INTRODUCTION

Long-term thinking approaches for a low-carbon future

The current carbonized energy system is responsible for the phenomenon of climate change, and leads to increasingly negative consequences throughout the world including air pollution and habitat degradation (Da Graça Carvalho, Bonifacio, & Dechamps, 2011; McKinsey & Company & KEMA, 2010). Spatial planning has a leading role in rethinking the energy system and transitioning to a low-carbon future. The expression ‘low-carbon future’ refers here to a future in which anthropogenic CO₂ emissions are minimized due to strategies that reduce their release through coherent social and economic development.

The transition toward such future challenges has already been confronted in the Alps region due to existing climate change effects. In this region, the average temperature has increased by 2°C in the last century, the glaciers are melting, the volume and quality of snow has changed, and the permafrost has thawed (Alpine Convention, 2012). These transformations affect the environmental safety of alpine communities, leading to unexpected natural disasters and affecting the seasonal pattern on which the local economy is based (Alpine Convention, 2012; Regione Del Veneto, 2012).
Generating and spreading awareness is still a key issue for the effective adaptation to and mitigation of climate change through the transition to a low-carbon energy system.

Cadore is the alpine area studied in the empirical research in this paper. It is composed of 22 municipalities located in the northern part of the Veneto region of Italy. It is a relevant case with respect to the low-carbon challenge due to its energetic configuration with a high dependence on fossil fuels for transport, and the absence of an energy strategy for the future. Top-down planning is missing and spontaneous individual actions promoted by private interest are affecting the territory (ARPAV, 2012; Regione Del Veneto, 2013; Zoboli, 1994). Cadore has a large amount of natural resources and is partially within the Dolomites UNESCO Natural Heritage Site. These render it more vulnerable to the exploitation of its natural resources and landscape.

The transitioning capacity of the Cadore community in the face of this challenge needs an integrated long-term guide. Strategic spatial planning offers this through the development of coherent and coordinate visions, but there is no ‘one best or one single way’ to plan strategically (Albrechts, 2010; Kunzmann, 2013). This paper refers to ‘visioneering’, an approach introduced by the Department of Regional Planning and Development, Vienna University of Technology. The term ‘visioneering’ combines the words envisioning and engineering. The former concerns the ability to have a mental picture developed in collaboration about the future, the latter concerns the application of engineering skills when translating the picture into feasible actions, and in representing them in maps (Salzmann, 2013; Zech, 2013). Visioneering, therefore, becomes a way to plan strategically, supported by maps and visual material along the whole planning and participatory process, aiming to engineer the results of the collaborative envisioning.

So far, little has been documented on envisioning and the changes occurring among the involved parties during its collaborative processes (Albert, Zimmermann, Jörg, & von Haaren, 2012). The research reported here aims to explore the effect of visioneering, with its envisioning and engineering processes, on a regional response to the challenge of a low-carbon future. The paper presents, therefore, an empirical application of visioneering, including its collaborative process and its evaluation.

The purpose of the paper is to investigate the trigger points that visioneering stimulates to generate a conscious regional response to the challenge of energy transition. The identification of those points becomes relevant in areas such as Cadore that lack an energy plan for the future and that are vulnerable to transition because of abundant natural resources.

**LITERATURE REVIEW**

**Visioneering and social learning**

Strategic spatial planning is no longer the mere production of plans, but a process in which different actors take part to understand the present and the common future objective; it is a process in which their awareness changes (Albrechts, 2010; Kunzmann, 2013; Olesen, 2013). Accordingly, the evaluation of spatial planning has moved from how to rank plans or programmes to how to trace values or understandings during the planning process (Faludi, 2000). The main purpose of strategic planning is, therefore, to guide decision-making and to let the involved parties comprehend what their situation is and what they can do, individually or collectively.

The literature refers to this phenomena as ‘social learning’ (Albert et al., 2012; Elbakidzea et al., 2015; Laurian & Shaw, 2009; Reed et al., 2010; Wilson & Piper, 2010). Social learning is gathering interest in spatial planning processes as a means to cope with complexity and its uncertainties. This type of learning has been defined in multiple ways. This paper refers to that elaborated by Reed et al. (2010) in the field of natural resource management and policy. This definition describes social learning as a process where two phenomena occur: first, changes in understanding appear in the individuals involved; and second, changes occur that go beyond the
individuals and become situated within wider social units. Both these phenomena happen through direct and/or indirect social interactions among actors within a social framework.

Visioneering boosts social learning through participatory events where individuals meet and learn collaboratively, exploring visual material, i.e., maps and pictures, that represent possible futures (Salzmann, 2013; Zech, 2013). Four dimensions of social learning were identified when analysing the low-carbon challenge in Cadore. These are partially based on the work of Garmendia and Stagl (2010) for sustainable development in three case study regions in Europe. This paper investigates such dimensions among the local decision-makers’ awareness in response to the low-carbon future.

The term ‘dimension’ indicates a domain of knowledge, values and modes of interaction involved in the issue. The dimensions frame the collaborative visioneering process on low-carbon and indicate that, during the process, participants (1) undergo a change in cognitive knowledge related to the treated concept; (2) better comprehend the complexity of the treated concept and how to cope with it; (3) find or suggest courses of action; and (4) undergo a change in understanding others’ priorities and ideas.

The four social learning dimensions are described as follows:

• **Cognitive knowledge** refers to the simplest mode of learning, i.e., the acquisition of new knowledge, facts or skills (Garmendia & Stagl, 2010). It refers to changes in knowledge about CO₂ released today in the region and the experiences of the involved stakeholders in the energy field.

• **Understanding the complexity** implies comprehending the uncertainties associated with a low-carbon future and the need for integrative thinking. In this dimension, participants refine their views about the low-carbon concept and how the decisions that need to be taken are interconnected.

• **Joint and single actions** is a dimension that refers to participants’ willingness to take joint actions at different governance levels, or acknowledging the possible actions that can be done individually.

• **Mutual understanding** implies a change in the participants’ capacity to understand the state of their neighbouring communities and how different actors can help each other and activate common actions.

**METHODOLOGY AND CASE STUDY OVERVIEW**

The visioneering approach applied in the Cadore region

The purpose of the paper is to investigate, and therefore evaluate, the trigger points that the visioneering approach stimulates to generate an aware regional response to the challenge of energy transition. The approach was applied in Cadore as part of a three-year doctoral research project focused on visioneering and its possible relevance to strategic spatial planning. This paper describes two stakeholders workshops, carried out during the research, organized with the purpose of discussing two low-carbon visions represented in maps and photomontages (Figure 1). Those visual materials were designed after content analysis of a previous series of semi-structured interviews with local stakeholders and energy experts.

The stakeholders involved in the two workshops were the decision-makers of Cadore: 22 invited local mayors and the president of the Magnifica Comunità di Cadore (MCC), the local institution that hosted the events and which represents the cultural identity of Cadore (for more details, see Table 1 and Figure 2).
During the Stakeholders Workshop I (SWI) that took place on 24 July 2015, nine stakeholders participated and were involved in the design and adjustment of the visions. To this end, the participants were divided into three focus groups guided by three moderators. The Stakeholders Workshop II (SWII) took place on 27 May 2016, where 10 stakeholders actively participated in two focus groups for the design and adjustment of the paths to reach the visions defined during the SWI. Different instruments were used to measure the changes in the dimensions of social learning. Pre- and post-event questionnaires provided quantitative data using a Likert scale (from 1 to 5, with 1 being strongly unfavourable to the statement, and 5 being strongly favourable). Focus groups, sketches and notes provided qualitative data.

**Data/empirics**

The data set comprises qualitative and quantitative data. The former were gathered through five focus groups, sketches and notes. It offered the chance to study the way in which individuals...
collectively make sense of the phenomena and construct meanings around it and the data were analysed with content analysis. The latter were collected through 18 pre- and 18 post-event questionnaires and helped to rank, on a Likert scale, the participants’ knowledge and perception through the evaluation of the arithmetic mean.

**FINDINGS**

**Effects of visioneering in the Cadore region**

Changes in the social learning dimensions were individuated through the data gathered during the SWI and SWII. The changes in each dimension are reported below. The conclusions on the visioneering approach and the trigger points that it stimulated are based on those changes.

**Cognitive knowledge**

All the participants declared in the post-event questionnaires that they increased their familiarity with the concept of a low-carbon future, and that they better perceived its possible spatial impacts. The majority of participants stated they had strengthened their familiarity with the potential of the local natural resources and acknowledged the necessity to manage them at a local scale.

**Understanding the complexity**

All the participants declared that the low-carbon issue was more complex than they thought before the SWI and SWII. A majority of them argued that positioning the actions required from the vision on a map reminded them of the problems connected to the implementation of them (e.g., as the bureaucratic procedures, the provision of funds). Despite such difficulties,
participants stated that the visual materials were advantageous in showing a vivid picture about futures they could realize.

**Joint and single actions**
The events helped the participants in reasoning about the actions that have a regional impact and which need a regional understanding. In the workshops the majority of the participants acknowledged the necessity of taking common actions. The local decision-makers nonetheless expect guidelines from the regional (Veneto) and provincial (Belluno) authorities. In that respect, the participants stated that experts (e.g., engineers, planners) were the key players needed to move towards a low-carbon future.

The topic that involved decisions based on values and feelings (e.g., the construction of new energy plants in the natural landscape) allowed for individual attitudes to emerge, hiding the institutional role of the participants and their common objectives.

**Mutual understanding**
In this dimension differences arose between the SWI and SWII. In the first event, the participants were more constructive and open minded, while in the second event they were critical and showed less mutual trust. In the latter case, they were influenced by the precarious stability of the national government, which generated mistrust in the future and a ‘fatigue’ for new ideas.

Overall, the participants admitted that the events were a base for a constructive discussion about a common future and a valuable platform for exchanging experiences.

**DISCUSSION**
The process has two main limitations. First, some of the participants of the SWI were not present at the SWII. Such discontinuity compromised a full comprehension of the visioneering approach for a few of the participants, but it allowed for the contribution of additional and different ideas from new stakeholders. Second, during the time between the workshops, the stakeholders were subject to a variety of external influences that could vary the changes in the social learning dimensions. The known external influences were mentioned by the participants, e.g., policy variables.

Despite these limitations, the findings show an unexplored potential for a desired low-carbon future. The participants desire a low-carbon future and acknowledge the necessity to go toward it collaboratively. With the help of the visual material, they perceived the complexity of the concept and explored how to break it down. The visions showed the necessary actions to reach a low-carbon future are interrelated and this encouraged the participants to reason about those that have a regional impact or need a regional understanding.

In conclusion, visioneering shaped a framework in which to give and take knowledge and opinions succeeded in building a base for discussion and generated a commitment for future collaboration on identified feasible actions.

**CONCLUSIONS**
**How visioneering stimulates a regional answer to a low-carbon future**
This paper focuses on investigating the trigger points that visioneering stimulates to generate an conscious regional response to the imminent challenge of energy transition. The assessment, through the dimensions of social learning, showed that visioneering highlights how it is necessary to enhance the cognitive knowledge of involved parties and the social dynamics between them to boost the regional response to a low-carbon future. The empirical research shows also that the
visual materials, typical of the visioneering approach, are beneficial to understand each individual’s role in the transition toward a low-carbon future and to strengthen each participant’s awareness of the available natural resources and their dislocation in the territory.

The empirical research shows that planning low-carbon futures in the alpine area involves several matters: climate change and its environmental impacts, an economic system different to the current one, and increased use of local natural resources with the consequent new appearance of the landscapes. Visioneering a low-carbon future not only concerns planning the reduction of CO₂ release but also calls into question the kind of development required to reduce emissions in each local context. Planning an aware low-carbon future means paying attention to the uniqueness of each context, where people or institutions locally embrace actions toward the future. Visioneering is a mode of planning that helps involved parties to identify those people or institutions, and to empower them to take action.

The use of visual material typical of visioneering stresses the different appearance of the places where people will live. This is a particularly relevant feature in a UNESCO Natural Heritage Site with a tourist industry based on the attractiveness of its landscape, such as Cadore. It is not clear if visual material can play an important role in contexts different from the alpine one, where fewer resources are spread throughout the territory and have a weaker impact on the landscape.

**DISCLOSURE STATEMENT**

No potential conflict of interest was reported by the author.

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