Spatial analysis of possible AgriPV parks from a landscape quality perspective

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1. Abstract

The Netherlands is facing considerable challenges while aiming to reduce 95% of greenhouse gas emissions by 2050, compared to 1990 levels [1]. Solar energy presents a key energy source, giving rise to the installation of photovoltaic panels on roofs and development of solar power plants (SPP) with agrophotovoltaics (APV) solutions. There are several drawbacks to enable energy transition in such a short time, such as scarce of land, environmental challenges and public opposition. APV along other SPP solutions may change the landscape quality (LQ) and, with that, raise concerns by local inhabitants, other landscape users and policy makers. Therefore, the improvement of developing APV and other SPP solutions is needed, among others advanced Decision Support Tools (DST) for CO_2 free electricity.

This paper presents the 1st development phase of a decision support tool, which enables evidence-based decisions on the *type*, *location* and *spatial extent* of SPP. The tool offers solutions for decision-makers, so they will be able to make relevant solutions to implement SPP along with APV innovations in the landscape, while maintaining the public support and enhancing LQ. The objective of the study was to develop scenarios for SPP to produce 250TJ renewable energy (the 2030 aim of Wageningen municipality) and assess the LQ of each scenario.

For the study site was chosen on open peatland in the western part of Municipality of Wageningen, the Netherlands (Figure 1). This study analysed the distribution of seven types of SPP under consideration of LQ with the main variables of functional, experiential and future value, related to social interest (economic, social and ecological) [2]. The values were appointed according to economic production of the land and distribution of different types of SPP. The weight system of social interest was used to assess the LQ values for each solar type.

The highest electricity production demonstrated the scenario with solar tracking system. However, the highest LQ values were shown by the APV scenario. The lowest value for LQ was noticed by the scenario with southern orientation and 15% distribution of solar arrays.

The created tool provides policy makers, developers and stakeholders with alternative SPP scenarios, each one with different LQ and surface to choose from. The general public and decision makers will learn what options exist to realize SPP in terms of technology (types), location and spatial extent, and with that rising public support for energy transition. The APV scenario permits crop and electricity production in the same area, creating a multifunctional landscape. Other scenarios generate electrical power without crop productions, which provides an important additional value to APV solutions.

2. References

[1] Governemnt of the Netherlands, “Klimaatakkoord,” *National climate agreement the Netherlands*, 2019. [Online]. Available: https://www.klimaatakkoord.nl/documenten/publicaties/2019/06/28/national-climate-agreement-the-netherlands. [Accessed: 04-Feb-2021].

[2] D. Oudes and S. Stremke, “Climate adaptation, urban regeneration and brownfield reclamation: a literature review on landscape quality in large-scale transformation projects,” *Landsc. Res.*, vol. 45, no. 7, pp. 1–15, 2020.

3. Figures and tables

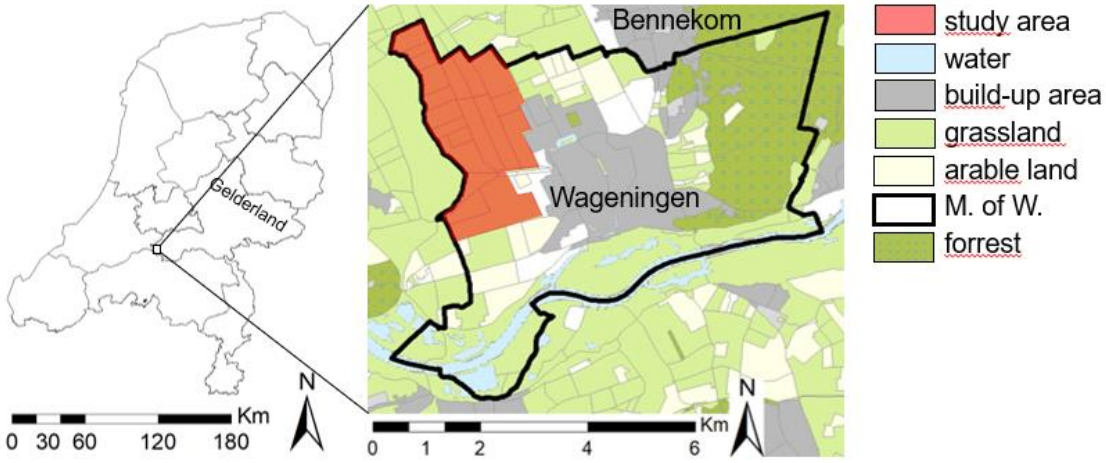

Figure 1: Map of the Netherlands with provinces. Right: Location of the study area in the Municipality of Wageningen. The land use of study area is grassland (peatland). M.of W. stands for Municipality of Wageningen.