

REAL Weg Regional Energy Cooperative Aller-Leine-Weser, Germany

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Is the project a case of...:

- State-initiated co-creation
- Entrepreneur-driven co-creation
- Grassroots-based co-creation*

**For an elaboration of the typology, please consult the GOGREEN theoretical framework p. 25.*

Integrated case analysis

Before proceeding to the scoring of the GFs, please provide a 3–5 page case analysis in which you describe the background, history, and national, regional, and local contexts of the case, the problems, and goals addressed by the local collaboration, the participating actors and their relationships, the unfolding of the co-creation process, the most important governance factors (this may include factors other than those in focus in this project), and the generated outputs and outcomes. The conclusion may specify a few lessons learned from the case study.

1) Background, history, and national, regional, and local contexts of the case

The Aller-Leine Valley (German: Aller-Leine-Tal) is a rural region in the federal state of Lower Saxony, Germany, located between the cities of Bremen, Hamburg, and Hanover. It encompasses eight municipalities characterised by rural village structures. About 72,000 inhabitants live on an area of about 776 km². Characteristic elements are the rivers Aller and Leine, which flow right through the region and give it its name. More than one third of the region is covered by forests, while just about half is agricultural land. The cultural river landscape has recreational and tourism function. With its former oil fields and historic windmills on the one hand, and wind energy, solar plants and a thematic energy route for tourists on the other, it is both a traditional and modern energy location (Regional Development Concept 2022, brief: REK 2022: 7f.).

The region has made its name as a model for endogenous and co-creative regional development, and as ‘100% energy region (Olson 2014), the latter including high self-sufficiency in regionally generated renewable energy: With regard to its electric power, the Aller-Leine Valley had already achieved its target of 100% renewable energy supply in 2012 and thus plays a pioneering role in promoting the German energy transition. In 2022, it covered over 150% of the total amount of electricity consumed in the region each year from renewable energy sources (REK 2022: 34).



Figure 1: Regional cooperation Aller-Leine Valley. REK 2022: 11

The Aller-Leine Valley is characterized by a vibrant community life and strong voluntary commitment. Many local actors have been involved in the regional development to drive forward the energy transition for a long time, and engage in local networks (REK 2022: 7; Interviews no. 1-7). In this context, citizens, farmers, representatives from the business sector, nature conservation, politics and administration have jointly implemented numerous projects.

A key player in this is a regional citizens' energy cooperative founded in 2017 called 'REALWeg' which serves as a platform and arena for co-creation of energy transition in the region focusing on citizen-driven implementation of regional e-car sharing, local citizen wind turbines and (Agri-) PV projects.

2) The aims of the project and the sustainability problems that it seeks to address

The relevance of renewable energies was recognised early on; after all, the topic has a long tradition in the region: A first milestone was reached in 1996 in the context of the then so called Aller-Leine Valley Project, when local actors (citizens, farmers, representatives from business sector, and environmentalists) who shared the same ideas and aimed at promoting renewable energies, formed a regional working group on renewable energies. Despite political resistance, particularly from the county level, the bottom-up activities of this group resulted in the first regional citizen wind turbine, called 'ALWinE (short form of 'Aller-Leine Wind Energy')' (Interviews no. 1-3) which was erected in the municipality of Schwarmstedt.

This citizen-driven success story paved the way for further projects in the region. In the following years, activities in the field of energy and regional networks intensified. As part of EU LEADER¹ funding, the topic of energy became a focal point (REK 2022; Interview No.3). In 2012, the citizen working group on 'renewable energies ran a model study to further explore the potential of renewable energies in the Aller-Leine Valley, which was intended as a political signal and starting point for a '100% Energy region (Samtgemeinde Ahlden, 2012). However, due to the complex legal regulations in Germany on energy

¹ LEADER = Liaison Entre Actions de Développement de l'Économie Rurale. LEADER is a European Union funding instrument that enables citizens in rural areas to help shape local regional processes.

transition, little political impetus was given and the group felt they had reached a culmination point (Interview no. 3). In order to take action into their own hands, the idea of a regional citizens' energy cooperative was born - a group of civil society actors in the municipality of Dörverden got the ball rolling.

The 'REALWeg Regional Energy Cooperative Aller-Leine Valley' was then established in 2017 (see statutes, Energy Cooperative 2017). It was seen as new impulse for the citizen-driven energy transition, and at the same time, the actors could build on and benefited from the many years of regional experience with LEADER and local networking in that field.

The energy cooperative thus aims to drive forward the regional energy transition from bottom up by expanding renewable energies, involving local and regional citizens and jointly implementing concrete projects to achieve this. Citizens can participate financially in a low-threshold way, they invest directly in the implementation of energy projects as cooperative and have a democratic say. In this way, energy transition becomes more tangible at a local level and gives citizens a direct share in the profits, promoting acceptance and empowerment.

3) The participants and their interaction and communication in and between meetings

A characteristic of the Aller-Leine Valley are its informal networks and personal contacts: Many arrangements are made by word of mouth or with a handshake (Interviews no. 1,2). In this context, the cooperative serves as a key agent and platform for regional bottom-up energy transition. The multi-stakeholder structure includes actors from administration (at municipality and county level), politics (mayors, local councils), business (local companies, farms) and civil society (citizens). As of 2024, there are eight core actors who are responsible for leadership and day-to-day business, and around 150 volunteer actors ('members').

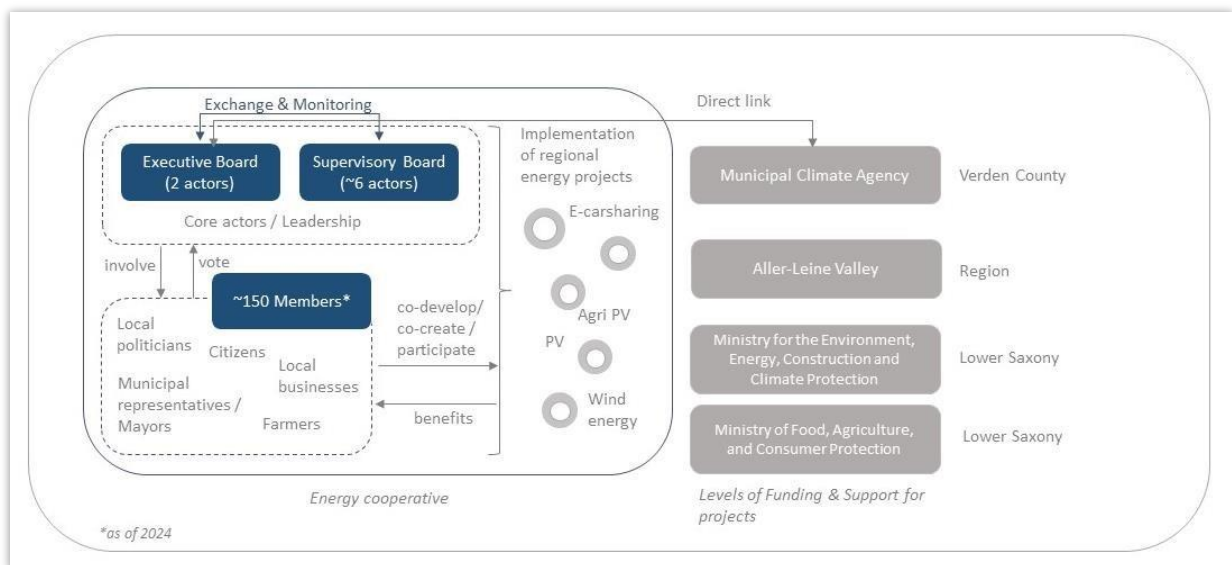


Figure 2: Organisational structure and main actors of REALWeg regional energy cooperation - own illustration

4) How often do they meet, and do they communicate between meetings?

The General Assembly, which is open to all members, takes place at least twice a year and is convened by the Leadership team (Executive Board and Supervisory Board). Besides, Leadership meetings and project specific meetings are held as required, in person or online. In addition to such more formal meetings, the work in the cooperative is characterised primarily by informal meetings/calls and bilateral agreements. In addition, there are local 'thematic working groups – currently on the subject of e-car sharing (Interview no. 5). Due to their rapid growth in membership and number of projects/project volume, REALWeg is in the process of becoming more professional, which goes hand in hand with formalisation. For instance, a project assistant position was created in 2023 to work for the energy cooperative. All other members are engaged on a voluntary basis.

5) The role and forms of knowledge sharing, coordination and joint problem-solving

The REALWeg cooperative combines expert and local knowledge as well as political know-how. By sharing knowledge, the actors promote renewable energies through development and implementation of concrete projects, such as photovoltaics and wind energy. In doing so, they pursue a proactive approach towards stakeholders and potential project/plant operators from local, regional or federal state level.

The activities can be divided into network-related activities (1) and implementation-oriented activities (2):

- a) 1: Establishing the cooperative as an arena and platform for co-creating the regional energy transition; expanding the network on local and regional level and participation of citizens.
- b) 2: Concretization of network activities through implementation of photovoltaic, wind energy and e-car sharing projects (currently around 9 projects) in municipalities within the region.

Leadership serves as an intermediary downwards to the members and citizens, as well as upwards to the county, federal state and ministries, which play an important role especially for permits and funding. Knowledge flows from members to the leadership who contribute their local expertise, and from the leadership to the members (e.g. on project progress, funding, plans etc.) and the general public (regional newspaper, press, public participation).

6) The relation between consensus and conflict and the handling of the latter

Interviewees say that there have been no major disagreements since the cooperative was founded in 2017. It is described as harmonious (Interviews no. 1, 2, 3), also because the focus is not mainly on financial but on the common objective of promoting the energy transition. All decisions are taken democratically at the General Assembly which takes place semi-annually. Each member has one vote. However, the larger the projects become and the more the cooperative invests, the more potential for conflict can be expected (Interview no. 5). Actors are aware that conflicts could arise in the future. One concern expressed during the General Assembly, for example, was that considering the growing number of projects and project volumes, there might be a greater risk that one of these projects could fail. This could undermine the established trust of regional stakeholders (Participant, General Assembly, June 2024). The leadership responds to these concerns with open communication and transparency. The current situation, positive developments as well as challenges and strategic decisions are discussed and agreed at the General Assembly.

7) The role and form of leadership: lead actor, steering group and/or collective leadership

The REALWeg citizens' energy cooperative is characterised by a multi-actor structure consisting of three main elements:

- a) The *Core actors* who are taking on the Leadership are well connected in the region. Many of them are/were also part of the early working group on renewable energies of the Aller-Leine Valley Project, which has been driving forward the local energy transition since the 1990s (Interviews no. 1-3). The *Executive board* consists of two key actors who take on the main lead and administrative project work. They are elected by the members in the General Assembly. At this level, the Climate and Energy agency of County Verden is involved, facilitating communication and information, providing a direct link from local to county/administrative level. In addition, there are six actors of the *Supervisory Board* which advises and represents the cooperative publicly. Both bodies are elected by the members in the General Assembly.
- b) The *Members* can participate at a low threshold and invest in the implementation of local and regional energy projects as part of the cooperative. Decision-making is regulated in the statutes and takes place democratically (by majority). However, they can also play an active role in co-development and co-creation of projects.

8) The temporal unfolding of the co-creation process: major shifts and ups and downs

- a) *Initial phase*: Pre-phase since the mid 1990s with the 'Renewable Energies Working Group' as part of the Aller-Leine Valley Project as a central element; the cooperation comprised the three municipalities of Ahlden, Rethem and Schwarmstedt; citizen wind turbine 'ALWinE' becomes a model project and paves the way for the region's energy focus and other activities;
- b) *Intermediate phase since early 2000s*: Establishment of the Aller-Leine-Valley Project as a regional cooperation and enlargement to eight municipalities; professionalization of development activities in the region; marketing as an energy region. These previous experiences have opened the doors to politics and funding.
- c) *Founding phase of REALWeg 2017*: Combination of citizen-driven activities for energy transition and formation of the first group around the REALWeg Regional Energy Cooperative in 2017, including several core actors and around 40 other members (with a local focus on the municipality of Dörverden). For funding reasons, the initial focus was on rural e-car sharing, which got off to a very successful start and was established in various municipalities.
- d) *Current growth and implementation phase*: Up to now 150 members from throughout the region; focus on regional, green energy production. Promotion and implementation of photovoltaics and wind energy. Successive increase in acceptance of the cooperative's ideas and measures; Cooperative has established a standing with municipalities, counties, and ministries (Interview no. 2) and has a higher investment volume.

9) The most important governance factors

- a) *The double role of Leadership (GF16)*: As described above, leadership is characterised by two central boards and a key person with dual function in the cooperative and at county level. This facilitates access, communication and a flow of information between local and county level as well as to other stakeholders/funding sources at regional and ministerial level. On the other hand,

however, there are also risks due to the centralization of functions in one person. The result is a mixture of grass-roots bottom-up and state-led top-down leadership.

- b) *Strong, informal networks in rural areas and the persistent willingness of stakeholders to act from a central basis for trust (GF13)*: Decisions are made with a handshake, people know and trust each other. The lines of communication are short, even between different levels (local - regional - state), the communication channels are informal and the actors work together in several contexts, creating commitment and a sense of responsibility. This process was even intensified when the region was enlarged from three to eight municipalities, crossing the borders of three counties.
- c) *Enabling local collaboration (GF10)*: The cooperative has emerged from a co-creation process in the region that has grown over many years and is supported by EU LEADER funding. As a result, energy transition has become a guiding principle and core theme for local and regional cooperation. As, the experience with bottom-up activities and participatory projects has grown over the years, as has the self-confidence of citizens.
- d) *Years of commitment to the regional vision built a strong narrative for the 100% energy region and have opened doors to politics (GF7)*: Decades of experience with LEADER funding have resulted in a vibrant bottom-up culture. Shared positive stories about the construction of a citizen wind turbine at the end of the 1990s or the successful implementation of a regional e-car sharing system have been driving further the citizen-driven project development.
- e) *Provision of access to blended financing (GF9)*: The multi-level constellation of involved actors, informal networks, as well as leadership with access to the administrative municipal level, provide access to blended financing for concrete project implementation. The cooperative invests with its joint capital (shares of the members) and, depending on the project topic and size, involves other funding sources, such as LEADER, the ministries and municipal resources.

10) The generated outputs and outcomes

- a) The REALWeg energy cooperative creates a platform for citizens in the region to get involved in the energy transition at a low threshold. Citizens can invest in projects, help develop them, contribute ideas and participate in decision-making.
- b) Implementation takes place directly in the region, which means that the stakeholders in the region benefit directly from it. Thus, the abstract climate targets become visible directly on the spot, e.g. via citizen wind turbines, PV systems, e-car sharing or a solar ferry. This helps strengthening civic influence and their contribution to local sustainability.

Scoring and analysis of governance factors

1. Perceived importance of biosphere conditions

QCA score:

- 0
- 0.33
- 0.66
- 1

Scoring confidence:

- Low confidence
- Medium confidence
- High confidence

Data sources:

- Interviews
- Documents
- Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

Climate, environmental and/or sustainability issues were a crucial starting point for developing the Energy Cooperative. The cooperative was established to address these problems, to raise awareness for energy transition and implement concrete projects (with a focus on ensuring services of general interest and e-mobility, open-space photovoltaics and wind energy). After all, rural areas serve as crucial implementation sites for energy transition. Thus, the perceived importance of biospheric conditions is seen by the interviewees as a self-evident and consistent factor which serves as strong motivation (Interviews no. 1-5).

The vision of the 100% Energy region has been anchored since the early 2000s and the goal of 100% renewable energy supply was already achieved in 2012. Since the REALWeg was founded in 2017, a regional e-car sharing system has been implemented in several municipalities, several photovoltaic projects have been developed, a model project on agri-PV has been launched and new citizen wind turbines have been erected.

2. Legislation, programs, and formal goals

QCA score:

- 0
 0.33
 0.66
 1

Scoring confidence:

- Low confidence
 Medium confidence
 High confidence

Data sources:

- Interviews
 Documents
 Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

REALWeg contributes to the regional energy transition through its networking and project implementation. It creates a concrete participation and investment opportunity for citizens in the region to get involved in climate protection, to invest in local energy projects and benefit economically from them. This contributes to creating acceptance, raising awareness and mobilising stakeholders in the region, which is reflected in the growing interest in the cooperative and its increasing number of members and projects.

The formal goals are set out in the cooperative's statutes. Hence, the actors are united by their joint goal to support:

- a) the production and regional distribution of electricity and other energy sources from renewable energies;
- b) consulting, organisation and implementation of energy projects, mobility and infrastructure services;
- c) the promotion of and participation in municipal bodies that organise regional cycles or serve the concept of sustainability.

Depending on the respective project and its focus, the activities refer to various legal bases at federal and state level (e.g. German Wind Energy Act, and Photovoltaic strategy of the German Federal Government)

for implementation. The interviewees see national strategies as important reference to which they can refer in the project. These strategic documents are helpful in the exchange with different actors, such as citizens and farmers, in order to demonstrate the projects' relevance. However, the studies on energy and photovoltaics at state level are particularly relevant. For example, a study on the ingration of solar energy in Lower Saxony was commissioned in 2020 (Badelt et al. 2020). As bifacial modules were mentioned here as especially promising, the REALWeg took them up as part of its model project on the topic of Agri-PV and was successful in raising funds.

3. Relative openness of public governance paradigms

QCA score:

- 0
- 0.33
- 0.66
- 1

Scoring confidence:

- Low confidence
- Medium confidence
- High confidence

Data sources:

- Interviews
- Documents
- Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

The bureaucratic apparatus creates opportunities to participate in cooperative problem-solving processes at the local government level. There is a general openness and interest in energy topics. Many mayors and politicians are part of the Energy Cooperative, i.e. direct members, even some municipalities have joined. The cooperative has grown considerably in recent years and has gained acceptance and influence among actors from the region and state. As a result, they are now also proactively approaching the cooperative to implement certain projects. This provides a good basis for co-creation. From an administrative point of view, a lot of social capital has been built up over the years. But administrative hurdle, such as limited personnel resources of the municipalities or restrictive framework conditions at state level hinder a swift project implementation (Interviews no. 3,5).

4. Formalized institutional channels for citizen participation and community mobilization

QCA score:

- 0
- 0.33
- 0.66
- 1

Scoring confidence:

- Low confidence
- Medium confidence
- High confidence

Data sources:

- Interviews
- Documents
- Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

There are close economic ties and the municipalities have been working together in regional cooperation since the 1990s and 2000s (REK 2022: 12). During the last 20 years, the EU LEADER programme with its process and project funding has enabled an active bottom-up collaboration of public, private and civil society actors to grow. Since then, the local and regional networks have been strengthened and several measures for climate protection and energy transition have been jointly developed and documented in

regional concepts. The region uses this successful development strategically for advertising and tourism marketing (e.g. through a themed energy route for cyclists).

Communication in the rural Aller-Leine Valley region is rather informal. Decisions are often made by handshake or mouth of word. The lines of communication are short. However, due to the regional focus and the dispersion of actors and projects, communication is also a challenge (Interview no. 1,6). The cooperative itself can be seen as an institutionalized form of citizen participation. Any citizen can become a member. The boards and meeting structures are formalized as basis for democratic decision-making (Interview no. 1,3). The decision-making process is regulated in the statutes and takes place democratically (by majority at the General Assembly). The engagement of new citizens is closely linked to the energy projects and their respective locations within the region. Depending on where the next energy project is planned, REALWeg organises information and participation events there, which increases its level of awareness, acquires local citizens and contributes to the further growth of the cooperative. A recent example of this is a PV plant in the municipality of Ahlden (borough Hodenhagen), where the mayor and the municipality have joined the REALWeg cooperative. Public information takes place via newsletters (usually quarterly), press releases and campaigns/events on specific projects.

5. Mechanism for ensuring top-down government and bottom-up social accountability

QCA score:

- 0
- 0.33
- 0.66
- 1

Scoring confidence:

- Low confidence
- Medium confidence
- High confidence

Data sources:

- Interviews
- Documents
- Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

Cooperation between regional actors is the basis for joint project work and problem solving in REALWeg. The activities are usually carried out by the leadership and members themselves (active project acquisition, search for suitable partners from administration, business or politics for project implementation). The actors have various contacts with relevant institutions at regional and state level (Municipal Climate and Energy Agencies, the Climate and Energy Agency of the Federal State of Lower Saxony (KEAN) and ministries).

Among the members, expectation is that the leadership reports on progress, planning status, costs and revenues of all current and planned energy projects (usually at the General Assembly). At the General Assembly, progress is discussed, questions are asked, the path for further development of the cooperative is set and joint decisions are made. Thus, downward accountability is exercised by the boards. Accountability to authorities and funding organisations is carried out in particular by the main operator who is also working at county level (municipal energy agency), facilitating access to funding resources, networks and promoting projects.

Bottom-up social accountability is ensured on the one hand by the members investing in the projects, and on the other by the projects becoming directly visible in the region and the locals benefiting from it. They can take responsibility for the energy transition and see a direct, also economical, impact. In this way, the rather abstract topics of climate protection and energy transition become locally tangible. As the cooperative has grown considerably in recent years and has gained acceptance and influence in the region, actors from the region and state are also proactively approaching the Leadership to implement specific projects. For example, local farmers offer their land otherwise unsuitable for agricultural use, to implement PV or wind turbines.

6. Strategic agenda-setting by means of translation

QCA score:

- 0
 0.33
 0.66
 1

Scoring confidence:

- Low confidence
 Medium confidence
 High confidence

Data sources:

- Interviews
 Documents
 Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

The topics of climate change mitigation and energy transition are fundamental and always present in the actors' work. The SDGs are not consciously included in the planning and implementation process, but the informants see them as an essential basis and overall framework (Interviews no. 1,2,3). As one of the interviewees put it: 'That's why we're doing this!' (Interview no. 1, translated from German).

Even though the green SDGs are not explicitly named in documents nor by the interviewees, the cooperatives' goals and activities contribute to SDG 7 (affordable, reliable, sustainable and modern energy for all), 11 (inclusive, safe, resilient and sustainable cities) and 13 (climate action) by implementing concrete energy projects in the region and directly benefiting the citizens (energy supply, profits, bottom-up culture in regional development). However, the basic statutes of the cooperative anchor common good and sustainability as core objectives and the actors are united by their joint goal to support:

- a) the production and regional distribution of electricity and other energy sources from renewable energies;
- b) consulting, organisation and implementation of energy projects, mobility and infrastructure services;
- c) the promotion of and participation in municipal bodies that organise regional cycles or serve the concept of sustainability.

7. Construction of narratives about successful multi-actor collaboration

QCA score:

- 0
 0.33
 0.66
 1

Scoring confidence:

- Low confidence
 Medium confidence
 High confidence

Data sources:

- Interviews
 Documents
 Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

In the interviews, many interviewees mentioned milestones that had positive influence on the development of the Aller-Leine Valley and the cooperative. As there are overlaps in their stories, these can be seen as positive narratives for co-creation:

1. Public funding

Over the last 20 years, public funding (EU LEADER programme, Federal State funding etc.) has enabled an active collaboration of public, private and civil society actors in the region to grow. In particular, the process funding of the LEADER programme initiated bottom up collaboration and active participation as new governance modes in the region, starting in a core cooperation of three municipalities which was later enlarged to nowadays 8 municipalities. The networks have become stronger, and several projects and climate mitigation measures have been jointly developed. LEADER has also strongly contributed to raising awareness of energy issues in the region and further developed the self-image as an energy region (REK 2022).

2. Energy project group & ALWine citizen turbine

A first milestone for citizen-driven energy transition was reached in 1996: Local actors (citizens, farmers, representatives from business sector, and environmentalists) formed a regional working group on renewable energies and – despite political hurdles – were successful in implementing the first regional citizen wind turbine, called 'ALWinE (short form of 'Aller-Leine Wind Energy). This achievement is still considered a pioneer for subsequent energy transition activities and civic commitment (Interviews no. 1,3).

3. 'allerauto - Regional e-car sharing

After the cooperative was founded in 2017, the members initially focused on sustainable mobility. A rural e-car sharing system (a collaboration between Energy Cooperative, the City of Verden, Municipal services, transportation companies, a private service provider and the Municipal Climate and Energy Agency) got off to a very successful start and was established in various municipalities. This raised visibility and laid the foundation for further activities by the cooperative.

With these starting conditions, the Energy Cooperative has emerged from a co-creation process in the region that has grown over many years, as has the actors' self-confidence and ability of self-organisation.

8. Building or harnessing institutional platforms and arenas

QCA score:

0

0.33

0.66

1

Scoring confidence:

Low confidence

Medium confidence

High confidence

Data sources:

Interviews

Documents

Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

In Germany, the energy transition still faces a number of challenges. It is being driven forward at national level in particular, but needs the involvement of local and regional actors in order to create impact. The REALWeg cooperative provides a concrete platform here: Citizens can participate financially in a low-threshold way, they invest directly in the implementation of local and regional energy projects as cooperative and have a democratic say. In this way, energy transition becomes more tangible at a local level and gives citizens a direct share in the profits, promoting acceptance and empowerment. Thus, the cooperative itself can be seen as an institutional arena, a regional platform and network, bringing together local and regional actors. Moreover, REALWeg is a member of the German platform for citizen energy projects (BBEn network).

In addition, there are physical and digital meetings. The General Assembly always takes place physically in one of the municipalities. The aim is, that it should be as low-threshold as possible, and reach as many members as possible. There is no physical office space but the municipality of Dörverden has proven to be the main venue for this (Interview no. 1).

9. Provision of access to blended financing

QCA score:

- 0
 0.33
 0.66
 1

Scoring confidence:

- Low confidence
 Medium confidence
 High confidence

Data sources:

- Interviews
 Documents
 Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

The cooperative and its projects are financed from various sources, above all there are Membership shares. Members must acquire a total of at least three shares in projects, so they invest directly in local energy projects and benefit from their profits (such as solar energy, wind turbines etc.).

Based on this, REALWeg uses its own capital to invest in selected local projects (wind energy, PV, e-car sharing) and, depending on requirements and project volume, involves other funding sources, e.g.:

- a) Ministries (particularly Environment, Energy and Climate Protection; state funds)
- b) LEADER funding (EU Regional development programme)
- c) Climate and Energy Agency Lower Saxony (KEAN) (federal state source)
- d) Municipal Climate and Energy Agency Verden (municipal resources).

Different funders result in a large network; commitment is higher as several stakeholders are involved and the project processes are complex. This goes hand in hand with a high communication effort, as the leadership has to be accountable to everyone and explains the funding structures, expenses and income (General Assembly). On the other hand, there is a better basis for argumentation with individual funders and stakeholders thanks to broad-based funding.

10. The capacity to leverage support from authorities to enable local collaboration

QCA score:

- 0
- 0.33
- 0.66
- 1

Scoring confidence:

- Low confidence
- Medium confidence
- High confidence

Data sources:

- Interviews
- Documents
- Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

Over the last 20 years, regional energy transition has become a guiding principle and core theme for local and regional cooperation. LEADER funding has supported the development of a vibrant bottom-up culture. There is a fundamental understanding that all citizens can contribute to the process of sustainable development in the region.

Moreover, the multi-actor structure of the REALWeg members plays a key role here, as many of the members themselves come from local politics and municipalities. Personal contacts and informal communication/trust is very important. The cooperative has grown considerably in recent years and has gained acceptance and influence in the region.

Yet the members have very different professional backgrounds, such as farmers, engineers, financial advisors, local politicians, municipalities. One interviewee, for example, previously worked for many years at management level in the Ministry of Agriculture in Lower Saxony. Through his networks, this person has built long-standing contacts to the Ministry, which are of advantage when implementing projects and submitting joint applications.

11. Inclusion and empowerment of relevant and affected actors

QCA score:

- 0
- 0.33
- 0.66
- 1

Scoring confidence:

- Low confidence
- Medium confidence
- High confidence

Data sources:

- Interviews
- Documents
- Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

The Aller-Leine Valley is traditionally characterized by many project groups, civic associations, organic farms and the willingness to get involved and to be active (Interview no. 2). These were good starting conditions for establishing the Regional Energy Cooperative. The cooperative also benefits from the organizational experience gained from the long standing cooperation in the Aller-Leine Valley Region and its Renewable Energy Working Group, which can be seen as a pioneers for many developments in the region. Citizens have experienced that they can make a difference in the region as a community.

Most interviewees agreed, that relevant and affected actors are involved in the cooperative and its project. However, some of the interviewees see a need for getting more farmers on board. Local political actors are already well represented (Interviews no. 1,2).

12. Clarification of interdependence vis-à-vis common problem and joint vision

QCA score:

- 0
 0.33
 0.66
 1

Scoring confidence:

- Low confidence
 Medium confidence
 High confidence

Data sources:

- Interviews
 Documents
 Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

The actors are aware of their roles in the process; the mutual dependency is perceived as 'binding in a positive sense' (Interview no. 1) and is not exploited. Although close personal contacts due to the rural characteristics sometimes make it difficult to switch between formal and informal roles and the question arises which function stands behind a specific statement or decision ('which hat are you wearing while making this statement', Interview no. 2). The challenge then lies in reflecting on these roles and making what has been said informally, formally binding.

On the other hand, there is a high level of commitment due to personal ties; people have known each other for a longer time and usually even work together in different projects, contexts, associations, etc. But looking ahead, the more funding the cooperative receives, the more formal their interactions will become (drawing up letters of intent etc.) which will have impact on its informal characteristic (Interview no. 1).

13. Trust-building and conflict mediation

QCA score:

- 0
 0.33
 0.66
 1

Scoring confidence:

- Low confidence
 Medium confidence
 High confidence

Data sources:

- Interviews
 Documents
 Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

Due to the many years of LEADER experience and often personal relationships, the actors know each other well. There is therefore a kind of 'fundamental' trust. The actors work together professionally – and often also privately – on several projects. They are linked by their connection to the region and the common goal of energy transition. Informants say that there have been no major disagreements since the cooperative was founded; the cooperation is described as very harmonious (Interviews no. 1, 2, 3), also because the focus is not mainly on finances but on the common objective.

However, the interviewees are well aware of possible sources of conflict. The bigger the projects become and the more the cooperative invests, the more potential for conflict can be expected (Interview no. 5). The leadership describes their strategy with the keyword ‘transparency’ (Interview no. 5). The stakeholders invest in the cooperative, implement projects together, and these can also fail or proceed differently than planned (Interview no. 5).

An example is the Agri-PV project, which was launched in 2022. Through the PV topic, the REALWeg Cooperative has good access to the ministries as there is great interest in funding and they ‘kick down open doors’ (Interview no. 1). The idea was welcomed by the political players in the region and in the ministries. However, following an exemplary application phase, there was a longer standstill. The actors were confronted with administrative hurdles that were not foreseeable at the beginning (grid expansion, land use plan changes, connection planning), resulting in delays due to personnel bottlenecks in the municipalities. This was perceived as frustrating by those involved and tempered their initial motivation (Interview no. 3). However, with the building permit now granted, the stakeholders are on their way of implementation in 2024 (REALWeg: General Assembly, June 2024).

Moreover, as the number of projects increases, the prioritization of projects is perceived differently. The projects have a different significance for the members. As a result, some actors fear that projects with greater political relevance and higher funding are pursued with greater vigour than those that for example have model character and impact, but may bring less funding. Also, leaders engage in the cooperative but also in local politics or project management, which could lead to conflicts of interest.

14. Use of experimental tools for innovation

QCA score:

- 0
- 0.33
- 0.66
- 1

Scoring confidence:

- Low confidence
- Medium confidence
- High confidence

Data sources:

- Interviews
- Documents
- Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

The Regional Cooperative aims to promote renewable energies through implementing concrete projects. Model projects play a major role in this regard and have already had a signalling effect for the region in the past (such as the wind-turbine ‘ALWINE’). In the 1990s, it was an important innovation for the region to strategically implement citizen participation and bottom-up tools. Since then, these bottom-up tools have been continuously developed and helped to co-create regional projects. Examples include the construction of community solar systems, e-carsharing or Agri-PV (REK 2022: 33).

A key topic in this regard is agriculture. Agriculture is facing a variety of challenges. The interviewees see particular potential in experimental tools for promoting organic agriculture (such as battery-powered agricultural equipment, self-propelled hoeing robots, flexibility in cultivation technology). An example is the Agri-PV model project. The project aims to further expand the region’s pioneering role is the current

construction of a free-standing agri-photovoltaic plant in the municipality of Dörverden that will test new solutions for agricultural use and photovoltaics, using bi-faciale modules (as first project in Lower Saxony) and experimenting with the cultivation of different crops in between. Instead of competing for land, Agri-PV aims to strategically combine climate goals and agricultural land use. The land is to be cultivated organically and various organic farmers from the municipality have agreed to cooperate, thus a diverse cultivation can be tested during the pilot phase. Since it is the first project also in Germany to implement organic farming between the rows of photovoltaic modules, it is expected to set an example and to develop impact for future projects of Agri-PV. The project will provide important knowledge on innovative agricultural land use methods for local communities and farmers, as well as accompanying scientists, who advise on organic farming and technology.



Figure 3: Agri-PV Model project, kick-off, April 2022. Copyright: Sylvia Bothmer

15. Ongoing critical self-reflection and learning (i.e., process and/or developmental evaluation):

QCA score:

- 0
- 0.33
- 0.66
- 1

Scoring confidence:

- Low confidence
- Medium confidence
- High confidence

Data sources:

- Interviews
- Documents
- Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

Successful participation in the EU LEADER and other regional development programmes (over 20 years) can be seen as a continuous learning process. The actors in the region have been working together as part of the programme since 2001 and have been able to implement various projects in the different funding periods. In the process, the topic of renewable energies has become increasingly important. Since 2016, climate-friendly mobility, in particular e-mobility, has become another key topic in the region (REK 2022: 8).

Besides the regional development programmes, no specific evaluation structures have been established so far. However, the democratic voting processes at the General Assembly provides regular feedback on current developments. The cooperative continues to develop in terms of content and organisation. For example at the General Assembly in June 2024, the decision was made to also include the operation of solar plants and wind farms as a new line of activities.

Moreover, in 2023, the leadership organized a 'Future day, to jointly discuss the future direction and further development of the cooperative. Here, some strategic decisions were made, such as hiring staff to support leadership, to set up working groups and to pursue new projects in the Aller-Leine Valley, with an agreement to focus on three thematic streams: photovoltaics, wind energy, and consulting. The following working groups have been established in this context (Interview no. 5):

- a) Developing a catalogue of criteria and defining requirements for the areas to locally implement energy projects
- b) Expansion of consulting services of the REALWeg Cooperative for local energy transition
- c) Search for available roof surfaces for future photovoltaic development

16. Exercise of facilitative leadership:

QCA score:

- 0
- 0.33
- 0.66
- 1

Scoring confidence:

- Low confidence
- Medium confidence
- High confidence

Data sources:

- Interviews
- Documents
- Observations

Please elaborate on the reasoning behind your scoring for this governance factor:

Leadership is shared and exercised by the elected actors of the Executive Board and Supervisory Board. The Executive board consists of two people who take on the main leading role and day-to-day business. As all of them are engaged on a voluntary basis, the actors are faced with the challenge of balancing their private interests with their professional ones. In addition, there are personal contacts and informal networks, so that you sometimes have to ask yourself: With which function or in which role are statements being made? (Interview no. 2)

A special feature is that one of the leaders is also active in one of the county's climate and energy agency and therefore has a dual role. At the same time, this actor has a particularly key function, as he facilitates access to the regional administrative level and the ministries. Thus, leadership is closely linked to this agency that was founded by the county and the affiliated municipalities (Interview no. 1,5). The members of the Supervisory Board also have important key roles for the Cooperative. They advise and represent the Cooperative in and out of court and are elected by the members during the General Meeting. One interviewee, for example, previously worked for many years at management level in the Ministry of Agriculture. Through the networks, he has built long-standing connections to the Ministry, which are an advantage when implementing projects and joint applications.

Outcome variable: Successfully co-created green transitions

The outcome variable ‘co-created green transitions’ will be scored in two parts. First, ‘co-creation’ will be scored based on an assessment of whether the participants in the initiative, project or process engaged in collaborative problem-solving that fostered creative ideas and innovative solutions (data will consist of survey data combined with interviews and documents). Next, ‘green transitions’ will be scored based on an assessment of whether the initiative, project or process has fulfilled or is expected to fulfill its green goals, ambitions and aspirations (data will consist of survey data combined with interviews and internal and/or external evaluation reports, including scientific publications).

The scoring of this variable is done in two parts:

- 1. Is the developed solution based on collaborative problem-solving spurring creativity and innovative solutions?*
- 2. Does the developed solution engender a green transition?*

This scoring should be conducted based on both the survey and complementary green outcome evaluations. Please consult Sections 4.4 and 6.10 in the Research Protocol for more details.

1. Is the developed solution co-created?

QCA score:

- 0
- 0.33
- 0.66
- 1

Scoring confidence:

- Low confidence
- Medium confidence
- High confidence

Data sources:

- Survey
- Interviews
- Documents
- Observations

Please elaborate on the reasoning behind your scoring for this part of the governance factor, including the data sources used for the scoring.

The overall assessment of the answers to the survey presented in the table below show that the respondents are mostly on the positive side. It is striking that the group who agrees, is the largest group for almost all questions. On a closer look, the respondents are either neutral or agree that different experiences and forms of knowledge have been mobilized during the problem solving and collaboration process to develop new perspectives, to search for unconventional and new solutions (1-3).

With regard to the novelty and innovation of the co-created solution, the answers are somewhat more hesitant (4-5). The distribution of answers shows a broad range (from disagreement/slight disagreement to strong agreement) and reveals some level of uncertainty among the respondents.

The answers to questions 6-10 indicate a fundamental agreement, belief in the project and support. Questions 11, 13 & 15 reveal that a majority of actors believe in the co-creative and innovative impact of the cooperative. All of the respondents (100%) either agree or slightly agree that the cooperative is meeting its goals and has led to an innovative solution.

Regarding questions 12 & 14, a majority of the respondents are either neutral or agree/slightly agree that the co-created solutions stimulated creative problem-solving and will be durable and robust in the long-run.

If possible, please insert your survey responses in the table below (in % for each response), including the mean/average % for each survey item.

N=19	Strong. dis.	Dis.	Slight. dis.	Neither agr/dis	Slight. agree	Agree	Strong. agree	Mean
	-3	-2	-1	0	1	2	3	∅
1. Problem-solving mobilized different experiences, and/or ideas and/or forms of knowledge to develop new perspectives	0%	0%	0%	0%	11%	68%	21%	2,11
2. Through the collaborative problem-solving process, different experiences and/or ideas and/or forms of knowledge have been mobilized to search for unconventional solutions	0%	0%	0%	5%	11%	53%	32%	2,11
3. The collaborative problem-solving process mobilized different experiences, and/or ideas and/or forms of knowledge to search for solutions that go beyond standard/text-book solutions	0%	0%	0%	5%	5%	53%	37%	2,21
4. The co-created solution breaks with established practices	0%	5%	11%	16%	16%	53%	0%	1,00
5. The co-created solution disrupts conventional wisdom	0%	16%	16%	37%	5%	21%	5%	0,16
6. The co-created solution offers new ideas to address the green transition problem	0%	0%	0%	0%	17%	44%	39%	2,22
7. I'm supportive of the co-created solution	0%	0%	0%	0%	6%	33%	61%	2,56
8. I'm content with the overall collaborative process of the project	0%	0%	0%	0%	5%	47%	47%	2,42
9. I feel the multi-actor collaboration process was a prerequisite for the success of the project	0%	0%	0%	0%	5%	53%	42%	2,37
10. I'm satisfied by the results of the co-creation effort in terms of expected impact on the welfare of the community	0%	0%	0%	0%	11%	44%	44%	2,33

11. The collaborative interaction in the project has led to an innovative solution	0%	0%	0%	0%	21%	63%	16%	1,95
12. The actors involved in the project are engaged in collaborative interaction that stimulated creative problem-solving	0%	0%	0%	11%	11%	63%	16%	1,84
13. The co-created solution meets the proposed goals of the project	0%	0%	0%	0%	17%	39%	44%	1,58
14. The co-created solution will be durable and robust in the long run	0%	0%	0%	5%	5%	53%	37%	2,21
15. The co-created solution is expected to significantly improve sustainability for the whole community	0%	0%	0%	0%	11%	26%	63%	2,53

2. Does the developed solution engender a green transition²?

QCA score:

- 0
 0.33
 0.66
 1

Scoring confidence:

- Low confidence
 Medium confidence
 High confidence

Data sources:

- Survey
 Interviews
 Documents
 Observations

Please elaborate on the reasoning behind your scoring for this part of the governance factor, including the data sources used for the scoring:

The answers below show that 82% of the respondents think the project has produced any green transition solution. Following on from this, the majority responds that the project is expected to produce green transition solutions aiming to avoid a worsening in the status quo (71%). The answer to the question of whether the project aims to maintain the status quo is more ambiguous (41% yes and 41% no). However, 88% believe that the project goes one step further and aims to improve the status quo.

² By "green transitions", we mean objectives and aspirations that correspond to at least one of the Green SDGs (SDG 6, 7, 11, 12, 13, 14, 15). The project does not have to refer explicitly to the green SDGs, but the project's green objectives

If possible, please insert your survey responses in the table below (in % for each response).

1. The project:	Yes	No	Not specified
...did not produce any green transition solution	0%	82%	18%
...is expected to produce/has produced a green transition solution aiming to avoid a worsening in the status quo	71%	24%	6%
...is expected to produce/has produced a green transition solution aiming to maintain the status quo	41%	41%	18%
...is expected to produce/has produced a green transition solution aiming to improve the status quo	88%	6%	6%

Please list all the informants you have interviewed for the case study (list project role + interview date):

We held 7 interviews in connection with the study. Most of the interviews were conducted online due to the travel distance. All interviews were conducted in German. The guideline was therefore translated into German beforehand. The actors were interviewed mostly in 2023. As the original case came to a longer standstill during the research, the researchers decided to shift the focus.

List of informants:

- a) Representative of the Regional Energy Cooperative, Municipal Climate and Energy Agency, May 2023
- b) Representative of the Regional Energy Cooperative, Farmer, August 2023
- c) Representative of the Regional Energy Cooperative, Agricultural Engineer, August 2023
- d) Representative of the Regional Energy Cooperative, Financial advisor, September 2023
- e) Representative of the Regional Energy Cooperative, Municipal Climate and Energy Agency, Follow up Interview, March 2024
- f) Representative of the Regional Energy Cooperative, Local politics, September 2024
- g) Representative of the Regional Energy Cooperative, Software Developer, September 2024

The informants are displayed anonymously, but a full list of names is available.

Please list all the observations you have made (type of meeting/workshop/etc. + observation date):

General Assembly 25.9.2023 / Face-to-face meeting (semi-annually), Municipality of Dörverden

- a) The meeting was held by the leadership team (executive board and supervisory board)
- b) Presentation of all current and planned projects, resp. status, measures, actors and sources of funding
- c) Overview of projects, numerous new PV projects
- d) Feedback on current developments, Q&A

- e) Decision-making process, voting by show of hands, agreement on the further procedure and next steps
- f) Professionalization of the leadership structure, recruitment of staff for project development
- g) Vibrant discussion

General Assembly 18.6.2024 / Face-to-face meeting (semi-annually), Borough of Hodenhagen

- a) The meeting was held by the leadership team (executive board and supervisory board)
- b) 40 members present
- c) Presentation of all current and planned projects, resp. status, measures, actors and sources of funding
- d) Feedback on current developments, Q&A
- e) Continued growth in members and projects/project volumes; Overview of projects: 7 PV projects, 1 wind energy, 1 e-car sharing
- f) Decision-making process, voting by show of hands, agreement on the further procedure and next steps

Please list all the documents you have analyzed (document name + source + year):

Badelt, Ole; Niepelt, Raphael; Wiehe, Julia; Matthies, Sarah; Gewohn, Timo; Stratmann, Manuel; Brendel, Rolf; von Haaren, Christina (2020): Integration von Solarenergie in die niedersächsische Energielandschaft (INSIDE). Niedersächsisches Ministerium für Umwelt, Energie, Bauen und Klimaschutz (2020), Hannover, November 2020

German Federal Ministry for Economic Affairs and Climate Action (2023): Photovoltaik-Strategie Handlungsfelder und Maßnahmen für einen beschleunigten Ausbau der Photovoltaik.

Lokale Aktionsgruppe Kooperationsraum Aller-Leine-Tal (2022): Regionales Entwicklungskonzept Kooperationsraum Aller-Leine-Tal (REK). Als Grundlage zur Anerkennung als LEADER-Region für den Förderzeitraum 2021-2027. <https://www.allerleinetal.de/index.php/regionales-entwicklungskonzept/> [access: 06/03/2024]

Lokale Aktionsgruppe Kooperationsraum Aller-Leine-Tal (2015): Regionales Entwicklungskonzept Kooperationsraum Aller-Leine-Tal (REK) zur Teilnahme am niedersächsischen Auswahlverfahren für die LEADER- und ILE-Regionen für den Förderzeitraum 2014-2020.

Olsen, Erik (2014): Germany's Grass-Roots Energy Revolution, New York Times, 13.09.2024.

Regional- und Energiegenossenschaft Aller-Leine-Weser eG (n.d.): Satzung (Statutes of the Cooperative) <https://www.realweg.de/ueber-uns/downloads> [access: 06/03/2024]

Regional- und Energiegenossenschaft Aller-Leine-Weser eG (n.d.): e-car sharing project <https://www.realweg.de/projekte/e-car-sharing> [access: 06/03/2024]

Samtgemeinde Ahlden (2012): Auf dem Weg zur 100% EnergieRegion+. Modellhafte Studie zum Energieverbrauch und zur mindestens 100%-igen Versorgung einer ländlichen Region in Niedersachsen aus erneuerbaren Energieträgern.

Zweckverband Aller-Leine-Tal (n.d.): <https://urlaub-aller-leine-tal.de/energieroute> [access: 06/03/2024]

Please note the response rate for the survey/measurement of outcome variable:

The survey was administered to 40 participants that attended the General Assembly in June 2024. It was administered in person as a paper questionnaire. We got 19 replies, thus producing a response rate of 48%.