ReTour

Renewable Energy in Tourism regions

LANDSCAPE LABORATORIES FOR COLLABORATIVE PLANNING

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Introduction

Research on the transition towards a higher share of renewable energy technologies (RETs) has put a strong emphasis on technological and economic aspects of generation facilities, often ignoring an equally important facet of successful transformation: **social acceptance**. The prospect of many more siting and decision-making processes entering previously untouched landscapes and regions in Austria, clearly underlines how future studies on social acceptance and the conflicts arising from a lack thereof will be of crucial importance, representing a highly attractive scope for scholarly investigation and debate. The project presented here aims to exploit this opportunity by using a case study approach in selected tourism regions, which we argue represent an ideal and highly relevant scholarly **learning environment**.

Mirroring the multifaceted nature of social acceptance research, ReTour is set up as an **inter- and transdisciplinary research project**. In collaboration with an advisory stakeholder group the project uses a mix of methods, including **spatially explicit modelling of potentials, focus groups, conjoint analysis, visualization studies and virtual reality assessments**. Findings and methodology will contribute to more efficient planning processes, foster social acceptance and ultimately help maximize the share of renewable energy. Currently a literature review is underway, a first stakeholder meeting has been held and spatially explicit modelling as part of the necessary preparations for the first empirical phase, the laboratories, is being carried out.

This contribution is focusing on the different aspects of the development of the laboratories framework, that will be tested and evaluated during the case study workshops.

The Landscape Laboratory

The landscape laboratory is a playing and **planning tool**, developed and evaluated within the ReTour project. The goal is to provide a set of methods, tools, and hardware for **collaborative planning** processes of renewable energy scenarios in tourism regions.

Core aspects of the landscape laboratories are 3D environments to support the evaluation of visual landscape impacts, **Virtual reality** approaches to enhance immersive effects and **new ways of human-computer interaction** to minimise entry barriers and to support collaborative processes.

3D Environment

The 3D environment is driven by the **open source game-engine Godot** (godotengine.org) to provide a realistic and **interactive 3D environment for communication and evaluation** of different planning scenarios. The landscape will be generated automatically based on **high-resolution GIS data** (Schauppenlehner et. al, 2019). This includes a digital elevation model, land use data, forest species distribution and tree heights, building footprints and heights as well as different infrastructure objects (e.g. wind turbines, power poles, etc.)

Virtual Reality Assessment

Large scale impacts on a landscapes scenery can be difficult to evaluate on standard media such as computer screens, as size proportions are strongly scaled. Virtual reality (VR) glasses can contribute to a **better perception of realistic scales and perspectives**. Therefore, the resulting renewable energy scenario is transferred to VR glasses for an individual estimation of the landscape impact.

Collaborative Planning Process

Participants from the case study regions can **contribute to different renewable energy scenarios** during workshops. To avoid entry barriers, common buildings blocks (Lego®) will be used for the siting process. The buildings **blocks are set on a map** and block size, colour and position will be recorded by an overhead camera. The video signal will be analysed and the representing items of renewable energy infrastructure will be placed as 3D objects (e.g. wind turbines or photovoltaic panels) in the 3D environment. Response from the computer provides an **overview of the site conditions** (e.g. average wind speed, slope aspect, land use, etc.), expectable energy output, as well as potential limitations (e.g. fall shorts of distances to settlements, etc.).

Conclusions and Outlook

We are convinced that the applicability of this project does not only lie in the findings it will produce but equally the methodology to produce these. The methodology itself will be interesting for two types of audience.

Firstly, the procedure proposed here, in itself, will represent an interesting **prototype of a participatory decision-making application** and can serve as a template for concrete RET-planning processes in the future. In fact, the documentation of its operationalization, aimed at increasing social acceptance and efficiency of the associated decision processes will be of immediate benefit to any institution involved in building RET structures, an audience that has already been involved through the accompanying stakeholder workshops.

Secondly, the interlinked and highly interdisciplinary nature of the methodology that aims to **reconcile one of the central divides in research on energy transitions** by merging a social science approach, with techno-economic modelling procedures, innovative 3D visualizations and virtual reality applications will be of central interest to scholars from a wide array of disciplines. More generally the interactive character of the procedures (e.g. virtual reality application) used, through quasi first hand experiences with renewable energy scenarios, can serve as a **gateway to creating highly engaging communication platforms**.

Qualitative and quantitative analyses will deliver concise results regarding various sensitive parameters that determine **social acceptance, with particular attention to visual impacts** generated by wind turbines and photovoltaic panels. In addition, the results from ReTour will contribute to our understanding of **multi-level governing the energy transition** in Europe as it brings together national targets with local needs and vice versa.

References
Schauppenlehner, T. et al. (2019 - in Print): Effiziente großflächige interaktive Landschaftsvisualisierungen im Kontext des Ausbaus erneuerbarer Energie: Das Potenzial freier Geodaten für die Entwicklung interaktiver 3D Visualisierungen. Journal für angewandte Geoinformatik

Illustations
Landscape: Thomas Schauppenlehner
Person with VR Glasses: (Freepik from www.flaticon.com - modified
Round table: Freepik from www.flaticon.com - modified

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