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Urban Planning (ISSN: 2183–7635)
2023, Volume 8, Issue 2, Pages 374–388
https://doi.org/10.17645/up.v8i2.6584

Article

A Comparative Study of Polarization Management Around Energy Transition-Related Land-Use Conflicts in The Netherlands

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Submitted: 5 December 2022 | Accepted: 16 March 2023 | Published: 22 June 2023

Abstract
The Dutch national government has decided to push the implementation of the "energy transition" it aspires to by inviting clusters of municipalities (so-called RES regions) to develop a regional energy strategy (RES). However, since the new renewable energy land-use claims compete with a growing number of land-use demands, RES implementation confronts land-use conflicts, resulting in complex trade-offs for conflict resolution and planning around polarization. In the Dutch context of land scarcity and a rich planning tradition that arose specifically to deal with this and ensuing conflicts, the need for integrated landscape management seems obvious. This article offers a comparative case study of two RES-related land-use conflicts and their management in South Limburg, focusing on the question of how far these cases display elements of an integrated landscape approach (ILA). The ILA is applied as an analytical framework to evaluate the land-use conflict management processes of the case studies by assessing which elements of ILA are present and whether their relative presence and quality help to resolve the conflicts. Based on document and media content analysis and 15 interviews, this article analyzes the different land-use claims, objectives, and landscape values identified in two RES areas and how they overlap or compete, resulting in conflicts or synergies. Our findings show that the ILA provides useful guidelines for tackling RES-related land-use conflicts, but does not pay sufficient attention to the political dimension.

Keywords
energy transition; integrated landscape approach; land-use conflict management; land-use conflicts; renewable energy development; the Netherlands

Issue
This article is part of the issue "Planning Around Polarization: Learning With and From Controversy and Diversity" edited by Oswald Devisch (Hasselt University), Liesbeth Huybrechts (Hasselt University), Anna Seravalli (Malmö University), and Seppe De Blust (ETH Zürich).

1. Introduction

If the Netherlands wishes to meet its national climate goal of reducing carbon emissions by at least 49% in 2030 and 95% in 2050 (Rijksoverheid, 2019), large-scale renewable energy development, like solar and wind farms, is likely to make an increasing claim on already scarce land resources. The National Program Regional Energy Strategy sets out the Dutch national government's plan to generate 35 TWh of renewable electricity on land by 2030. To achieve this goal, 30 clusters of municipalities (so-called RES regions) have been established within the existing twelve Dutch provinces. This way, the national government aims to incentivize local governments, residents, businesses, grid operators, and civil society organizations to jointly develop a regional energy strategy (RES) and identify RES search areas for renewable energy development. The RES aims to be an important guiding document that determines how much renewable electricity each RES region can contribute to the national target, recognizing that each region faces unique opportunities and limitations (Stuurgroep RES Zuid Limburg,

2020). On 1 July 2021, the RES Zuid Limburg 1.0 was submitted to the state for the South Limburg region. The RES is supposed to be updated every two years based on national agreements and new insights and developments. However, it is important to note that the RES for each region has no formal status until it is approved by municipal and provincial democratic bodies.

Given the significant spatial implications of the energy transition, the RES can also be seen as a spatial transition that may lead to land-use conflicts. Land-use conflicts occur when "there is incommensurability between different land uses" (Boonstra, 2009, p. 10), which happens when forms of land use are mutually exclusive (Boonstra, 2009). Incommensurability outlines an "essential difference between interests and values" since "interests can be made commensurable (often financially) but values cannot be measured with a common scale" (Boonstra, 2006a, p. 2). Brown and Alessa (2005) introduced the concept of landscape values for land-use planning: People who develop a degree of place attachment to an area, are more likely to resist changes in land-use that disrupt this attachment, due to identification with, or dependency on these places. Alessa et al. (2008, p. 29) define landscape values as "those values people associate with the places where they live, work, visit, or otherwise attach meaning to." Building on this, Brown et al. (2015, p. 196) identify land-use conflicts as "differences in landscape values and land use preferences.''

In the Netherlands, RES-related land-use values are competing with multiple other land-use claims. Being one of the most crowded countries globally in terms of population density and economic production per square kilometre, the Netherlands experiences an increase in spatial pressure, which is expected to grow towards 2050 (College van Rijksadviseurs, 2020; DenkWerk, 2020). Several competing demands claim extra space, which will lead to difficult choices. To account for a rising number of households, an estimated 1.6 million new homes are needed, of which 10 to 12,000 are needed in Limburg, the Dutch province with the smallest growth in housing supply (Hubers, 2021). Provinces must also acquire tens of thousands of hectares of new nature to reach biodiversity targets, and land needs to be allocated differently to adapt to the impacts of climate change (van Dinther, 2020). Additionally, if farmers want to preserve farmland for producing food and work less intensively and more organically, a larger space is needed (Berezow, 2017). The transition to a circular economy requires not only technology and expertise but also land as companies request the necessary space and infrastructure to achieve this (Leunissen, 2020).

The energy and spatial transition are particularly complex for the RES region of South Limburg, intending to contribute 1.3 TWh to the national task, made up of wind-on-land (0.17 TWh), large-scale solar on roof (0.71 TWh), and solar on land (0.45 TWh); only 0.056 TWh is yet realized (Stuurgroep RES Zuid Limburg, 2021). Several land-use restrictions are in place, embodying a protected National Landscape and Natura 2000 area and the second most urbanized area of the Netherlands. These restrictions are illustrated by the Provincial Zoning Plan Limburg (*Provinciale Omgevingsvisie* in the original, also known as POL14), which currently forms the provincial spatial vision and is reflected in regional and local policy. The plan considers the national landscape of South Limburg unsuitable for the placement of wind turbines and, therefore, excludes this area for wind energy, except for the urbanized area.

Considering that change in the social and physical environment is inevitable and a catalyst for conflicts, the focus should be on conflict management instead of conflict avoidance (Boonstra, 2009; Brown & Raymond, 2014; Keough & Blahna, 2006). As land-use conflicts deal with incommensurable values, conflict resolution is not applicable because it aims for commensuration (Boonstra, 2006b). Therefore, management better indicates the efforts made to bring values together and reach mutually beneficial outcomes in land-use planning (Keough & Blahna, 2006). Nonetheless, managing land-use conflicts and competing objectives is complicated and context-specific, as it deals with social dynamics, complex natural systems, uncertainties, and long-time scales (Petrescu-Mag et al., 2018; Sayer et al., 2013).

Reflecting the wider shift to governing by governance (Jordan, 2008; Stoker, 1998) and horizontal coordination for joint problem-solving (Bowen et al., 2017), the Netherlands decentralized spatial planning, increased regional partnerships as instruments for realizing state policy, and privatized key elements such as the energy system (Kuindersma & Boonstra, 2010; van Dinther, 2021). The RES is an example of this, making provinces and municipalities responsible for guarding the spatial quality, collaborations, land-use conflict management, and decision-making processes.

Due to this decentralization of power and responsibilities, participative approaches for land-use planning and conflict management are increasingly used to secure legitimacy and support (Boonstra, 2006b). Many scholars encourage inclusive participation of stakeholders in decision-making to encompass a diversity of values, prevent collective protests and safeguard natural resources (Keough & Blahna, 2006; Mann & Jeanneaux, 2009; Reed et al., 2017; Sayer et al., 2017). By assembling stakeholders and recognizing their aspirations for the landscape within an effective facilitation and negotiation process, sociocultural, economic, and environmental goals can be aligned (Keough & Blahna, 2006; Reed et al., 2017; Sayer et al., 2013).

Provinces and municipalities struggle to reach their climate goals as land-use conflicts emerge, which are challenging to reconcile. In North Limburg, in 2018, a conflict around the construction of a wind farm in Venlo resulted in a political dispute, lawsuits, and damage claims; the same month, environmental group Schinnen-Spaubeek declared to do "anything to prevent" energy parks being developed, after learning that land

near De Horse industrial estate is marked as a search area for the RES (Claessens, 2021). These debates are not surprising considering 46% of Limburg inhabitants affirmed in research for the new Provincial Zoning Vision that energy development should not be at the expense of the landscape (Provincie Limburg, 2020). Considering the diversity and complexity of the land-use demands involved, the Dutch context of land scarcity, and a rich planning tradition that arose specifically to deal with this and the ensuing conflicts, the need and the opportunity for integrated landscape management are present.

The integrated landscape approach (ILA) received increasing attention in the recent scientific literature (Arts et al., 2017; Esch et al., 2017; Ros-Tonen et al., 2018). As developing countries face the effects of competing demand for natural resources and increasing pressure on nature the most, the landscape approach arose as a "decision support solution" for the growing number of development issues, e.g., conflicting claims (Horn & Meijer, 2015, p. 7). ILA is internationally regarded as an answer to current and future global challenges by reconciling competing objectives for natural resources (Freeman et al., 2015; Reed et al., 2020; Sayer et al., 2017; van Oosten et al., 2021). It is an alternative approach to conventional sectoral land-use planning by removing silo-thinking and acknowledging that land comprises multiple cross-sectoral objectives (Arts et al., 2017; Horn & Meijer, 2015; Reed et al., 2015). This article adopts the definition of ILA as employed by Sayer et al. (2013, p. 8349), i.e., as "processes, tools, and concepts for allocating and managing land within a landscape of competing land uses, to achieve social, economic and environmental objectives" to analyse RES-related planning around polarization. Sayer et al. (2013) synthesized the consensus on landscape approaches and good practices in "Ten Principles for a Landscape Approach to Reconciling Agriculture, Conservation, and Other Competing Land Uses," which are used in this article to examine RES-related land-use conflict management.

This article uses a comparative case study approach to analyze how far the management of RES-related land-use conflicts in the RES region of South Limburg displays elements of the ILA and whether the relative presence and quality of these help resolve the conflicts. We chose two case studies for comparative analysis: the RES search areas Abdissenbosch and Akerweg, both located in the municipality of Landgraaf, part of the conurbation called Parkstad in the Dutch province of Limburg. Parkstad is the second most urbanized area in the Netherlands, with a high population and building density. Both cases sparked a need to reconcile competing land-use claims. These finalized cases are suitable for comparison, as they operate in a similar governance context.

Considering the energy transition is just starting to unfold, research has yet to identify and evaluate the emerging challenges for land use. Given the complex and pressing nature of land-use conflicts that arise from the energy transition, effective management strategies are urgently needed. This research contributes to this field by presenting a comparative case study that examines the effectiveness of the ILA in managing polarization and conflict around energy transition-related land use. By shedding light on the potential of the ILA to facilitate collaboration and coordination among stakeholders with varying values and interests, this study emphasizes the importance of considering local contexts and unique challenges when implementing land-use management strategies.

2. The Integrated Landscape Approach

The landscape (level) theory is particularly relevant for this research, as competing land-use claims may result in wicked problems, demanding a more integrated and interdisciplinary approach with a better understanding of complex social dynamics and natural systems. Furthermore, interpreting the landscape as a socio-ecological system (Denier et al., 2015, p. 26), allows for studying land-use conflicts and their management on multiple scales and levels, supporting better problem formulation, and preventing a type III error—solving the wrong problem (Hoppe, 2010).

Following the definition of ILA as employed by Sayer et al. (2013), the landscape approach is called "integrated" because it brings together stakeholders of different sectors and integrates their pursued objectives to establish more sustainable development. Horn and Meijer (2015) created a useful overview that shows the integrated nature of ILA by placing the different stakeholders and their primary objectives within a 3-set Venn diagram (*people*, *planet*, *profit*). We will address this as the 3P-diagram hereafter. In Figure 1, the ILA can be seen right in the middle, incorporating the three domains and their associated stakeholders. ILA aims to develop a shared vision among stakeholders and improve understanding of the landscape conditions (e.g., ecosystem health) and needs (e.g., biodiversity). By increasing knowledge of the dynamics in a landscape and the ecosystem services, ILA intends to support long-term sustainable planning and decision-making to reduce the harmful impacts of human activities (Horn & Meijer, 2015).

The 3P-diagram is a practical tool to map the stakeholders and their objectives identified in the case studies and illustrates which objectives overlap or compete with each other. However, it remains unclear which objectives are linked to which actors, as they are displayed separately, which we have added in our application of this tool (see the 4P-diagram in Figure 6). A plethora of landscape frameworks and initiatives arose over the years across various sectors, resulting in knowledge fragmentation and redundant re-inventions (Reed et al., 2015). Following an intergovernmental and inter-institutional process, Sayer and colleagues' guidelines were developed and accepted broadly by scholars and practitioners (see Arts et al., 2017). Figure 2 illustrates Sayer et al.'s (2013) ten principles and the objectives they

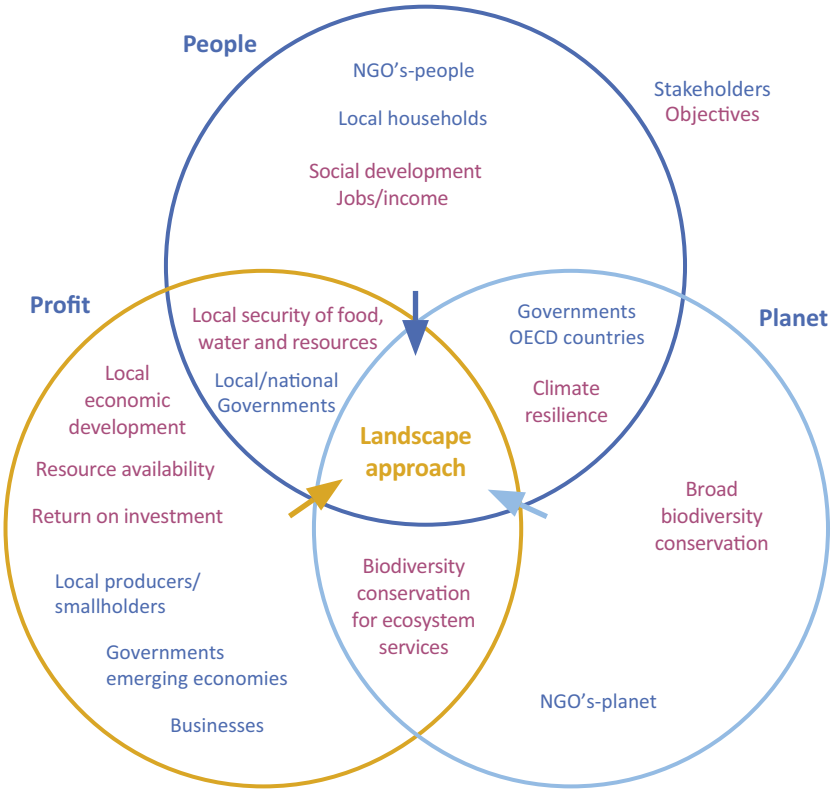

Figure 1. ILA 3P-diagram based on Horn and Meijer (2015).

pursue. They are applied to the case studies of this article to investigate land-use claims and the complex act of collectively managing the competing social, economic, and environmental objectives, trade-offs and synergies within the landscape, the role of public participation and the inclusion of stakeholders, and the role of sustainability in the planning, management, and decision-making processes related to land-use conflicts.

The ILA has received both praise and criticism. One common critique of the approach is the assumption

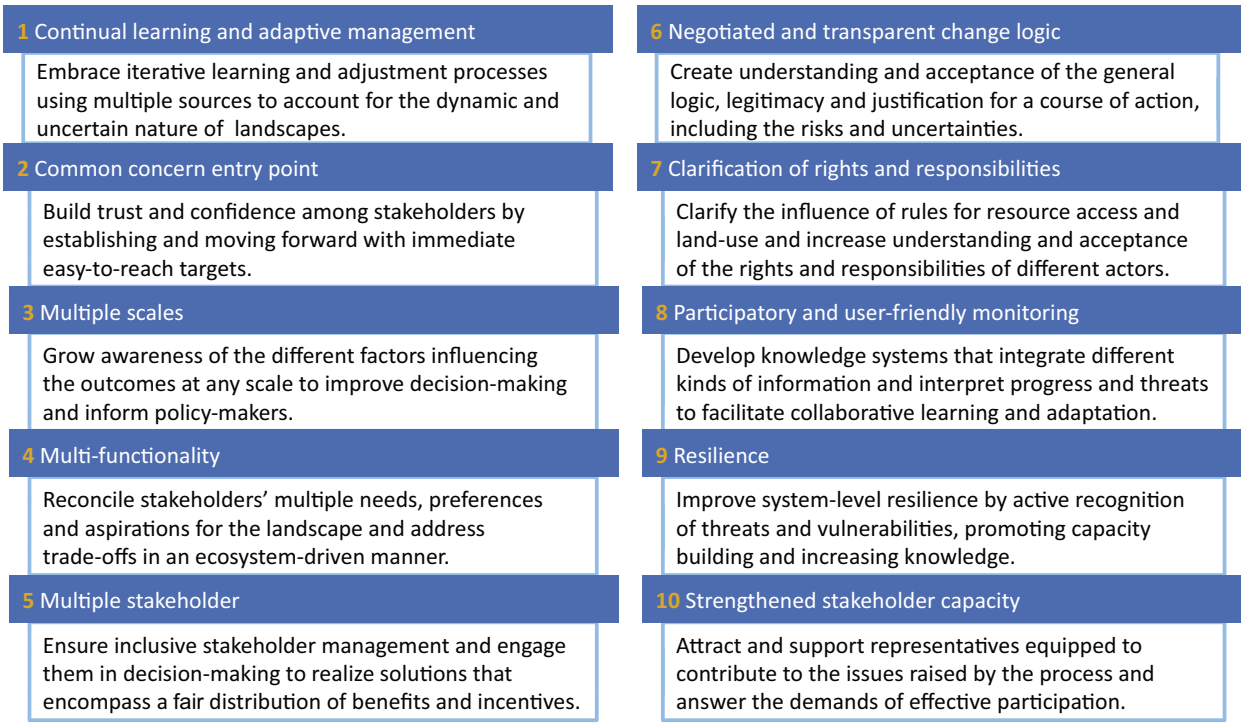

Figure 2. Objectives of the ten principles outlines by Sayer et al. (2013).

that competing objectives can be integrated at the landscape level and that all stakeholders share the same desire to achieve sustainable development (Arts et al., 2017). However, in reality, stakeholders often hold different and incommensurable values, and achieving consensus may be difficult or even impossible. Additionally, ILA may face challenges in measuring progress and outcomes in a wicked problem domain, where simple performance assessment and analytical evaluations may not be adequate (Sayer et al., 2013). Another obstacle to successful cross-sectoral integration is the bureaucratic structures of modern administrations, which often operate in sectorial silos with distinct decision logics (Arts et al., 2017). Such structures and institutions can limit collaboration and coordination across different sectors and make it difficult to achieve meaningful integration of objectives. Finally, Sayer et al. (2013) note that less developed countries may lack the resources and capability to cultivate long-term multi-stakeholder engagement. Advanced economies may achieve greater success by leveraging good governance practices and a more powerful civil society. Overall, these criticisms suggest that the ILA may face significant challenges in practice.

3. Methodology

The article is based on exploratory research investigating land-use claims and conflicts in relation to the RES South Limburg. A comparative case study approach using qualitative research methods was adopted to recognize the context-specific factors influencing land-use claims, conflicts, and their management in South Limburg as they operate within a socio-system (Patten & Newhart, 2017). The research was conducted from June to August 2021.

A preliminary screening of potential cases in South Limburg was done through desktop research on the RES search areas identified by Stuurgroep RES Zuid Limburg. Then, media content analysis was performed using the media search engine LexisNexis and the online archive of the regional daily newspaper *De Limburger* to identify competing land-use claims and land-use conflicts in these search areas and to analyze land-use claims and objectives. The media affirmed that Parkstad faces challenges in achieving its RES targets with emerging land-use conflicts. The municipality of Landgraaf frequently featured in regional news about the developments of the energy park Abdissenbosch and solar park Akerweg. Both initiatives display a need to reconcile competing land-use claims. Landgraaf takes a frontrunner position in Parkstad, carrying out the RES while neighboring cities such as Heerlen and Kerkrade have not decided yet on concrete locations. For that reason, two finalized cases in Landgraaf were selected for comparison, being well suited for this purpose due to their similar governance contexts. In total, 26 media reports were examined for land-use claims, objectives, and values, in addition to patterns and relationships related to Sayer et al.'s (2013) ten principles.

To complement the media analysis, document analysis was performed based on government publications, records of council meetings, and other official reports related to the energy transition and the case studies. The online city council archive was used, providing a rich source of data. It contains amendments, political questions to the college, decision lists, motions, city council information letters, and commitments made by the college. We analyzed all council meeting notes and documents from 11 April 2018—15 July 2021. In addition, we analyzed the recorded council meetings of 25 February 2021 and 16 June 2021 as they covered the political discussion on the energy parks and the RES targets. Moreover, the websites of the identified actors were investigated for (research) reports and perspectives. In total, 55 documents were included in the analysis of land-use claims, objectives, and values in addition to patterns and relationships related to the ten principles.

Finally, we held 15 semi-structured in-depth interviews to analyze the context and dynamics behind the land-use claims, conflicts, and conflict management in the case studies. We used purposive sampling based on the previous document and media content analysis and an additional online search, and selected actors based on their (potential) knowledge about the case study. Nearly all interviews were conducted online and followed an iterative approach, allowing for supplementary questions in the following interviews.

For analyzing the landscape claims, objectives, and values involved in both cases, the typology of 14 landscape values classified by Brown (2004) served as the basis for mapping the actors' landscape values. We added *climate*, *well-being*, and *ecological* as standalone landscape values to adapt to the specific contexts and data of the case study. Furthermore, a clear distinction is made between *biological* values, where stakeholders admire areas because of the existence of plants and animals, and *ecological* values, where biodiversity and the ecosystem play a more prominent role. As a result, 17 spatially-representative landscape values are identified (see Figure 3). For most actors, the research found several landscape values, without specifying ranking. For this reason, we included all the identified values to account for completeness and prevent bias. Also, actors often used ancillary issues (von der Dunk et al., 2011) when voicing their conflicts. Therefore, the values are depicted in alphabetical order in the table, as no rank order is implied or should be inferred.

For the analysis and easy visual representation of overlapping and competing land-use claims, we customized Horn and Meijer's 3P-diagram to show the interconnected nature of the various land-use claims in the case studies. Considering land claims are made to achieve land-use objectives, the identified actors and their objectives were placed in the corresponding circles—*people*, *planet*, and/or *profit*. The resulting diagrams for each case study illustrate which objectives

Landscape values	Description
Aesthetic	Area valued of the attractive scenery, such as sights, smells or sounds
Biological	Area valued because it provides places for a variety of plants and animals
Climate	Area valued because it can help meet climate ambitions
Cultural	Area valued because people can continue to pass down wisdom, traditions and a way of life
Ecological	Area valued of its significance on biodiversity and support of the ecosystem
Economic	Area valued because it offers economic opportunities
Future	Area valued as they allow future generations to know and experience the areas as they are now
Heritage	Area valued because they have natural and human history
Intrinsic	Area valued for their own sake, now matter what others think about them or whether they are used
Learning	Areas valued because they can be used to learn about the environment
Life-sustaining	Areas valued because they help produce, preserve, clean and renew air, soil and water
Recreational	Area valued because it offers recreation activities and experiences
Spiritual	Area valued because they are sacred, religious, spiritually important
Subsistence	Area valued because it provides for necessary food and materials to sustain people's lives
Therapeutic	Area valued because they make people feel better, physically and/ or mentally
Well-being	Area valued because it supports or protects human well-being
Wilderness	Area valued because they are wild

Figure 3. Predefined landscape values and their descriptions.

overlap or compete. The area where all three circles overlap depicts reconciled objectives and a shared vision among stakeholders. Since politics forms a critical domain of external influence, affirmed by the case studies, the customized 3P-diagrams were then extended by adding a fourth P—politics—creating a 4P-diagram. Politics is displayed as an external sphere and not presented as a fourth circle, since the model aims to provide a simplified and easy-to-understand representation. The 4P-diagrams illustrate how the political actors connect to the other actors and how their objectives and (political) decisions influence the process.

For the analysis of the conflict management in these cases, Sayer et al.'s (2013) ten principles for an ILA were used as an analytical framework to map and analyze the land-use conflict management process of the Abdissenbosch and Akerweg area. Thereby, we analyzed how and why the competing land-use claims resulted in land-use conflicts or synergies. We determined 21 process indicators connected to the ten principles to assess the realization of the principles in the case studies. These process indicators were established by identifying the elements for a successful reconciliation process by studying descriptions of the ten principles, the identified objectives, and their related challenges and opportunities. The land-use conflict management process of Abdissenbosch and Akerweg was analyzed and described by qualitatively scoring the performance of the process indicators on a Likert scale and comparing the results (see Supplementary File 3). Document analysis, media content analysis, and interviews were used to obtain the data.

4. Results: Land-Use Claims, Conflicts, and Management in Two RES Areas of Landgraaf

4.1. The Case Studies

The first case study in Abdissenbosch is a former landfill site known as Kreupelbusch, located on the northern outskirts of the municipality, next to the border with Germany (see Figure 4). As the landfill was finished off with a covering layer, excavating may go no deeper than 60 cm (Arcadis, 2019). The Kreupelbusch area fulfils various functions: former landfill, landfill gas extraction, nature, recreation, and energy development. Despite its history and recent developments, the area falls in the protected Gold-Green nature zone and is positioned between Natura 2000 areas Brunssummerheide and Tevenerheide. Nevertheless, the area was located as a search area for wind turbines in PALET 1.0 and the concept version for RES but was later adjusted in the final version.

The second case study is located on the northeastern outskirts of Landgraaf (see Figure 5). The area consists of three separate parcels of farmland totaling approximately 9.6 hectares and is surrounded on the right by forest considered Gold-Green Nature (Kronos Solar,

Figure 4. Abdissenbosch map captured using Openstreetmap on PDOK.

2020). The area falls outside of Natura 2000 and the Nature Network Netherlands, but is designated as a "silence area" and has medium, high-to-very high archaeological expectations (Provinciale Staten van Limburg, 2019). Within the PALET and RES, the area is located in the search area for large-scale solar energy generation (Bos, 2021). However, resulting from the zoning plan, the following uses are assigned for the area: sustainable agriculture; control and prevention of soil erosion and flooding; preservation and development of the natural, landscape, cultural-historical, and archaeological values present; protection of the adjoining nature reserve, the so-called buffering; opening up of the individual plots; recreational co-use (Kronos Solar, 2020). Therefore, within the rules of the current zoning plan, it is not permitted to realize a solar park at this location, and a planning permit must be applied for.

4.2. Land-Use Claims, Objectives, and Landscape Values

Eight of the 17 predefined Landscape values were identified for the Abdissenbosch area (see Supplementary File 1): *biological*, *ecological*, *climate*, *well-being*, *economic*, *aesthetic*, *recreational*, and *learning*. The advisory group counts the most landscape values (4x), which may reflect the fact that the group consisted of people from diverse backgrounds, representing different interests. In addition, two of the values identified for this group—*recreational* and *learning*—were not identified for any other group. The landscape values

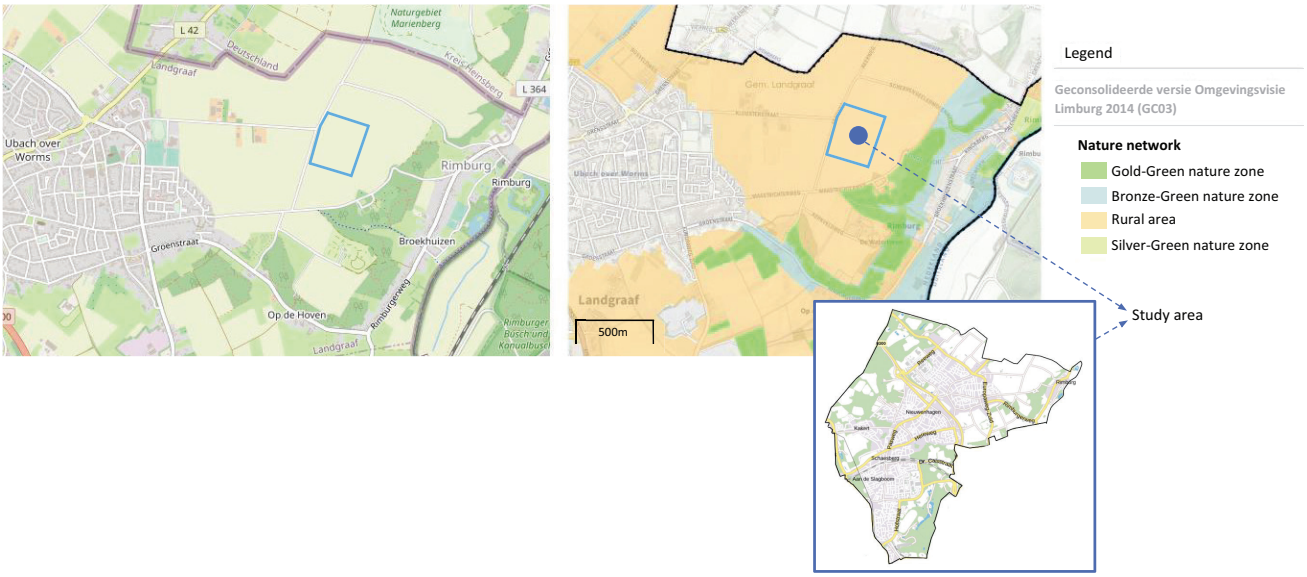

Figure 5. Akerweg map captured using Openstreetmap on PDOK.

cultural, *future*, *heritage*, *intrinsic*, *life-sustaining*, *spiritual*, *subsistence*, *therapeutic* and *wilderness* were not identified for any stakeholders making claims on the Abdissenbosch area.

In the Akerweg case, eight of the 17 predefined Landscape values were identified (see Supplementary File 2): *biological*, *climate*, *aesthetic*, *economic*, *subsistence*, *recreational*, *ecological*, *and well-being*. The political parties share many values with local residents, which may reflect that they represent the population and a variety of different interests. The value *well-being* was identified exclusively for the political parties SP, VVD, OPL, and Progressieven, taking place on a local level and social scale (Gemeente Landgraaf, 2021a, 2021b). For six (out of 11) actor groups, the value *biological* was recognized, covering all 4 Ps, playing out on a local level as the actors claim to share the importance of nature and farmland conservation, and deer protection. The landscape values *cultural*, *future*, *heritage*, *intrinsic*, *learning*, *life-sustaining*, *spiritual*, *therapeutic*, and *wilderness* were not identified for any stakeholders making claims.

Comparing the two cases shows that seven of the eight recognized landscape values are similar (i.e., *biological*, *climate*, *aesthetic*, *economic*, *recreational*, *ecological*, and *well-being*) but that the value *learning* was exclusively found for Abdissenbosch and the value *subsistence for* Akerweg. In both cases, the value *biological* was recognized as being the most prominently present, compared to the other values. However, the landscape value *aesthetic* appeared more dominant for Akerweg. The landscape values *cultural*, *future*, *heritage*, *intrinsic*, *life-sustaining*, *spiritual*, *therapeutic*, and *wilderness* have not been identified for any stakeholders in either case.

4.3. Overlapping and Competing Land-Use Claims

Figures 6 and 7 illustrate the use of a 4P-diagram in which land-use objectives overlap or compete with each other. In both cases, the research identified that the energy development objectives of the municipality, province, and initiators compete with residents because they desire pleasant scenery and with local parties due to environmental and well-being protection. For the Abdissenbosch area, the *planet* actors *Natuurmonumenten* ("nature monuments") and Natuur en Milieufederatie Limburg Limburg (Federation for Nature and Environment Limburg) directly opposed the energy development objectives due to the Gold-Green

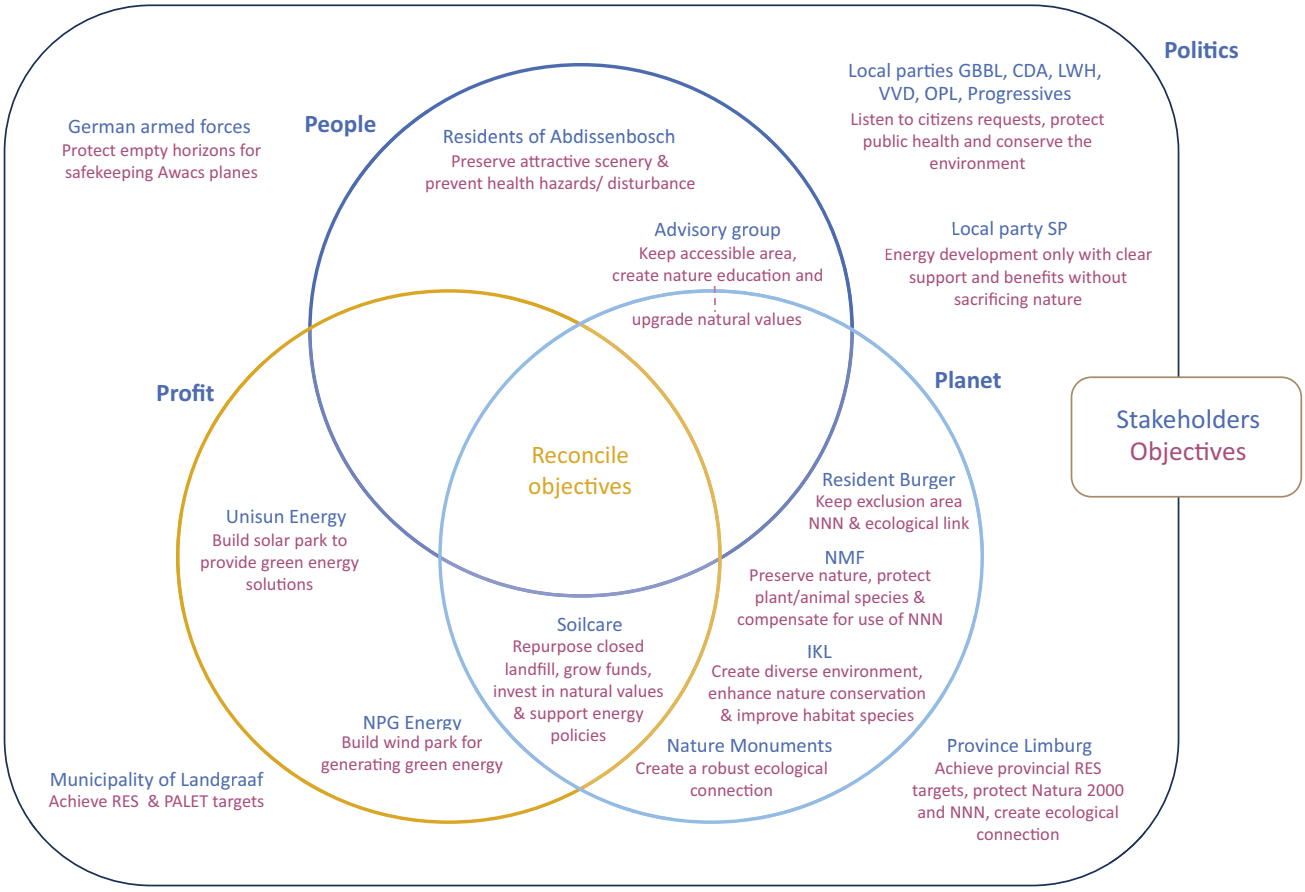

Figure 6. 4P-diagram of Abdissenbosch and overview of stakeholders and their objectives. Notes: CDA stands for Christian Democratic Appeal, GBBL for Common Citizens Interest Landgraaf, LWH for List Wiel Heinrichs, IKL for Landscape Organisation Limburg, NMF for Nature and Environment Foundation, OPL for Senior Party Landgraaf, SP for Socialist Party, and VVD for People's Party for Freedom and Democracy.

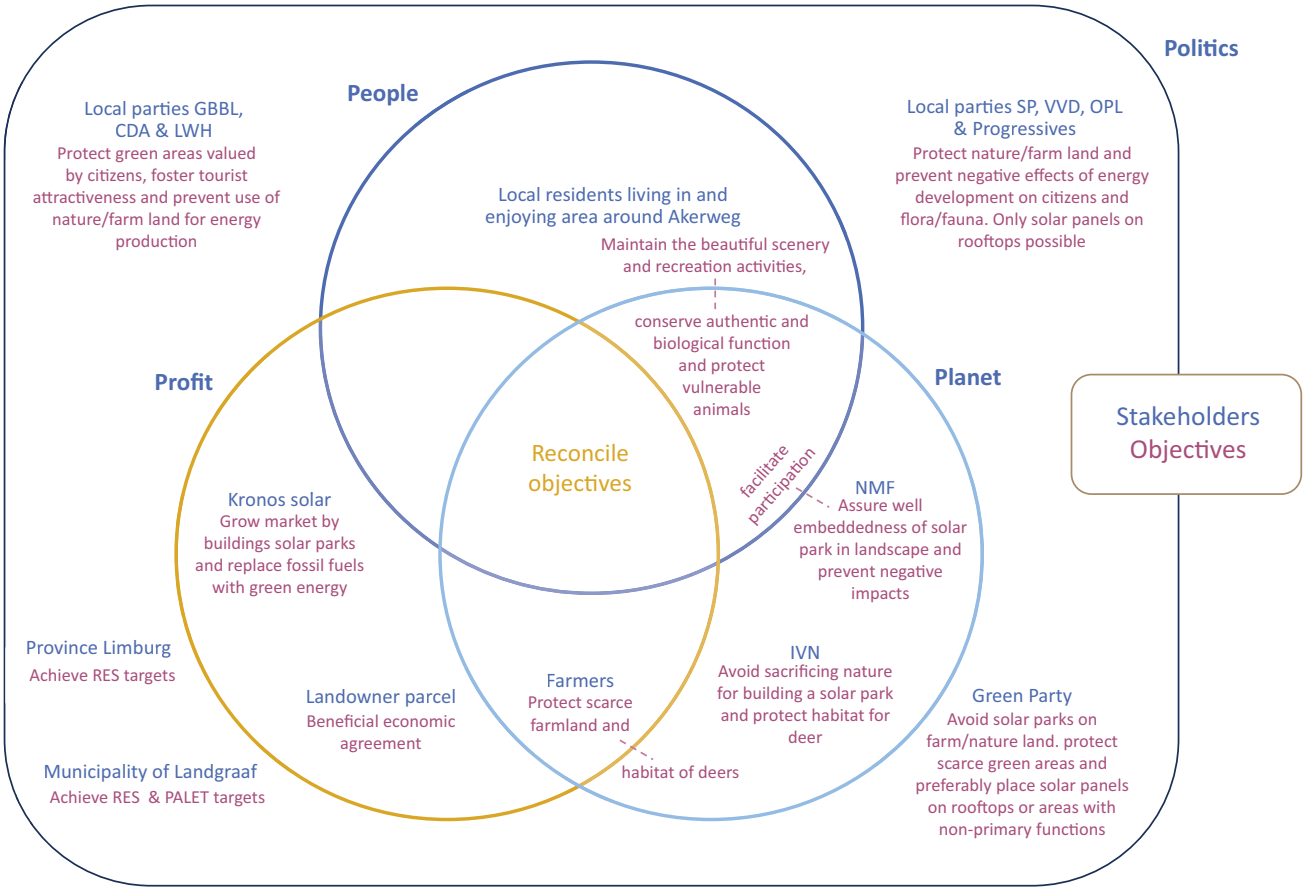

Figure 7. 4P-diagram of Akerweg and overview of stakeholders and their objectives. Notes: CDA stands for Christian Democratic Appeal, GBBL for Common Citizens Interest Landgraaf, IKL for Landscape Organisation Limburg, LWH for List Wiel Heinrichs, NMF for Nature and Environment Foundation, OPL for Senior Party Landgraaf, SP for Socialist Party, and VVD for People's Party for Freedom and Democracy.

status and ecological connection, when in the Akerweg area they stated conditions for the construction of a solar park. However, the data did not reveal any *profit* actors opposing energy goals in the Abdissenbosch case, whereas for the Akerweg, the desire of farmers to preserve farmland did conflict with the solar park plan. In addition, initiator Bodemzorg (which means "soil care") in the Abdissenbosch case overlaps with *planet* because of its (mandatory) goal to invest in natural values and therefore stands closer to the environmental objectives of residents, local parties, and environmental groups. In comparison, initiator Kronos Solar of Akerweg is placed solely in *profit*. Nevertheless, our research found there to be no overlapping objectives among *profit* and *people* for both cases.

Many of the identified land-use claims are recognized to be related to sustainability, but the corresponding landscape values are playing out on various scales and levels, affirming Giller et al.'s (2008) theory. Research shows that for both cases the circle *planet* contains the most actors' land-use objectives which are related to nature preservation and animal protection and that all the political parties link to *planet* by their ambition to protect the green areas valued by citizens. These biological landscape values manifest on a local level. The land-use claims of the province, municipality, and initiators also relate to sustainability with their renewable energy goals but differ from each other by their landscape values: The province and municipality value the two areas because they can help meet regional and national climate ambitions; initiator Kronos Solar has an economic landscape value; initiator Bodemzorg has, besides their economic landscape value, also an ecological landscape value because of their regional task to keep the environment around the old waste site safe. In the Abdissenbosch case, the province has three different sustainable land-use objectives competing with each other: achieving climate goals through the RES targets, conserving important nature zones, and enhancing the ecological connection with the Heidenatuurpark.

4.4. Land-use Conflict Management

The land-use conflict management process of Abdissenbosch and Akerweg were analyzed and described qualitatively, scoring the performance of the process indicators on a Likert scale and comparing the results (see Supplementary File 3).

For both cases, the research identified that no evaluation or documentation had taken place to establish learning for the future. Nevertheless, two respondents stated that continual learning about the energy transition and its challenges and opportunities does occur through various regional bodies such as the Parkstad incubator for energy projects, the wind energy acceleration team, the management committee on sustainability, and management and working groups of RES (South) Limburg. Nevertheless, two other respondents argued that more international and best practice studies concerning multi-functionality should be undertaken or reviewed, such as the combination of solar parks and agriculture in Germany, which is particularly interesting for a small country like the Netherlands. In addition, the research found that more attention is needed to attract and engage young people in the energy transition and participation processes. A difference between the cases is that the Akerweg initiator did not have the same opportunities for acquiring interdisciplinary knowledge, continual learning, and adaptive management to counter local opposition as in the Abdissenbosch case. Nonetheless, more parties were involved in the research process and discussions for the Abdissenbosch case than in the Akerweg case due to the additional environmental requirements, which enabled more interdisciplinary learning.

Four interviewees reflected that the preparations and actions to build trust were similar for the two cases. However, there was a striking difference since, in the Akerweg case, the information meeting was online due to Covid regulations instead of real-life (interviews 2 and 8; see Supplementary File 4). Additionally, residents of the Akerweg area spoke of immediate discussions and protests on Facebook and WhatsApp Groups, even before the information meeting. This was not the case for Abdissenbosch, and four interviewees attested that citizen involvement and protest were lower than for the Akerweg area, as the latter has an authentic landscape and many recreational users. From interview 5:

> There, people did stand up. I completely missed that involvement at Abdissenbosch. The right questions were asked online. People understood and knew what it was about….Kreupelbusch is a bit of a no-man's land, so there are not that many people who are worried about that.

However, unlike the Abdissenbosch case, Akerweg missed the chance to increase trust and support for the solar park and possibly create a common concern entry point through an advisory group.

Considering Abdissenbosch has gone through the whole process in a participatory manner, multiple scales (i.e., ecological, social, economic) were targeted to influence the outcome positively. This differentiates from the Akerweg case that could not finish the research, planning, and implementation steps and did not have the chance to create an advisory group, missing a vital opportunity to address the social scale adequately. Since the Kreupelbusch area is a former landfill and Gold-Green exclusion area, close to Natura 2000 zones, with strict building conditions, it received much attention for the environment, biodiversity, and possible adverse effects (interviews 9 and 10). Therefore, the initiators expected the solar park to be a sensitive topic and spent ample time raising awareness of the different factors influencing the outcomes at various scales. On the other hand, the Akerweg area was located in a search area for solar energy development and was previously agreed on by the city council for exploration. Kronos Solar, therefore, did not anticipate much trouble, even more considering the business case offered various possibilities for benefits and biodiversity improvements (interview 8). Hence, in the Akerweg case, the political and societal influences that negatively impacted the outcome were not (adequately) anticipated.

Lastly, it remains unclear for both cases if and to what extent the ecosystem services and their interactions, flows, feedback, and synergies were covered in ecological research. The mandatory ecological quick scan looks merely at whether protected species and natural areas occur in or near a planning area to not violate the Nature Protection Act. Merely if important natural values or protected species are identified or expected, further research and possible mitigation measures are required. Since the list of protected plants was abbreviated when the Nature Protection Act replaced the Flora and Fauna Act, these can be written off almost immediately (interview 12). In addition, certain animal species are sometimes treated carelessly in the ecological quickscan and done in the wrong season (interview 12). Moreover, it has not been identified for both cases if multidisciplinary research has been reviewed or done to investigate the consequences of energy parks on ecosystem services.

For the Abdissenbosch case, it was recognized that the reconciliation process occurred largely within the advisory group, differing from Akerweg, which did not get the chance to go through this process. Kronos Solar did not yet consult the residents about their wishes and how they felt things could be improved, even though there were many possibilities for reconciliation and multi-functionality because of the abundant space (interviews 8 and 15). Nevertheless, another significant contrast between the cases coming out of this research is the difference in value and use of the area, which complicated the reconciliation process for Akerweg. Additionally, it was mentioned that many people from the constituency of the GBBL use the area for recreation and that two best-known former aldermen live in the neighborhood that runs into the Akerweide area, holding external political influence over the decision-making process (interview 14). Moreover, since the Akerweg area is agricultural land, objectives competing with farming were found to be difficult to reconcile, as there has been growing discussion about limited agricultural

land in Landgraaf: "For years, farmers have been fighting over every square meter" (interview 14). Regardless, for both cases, our research did not find the use of multiple resource assessment and if (understanding of) the ecosystem services and their trade-offs were investigated and included in the decision-making process.

The research found differences in use and value between the two cases impacts the amount of interest and the demand for participation. According to the interviewees, the former dumpsite has a negative past with hardly any neighbors and few users, limiting interest in involvement in decision-making processes (interviews 3, 5, and 14). In the Akerweg case, the area is considered vital for recreation for residents and visitors outside the neighborhood and multiple stakeholders actively shared their opinions from the beginning (interviews 4, 6, and 7). According to a resident of Abdissenbosch, "it was much easier to be critical" in the Akerweg case, as the meeting was online, and people could submit questions via WhatsApp instead of saying them in person (interview 5). Moreover, the research indicates that it is more difficult to develop trust when the conversations are not face-to-face. "We have remained at a distance as the big developer coming to collect bags of money," stated Blijleven (interview 8), affirmed by the two residents of Ubach over Worms (interviews 4 and 6) and the online petition (Geuskens, 2021). Nevertheless, the initiator of the Akerweg case could not alter the concerns by walking through the entire multiple-stakeholder participation process, as done for the Abdissenbosch case.

The research recognized resistance to energy development plans and low acceptance of solar parks in highly used and highly valued areas. For both cases, the results reveal a group of residents that do not accept or understand the need for large-scale energy projects, the climate targets in general, and the sense of urgency. A difference between the cases is how in the Akerweg area, the high visibility of the solar park and the large number of people anticipating a hindrance in the landscape negatively impact the acceptability. Additionally, the Akerweg solar park initiators could not create understanding and increase the acceptability of their plans as the participation process was suspended in the preliminary stage. Nonetheless, for both cases, political interference influenced the decision-making process, around the same time close to the elections, as the city council protested the solar park in the Akerweg area and voted against wind turbines to allegedly gain votes of the neighborhood.

Regarding clarification of rights and responsibilities, the research found a difference between the cases because, in the Abdissenbosch case, the rights and responsibilities of various actors were communicated (to a certain extent), particularly in the advisory group, while in the Akerweg case, the interviewed residents declared minimal clarification and no advisory group was established. Nevertheless, in both cases, the research identified resistance to the energy transition responsibilities of the municipalities.

Regarding participatory and user-friendly monitoring, the Akerweg area did not receive the same opportunity as Abdissenbosch to share broad knowledge with stakeholders, monitor their activities, measure progress, and communicate the results. Nonetheless, the research recognized that more research and monitoring overall is required to establish the impact solar and wind parks have on the environment, as the developers and government officials interviewed declare missing this knowledge (interviews 3, 7, 10, 11, and 12). Kempenaar of Unisun Energy attest that presently, no research is being conducted by them or in combination with partners into the effects of their solar parks, but stated being open to it: "I have always said, you get carte blanche from me….You can come and look and research every year" (interview 11).

The Akerweg case did not receive the same opportunity as Abdissenbosch to finish its assessment of drivers empowering or hindering resilience, create more awareness of threats and devise a landscape plan to improve the area's resilience. Nevertheless, the research found that the concept and theory of "resilience" have not been applied directly in both cases' assessments, plans, or designs.

The Akerweg case did not receive the same opportunities as Abdissenbosch to strengthen stakeholders' capacity for effective participation through the advisory group or other means. Nevertheless, for both cases, the research did not identify that the stakeholders' skills and abilities were cultivated utilizing cultural or financial factors.

5. Discussion and Conclusion

Our comparative case study of two RES-related land-use conflicts and their management in South Limburg started with the question of how far these cases display elements of the ILA and whether the relative presence of these elements helps to resolve the conflicts. Our exploratory research found that various land-use claims related to different landscape values competed in the two studied RES areas. When they are (believed to be) incommensurable, they result in land-use conflicts. For both cases, multiple stakeholders used environmental and animal protection objectives, besides others, to oppose renewable energy objectives. By performing extensive land-use conflict management, competing land-use objectives can be reconciled to a mutually beneficial outcome, as we have seen in the Abdissenbosch case. On the other hand, the Akerweg case shows that when land-use conflict management gets interrupted in a preliminary stage, it reduces the possibility of reconciliation. In both cases, sustainability criteria affected land-use conflict management and the outcome. In the Abdissenbosch case, ecological conditions set by the province and the ecological requirements of

the advisory group resulted in a nature-inclusive solar park that improved the area's resilience. Contrastingly, in the Akerweg case, environmental concerns of the neighborhood and local parties due to anticipated negative impacts of the solar park and worry of losing scarce green/farm areas resulted in the annulment of the solar park.

In the Abdissenbosch case, an extensive participatory land-use conflict management process ensured reconciled objectives, a shared vision among stakeholders, an improved understanding of the landscape conditions, and enhanced resilience. The land-use conflicts were managed by multiple-scale awareness, inclusive stakeholder engagement, transparent and open communication, and addressing trust and power imbalances. Sustainability was a vital criterion in the process as the initiator had to meet obligatory requirements set by the province to improve natural values, protect endangered species, and preserve the ecological connection. In addition, the advisory group members demanded nature conservation, improvement of the biotopes in the area, and nature education. In addition, the achievement of the RES targets was a criterion for the municipality and the province to support the solar park. This shows how the strong presence of ILA elements supports integrated land-use conflict management with sustainability-related polarization.

In comparison, in the Akerweg case, there was no extensive participatory land-use conflict management process, and the land-use conflicts were therefore not managed. Sustainability criteria did play a role in the start of the process and impacted the outcome as the residents and local parties used nature conservation and animal protection objectives to state their opposition to the solar park. The RES targets and ambition for an energy-neutral region did not possess enough weight to influence the decision-making process, which could be explained by the fact that the energy transition-related responsibilities of the municipalities and the logic and justification of the solar park proposal were contested. This shows that the absence of ILA elements hinders integrated land-use conflict management with sustainability-related polarization.

The ILA, the 3P-diagram of Horn and Meijer (2015), and the analytical framework proposed by Sayer et al. (2013) have proven to be valuable for our analysis. Adjusting the 3P-diagram to a 4P-diagram made visible the role of political actors in land-use conflicts and how their objectives relate to other actors. However, as *politics* is displayed as an outer layer instead of a circle, it is not immediately apparent how the political actors connect with the other circles. This is especially problematic since political resolution is a likely route in RES-related land use conflicts and because the RES lacks binding status. Nevertheless, the 4P-diagram gives a useful, albeit simplified, overview of the identified land-use objectives and to what extent they overlap or compete. Applying Sayer et al.'s ten principles as guidelines and indicators to our comparative research shows that land-use conflict management needs to be sufficiently integrated to succeed. The lack of an integrative approach, on the other hand, may create additional obstacles throughout the resolution process and makes it more difficult. Therefore, the ILA can be a good starting point for future RES-related land-use conflict management.

However, our research also identified two major challenges for RES-related land-use conflict management. The first one concerns the limits of inclusive participation in land-use conflict. Confirming the literature (e.g., Arts et al., 2017; Mann & Jeanneaux, 2009), achieving inclusive participation with people from all backgrounds and ages is difficult, and especially young people are often underrepresented. Therefore, it could be an opportunity for the RES to more explicitly involve the younger generation, as they might change the dynamic of the negotiation process. Overall, it is clear that rather than focusing on whether participation is needed, the burning question in these conflicts nowadays is (and should be) how participation can be done well.

Another challenge is that the very process of implementing the energy transition through RES areas is still contested. Due to the voluntary character of the RES, both residents and political parties may question the RES targets as compulsory. As two interviews and a city council meeting reflected, the sense of obligation was not shared by everyone, and fingers were also pointed at other municipalities. However, when every municipality argues that another can compensate for their failed efforts, it may easily result in underachievement. This reflects the ambiguous status of the RES as a guiding document in such a complex issue.

Acknowledgments

We are thankful to the management team of the Maastricht Sustainability Institute for supporting this publication and to Paul Weaver for his invaluable editorial support.

Conflict of Interests

The authors declare no conflict of interests.

Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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