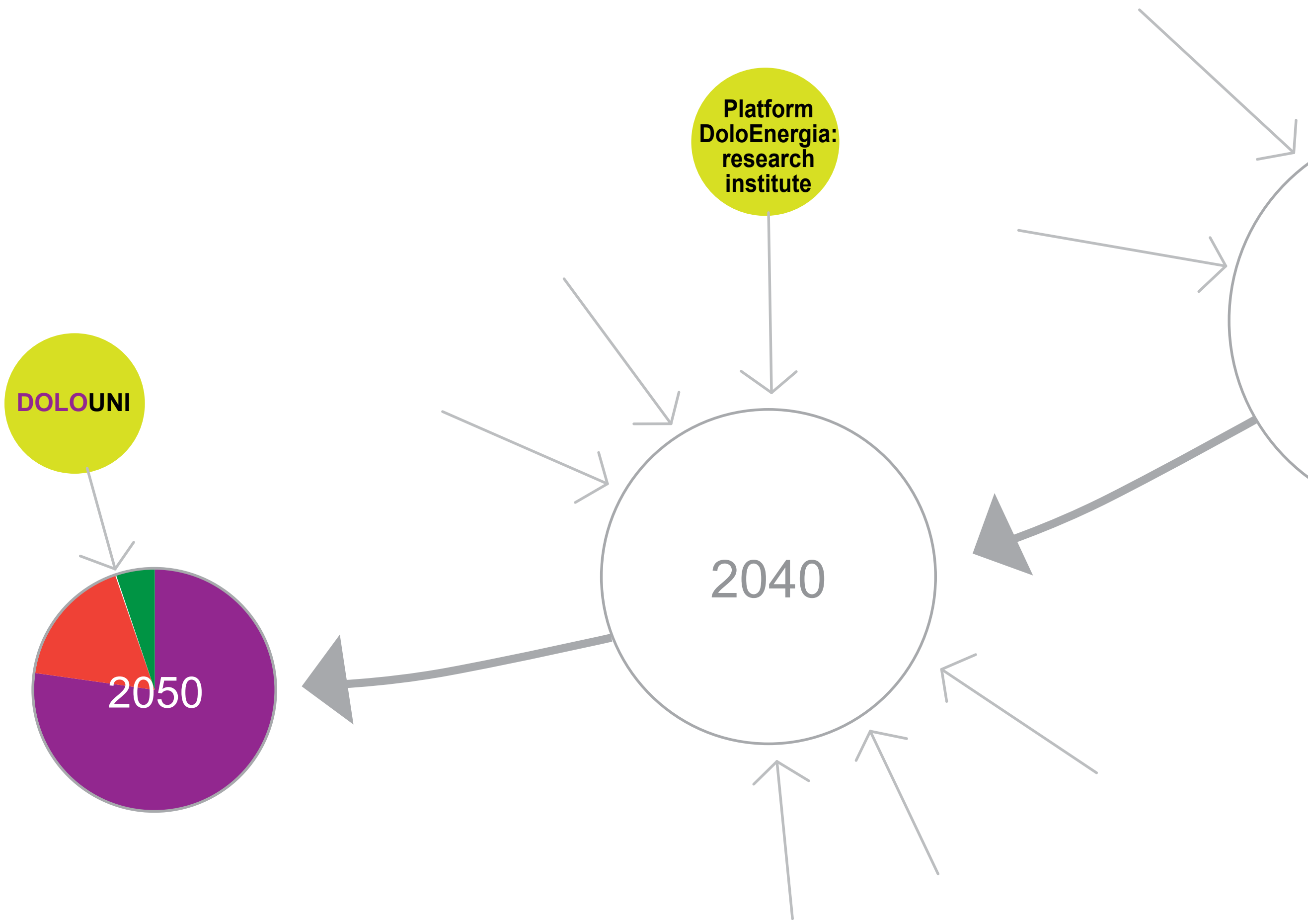
1. First stick the actions on the suitable year. The stickers refer to the achieved actions and report the percentage of decreased emissions in respect to the year 2016.

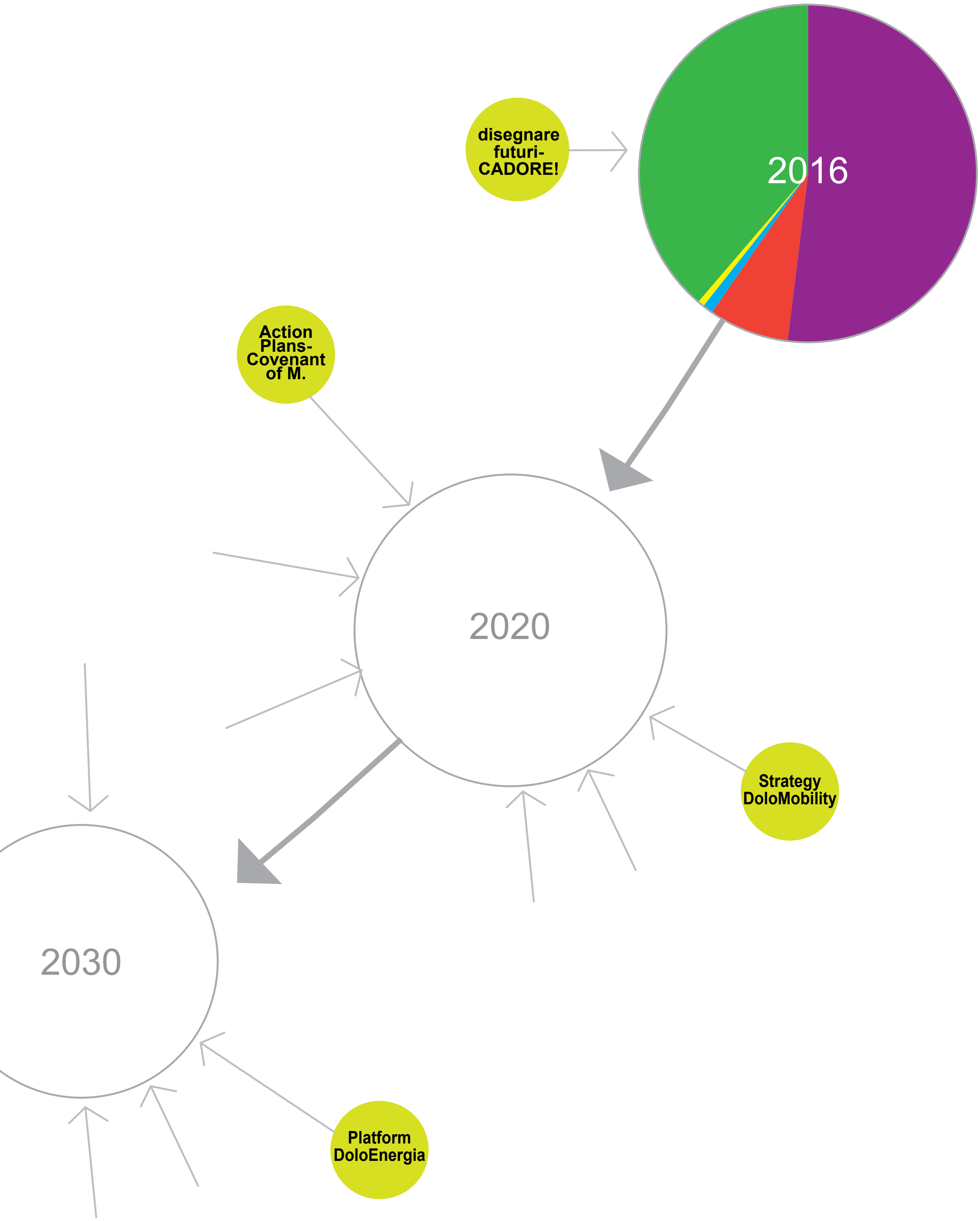
2. Then draw in the circles the quota of emissions per each different sector (Transport; Residential, Commercial, and Institutional; Industry; Agriculture; Energy Production).

3.Use all the stickers.

LEGEND:

- MANAGEMENT OF RESOURCES AND CO_2
- MOBILITY
- RES IMPLEMENTATION




disegnare futuri-CADORE!
2016
Action Plans-Covenant of M.
2020
Strategy DoloMobility
2030
Platform DoloEnergia

3.4.4. Stakeholder Workshop II and the Study Tour

The aim of the Stakeholder Workshop II (SWII), named 'disegnare futuri - Cadore II', was to present and confront the visions developed after the SWI, the OS, and the back-casting process, and to design the paths toward the visions. The invited stakeholders were the same decision-makers of the SWI: the 22 local mayors or representatives, the president of the MCC, and the president of GAL. The invitations were sent three times by e-mail both from the MCC and from me, once by mail with certified mail.
The SWII took place the 27th and 28th of May 2016 in the MCC building and in Kötschach-Mauthen (Austria). The first day of the event consisted in a reserach **presentation** and **focus groups**, the second day was a tour of a **best practice** municipality. 10 individuals attended on the first day (2 mayors, the vice president of the MCC, 2 vice mayors, 5 municipal councilmen). The second day was open to the workshop participants and to interested citizens.
The research presentation lasted approximately 45 minutes following the order of the presented panels (Appendix 5.3). It also included some dialogue with the participants on the CO_2 emissions data from ARPAV. The focus group, in which the stakeholders actively participated, involved the design and adjustment of the paths to reach the visions: only one group was formed due to number of participants (10). The scope of the focus group was to **design the paths** to go toward the two defined presented visions. The visual material used to do that were a series of stickers, they represented the different actions and milestones emerged from back-casting that had to be fixed on a chronological line toward the future, the year 2050. The three moderators of the focus group were skilled in facing a discussion on low-carbon futures. One was specialized in community psychology and had the task of exploring the social dynamics between the participants and their opinions on the social setting of the visions. The second, an architect, had the task of bringing creativity inside the group by proposing and moderating new spatial solutions. The third moderator was myself; I drove the debate mainly on the energy topic and on the actions of the paths.
The **study tour** took place on the 28th of May, it aimed to show a best practice in the nearest Carinthia Region (Austria) were an energy vision has been adopted, and is now in the implementation phase. The best practice is the Kötschach-Mauthen village, well known as a **self-sufficient** energy model community. In 2006 the association 'energie: autark Kötschach-Mauthen' initiated the

supervision and promotion of RES. The main function of the association is raising energy awareness, supervising RES projects, and organising energy tours. The participants in the study tour were 20 (including the three moderators). The head of local association guided the tour through the main energy sites of the village, providing clear explanations and information about the idealization, realization, and management of the energy vision (see details in the timetables Table 3.19).

15th April	Written Invitations
06th May	Online Invitations
27th May	Stakeholder Workshop II
	16:30 -17:30 Frontal presentation 18:00 - 19:00 Focus group 19:00 – 19:30 Final discussion
28th off May	Study Tour
	8:00 departure from Pieve di Cadore 11:00 arrival in Kötschach-Mauthen Presentation of the 'energie:autark Kötschach-Mauthen' Visit to the Sonnenenergie –Rathaus energy plants 14:00 visit to the hydropower storage plant Visit to the wind-power plant 19:30 Arrival in Pieve di Cadore

Table 3.19. The timetable of the SWII 'disegnare futuri - Cadore II'.


Borghi & Nodi
Borghi & Nodi

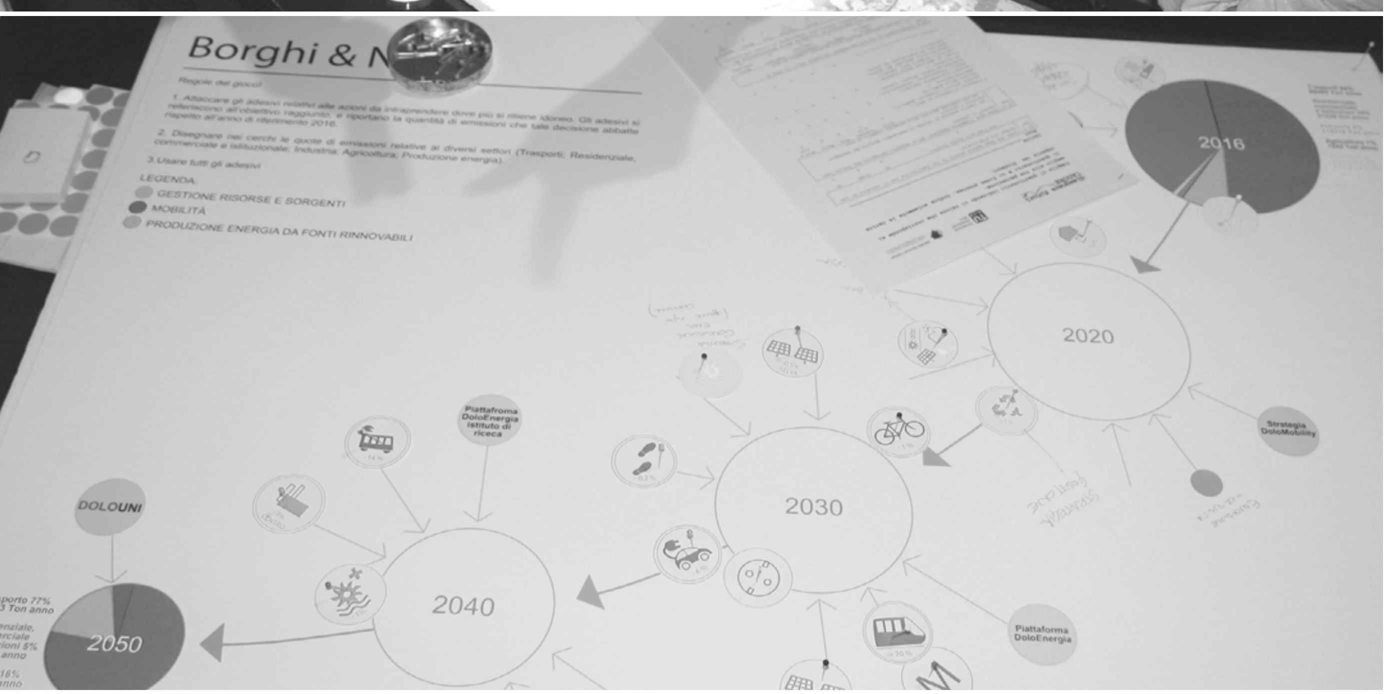

Borghi & N
Regole del gioco!
1. Attaccare gli adesivi relativi alle azioni da intraprendere dove più si ritiene idoneo. Gli adesivi si riferiscono all'obiettivo raggiunto, e riportano la quantità di emissioni che tale decisione abbatte rispetto all'anno di riferimento 2016.
2. Disegnare nei cerchi le quote di emissioni relative ai diversi settori (Trasporti; Residenziale, commerciale e istituzionale; Industria; Agricoltura; Produzione energia).
3.Usare tutti gli adesivi
LEGENDA:
GESTIONE RISORSE E SORGENTI
MOBILITÀ
PRODUZIONE ENERGIA DA FONTI RINNOVABILI
2016
2020
2030
2040
2050
Piattaforma DoloEnergia istituto di ricerca
DOLOUNI
Strategia DoloMobility
Piattaforma DoloEnergia

Figure 3.66. The first picture shows the presentation of the research, the following show the focus group at work in the SWII.

The collection of qualitative and quantitative data in the SWII involved different research methods (see Table 3.20). A pre and post event self-completion questionnaire, structured according to the four learning dimensions and the information dimension, aimed to rank the participants' knowledge and perception about the low-carbon topic and the variables present in the visions. Data was collected through the Likert scale: one to five, five being the maximum. The pre-event questionnaires were filled out at the beginning of the event, while the post-event questionnaires were filled out at the end of the focus group. A third self-completion questionnaire was filled out at the end of the tour, and had the aim of ranking the quality and usefulness of this experience. Through the collection of qualitative data, the focus group allowed for the study of how the participants individually and collectively make sense of low-carbon as a matter of concern, and construct meanings around it. The moderators followed a guide, shaped on the five dimensions of learning and information ►. Data was collected regarding the participants' responses to questions posed by the moderators, and the participants' verbal and non-verbal interactions.

► The four social learning dimensions, and the fifth information dimension, are part of the scheme for the Visioneering evaluation, and are widely explained in chapter 2.5.

In addition to written notes, drawings and sketches were collected (the questionnaires are reported in Appendix 5.1).

Methods	**Data Type**	**Amount of Data**
Pre and post questionnaire	Returned sheet	8 pre event questionnaires 10 post event questionnaire
Focus group	Audio Notes Photos	3 moderators 1 observer
Tour questionnaire	Returned sheet	11 questionnaire (6 councilman, 2 mayor, 1 MCC president, 2 citizens)
Visual material	Sketch Drawing Stickers	2 Maps (visions) 2 Paths

Table 3.20. Overview of the mixed research methods for the evaluation of the visioneering mode application in the SWII.


KW.-KREUZTRATTE

Figure 3.67. Pictures from the study tour in Kötschach-Mauthen - Carinthia, Austria (figure source: B. Medeot, 28th of May 2016).

Findings from the Stakeholders Workshop II and Study Tour

The findings from the SWII and study tour report the changes in the social learning dimensions and information dimension that refers also to new insight in the design aspects. The paths, as designed during the workshop, are reported separately in the next section 3.4.5, due to the relevance of their contents. 50% of the participants of the SWII didn´t attended the previous SWI. In this empirical research **discontinuity** decreases a better understanding of the research between the stakeholders, but permits the contribution of new participants and different ideas.

After the SWs, changes were identified in each of the social learning dimensions. In this respect, another limit of the research is given by the time between the SWI and SWII, time in which the stakeholders were subjected to a variety of external influences that could vary the changes in the social dimensions. The known **external influences** were mentioned by the participants, such as policy variables from different levels of governance, and the role of local media ►. The unknown external influences remain unidentified.

► Innes and Booher called this type of limit, in the 'collaborative rationality' theory, external pressure. See chapter 2.1.3.

Cognitive Knowledge Dimension

In general, the participants of the SWII had good knowledge about the CO_2 emissions in the area. The discussion during the frontal presentation mostly regarded the accuracy of the carbon emissions data from ARPAV, and the initiative already tackled by the municipalities.

Surprisingly the interests of those who attended was limited to the borders of their own municipality - the administrative borders –. Only few other topics there were a larger interests on: waste management, and the *mobility* sector. Questions were asked regarding the Santo Stefano di Cadore municipality biomass plant and its district heating. In this case the knowledge **exchange** was useful and well formulated by the individuals.

In the post event questionnaires, 80% of the stakeholders stated that they increased their familiarity with the concept of low-carbon, and their perceptions of the importance of actions in the mobility sector.

Figure 3.68. Picture from the study tour in Kötschach-Mauthen and its wind turbine at the Plöckenpaß - Carinthia, Austria (figure source: B. Medeot, 28th of May 2016).

Mutual Understanding Dimension

Concerning the Regional Grasp aspect, the region already produces a high amount of electricity, but it is consuming a large amount of oil and biomass, some participants would like to be rewarded for that and not take further initiatives in the field of RES. They would like to avoid the usage of natural resources of the region and maintain the landscape value, labelling RES as '**ugly technologies**'.

For the Visions' Content aspect, the participants added written notes in the visions' paths about the necessity to educate citizens and tourists on the energy topic, but also on the waste production and the *mobility* sector. During the focus group a huge debate concerning the management of waste at the regional scale occurred: some participants highlighted that they would like to see a pyrolysis plant for the combustion of all waste, rather then only FORSU, while some insisted for the use of only FORSU for biogas production.

The willingness to exchange ideas and communicate about low-carbon futures as at matter of concern was low. In that respect, in the Mutual Understanding dimension huge differences occurred between the SWI and SWII. While in the first event, the participants were more constructive, and open minded, in the second event the participants were more critical, less constructive, showing less reciprocal trust.

In the post event questionnaires, the participants declared that after the event they would be more strongly committed to the development of a low-carbon future in Cadore, mainly through the framework of the MCC.

Always in the post event questionnaires, 80% of the participants declared that they would maybe meet again with others, while 20% declared that they will certainly meet again. Once again, this shows willingness to work together in the future. In the same questionnaires the stakeholders also stated that **citizen** participation is perceived the *mobility* and *RES implementation* sectors as primarily important for the transition toward a low-carbon future in, while acknowledging the importance of all three sectors. In this respect, those who participated in the study tour to Kötschach- Mauthen admitted that the tour was one of the most **inspiring** moments of the all events. Seeing what others, that have the same resources and geographical setting, are doing was motivating. After the study tour in Kötschach-Mauthen the participants (represented not only by decision-makers) stated that experts have a minor role in implementing low-carbon futures, in comparison to politicians, administrations, and citizens.

Complexity Dimension

In both the SWs, after the event, the participants declared that the low-carbon topic is more **complex** than what they had thought before the event. When the visions started to be broken down into actions, the participants found it difficult to make decisions on **single** actions to place on the timeline, and the discussion become more tense.

Joint and Single Actions Dimension

In the pre event questionnaires, the participants stated that they will be committed in all the different aspects of life, i.e., *personal*, *municipal*, *MCC*, *regional*, and *provincial* in order to reach a low-carbon future.

As far as the Visions' Content aspect, during the design of the visions' paths, the actions referred to the *mobility* sector (e.g. train, stations) were decided upon through a collaborative effort, through dialogue and **negotiation**. The decisions made by single individuals were referred to things that had already been done, or that could be done in the municipal scale, therefore inside their own borders. Certainly the willingness in making common decisions was mainly used in the *mobility* sector.

Also in the questionnaires after the tour, the participants declared that they would be committed in all three sectors of actions, but mainly in the *RES implementation*. The participants are aware of the necessity to take Joint Or Single Action and initiatives, but not without **top-down** guidance, or not without someone who makes choices' responsibility, someone who as been called '**leader**' from the participants. There is in fact a miss-match between the goals fixed at the regional level, and the things implemented at the local level, because it is missing a body that takes care of these procedures ►. In that respect, the participants would like to see Joint Or Single Action for the low-carbon future done by the Regola and the MCC. Already in the SWI the MCC expressed the willingness to exercise its coercive force for the commitment to a regional future, but during the SWII the same institution, represented by a different person, took a different and/or opposite position. This episode showed that the individuals participating in the focus group are strongly driven by **personal perceptions**, rather than the institution they represent. This is particularly true for the low-carbon topic in which **values** and feelings for the futures are involved in the decisions to be made. The result on Likert scale of the SWI and SWII shows that, for the visions, there is gap between the perception of the **possible** and **realizable** value: all the visions are

► The Belluno Province is weakened. See chapter 3.1.3 and the last Law n.56 (7th of April 2014) in which effectively the provincial body has been converted in 'Ente di Area Vasta'.

perceived as possible, but only Grappolo Balsamico is perceived as realizable. This result shows that Visioneering has a strong potential in showing possible diverse futures, but needs to strengthen its ability to show them as realizable.

Visioneering Dimension

During the SWI, the maps were a good instrument, but not the primary source of information about the Visions' Content, surely in the SWII the image of actions, the stickers of the visions' paths, were fundamental to show what the participants were discussing about. In the SWII, the decision-makers realized the difficulties implied in each decisions when the visions were translated into actions marked on the paths as stickers. They stated that seeing each actions meant also seeing the **problems** related to the implementation of them, problems related to the level of governance that needed to be involved, the bureaucracy procedures, the provision of founds, and the opposition by a part of the citizens. The result od the design process is that the actions that were accepted by the stakeholders were the **easiest** to be implemented in the plethora of possible actions.
The visual material is therefore beneficial to strengthen awareness, to better understand each individual's role in the challenge, and the gap in the social and administrative level for the implementation of actions toward the low-carbon futures. The participants stated also that the instrument of vision helps in deciding upon Joint Or Single Action, in choosing potential personal actions, but mainly in understanding the complexity. In general, the participants think that the SWII and SWI are important events and a good basis for constructive discussion about the future. Nontheless during the SWII there was less trust in the effective impact of the research project.

Further Consideration

Some of the participants of the SWI were not present at the SWII, but in general, the invited individuals that participated in the SWI and SWII, were already active in the field of energy. That shows that those who decided to participate were already interested in the matter of concern of the low-carbon future before the events. With an initial participation in the focus group of 10 stakeholders, and final of eight (two had to go due to work obligations) the average of engaged participants during the discussion of the SWII was low. The youngest participants remained after the end of the focus group in search of a dialogue with the moderators. This demographic category, during the design of the visions' paths, scarcely participated, and when they participated, others often interrupted them. During the focus group, in fact, one of the oldest mayors insisted in guiding the participants during the entire event. Consequently a lack of 'authentic dialogue' was manifest, because some parties censored themselves ►. From participants' statements in the latter, informal dialogue emerged that gender issues also play an important role in the management of the municipalities themselves. It was said that in municipalities that have more women, in the administrative body, are more interested in social topics and the involvement of **citizens** (not in decision-making, but in activities inside the municipalities). The moderators kept the group united, especially when the atmosphere between the participants was tense, particularly on the topic of hydropower and the visual impact of solar panels. The participants forgot the general comprehension of the visions when the design of the paths began. During the activity they were mainly interested in the single actions, without taking into account the full picture (of the future).

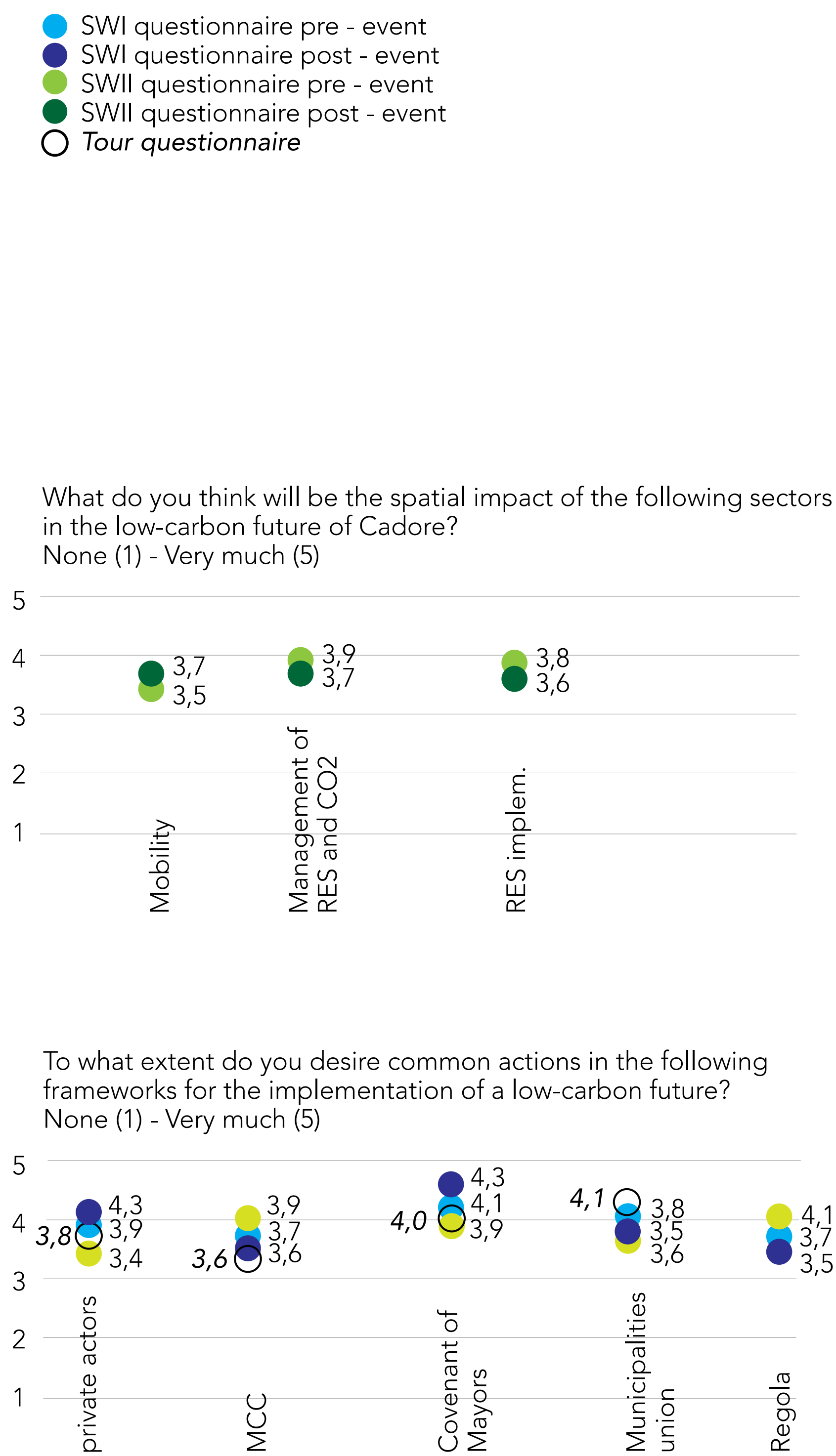
► In the Innes and Booher theory of 'collaborative rationality' the authentic dialogue is the one in which all the parties are sincere, see chapter 2.1.3.

The moderator played a less relevant role in the study tour than in the 'collaborative rationality' of the focus group, in the formal environment, moderators and participants were freely moving in the open landscape. Such **environment** facilitated the removal of power relations and status-quo between the participants, and simplified the exchange of knowledge and information among the participants, the moderators and the guides. The participants in this context asked many questions on the technical aspects of the vision implementation in the site of the tour, but also on the social setting that led to its implementation. A particularly relevant question asked during the study tour was: 'What's the difference between them (the Carinthian case) and us (the Cadore case)?'. The question refers to the capacity of the visited site to implement the project, that was perceived as possible but not realizable for Cadore itself ►. In general Visioneering, and its back-casting approach, helped to show the complexity of a global challenge such as the pursuit of a low-carbon future, and how its actions are interrelated. It helped the participants in thinking – **reasoning** – about the actions that have a regional impact and need a regional understanding. Nonetheless, the topic that involves decisions based on values and feelings for the future, allowed for the individual attitudes to emerge, hiding the institutional role of the participants.

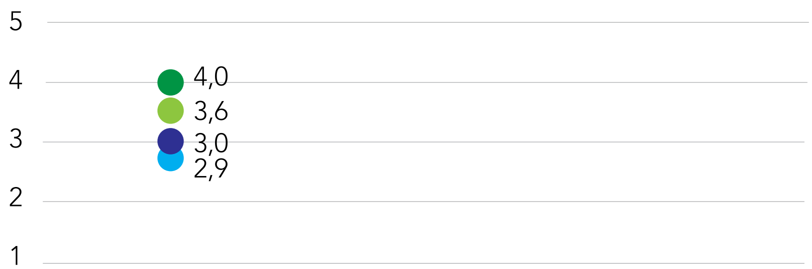
► The conflicting perception of the Cadore in comparison to the nearest region already emerged during the interviews and colloquiums in the Regional Grasp aspect, chapter 3.3.1.

Figure 3.69. In the diagrams it is possible to see the differences between the comparable questions (on the Likert scale) between the first SWI, the SWII, and the study tour (author's own design).

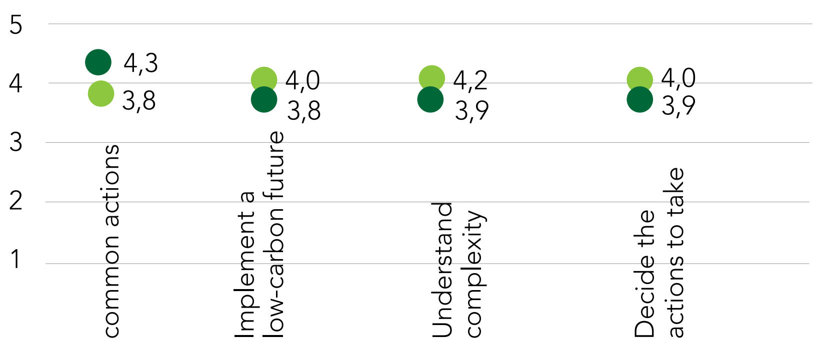
Comparision on the Likert scale of the partecipatory events results



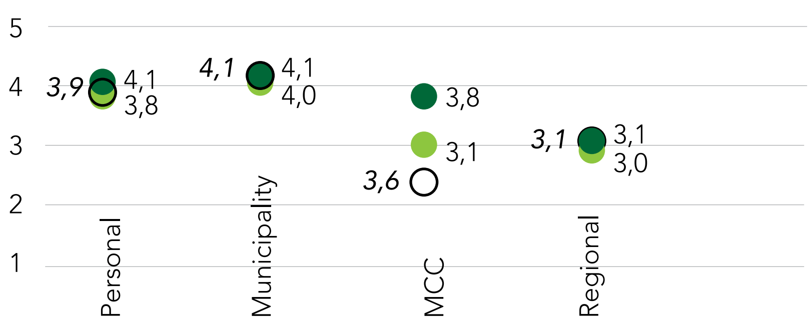
Reaching a low-carbon future in Cadore by 2050 is:
Easy (1) - Extramely complex (5)



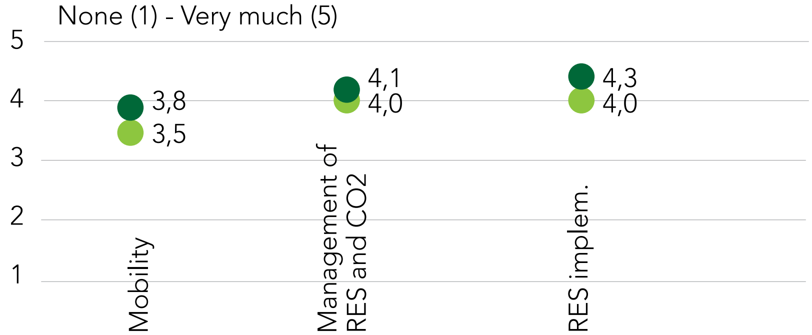
How do you think that the visions, and the paths, help to:
None (1) - Very much (5)



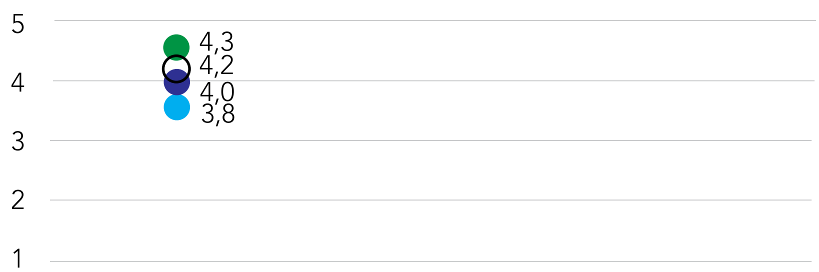
To what extent will you be commited to reducing CO_2 emissions in the following frameworks?
None (1) - Very much (5)



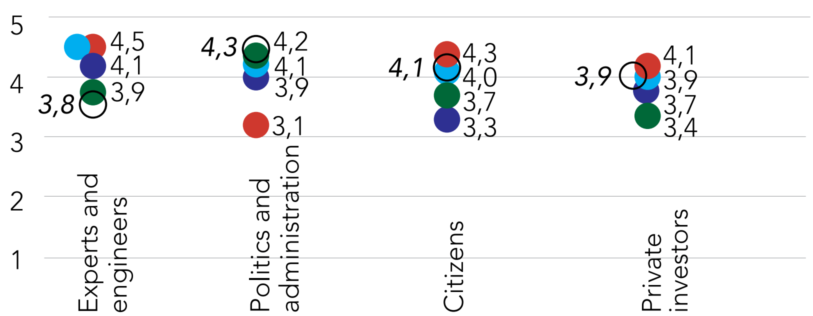
To what extent will you be commited within your municipal administration framework to reduce CO_2 emissions in the following sectors?
None (1) - Very much (5)



To what extent do you think events such as this one are useful for constructive discussions?
None (1) - Very much (5)



How much can the following actors contribute towards the realization of your favorite visions?
None (1) - Very much (5)



Il Grappolo Balsamico

Regole del gioco!

1. Attaccare gli adesivi relativi alle azioni da intraprendere dove più si ritiene idoneo. Gli adesivi si referiscono all'obiettivo raggiunto, e riportano la quantità di emissioni che tale decisione abbatte rispetto all'anno di riferimento 2016.

2. Disegnare nei cerchi le quote di emissioni relative ai diversi settori (Trasporti; Residenziale, commerciale e istituzionale; Industria; Agricoltura; Produzione energia).

3.Usare tutti gli adesivi

LEGENDA:

- GESTIONE RISORSE E SORGENTI
- MOBILITÀ
- PRODUZIONE ENERGIA DA FONTI RINNOVABILI

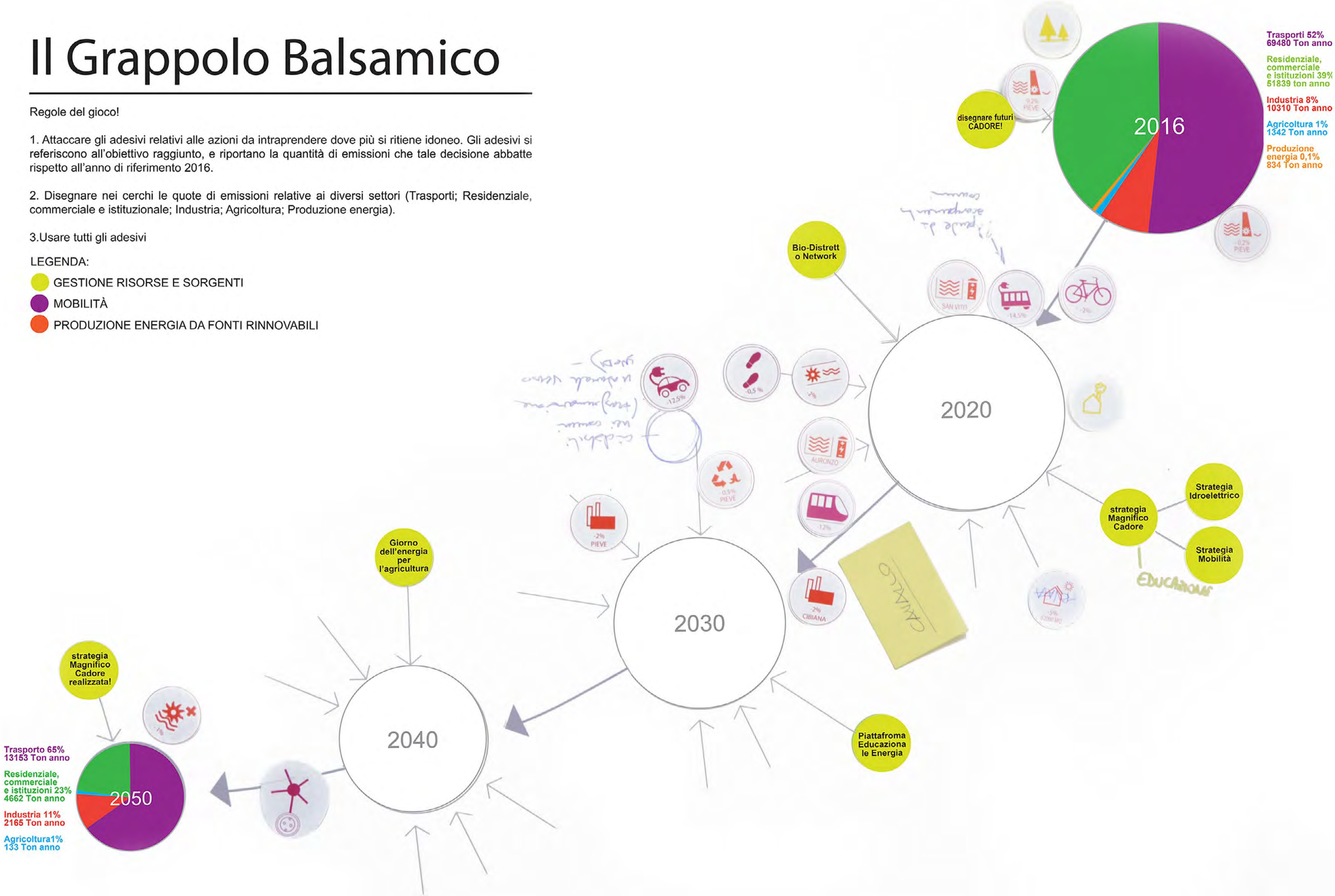


Figure 3.70. The figure shows the paths envisioned during the SWII.

3.4.5. The Defined Paths

During the SWII, the participants worked on the milestones and on the paths to reach the visions. The results are visible in the two pictures of the **obtained paths** (see Figure 3.70; Figure 3.71). The scope of the focus group was to design together the paths to go toward the two visions defined after the SWI. The visual material used to do that was a series of **stickers** that represented the different actions that emerged from the back-casting approach. The stickers had to be attached to a panel that reported a chronological line from the future, the year 2050, until the present, the year 2016. Those two years were graphically represented by the graphs of the CO_2 of the respective years. The chronological line was then interrupted each 10 years with a circle that symbolized the **milestones** to be 'colored' with the amount of emissions of that year.
Further comments of the visions' paths are reported in the Findings from SWII.

The Grappolo Balsamico Path

In the path of the Grappolo Balsamico vision, the actions of the *management of natural resources and CO_2 emissions* sector were fixed before the event, in order to give more space, given the short amount of time, to discuss the *mobility* and *RES implementation* sectors. In the Grappolo Balsamico's path, the participants listed the already active actions such as forest management plans and the construction of two hydropower plants on the environmental flow. The participants fixed the actions that can be **easily** implemented in the nearest future, i.e., solar panels on the rooftop of buildings, filters for the household chimneys, and the construction of cycling-lane. A train connection and green public transport is wished for 2030, together with some other initiative such as district heating, and the biogas plant from FORSU - or the participants named the possibility of an incinerator for waste. In the furthest future the participant fixed the addition and renovation of hydropower plants, and the finished node **Stop e Cambia!**.
In the Grounding act, the empirical research demonstrated that the participants make decisions (or agreements) on **short-term** or medium term actions. In the long term, it is likely that only the **milestones** are fixed. In both the designed paths the actions fixed are not sufficient to accomplish the reduction of the 85% of CO_2 on the base of 2010. That causes a gap between the future imagined in the visions and the paths that would involve a further collaborative revision of both.

Borghi & Nodi

Regole del gioco!

1. Attaccare gli adesivi relativi alle azioni da intraprendere dove più si ritiene idoneo. Gli adesivi si referiscono all'obiettivo raggiunto, e riportano la quantità di emissioni che tale decisione abbatte rispetto all'anno di riferimento 2016.

2. Disegnare nei cerchi le quote di emissioni relative ai diversi settori (Trasporti; Residenziale, commerciale e istituzionale; Industria; Agricoltura; Produzione energia).

3.Usare tutti gli adesivi

LEGENDA:

- GESTIONE RISORSE E SORGENTI
- MOBILITÀ
- PRODUZIONE ENERGIA DA FONTI RINNOVABILI

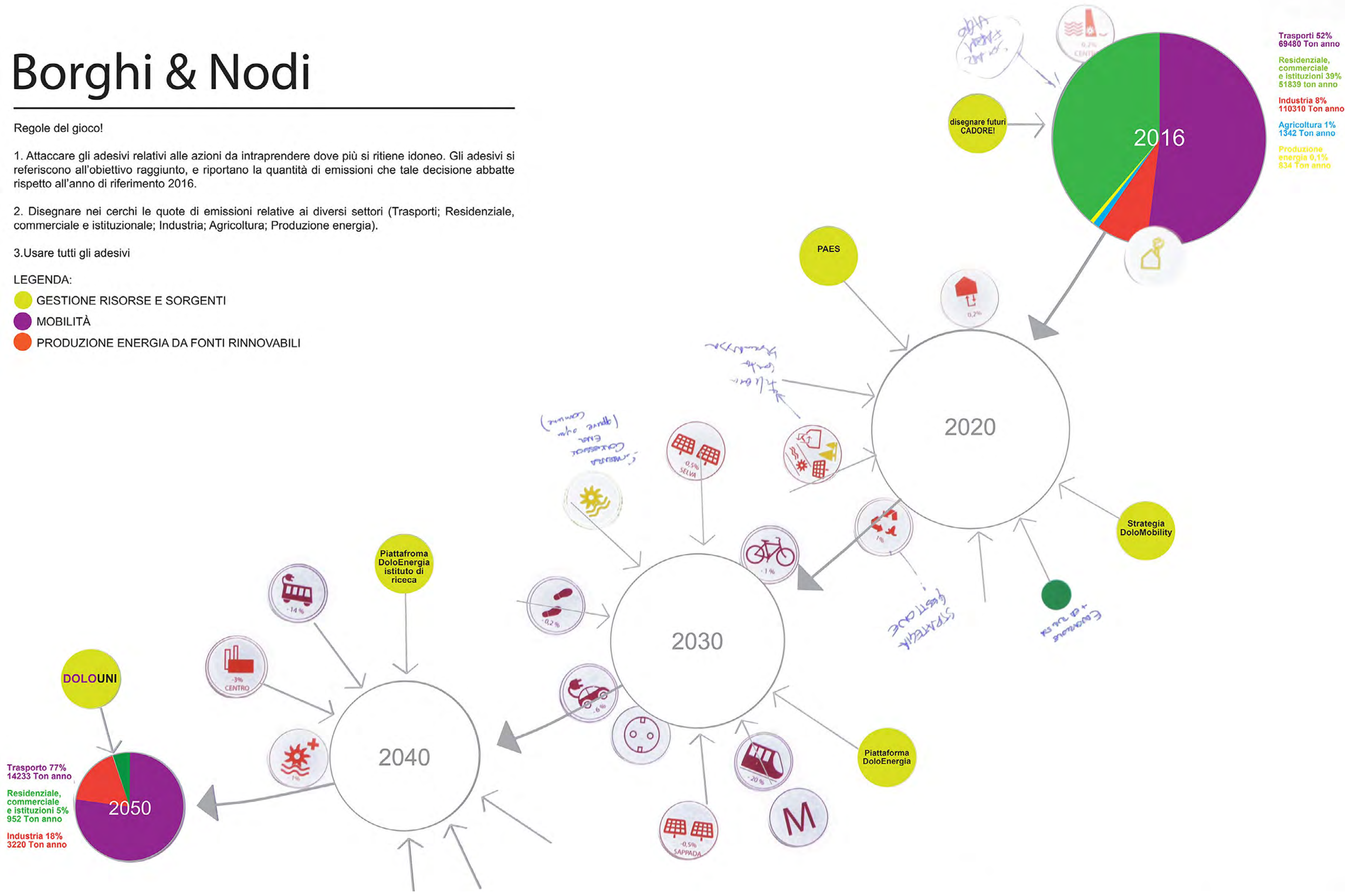


Figure 3.71. The figure shows the paths envisioned during the SWII.

The Borghi & Nodi Path

In the Borghi & Nodi path, the actions of the sector *management of natural resources and CO_2 emissions* were fixed before the event, in order to give more space during the fixed short time of the focus group to the *mobility* and *RES implementation* sectors. In the Borghi & Nodi path, the participants fixed the actions already active, or almost active in the present, such as the filters for the household chimneys, and the hydropower plants in the environmental flow of the dams. In the nearest future they added actions for the education of citizens and tourists on the topics of waste and energy.

The **green tool-kits** for public administration buildings were fixed for 2020, together with the new biogas plant from FORSU and a waste incinerator. 2030 is, in this path, the focal period for the *mobility* sector, in which the above ground subway and its stations are built, together with new cycling-lanes, pedestrian lanes, and electric charging spots. Also two new solar farms are fixed in this year. In the furthest future the participants fixed the addition of new and renovated hydropower plants and district heating. In the Grounding act, the empirical research demonstrated that decisions on actions most likely regard short term or medium term actions. In the long term only the milestone are fixed. In both the designed paths the actions fixed are not sufficient to accomplish the reduction of 85% of CO_2 on the basis of 2010. That causes a **gap** between the future imagined in the visions and the paths that would involve a further collaborative revision of both.

3.5. Moving and Spreading

During the Grounding and Spreading acts, the visions were confronted and adjusted with the local stakeholders in the SWI and the OS. In SWII, the paths were designed by the participants including actions and milestones toward the visions through a back-casting approach. The actions fixed on the timeline toward the low-carbon futures should have hypothetically been taken in the following Moving act. The latter is the act in which the local context starts the **journey** along the paths drawn during Grounding. In the time constraints of the empirical research, it was not possible to figure out if the stakeholders, who participated, took the designed actions. In this final act the empirical research consisted in further Spreading, with a series of **telephone interviews**. The participants were asked about their activities for the low-carbon future, their opinion on the Visioneering mode application, and the impact they thought the mode had. The chapter ended with an overview of the evolution of visions and paths (chpater 3.5.2) during the Visioneering application, that from fuzzy **statements** become real paths that Cadore can undertake in the pursuit of low-carbon futures. This evolution is not an action embedded in the Moving act, but is a way to revise and go through the variables that emerged or have been left behind during the process, tracing progress done with the planning process.

3.5.1. Telephone Interviews

The telephone interviews had the aim of testing the findings obtained in the SWs, and to check the impact of Visioneering; they facilitated moreover the further spread of the visions and of the commitment for future collaboration with the research project. The method used was **semi-structure interviews** shaped on the four dimensions of social learning and the fifth dimension of information. A special focus was given on the design aspect of Regional Grasp in the Cognitive Knowledge and in the Joint and Single Action dimensions. The questions asked focused on what are they doing to implement a low-carbon future, and if they increased their commitment to this matter of concern after the SWs. The interviewees that gave their availability to participate in this last event were both participants of the SWI and SWII, for a total of 11 obtained interviews, on the total of the 17 participants of both the SWs.

Methods	Data Type	Amount of Data
Semi-structured interviews	Written notes Recorded audio	SWII – 5 Participants SWI – 5 participants SWI and SWII – 1 participants

Table 3.21. Overview of the qualitative data gained through the telephone interviews.

Findings from the Telephone Interviews

Cognitive Knowledge Dimension

In the analysis of the telephone interviews an element of the Regional Grasp design aspect predominantly appears: the shortage of economic resources in the municipalities, and the consequent time **shortage** of administrative employees. This issue strongly increased from the first interviews and colloquiums in the spring of 2014, to the last telephone interviews of September 2016.
During the interviews each participant listed the type of activities that the municipality is doing for the implementation of low-carbon futures. The major contributions are in the *RES implementation* sector. Some of those are already active contributions, or are in the implementation phase since 5 or 10 years, therefore before the start of the Visioneering application. They vary from solar panels on roofs, small solar farms, hydropower plants, and biomass implants in the public buildings. Some of those activities started after the SWI, but a univocal cause-effect impact is not certain.
The Comelico area seems the most active area in implementing a low-carbon future, with an Action Plan (Covenant of Mayors) that involves more municipalities. This was also activated after the SWI, but a univocal cause-effect impact is not probable. All of the participates admitted in the final telephone interviews that he/she was already interested in the low-carbon topic (the word sustainability has been used often as its synonym) before the event therefore uninterested people didn't participate at all. A challenge for further application can be to effectively involve the people that are not interested in the matter of concern and therefore not eager to participate in this kind of event. In the empirical research, the scarce participation was further caused as a result of the voluntary application of Visioneering.

Mutual Understanding Dimension

All the interviewees admitted that they did not meet the other participants after the SWII. Some of them explicitly stated their disappointment while admitting it, because they recognized that a topic such as the low-carbon future, requires a territorial coordination and immediate actions. In that respect, few interviewees repeated that it '**leader**' is necessary in order to deal with a matter of concern such as the low-carbon future ►. Some respondents have therefore asked for a public presentation to see the results of the research project, but also wished for the participation of schools in possible research developments.

► See the findings from the SWII and the definition of 'leader' given by the participants.

The role of the MCC and Regola are differently perceived from the participants. While the first is recognized by all of the participants as an institutional power that can effectively promote a low-carbon future, the second has representative power that varies from municipality to municipality (in some municipalities the Regola has not been reconstituted since Napoleonic times). This raises the question of how the Regola should be seen in the territory, as a private or public actors.

The shortage in economic resources paralyzes the municipal body in their normal administration. Some stated that it is possible to find economical resources in other institutional frames (e.g. European or Regional) but then, what is missing, is the time for the councillor or the body itself to implement the project. Finally, when some initiatives try to be implemented, the next obstacle is the slow and contradictory bureaucracy, e.g. waiting for the licenses (in the case of hydropower), or for the results of project funding.

Complexity Dimension

The participants observed that the visions, expressed in maps, were a good tool for the understanding of complexity. All of the participants stated this, even if during the telephone interviews it was difficult for them to remember the specificities of the visual materials.

Joint or Single Action Dimension

Concerning the Visions' Content, the majority of interviewees recognized that the *mobility* sector requires a more comprehensive territorial approach and that it should receive a monetari incentive from a level above that of the municipality. Nonetheless some of the municipalities are taking small actions in this sector, such as creating a park for bike sharing and new cycling lanes. In the local context, there are high expectations of actions from higher levels of governance, mainly from the Region, especially for the planning of the energy transition. This is probably due to the fact that the provincial level has been weakened with the last reform; therefore no more strong decisions are made at this level but solely at the regional level which is perceived as a distant institution (it is based in Venice). As a result, there is a miss-match between the goals fixed at a regional level, and the things implemented, because of the missing governance level – or body – that takes care of this procedure. The municipalities of Cadore, feel forgotten from the Veneto Region that should be representing them, and they underline that the bureaucratic procedures at a regional level are extremely slow. A consequence they is that the municipalities can, effectively act only be '**delegating**' actions to the private sector. The consequence of this condition is once again the perceived necessity on the territory of a 'leader' or rather local actors that have knowledge of the local territory and that are willing to take the responsibility to implement project or actions.

Visioneering Dimension

The telephone interviews did not have the specific aim to gather critique about the Visioneering mode of planning, nonetheless the contributors made a couple of pertinent comments. Those who participated in the SWI, and were not present in the SWII, mainly remembered the use of **visions** and the low-carbon matter of concern. The first, was seen as an innovative mode to administrate changes, the second as a relatively urgent issue. In that respect, one of the contributors stated that she already used visions in the context of the UNESCO foundation, while another interviewee stated that, since her participation in the SWI, she has tried to use the vision tool at the municipal council.

Further Considerations

After the telephone interviews, it can be said that for the participants, the most important element was a framework within which to talk constructively, guided by an expert, and with visual material in which to fix ideas and knowledge. Concerning the low-carbon matter of concern, the tour was the most significant event for participants. All the contributors where already interested in the low-carbon topic before the events, therefore those who participated were already partially aware of the relevance of the matter of concern. There are many reasons why some municipalities didn't participate in the SWI and SWII, e.g. lack of time, or work obligations. Those who didn't participate probably perceived the low-carbon matter of concern as something of low urgency, a further steps of the Visioneering application could be to involve them.

During the last telephone interviews, the design aspect of Regional Grasp allowed the concern on lack of resources (time, employees, and money) and the support of the province to emerge. Therefore the mayors have less time to dedicate to the topic that does not regard the **day-by-day** administration. This means that there is no time at all to think about energy.

In the last telephone interviews the participants asked several times to organize an additional workshop. The SWs were therefore a necessary platform, a 'collaborative rational' arena, where the 22 municipalities met in order to talk about different themes. It is not clear why they asked for it while in the MCC they already had monthly meetings. Probably the participants missed the informal setting of the Visioneering arena guided by a planner / researcher. The acknowledgment that this was the last step of the project left some disappointment in the participants; this demonstrated their **willingness** to work together in the project. Thus I proposed a presentation in the summer of 2017 to show the result of the research project.

3.5.2 The Evolution of Visions and Paths

Alongside the Visioneering mode of application, the visions evolved from **fuzzy** statements to **well-defined** maps and concrete paths that the region can undertake to go towards low-carbon futures. The final two visions and paths, the last outputs of the Visioneering mode, developed beforehand as visual materials through different stages. The first visual output of the planning process was a network graph. It resulted from interviews, colloquiums, Checking the Documents, and the CW and it shows a cluster of nodes or ideas. The network graph was the framework within which possible futures for the local context were envisioned (see chapter 3.3.4). The graph's nodes belong to four different categories which are the result of a multidisciplinary view of low-carbon as a matter of concern, namely energy, society, environment, and the economy.

During the **Grasping act**, three nodes emerged from the network graph, as the most relevant ideas for the possible low-carbon futures of Cadore: municipal energy autonomy; sustainable tourism; research and education. The three nodes are the core concept of the first proposal of visions, and of storytelling around them. Those three visions are:

1. **Borgo 1555** (The 1555 Village), which represents energetically autonomous villages that internally manage RES production.
2. **Grappolo Balsamico** (The Healthy Cluster), which represents regional development through sustainable tourism and a collaborative management of resources through a public management of the energy system.
3. **ElectriCore** represents a highly innovative region with an educational center, and with regional and cross-boarder management of the resources by private investors.

From these first descriptions of the visions, I conducted a brief engineering process based on the energy production and consumption of these possible futures. Thus it was possible to design three maps that reported the hypothetical energy spatial impacts of these futures. The maps are completed by a graph of the energy supply, photomontages of the landscape, and a story (see Appendix 5.2).

1. The **map of the Borgo 1555** vision was based on a visual representation typical of a local map of the XIX century. The aim was to recall the societal and physical closure of the past centuries, when the connection with the nearest urbanized centers was scarce and difficult to achieve. In this vision, the photomontage

(Figure 3.46) shows a highly utilized landscape for the production of RES and for agriculture, and a limited forest development in comparison to the current trend, due to the use of wood as a resource for energy production.

2. The **map of the Grappolo Balsamico** vision is based on a satellite image of the region that highly evidences its natural richness, namely wood and water, and the beauty of the landscape appearance. The photomontages of this vision (Figure 3.49) show a train connection, electric mobility throughout the territory, and architectural contemporary forms.
3. The **ElectriCore vision** is represented in a more typical cartographic image, where the connections with the nearest urbanized center of Lienz is strongly highlighted, as is the density population on the envisioned Centro di Cadore. In this vision, the photomontages (Figure 3.52) show a skyscraper, architectural forms typical of cities, and a forgotten forest management that led to landscape degradation in favour of more advanced transport connections.

This visual material was presented first in **the SWI**, described in chapter 3.4.1, and then in an OS, described in chapter 3.4.2. During the SWI the participants actively sketched on the maps and attached post-it notes to add new characteristics to the visions, for instance the necessity of local services, a refused high density, hydropower on the aqueducts, and EUSALP – a EU strategy for the Alpine Region. The original poster that represented the visions used for the SWI are in Appendix 5.2, together with the posters sketched during the event. After those participatory events, the Visions' Content design aspect changed, and two main important action-lines on which to strengthen the Visions' Content emerged. The first line consisted in the necessity, in the visions, of a process of capacity development that framed common actions through the low-carbon challenge. The second line consisted in the necessity, in the visions, of increasing the presence of energy experts, such as engineers, educators, and planners, in order to increase the awareness on the local resource potential, and on a correct use of them.
After the SWI and OS the Visions' Content moved clearly from the technical energy topic proposed in the first version of the visions, to a more social understanding of them. Those two important action-lines had a key role in the back-casting approach. After the SWI and the OS, beside the two mentioned action-lines, **two moderate visions** emerged such as the visions that represent the most favored Visions' Content by the participates.

1. The first is **Grappolo Balsamico** (The Healthy Cluster), it was the most favored vision and maintained its main characteristics, to represent a regional development through sustainable tourism and agriculture, and a collaborative management of resources (map of the vision in Figure 3.61). But in this second version of this vision, the private companies and citizens, privately or in economical partnership, are the investors, and not the public parties as in the first proposal. The well-defined version of the Grappolo Balsamico vision was represented again by a satellite image that underlines Cadore's natural richness, but the supporting image was in black and white in order to let the colored actions appear in the overall spatial setting (Appendix 5.2). In this vision, the photomontages (Figure 3.58) show a train connection, electric mobility throughout the territory, and architectural contemporary forms.
2. The second moderate vision, **Borghi & Nodi** (Villages & Knots), is the fusion between ElectriCore and Borgo 1555 (map of the vision in Figure 3.65). Borghi & Nodi represents the energy development of villages in an autonomous way, an element of Borgo 1555, together with the idea of the educational center, an element of ElectriCore. The idea of having isolated hamlets, a distinctive element of the Borgo 1555 vision, was refused, while the necessity for stronger physical connections among hamlets and to the nearest most urbanized centers was emphasized. The latter was previously a distinctive element in the ElectriCore vision. In the Borgh & Nodi vision the local administrations and large private companies are the investors for a transition to a low-carbon future, an element that is a mixture from the first three proposed visions. The well defined Borghi & Nodi vision is represented in a cartographic image in black and white that highlighted the discontinuity of the territory given by the mountains, and therefore the lines where faster connections can be built. The base image was in black and white to highlight the colored actions of the vision itself (see Figure 3.65). The photomontage (Figure 3.62) in that case showed the educational center of Centro di Cadore, recalling the architectural forms of a famous European educational centre.

The **engineering process** of Grappolo Balsamico and Borghi & Nodi focused on the decrease of CO_2 emissions, and not on the production of energy itself as it was in the first proposal of the visions. This is because the first proposal attempted to represent comprehensive pictures of futures based on a different energy system than the current one. The further defined proposal required a deeper link to

CO_2 emissions of the specific local context and only then more attention on the consequent energy needs. The **Grounding act**, was therefore focused on the hypothetical decrease of carbon emissions provoked by the actions identified in the back-casting process.
Engineering the second version of the visions led to **three main sectors of actions** through which CO_2 emissions could be cut down in Cadore: *mobility*, *management of natural resources and CO_2 emissions*, and *RES implementation*. The capacity development process and the experts' involvement, action-lines that strongly emerged with the SWI and **OS**, were integrated in the sector *management of natural resource and CO_2 emissions* (see Figure 3.60, Figure 3.64). Those three sectors of actions are represented in the visions by three different colors: *mobility* in purple, *management of natural resources and CO_2 emissions* in green, and *RES implementation* in orange. Each action was marked on a map, and was then presented in the form of sticker for the design of the path on a chronological line toward the future (Figure 3.65, Figure 3.62).
Together with the sector of actions, three **scales of action** that can be effectively marked on the maps emerged. The first is the *regional scale,* it refers to Cadore and concerns the actions that have a spatial impact on the regional scale, and that have to be managed at this scale. The second is the *municipal scale*, it refers to actions that have a spatial impact at the municipal level and have to be managed at that level. The third is the *building scale*, it refers to the actions that have spatial impact on buildings.
While the sector of actions is represented in the SWII visual materials by different colors, the scale of actions are represented by the edge of the sticker of each action (see Figure 3.60, Figure 3.64). A single line represented the municipal level, a double line for the Cadore level, and dashed line for the building level. This type of representation permitted to keep the base map of the vision on a regional level, but to make decisions also on smaller level (posters of the SWII are reported in Appendix 5.3).
During **the SWII** the participants worked on the **paths** to reach the visions. The stickers, that represented the different actions emerged during the back-casting approach, had to be attached in a panel that reported a chronological line from the future 2050 until the present 2016. Those two years are graphically represented by the graphs of the carbon emissions of the respective year (see Figure 3.70, Figure 3.71).

During the workshop the decision on actions likely regarded short-term or medium-term actions. On the long term only the milestones were fixed, this is the reason why the paths look particularly eventful in the first decades, graphically, until 2030 approximately, and less eventful in the later decades (Figure 3.70; Figure 3.71). In the nearest future the participants added actions for the education of citizens and tourists on the topics of waste and energy management, therefore once again driving the vision toward **social aspects**. In both the visions the agreement on the action to carry out on the *mobility* sector was high, with an elevated interest in fixing a time for the train connection.

In both the designed paths, the actions fixed a**re not sufficient** to accomplish the reduction of 85% of CO_2 emissions on the basis of the 2010 data. On the contrary, the participants had no the desire to change the overall message of the Visions' Content represented in the maps, only few actions were rejected.

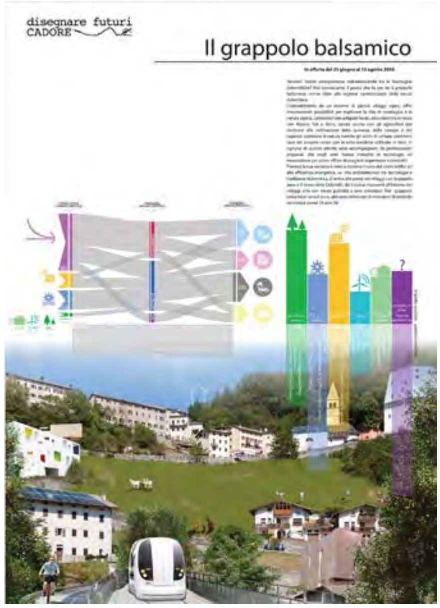
Figure 3.72. The sequence, in the following pages, shows how the outputs of Visioneering evolved along the whole process (author's own design).

NETWORK GRAPH
chapter 3.3.4

CW
Interviews, colloquiums, and trips; Checking the Documents

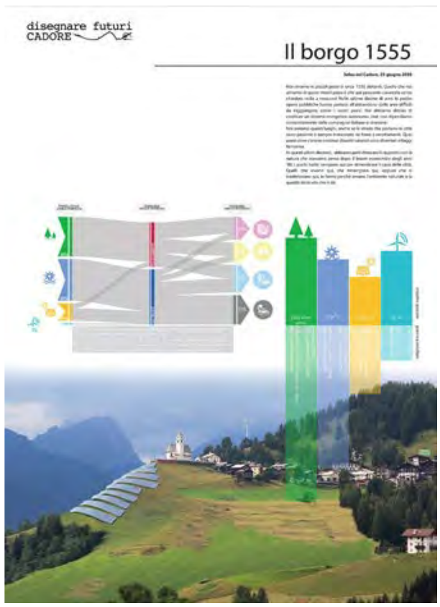
Sustainable Tourism

It represents a region developed through sustainable tourism and a collaborative management of the resources, with a public management of the energy system.



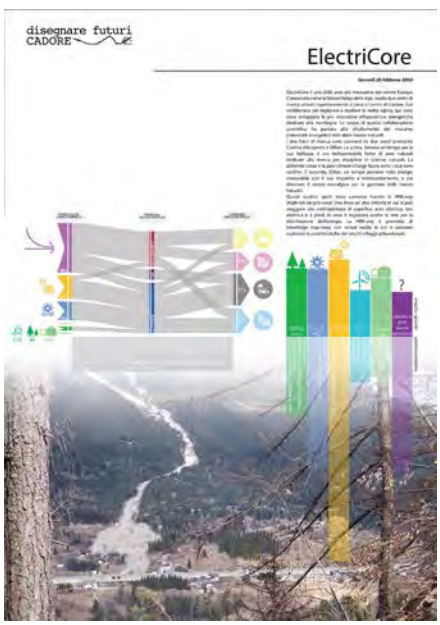
Energetically Autonomous Municipalities

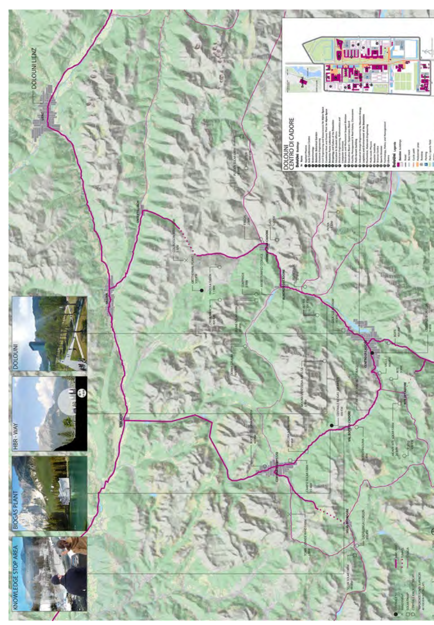
It represents energetically autonomous villages that manage internally their resources.



Research and Education

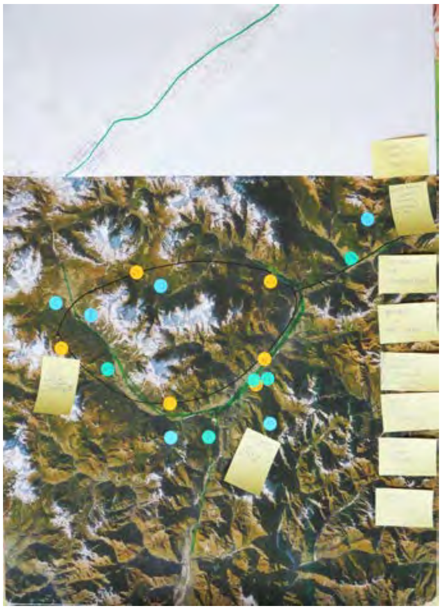
It represents an highly innovative region with an educational centre and with regional and cross-boarder management of the resources through private investors.

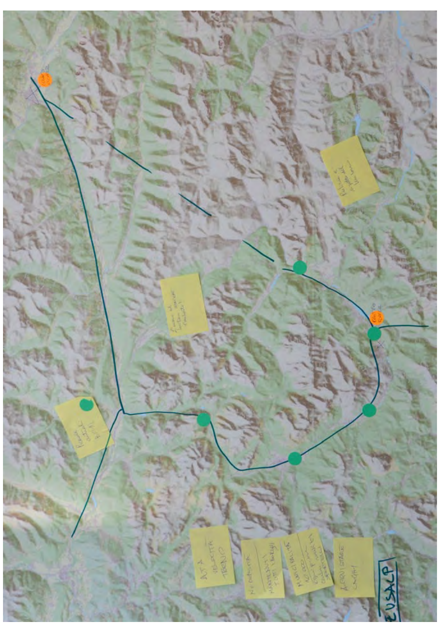


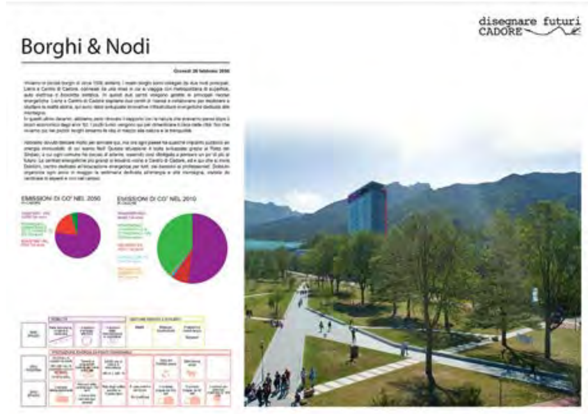


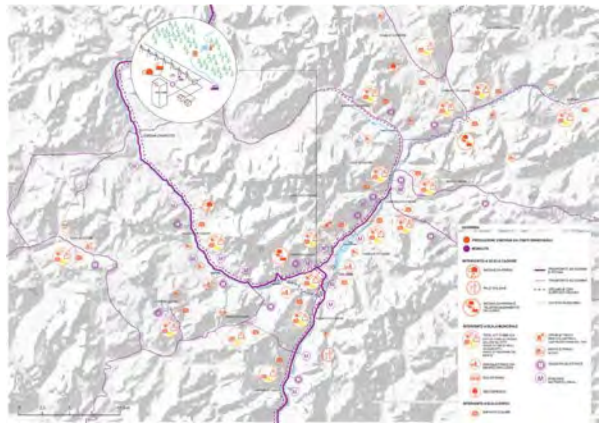
FLASH VISIONS
as three statments chapter 3.3.4

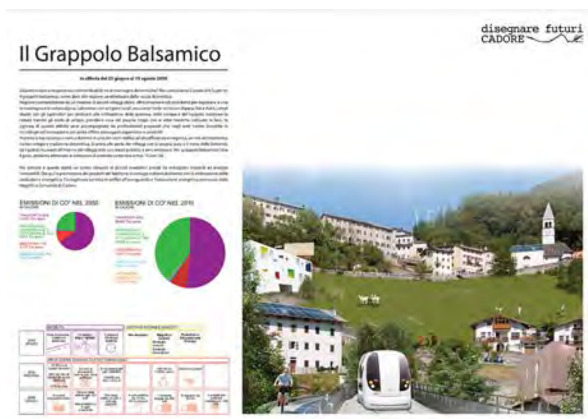
3 VISIONS
as three possible energetic futures appendix 5.2

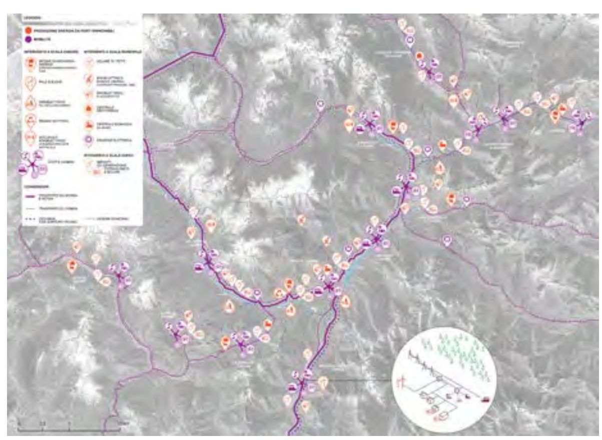






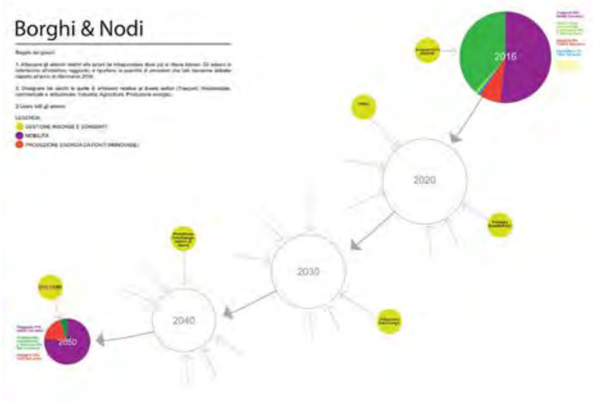


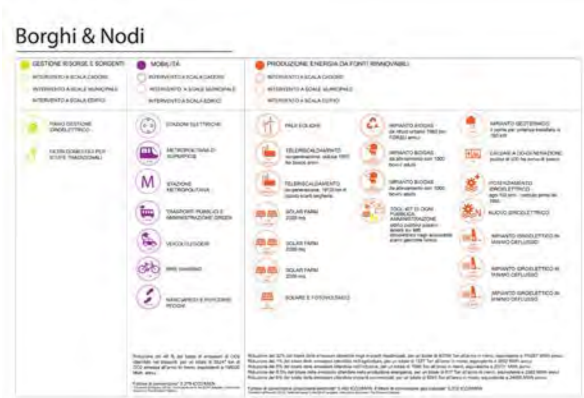


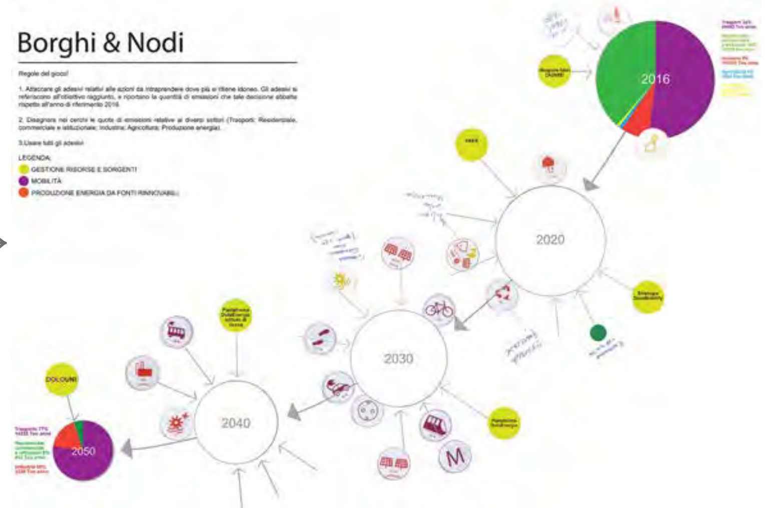


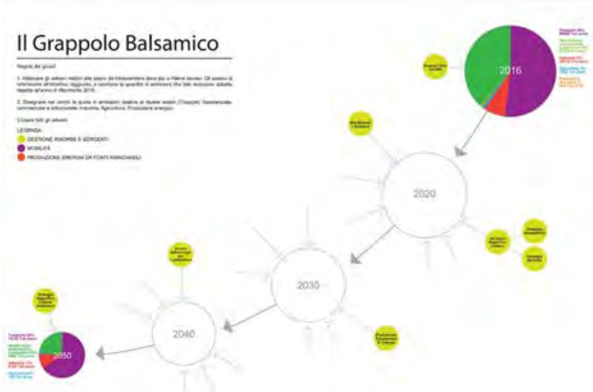
SWI OS
Interviews, colloquiums

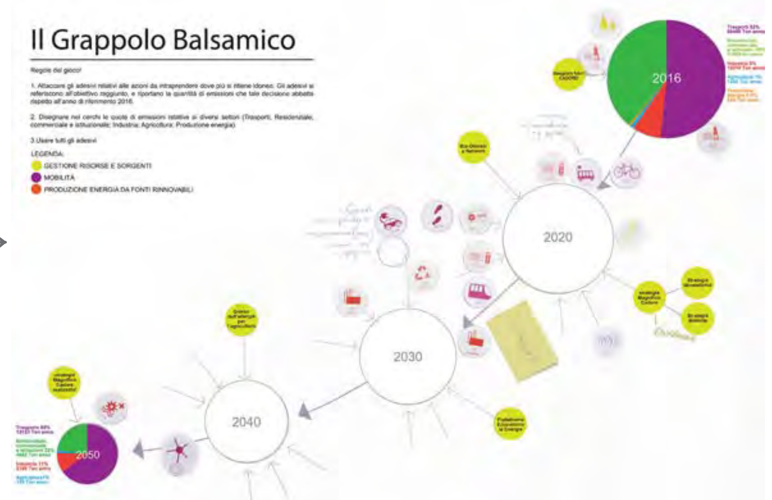
2 DEFINED VISIONS
two possible low-carbon futures appendix 5.3











their set of milestones and actions appendix 5.3

SWII

2 PATHS
toward low-carbon futures chapter 3.4.5

Telep. Interviews

4. The Contributions and Limits of Visioneering

4.1. Eight Statements on Contributions and Limits

The basic assumption behind this doctoral research is that Visioneering is a mode of planning that properly fits the low-carbon challenge since it explores futures in a comprehensive way, through envisioning, and it designs strategies to reach that future, through engineering. These are necessary features since a low-carbon future is a challenge that does not only concern the technical aspects of a new energy system, but it also involves cultural, social, and economic processes. The research question emerges therefore with the aim of clarifying the contribution of Visioneering in the strategic spatial planning discipline committed to low-carbon futures.

What can be the contribution of Visioneering in strategic spatial planning toward low-carbon futures?

The question becomes particularly relevant in areas that lack an energy plan or future strategy, and that are vulnerable to the transition to a low-carbon future because of their high quantity of exploitable natural resources and the threat of climate change to their economic and environmental setting.

With the purpose of answering the research question, the thesis consisted in applying the Visioneering mode in the local context Cadore through the 'Action Research Through Design' method. The limit of this type of empirical investigation is that it was a simulation of a planning process: Visioneering was informally applied and the participants contributed voluntarily. Despite this limit, the findings demonstrated that Visioneering can effectively deal with **complexity** and **uncertainties**, characteristics of a long-lasting global challenge, and stimulate a regional response of a vulnerable Alpine region toward it ►.

► The findings of each consultative and participatory events of the empirical research are reported from chapter 3.2 to 3.5.

The conclusions scrutinize four areas: the **strategic spatial planning** theory, the **Visioneering** mode of planning, the **low-carbon future** as a matter of concern in our regions, and their relation to the **local context** Cadore. The conclusions move among these four areas represented in a rhomboidal network graph shown in Figure 4.1 in the following page. The upper corner of the graph is the spatial planning mode, **Visioneering,** and it is supported by the **strategic spatial planning** theory behind it. It is then directly related to the **low-carbon** future challenge, showed in the opposite corner, or rather the motivation for applying this planning mode in the empirical research. The fourth corner of the rhombus is

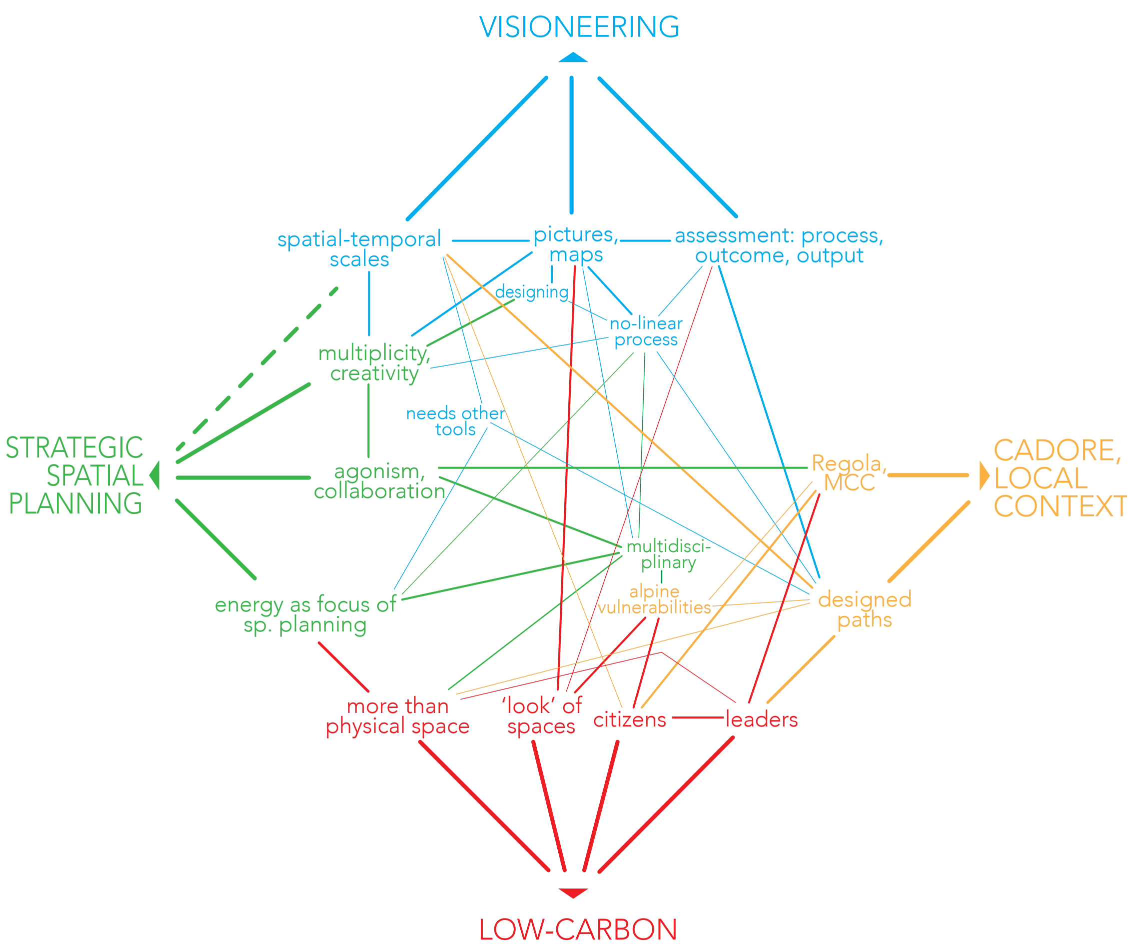
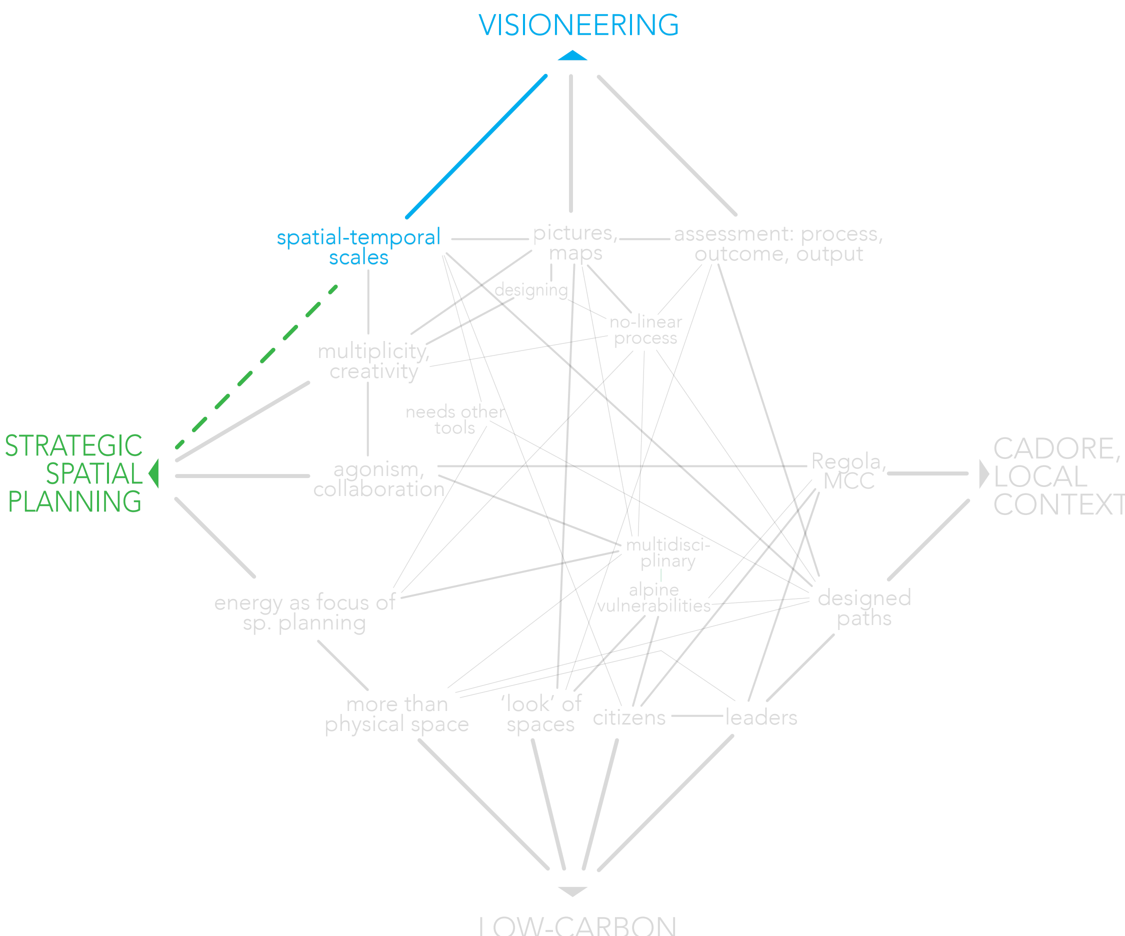


Figure 4.1.The rhombus has, at its four corners, the spatial planning mode Visioneering, the strategic spatial planning theory behind it, the low-carbon future challenge, and Cadore. The latter is the local context through which the other three areas were investigated. They frame a network graph that presents the key concepts of the conclusions. The eight statements that compose the conclusions of the doctoral thesis are represented with the sequential presence of the key concepts in the rhombus (author's own design).

Cadore, the local context from which the other three areas have been investigated. Within the rhombus a series of key **concepts** show the relation between the four areas.
The conclusions are related to the key concepts reported in the rhombus, and are articulated through eight **statements** followed by supportive discourses. The eight statements are:

1. The strategic spatial planning mode of Visioneering attempts to merge the **spatial-temporal scales** on maps.
2. The **creative** process of designing in Visioneering allows for a **multiplicity** of futures to emerge.
3. A collaborative process, with **agonism** and **multidisciplinary** inputs, generates a **no-linear** process of planning.
4. The low-carbon future is **more than** physical spaces.
5. The discipline of spatial planning calls for a focus on the **energy topic**.
6. In the vulnerable **Alpine environment** the low-carbon future affects the '**look**' of spaces.
7. The designed **path** toward the future is a key **output** of the Visioneering process.
8. To reach the low-carbon future in each local context requires the engagement of local institution, '**leaders**', and **citizens**.

The supporting discourse includes the **contributions** and **limits** that refer to the Visioneering mode of planning in its application, and possible future applications. They also include **further research** ideas on how spatial planning might contribute to face an imminent challenge such as the low-carbon future. Lastly the conclusions chapter ends with a final **remark** on Visioneering and on the low-carbon future of Alpine rural areas.


VISIONEERING
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CADORE, LOCAL CONTEXT
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alpine vulnerabilities
energy as focus of sp. planning
designed paths
more than physical space
'look' of spaces
citizens
leaders
LOW-CARBON

The strategic spatial planning mode Visioneering attempts to merge the spatial-temporal scales.

Visioneering explores, ties, and merges the many spatial-temporal scales that affect a local context. In the empirical experience of this research, Visioneering attempted to merge the spatial scales of a transition toward a low-carbon future with its long-term temporal scales ►.

► The definition of 'local context' is given in chapter 2.4. In the research the local context is the MCC and its 22 municipalities.

The **spatial scales** refer to the international, national, and regional levels that compose roadmaps toward the future, set energy targets, and adopt measures and guidelines for their implementation. These levels overlap with the particular challenges that a local spatial environment faces ►. The energy transition is continually re-scaled in its administrative and political implications, as well as in its technological innovations and implementations. Visioneering ties these many spatial scales to a local context represented in a map. The **temporal scales** refer to the many ways in which the low-carbon challenge affects the next decades, from the time of the individual or of a mayor's mandate. Thanks to the back-casting approach, Visioneering tries to tie them to the present time, and represents them in the path as a process of actions ►.

► The international, national, and regional targets that influence Cadore are reported in the chapter 3.1.3. These targets influence the smaller scales where they overlap with the local challenges, e.g., the environmental impacts of climate change on the alpine territory.

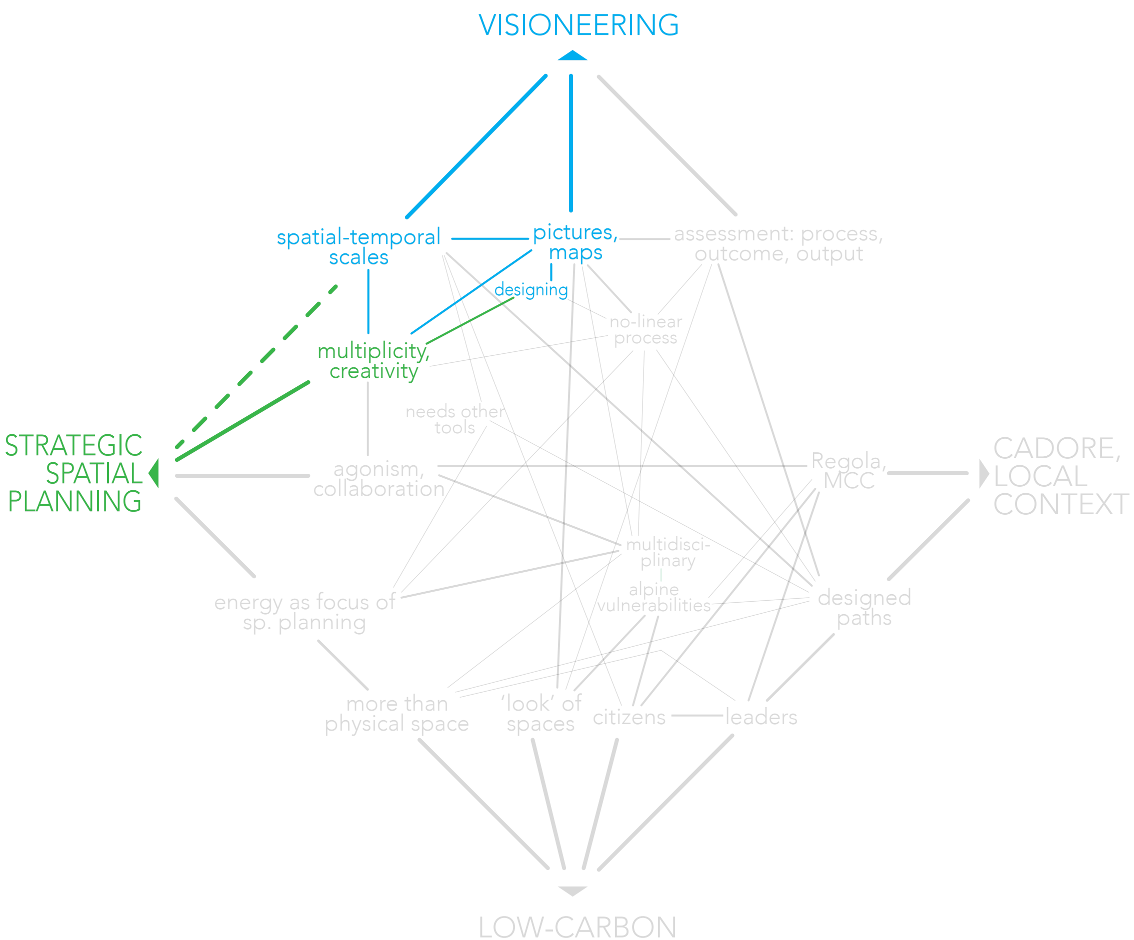
► The definition of back-casting approach and path is given in chapter 2.3.2.

Visioneering certainly looks at the **coexistence** of many spatial-temporal scales that affect a local context, it attempts to design the many space-times of such context, with the aim to decode a day-to-day answer to the future that local agents can accomplish. Hence Visioneering merges the temporal-spatial scales through **maps** and **paths** that represent these scales, and also through a collaborative process for the design and implementation of the maps and paths.

A key **contribution** of Visioneering in strategic spatial planning is the recognition that, when dealing with complex challenges and uncertain long-term futures, spatial planning needs to look at space and time as implicated in each other, the planning of one will influence the planning of the other. Planning the space is planning a flexible process that is able to adjust and adapt to unpredicted events. The **limits** of such planning approach is that uncertainties will always dominate the planning process, the greater the time distance of the planned events, the greater the degree of uncertainty upon the futures.

Further researches can be done on the kind of instruments or code, if necessary, to represent the spatial and temporal scales. In other words, how the many spatial and temporal scales can be translated into a planning instrument ►.

► The 'plan of immanence' and the 'plan of organization' studied by Hillier (2011) are an attempt to design and manage these scales. They are comparable to the vision and the path of Visioneering and are described in chpater 2.1.2.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'look' of spaces
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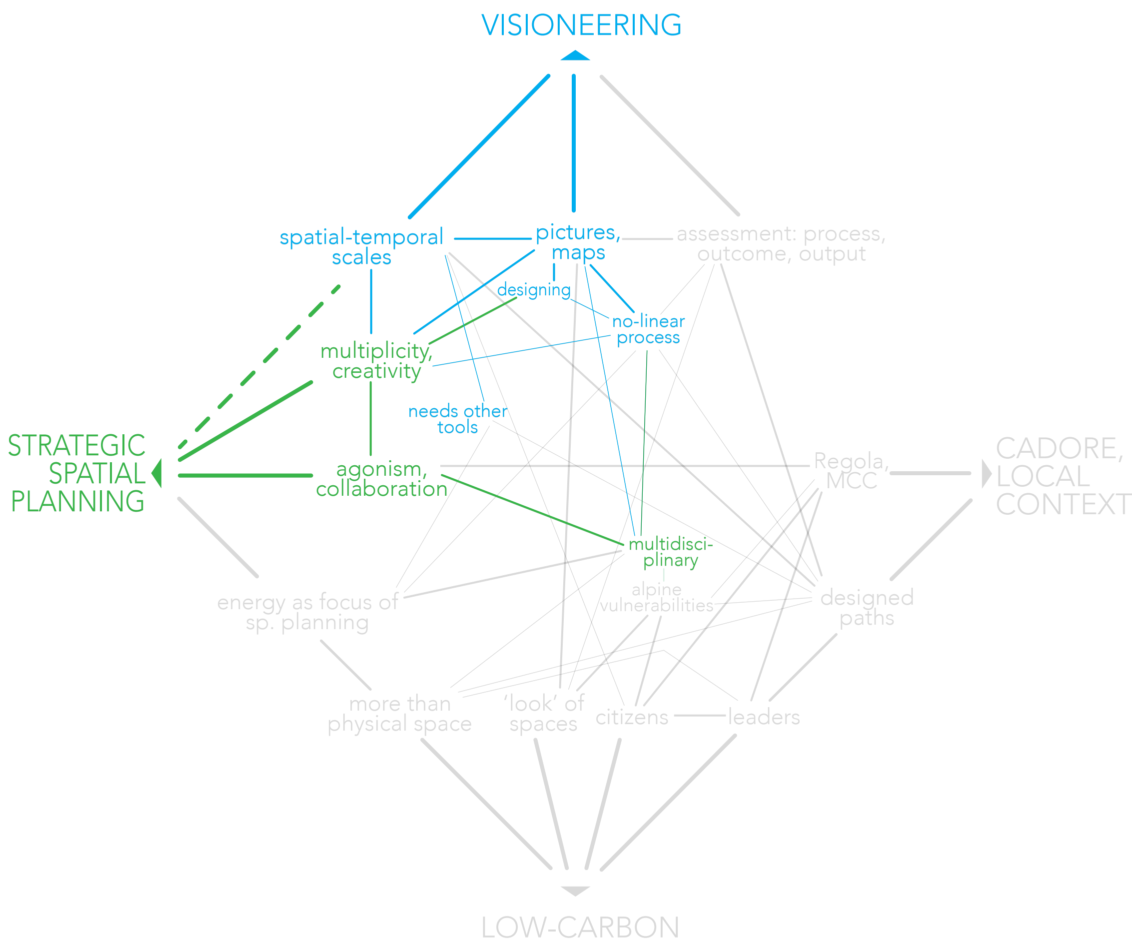
leaders
LOW-CARBON

The creative process of designing in Visioneering allows for a multiplicity of futures to emerg on maps.

► Proactive thinking, as explained in chapter 2.1.2., is the way of thinking in strategic spatial planning that permits to perceive the future as something not yet decided.

To link the many spatial and temporal scales, Visioneering solicits proactive thinking, a way of seeing the future not as a projection of today's problems, but as a break from them ►. Through proactive thinking Visioneering encourages **multiplicity**, the way to gather and legitimize diverse and multiple point of views on a matter of concern during **creative designing** processes. Designing is no longer the mere research of a solution to a matter of concern, but a creative act, a chance to develop diverse ideas that break with the present. The creative process is favored by drawing visual material, a technique that helps to develop an informal environment in which to discuss about futures. The visual materials are sketches, pictures, collages, and mainly **maps** that make visible the many spatial-temporal scales otherwise too abstract to be grasped.
Maps are useful – inspiring – instruments that vividly show the local context's futures designed during the planning process in which the participants explore the matter of concern. Each resulted map represents a trajectory, it has the power to show things and therefore hide others. A **multiplicity** of maps, of trajectories, overcomes this risk and avoids a rigid perception of one future. In Visioneering, designing maps consists in continually exploring and redefining priorities, opportunities, and relations that are likely to be implemented and that are intentionally important. Thus mapping is the act of choose upon the functioning of many possible future spaces, and the consequent looks of them.

The **contribution** of Visioneering that lies in proactive thinking and designing is that it guarantees a multiplicity of futures. A planners' focu on designing gives the chance to explore multiplicity with new ideas that break with the present problems. The **limits** of designing are that it consists of many attempts to figure out feasible solutions, it does not therefore bring to one immediate result.
Further research on Visioneering and strategic spatial planning might be needed to explore the effective role and the benefits of creativity in a collaborative spatial planning process.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A collaborative process, with agonism and multidisciplinary inputs, generates a no-linear process of planning.

Collaboration is not a prerequisite of spatial planning processes, and, the search for 'collaborative rationality' leads to agonism. **Agonism** is the instrument through which new ideas or conflicts, or existing problems and concerns, enter the planning arena avoiding a consensual view of the future. In the planning arena 'collaboration of' the involved parties becomes 'collaboration for' the future; as agonism is no longer the 'struggle against' the other parties, but the 'struggles for' the possible future ►.

► More details on agonism theory as used in the research on chapter 2.1.3. Agonism is the process in which the participants mobilize towards collaboration for decisions, which might be consensual, or instead, unresolvable. Agonism was present in the doctoral research mainly during the SWII, discussed and argued in the findings in chapter 3.4.4.

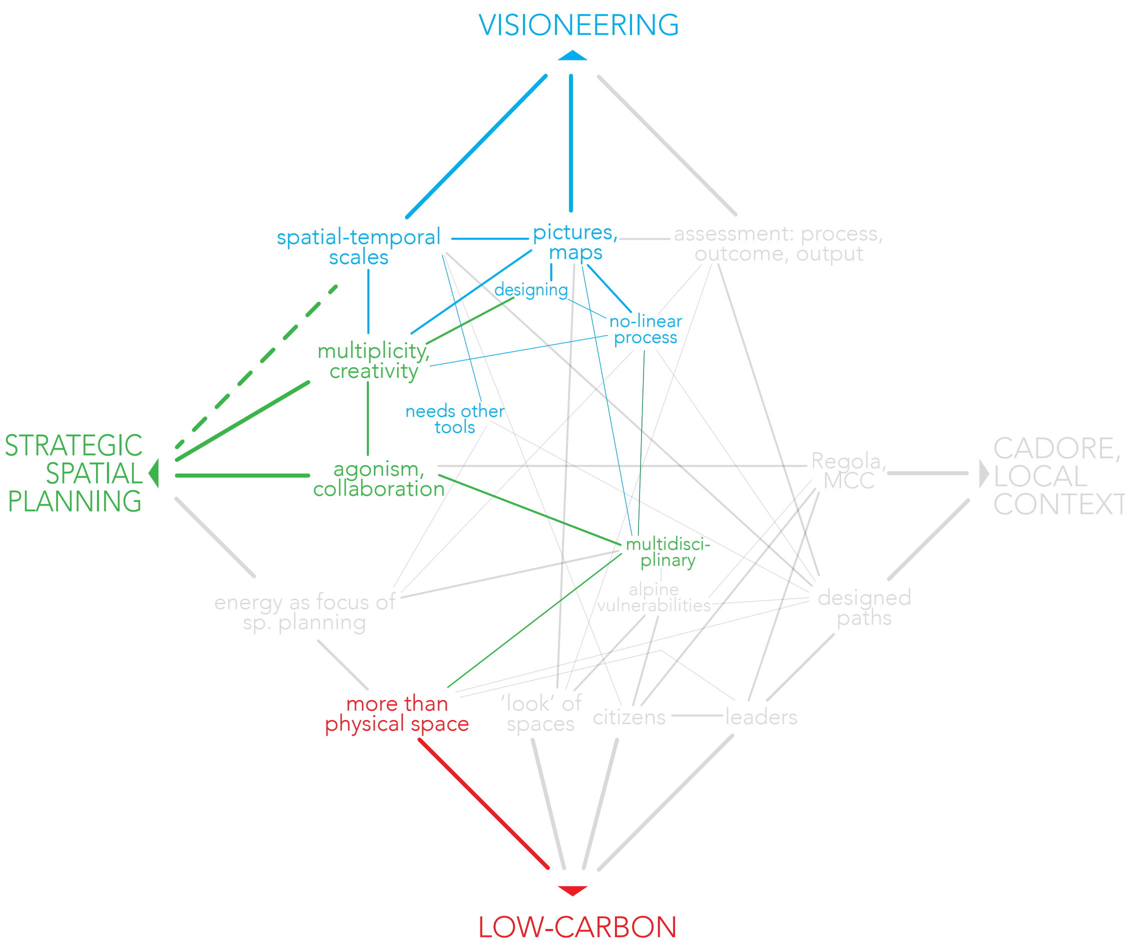
Actual collaboration is desirable, but not an **indispensable**, result of the planning process. Stakeholders come to the arena not for solidarity and consensual agreement, but to represent a position in the community. During the process they might censor themselves, be confrontational, or take a stance rather than decision-making. When the process is stuck in the search for collaboration or agonism, the stakeholders may underestimate the process. Nonetheless simply from participating, they benefit by learning about the matter of concern and building a relational network. In the latter case smaller arenas for actual collaborative actions might be the result of the planning process, since it takes a group of individuals to pursue and share an objective, namely the planning process itself and the designed futures. Smaller arenas for actions are a powerful result in community that neglects the changes because it lacks social networks and a supportive community.

Two other factors affect the 'collaborative rationality': first, the **environment** in which the arena takes place influences the capability or willingness of stakeholders to speak ►. It affects certain, or other parties, giving them a more authoritative role. The second factor is the position and the **skills** planners have that keep different stakeholders in the arena, and steer the agonism between them in order to let new diverse ideas emerge along with new networks. In such case, modes of planning as Visioneering are oriented toward developing ideas, networks of agents, knowledge, and creating actions, and not the mere purpose of accomplishing outputs and agreements. The planner becomes a node in the network of agents, and steers the collaborative designing of feasible futures.

► The different attitudes of participants in reasoning about the challenge in the workshop and the study tour is reported in the findings from SWII in chapter 3.4.4.

Multidisciplinary ideas and inputs are indispensable for designing the visions as a collage of knowledge and ideas from different involved parties on a specific matter of concern, and not as the revelation of one person. The constant acknowledgment of additional required knowledge and the continuous generation of new ideas causes the regular review of visions. The evolving local context, in which the arena is located, affects further review. The result is a planning process that **moves among** a set of overlapping and interweaving acts of planning, and not the application of a **linear** method that advances across accomplished outputs.

Visioneering and its acts contribute to demonstrating that strategic spatial planning can deal with complex and wicked problems when it is flexible in its unfolding process. Besides, a multidisciplinary approach **contributes** to facilitating the involvement of new points of view, facts, and knowledge in the arena, giving a balanced representation of stories. The **limit** of this contribution is that it does not allow for an in depth analysis of each characteristic of the local context, but it remains an approach that creates a comprehensive picture of the future. A second limit of involving a vast amount of multidisciplinary fields is the possibility of losing the main message of the planning process, or of the planned futures.



The low-carbon future is more than physical spaces.

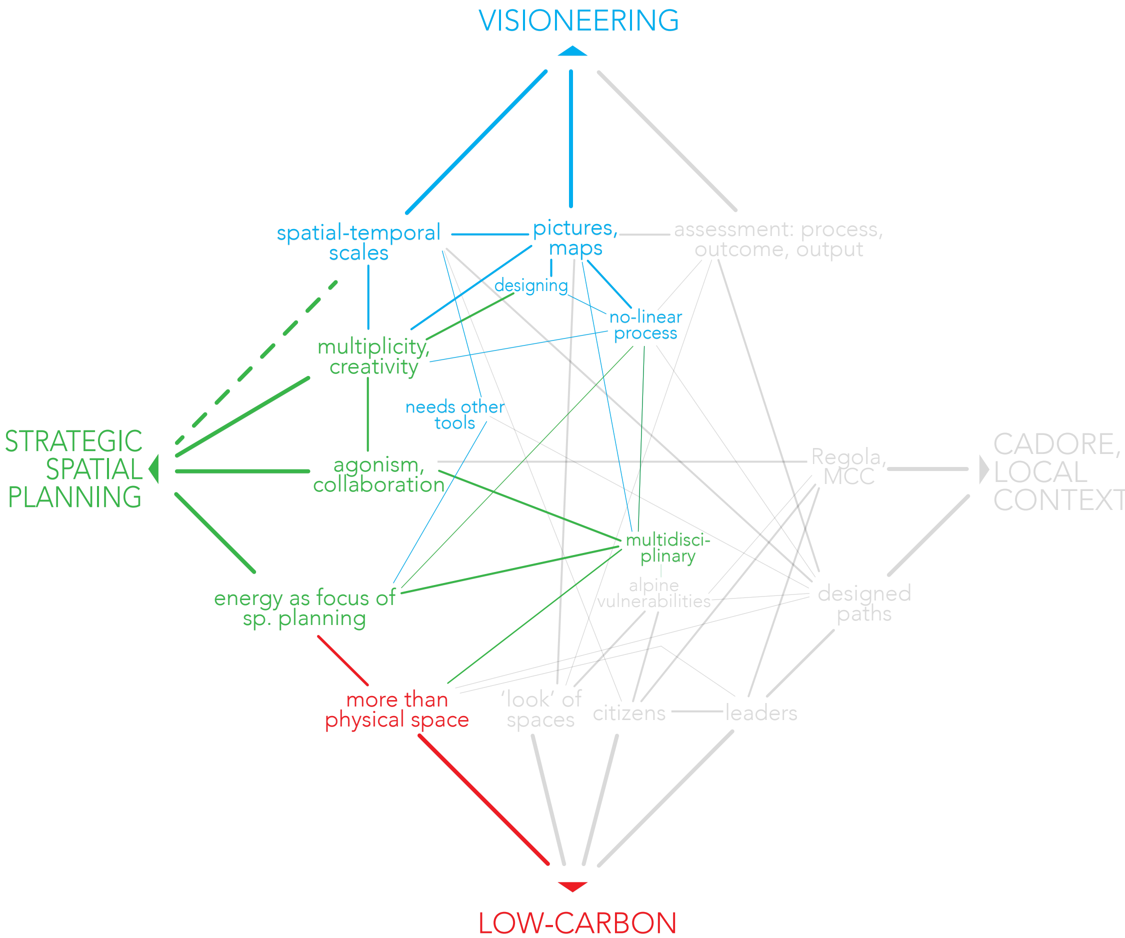
An energy system based on the burning of fossil fuels by human activities has caused the rise of CO_2 in the atmosphere. A less carbon intensive energy system depends on the reduction of CO_2 emitted by anthropogenic activities, and therefore on changing those activities through different lifestyles. Thus, a low-carbon future does not only concern changes in the **physical space**, the three dimensional space, but also calls into question the kinds of development that produce less CO_2 emissions for each local context. It calls into question values and emotions, components that transcend the technical aspects of the energy system ►.

► Values, defined in chapter 2.1.2, are one's principles used in the decision-making process based upon the judgement of what is important in life.

The achievement of the energy targets fixed at national and regional levels is sufficient to obtain a low-carbon Nation or Region, but not sufficient to obtain a low-carbon local context. For instance, in Cadore, an increase in the use of natural resources is expected due to the implementation of RES. At the same time an adequate proposal to reduce the dependence on fossil fuels within the mobility system is missing ►. This finding demonstrates that targets fixed at large spatial scales lack the potential agency of local scales for the achievement of low-carbon futures. Visioneering is a mode of planning that can assist, and build support for possible different futures at smaller scales.

► The targets fixed by the Veneto Region, reported in chapter 3.1.3, regard RES implementations and energy efficiency.
The fossil fuel dependence of the mobility system in Cadore emerged in the findings from the interviews, colloquiums, and trips that are reported in chapter 3.3.1.

The **contribution** Visioneering to the design of low-carbon futures is the planning of futures that are not merely the deployment of RES and an enhanced efficiency of the energy system. Visioneering low-carbon futures is an opportunity for each local context to image the energy transition through new diverse social and economic development. An in-depth study on each local context is needed to contextualize the challenge and adapt it to the social and economic uniqueness of the context. Understanding low-carbon futures as more than a matter of physical spaces may **limit** an inquiry of the technical aspects and their relevance in the specificity of local contexts.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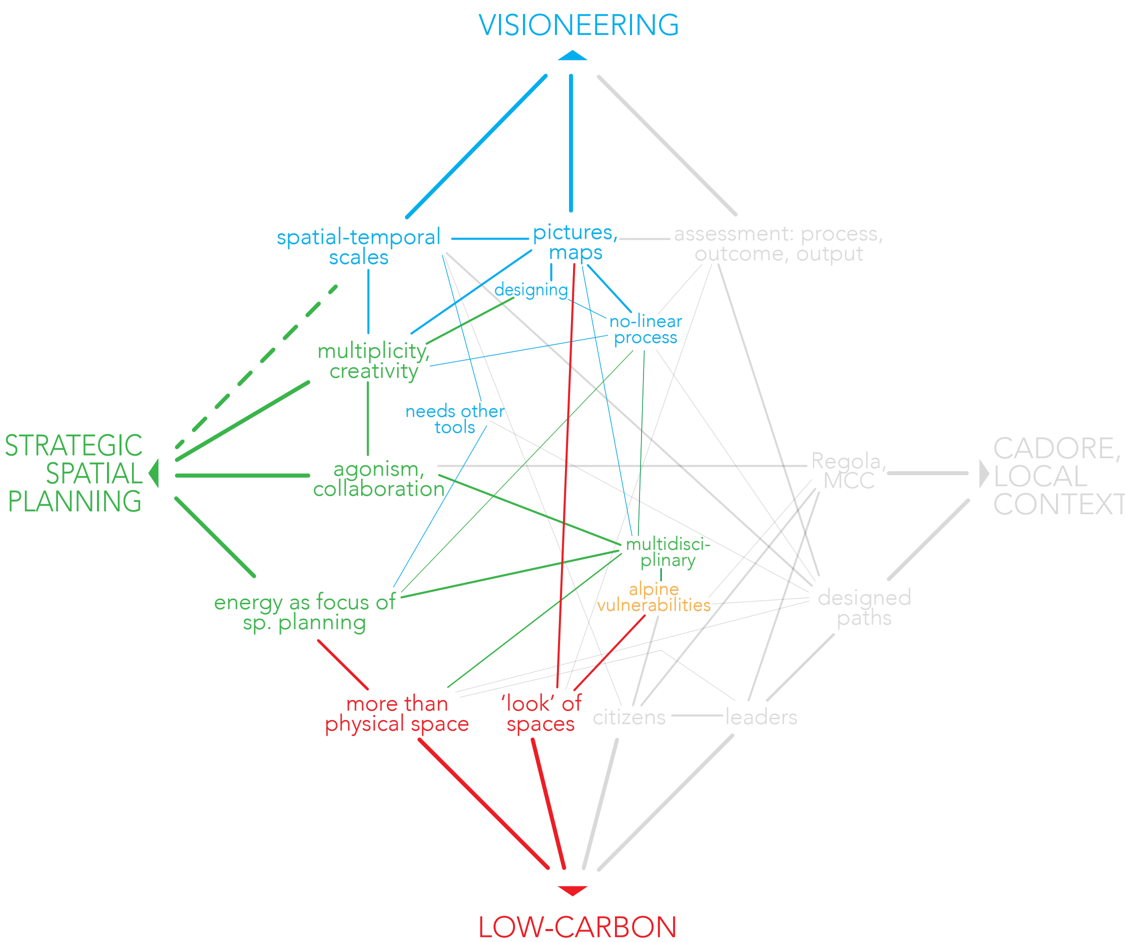
The discipline of spatial planning calls for a focus on the energy topic.

Spatial planning can have a fundamental contribution in the transition to a new energy system. Planning that transition requires a deeper understanding of the relation that energy has with three-dimensional space, but also with society, environment, and the economy. Spatial planning requires adequate skills and instruments related to the fields that the **energy topic** touches. Contemporary planning that deals with this topic must involve new knowledge that includes social, economic, spatial, and technical points of view in order to efficiently and coherently coordinate the involved parties.
A further element of the current energy system is the involvement of a new series of actors and stakeholders. Nowadays, thanks to new technologies, anyone can become a player in both the production and consumption of energy. New stakeholders are, for instance, those who contribute to small grid distribution or environmental groups. Spatial planning must pay attention to them and to the difference they can make in the transition to a new energy system.

A **risk** of planning within the complexity of the energy topic is the possibility of reducing the mission solely to the technical field in order to facilitate the planning process. Visioneering a comprehensive picture of the future **contributes** to addressing the energy topic in its complexity, with the spatial influences, and the related economic and social implications.
Further research might be focused on the potential of the spatial planning discipline in influencing and planning energy systems.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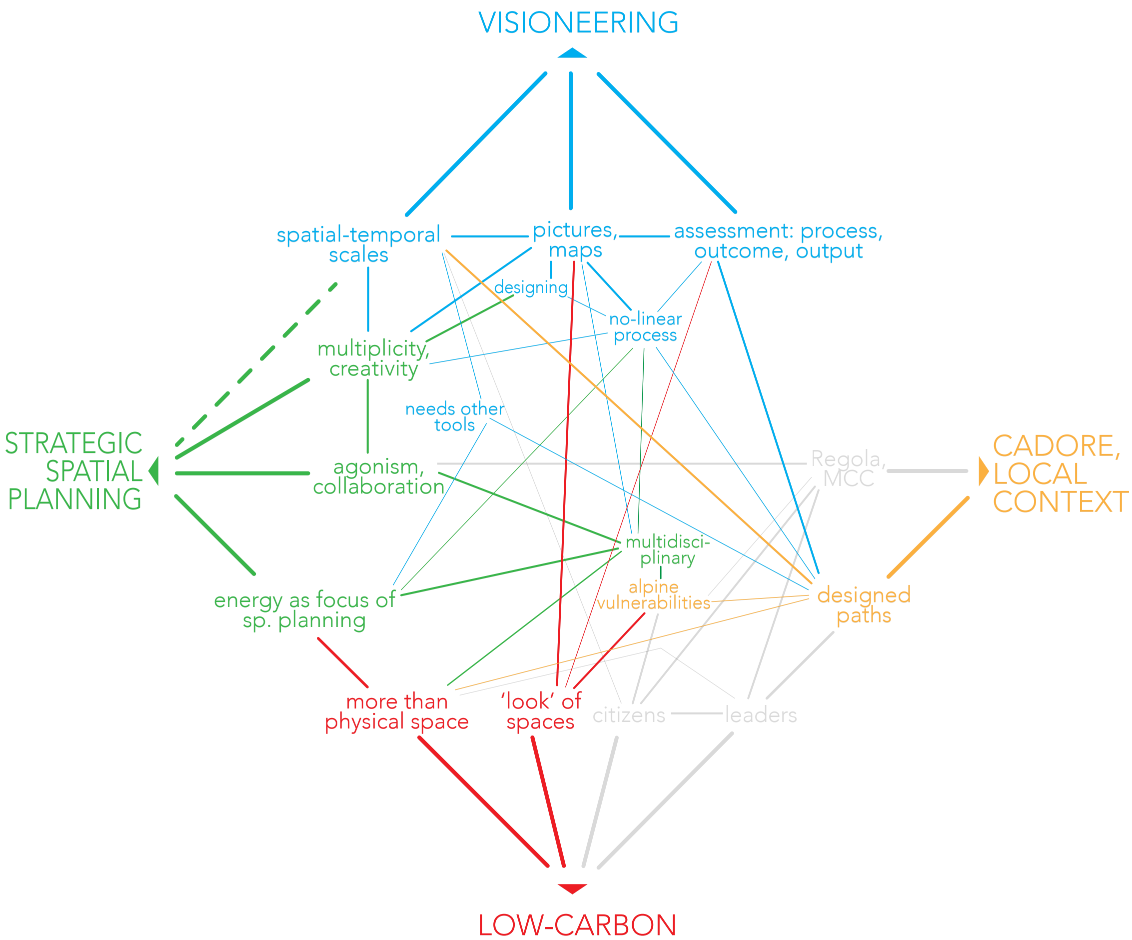
In the vulnerable Alpine environment the low-carbon future affects the 'look'of spaces.

The previous two statements clarify why planning a low-carbon future is more than reshaping physical spaces, than the technical deployment of RES, and than enhencing energy efficiency. On the other hand these necessary spatial interventions will change the 'look' of the spaces where we live. The spaces of low-carbon futures will in fact appear different from present day due to: the RES in the landscape, a different way to move throughout the territory, new energy networks, more efficient buildings, and new arrangements for the energy storage.
Spatial planning for the search of low-carbon futures has to show that reducing CO_2 emissions is a global challenge that needs actions at the local scale. These actions affect the **'look' of the spaces** where we live our everyday life.
One factor that influences mountain areas that tackle the global challenge of an energy transition is how they relate to a natural environment characterized by the richness of its resources. **Alpine** transitions to a new energy future is a question of introducing spatial measures that effect the use of the endogenous natural resources, thus the visual appearance of the urban and natural landscapes, e.g., development of artificial lakes, implementation of a new energy plants, ensuring the vital flow of rivers. Nature, its resources, and the landscape are relevant components for the implementation of a low-carbon future in the Alpine environment, and its society must be willing to accept a **new local aesthetic ►**. To guide this process, spatial planning should co-evolve with landscape planning. Moreover it is extremely important that the resources consumed in the local areas bring benefits to the area (e.g. economic or social) in order to facilitate the acceptance of this future.

► This is specifically referred to the perception of RES in the landscape. In fact, many participants perceive them as ugly. See chapter 3.4.4, and related findings during the SWII.

A fundamental **contribution** given by Visioneering in dealing with low-carbon futures is the use of visual material that stresses the different appearance of the places where people will live. It is **not clear** if visual material may play an important role in spatial planning committed to low-carbon futures in contexts different from the Alpine one, where less resources are spread throughout the territory and are therefore less visible on a map.
Further research could explore the potential relation between landscape planning and spatial planning for an energy-based future.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The designed path toward the future is a key output in the Visioneering process.

Visioneering leads to the design of comprehensive pictures of the futures represented in maps, the translation of these maps into actions, and the design of the path to fit the actions into a temporal frame. The **path exemplifies the journey toward the future**, and designing it consists in linking the temporal scales that lead to the vision to the spatial scales of the vision itself ► .

► The path is explained in chapter 2.3.2. Chapter 3.4.5 reports the design of the paths during the empirical research.

The design process of Visioneering is dedicated, therefore, not only to drawing maps about the spatial setting of places in a hypothetical future, but also to delineating paths along a timeline. Delineating the paths allows the planners to comprehend the necessary **planning tools** to implement detailed interventions along the timeline. Effectively, when the vision is split into actions, it calls for tools that address such actions: projects, programs, regulations, management plans, are embedded in the path that drives the local context to the future.

Designing the path also leads to figuring out how the interrelations among actors, actions, and their spatial interrelations, can work along the time toward the vision. This implies to acknowledge how different contribution and knowledge – a multidisciplinary approach– might interact, and on which spatial scale they might interact (e.g. regional, local, individuals) ► . The process to design the path – a graphic planning instrument - is therefore a moment in which to make decisions on actions and on the parties involved in such actions.

► In the findings of both the SWs, reported in chapter 3.4.1 and 3.4.4, the participants acknowledged the necessity for a common regional response to the mobility issue, and the opportunity for individual actions within the implementation of small RES projects.

The Visioneering process can be assessed through the changes in social learning as successfully proved by the empirical research ►. The changes in social learning served to identify where more mutual understanding is required, if the involved parties comprehend the complexity of the challenge, and where joint or single actions can be made. They helped, and can help in future planning processes, to figure out how to strengthen the social dynamics among the involved parties to enforce a regional response.

► See in chapter 2.4 the definitions of output, outcome, and process.

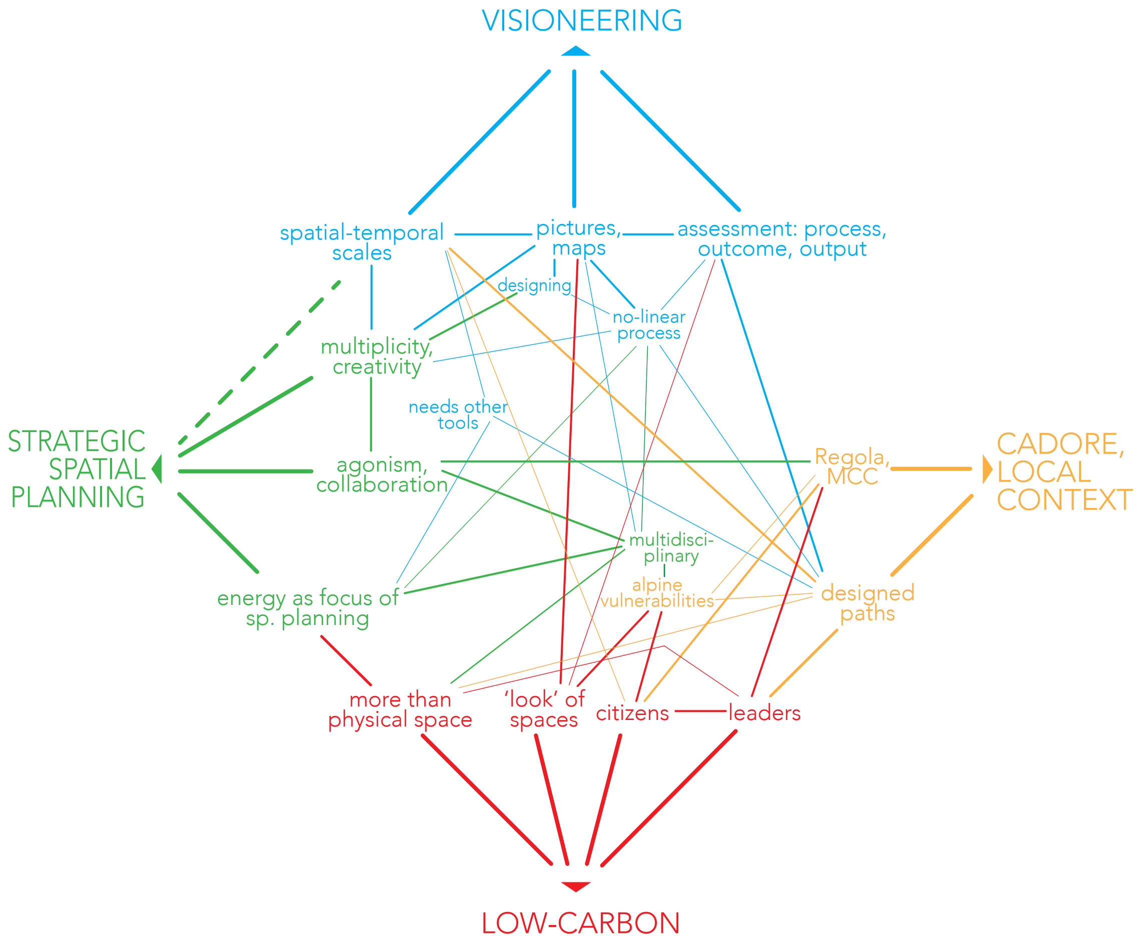
The output of the planning process, visions and paths, are nonetheless the means that steer the planning arena, and are the objectives of the process itself. **Paths and maps** should also be **assessed** in order to ensure that the process leads to an effective response to the challenge.

The main **limit** of the empirical research is that the Visioneering mode of planning was informally applied and the participants contributed voluntarily. This led to a mistrust in the outputs and their efficacy. A second limit is that the long-term impacts of Visioneering cannot be seen in the short-term of the doctoral research. An additional limit related to the assessment of the social learning process, is the difficulty in verifying whether Visioneering or external influences caused the changes in the learning dimension ► .

► This statement is supported by the fact that the paths

The instrument of the path, and its design, **contributes** to the comprehension of how space might be 'produced' through a series of events, and it is an attempt to graphically represent this 'production' process. Strategic spatial planning calls for further **research on planning** instruments that represent the 'production process' of local contexts, and the necessity to asses their efficacy.

obtained in the empirical research, reported in chapter 3.4.5, are not sufficient to accomplish the low-carbon futures designed in the visions.



To reach the low-carbon future in each local context requires the engagement of local institution, 'leaders', and citizens.

The socio-spatial transformation toward a low-carbon future requires a mobilization of actors and actions in a relatively short time, that can be done by nations, regions, municipalities and individuals that take **responsible actions**.

During the design of the path it is important to explore both the bottom-up and top-down dynamics, specifically the influences of the spatial scales among each other, in order to understand what can be done, where, and by whom. The local responsibilities implicated in causing the global challenge, namely the necessary energy transition, become the answer to the challenge itself ► . The energy programs composed and adopted by Europe, its nations, and each region, are effectively implemented through actions at the local scales by single citizens, or groups of citizens as companies, or administrative bodies. In fact **citizens or institutions** are fundamental to make decisions and embrace actions geared towards a low-carbon future.

► During the SWs, reported in chapter 3.4.1 and 3.4.4, some participants stated that they would like to involve citizens in designing visions about energy because citizens know a little about it.

In Cadore, the economic crisis, the environmental vulnerability, the weakened provincial level, do not permit immediate answers given by large economical investments or large top-down imprint ►. The participants at the empirical research called 'leaders' the agents that might make decisions and implement them. A '**leader**' in this conception is the one responsible for taking the action, with its positive or negative effects. It is someone present in the territory that has knowledge about the local context, and locals know it. It is 'leader' because it makes decisions and take actions, and not because of its technical competences. An **institutions** or stakeholders platform already present in a local context can act as a 'leader'.

► The Belluno Province, which should develop a provincial plan for energy that also involves Cadore, is weakened, see chapter 3.1.3.

In Cadore, the MCC and Regola could be recognized as 'leaders' that guide the municipalities or citizens toward a future with less CO_2 ►. They are, in fact, two institutions rooted in the area, recognized and trusted (to a different degree) by the different municipalities. They might act as a platform that coordinates the journey toward the low-carbon future, or that takes actions, and thus causes spreading effects.

► See the findings of the SWI and the necessity to rearrange the Regola rules, chapter 3.4.1.

Visioneering contributes to low-carbon futures by **activating** 'leaders' on the local scale, or by **empowering** the involved parties to identify those 'leaders'. The figures of 'leaders' emerged in the empirical research as fundamental figures that might effectively take actions in Cadore, a rural mountain area composed of 22 municipalities and a low-density population ► . In this research it is **not clear** if the figure of the leader might be useful also in a highly urbanized area, or an area with different vulnerabilities.

► In the findings of the SWs, the MCC is a 'leader' in the area, but requires further competences that aid the process of planning in the field of energy. See the findings from SWII in chapter 3.4.4.

Further action research may be useful to fill the gap that statutory planning is not able to fill in the face of low-carbon futures in remote areas. Effectively, individuals' trust in research is different than that in statutory planning or in private initiatives. Action research and informal planning can be activated where the formal planning system is unsuccessful or does not exist, where there is an institutional gap that needs to be filled.

4.2. Final Remarks

The peculiarity of the Visioneering mode of planning is to connect a proactive multidisciplinary thinking of the future, to a matter of concern, through the simple instrument of a map and a path. It aims to collaboratively translate the spatial and temporal scales, involved in this matter, in visual material that refers to a specific local context. Visioneering embraces therefore the procedural theory of strategic spatial planning, proposing clear acts and tools that planners can use in a local context for an identified matter of concern.

In Visioneering the planning arena requires a multidisciplinary approach that crosses many spatial and temporal scales, and in which the social and economic aspects are indivisible from the spatial. This asks for the recognition and involvement of new and different knowledge in the arena, and it results in a process that is adaptable to the many inputs.

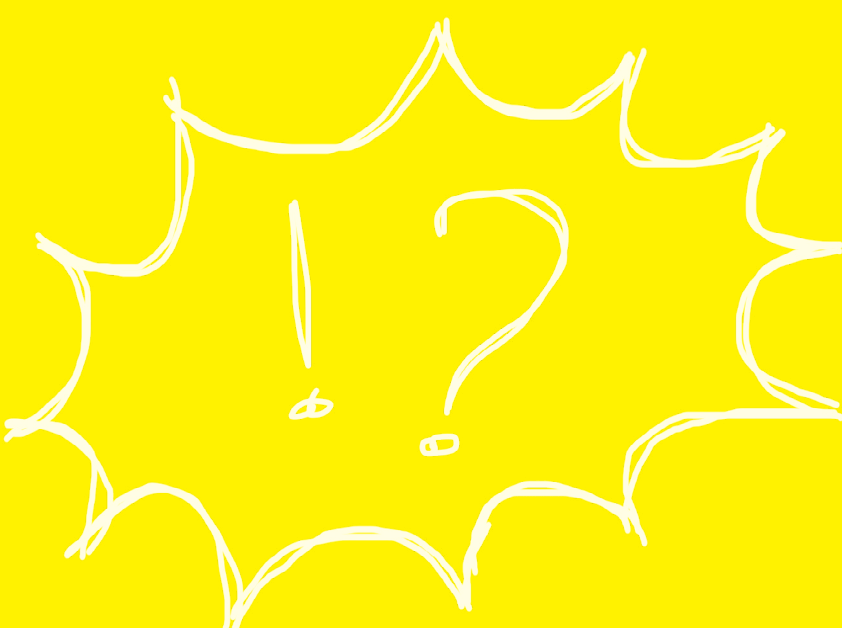
Visioneering futures in local contexts, with local parties involved, generates awareness of the parties themselves on their own potential. Besides, it serves to identify, design, and draw on maps and paths, actions that can effectively be made by the involved parties.

This is particularly relevant when dealing with a matter of concern that is also a global challenge because it allows the local context to take actions at the moment in which the global challenge itself is recognized and must be faced. The result is a local context able to tackle the challenge with immediate responses that precede indispensable top-down planning efforts.

The low-carbon future requires collaboration and actions by locally placed forces. Visioneering empowers them and activates their potential agency. Specifically in the local context of the doctoral research, the economic crisis and a weakened provincial level block immediate economic investments or decisive top-down energy planning that could implement actions toward low-carbon futures.

It is a contradiction to marginalize Alpine areas that provide resources and social capital for the transition to a low-carbon future from the challenge itself. It is necessary to raise their awareness and empower each of them to overcome the obstacles that prevent local citizens and administrations from taking actions. Thus areas that have been until now considered mere means for the transition can become driving forces for it, because local contexts that until now emitted CO_2 are the same local contexts that can stop their emissions.

In that respect I wish for more informal planning or action research in the area where statutory planning can not, or does not act, because of a missing administrative level or because the context is perceived irrelevant to the transition.



5. Appendix

5.1. Questionnaires

Pre-Event Questionnaires of the SWI

Question						Average on the Likert scale
Value on the Likert scale	(1)	(2)	(3)	(4)	(5)	
% of votes	X%	X%	X%	X%	X%	X

Che familiarità hai con il concetto di futuro Low-Carbon, o a basse emissioni di biossido di carbonio?
How familiar are you with the low-carbon concept?

	Nulla *None (1)*	Vaga *Few (2)*	Scarsa *Scarce (3)*	Buona *Good (4)*	Ottima *Very good (5)*	
	0%	10%	30%	60%	0%	3,5

Quante emissioni di biossido di carbonio credi producano oggigiorno le seguenti fonti in Cadore?
To what extent do you think the following sectors are currently producing carbon emissions?

	Nullo *None (1)*	Trascura Bile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltis Simo *Very much (5)*	
Mobilità privata *Private Transport*	0%	10%	0%	80%	10%	3,9
Mobilità pubblica *Public Transport*	0%	20%	40%	30%	0%	3,1
Industria *Industry*	20%	0%	20%	30%	30%	3,5
Edifici privati *Private buildings*	0%	0%	40%	50%	0%	3,6
Edifici pubblici *Public buildings*	0%	0%	40%	50%	0%	3,6

Che familiarità hai con l'impatto spaziale che hanno i seguenti sistemi per la produzione di energia?
How familiar are you with the different spatial impacts of the following renewable energy sources?

	Nulla *None (1)*	Vaga *Few (2)*	Scarsa *Scarce (3)*	Buona *Good (4)*	Ottima *Very good (5)*	
Pannelli solari e fotovoltaici *Thermal and photovoltaic solar panels*	0%	0%	0%	90%	10%	4,1
Mini centrali idroelettriche *Mini hydro power plants*	0%	0%	10%	80%	10%	4,0
Geotermico *Geothermal power*	10%	20%	50%	20%	0%	2,8
Biomassa legnosa (diradamento bosco e scarti di segheria) *Biomass from wood*	0%	10%	10%	70%	10%	3,8
Biogas da rifiuti organici *Biogas from FORSU*	30%	0%	20%	30%	0%	2,9
Piccolo eolico *Small wind-power*	30%	0%	50%	20%	0%	2,6
Sistemi di accumulo d'energia *Storage systems*	30%	20%	30%	20%	0%	2,4

Cha familiarità hai con il ruolo che i seguenti sistemi per la produzione di energia possono avere in Cadore nei prossimi 30% anni?
How familiar are you with the roles different renewable energy sources can play in your community in the next 30% years?

	Nulla *None (1)*	Vaga *Few (2)*	Scarsa *Scarce (3)*	Buona *Good (4)*	Ottima *Very good (5)*	
Pannelli solari e fotovoltaici *Thermal and photovoltaic solar panels*	0%	10%	30%	60%	0%	3,5
Mini centrali idroelettriche *Mini hydro power plants*	0%	0%	30%	60%	10%	3,8
Geotermico *Geothermal power*	0%	10%	40%	10%	0%	2,3
Biomassa legnosa (diradamento bosco e scarti di segheria) *Biomass from wood*	0%	0%	30%	50%	20%	3,9
Biogas da rifiuti organici *Biogas from FORSU*	10%	10%	50%	30%	0%	3,0
Piccolo eolico *Small wind-power*	20%	20%	30%	30%	0%	2,7
Sistemi di accumulo d'energia *Storage systems*	30%	20%	20%	30%	0%	2,5

Quanto credi che i seguenti protagonisti possano contribuire a raggiungere un futuro Low-Carbon in Cadore?
How much can the following actors contribute towards low carbon energy futures?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Esperti e ingegneri *Experts and Engineers*	0%	0%	0%	50%	50%	4,5
Politici e pubbliche amministrazioni *Politicians and public administrations*	0%	0%	20%	50%	30%	4,1
Cittadini *Citizens*	0%	0%	20%	60%	20%	4,0
Investitori privati *Private investors*	0%	0%	30%	50%	20%	3,9

Quanto credi che i seguenti interessi possano sostenere un incremento della produzione di energia Cadore?
To what extents do the following interests support the increased energy production in Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Interesse economico delle parti private *Private economic interests*	0%	0%	20%	70%	10%	3,9
Interesse economico delle parti pubbliche *Public economic interests*	0%	0%	10%	60%	30%	4,2
Protezione ambientale *Environmental protection*	0%	10%	40%	30%	20%	3,6
Sicurezza nazionale *National security*	30%	0%	30%	30%	10%	2,9

Quanto contano le necessità delle seguenti categorie quando pensi all'incremento della produzione di energia in Cadore?
How relevant are the needs of the following categories when deciding about an increase of energy production in Cadore?

	Non importanti *Not Important (1)*	Poco importanti *Barely important (2)*	Abbastanza importanti *A bit important (3)*	Importanti *Important (4)*	Molto importanti *Very important (5)*	
Generazioni future *Future generations*	0%	0%	0%	30%	70%	4,7
Esseri viventi umani *Human beings*	10%	0%	10%	30%	50%	4,4
Esseri viventi non-umani *Non-human beings*	0%	10%	20%	10%	50%	3,7

In che contesto puoi immaginare azioni integrate per sviluppare un futuro Low-Carbon in Cadore?
In which context can you imagine common actions for the development of a low-carbon future in the Cadore area?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Partnership economiche *Economic partnerships*	0%	0%	20%	70%	10%	3,9
Cittadinanza attiva *Active citizenship*	0%	0%	30%	50%	20%	3,9
Azioni da parte della Magnifica Comunità di Cadore *Actions by the MCC*	0%	0%	40%	40%	10%	3,7
Potenziamento del patto dei sindaci *Implementing the Covenant of Mayors*	0%	0%	10%	70%	20%	4,1
Azioni da parte della provincia di Belluno *Actions from the Belluno Province*	0%	0%	20%	60%	20%	4,0
Azioni da parte della Regione Veneto *Actions from the Veneto Region*	0%	0%	20%	60%	20%	4,0
Azioni da parte della Regola *Actions from the Regola*	0%	0%	40%	40%	10%	3,7
Unione tra comuni *A union between municipalities*	0%	0%	20%	80%	0%	3,8

Aumentare la produzione di energia in Cadore è:
Increasing the production of energy production is:

Molto semplice *Really easy (1)*	Sempli Ce *Easy (2)*	Abbastanza complesso *A bit complex (3)*	Complesso *Complex (4)*	Molto complesso *Very complex (5)*	
0%	30%	50%	0%	10%	2,9

Per quale dei seguenti mezzi per la produzione di energia vorresti vedere opportunità per azioni comuni da parti pubbliche in Cadore?
For which of the following means of energy production would you like to see common actions from public parties in Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Pannelli solari e fotovoltaici *Thermal and photovoltaic solar panels*	0%	30%	10%	50%	10%	3,4
Mini centrali idroelettriche *Mini hydro-power plants*	0%	10%	20%	70%	0%	3,6

Geotermico *Geothermal*	10%	10%	20%	40%	0%	3,1
Biomassa legnosa (bosco e scarti di segheria) *Biomass from wood*	0%	10%	10%	60%	30%	4,1
Biogas da rifiuti organici *Biogas from FORSU*	20%	20%	20%	30%	0%	2,7
Biogas da allevamento *Biogas from livestock*	30%	10%	40%	10%	0%	2,5
Piccolo eolico *Small wind-turbine*	40%	10%	30%	30%	0%	2,5
Sistemi di accumulo d'energia *Energy storage system*	0%	30%	40%	20%	0%	2,9

Per quale dei seguenti mezzi per la produzione di energia vorresti vedere opportunità per azioni da parti private?
For which of the following means of energy production would you like to see common actions from private parties in Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Pannelli solari e fotovoltaici *Thermal and photovoltaic solar panels*	10%	0%	10%	70%	0%	3,9
Mini centrali idroelettriche *Mini hydro-power plants*	20%	10%	10%	50%	0%	3,0
Geotermico *Geothermal*	30%	0%	0%	50%	0%	2,9
Biomassa legnosa (bosco e scarti di segheria) *Biomass from wood*	0%	10%	0%	70%	10%	3,9
Biogas da rifiuti organici *Biogas from FORSU*	20%	20%	20%	20%	10%	2,8
Biogas da allevamento *Biogas from livestock*	20%	20%	30%	20%	0%	2,6
Piccolo eolico *Small wind-turbines*	20%	10%	30%	30%	0%	2,8
Sistemi di accumulo d'energia *Energy storage system*	0%	20%	50%	20%	0%	3,0

Fino a che punto pensi che i seguenti assetti energetici possano rappresentare un possibile futuro per il Cadore?
To what extent do you think the following energy settings can represent a possible future of Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Villaggi energeticamente autosufficiente *Autonomous villages*	10%	0%	10%	40%	30%	3,9
Cadore energeticamente autosufficiente *Energy autonomy for Cadore*	10%	0%	20%	40%	20%	3,7
Cadore con sistema pubblico centralizzato di produzione e vendita di energia *A centralized public system of energy production in Cadore*	10%	0%	20%	50%	10%	3,6
Cadore con sistema privato centralizzato di produzione e vendita energia *A centralized private system for energy production in Cadore*	10%	20%	10%	40%	0%	3,0

Quanto desiderabili sono le seguenti priorità per andare verso un futuro Low-Carbon in Cadore?
How desirable do you find the listed priorities for the transition to a low carbon future in Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Turismo sostenibile	0%	0%	10%	50%	30%	4,2

Sustainable tourism						
Imprenditoria dell'artigianato *Handicraft industry*	0%	0%	10%	60%	10%	4,0
Centri per l'educazione universitaria *Centers for university education*	10%	0%	30%	20%	20%	3,5
Imprenditoria dell'agricoltura e del cibo *Agriculture/food entrepreneurships*	10%	0%	30%	30%	10%	3,4
Sistema di trasporto multiplo: treno + auto + bici + car sharing *Multiple transport system train+car+bike+car sharing*	0%	0%	20%	30%	40%	4,2
Mobilità elettrica *Electrical mobility*	20%	10%	20%	30%	10%	3,0
Trasporto ad alta velocità *High speed transport system*	10%	20%	50%	0%	10%	2,8
Connessione ferroviaria *Railway connection*	10%	0%	20%	40%	20%	3,7
Abbandono dei villaggi più piccoli *Abandonment of small villages*	60%	0%	10%	0%	10%	1,8
Densificazione dei centri abitati più grandi *Increasing the density of the largest urban centers*	40%	30%	10%	0%	0%	1,6

Fino a che punto le seguenti priorità possono effettivamente essere attuate in Cadore per un futuro Low-Carbon?
To what extent do you think the below listened priorities can effectively be realized in Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Turismo sostenibile *Sustainable tourism*	0%	10%	10%	40%	40%	4,1
Imprenditoria dell'artigianato *Handicraft industry*	0%	10%	20%	60%	10%	3,7
Centri per l'educazione universitaria *Centers for university education*	20%	0%	30%	40%	10%	3,2
Imprenditoria dell'agricoltura e del cibo *Agriculture/food entrepreneurships*	0%	10%	40%	50%	0%	3,4
Sistema di trasporto multiplo: treno + auto + bici + car sharing *Multiple transport system train+car+bike+car sharing*	0%	10%	20%	50%	20%	3,8
Mobilità elettrica *Electrical mobility*	20%	10%	30%	20%	10%	2,8
Trasporto ad alta velocità *High speed transport system*	50%	10%	30%	0%	0%	1,8
Connessione ferroviaria *Railway connection*	20%	0%	20%	30%	30%	3,5
Abbandono dei villaggi più piccoli *Abandonment of small villages*	60%	10%	10%	10%	0%	1,7
Densificazione dei centri abitati più grandi *Increasing the density of the largest urban centers*	60%	30%	0%	0%	0%	1,3

Quanto credi siano utili eventi partecipativi come il l'incontro partecipativo per potenziare discussioni costruttive?
To what extent do you think events such as this one are useful for constructive discussions?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*

	0%	10%	20%	50%	20%	3,8

Quanto i seguenti mezzi di comunicazione ti aiutato nella pratica quotidiana per lavorare sul territorio?
To what extent did the following material help you in your daily work?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Mappe *Maps*	10%	10%	10%	30%	20%	3,4
Grafici *Graphs*	10%	10%	40%	30%	0%	3,0
Discussioni orali *Oral discussions*	10%	10%	10%	60%	0%	3,3
Testi scritti *Written texts*	10%	10%	20%	20%	0%	3,2
Disegni e schizzi *Drawings and sketches*	20%	30%	30%	10%	0%	2,3

Post-Event Questionnaires of the SWI

Question						Average on the Likert scale
Value on the Likert scale	(1)	(2)	(3)	(4)	(5)	
% of votes	X%	X%	X%	X%	X%	X

Come valuteresti la tua esperienza durante questo incontro partecipativo?
How would you evalute your experience in this event?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Utile *Useful*	0%	0%	0%	100%	0%	4,0
Inusuale *Unusual*	0%	25%	50%	25%	0%	3,3
Stimolante per azioni comuni *Stimulated common actions*	0%	0%	0%	63%	25%	4,3
Stimolante per la motivazione personale *Stimulated personal actions*	0%	0%	0%	88%	0%	4,0
Le visioni posso effettivamente aiutarci per seguire una direzione *The visions can help choose a direction*	0%	0%	13%	50%	13%	4,0

Quanto i seguenti mezzi di comunicazione ti hanno aiutato a visualizzare la complessità del concetto Low-carbon?
To what extent did the following material help you to understand the complexity of a low-carbon future?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Mappe *Maps*	0%	0%	50%	50%	0%	3,5
Grafici a network *Graphs and Networks*	0%	0%	25%	38%	13%	3,8
Fotomontaggi *Photomontage*	0%	0%	25%	50%	0%	3,7
Presentazione orale *Oral presentation*	0%	0%	0%	88%	13%	4,1
Testi scritti *Written text*	0%	0%	63%	13%	0%	3,2

Quante emissioni di biossido di carbonio credi producano ora le seguenti fonti in Cadore?
To what extent do you think the following sectors are currently producing carbon emissions?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Mobilità privata *Private transport*	0%	0%	13%	63%	13%	4,0
Mobilità pubblica *Public Transport*	13%	0%	50%	13%	0%	2,8
Industria *Industry*	0%	25%	25%	13%	25%	3,7
Edifici privati *Private buildings*	0%	0%	38%	63%	0%	3,6
Edifici pubblici *Public buildings*	0%	0%	38%	38%	0%	3,5

Che familiarità hai con l'impatto spaziale che hanno i seguenti sistemi per la produzione di energia?
How familiar are you with the different spatial impacts of the following renewable energy sources?

	Nulla *None (1)*	Vaga *Few (2)*	Scarsa *Scarce (3)*	Buona *Good (4)*	Ottima *Very good (5)*	
Pannelli solari e fotovoltaici *Thermal and photovoltaic solar panels*	0%	13%	13%	75%	0%	3,6
Mini centrali idroelettriche *Mini Hydropower plants*	0%	0%	13%	75%	0%	3,9
Biomassa legnosa (diradamento bosco e scarti di segheria) *Biomass from forest (thinning and cleaning the forest)*	0%	0%	25%	63%	0%	3,7
Biogas da rifiuti organici *Biogas from FORSU*	0%	25%	38%	13%	0%	2,8
Piccolo eolico *Small wind turbines*	25%	13%	25%	13%	0%	2,3
Sistemi di accumulo d'energia *Storage energy system*	13%	13%	50%	0%	0%	2,5

Aumentare la produzione di energia in Cadore è:
Increasing energy production in Cadore is:

	Molto semplice *Really easy (1)*	Semplice *Easy (2)*	Abbastanza complesso *Slightly complex (3)*	Complesso *Complex (4)*	Molto complesso *Really complex (5)*	
	0%	25%	50%	0%	13%	3,0

Quanto credi che i seguenti protagonisti possano contribuire a raggiungere la visione che più credi possibile?
How much can the following actors contribute towards low carbon energy futures?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Esperti e ingegneri *Experts and engineers*	0%	0%	0%	75%	13%	4,1
Politici e pubbliche amministrazioni *Politicians and public administrations*	0%	0%	38%	25%	13%	3,9
Cittadini *Citizens*	0%	0%	50%	25%	0%	3,3
Investitori privati *Private investors*	13%	0%	0%	50%	13%	3,7

Quanto contano le necessità delle seguenti categorie quando pensi all'incremento della visione che più credi possibile?
How relevant are the needs of the following categories when deciding on an increase of energy production in Cadore?

	Non importanti *Not Important (1)*	Poco importanti *Barely important (2)*	Abbastanza importanti *A bit important (3)*	Importanti *Important (4)*	Molto importanti *Very important (5)*	
Generazioni future *Future generations*	0%	0%	13%	38%	38%	4,3
Esseri viventi umani *Human beings*	0%	0%	25%	38%	25%	4,0
Esseri viventi non-umani *Non-human beings*	0%	25%	13%	13%	25%	3,5

In che contesto puoi immaginare azioni integrate per sviluppare la visione che più credi possibile?
In which context can you imagine common actions for the development of the visions you think are most likely to be adopted?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Partnership economiche *Economic partnerships*	0%	0%	0%	50%	25%	4,3
Cittadinanza attiva *Active citizenship*	0%	0%	25%	50%	0%	3,7
Azioni da parte della Magnifica Comunità di Cadore *Actions by the MCC*	0%	13%	13%	63%	0%	3,6
Potenziamento del patto dei sindaci *Implementing the Covenant of Mayors*	0%	0%	13%	38%	38%	4,3
Azioni da parte della provincia di Belluno *Actions by the Belluno Province*	0%	0%	25%	50%	50%	3,9
Azioni da parte della Regione Veneto *Actions by the Regione Veneto*	0%	0%	50%	35%	25%	4,0
Azioni da parte della Regola *Actions by the Regola*	0%	13%	25%	25%	13%	3,5
Unione tra comuni *Union among municipalities*	0%	13%	13%	50%	0%	3,5

Per quale dei seguenti mezzi per la produzione di energia vorresti vedere opportunità per azioni comuni da parti pubbliche in Cadore?
For which of the following means of energy production would you like to see common actions from public parties in Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Pannelli solari e fotovoltaici *Thermal and photovoltaic solar panels*	0%	0%	50%	38%	0%	3,4
Mini centrali idroelettriche *Mini hydropower plants*	0%	0%	0%	75%	13%	4,1
Geotermico *Geothermic*	0%	13%	38%	25%	0%	3,2
Biomassa legnosa (bosco e scarti di segheria) *Biogas from wood*	0%	0%	13%	50%	25%	4,1
Biogas da rifiuti organici *Biogas from FORSU*	0%	13%	38%	25%	0%	3,2
Biogas da allevamento *Biogas from livestock*	0%	25%	38%	13%	0%	2,8
Piccolo eolico *Small wind turbine*	0%	25%	38%	13%	0%	2,8
Sistemi di accumulo d'energia *Storage system*	0%	25%	50%	0%	0%	2,7

Per quale dei seguenti mezzi per la produzione di energia vorresti vedere opportunità per azioni da parti private?
For which of the following means of energy production would you like to see common actions from private parties in Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Pannelli solari e fotovoltaici *Photovoltaic and thermal solar panels*	13%	0%	0%	50%	25%	3,9
Mini centrali idroelettriche *Mini hydropower plants*	0%	38%	25%	13%	0%	2,7
Geotermico *Geothermic*	0%	13%	63%	0%	0%	2,8
Biomassa legnosa (bosco e scarti di	0%	0%	38%	38%	0%	3,5

segheria) *Biomas from Wood*						
Biogas da rifiuti organici *Biogas from FORSU*	13%	13%	50%	13%	0%	2,7
Biogas da allevamento *Biogas from livestock*	13%	0%	63%	13%	0%	2,9
Mini eolico *Mini wind turbine*	0%	13%	38%	13%	0%	3,3
Sistemi di accumulo d'energia *Enrgy storage system*	13%	13%	38%	25%	0%	2,9

Fino a che punto pensi che le seguenti visioni possano rappresentare un possibile futuro per il Cadore?
To what extent do you think the following visions can represent a possible future of Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
ElectriCore (con DoloUni) *ElectriCore*	0%	0%	63%	13%	0%	3,2
Il grappolo balsamico (cooperazione tra settore primario e terziario) *The Healthy Cluster*	0%	0%	25%	25%	25%	4,0
Il borgo 1555 (autonomia municipale) *The 1555 Village*	0%	0%	50%	25%	13%	3,6

Quanto desiderabili sono le seguenti visioni per andare verso un futuro Low-Carbon in Cadore?
How desirable are the below listened priorities for the transition to a low carbon future in Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
ElectriCore (con DoloUni) *ElectriCore*	0%	25%	25%	25%	0%	3,0
Il grappolo balsamico (cooperazione tra settore primario e terziario) *The Healthy Cluster*	0%	0%	13%	38%	25%	4,2
Il borgo 1555 (autonomia municipale) *The 1555 Village*	0%	0%	63%	25%	0%	3,3

Fino a che punto le seguenti visioni possono effettivamente essere attuate in Cadore per un futuro Low-Carbon?
To what extent do you think the below listened visions can effectively be realized in Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
ElectriCore (con DoloUni) *ElectriCore*	0%	13%	50%	13%	0%	3,0
Il grappolo balsamico (cooperazione tra settore primario e terziario) *The Healthy Cluster*	0%	0%	38%	25%	13%	3,7
Il borgo 1555 (autonomia municipale) *The 1555 Village*	0%	13%	38%	25%	13%	3,4

Quanto credi siano utili eventi partecipativi come disegnare futuri –CADORE per potenziare discussioni costruttive?
To what extent do you think events such as 'disegnare futuri –CADORE' *are useful for constructive discussions?*

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
	0%	0%	13%	75%	13%	4,0

Come vorresti presentare i risultati di disegnare futuri - CADORE ai cittadini?
How would you like to present the results of the workshop 'disegnare futuri –CADORE' to citizens?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Brochure *Brochure*	0%	0%	25%	38%	13%	3,8
Presentazione frontale *Presentation*	0%	0%	13%	38%	25%	4,2
Discussioni pubbliche *Public Discussion*	13%	0%	13%	38%	25%	3,9
Materiale online *Online material*	0%	0%	25%	25%	25%	4,0
Pubblicazioni in giornali *Magazine publications*	0%	0%	25%	50%	0%	3,7

Fino a che punto l'incontro disegnare futuri - CADORE ti ha aiutato a capire il punto di vista delle seguenti persone?
To what extent did the workshop 'disegnare futuri –CADORE' *help you understand the point of view of the following figures?*

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Moderatori, presentatori *Moderators and the presenter*	0%	0%	13%	75%	0%	3,9
Gli altri membri delle amministrazioni pubbliche *The other municipalities' representatives*	0%	0%	0%	75%	13%	4,1

Pre-Event Questionnaires of the SWII

Question						Average on the Likert scale
Value on the Likert scale	(1)	(2)	(3)	(4)	(5)	
% of votes	X%	X%	X%	X%	X%	X

Dopo lo scorso incontro disegnare futuri-CADORE, ti sei interessato maggiormente al tema Low-Carbon?
After the last worskhop 'disegnare futuri –CADORE', have you been more interested in the low-carbon concept?

	Non c'ero allo scorso incontro *I didn't take part in the last event*	Si	Forse	No
	50%	25%	0%	25%

Come sarà l'impatto spaziale[1] delle seguenti categorie nel futuro Low-Carbon[2] in Cadore?
What do you think will be the spatial impact of the following sectors in the low-carbon future of Cadore?

[1] per impatto spaziale si intende il cambiamento spaziale del paesaggio costruito e natural
The term spatial impact refers to the spatial changes in the urban and natural environment
[2] con una riduzione dell'85% delle emissioni rispetto al 2010
with a reduction of 85% of CO2 emissions based on 2010 data

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Trasporti (trasporto di merci, veicoli privati, trasporti pubblici, veicoli della pubblica amministrazione, …) *Mobility*	0%	25%	12,5%	50%	12,5%	3,5
Energia rinnovabile (pannelli solari, fotovoltaici, idroelettrico, biomassa da bosco, eolico, sistemi di accumulo …) *RES implementation*	12,5%	12,5%	12,5%	62,5%	12,5%	3,8
Piani di gestione delle risorse naturali (dighe e mini impianti idroelettrici, gestione del bosco, gestione di piattaforme ed eventi educativi, …) *Management of RES implementation and CO2 emissions*	0%	0%	25%	50%	12,5%	3,9

Raggiungere un futuro Low-Carbon[2] in Cadore entro il 2050 è:
To reach a low-carbon future in Cadore by 2050 is:

[2]con una riduzione dell'85% delle emissioni rispetto al 2010
with an 85% reduction from 2010

	Molto semplice *Really easy (1)*	Semplice *Easy (2)*	Abbastanza complesso *Slightly comples (3)*	Complesso *Complex (4)*	Molto complesso *Extremly complex (5)*	
	0%	12,5%	12,5%	75%	0%	3,6

Q4.18 Quanto ti impegnerai nei prossimi mesi e anni nei seguenti ambiti per ridurre le emissioni di CO2 in Cadore?
To what extent will you be commited to reducing CO2 emissions in the following frameworks?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Personale, familiare *Personal, family*	0%	12,5%	12,5%	62,5%	12,5%	3,8
Amministrazione comunale *Municipal administration*	0%	12,5%	0%	62,5%	25%	4,0

Magnifica Comunità di Cadore *MCC*	12,5%	0%	37,5%	37,5%	0%	3,1
Regionale, Provinciale *Regional (Veneto)*	12,5%	12,5%	25%	37,5%	0%	3,0

Quanto ti impegnerai nei prossimi mesi e anni con la tua amministrazione per ridurre le emissioni di CO2 in Cadore nei seguenti settori?
To what extent will you be commited within your municipal administration framework to reduce CO2 emissions in the following sectors?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Trasporti (trasporto di merci, veicoli privati, trasporti pubblici, veicoli della pubblica amministrazione, …) *Mobility*	0%	25%	37,5%	37,5%	0%	3,3
Energia rinnovabile (pannelli solari, fotovoltaici, idroelettrico, biomassa da bosco, eolico, …) *RES implementation*	0%	0%	25%	50%	25%	4,0
Piani di gestione delle risorse naturali (dighe e mini impianti idroelettrici, gestione del bosco, gestione di piattaforme ed eventi educativi, …) *Management of RES implementation and CO2 emissions*	0%	12,5%	0%	50%	25%	4,0

Quanto desideri azioni integrate negli ambiti di seguito citati per sviluppare un futuro Low-Carbon[2] in Cadore?
To what extent do you desire common actions in the following frameworks for the implementation of a low-carbon future?

[2] con una riduzione dell'85% delle emissioni rispetto al 2010
with an 85% reduction from 2010

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Partnership economiche tra soggetti privati *Private economic partnerships*	0%	12,5%	25%	50%	0%	3,4
Azioni da parte della Magnifica Comunità di Cadore *Actions by the MCC*	0%	0%	12,5%	75%	0%	3,9
Adesione al Patto dei Sindaci *Adhering to the Covenant of Mayors*	0%	0%	12,5%	75%	0%	3,9
Azioni da parte della Regola *Actions by the Regola*	0%	0%	0%	75%	12,5%	4,1
Unione / fusione tra comuni *Union/ fusion among municipalities*	0%	0%	50%	25%	12,5%	3,6

Post-Event Questionnaires of the SWII

Question						Average on the Likert scale
Value on the Likert scale	(1)	(2)	(3)	(4)	(5)	
% of votes	X%	X%	X%	X%	X%	X

Credi che dopo questo evento la tua familiarità con il concetto di Low-Carbon sia migliorata?
Do you think that after this event your familiarity with the low-carbon concept increased?

	Non c'ero allo scorso incontro *I didn't attend last event*	Si *Yes*	Forse *Maybe*	No *No*
	20%	80%	0%	0%

Come sarà l'impatto spaziale[1] delle seguenti categorie nel futuro Low-Carbon[2] in Cadore?
What do you think will be the spatial impact of the following sectors in the low-carbon future of Cadore?

[1] per impatto spaziale si intende il cambiamento spaziale del paesaggio costruito e natural
The term spatial impact refers to the spatial changes in the urban and natural environment
[2] con una riduzione dell'85% delle emissioni rispetto al 2010
with a reduction of the 85% of CO2 emissions based on 2010 data

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Trasporti (trasporto di merci, veicoli privati, trasporti pubblici, veicoli della pubblica amministrazione, …) *Mobility*	0%	10%	20%	60%	10%	3,7
Energia rinnovabile (pannelli solari, fotovoltaici, idroelettrico, biomassa da bosco, eolico, sistemi di accumulo …) *RES implementation*	0%	10%	30%	50%	10%	3,6
Piani di gestione delle risorse naturali (dighe e mini impianti idroelettrici, gestione del bosco, gestione di piattaforme ed eventi educativi, …) *Management of RES implementation and CO2 emissions*	0%	10%	20%	60%	10%	3,7

Raggiungere un futuro Low-Carbon[2] in Cadore entro il 2050 è:
Reaching a low-carbon future in Cadore by 2050 is:

[2] con una riduzione dell'85% delle emissioni rispetto al 2010
with a reduction of the 85% of CO2 emissions based on 2010 data

Molto semplice *Really easy (1)*	Semplice *Easy (2)*	Abbastanza complesso *Slightly complex (3)*	Complesso *Complex (4)*	Molto complesso *Extremly complex (5)*	
0%	0%	0%	100%	0%	4,0

Quanto credi sia importante un incremento della partecipazione dei cittadini nei seguenti settori per raggiungere un futuro Low-Carbon?
How important do you think is the involvement of citizens in the following sectors in order to reach a low-carbon future in Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Trasporti (trasporto di merci, veicoli privati, trasporti pubblici, veicoli della pubblica amministrazione, …)	0%	0%	10%	50%	40%	4,3

Mobility						
Energia rinnovabile (pannelli solari, fotovoltaici, idroelettrico, biomassa da bosco, eolico, …) *RES implementation*	0%	0%	10%	80%	10%	4,0
Piani di gestione delle risorse naturali (per dighe e mini impianti idroelettrici, gestione del bosco, gestione di piattaforme ed eventi educativi, …) *Management of RES implementation and CO2 emissions*	0%	0%	20%	60%	10%	3,9

Quanto credi sia importante un incremento della partecipazione di tutto il Cadore come regione nei seguenti settori per raggiungere un futuro Low-Carbon?
To what extent is the importance of the involvment of the entire Cadore region in the following sectors in order to reach a low-carbon future?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Trasporti (trasporto di merci, veicoli privati, trasporti pubblici, veicoli della pubblica amministrazione, …) *Mobility*	0%	0%	0%	50%	50%	4,5
Energia rinnovabile (pannelli solari, fotovoltaici, idroelettrico, biomassa da bosco, eolico, …) *RES implementation*	0%	0%	0%	70%	30%	4,3
Piani di gestione delle risorse naturali (per dighe e mini impianti idroelettrici, gestione del bosco, gestione di piattaforme ed eventi educativi, …) *Management of RES implementation and CO2 emissions*	0%	0%	10%	50%	40%	4,3

Fino a che punto pensi che le seguenti visioni, e i percorsi per raggiungerle, possano rappresentare un possibile futuro?
To what extent do you think the listed visions and paths represent a possible low-carbon future of Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Il grappolo Balsamico *The Healthy Cluster*	0%	0%	20%	60%	20%	4,0
Borghi & Nodi *Borghi & Nodi*	0%	0%	50%	40%	0%	3,4

Fino a che punto le seguenti visioni, e i percorsi per raggiungerle, possono effettivamente essere attuate in Cadore?
To what extent do you think the listed visions and paths can effectively be realized in Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Il grappolo Balsamico *The Helathy Cluster*	0%	0%	30%	50%	20%	3,9
Borghi & Nodi *Borghi & Nodi*	0%	20%	40%	20%	0%	3,0

Quanto credi che i seguenti protagonisti possano contribuire a raggiungere la visione che più credi possibile?
How much can the following actors contribute towards the vision that you think is most possible?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Esperti e ingegneri *Experts and engineers*	0%	0%	30%	50%	20%	3,9
Politici e pubbliche amministrazioni *Politicians and public administrations*	0%	10%	0%	50%	40%	4,2
Cittadini *Citizens*	0%	10%	20%	60%	10%	3,7
Investitori privati *Private investors*	0%	10%	40%	50%	0%	3,4

Quanto credi che le visioni, e i percorsi per raggiungerle, aiutino in:
How do you think that the visions, and the paths, help to:

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Intraprendere in futuro azioni comuni *Take common actions for the future*	0%	10%	0%	90%	0%	3,8
Intraprendere un percorso personale Low-Carbon *Begin a personal journey toward the low-carbon future*	0%	0%	30%	40%	30%	4,0
Capire la complessità del tema Low-Carbon *Understand the complexity of the low-carbon concept*	0%	0%	10%	50%	30%	4,2
Decidere le azioni da intraprendere per un futuro Low-Carbon *Decide the actions necessary for a low-carbon future*	0%	0%	10%	80%	10%	4,0

Quanto ti impegnerai nei prossimi mesi e anni nei seguenti ambiti per ridurre le emissioni di CO2 in Cadore?
To what extent will you be commited to reducing CO2 emissions in the following frameworks?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Personale, familiare *Personal, family*	0%	0%	0%	90%	10%	4,1
Amministrazione comunale *Municipal administration*	0%	10%	0%	50%	30%	4,1
Magnifica Comunità di Cadore *MCC*	0%	10%	20%	40%	20%	3,8
Regionale, provinciale *Regional (Veneto)*	0%	30%	30%	20%	10%	3,1

Quanto ti impegnerai nei prossimi mesi e anni con la tua amministrazione per ridurre le emissioni di CO2 in Cadore nei seguenti settori?
To what extent will you be commited within your municipal administration framework to reduce CO2 emissions in the following sectors?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Trasporti (trasporto di merci, veicoli privati, trasporti pubblici, veicoli della pubblica amministrazione, …) *Mobility*	0%	0%	30%	50%	10%	3,8
Energia rinnovabile (pannelli solari, fotovoltaici, idroelettrico, biomassa da bosco, eolico, …) *RES implementation*	0%	0%	0%	60%	30%	4,3
Piani di gestione delle risorse naturali (dighe e mini impianti idroelettrici, gestione del bosco, gestione di piattaforme ed eventi educativi, …) *Management of RES implementation and*	0%	0%	0%	90%	10%	4,1

CO2 emissions

Fino a che punto l'incontro *disegnare futuri-CADORE* ti ha aiutato a capire il punto di vista delle seguenti persone?
To what extent did the workshop 'disegnare future –CADORE' help you to understand the point of view of the following figures?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Moderatori, presentatori *Moderators, presenter*	0%	0%	20%	80%	0%	3,8
Gli altri membri delle amministrazioni pubbliche *The other municipalities' representatives*	0%	10%	20%	60%	10%	3,7

Credi che nei prossimi mesi ti incontrerai nuovamene con tutti o alcuni dei partecipanti di *disegnare futuri-CADORE* per intraprendere azioni comuni?
Do you think that in the following months you will meet again with few or all of the partecipants of this event in order to take common actions?
Es. lezioni nelle scuole, presentazioni alla Magnifica, presentazioni aperte alla cittadinanza, partnership per un piano di gestione dei boschi, consulenze su azioni già intraprese da altri, …
E.g. lessons, presentations at the MCC, presentations open to all citizens etc…

	No *No*	Forse *Maybe*	Si *Yes*
	0%	80%	20%

Vorresti presentare i risultati di *disegnare futuri-CADORE* ai cittadini? Se si, come?
Would you like to present the results of this event to citizens? If yes, how?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Presentazione frontale *Presentation*	0%	0%	50%	30%	20%	3,7
Discussioni pubbliche *Public discussion*	0%	0%	30%	50%	10%	3,8
Materiale online *Online material*	0%	10%	20%	50%	0%	3,7
Pubblicazioni in giornali *Magazine publications*	0%	10%	10%	70%	0%	3,7

Quanto credi siano utili eventi partecipativi come *disegnare futuri–CADORE* per iniziare discussioni costruttive?
To what extent do you think events such as this one are useful for constructive discussions?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
	0%	0%	0%	70%	30%	4,3

Post Study Tour Questionnaires

Question						Average on the Likert scale
Value on the Likert scale	(1)	(2)	(3)	(4)	(5)	
% of votes	X%	X%	X%	X%	X%	X

Quanto credi siano utili eventi partecipativi come il tour di oggi per iniziare discussioni costruttive?
To what extent do you think events such as the tour are useful for constructive discussions?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
	0%	0%	0%	80%	20%	4,2

Quanto credi che i seguenti protagonisti possano contribuire a raggiungere la visione presentata ieri che più credi possibile?
How much can the following actors contribute towards the realization of your favorite visions? (You must choose between the two presented yesterday).

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Esperti e ingegneri *Experts and engineers*	0%	0%	30%	40%	10%	3,8
Politici e pubbliche amministrazioni *Politicians and public administrations*	0%	0%	0%	50%	10%	4,3
Cittadini *Citizens*	0%	0%	10%	50%	20%	4,1
Investitori privati *Private investors*	0%	0%	30%	40%	10%	3,9

In che contesto puoi immaginare azioni integrate per sviluppare un futuro Low-Carbon in Cadore?
In which framework do you imagine common actions for the implementation of a low-carbon future in Cadore?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Partnership economiche *Economic partnerships*	0%	0%	10%	70%	0%	3,8
Cittadinanza attiva *Active citizenship*	0%	0%	10%	60%	10%	3,8
Azioni da parte della Magnifica Comunità di Cadore *Actions by MCC*	0%	0%	40%	50%	0%	3,6
Potenziamento del patto dei sindaci *Implenting the Covenant of Mayors*	0%	0%	20%	40%	20%	4,0
Azioni da parte della provincia di Belluno *Actions by the Belluno Province*	10%	0%	0%	60%	30%	3,3
Azioni da parte della Regione Veneto *Actions by the Veneto Region*	0%	0%	40%	40%	10%	3,6
Azioni da parte della Regola *Actions by the Regola*	0%	0%	10%	50%	10%	4,0
Unione, fusione tra comuni *Union / fusions among municipalities*	0%	0%	20%	20%	30%	4,1

Quanto ti impegnerai nei prossimi mesi e anni nei seguenti ambiti per ridurre le emissioni di CO2 in Cadore?
To what extent will you be commited to reducing CO2 emissionsin the following frameworks?

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Personale, familiare *Personal, family*	0%	0%	20%	70%	10%	3,9

Amministrazione comunale *Municipal administration*	0%	0%	10%	70%	20%	4,1
Magnifica comunità di Cadore *MCC*	0%	0%	40%	40%	0%	3,6
Regionale *Regional (Veneto)*	0%	0%	60%	20%	0%	3,1

Quanto ti impegnerai nei prossimi mesi e anni con la tua amministrazione per ridurre le emissioni di CO_2 in Cadore nei seguenti settori?
To what extent will you be commited to reduce CO_2 emissions in the following sectors?

	Nullo None (1)	Trascurabile Negligible (2)	Poco A bit (3)	Molto A lot (4)	Moltissimo Very much (5)	
Trasporti (trasporto di merci, veicoli privati, trasporti pubblici, veicoli della pubblica amministrazione, …) *Mobility*	0%	0%	40%	50%	10%	3,6
Energia rinnovabile (pannelli solari, fotovoltaici, idroelettrico, biomassa da bosco, eolico, …) *RES implementation*	0%	0%	10%	70%	20%	4,1
piani di gestione delle risorse naturali (dighe e mini impianti idroelettrici, gestione del bosco, gestione di piattaforme ed eventi educativi, …) *Management of RES implementation and CO_2 emissions*	0%	10%	0%	80%	10%	3,9

Quanto credi che le visioni, e i percorsi per raggiungerle, aiutino in:
How do you think that the visions, and the paths, help to:

	Nullo *None (1)*	Trascurabile *Negligible (2)*	Poco *A bit (3)*	Molto *A lot (4)*	Moltissimo *Very much (5)*	
Intraprendere in futuro azioni comuni *Decide upon future common actions*	0%	0%	10%	40%	30%	4,3
Intraprendere un percorso personale Low-Carbon *Begin a personal journey toward a Low-Carbon future*	0%	0%	30%	40%	10%	3,8
Capire la complessità del tema Low-Carbon *Understanding the complexity of the low-carbon future concept*	0%	0%	10%	70%	0%	3,9
Decidere le azioni da intraprendere per un futuro Low-Carbon *Deciding upon actions to implement a low-carbon future*	0%	0%	20%	60%	10%	3,9

Online Survey

Question		
Answer	Number of answer	Percentage of aswer
Si	x	X%
No	x	X%
Non piú	x	X%

Vivi in Cadore? *Do you live in Cadore?*

Si *Yes*	120	70.6%
No *No*	30	17.6%
Non piú *No longer*	20	11.8%

Sesso *Gender*

Donna *Female*	81	47.6%
Uomo *Male*	89	52.4%

Stà *Age*

tra i 18 e 30 anni *between 18 and 30 years old*	60	35.3%
tra i 30 e 50 anni *30 and 50 years old*	76	44.7%
tra i 50 e 90 anni *50 and 90 years old*	34	20%

Hai familiaritá con il concetto di futuro Low-Carbon, o a basse emissioni di anidride carbonica?
Are you familiar with the Concept of low-carbon futures or carbon emissions?

No *No*	52	30.6%
Poco *A bit*	64	37.6%
Si *Yes*	54	31.8%

Quante emissioni di anidride carbonica producono le seguenti fonti in Cadore?
How many carbon emissions are produced by the following sectors in Cadore?

Trasporti privati *Private Transport*		
Nulle *Zero*	2	1.2%
Poche *Few*	37	21.9%
Molte *Many*	130	76.9%
Trasporti pubblici *Public Transport*		
Nulle *Zero*	7	4.1%
Poche *Few*	111	65.3%
Molte *Many*	52	30.6%
Industria *Industry*		
Nulle *Zero*	12	7.2%
Poche *Few*	81	48.5%
Molte *Many*	74	44.3%
Edifici private *Private Buildings*		
Nulle *Zero*	7	4.1%
Poche *Few*	67	39.4%
Molte *Many*	96	56.5%
Edifici pubblici *Public Buildings*		
Nulle *Zero*	5	3%
Poche *Few*	86	50.9%
Molte *Many*	78	46.2%

Vorresti che i seguenti metodi per la produzione di energia venissero incrementati in Cadore?
Would you like to see an increase in the following RES in Cadore?

Pannelli solari e fotovoltaici *Solar and thermal panles*		
No *No*	3	1.8%

Poco *Few*	18	10.7%
Si *Yes*	148	87.6%
Mini idroelettrico *Mini Hydropower*		
Poco *Few*	41	24.3%
Poco *Few*	50	29.6%
Si *Yes*	78	46.2%
Geotermico *Geothermal*		
No *No*	23	13.9%
Poco *Few*	40	24.1%
Si *Yes*	103	62%
Biomassa legnoso *Biomas from forest -Wood*		
No *No*	11	6.5%
Poco *Few*	48	28.6%
Si *Yes*	109	64.9%
Biogas da FORSU e livestock *Biogas from livestock and FORSU*		
No *No*	22	13%
Poco *Few*	48	28.4%
Si *Yes*	99	58.6%
Piccolo eolico *Small wind turbines*		
No *No*	88	53%
Poco *Few*	41	24.7%
Si *Yes*	37	22.3%

Contano le necessità delle seguenti categorie quando pensi all'incremento della produzione di energia in Cadore?
How relevant are the needs of the following categories when thinking about the energy future of Cadore?

Generazioni future *Future Generations*		
Poco *Few*	7	4.2%
Molto *A lot*	158	94%
Esseri viventi umani *Human beings*		
Poco *Few*	10	6%
Molto *A lot*	154	92.2%
Esseri viventi non umani *Non-Human beings*		
Poco *Few*	46	27.7%
Molto *A lot*	118	71.1%

Incrementare la produzione di energia in Cadore è: *Increasing the energy production in Cadore is:*

Semplice *Easy*	45	26.5%
Complesso *Complex*	102	60%
Molto complesso *Really complex*	23	13.5%

Sono desiderabili le seguenti prioritá per andare verso un futuro Low-Carbon in Cadore?
How desirable do you find the listed priorities for the transition to a low carbon future in Cadore?

Turismo sostenibile *Sustainable tourism*		
No *No*	3	1.8%
Poco *A bit*	20	12.1%
Molto *A lot*	142	86.1%
Abbandono dei village più piccolo *Abandonement of smaller villages*		
No *No*	106	63.1%
Poco *A bit*	31	18.5%
Molto *A lot*	31	18.5%
Sviluppo dell´artigianato *Development of handicrafts*		
No *No*	11	6.7%
Poco *A bit*	59	36%
Molto *A lot*	94	57.3%
Centri per l'educazione universitaria *Center for university education*		
No *No*	21	12.7%
Poco *A bit*	78	47.3%
Molto *A lot*	66	40%
Densificazione dei centri abitati più grandi *Increasing the density of the largest urban centers*		
No *No*	73	44.5%
Poco *A bit*	68	41.5%

	Molto *A lot*	23	14%
Sviluppo del mercato agroalimentare *Increasing agrofood sector*			
	No *No*	5	3%
	Poco *A bit*	39	23.6%
	Molto *A lot*	121	73.3%
Sviluppo dell´agricoltura *Increasing agriculture*			
	No *No*	5	3%
	Poco *A bit*	38	22.9%
	Molto *A lot*	123	74.1%
Auto elettrica & Car sharing *Electric car and car sharing*			
	No *No*	22	13.2%
	Poco *A bit*	46	27.5%
	Molto *A lot*	99	59.3%
Trasporto ad alta velocità *High speed connection*			
	No *No*	71	42.3%
	Poco *A bit*	67	39.9%
	Molto *A lot*	30	17.9%
Connessione ferroviaria *Railway connection*			
	No *No*	11	6.6%
	Poco *A bit*	22	13.2%
	Molto *A lot*	134	80.2%
Bici elettrica & Bike sharing *Electric Bicycle & Bike sharing*			
	No *No*	18	10.7%
	Poco *A bit*	52	30.8%
	Molto *A lot*	99	58.6%

Le visioni sono state presentate con un breve testo e un'immagine. *The visions were presented with a short text and a picture*

Le tre visioni aiutano a visualizzare un possibile futuro? *Do the three visions help visualize a possible future?*

Si *Yes*	87	51.5%
Forse *Maybe*	66	39.1%
No *No*	16	9.5%

Sono desiderabili le seguenti visioni per il Cadore? *Are the following visions desirable for Cadore?*

ElectriCore *Electricore*			
	No *No*	23	13.9%
	Poco *Abit*	63	38%
	Molto *A lot*	80	48.2%
Il grappolo balsamico *The Healthy Cluster*			
	No *No*	8	4.7%
	Poco *A bit*	43	25.4%
	Poco *A bit*	118	69.8%
Il borgo 1555 *The 1555 Village*			
	No *No*	34	20.5%
	Poco *A bit*	62	37.3%
	Poco *A bit*	70	42.2%

Possono le seguenti visioni essere attuate in Cadore? *Can the following visions be realized in Cadore?*

ElectriCore *Electricore*			
	No *No*	53	31.4%
	Forse *Maybe*	72	42.6%
	Si *Yes*	44	26%
Il grappolo balsamico *The Healthy Cluster*			
	No *No*	17	10.1%
	Forse *Maybe*	65	38.5%
	Si *Yes*	87	51.5%
Il borgo 1555 *The 1555 Village*			
	No *No*	32	19%
	Forse *Maybe*	73	43.5%
	Si *Yes*	63	37.5%

Aumentare la produzione di energia in Cadore è: *To increase the energy production in Cadore is:*

Semplice *Easy*	39	23.1%
Complesso *Complex*	113	66.9%
Molto complesso *Really complex*	17	10.1%

Vorresti vedere azioni da parti pubbliche per la produzione di energia dai seguenti mezzi?
Would you like to see public action for the implementation of the following RES?

Pannelli solari e fotovoltaici *Thermal and Photovoltaic Panles*		
No *No*	3	1.8%
Forse *Maybe*	24	14.4%
Si *Yes*	140	83.8%
Mini centrali idroelettriche *Small Hydropower plant*		
No *No*	46	27.7%
Forse *Maybe*	42	25.3%
Si *Yes*	78	47%
Geotermico *Geothermal*		
No *No*	24	14.4%
Forse *Maybe*	44	26.3%
Si *Yes*	99	59.3%
Biomassa legnosa *Biomass from wood*		
No *No*	18	11.1%
Forse *Maybe*	39	24.1%
Si *Yes*	105	64.8%
Biogas da rifiuti organici e allevamento *Biogas from livestock and FORSU*		
No *No*	22	13%
Forse *Maybe*	49	29%
Si *Yes*	98	58%
Pale eoliche *Wind turbines*		
No *No*	88	53.7%
Forse *Maybe*	33	20.1%
Si *Yes*	43	26.2%

Credi che i seguenti protagonisti possano contribuire a raggiungere la visione che più credi possibile?
Do you think that the following actors can contribute towards the vision you think is possible?

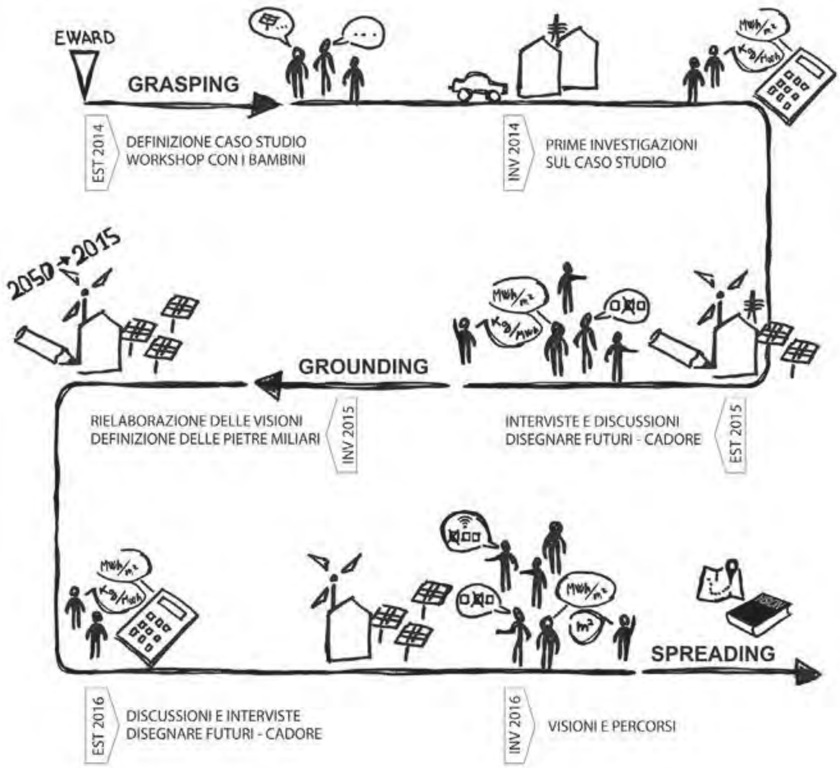
Esperti e ingegneri *Experts and engineers*		
No *No*	7	4.2%
Forse *Maybe*	31	18.8%
Si *Yes*	127	77%
Politici e pubbliche amministrazioni *Politicians and public administrations*		
No *No*	51	30.7%
Forse *Maybe*	52	31.3%
Si *Yes*	63	38%
Cittadini *Citizens*		
No *No*	11	6.6%
Forse *Maybe*	32	19.3%
Si *Yes*	123	74.1%
Investitori private *Private investors*		
No *No*	8	4.9%
Forse *Maybe*	56	34.1%
Si *Yes*	100	61%

Come valuteresti la tua esperienza durante questo questionario? *How would you like to evaluate the experience during this survey?*

Le cose lette sono inutili *Reading this material is useless*	3	1.8%
È utile pensare a possibili futuri *It is useful to think about futures*	96	57.1%
È inusuale immaginare il futuro *It is unusual to think about the future*	4	2.4%
Le visioni sono interessanti *The visions are interesting*	65	38.7%

5.2. Posters of the Stakeholder Workshop I

la ricerca



Visioneering è un approccio di progettazione territoriale che si pone come scopo visualizzare possibili futuri. La tecnica **backasting**, ovvero dal futuro seguire un percorso a ritroso per capire cosa può essere fatto ora, è fondamentale in questo approccio.

Visioneering è articolato in tre fasi principali: **Grasping**, in cui conosce la regione e cosa sta succedendo; **Grounding**, in cui si disegnano le visioni e il percorso backcasting; **Spreading**, in cui le visioni vengono discusse, pubblicate o attuate.

Lungo lo svolgimento di tutta la ricerca sono previsti diversi eventi partecipativi: workshop con bambini, interviste guidate, questionari pre e post evento, eventi partecipativi con i soggetti interessati e un sondaggio online.

perchè disegnare futuri

I tre futuri visualizzati sono il risultato dell'elaborazione e analisi di diversi documenti, interviste e studi di buone pratiche. Dalla raccolta dei dati è risultato un grafico a network in cui viene rappresentata la complessità dei futuri, di come essi siano correlati tra loro e delle incertezze di previsione.

Da questo network sono state estrapolate tre argomentazioni adattabili alla realtà cadorina:

1) **ricerca ed educazione**, correlata ad un elevato sfruttamento delle risorse naturali;

2) **turismo sostenibile**, correlato ad un equilibrato uso delle risorse ed investimenti nell'efficienza degli edifici;

3) **autonomia municipale**, correlato all'autosufficienza energetica di piccole comunità.

Figure 5.1. Research presentation

Il borgo 1555

Selva nel Cadore, 25 giugno 2050

Noi viviamo in piccoli paesi di circa 1555 abitanti. Quello che noi amiamo di questi nostri paesi è che qui possiamo cavarcela senza chiedere nulla a nessuno! Nelle ultime decine di anni le poche opere pubbliche hanno portato all'abbandono delle aree difficili da raggiungere, come i nostri paesi. Noi abbiamo deciso di costriure un sistema energetico autonomo, cioè non dipendiamo completamente dalle compagnie italiane o straniere.
Noi amiamo questi luoghi, anche se le strade che portano in città sono pessime e sempre minacciate da frane e smottamenti. Quei paesi dove c'erano continui disastri naturali sono diventati villaggi fantasma.
In questi ultimi decenni, abbiamo però ritrovato il rapporto con la natura che avevamo perso dopo il boom economico degli anni '80. I pochi turisti vengono qui per dimenticare il caos delle città. Quelli che vivono qui, che rimangono qui, oppure che si trasferiscono qui, lo fanno perché amano l'ambiente naturale e la qualità della vita che ti dà.

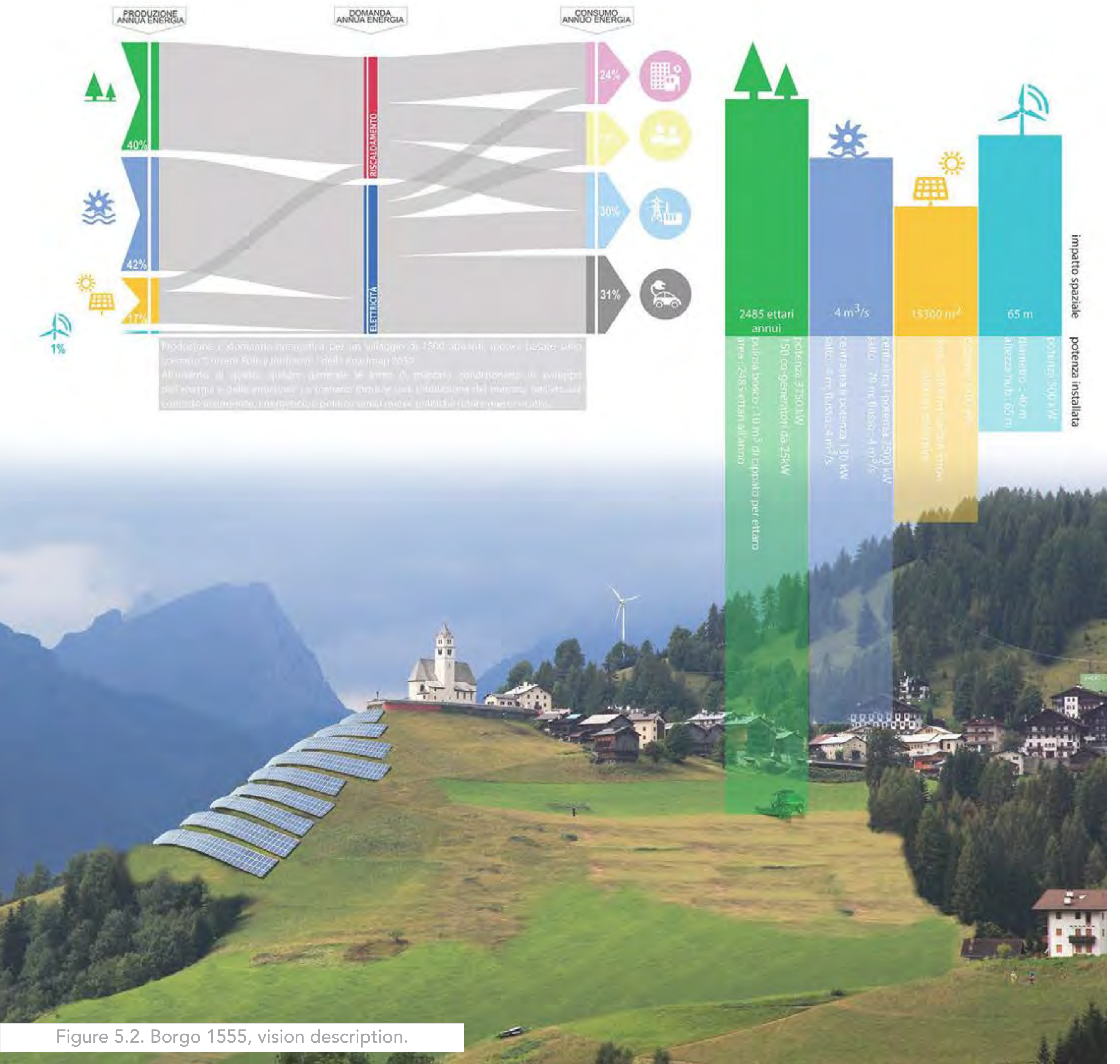


Figure 5.2. Borgo 1555, vision description.

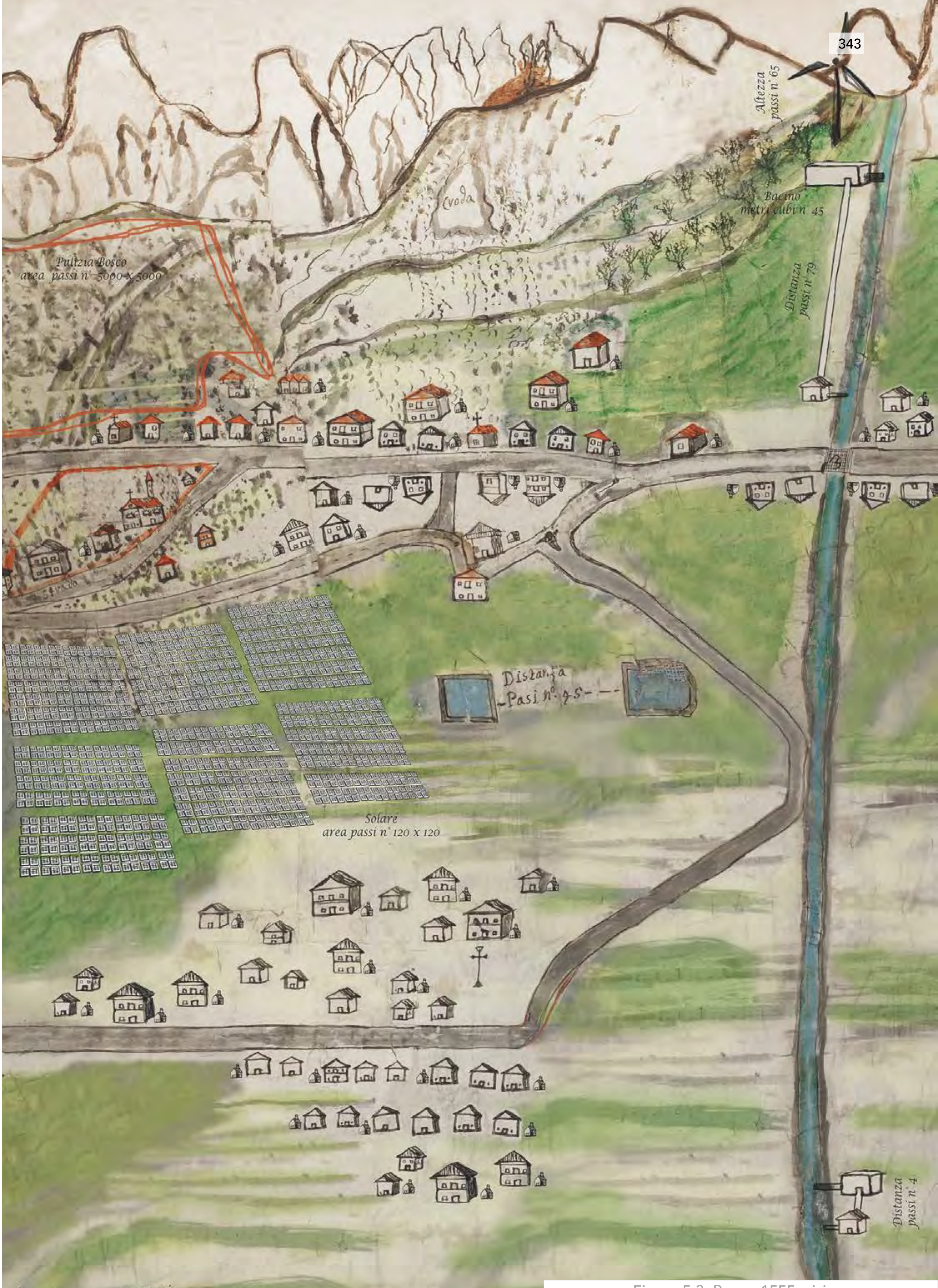


Figure 5.3. Borgo 1555, vision.

Figure 5.4. Borgo 1555, vision after SWI.

Il grappolo balsamico

In offerta dal 25 giugno al 15 agosto 2050

Desideri vivere un'esperienza indimenticabile tra le montagne dolomitiche? Noi conosciamo il posto che fa per te: *Il grappolo balsamico*, nome dato alla regione caratterizzata dalla roccia dolomitica.

Contraddistinta da un insieme di piccoli villaggi alpini, offre innumerevoli possibilità per esplorare la vita in montagna e la natura alpina. Laboratori con artigiani locali, escursioni tra le rocce con Alpaca, Yak e Asini, campi studio con gli agricoltori per dedicarsi alla coltivazione della quionoa, della canapa e del luppolo; esplorare la natura tramite gli occhi di un'ape; prendersi cura del proprio corpo con le erbe mediche coltivate in loco. In ognuna di queste attività sarai accompagnato da professionisti preparati che negli anni hanno investito in tecnologie ed innovazione per poter offrire stravaganti esperienze e prodotti!

Prenota la tua vacanza e vieni a dormire in uno dei nostri edifici ad alta efficienza energetica, un mix architettonico tra tecnologia e tradizione dolomitica. Si arriva alle porte dei villaggi con la propria auto o il treno delle Dolomiti, da lì potrai muoverti all'interno dei villaggi solo con mezzi pubblici a zero emissioni. Nel grappolo balsamico l'aria è pura, abbiamo eliminato le emissioni di anidride carbonica ormai 10 anni fa!

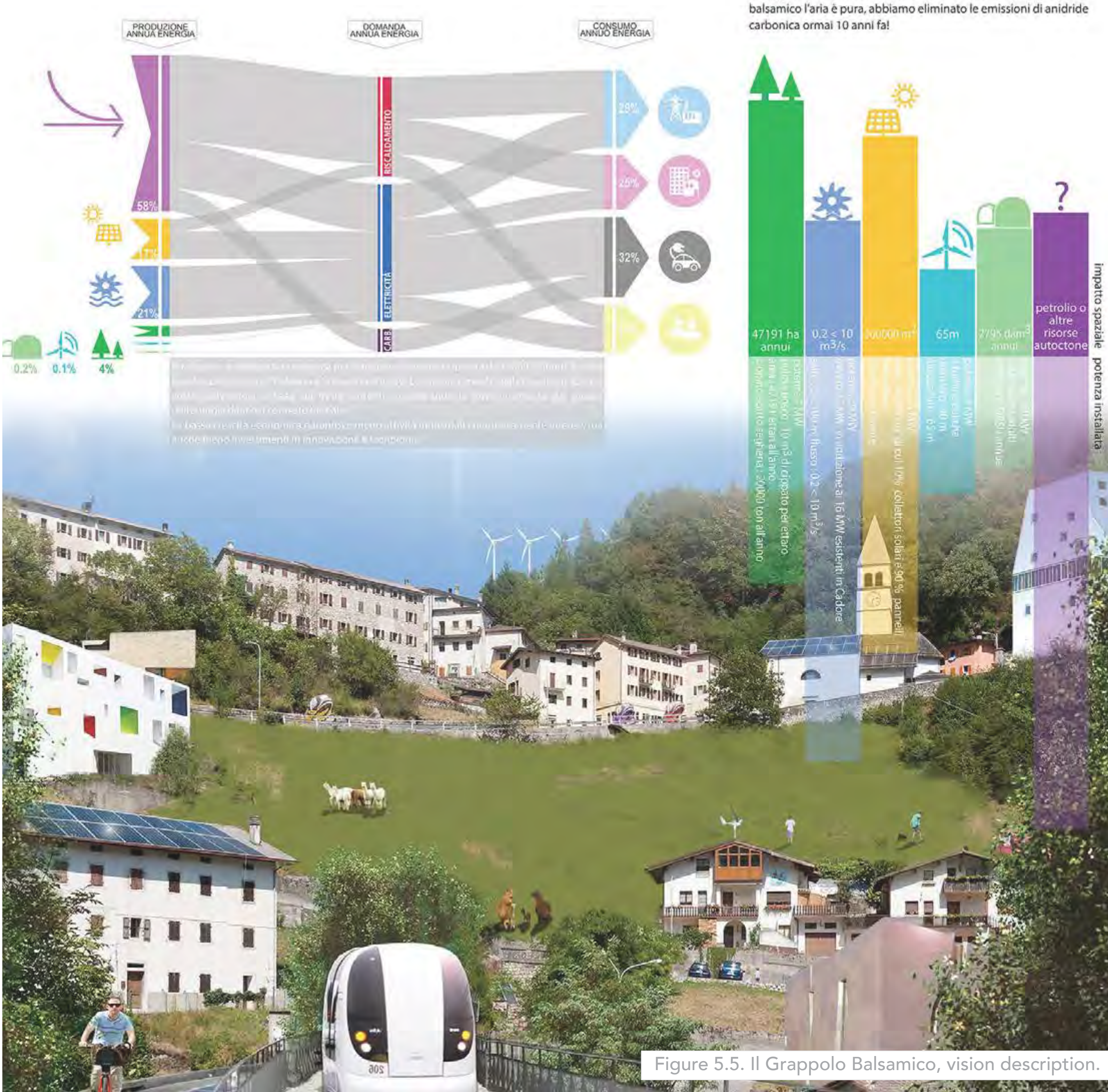


Figure 5.5. Il Grappolo Balsamico, vision description.

Figure 5.6. Il Grappolo Balsamico, vision.

Figure 5.7. Il Grappolo Balsamico, vision after SWI.

ElectriCore

Giovedì 26 febbraio 2050

ElectriCore è una delle aree più innovative del centro Europa. Conosciuta come la Silicon Valley delle Alpi, ospita due centri di ricerca ubicati rispettivamente a Lienz e Centro di Cadore. Essi collaborano per esplorare e studiare la realtà alpina, qui sono state sviluppate le più innovative infrastrutture energetiche dedicate alla montagna. Lo scopo di questa collaborazione scientifica ha portato allo sfruttamento del massimo potenziale energetico dato dalle risorse naturali.

I due fulcri di ricerca sono connessi da due snodi principali: Cortina d'Ampezzo e Sillian. La prima, famosa un tempo per la sua bellezza, è ora indispensabile fonte di aree naturali dedicate alla ricerca per discipline in scienze naturali. La *dolomitic stone* e la *post-climate change* fauna sono i due temi cardine. Il secondo, Sillian, un tempo pioniere nelle energie rinnovabile con il suo impianto a teleriscaldamento, è ora divenuto il centro nevralgico per la gestione delle risorse naturali.

Questi quattro spots sono connessi tramite la HRB-way (high-rail-bicycle-way). Una linea ad alta velocità in cui si può viaggiare con metropolitana di superfice, auto elettrica, bici elettrica e a piedi. In essa è inglobata anche la rete per la distribuzione dell'energia. La HBR-way è provvista di *knowledge stop-areas* con *virtual reality* in cui si possono esplorare le caratteristiche dei vecchi villaggi abbandonati.

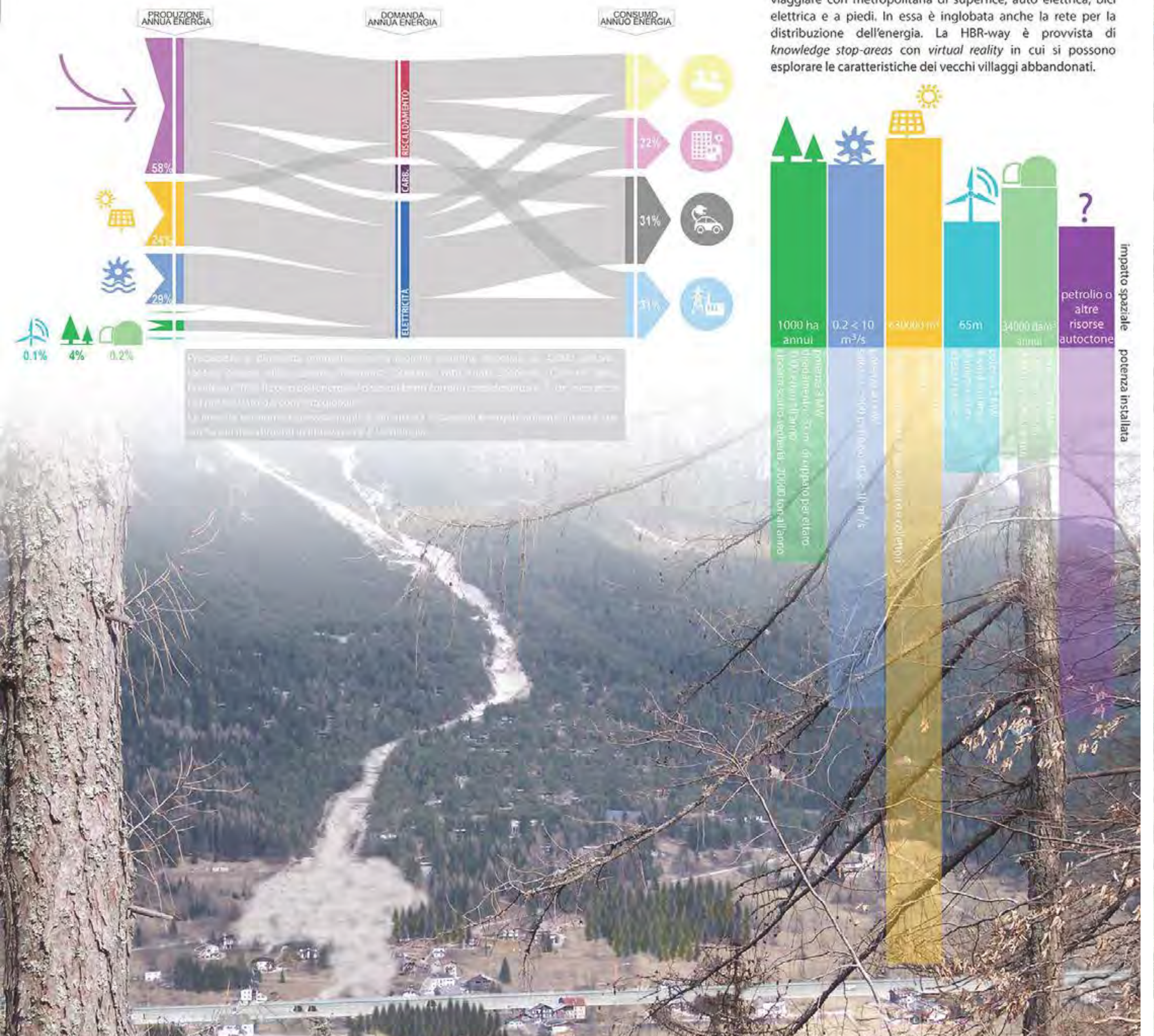


Figure 5.8. ElectriCore, vision.

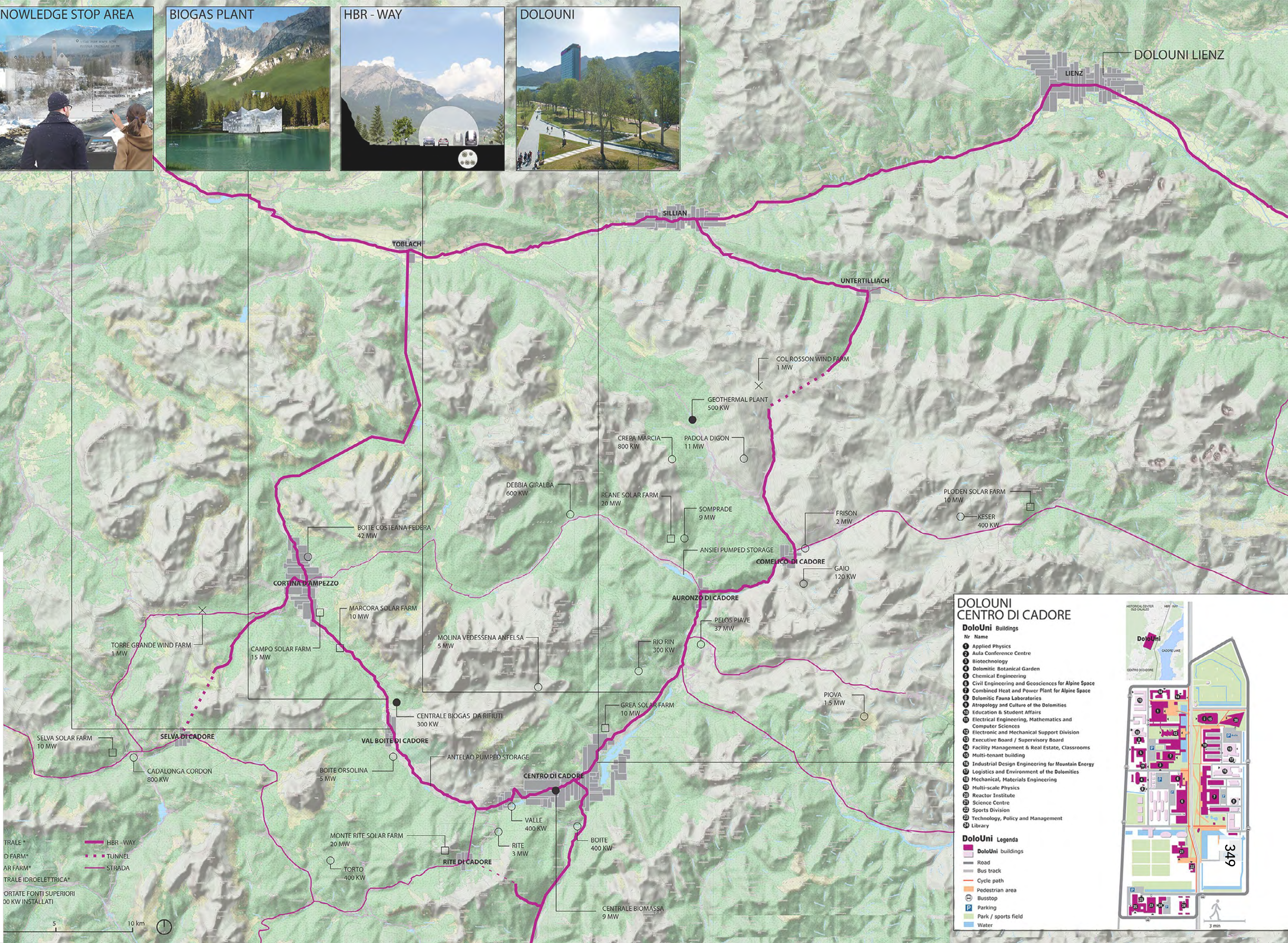


Figure 5.9. ElectriCore, vision.

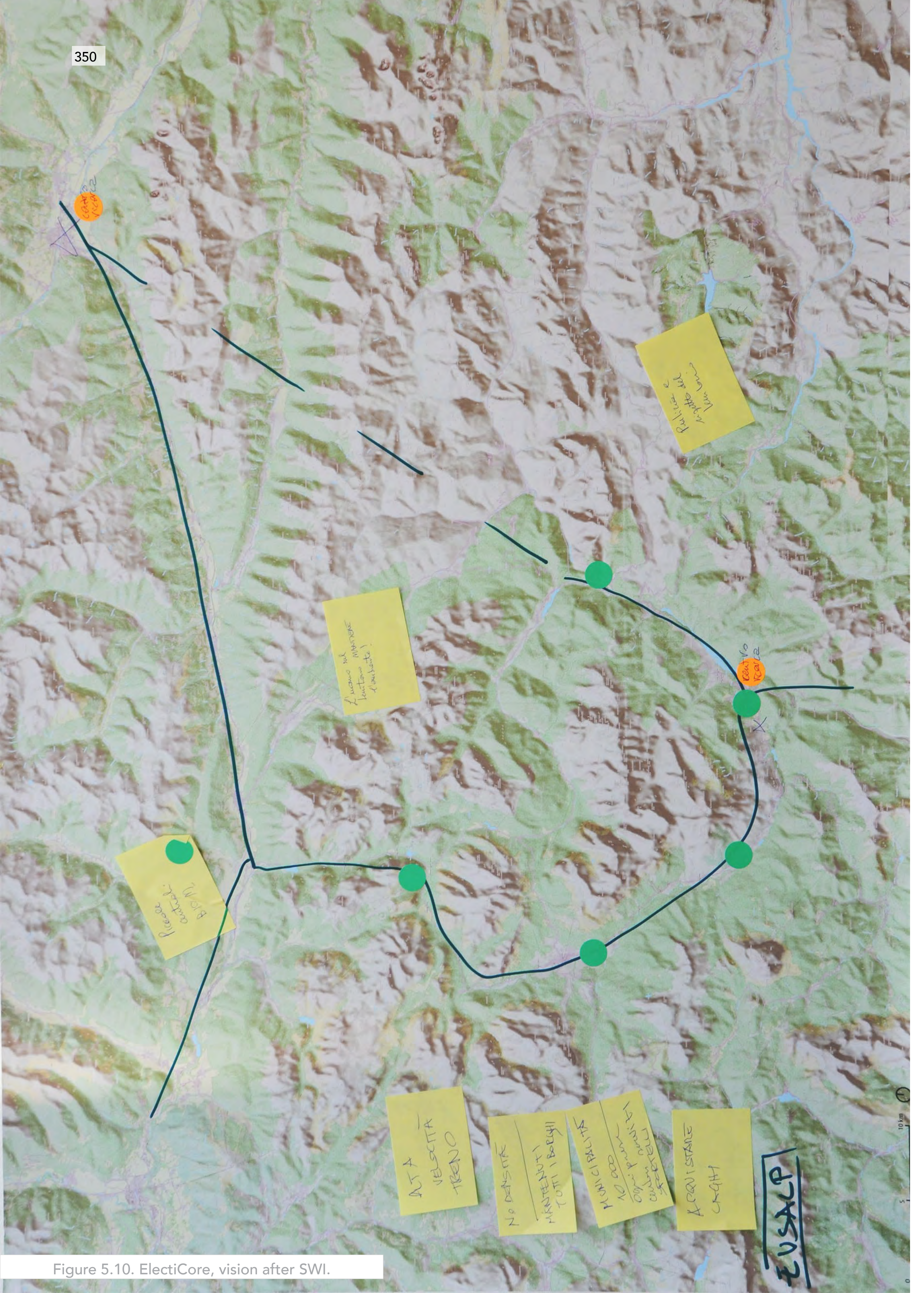


Figure 5.10. ElectiCore, vision after SWI.

Quali futuri energetici per la regione cadorina?

"ElectriCore Dolomiti è una delle aree più innovative del centro Europa. Ospita due centri di ricerca ubicati rispettivamente in Centro Cadore e a Lienz.

I due centri, che collaborano per esplorare e studiare la realtà alpina, hanno sviluppato le più innovative strutture ed infrastrutture energetiche dedicate alla montagna. Il territorio è inoltre interconnesso da una linea ad alta velocità in cui si viaggia con metropolitana di superfice, auto elettrica e bicicletta".

Le parole che avete letto sono l'intrudizione ad una visione futura che ritrae il Cadore del 2050. Stiamo andando verso un futuro in cui le emissioni di anidride carbonica saranno quasi assenti. Si sta infatti sempre più consolidando la produzione di energia da fonti rinnovabili e con una miglior efficienza energetica.

Questo succede non solo perché le risorse esauribili che tramite la combustione producono anidride carbonica come petrolio e gas finiranno, ma anche per proteggerci dall'inquinamento e mitigare i cambiamenti climatici. Affinché ciò avvenga tutti gli strumenti che producono emissioni e gli attuali sistemi di distribuzione dell'energia subiscono e subiranno un'innovazione tale che cambierà anche il nostro modo di vivere e di muoversi nel territorio.

Presso la *Technische Universität* di Vienna, si sta svolgendo una ricerca che ha lo scopo di indagare i futuri energetici della regione cadorina. Sapendo che non esiste un solo futuro, ma infinite possibilità, sono state disegnate tre visioni, tre possibili futuri, in cui il Cadore potrebbe trovarsi nel 2050. Tali visioni

Un progetto che coinvolge i comuni del Cadore e punta ad un modello energetico a basse emissioni di anidride carbonica. Lo studio è partito l'anno scorso ed ha coinvolto fin da subito la Magnifica Comunità ed alcuni Comuni

sono basate su diverse realtà esistenti, progetti territoriali già elaborati nell'arco alpino e sugli scenari energetici redatti dalla Comunità Europea.

La ricerca, che vede l'applicazione del metodo 'visioneering', ovvero immaginare futuri per poi disegnarli ed ingegnerizzarli, prevede lo svolgersi di eventi partecipativi. Nell'estate 2015 le visioni sono state presentate ai sindaci cadorini invitati presso la Magnifica Comunità di Cadore.

Dopo una breve presentazione della ricerca, l'evento ha visto la partecipazione degli invitati a uno stimolante ragionamento sul futuro del territorio tramite l'uso di mappe ed immagini. Un secondo evento è previsto durante questo mese di maggio per valutare gli ulteriori sviluppi della ricerca. Verranno inoltre presentati i risultati del questionario online aperto a tutti e disponibile negli ultimi mesi del 2015. Anche in tale occasione le visioni sono state presentate e raccolte le impressioni e i commenti di residenti e non in Cadore.

Un futuro energetico a basse emissioni di anidride carbonica prevede non solo l'instaurazione di un sistema di produzione dell'energia da fonti rinnovabili ma anche una miglior efficienza energetica, e quindi un minor spreco di energia. Affinché ciò avvenga è fondamentale un'attiva e consapevole cittadinanza sul tema.

Per maggiori informazioni sul progetto consultare la pagina raum.tuwien.ac.at/eward.

Chiara Andreotta

Figure 5.11. After the SWI the MCC proposed to write an article on the local newspaper *Il Cadore* about the event and the research. I wrote the article '*Quali future energetici per la regione cadorina?*' then published on Il Cadore in May 2016 (ANNO LXIV) at p. 16.

5.3. Posters of the Stakeholder Workshop II

Il Grappolo Balsamico

In offerta dal 25 giugno al 15 agosto 2050

Desideri vivere un'esperienza indimenticabile tra le montagne dolomitiche? Noi conosciamo il posto che fa per te: *Il grappolo balsamico,* nome dato alla regione caratterizzata dalla roccia dolomitica.
Regione contraddistinta da un insieme di piccoli villaggi alpini, offre innumerevoli possibilità per esplorare la vita in montagna e la natura alpina. Laboratori con artigiani locali, escursioni tra le rocce con Alpaca, Yak e Asini, campi studio con gli agricoltori per dedicarsi alla coltivazione della quionoa, della canapa e del luppolo; esplorare la natura tramite gli occhi di un'ape; prendersi cura del proprio corpo con le erbe mediche coltivate in loco. In ognuna di queste attività sarai accompagnato da professionisti preparati che negli anni hanno investito in tecnologie ed innovazione per poter offrire stravaganti esperienze e prodotti!
Prenota la tua vacanza e vieni a dormire in uno dei nostri edifici ad alta efficienza energetica, un mix architettonico tra tecnologia e tradizione dolomitica. Si arriva alle porte dei villaggi con la propria auto o il treno delle Dolomiti, da lí potrai muoverti all'interno dei villaggi solo con mezzi pubblici a zero emissioni. Nel grappolo balsamico l'aria è pura, abbiamo eliminato le emissioni di anidride carbonica ormai 10 anni fa!

Per arrivare a questa realtà un solido network di piccoli investitori privati ha sviluppato impianti ad energie rinnovabili. Ora qui la promozione dei prodotti del territorio si coniuga indissolubilmente con la dislocazione della produzione energetica, l'accoglienza turistica in edifici all'avanguardia e l'educazione energetica promossa dalla Magnifica Comunità di Cadore.

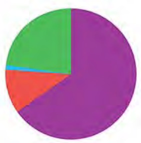
EMISSIONI DI CO_2 NEL 2050
IN CADORE

TRASPORTO 65%
13153 Ton anno

RESIDENZIALE, COMMERCIALE E ISTITUZIONALE 23%
4662 Ton anno

INDUSTRIA 11%
2165 Ton anno

AGRICOLTURA 1%
133 Ton anno



EMISSIONI DI CO_2 NEL 2010
IN CADORE

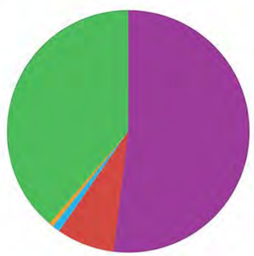
TRASPORTI 52%
69480 Ton anno

RESIDENZIALE, COMMERCIALE E ISTITUZIONALE 39%
51839 ton anno

INDUSTRIA 8%
10310 Ton anno

AGRICOLTURA 1%
1342 Ton anno

PRODUZIONE ENERGIA 0,1%
834 Ton anno



	MOBILITÀ			GESTIONE RISORSE E SORGENTI			
2050 SPAZIO	Rete ferroviaria, ciclabile e pedonale	13 stazioni stop e cambia!	6 stazioni d'energia elettrica	Bio-distretto	Magnifico Cadore Strategia mobilità Strategia idroelettrico	Piattafroma Educazionale Energia	
	PRODUZIONE ENERGIA DA FONTI RINNOVABILI						
2050 RISORSA	19120 ton di cippato da scarti 283,146 t ton di cippato da pulizia del bosco 1416 ha anno	Torrenti e acquedotti, riserve per neve artificiale	5 mq solare per ogni cittadino 184000 mq 430 x 430 m		408448 ton FORSU annui	2000 bovini adulti	
2050 SPAZIO	4 centrali teleriscaldamento	Rinnovo delle centrali ogni 100 anni Mini idroelettrico in ogni acquedotto	Tetti degli edifici privati e aziende agricole	4 pale eoliche da 20 kw 50 m altezza	1 centrale biogas da 500 kW	4 impianti da 50 kW	4 pompe per potenza installata di 150 kW

Figure 5.12.Il Grappolo Balsamico, vision description.

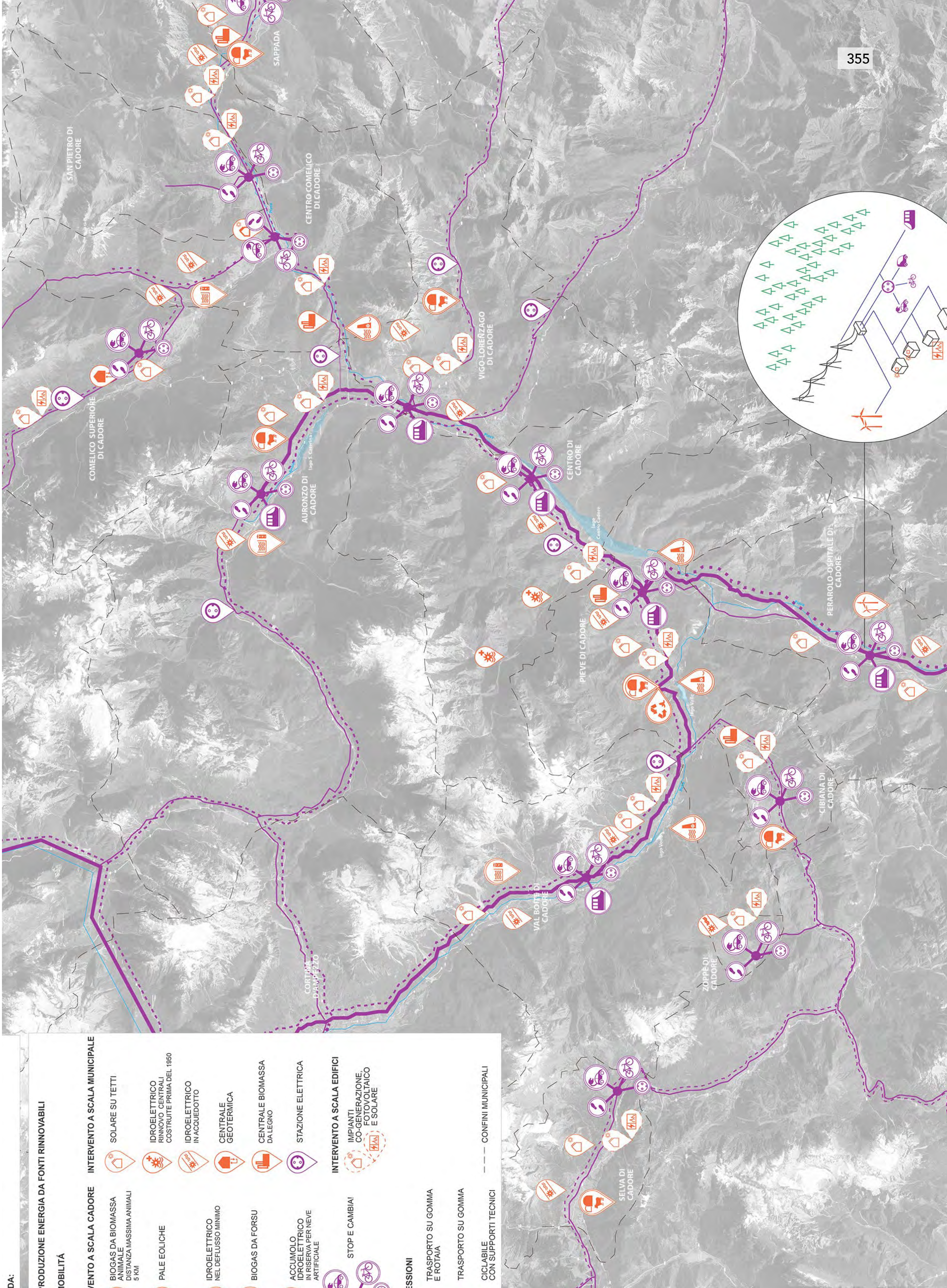


Figure 5.13. Il Grappolo Balsamico, vision.

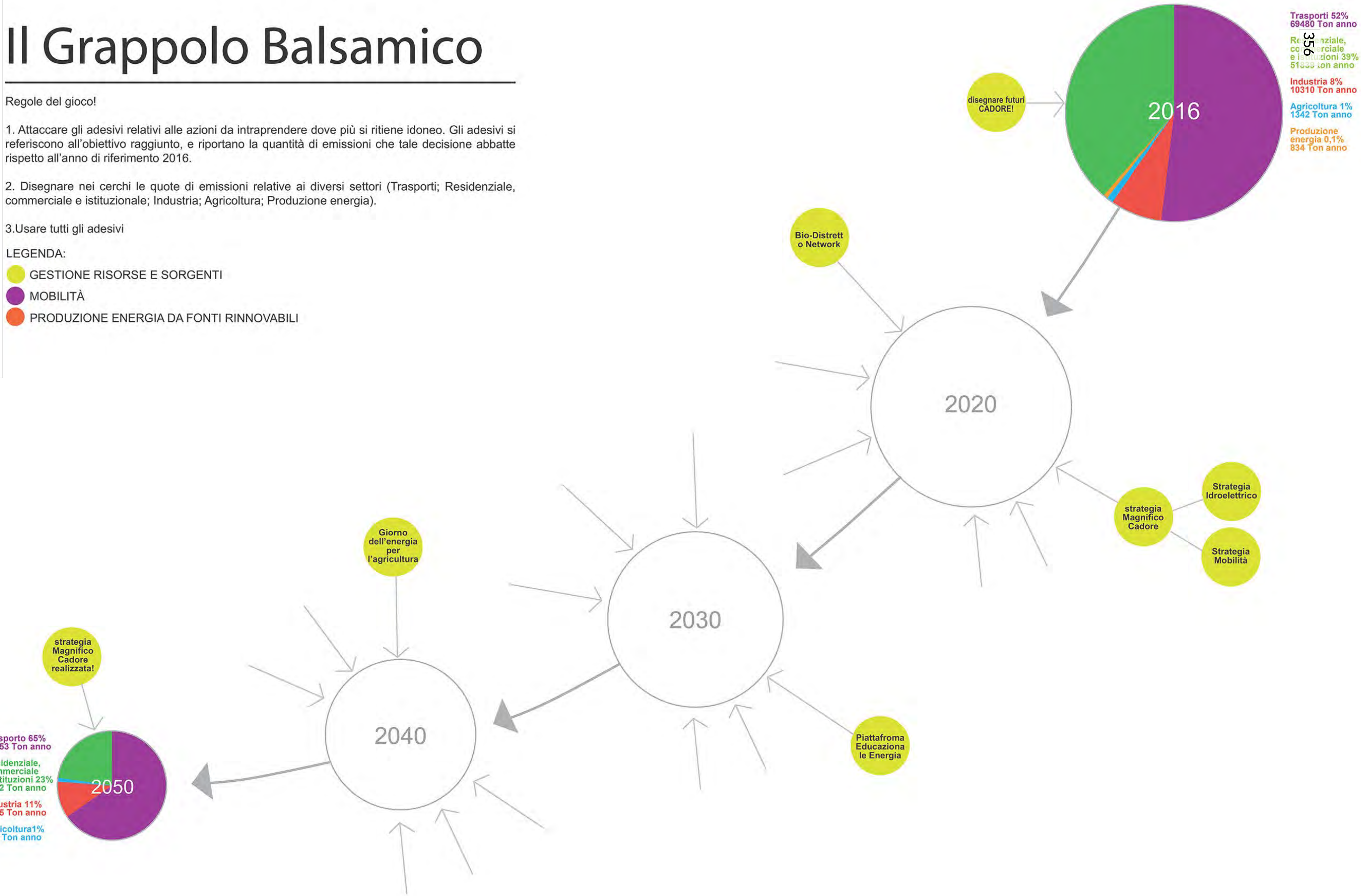


Figure 5.14. Il Grappolo Balsamico, path.

Il Grappolo Balsamico

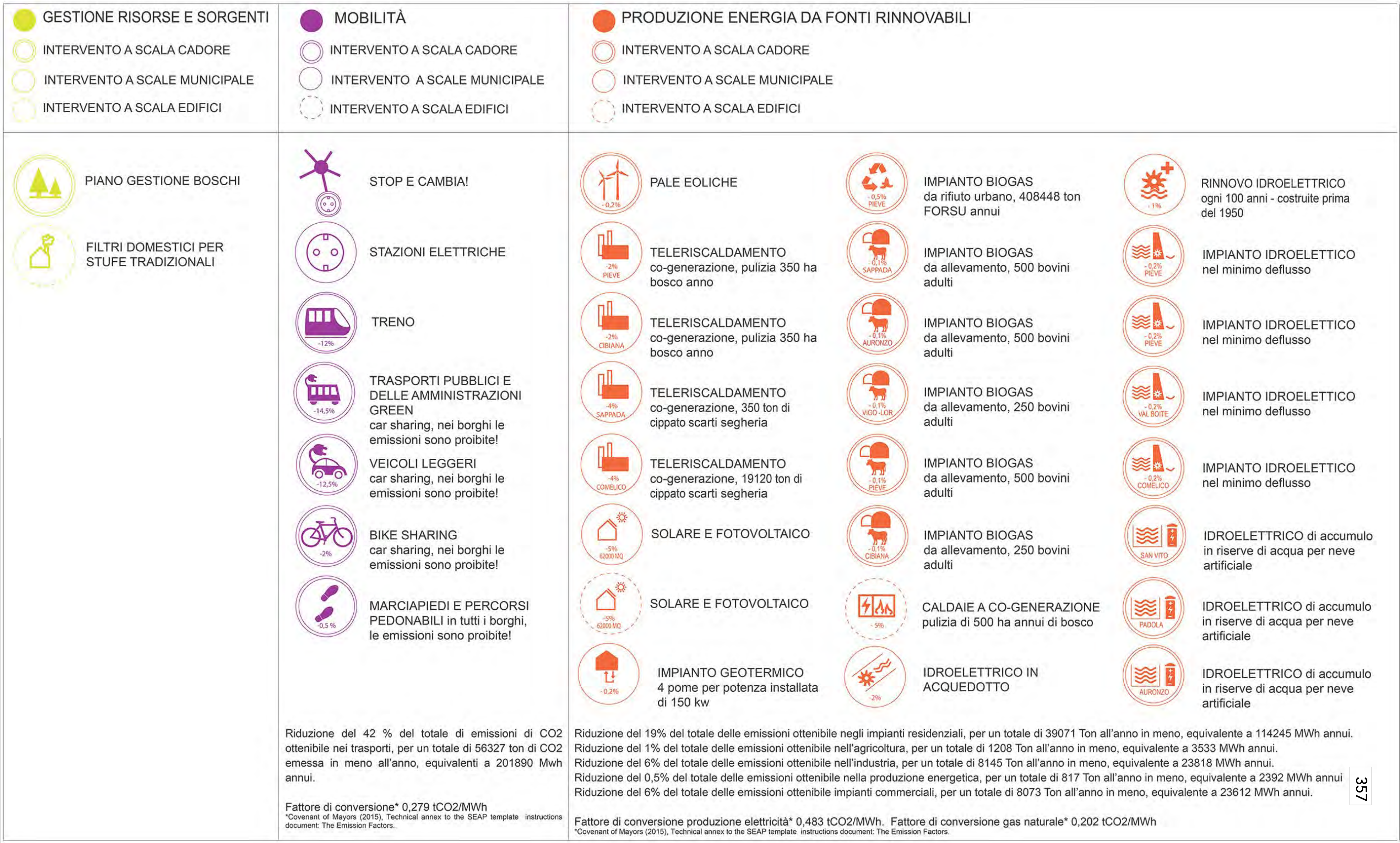


Figure 5.15. Il Grappolo Balsamico, actions set.

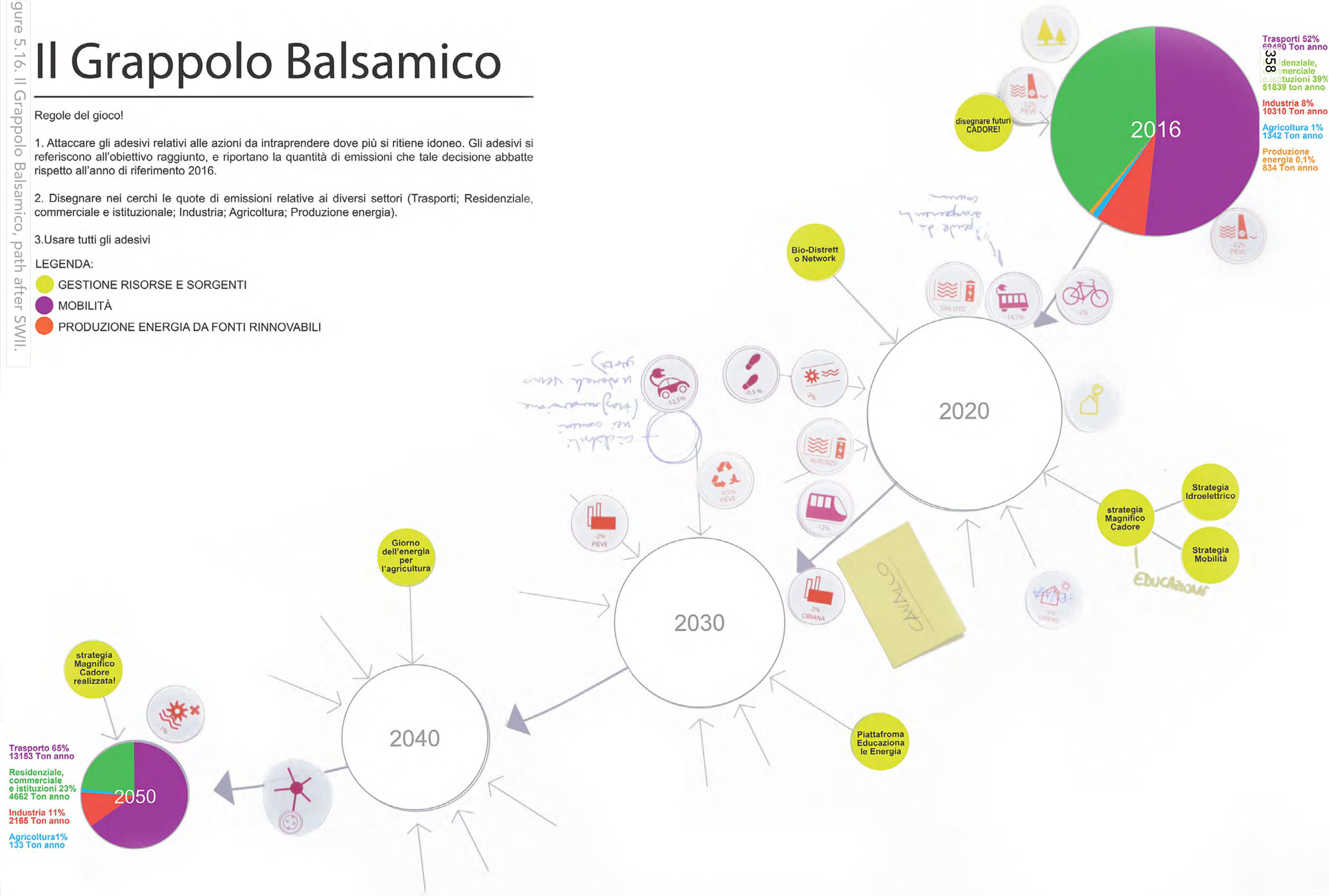


Figure 5.16. Il Grappolo Balsamico, path after SWII.

Borghi & Nodi

Giovedì 26 febbraio 2050

Viviamo in piccoli borghi di circa 1500 abitanti. I nostri borghi sono collegati da due nodi principali, Lienz e Centro di Cadore, connessi da una linea in cui si viaggia con metropolitana di superfice, auto elettrica e bicicletta elettrica. In questi due centri vengono gestite le principali risorse energetiche. Lienz e Centro di Cadore ospitano due centri di ricerca e collaborano per esplorare e studiare la realtà alpina, qui sono state sviluppate innovative infrastrutture energetiche dedicate alla montagna.
In questi ultimi decenni, abbiamo però ritrovato il rapporto con la natura che avevamo perso dopo il boom economico degli anni '80. I pochi turisti vengono qui per dimenticare il caos delle città. Noi che viviamo qui nei piccoli borghi amiamo la vita in mezzo alla natura e la tranquillità.

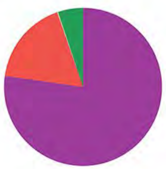
Abbiamo dovuto faticare molto per arrivare qui, ma ora ogni paese ha qualche impianto pubblico ad energia rinnovabile, di cui siamo fieri! Questa situazione è stata sviluppata grazie al Patto dei Sindaci, a cui ogni comune ha deciso di aderire, essendo così obbligato a pensare un po' di più al futuro. Le centrali energetiche più grandi si trovano vicino a Centro di Cadore, ed e qui che si trova DoloUni, centro dedicato all'educazione energetica per tutti, dai bambini ai professionisti. DoloUni organizza ogni anno in maggio la settimana dedicata all'energia e alla montagna, visitata da centinaia di esperti e non nel campo.

EMISSIONI DI CO_2 NEL 2050
IN CADORE

TRASPORTI 77%
14233 Ton anno

RESIDNZIALE, COMMERCIALE ISTITUZIONALE 5%
952 Ton anno

INDUSTRIA 18%
3220 Ton anno



EMISSIONI DI CO_2 NEL 2010
IN CADORE

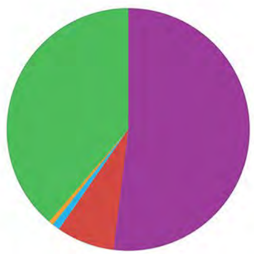
TRASPORTI 52%
69480 Ton anno

RESIDENZIALE, COMMERCIALE E ISTITUZIONALE 39%
51839 ton anno

INDUSTRIA 8%
10310 Ton anno

AGRICOLTURA 1%
1342 Ton anno

PRODUZIONE ENERGIA 0,1%
834 Ton anno



	MOBILITÀ			GESTIONE RISORSE E SORGENTI			
2050 SPAZIO	Rete ferroviaria, ciclabile e pedonale	14 stazioni d'energia elettrica	13 stazioni della metropolitana di superficie	PAES	Strategia DoloMobilità	Piattaforma DoloEnergia DoloUni	
	PRODUZIONE ENERGIA DA FONTI RINNOVABILI						
2050 RISORSA	19120 ton di cippato da scarti 283,146 t ton di cippato da pulizia del bosco 1416 ha anno	Torrenti e acquedotti, riserve per neve artificiale	33000 mq di solare e fotovoltaico 180 m x 180 m		7862 ton FORSU annui	2000 bovini adulti	
2050 SPAZIO	2 centrali teleriscaldamento	Rinnovo delle centrali ogni 100 anni 1 nuova mini centrale ogni torrente	Tetti degli edifici pubblici e 3 solar farm	9 pale eoliche da 20 kw 50 m altezza	1 centrale biogas da 500 kW	2 centrali biogas da 50 kW	4 pompe per potenza installata di 150 kW

Figure 5.17. Borghi & Nodi, vision description.

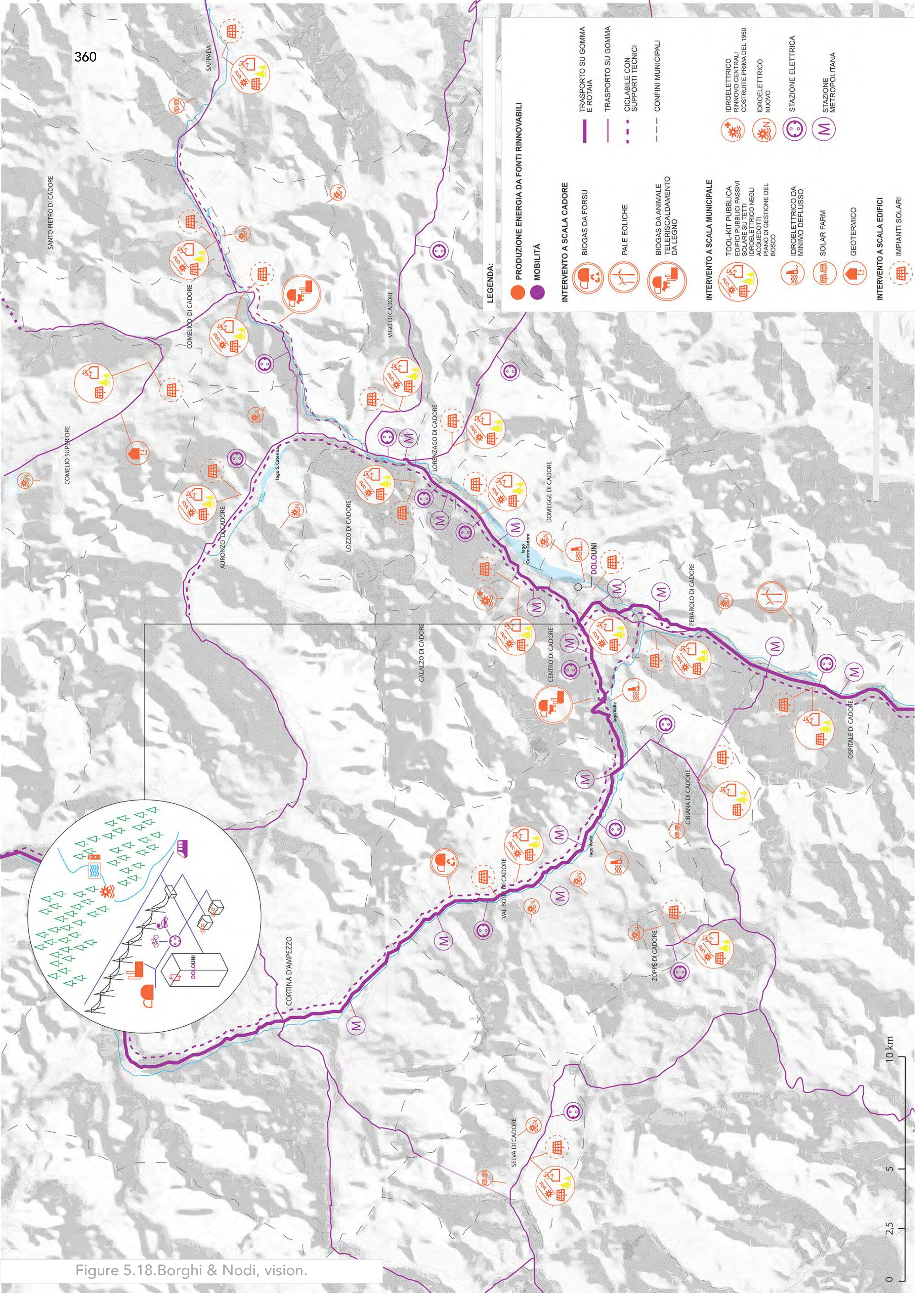


Figure 5.18.Borghi & Nodi, vision.

Borghi & Nodi

Regole del gioco!

1. Attaccare gli adesivi relativi alle azioni da intraprendere dove più si ritiene idoneo. Gli adesivi si referiscono all'obiettivo raggiunto, e riportano la quantità di emissioni che tale decisione abbatte rispetto all'anno di riferimento 2016.

2. Disegnare nei cerchi le quote di emissioni relative ai diversi settori (Trasporti; Residenziale, commerciale e istituzionale; Industria; Agricoltura; Produzione energia).

3.Usare tutti gli adesivi

LEGENDA:

- GESTIONE RISORSE E SORGENTI
- MOBILITÀ
- PRODUZIONE ENERGIA DA FONTI RINNOVABILI

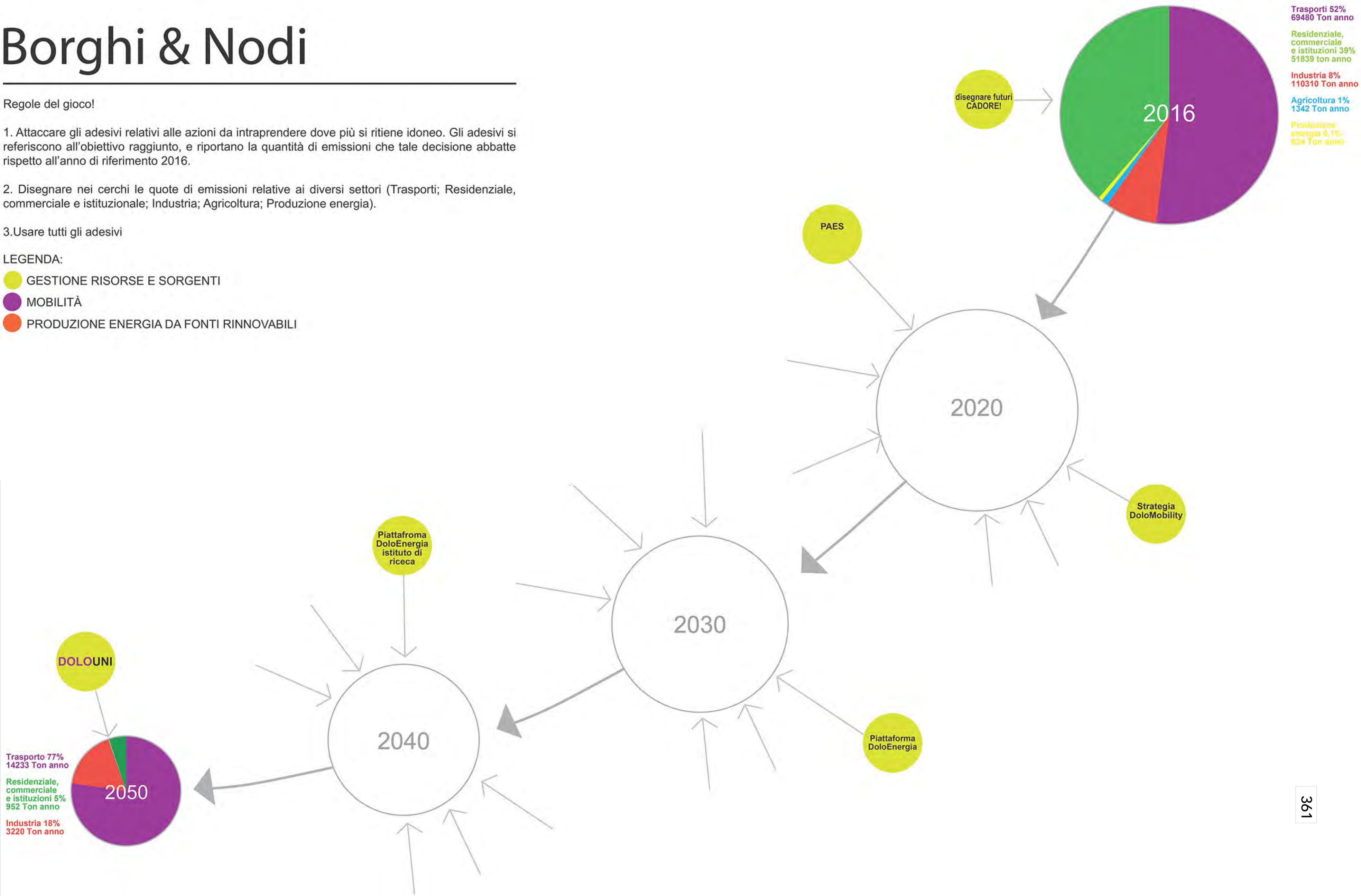


Figure 5.19.Borghi & Nodi, path.

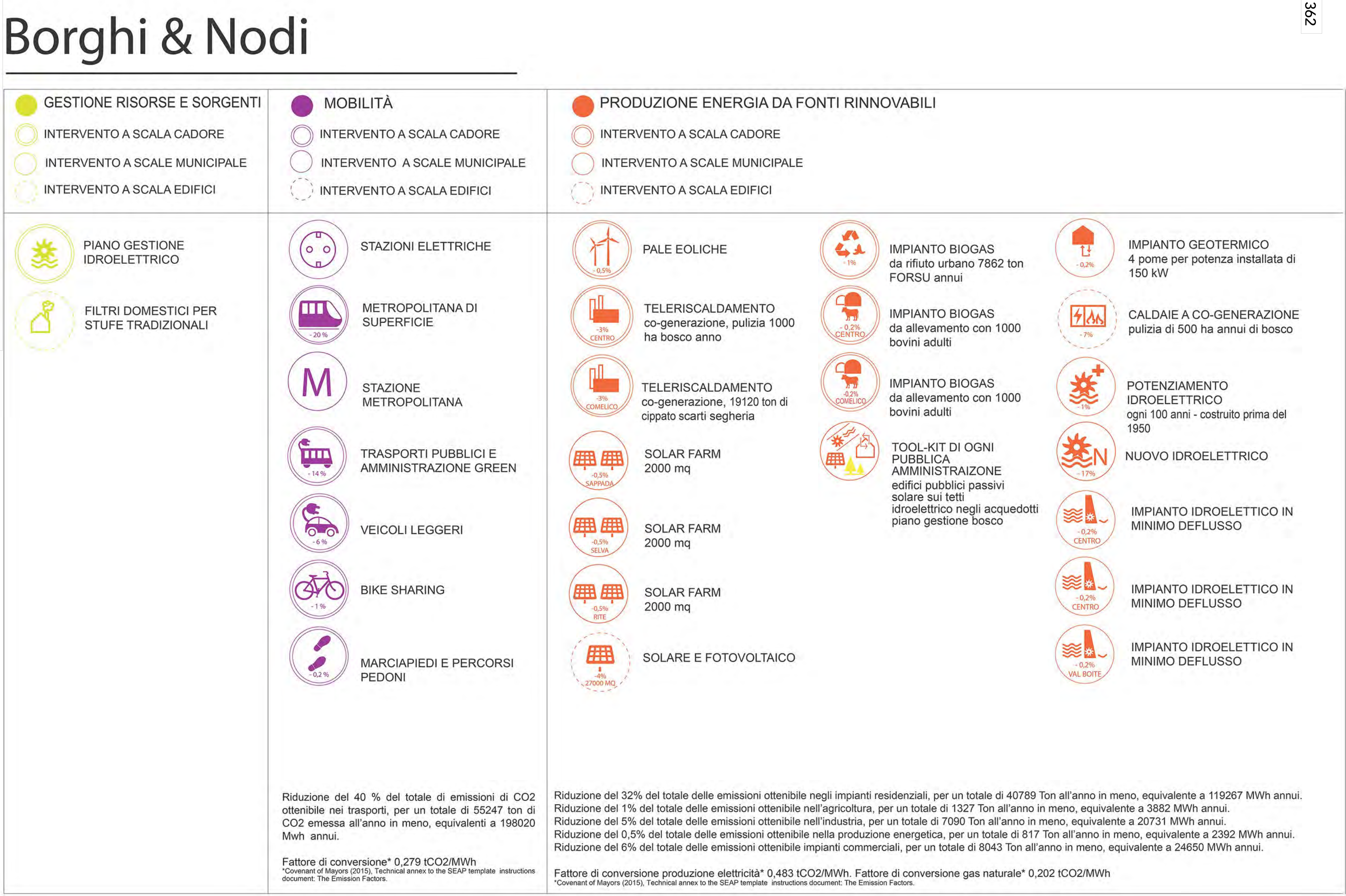


Figure 5.20. Borghi & Nodi, actions set.

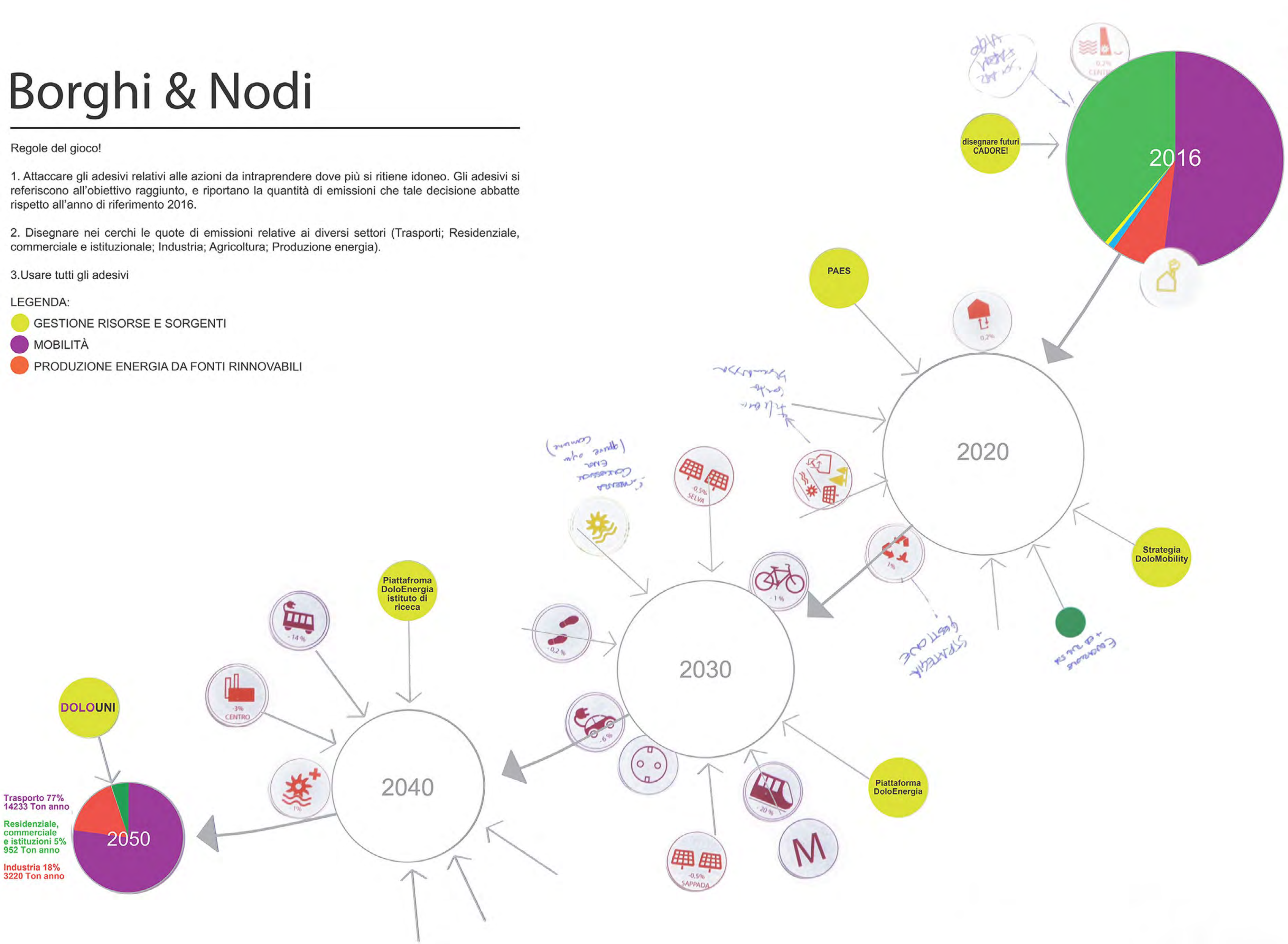


Figure 5.21. Borghi & Nodi, path after SWII.

KU LEUVEN

University of Antwerp

CERTIFICATE OF ATTENDANCE

This is to certify that

Chiara Andreotta

attended the AESOP PHD WORKSHOP 2016

'PLANNING AND URBANISM RESEARCH IN A GLOBAL WORLD'

in Leuven- Brussels
during the period 14-17 June 2016

Chair of the local organizing committee
prof. Frank Moulaert (KU Leuven)

F Moulaert

Leuven, 17 June 2016

Workshop co-ordinator
prof. Hans Leinfelder (KU Leuven)

H Leinfelder

YOUNG ACADEMICS **NETWORK**

AESOP
ASSOCIATION OF EUROPEAN SCHOOLS OF PLANNING

5.4. Conferences Attended

Planning And Urbanism Research In A Global World

I participated in the 'AESOP PhD Workshop - Planning And Urbanism Research In A Global World', that took place in Leuven (Belgium) from the 14th to the 17th of June 2016.

During the workshop I worked with doctoral researchers from European, American, Australian, and African schools in urbanism and planning. We were assisted in reviewing substantial and methodological issues of the ongoing doctoral researches by 8 international tutors and 8 Belgian mentors.
The setting of the workshop permitted to present and receive feedback with three different presentations. Moreover, before the attendance at the workshop, the doctoral students had to write a paper and an extensive presentation on the doctoral research that was distributed to all the participants. Parallel sessions with small groups of students and mentors were taking place every day, together with plenary sessions held by mentors and tutors on methodological issues.
At the event, I presented the paper 'Social learning: a way to evaluate Visioneering' and the overall thesis.

EMPOWERING PRESENTS, THINKING ABOUT FUTURES A CASE IN THE CENTRAL DOLOMITES

Chiara Andreotta

Thematic dimension n° 1 - SMART PLANNING FOR ADAPTATION AND MITIGATION
Tags: visioneering, futures, low-carbon, visions

THE LOW-CARBON FUTURE

The transition towards a **low-carbon** energy system occupies an important part of spatial planning agendas.
The current carbonized society is at the center of several attempts to plan new **cities and regions** as places where to reduce carbon emissions.
A planning approach that enhances local **awareness** and stimulates local agents is necessary in the areas that neglect or postpone a low-carbon future.
Strategic spatial planning gives communities the chance to **design futures** through a collaborative mode of planning such as **visioneering**.

THE ALPINE CONTEXT

The **Alps** are suffering both from an **environmental** and **economic crisis** due to climate change, and from a cultural crisis.
With the fall of a traditional economy based on the use of lands, the Alps are nowadays endangered by an industrial and tertiary imprint that **exploits natural** resources and devalues human capital.
The Alps ensure services and natural resources for the surrounding lands and play a **crucial role** in Europe in the transition to a low-carbon energy system.
Visioneering low-carbon futures of vulnerable Alpine territories is a step towards envisioning **diverse futures**.

THE RESEARCH QUESTION

Does the use of the visioneering mode of planning enhance the awareness of an Alpine community to tackle low-carbon futures?

The **Cadore** area (Italy), in the Alpine region, offered an optimal opportunity to test the visioneering mode of planning.

THE CASE STUDY: CADORE

Cadore comprises 22 municipalities in the Northern part of the **Belluno province** in the Veneto region.
It has a high amount of **natural resources** and part of it is **Dolomites UNESCO** Natural Heritage.
The lack of a provincial **energy strategy** and the area's dependency on **fossil fuel** provided an optimal space for planning low-carbon futures.

THE VISIONEERING MODE

Visioneering is a **mode** of doing spatial planning, it serves to draw visions of possible futures on maps, and then design feasible paths to support the journey toward those visions.
Visioneering therefore **merges** the **envisioning** process with the **engineering** process.
The acts are a part of the visioneering process. The four acts are **grasping**, **grounding**, **spreading**, and **moving.**

THE DATA

The assessment of the visioneering process was done through 5 dimensions of social learning and their changes among the events and the outputs.

1. Cognitive knowledge
2. Mutual understanding
3. Joint or single actions
4. Understanding complexity
5. visioneering critique

THE EMPIRICAL APPLICATION

GRASPING AND SPREADING

April 2014

The **grasping** act consisted in gathering knowledge and ideas for the futures of Cadore.

events trips, expert interviews
output long term visions

The **spreading** act consisted in involving stakeholders and actors in the planning process.

events stakeholder interviews, children's workshops (storytelling, drawing, collage)
output three visions designed on maps

3 visions
June 2014

GROUNDING AND SPREADING

July 2014

The **grounding** act consisted in designing the path toward the visions with back-casting.

events two stakeholder workshops (focus groups and questionnaires), online survey
output two preferred visions, two paths to reach them

2 visions
January 2016

2 paths
May 2016

MOVING AND SPREADING

September 2016

The **moving** act consisted in following the actions planned in the previous acts and follow the path of the visions.

events telephone interviews

THE FINDINGS

Visioneering enhanced Cadore 's regional awareness to tackle the challenge of a low-carbon future.

Visioneering and its collaborative process was a new opportunity for the area to **give-and-take** knowledge.
Visioneering allowed for **reasoning** about actions that require collaboration in the long-term.
The visions and paths helped each decision-maker understand their **role** in the path toward low-carbon futures.
The visions and paths empowered decision-makers to take **actions and responsibility.**

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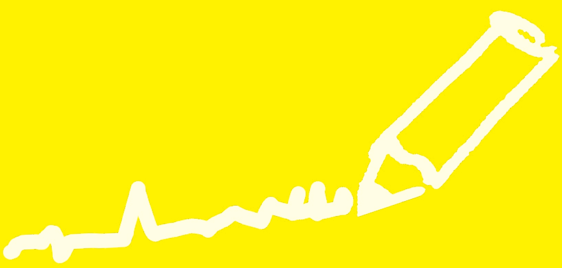
Smart and Sustainable Planning for Cities and Regions 2017

I participated in the 'Smart and Sustainable Planning for Cities and Regions 2017' conference that took place in Bolzano (Italy), from the 22nd to the 24th of March 2017.

The SSPCR Conference was organized by the Institute for Renewable Energy of the EURAC Research Academy. EURAC is a private research center with researchers from all over the World, and dedicated to the greatest challenges of our nearest future: people's health, energy, well-functioning political and social systems, and environmental protection. Particularly the Institute for Renewable Energy conducts applied research on advanced energy systems, sustainable energy sources, and smart energy city approaches.
During the conference, I presented part of my doctoral researcher with a poster, and I attended keynote speeches, round-tables, and presentations. Substantial and methodological issues of the energy future, and of a low-carbon transition, were explored in those events. Participants from European, American, and African schools in urbanism and planning actively participate in the conference.



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CURRICULUM VITAE

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Italian citizenship

[EMPLOYMENT]

04/2017-CURRENT **Hadler bis Hausdorf Architekten** | Vienna, Austria
> municipal land-use and development planning
> design of public space

02/2014 - 02/2017 **Doctoral Candidate** | Department of Spatial Planning, Vienna University of Technology, Austria
> design of low-carbon futures for alpine areas
> regional planning methodologies oriented to the future
> organization and realization of workshops
> teaching master's students '*Planning and Development in Agglomerations: Desired Futures & Envisioning'*

05/2014 - 08/2014 **PUMAR Architects** | Vienna, Austria
> metric survey of buildings
> design of private and social housing
> project presentations

10/2013 **Exhibition guide at Cantieri d'Alta Quota** | Fondazione Architetti Belluno Dolomiti, Italy
> visitors guide at the exhibition 'Construction Sites at High Altitude'

06/2012 - 10/2012 **B+C Architects** | Paris, France
> realization of scale models
> design of social housing and public spaces
> project presentations

07/2009 - 05/2010 **IN_Arch studio** | Udine, Italy
> design of private and social housing
> project presentations

[EDUCATION]

03/2014 – 05/2017 **Doctoral Candidate** | Department of Spatial Planning, Vienna University of Technology, Austria
> doctoral research '*Visioneering Low-Carbon Futures, a Case in the Central Dolomites'*

07/2016 - 08/2016 **Qualitative Research Methods** | MOOC, University of Amsterdam
> collection and analyses of qualitative data

09/2012 - 07/2013 **Master of Architecture** | University of Udine, Italy
> design of buildings that satisfy aesthetic and technical requirements
> design of urban area and planning development processes
> knowledge of the history and theories of architecture and the related human sciences

09/2007 - 04/2010 **Bachelor of Architecture** | University of Udine, Italy
> design of small scale buildings and objects

09/2001 - 07/2007 **Maestro d'arte in the Art of Fabric** | High School of Arts, Cortina d'Ampezzo, Italy
> design and realization of fabrics
> knowledge of the fine arts related to fabrics

[OTHER EXPERIENCES]

12/2015 **Professional Practice Examinations** | Licensed Architect

08/2016- CURRENT **e-commerce FalegnamiAndreotta** | ETSY shop
> design of wooden objects

[PUBLICATIONS]

2016 Andreotta C.(2016). **Visionering Low-Carbon Futures: the Case of the Northern Dolomites**. In: Ulmann, B. et al. (ed.), Vienna Young Scientists Symposium. Book-of-Abstracts.com

2015 Andreotta, C., Zech, S. (2015). ***Preparing the Future: Visioneering in the Planning Process of Mega Transport Infrastructure.*** In: Fabbro S. (ed.), MegaTrartsport Infrastructure Planning, Springer International Publishing Switzerland 2015

2013 Andreotta, C. (2013). ***Regional Portrait from the POLY5 Partners' view***. In: Student Workshop Tracking The Ljubljana Urban Region 2012/2013. Ljubljana: University of Ljubljana, pp. 50-53

2004 Andreotta C. (2004). ***Architettura rurale a Borca di Cadore**.* Istituto Ladin de la Dolomites, Tipolitografia Print House Cortina

[CONFERENCES]	
14th - 17th June 2016	**AESOP PhD Workshop - Planning And Urbanism Research In a Global World** | Leuven, Belgium > multiple presentations and round tables
9th – 10th June 2016	**TU VSS - Vienna Young Scientists Symposium** | Vienna, Austria > oral presentation
22nd - 24th March 2017	**Smart and Sustainable Planning for Cities and Regions 2017** | Bolzano, Italy > poster presentation
[TOOLS]	**Software** | Autocad; Vectorworks; V-Ray; Sketchup-Pro; Rhinoceros; Adobe Illustrator, Photoshop and Indesign; Allplan; Qgis; Microsoft Office. **Languages** | Italian mother tongue; English C1; German B1.

Vienna, 24th of May 2017

Chiara Andreotta