

Integrative Community Energy

A qualitative exploratory study on the integration of societal and spatial objectives by Dutch community energy initiatives and the effect of organizational structure and the supportiveness of the governance context on this integration

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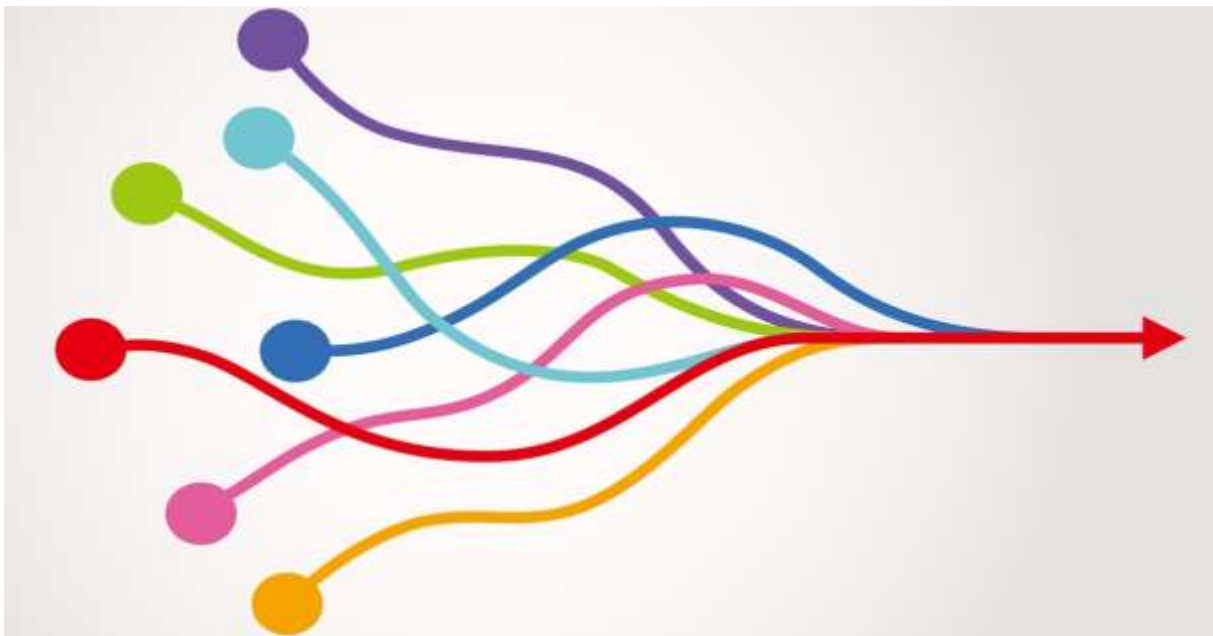
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Abstract

This research explored the effect of organizational structure and the supportiveness of the governance context on the degree of integration of societal and spatial objectives by community energy initiatives. The research distinguishes between physical and social organizational structure. The main research question guiding this research is "How does the organizational structure of community energy influence the integration of societal and spatial objectives by community energy and how is this integration affected by the supportiveness of the local governance context?". To answer this question, a qualitative exploratory research design was selected. Six cases of Dutch community energy initiatives were examined. The results of the analysis show that physical organizational structure positively influences the degree of integration by community energy up until a certain limit in size. In addition, having broad objectives and re-investing profits broadly positively influences the degree of integration for the four initiatives not surpassing this limit in size. The supportiveness of the governance context also positively influences the degree of integration for those four initiatives.

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Overview of acronyms

GAT: Governance Assessment Tool

RES: Regional Energy Strategy

CP: Coöperatie Pingjum

GR: Gebiedscoöperatie Rivierenland

ESR: Energie Samen Rivierenland

GP: Grunneger Power

PBG: Pleatslik Belang Grou

1. Introduction

Countries and their governments are facing the task of moving towards becoming more sustainable societies. Transitioning from fossil fuels to renewable energy sources generally plays a major role in policies and projects related to achieving higher degrees of sustainability. This energy transition is not solely a technical issue, it is influenced by and influences a multiplicity of spheres of society, such as infrastructures, regulations, social practices and landscapes (Frantál et al., 2018; Smil, 2010). To give shape to realising the energy transition on predominantly the local level, throughout the world communities have been and are transforming from being passive consumers of energy, to active prosumers who both consume and produce energy (Koirala et al., 2016; van der Schoor and Scholtens, 2015).

This shift relates to the concept of community energy or local low carbon energy initiatives (LLCEIS), which in the literature is often referred to as 'community renewable energy' (e.g. Devine-Wright et al. 2007) or 'grassroots innovations' (e.g. Seyfang et al. 2014). LLCEIs are in essence citizen initiatives or established organisations that aim to produce low-carbon energy and/or decrease GHG emissions. LLCEIs generally strive to reach such goals with an energy system approach that is oriented around communities, with more autonomy and influence than centralized private-oriented energy systems (Warbroek et al., 2019). Community energy is rising. In 2014, thousands of cooperatives or other locally oriented non-profits which aim to promote production and consumption of renewable energy existed (Oteman et al., 2017). According to REScoop.eu, Europe houses over 1500 energy cooperatives, with more than a million members (REScoop.eu, 2018). This number has most likely increased over the course of the last years. Looking at the amount of energy cooperatives in the Netherlands, the number has increased from 243 in 2015 to 676 in 2021, which is an increase of more than 178% in six years' time (Schwenke, 2021).

Community energy initiatives throughout Europe are currently relatively diverse and cover various aspects of energy, yet big multinational energy firms are the dominant force in the energy transition (Hewitt et al., 2019). Additionally, Hewitt et al. (2019) identify three innovation waves of community energy. The phase we are currently in and which started around 2008 revolves around concerns of citizens in regards to democratization and decentralization of energy. Traditionally, the focus of community energy primarily revolves around the production of energy on the local level. The current phase, however, places a larger emphasis on holistic solutions for energy, focusing not only on electricity itself, but integrating this with topics like waste reduction or the circular economy (Hewitt et al., 2019). The mechanisms and processes behind such integrative community energy initiatives have not been extensively researched. In addition, the effect of organizational structure of community energy on its ability to integrate multiple objectives or supportiveness of the the local governance context to on this integration has not been researched yet. This study sets out to explore these relationships.

1.1 Problem statement

The energy transition to renewable energy sources brings about various societal and spatial challenges on the local level, yet it also has the potential to contribute to solving societal and spatial issues. Community energy is increasingly focusing on reaching goals related not only to renewable energy generation. Examples of other goals are enhancing biodiversity, combating economic decline, or retaining water. However, integrating various objectives by community energy is not always stimulated by the governance context in which initiatives operate. This alerts to the fact the nature of the problem of climate change is often not compatible with the more specialised nature of institutions (Oseland, 2019). Research outlining whether or not a supportive governance context positively influences the degree of integration by community does not circulate in academia. In addition, various organizational structures of community energy have emerged which aim to deal

with the energy transition on the local level. However, it is unclear what the influence of organizational characteristics is on the integration of societal and spatial objectives in renewable energy projects by community energy.

The problem investigated in this research is two-sided. First, it looks at how characteristics of organizational structure of community energy influence the ability of community energy to integrate objectives. The problem is that currently, it is unclear how organizational structure affects the ability of community energy to integrate objectives. Second, the research dives into the supportiveness of the governance contexts of the community energy initiatives. It explores whether or not this supportiveness influences the ability of community energy to integrate societal and spatial objectives. Again, the problem is that it is unclear how the supportiveness of the governance context influences the ability of community energy to integrate objectives.

1.2 Research objective

This research primarily investigates how the organizational structure of community energy influences the degree of integration by community energy. In addition, this study investigates the extent to which the supportiveness of the governance context influences the integrative nature of community energy. The core aim of this research is to identify which characteristics pertaining to organizational structure affect the integration of objectives by community energy. The objective of the results relating to the relationship between the governance context and integration is to provide an additional understanding of integration by community energy and the mechanisms behind it. The researcher hopes to fill the gap in academic literature of the effect of organizational structure on integration by community energy. Ideally a set of recommendations is constructed to both persons involved in community energy and partners of community energy, such as local governments or civil society. The results of the research hopefully also lay the groundwork for further research on organizational structures of community energy vis-à-vis their ability to integrate objectives.

1.3 Societal and scientific relevance

The degree of social connectivity in local communities can be increased if community energy realizes other goals than generating renewable energy for their local communities, such as economic goals or goals related to sustainability. Citizens are more likely to engage in renewable energy projects if they can profit from it. As an example of a benefit, local energy projects can lead to job creation and economic growth (Koirala et al., 2016). This can in turn help local communities to reduce or eliminate other issues they are having within their communities, such as combating population shrinkage.

Citizens could also become more open to engage in community energy if they have the idea renewable energy projects contribute to other goals of which the community can benefit outside of the economic realm, such as climate adaptation or increasing biodiversity. This leads to the simultaneous attainment of other important objectives, while also increasing the support for community energy. It could also lead to citizens who are usually not keen on participating in local renewable energy projects being more willing to get involved, ultimately leading to a more effective pursuit of local renewable energy generation itself due to an increased scale. This then positively affects GHG emissions reductions. In addition, improving an understanding of the way organizational structure of community energy influences the integration of objectives can help community energy expand its reach.

It is not unequivocal to what extent community energy is currently integrating objectives. Because of the rich variety of topics integration can comprise, it is relevant for addressing societal and spatial issues in local communities to investigate which topics are integrated by community energy initiatives. This study addresses that. Additionally, little academic attention has so far been paid to

researching the extent to which the supportiveness of the governance context influences community energy initiatives in realizing the integration of topics not related to renewable energy generation. Next to this, scholars have not yet investigated the effect of organizational structure of community energy on the ability of initiatives to integrate societal and spatial objectives. Community energy literature so far mostly revolves around transition management and strategic niche management. The scientific relevance of this study primarily stems from attempting to bridge this research gap. In addition, answers on the topic of this research can help local policymakers or civil society to prioritize facilitating certain organizational structures over others, as well as provide future founders of community energy with insights in the (dis)advantages of certain organizational structures of community energy vis-à-vis their ability to integrate objectives. This research attempts to make a practical contribution in this regard.

1.4 Research questions

The main research question of this research is: *“How does the organizational structure of community energy influence the integration of societal and spatial objectives by community energy and how is this integration affected by the supportiveness of the local governance context?”*.

To answer the central research question, a division of various sub questions is constructed. The following sub questions have been formulated:

1. *“To what extent does community energy pursue other societal and spatial objectives than renewable energy generation and which barriers, if any, prevent the integration of multiple objectives?”*
2. *“How does the organizational structure of community energy influence the integration of societal and spatial objectives by community energy?”*
3. *“How does the degree of supportiveness of the local governance context influence the integration of societal and spatial objectives by community energy?”*

2. Theoretical Framework

In this chapter an overview is provided of the literature review concerning the most relevant concepts of this research: community energy, integration, organizational structure and the governance context. The conceptualizations provided by the literature are described as well as implications of the concepts for this study. In addition, the functioning of the Governance Assessment Tool (GAT) is described, which is an analytical framework that is used to analyse the selected cases in this research. The chapter includes five propositions, which are used to guide the analysis of the results of this explorative multiple case study. These propositions have emerged based upon the literature review. One of the objectives of this research is to explore whether or not the supportiveness of the local governance context of community energy enables integration of multiple objectives. Therefore, a framework able of assessing the governance landscape is demanded. The GAT is a tool capable of doing this and has consequently been selected to make this assessment. The GAT is discussed at the end of this section.

2.1 Community energy

In order to arrive at any meaningful answers on the sub questions of this study, an understanding of what exactly community energy entails needs to be unpacked first. The next section addresses this. First, it will dive into the background of the emergence of community energy. Then, community energy is conceptualized based upon the literature. The subsection concludes with the benefits community energy brings about, as well as barriers it is facing.

2.1.1 History/background

Over the course of fifty years, community energy initiatives have emerged throughout Western-European countries. Danish wind energy cooperatives and community district heating projects were one of the frontrunners of community energy and came into existence in the 1970s. In Germany, wind energy cooperatives developed in the 1980s and in the following decades solar energy cooperatives and local utility companies with co-ownership of citizens appeared (Warbroek and Hoppe, 2017). In the Netherlands, a small number of community energy initiatives emerged in the 1970s, when the oil crisis challenged the national government to approach energy differently (Oteman et al., 2017). The primary motivation of the establishment of Dutch community energy initiatives in the 1980s and 90s was as a statement against nuclear energy (Boon and Dieperink, 2014), but pro-environmental attitudes of founders played a role as well. Over the last decades specifically, a strong upsurge in the amount and also in the type of community energy initiatives occurred. In 2010, slightly over 20 energy cooperatives were present in the Netherlands (Schwenke, 2016). This grew to 243 energy cooperatives in 2015 and to 676 energy cooperatives in 2021, with a total of about 112.000 participants members (Schwenke, 2022). Some examples of types of energy cooperatives are local initiatives which aim to enhance the liveability of its community, production cooperatives which focus solely on the development and exploitation of for instance a solar farm, or crowdfunding initiatives in which funds are raised to realise collective energy goals (Schwenke, 2021).

2.1.2 Conceptualisation/definition

Community energy is on the rise in various countries, yet it does not have a clear-cut definition. The concept has attracted significant academic attention in the last ten to fifteen years. Resulting from this attention, various characterizations of community energy have emerged. Examples are 'community renewable energy', 'grassroots innovations (or initiatives)', or 'local low-carbon energy initiatives (LLCEIs)' (Seyfang and Smith, 2007; Warbroek et al., 2019; Kooij et al., 2018; Warbroek and Hoppe, 2017; Walker et al., 2010). Exact definitions differ in academia, yet its implicit meanings are comparable to a fairly large extent. It often includes the same aspects: community energy initiatives

are initiatives which are organized through bottom-up activities (Kooij et al, 2018, Warbroek et al., 2019), which aim to achieve low carbon goals (Hoppe and de Vries, 2019) typically performed at the local 'community-oriented' level (Kooij et al., 2018; Warbroek et al., 2019). 'New style' community energy is revolving more around the general wellbeing of the communities it produces its renewable energy for and is focusing less profoundly on the generation of renewable energy as the end goal, but rather as a means to certain specific ends (Warbroek and Hoppe, 2017; Hewitt et al., 2019; Hoppe and de Vries, 2019). When speaking of community energy in general, it can be defined as 'decentralized, non-governmental initiatives of local communities and citizens to promote the production and consumption of renewable energy' (Oteman et al., 2014). This can comprise various types of projects or organizations, but it runs like a thread through community energy literature that community energy relates to renewable energy production, energy consumption reduction. i.e. low carbon or climate mitigation goals, at the community level. Despite the differing phrasings in the literature, in this research will be referred to 'community energy', as an organization or initiative which works on such low carbon goals at the local community level.

2.1.3 Benefits and barriers

Having stated what community energy entails and how it has emerged, it leaves to wonder why community energy is desirable in the first place. To explain its importance, benefits of community energy will be listed in this section. Community energy has diverse potential benefits. Examples are economic benefits, enhanced participation or community building. Other benefits caused by community energy are innovation spurring, or benefits related to climate protection and renewable energy production (Brummer, 2018). Additionally, local energy projects can result in the creation of new jobs on the local level and decrease the dependence of local energy systems on the national grid (Koirala et al, 2016).

Benefits of community energy often have a strong interrelatedness. Increasing local energy efficiency via community energy at the household level, for instance, decreases energy consumption. This then results in fewer greenhouse gas emissions and therefore a lower negative impact on climate, but it also results in a lower electricity bill and it therefore simultaneously generates economic benefits. Another example is when an initiative which revolves around renewable energy provision starts taking off, people encourage one another to participate in the projects of the initiative. An associated increase in local community building, which can be seen as a goal on its own, causes people to develop a more favourable attitude towards renewable energy generation (Brummer, 2018). This then leads to more local investments in renewable energy projects by community energy. More investments result in more local renewable energy production, which has a positive impact on climate-related goals again. Consequently, the implication is that community energy is a promising partner for the government (Oteman et al., 2017).

Despite the potential of community energy to provide benefits, however, a multiplicity of potential barriers are identified which can hinder the emergence or effectiveness of community energy. Examples are organizational issues, a lack of institutional or political support, scepticism about community energy or a lack of resources or expertise to engage in community energy (Brummer, 2018). Koirala et al. (2016) provide an overview of key barriers in shaping integrated community energy systems. They distinguish between technological, socio-economic, environmental and institutional issues. Community energy initiatives which focus only at realizing renewable energy projects already experience barriers. For those initiatives which integrate other objectives into their projects, it can be expected barriers are even more tenacious or there might be additional types of barriers. This study sets out to explore which barriers integrative community energy faces. Perhaps these barriers are different from the barriers identified in the literature.

2.2 Integration

This section first dives into what is meant with integration of objectives and how it is applied in the community energy context. This is a step which is required to lay the theoretical foundation for this explorative multiple case study. Because integration is a core aspect of this research, it is a concept which needs to be clearly defined, based on what is present in the literature. Integration in the context of community energy simultaneously pursuing multiple objectives is something which has received little academic attention. As a result, the integration literature review of this research focuses on integration contexts which are closely related to integrative community energy, but not necessarily the same as community energy. The researcher was forced to go along this path, due to a lack of available integration literature which is applied in the same context. Currently, focusing on such contexts is the most optimal method of coming to relevant expectations in this study.

Integration of multiple objectives by community energy will be referred to as 'integrative community energy', which is conceptualised in this section. This review sheds a light on how integration of multiple objectives in comparable contexts to the community energy context functions, such as in climate policy integration or in the integration of climate adaptation and mitigation. In addition, the review will link such concepts with integrative community energy, to arrive at an explanation of what it means, why integrative community energy is desirable and which potential barriers it could face.

2.2.1 Conceptualisation/definition

Integration is comparable to the concept of synergy, which can be defined as 'two or more agents, components, business units or interventions which are collaborating to realise a jointly defined goal which matches all agendas' (Duguma et al, 2014). However, synergy is not precisely the same as integration, as the synergetic approach aims to achieve a jointly defined goal rather than incorporating different goals into projects simultaneously. Because the focus of this study is on community energy which integrates multiple objectives into their projects instead of merely the realisation of (a) certain jointly defined goal(s), community energy aiming to reach integration rather than synergy is investigated. The term 'integrative community energy' is used in this research to refer to such community energy initiatives. It is conceptualised as "an initiative of citizens who are united in an organisational form; who manage and execute projects related to local renewable energy generation, and who pursue other societal and/or spatial objectives simultaneously".

2.2.2 Desirability of integration

The world of academia provides little concrete examples of integrative community energy and the mechanisms behind it. To arrive at a better understanding of these mechanisms, other types of integration contexts which are more extensively covered in the literature provide a starting point. The following section discusses such examples and attempts to explain the consequential desirability of integrative community energy.

The integration of climate adaptation and climate mitigation is an example of a context where multiple objectives are pursued simultaneously. In the integration context of climate adaptation and climate mitigation, various benefits can arise. Examples range from alleviating flooding risks through reforestation (climate adaptation), leading to carbon sequestration (climate mitigation), to exploiting synergies in agriculture, preserving biodiversity, or enabling food security (Dang et al., 2003; Hennessey et al., 2017; Di Gregorio et al., 2017). Because of the broader focus of combining climate adaptation with mitigation instead of pursuing it individually, an approach arises which incorporates multiple goals. This approach is similar to the approach of integrative community energy. Their core activity relates to greenhouse gas emission reductions and thus climate mitigation. This portrays how the integration context of climate adaptation and climate mitigation is comparable to the context of

integrative community energy. As a result of this, it can be expected integrative community energy can also bring about various benefits.

Another context where integration occurs which provides an insight into the potential benefits an integrative approach can cause, is integration in climate policymaking. Examples of co-benefits arising from such integrative policymaking are an increase in soil quality and energy security, or strengthening the economy (Karlsson et al., 2020). Climate policymaking regularly includes societal and spatial objectives in policymaking. Seeing as these themes are also touched upon by integrative community energy, the contexts appear largely similar to one another. Consequently, integrative community energy is expected to deliver various co-benefits as well.

Renewable energy projects usually take up a significant amount of space. Space is becoming increasingly scarce, so the energy transition brings about spatial challenges. Spijkerboer et al. (2019) argue spatially integrating renewable energy with differing land use functions has the potential to contribute to a more efficient use of limited amounts of space, which ultimately allows for an easier roll-out of technologies related to renewable energy. This illustrates the relevance of community energy integrating spatial objectives in their climate mitigation activities, as incorporating spatial objectives can ultimately lead to attaining renewable energy objectives. Additionally, literature pointing to the potential of community energy to bring about different environmental and (local) socio-economic benefits is growing (Berka and Creamer, 2018). Realising such benefits can in turn lead to a local community being more receptive to renewable energy, leading to an increase in membership size at community energy and thus in project sizes.

Seeing as integration of climate adaptation and mitigation, integration in climate policymaking, and integrating spatial objectives in renewable energy projects provides many benefits, it can be expected integrative community energy can provide promising benefits as well. Laes et al. (2014) even go so far as saying low-carbon development, which is something in which community energy plays a pivotal role, depends upon the simultaneous pursuit of diverse goals. They advocate for the search for win-win situations related to social and environmental concerns, as it offers better chances to achieve low-carbon goals. This is another indication of the desirability of integrative community energy. The studies which are mentioned in this section all point to the desirability of integrative community energy, yet this context itself has been barely explored. All in all, research on integrative community energy and the mechanisms behind it is called for. This study contributes to the exploration of that.

2.2.3 Barriers to integrative community energy

Because the literature does not provide significant evidence to explain the mechanisms behind integrative community energy, a relative lack of knowledge exists concerning barriers related to attaining integration in this context. Similar to the previous section using different integration contexts to explain why integrative community energy is desirable, the next section uses examples of barriers in different integration contexts, to arrive at a better understanding which potential barriers integrative community energy faces.

Most of the barriers of similar integration contexts to integrative community energy revolve around a lack of coordination among policymakers and/or stakeholders, or having a lack of alignment of different objectives and a focus too specific on increasing renewables. Another barrier in similar integration contexts is a lack of institutional harmonization. One example in this regard is the context of the integration of renewable energy with rural development. This is comparable to the context of integrative community energy, because rural development typically revolves around increasing the general wellbeing, which is often the goal of integrative community energy as well. Clausen and Rudolph (2020) find the development of renewable energy is foremost linked to de-carbonization of

the energy sector and not necessarily to achieving goals related to rural development. This can be explained by different responsible authorities having separate goals and a lack of coordination between these institutions. Consequently, it can be expected this perceived barrier also plays a role for integrative community energy.

The same pattern can be found in the climate adaptation/mitigation integration context. Shrestha and Dhaka (2019) describe that the institutions which are responsible for coming up with sectoral policies regarding climate change face inadequate coordination and that this siloed approach is the leading barrier in accomplishing synergy. Di Gregorio et al. (2017) found an integrated approach to mitigation and adaptation is primarily hindered due to insufficient knowledge concerning trade-offs and synergies at the local level itself, as well as between the local and global scale. Integration in the climate policymaking context is also illustrative of barriers integrative community energy can face. In their co-benefits climate policy review, Karlsson et al. (2020) find that a lack of policy integration, i.e. "taking several goals into consideration simultaneously when designing policy", to stand out among arguments to not achieve co-benefits in climate policymaking. Decision making often occurs in silos, meaning that for instance ministries focus primarily on their own (core) issues, without paying much attention to other important dimensions. Laes et al. (2014) confirm this, arguing that integration of multiple objectives within low-carbon development remains a large challenge and that it is of incredible difficulty to realize, seeing as "existing administrative structures and procedures tend to encourage a partial vision of problems".

Spatially integrating renewable energy technologies with other land use functions faces similar hindrances. A certain disconnect often exists between policy domains which are involved with renewable energy and limited knowledge is available on how institutional harmonization can be achieved (Spijkerboer et al., 2019). The arguments provided by the scholars all tie into one another. The integration contexts exemplify quite similar barriers and relate to insufficient coordination between institutions, as well as failing to take into account different objectives simultaneously. This showcases how adopting an integrated approach can be hindered. Together, the explanations of barriers in other integration contexts identified in the literature lead to the expectation that integrative community energy is also hindered by a lack of institutional harmonization and a too specific focus on increasing the uptake of renewables.

Literature about integration in contexts related to the community energy context shows its promising potential, which implies integrative community energy has the potential to deliver relevant objectives within their communities too. It can be expected that if stakeholders of community energy at the local level pay attention to coordinating multiple objectives, community energy can be more integrative and thus deliver more local benefits. However, community energy comprises a variety of organizational structures. The impact of organizational structure on the ability of community energy to be integrative has not yet received any academic attention. Perhaps certain characteristics of the organizational structure of community energy allow for them to be more or less integrative. This can aid in better understanding how an integrative nature can be reached or facilitated. Seeing as this integrative nature is desirable based upon implications of similar integration contexts, an exploration of the effect of organizational structure on integrative community energy is called for. This study addresses this effect and the next section zooms in on the topic of organizational structure accordingly.

2.3 Organizational structure

This study aims to explore the impact of organizational structure of community energy on their ability to integrate objectives. To be able to connect the integrative nature of community energy vis-à-vis its organizational structure, first an understanding of what organizational structure entails needs to arise. To arrive at such an understanding, organizational structure is first defined based

upon the literature. In this section, a distinction is made between physical structure and social structure and these concepts are conceptualized afterwards. Furthermore, insights are provided into how different organizational structures of community energy can bring about different project impacts. The section concludes with linking organizational structure to integrative community energy.

2.3.1 Conceptualisation/definition

Structure on its own is a broad concept, as it can be attributed to a large number of contexts. Structure revolves around certain relationships between aspects of one organized whole (Ahmady et al., 2016). Organizational structure, thus, relates to the relationships between aspects of organizations. Organizational structure signifies a framework for the relationships between systems, people, operating processes and jobs. It determines the duties, tasks and the coordination thereof to achieve the goals of the organization. Organizational structure provides the foundation based upon which coordination and control within an organization can be accomplished (Andrews, 2010; Ahmady et al., 2016). Organization theorists typically distinguish between two types of structures: physical structure and social structure. The characterization of physical structures is based upon the relationships between physical elements of organizations, e.g. geographical location. Social structure, on the other hand, revolves around the relationships between social elements of an organization, e.g. positions or departments (Ahmady et al., 2016). In this study, both the physical and social structure of community energy are taken into consideration to characterize its organizational structure. In this research, organizational structure of community energy is conceptualized as ‘the way in which community energy is organized both physically and socially, to coordinate resource allocation and activities of the organization, to accomplish the objectives of the organization’. The distinction between physical organizational structure and social organizational structure is made later in this section. First, a brief overview of the typical organizational characteristics of community energy is provided.

Community energy typically has three organizational characteristics. The organizations are usually relatively small, their management typically consists of volunteers without paid staff and their income or financial assets comprise deposits of members. Additionally, management candidates are usually acquaintances of members or managers (Brummer, 2018). Community energy was initially driven by goals which do not extend beyond the scope of renewable energy projects itself, which led to business models which are characterized by realizing (financial) returns for membership-based investors. As a result, their approach hinges on organizing activities via the coordination of involving private individuals (Yildiz et al., 2015; Berka and Creamer, 2018). Most of the organizations have little financial power because of their limited ability to generate income and investments, which makes involving external experts and having the required knowhow to realise projects a challenge. Virtually no concrete hierarchical structures exist within the organizations.

Almost no hierarchical structures exist within community energy and their size is relatively small. Therefore, when exploring the effect of organizational structure on integrative community energy, it is most fruitful to investigate social structure characteristics associated with income streams and its re-investment, having paid staff and the objectives of the specific organizations. As a result of this, the social organizational structure of community energy is conceptualized as ‘the organizational characteristics of community energy, related to re-allocation of financial income streams, the presence of paid staff and the objectives of the organization’. The physical organizational structure of community energy should also receive attention, seeing as excluding it might lead to unrepresentative results. It is conceptualised as ‘the organizational characteristics of community energy, related to its geographic span and membership size’.

2.3.2 Importance of different ways of organizing community energy

An increase in competition urges cooperatives to adopt different business forms and organizational structures, as Chaddad and Cook (2004) show in the context of agriculture. One of the benefits the cooperative model as an organizational structure brings along, is its effective ability to correct market failure (Nilsson, 2001). So, the cooperative model has to change continuously to remain relevant in the market it operates in, to be able to continue to address market failures commercial parties do not satisfactorily consider. This applies to the context of community energy as well. In general, the climate in which community energy operates is changing, which brings about new organizational challenges and perhaps new organizational structures (Berka and Creamer, 2018; Adu-Lankam and Camarinha-Matos, 2019). This points to the relevance of exploring the effect of different aspects of organizational structure of community energy: without adaptation to new challenges, the future of community energy is endangered.

Andrews (2010) remarks that the physical environment in which organizations operate, i.e. their physical organizational structure, is a determinant of the behaviour taking place within organizations, which plays a large role in terms of organizations being able to accomplish their targets. It is pointed out the influence organizational structure has is of a complex nature and related to internal and external organizational characteristics, which points to the relevance of social organizational structure too. Next to that, Berka and Creamer (2018) state "the diversity of CRE (community renewable energy) projects in the UK inevitably leads to significant differences in projects' ability to deliver given social, environmental and economic impacts". However, little systematic evidence exists in the literature in terms of impacts different types of community energy deliver at the local level (Berka and Creamer, 2018). Additionally, projects which include a high degree of social capital as a precondition are more likely to be oriented around issues around aforementioned impacts. This is related to the social structure of an organization and it entails cooperatives which strive to reach social impacts are likely to deliver a wider range of impacts. This ties into the integration of objectives too. Interactive processes in this context are insufficiently understood, which calls for research which explores and describes the characteristics of the physical and social organizational structure of community energy. This study dives into such an exploration.

2.3.3 Organizational structure and different project impacts

In their review and research agenda concerning community energy and its local impacts, Berka and Creamer (2018) provide a comprehensive overview of the types of community energy projects in the UK in 2014. The organizational structures are compared regarding the used technologies, the scale of the energy generation, total capacity, the number of projects, as well as the extent of charitability and shared ownership of the organizations. The evidence suggests medium to large community energy projects are able to deliver sustained wide socio-economic benefits. In other words: projects with certain physical structure characteristics are better to deliver wider, more integrative outcomes. Additionally, the degree to which such impacts can be realised via community energy depends on a variety of project management aspects, such as local procurement and earning allocations (Berka and Creamer, 2018). Independently, different types of projects do not necessarily influence the ability to deliver these impacts. These aspects play a large role as well. The study by Berka and Creamer (2018) provides a first entry point to explain how aspects of both the physical and social organizational structure of community energy can influence its ability to deliver certain impacts. Consequently, different aspects of organizational structure of community energy could also influence its ability to deliver integrative impacts. This makes it worthwhile to explore the relationship between organizational structure of community energy and its integrative nature, which is what this study sets out to do.

Ruggiero et al. (2018) identify three types of community energy in the Finnish context: cost reduction projects, technical expertise projects and system change projects. The first type primarily exists to

lower energy costs, the second type to lower energy costs as well as due to environmental considerations, whereas system change projects look to increase renewables at the local level while aiming to achieve societal change simultaneously. The three different types of community energy have different project outcomes in terms of scale and the degree of integration of objectives. The third type of community energy looks to achieve societal change while increasing renewables at the local level and this type realizes more integration than the other two types. This shows that in the study done by Ruggiero et al. (2018), one characteristic of the conceptualization of social organizational structure of this research influences the degree of integration, which is the broadness of objectives of community energy. Thus, this helps in explaining the link between organizational structure and integration and it points to exploring this relationship. In addition, the next section attempts to make this link more concrete, by outlining the fundamental characteristics of integration and organizational structure as described in the theoretical framework. Physical and social organizational structure individually are connected to integration by community energy, making the link between organizational structure and integration more explicit.

2.3.4 Link between organizational structure and integration

To study the impact of organizational structure of community energy on this integrative character, it is practical to look at both the physical and social characteristics of organizational structure of community energy. Because the management of community energy typically contains volunteers and having paid staff is not a given fact, it is not sensible to look at more standard characteristics of organizational structure, such as formalisation. In terms of social structure, it makes more sense to look at how revenue is reallocated, whether or not paid staff is present and if the (main) goal of the organisation revolves around merely increasing renewable energy, or using renewable energy as a means to broader societal or spatial impacts at the local level. The physical structure is more straightforward than social structure and relates to size and geographical span. It can, however, not be viewed independently of the social structure of community energy, seeing as size is likely to have an effect on aspects of social structure, such as the ability to obtain more revenue streams and hiring personnel. The expected relationship between aspects of social and physical structure are outlined below.

In terms of the social structure of community energy, it can be expected that if the goal is to achieve broader societal change than only increasing the amount of generated renewable energy, an increase in the degree of integration occurs too. The same goes for the way earnings are reallocated. If profits are used not only to increase the project sizes of renewable energy, but for purposes related to improving the local community, the expectation is more integration occurs. It is probable that the direction of objectives and the way revenue streams are allocated are related: if the goal is to achieve broad societal change, it is likely revenue is used for more than increasing the uptake of renewables. This research also assumes that an increase in integration by community energy occurs if paid staff is present. Integration by community energy does not usually happen right away when an initiative is founded, because it takes time to get acquainted with the processes revolving around renewable energy projects itself, and integration is usually a following step. Having paid staff is an indication an initiative is already quite far in this regard, meaning their integrative nature is expected to be higher. Having paid staff also means a larger capacity compared to operating only with volunteers, which means more hours can spent on attaining various objectives and thus having a more integrative nature. The following propositions emerge:

Proposition 1: The more paid staff is present at an initiative, the higher its integrative nature.

Proposition 2: The more an initiative aims to broadly improve the liveability of its community, the higher its integrative nature.

Proposition 3: The more an initiative re-invests profits broadly, the higher its integrative nature.

The physical structure of community energy has a similar expected effect on its integrative character. An increase in organization size typically entails more revenue is generated via memberships. Covering a larger geographic span leads to a larger amount of potential members, indirectly influencing the size and thus income. This increase in income can in turn lead to more financial input for goals outside of renewable energy generation, leading to more integration. The argument can be made the other way around as well: if community energy covers a small area because it is for instance located in a small village, it is likely insufficient revenue streams can be obtained to allocate earnings to enable societal change, let alone hire personnel. The assumption is, therefore, that an increase in size or geographic span of community energy leads to more integration. The following proposition emerges:

Proposition 4: The larger the physical structure size of an initiative, the higher its integrative nature.

2.4 Governance context

In this section, a brief overview is provided of the academic background of governance and the background of community energy collaboration with local governments. Based upon this overview, an understanding arises what governance entails. Consequently, this background helps in understanding what the governance context entails. The link between the governance context and integrative community energy is further explained in this section. The section concludes with a conceptualisation of the governance context and a proposition, which are both used to analyse the selected cases.

2.4.1 Background of governance

Governance has gained widespread attention in academic and political discourses. The broad concept governance is not scientifically well defined. In an attempt to define governance in an encompassing manner, Lange et al. (2013) define governance as ‘a process of – more or less institutionalized – interaction between public and/or private entities, ultimately aiming at the realization of collective goals’. According to Lange et al. (2013), governance concerns ‘practices through which society are governed’. Höfer and Rommel (2015) coin governance as a concept revolving around mechanisms organizations use to organize and control responsibilities, authority, governing bodies and owners. Governance has emerged as a concept explaining new dynamics in the interplay of governing, i.e. network arrangements concerning the division of public and private actors. Such arrangements usually involve ‘complex multi-actor interactions across state, market and civil society’ and typically takes place at various levels (Lange et al., 2013). Governance includes various sub-sections or sub-concepts of governance, i.e. political, economic and sustainability governance (Brummer, 2018). Governance alone, for instance by non-governmental actors, does not solely determine the future of sustainability and thus community energy: it also depends on the extent to which governments stimulate processes of self-organization and social innovation by community energy. Governmental institutions and traditional political authority continue to play a pivotal role in this regard (Warbroek and Hoppe, 2017).

2.4.2 Background of community energy collaboration with local governments

In their case study comparison looking into community energy and (local) modes of governing in the Dutch provinces of Overijssel and Fryslan, Warbroek and Hoppe (2017) observe local governments employ two modes of governing: an authoritative mode and an enabling mode. In the enabling mode, the government facilitates or enables private or community actors to contribute to the public good. In the authoritative mode, considering the public interest (of all citizens) continues to be a task of the government. A key challenge for local administrators is to strike a good balance between the two. In addition, local governments play a key role in the attainment of lowering carbon uptake in

general terms and especially in supporting community energy to realize their goals. This goes for integrative community energy too.

In their research investigating community energy collaboration with municipalities in Switzerland and Germany, Schmid et al. (2020) find a strong connection between community energy and municipalities. This connection features collaboration and support. It is also observed that merely municipal structures are not entirely sufficient as a supporting mechanism for community energy: superordinate policies continue to be essential. In addition, Creamer et al. (2018) denote local governments are positioned well to work together with community energy. In spite of this, academic results regarding interaction or cooperation between local governments and community energy are not entirely unequivocal. Local governments can be too pro-active or too involved, sometimes resulting in dependency relations (Healey, 2015). Community energy is often viewed by local governments as enlargements of their own strategies or goals to accomplish climate mitigation. Yet, community energy often finds itself in a reality in which it is restricted due to political preferences and legislation. This results in support which is conditional, as local governments want to maintain a degree of influence over the way community energy organizes its activities (Warbroek and Hoppe, 2017). It can be expected that this degree of supportiveness of local governments influences the ability of community energy to be integrative as well. Seeing as governance comprises more than only governmental collaboration, research is called for which explores the relationship between the governance context of community energy and its ability to be integrative. The next section further deepens this relationship and conceptualizes what precisely is meant with the governance context.

2.4.3 The governance context and integrative community energy

Local interactions related to governance undoubtedly play a role in the success of community energy. Whether or not initiatives can reach their own goals and potentially goals of other local partners, inter alia depends on the context related to governance in which they operate and the degree to which they are positively facilitated to act. The same goes for integrative community energy. To zoom in on the effect of the governance context on integration, the concept of governance context needs to be conceptualized first. The governance context of integrative community energy is conceptualized as “the process of interaction between public and private stakeholders influencing the attainment of the integration of societal and spatial objectives by community energy”.

It would be inadequate to not include the effect of the governance context on the integrative nature of the selected cases. There might be intervening effects of the governance context on the degree of integration. Additionally, accounting for the governance contexts might also assist in better understanding how the organizational structure of initiatives explains the degree of integration, which is the primary goal of this research. Therefore, this relationship is explored in this study. The following proposition arises:

Proposition 5: The more supportive the governance context of an initiative, the higher its integrative nature.

In order to explore the relationship between the governance context and integration, the governance context of the selected cases needs to be assessed. The Governance Assessment Tool (GAT) is a tool which is capable of enabling researchers to assess governance contexts. It is applied in this study. This tool and the specific aspects of the tool which are used to assess the governance contexts are explained in the next section.

2.4.3 The Governance Assessment Tool

In this study, the GAT is used to assess the degree of supportiveness of the governance context of six community energy initiatives. The GAT is based on the Contextual Interaction Theory, which is a theoretical framework that looks at implementation processes (Bressers 2004, 2009; Bressers et al., 2016). The GAT focuses on the structural context of the governance regime (Bressers et al., 2016). Four criteria are used in the GAT to determine the degree of supportiveness of the governance regime: extent, coherence, flexibility and intensity. The first three criteria are most relevant to enable an assessment of the supportiveness of the governance context for integrative community energy. Therefore, the intensity criterium is excluded when assessing the governance contexts of the initiatives.

Within the GAT, the extent zooms in on the completeness of the governance context. It looks at whether or not all elements of the dimensions that are relevant for a certain sector are taken into account (Bressers et al., 2016). Coherence revolves around whether or not the elements of the dimensions of the governance context reinforce or contradict one another. It encompasses the effects of different (governmental) layers and their interactions on one another. Flexibility refers to the extent the governance context allows for a variety of ways to reach policy goals, which depends on opportunities and threats along the road. These three criteria are ideal for assessing the degree of supportiveness of the governance context vis-a-vis the integrative nature of community energy. Together, they provide a solid base to dive into this relationship.

To assess the degree of supportiveness of the individual criteria for the selected cases, the GAT comprises five governance dimensions: levels and scales, actors and networks, problem perspectives and goal ambitions, strategies and instruments and responsibilities and resources. In this research, the strategies and instruments dimension is excluded, because the data have not provided sufficient information to assess this dimension. The first dimension revolves around which administrative levels are involved, in what way and their mutual dependency. The second dimension has to do with which actors are involved in the process, how they interact and whether or not a sense of dialogue is present. The third dimension comprises which perspectives there are in the debate by the public and stakeholders, the way policy deals with potential hindrances and which goals are formulated. The last dimension deals with the different responsibilities of organizations, which tasks are divided by policy and habit and which resources are provided to execute tasks and attain goals. For each of the cases, a score is provided for the individual criteria based upon these dimensions. This is further explained in the next chapter.

3. Methodology

In this chapter, the methodology of the research is described. The first section dives into the research design and how and why the specific cases were selected. The subsequent section revolves around the collection of the data used in this research. It explains the approach of the literature review and how data are collected via interviews. After that, the operationalization section addresses how the relevant concepts of this research are measured. The chapter concludes with a description of the way the obtained data are analysed in this research.

3.1 Research design and case selection

This research has a qualitative and exploratory nature. The case selection technique is the diverse case method, which is a case selection method which aims to represent the range of values characterizing the independent and the dependent variable or a particular relationship between X and Y (Seawright and Gerring, 2008). This technique is selected due to its potential to seek the proper hypotheses in exploratory research and because more than two cases are studied in this research. This study uses propositions to guide the analysis rather than hypotheses, which are by and large similar. As a consequence, the diverse case method is a valid case selection method. The researcher has opted for a multiple case study instead of a quantitative study, seeing as integrative community energy is relatively novel with little data available on its functioning. This explains the exploratory nature of this research. The researcher determined that conducting a quantitative study would be inadequate, seeing as a qualitative study can provide more meaningful insights into exploratory research than a quantitative study.

The focus in this study is on cases of integrative community energy and their governance contexts in the Netherlands. Five specific cases were initially selected where integration of societal and spatial objectives by community energy occurs. The most important selection criterion for the cases is that the initiatives must integrate multiple societal and/or spatial goals within their renewable energy generation projects. During one of the conducted interviews, a remark was made about a certain regional cooperative. The researcher determined this regional cooperative, Energie Samen Rivierenland, should be interviewed as well because it would provide additional insights into the functioning of regional cooperatives and also on integrative community energy. Therefore, the sample size was increased to six cases. Three of the cases are located in the province of Fryslân. One is situated in the province of Groningen and two in the province of Gelderland. The researcher collaborated with the Stichting Doarpswurk, which has helped to identify and provide contact information of some of the relevant community energy initiatives in Fryslân. The other selected cases were found through Google searches and checking the extent of integration of objectives of community energy through their websites.

3.2 Data collection

At the beginning of the research, an extensive literature review was conducted. This literature review primarily revolves around the inclusion of scientific articles which enable a better understanding of the background of the relevant topics of this study. The websites of the included community energy initiatives have also been consulted to obtain information.

3.2.1 Secondary data

The literature review zooms in on the topics of community energy, integration and organizational structure. It focuses on what community energy conceptually entails, how it has materialised in the last decades, which benefits community brings along for society and what typical barriers are perceived by those engaged in community energy processes. Next to this, the literature review looks at integration as a theoretical concept. Integration of objectives by community energy as a concept

has received little academic attention, which is why the review revolves around integration contexts which are closely related to integration by community energy. By comparing these contexts and linking them to integration by community energy, the literature review provides a background to understand what integration of objectives by community energy, i.e. integrative community energy, is. Based upon this understanding, integrative community energy is conceptualized. Additionally, the review serves as an overview of different entry points to illustrate why integrative community energy is desirable and which barriers it could face based upon those entry points. The literature review points to exploring the concept of integrative community energy and it shows how organizational structure could impact the integrative nature of initiatives. All in all, the literature review points to exploring the relationships between both the governance context and organizational structure vis-à-vis integrative community energy.

3.2.2 Primary data

Next to the literature review, data was obtained via interviews. Semi-structured interviews were conducted to obtain relevant information and experiences. Within the cases, a board member of a community energy initiative was interviewed. The transcripts of the interviews do not include every precise word which was said in the interview, to enable time to be saved. The transcripts do include all the relevant information to enable an analysis and case comparison by the researcher. Board members of community energy are the ones tasked with leading the initiatives and they are responsible for their activities and cooperation with external organizations. Therefore, board members of the selected cases were interviewed. Additionally, per case a local governmental representative was interviewed. Municipal officers responsible for processes revolving around sustainability, renewable energy and the increase of uptake of renewables were consulted, as they are the ones collaborating with the community energy initiatives. Interviewed board members of community energy often pointed to the right government officials to include in this research.

In the case of Grunneger Power, an employee rather than a board member was interviewed. Within their organization, board members are typically not interviewed for student theses and therefore an experienced full-time employee was interviewed instead. This did not prove to be an obstacle in terms of obtaining the required information. In addition, an employee of Stichting Doarpswurk was interviewed, to provide information about Grou 2030. The respondent from this initiative mentioned that it was difficult for him to point to one specific municipal officer which could be interviewed for this research, because they are not in regular contact with the municipality. Stichting Doarpswurk has helped Grou 2030 throughout its history and could, therefore, shine an adequate light on the governance context of Grou 2030.

The interview with regional cooperative Rivierenland was done with two board members instead of one. The interview provided extra information on the function of the cooperative as more of an advocate and lobbying organization for other cooperatives in the region. The board members referred to Energie Samen Rivierenland (ESR), which is the regional cooperative in the same area, focusing more on supporting initiatives with knowledge, capacity and practical work to realize the energy transition in the region. To arrive at a better understanding of the differences between the two organizations and to strengthen the knowledge within this research in terms of different organizational structure, a board member/director of ESR was also interviewed. Because both organizations occupy a relatively large area for a community energy initiative, a programme manager of the Regional Energy Strategy Rivierenland was interviewed instead of a municipal officer. The respondent has a better understanding of the functioning of both organizations than a municipal officer and has collaborated with both ESR and Gebiedscoöperatie Rivierenland. The respondent has helped in generating a better understanding of the governance context in the region. The information obtained in this interview was used to assess the integrative nature and governance contexts of both initiatives.

3.3 Operationalization

This section addresses how the data obtained via the interviews are measured. It first highlights the different types of community energy initiatives which were selected. After that, a typology of the integrative nature of the initiatives is provided. This typology enables a differentiation between the integrative nature of the selected cases. Subsequently, characteristics of physical and social organizational are operationalized. The section concludes with the operationalization of the governance context.

3.3.1 Types of community energy

In this research, a variety of different community energy initiatives are selected. Six different types of community energy are compared: an initiative which ensued from a village interest group (dorpsbelangen); a village cooperative (dorpscoöperatie); an energy cooperative (energiecoöperatie) which operates in a village; an energy cooperative which operates in a city; a regional cooperative (gebiedscoöperatie) with a focus on networking and lobbying and finally a regional cooperative with a focus on physically deploying the energy transition.

3.3.2 Integration

The integrative nature of the six different initiatives is measured. A typology of five types of integrative nature is used to differentiate between the initiatives. The five types which are included in the typology are: extremely integrative, very integrative, integrative, slightly integrative and not integrative. Table 1 addresses what these classifications of integration entail specifically within this study. The classifications of integration are based upon the collected data from the interviews with board members of the initiatives and governmental officials. The determination which initiative relates to which classification of the typology is made by the researcher. This is qualitatively assessed based upon both the prioritization within the activities of the initiatives, as well as the different types of activities and the diversity within the activities.

The degree of integration	Meaning
Extremely integrative	Initiative arranges a great variety of different activities and very effectively integrates objectives within these activities
Very integrative	Initiative arranges a variety of different types of activities and effectively integrates objectives within these activities
Integrative	Initiative arranges different types of activities and realizes different objectives
Slightly integrative	Initiative primarily focuses on renewable energy objectives within their activities, but manages to realize different objectives to some extent
Not integrative	Initiative arranges renewable energy activities without attention for other objectives

Table 1: Typology of the degree of integration of community energy

Prioritization within the activities is measured by the extent to which initiatives prioritize renewable energy objectives over other objectives in their activities. Prioritizing renewable energy over other themes contributes to a low degree of integration, whereas adopting a broader prioritization contributes to a high degree of integration. Diversity of the activities is measured by looking at the different types of activities and the diversity within the activities itself. The difference in types of activities relates to the degree to which the activities do not revolve around merely renewable energy generation, but also around other themes. For example, if an initiative focuses on planting trees and exploiting wind energy, it contributes more to a high degree of integration compared to an

initiative which only exploits wind energy. In addition, the difference in types of activities relates to the degree to which different types of renewable energy activities are arranged. For instance, if an initiative exploits a solar park and it is re-selling renewable energy via an energy supplier, it contributes more to a high degree of integration compared to an initiative which only exploits a solar park. Lastly, the diversity within the activities itself is used to measure the integrative nature of the cases. For example, if an initiative exploits a solar park in which water is stored which can be used for agricultural purposes during droughts, it contributes more to a high degree of integration than if an initiative exploits a solar park without water storage.

3.3.3 Organizational structure

To measure the effect of organizational structure of community energy on its integrative nature, a distinction is made between physical and social organizational structure. Physical structure relates primarily to the size of an initiative. The physical structure of initiatives is measured by looking at the amount of members it has and the geographic span in square kilometres. The social structure of initiatives, on the other hand, relates less to size and more to the relationships between social elements of organizations. It is measured in this research by looking at three aspects. The first aspect revolves around the allocation of the obtained income of an initiative. A differentiation is made between re-investing profits broadly in different types of objectives and re-investing profits less broadly, pertaining to operational management or only renewable energy objectives. The second aspect relates to how broad the objectives of initiatives are. It is measured by looking at the degree to which the goals of the organisation are related to improving the liveability of its community, as opposed to only focusing on renewable energy objectives. The final aspect of social structure relates to whether or not paid staff is present. It is measured by looking at the amount of employees who receive payments via the initiative.

3.3.4 Governance context

The extent to which the governance context of the initiatives is supportive is measured for the different initiatives. This measurement is based upon the collected data from the interviews. It relates to not only to cooperation with municipal governments by community energy, but also with other stakeholders and governmental levels. To measure the degree of supportiveness of the governance context, the GAT is used. Three criteria of the GAT are used: the extent, coherence and flexibility. The extent revolves around the completeness of the governance context. The coherence relates to whether or not the dimensions of the governance context reinforce one another, whereas flexibility refers to the extent the governance context allows for a variety of ways to reach policy goals. The GAT has five dimensions of the governance regime, of which four are used to assess the governance context. These dimensions are: levels and scales, actors and networks, problem perspectives and goal ambitions and responsibilities and resources. The fifth dimension, strategies and instruments, was excluded from this research because the interviews provided insufficient information to assess this dimension. For each of the included criteria, an assessment of the dimensions is made based upon the interviews with the respondents. A score mechanism is applied to differentiate between the cases, which is further explained in the final section of this chapter.

3.4 Data analysis

In this section, the analysis of the data is explained. The explanation is provided for the investigated themes of this research: the degree of integration, the influence of organizational structure on the degree of integration and the influence of the supportiveness of the governance context on the degree of integration.

3.4.1. The degree of integration

For the analysis of degree of integration, deductive coding was performed using ATLAS.ti. Two codes are applied in this research, which were composed to analyse the degree of integration based upon the literature review. The codes were used to observe the prioritization within the activities, the different types of activities and the diversity within the activities. The codes were assigned to passages or statements in the transcripts of the interviews related to the prioritization and the diversity of activities. This provided the researcher with the opportunity to assign the classifications of degree of integration (Table 1) to each initiative. Assigning the classifications of the typology to the initiatives was done based upon four elements. First, the prioritization within the activities of objectives outside of renewable energy contributes to a high degree of integration. Next to this, different types of activities, i.e. not pertaining to renewable energy, contribute to a high degree of integration. Additionally, different types of activities pertaining to renewable energy contribute to a high degree of integration. Finally, diversity within the activities itself contributes to a high degree of integration. Together, these four elements have led to assigning the classifications of the typology. These classifications have laid the foundation enabling the researcher to explore the effect of both the organizational structure and the supportiveness of the governance context individually on the degree of integration.

3.4.2. The influence of organizational structure on the degree of integration

In order to explore the influence of organizational structure on the degree of integration, a distinction was made between physical and social organizational structure. Deductive coding was performed using ATLAS.ti. The pre-determined codes were formulated based upon the literature review and were assigned to passages and statements of the transcripts of the interviews. Six codes were assigned to identify the characteristics of both physical and social organizational structure for every case. Three different codes pertaining to physical structure were formulated and three codes pertaining to social structure. The exploration of the influence of physical structure on the degree of integration was performed by cross-examining the integration classifications with the three codes pertaining to organizational structure. Similarly, the exploration of the influence of social structure on the degree of integration was performed by cross-examining the integration classifications with the three codes pertaining to organizational structure. Combining both cross-examinations, this has enabled the researcher to explore the effect of organizational structure on the degree of integration of community energy overall.

3.4.3 The influence of the supportiveness of the governance context on the degree of integration

In order to explore the influence of the supportiveness of the governance context on the degree of integration, the supportiveness of the governance contexts of the cases had to be assessed. The analysis of the governance context was done based upon the GAT, for which deductive coding was performed using ATLAS.ti. The pre-determined codes were formulated based upon four dimensions of the governance regime to assess the governance context: levels and scales, actors and networks, problem perspectives and goal ambitions and responsibilities and resources. Four corresponding codes were formulated and assigned to passages and statements of the transcripts of the interviews.

The researcher used these codes to assess three criteria: the extent, coherence and flexibility. This assessment included the four aforementioned dimensions for every criterium. For every included dimension, a maximum score of two and a minimum score of zero is assigned. Because every criterium includes four dimensions in the overall assessment, a maximum score of four times two points (8) or a minimum score of four times zero points (0) is assigned per criterium. Because the study focuses on three criteria to assess the governance context, a maximum score of three times eight points (24) and a minimum score of three times zero points (0) can be assigned.

For every individual case, a matrix which visualizes the scores is provided in the next chapter. A green square represents two points, a yellow square one point and a red square zero points. The scores of the three separate criteria are added together in the end, which results in a final score. This score is divided by the maximum score of 24 and is multiplied by 10. The minimum score of this multiplication is zero and the maximum score is a ten. A score of zero points means the governance context is not in any way supportive. A score of ten points means the governance context is extremely supportive. To analyse the influence of the supportiveness of the governance context on the degree of integration, the supportiveness score of the governance contexts of the initiatives were compared with the integration classifications assigned to the initiatives. This has enabled the researcher to explore the effect of the supportiveness of the governance context on the degree of integration by community energy.

4. Results of the analysis

In this chapter, the results of the analysis are outlined. In the first section, an overview of the results for every individual case is provided. It describes the characteristics relating to physical and social organizational structure and background information relating to the governance context. In addition, the results related to the degree of integration of the initiatives are outlined, as well as which barriers the initiative faces. After this, a cross case analysis is performed. In this analysis, the cases are compared to analyse the relationship between organizational structure and the degree of integration, as well as between the supportiveness of the governance context and the degree of integration.

4.1 Results

In this section, an overview is provided of the results of the initiatives pertaining to the organizational structure, the governance context, the degree of integration and the barriers an initiative faces. Of the physical structure, the description addresses the amount of inhabitants in the area, the geographic span and the membership size of the initiative. In terms of social structure, it dives into the broadness of objectives, the way profits are re-invested and whether or not paid staff is present. In terms of the governance context, the results provide background information about the initiative, as well as relevant information which explain the supportiveness of the governance context. A matrix is provided which visualizes the scores pertaining to the extent, coherence and flexibility as derived from the GAT. The supportiveness score is described per case, which is assessed based upon these criteria. Subsequently, both the prioritization of the activities and the different types of activities are enumerated. Classifications of the integration typology based upon table 1 are assigned here as well. After that, the barriers the initiative faces are described. The results per case ends with a table which summarizes the relevant indicators of the variables.

4.1.1 Coöperatie Pingjum (CP)

4.1.1.1 Organizational structure

Physical structure: Pingjum has slightly more than 500 inhabitants and a geographical span of about 13 square kilometres. The initiative has 79 member households, of which 29 are energy purchasers. The board consists of 5 volunteers.

Social structure objectives: The initiative was founded as a cooperative, to enable them to request a windmill. One of the most important aspects for the initiative is to have a say in a fair division of benefits and burdens of local energy. Increasing renewable energy is a goal, alongside improving the liveability of the village. The initiative aims to create a situation where people who can normally not afford to, adopt a greener lifestyle. When agrarians who were helped by the initiative used their roofs for themselves, their target of improving the liveability in the village was not reached, only the target of increasing renewable energy.

Social structure re-investing profit: Household members (79) pay €5 annually, with an extra €2,50 for every family member. The income ranges typically between €5 and €10. The initiative also obtains financial profits, through reselling energy via EnergieVanOns. They receive €75 per client, 29 in total (€2175). Some income is generated via sales of the village garden (flowers and vegetables). The profits flow back to the local community: to the dining group where people only pay a small fee themselves, or to contributions towards the local youth centre and music association. No paid staff is present.

4.1.1.1.2 Governance context

CP was founded around 2014 to participate in the local discussion about some of the windmills which were planned to be installed. Pingjum has a village interest group too, which is not always an evenly active group. CP interacts with the village interest group occasionally. Multiple local associations are grouped under the village interest group, such as sports or art. The village interest group maintains the relationship with the municipality and redirects energy related matters from the municipality to CP. There is a link between the municipality and CP itself too, which is not a very strong one.

CP requested their own windmill in 2015-2016. After the request was denied, CP remained active in the local discussion about windmills and they were opponents of agrarians who wanted to have large windmills installed on their property. After that, installing new windmills was no longer an option due to provincial policy. The alternative plan was to install solar panels and to integrate it within the cooperative. CP needed the same agrarians later on, because they had roofs which could be used to install the solar panels. CP provided them with advice and guidance, but in the end, the agrarians wanted to keep the ownership and revenue of the solar panels for themselves. In terms of providing energy to its members, CP only had one option left: to sell energy through EnergieVanOns. Because of that, CP has been able to obtain only modest revenues.

CP feels both the municipality and the province have treated the residents of Pingjum poorly when denying the windmill requests, as a consensus existed the residents wanted a windmill, and they had designated a location. The municipality has not provided CP with energy related subsidies. The interaction between CP and the municipality is insufficient. The municipality does organize a quarterly gathering with community energy initiatives, with the goal of increasing the network and sharing knowledge. The municipality is also willing to grant some payments for instance for solar parks. However, the capacity of the municipality is too low to actively facilitate initiatives and to be able to provide them with the necessary tools and advice. Right now, the approach is quite reactionary. The municipality tends to also have a focus on the larger cities within the municipality, Sneek and Bolsward, rather than small villages such as Pingjum.

The extent of the governance context of Coöperatie Pingjum is adequate, with a score of 5 out of 8. The coherence of the governance is inadequate, with a score of 3 out of 8. The flexibility of the governance context is very low, with a score of 1 out of 8. All in all, the degree of supportiveness of the governance context of Coöperatie Pingjum has a score of 9 out of 24, which comes down to a 3.8 out of 10.

Quality of governance regime → Governance dimension ↓	Extent	Coherence	Flexibility
Levels and scales	Yellow	Yellow	Red
Actors and networks	Green	Red	Red
Problem perspectives and goal ambitions	Yellow	Yellow	Yellow
Responsibilities and resources	Yellow	Yellow	Blue

Table 215: Results of the supportiveness of the governance context of Coöperatie Pingjum

4.1.1.1.3 Integration

The initiative employs multiple activities which improve the liveability of the village. Examples are a village garden and a dining group. The dining group works to combat loneliness and has mostly a social function. Next to that, CP continues to develop the energy transition where possible. A lot of effort went into processes revolving around a local windmill and solar panels for agrarians, who ended up using the roofs for themselves. Both the energy transition and improving the liveability are targets of their activities. The priority within their activities is not completely clear, remaining fairly general according to the results. The degree of integration of the initiative based upon the typology is ‘integrative’.

Barriers: The initiative invested a great deal of time in guiding agrarians with roofs for solar panels, without being able to integrate the solar roofs in the initiative. CP lost out on a lot of income and the ability to re-invest it in the local community, as the agrarians kept the revenues for themselves. The respondent feels the opposition of 2014 played a large role here. The largest barrier the initiative experiences is their dependency on meadows and roofs to install solar panels, because they are not the owner of appropriate locations. The provincial policy of the province which forbids them from installing windmills is also a large barrier. The initiative has only been able to sell energy via EnergieVanOns. Their provided energy is slightly more expensive than regular energy companies, which means not everybody is interested in purchasing it. If these experienced barriers could be lifted, the initiative would have considerably more revenues which could be re-invested into the local community and thus enhance its integrative nature.

Physical structure	Membership of 79 households, of 500 inhabitants in Pingjum. Surface of around 13 square kilometres
Social structure: objectives	Having a say in a fair division of benefits and burdens of energy. Goal is to become a carbon neutral village while improving the liveability
Social structure: re-investing profit & paid staff	Profits flow back to local community: dining group, contributions to youth centre and music association. No paid staff, five voluntary board members
Degree of supportiveness of the governance context	Extent: 5/8. Coherence 3/8. Flexibility 1/8. Overall score: 3.8/10
Integration: activities	Selling energy via EnergieVanOns, dining group, village garden, contributing to local facilities
Integration: priorities	Realising the energy transition and improving local liveability
Degree of integration	Integrative
Barriers	Dependency on external parties for appropriate locations to install solar panels as a community energy initiative, bad relationships with those parties based on their collective history and as a result, their limited ability to deliver services and obtain more income, which could be re-invested locally

Table 3: Results of the organizational structure and degree of integration of Coöperatie Pingjum

4.1.2 Grieneke

4.1.2.1 Organizational structure

Physical structure: Grieneke has five board members, one of each village (except for one). They also have 9 or 10 people in a sort of advisory council, such as a contractor or a dairy farmer. The initiative is an initiative founded from the 'village interests' from the different villages. Currently they work in 6 villages, the expectation is 2 or 3 will join in the future as well. The area is called the Greidhoeke, comprising around 500 households altogether. The villages are: Baard, Easterlittens, Húns, Leons, Wiuwert and Britswert. A bit under half of the 500 households are a member of Grieneke. Of those households, around a half of those are purchasers of EnergieVanOns. In addition, the geographic span of the initiative is 16.57 square kilometres.

Social structure objectives: The statutory objectives of Grieneke are to enhance sustainability/renewable energy and they are also related to mobility and sustainable living. Next to that, societal objectives are important in a broad sense. All objectives are related to the above, specifically with facilitating households to take steps in this context.

Social structure re-investing profit: The income Grieneke obtains is via subsidies and membership income. For every customer to EnergieVanOns they receive €30 annually per every energy source (gas, electricity etc). Membership is €10 annually if households do not purchase energy, or €20 when they do. Financial streams all go directly towards sustainable goals in the villages. Board members do proposals to the members assembly or vice versa. Board members of Grieneke do not receive compensations. At the time of the interview, a trainee from the municipality helps them out for some months for one day a week. A consultant is hired to guide them through subsidy trajectories.

4.1.2.2 Governance context

Grieneke was founded as an initiative of the several town interests. Grieneke is independent from them, but are in intensive contact with the town interests. This helps Grieneke to maintain a more personal connection with residents. Grieneke is working together with the municipality in a work group on a project of enhancing the sustainability of homes. The head of sustainability of the municipality is a member of this work group and he is the advisor of Grieneke in the general sense. He is the contact person from the municipality and he is able to link them to other persons at the municipality. They are satisfied with this collaboration. Grieneke receives income through subsidies on various levels: municipal, provincial and European. Grieneke also participates in multiple advisory bodies for sustainability from the province and the municipality. Grieneke is invited to all sorts of meetings and activities by the government and other organizations. The representatives thereof are insufficiently open to participating in activities or meetings in the evenings according to Grieneke, which they view as a problem.

Grieneke is represented at the national level by Energie Samen. Grieneke sells energy through EnergieVanOns. The initiative sees the collaboration with the municipality as mostly good, in terms of both advice and funding. The municipality has similar goals to Grieneke and they view each other as a partner to integrate objectives. The municipality wants to realize integration too, but the large size of the municipality can make it hard to provide local initiatives with appropriate support. Grieneke sees the province as less of a constructive partner, they view the provincial policy of installing no new windmills as a large problem. The province has ambitions, but does not provide sufficient resources to implement certain measures at the municipal level. Together with seven other community energy initiatives, Grieneke forms an umbrella organization. They share knowledge and expertise here and sometimes bundle forces to address issues at the municipal or provincial level.

The extent of the governance context of Grieneke is very high, with a score of 7 out of 8. The coherence of the governance context is very high as well, with another score of 7 out of 8. The flexibility of the governance context is somewhat lower, with a score of 5 out of 8. All in all, the degree of supportiveness of the governance context of Grieneke has a score of 19 out of 24, which comes down to a 7.9 out of 10.

Quality of governance regime → Governance dimension ↓	Extent	Coherence	Flexibility
Levels and scales			
Actors and networks			
Problem perspectives and goal ambitions			
Responsibilities and resources			

Table 4: Results of the supportiveness of the governance context of Grieneke

4.1.2.3 Integration

Grieneke conducts a rich variety of activities. These activities are: a shared car project, stimulating charging stations, looking into tiny houses, having board members who are energy coaches to help households with insulation or heat pumps, facilitating solar panels on e.g. a sport canteen, facilitating collective participation or purchasing of e.g. insulation materials, investing in sustainable cups for the local café, going by houses to give away LED lamps, as well as trying to stimulate contractors and installers to follow more relevant trainings. Grieneke also sells energy via EnergieVanOns. The priority of the initiative is to enhance local sustainability and to facilitate households to do so. Everything serves this purpose. Currently internal discussions are held about what gets priority within the projects, to be able to better divide tasks among those involved. . The degree of integration of the initiative based upon the typology is ‘very integrative’.

Barriers: Grieneke faces several barriers. One of those is the large amount of time it takes surrounding procedural matters, such as applying for subsidies and helping residents with advice on financing. Money is a barrier as well, there is a limited availability for reimbursements for voluntary work. Also, big renewable energy projects are rather expensive and hiring experts to help the initiative is sometimes necessary, but very expensive as well. The income the initiative obtains is insufficient to pay for this. Grid congestion is starting to be an issue as well, because it will be impossible to connect new projects/initiatives on the grid for the upcoming years. Another barrier is the high age of their board members and the difficulty of attracting younger people to join the initiative and take over for them. Communicating and carrying out their message to residents proves to be difficult too. E-mails they send out are barely read and people check out their website only if people are visited and the page is pointed out to them. The corona pandemic has made this much more difficult, seeing as residents were not keen on being visited. A fairly large group remains nearly impossible to reach and it takes a lot of effort to reach the middle group. The final barrier is the provincial policy which forbids the instalment of new windmills. These barriers appear to relate mostly to barriers to increasing renewable energy projects. But, seeing as this is their main income source and profits flow back directly to sustainable goals in the villages, these barriers are barriers to increase their integrative nature as well.

Physical structure	Membership of about 250 households, almost half of all households. Surface of 16.57 square kilometres
Social structure: objectives	Enhancing sustainability/renewable energy, as well as mobility and sustainable living. Societal objectives are important broadly. Everything revolves around facilitating households to take steps related to their objectives
Social structure: re-investing profit & paid staff	Profits flow back directly to sustainable goals in the villages. No paid staff, five board members
Degree of supportiveness of the governance context:	Extent 7/8. Coherence 7/8. Flexibility 5/8. Overall score: 7.9/10
Integration: activities	Shared car project, stimulating charging stations, tiny houses, energy coaches, facilitating solar panels on facilities, facilitating collective purchasing, investing in sustainable cups, giving away LED lights, stimulating training of contractors and installers, selling energy via EnergieVanOns
Integration: priorities	Enhancing local sustainability and facilitating households to do so
Degree of integration	Very integrative
Barriers	Time it takes for procedural matters, insufficient income for large projects, grid congestion, high age of board members, communicating with residents effectively and provincial windmill policy

Table 5: Results of the organizational structure and degree of integration of Grieneke

4.1.3 Grou 2030

4.1.3.1 Organizational structure

Physical structure: Grou has around 5750 inhabitants in 2021 and a surface of 25.17 square kilometres (Allecijfers, 2022). PBG has between 600 and 700 members. Grou 2030 was founded via PBG. More background information on the precise functioning of PBG and Grou 2030 is provided in the governance context paragraph of this sub-section.

Social structure objectives: Grou 2030 was founded by people who were concerned with sustainability and biodiversity. The work groups biodiversity, energy, housing, society and nutrition have their own perspective of looking out for the interests of residents of Grou within their own theme. The objectives are very much tied to the aforementioned activities. The ambition is to grow so a sort of village manager can be paid, who helps to create extra mass and impact of the activities. This person could for instance manage the process when a heat network needs to be installed to make use of thermal energy from surface water. If the village cooperative wants to maintain a steady income to realize this, the business case needs to be further developed.

Social structure re-investing profit: PBG is an association where any resident of Grou can become a member for €10 annually, the work groups do not necessarily have their own income sources. Grou 2030 does subsidy requests, e.g. €350 at PBG for a tree planting action in a neighbourhood. A large portion of income is specific funding or subsidies from e.g. the government. PBG together with Business Club Grou and the municipality have paid significant sums of money for developing the

concept Grou. However, Grou 2030 has to knock on the door of PBG or other parties for income, which is re-invested through their different work groups and within their themes. In addition, no paid staff is present. PBG has a board which consists of 7 members. The five active work groups have about 25 volunteers in total. Some volunteers are a member of different work groups simultaneously.

4.1.3.2 Governance context

Grou 2030 was founded via the initiative Pleatslik Belang Grou (PBG). Grou 2030 has five work groups: biodiversity, energy, housing, society and nutrition. The initiative works together with Business Club Grou (BCG) too, which represents the entrepreneurs of the village. To realise coordination within Grou 2030, a steering group was initiated with a member of each work group. The steering group is also the external face towards the municipality and residents. They meet with the chairmen of PBG and BCG twice a year to exchange information and look at activities. PBG is occupied with all kinds of affairs in Grou, such as housing or landscaping. They have various groups, such as a parking committee or a socioeconomic committee. This is independent from Grou 2030 and little contact between PBG and Grou 2030 exists in this context.

A biannual consultation exists with representatives of PBG, BCG, Grou 2030, the Saint Pieter committee and the sports centre. This has led to the emergence of 'stuurgroep ontwikkeling Grou' (steering group), with the chairmen of PBG and BCG, the chairman of the aforementioned consultation and four entrepreneurs. The steering group is the interlocutor of public officials of the municipality and it has made contact with the municipality for financial resources. To strive for more coherence in local collaboration, there is currently a request waiting at stichting Doarpswurk to found a town cooperative, in which the various groups and committees can be integrated and more income can be generated. So far, the work groups within Grou 2030 mostly do not have conflicts with one another, with some minor exceptions.

Together with the municipality, the initiative is looking how to address housing issues. Grou 2030 incidentally does subsidy requests for funding, for instance at PBG or the municipality. Most of the collaboration with the municipality is for subsidies and does not stretch much further. The initiative has to find out things themselves to a large extent and it takes a lot of time to reach the right person at the municipality to ask for help. Primarily the work group biodiversity has been supported by the municipality. In addition, stichting Doarpswurk has been helpful with information and guidance. Other partners are the Friese Milieufederatie, the Institute for Nature education and the forest management organization. Incidentally Grou 2030 has contact with other support or interest groups.

The extent of the governance context of Grou 2030 is high, with a score of 6 out of 8. The coherence of the governance context is high as well, with another score of 6 out of 8. The flexibility of the governance context is lower, with a score of 4 out of 8. All in all, the degree of supportiveness of the governance context of Grou 2030 has a score of 16 out of 24, which comes down to a 6.7 out of 10.

Quality of governance regime → Governance dimension ↓	Extent	Coherence	Flexibility
Levels and scales	Yellow	Yellow	Red
Actors and networks	Green	Green	Yellow
Problem perspectives and goal ambitions	Green	Green	Green
Responsibilities and resources	Yellow	Yellow	Yellow

Table 6: Results of the supportiveness of the governance context of Grou 2030

4.1.3.3 Integration

Grou 2030 is talking with the municipality to fulfil the need for social housing and to expand the area of the village, because it is closed in by the nearby lake. Recently, a tree planting action was organised in a neighbourhood in Grou. Also, 2 information panels were installed next to the lake. The initiative has also installed facade gardens (geveltuinen) in a neighbourhood together with residents and the municipality. The workgroup biodiversity works primarily on optimizing or strengthening biodiversity in Grou. They have been busy with bee hotels, mowing policy and planting trees. Grou 2030 is also occupied with developing walking tracks in the nearby farmland, together with nearby villages. The workgroup nutrition works together with farmers to come to biologically cultivated vegetables which is sold directly to inhabitants of Grou. Occasionally volunteers help to grow crops. Various residents of Grou have a weekly delivery of those vegetables at home.

The work group energy is investigating the possibility of using thermal energy from surface water. They have also went by houses together with energy coaches of the municipality to provide advice regarding tour strips, LED lights et cetera. The work group society is represented by an architect in the stuurgroep. He is working on social housing and homes for starters and seniors. Lastly, together with the Institute for Nature Education, a tiny forest was engineered near the elementary schools. In terms of priority of the work groups, the individual work groups do not really have their own policy, they make a sort of annual plan. If there is overlap between the groups, this is discussed in the 'regiegroep' (1 to 2 times a year). Each work group has 1 person in the regiegroep. Occasionally conflicts between work groups occur, e.g. between the work groups energy and biodiversity when they were looking into the possibility of a windmill in the area. The degree of integration of the initiative based upon the typology is 'very integrative'.

Barriers: Grid congestion is an issue for Grou 2030. Grou has a large industry area with many sheds, barns, barracks and garages with appropriate roofs to install solar panels. However, no cables to transport energy are nearby and this will not be possible for at least four years. Thus, installing solar panels on the roofs is not currently an option. Another barrier is manpower: Grou 2030 has too much work for the amount of volunteers it has. Resources are a barrier as well: their financial resources are limited. The initiative hopes to partially lift the barriers of manpower and resources by becoming a town cooperative, where they can bundle forces via for instance collective administration and communication. In addition, the provincial policy of not installing new windmills is a barrier specifically for the energy work group. The last barrier is the fragmentation of the municipality. Accessibility is the first problem and ending up at the right person to ask for information is the

second problem. This takes a lot of time for the volunteers to be helped effectively. All of the barriers limited the efficiency of the initiative, which sometimes stands in the way of their integrative nature. The more time and resources the volunteers in the different work groups have, the more they can focus on attaining and integrating their objectives.

Physical structure	Grou has about 5500 inhabitants, between 600-700 members of PBG. Surface of 25.17 square kilometres
Social structure: objectives	Grou 2030 was founded by people concerned with sustainability and biodiversity. Goals revolve around that, while looking out for the interests of all residents of Grou. The work groups have their own perspective of achieving this. The ambition is to grow, so they can better combine their strengths and create budget to appoint a staff member as a manager
Social structure: re-investing profit & paid staff	PBG is an association where members pay €10 annually. Grou 2030 knocks on the door of PBG or sometimes other parties for subsidy requests. Income is re-invested through the different work groups. No paid staff: board of 7 members (PBG), with about 25 volunteers in 5 work groups
Degree of supportiveness of the governance context	Extent 6/8. Coherence 6/8. Flexibility 4/8. Overall score: 6.7/10.
Integration: activities	Work groups biodiversity, energy, housing, society and nutrition take on various activities: planting trees, installing information panels, installing facade gardens, bee hotels, mowing policy, developing walking tracks, helping farmers to grow crops, investigating the possibility of thermal energy via surface water, energy coaching via municipality, providing LED lights
Integration: priorities	Because of the different work groups, the priority of activities is less clear. Grou 2030 adopts more or less a scattershot approach
Degree of integration	Very integrative
Barriers	Grid congestion, manpower, resources, internal incidental fragmentation and the fragmentation of the municipality

Table 7: Results of the organizational structure and degree of integration of Grou 2030

4.1.4 Gebiedscoöperatie Rivierenland (GR)

4.1.4.1 Organizational structure

Physical structure: The regional cooperative GR covers the region Rivierenland, in which eight municipalities (Buren, Culemborg, Maasdriel, Neder-Betuwe, Tiel, West Betuwe, West Maas en Waal, Zaltbommel) are located. Around 25 initiatives in the region are their members. There are close to 250.000 inhabitants in the region (Regio Rivierenland, n.d.), with a surface of about 3000 square kilometres.

Social structure objectives: To fulfil the need to regionally make connections which do not dive into the business cases of community energy, but rather administrative collaboration, improving communication and knowledge on financing, which transcend the local and thematic cooperatives. The focus is mainly on energy but is not limited to it. The goal is to build trust and legitimacy between actors, so they can do their job better essentially. The statutes of GR say their goal is to improve the wellbeing and prosperity in the region via sustainability.

Social structure re-investing profit: Income is used so they can maintain a proper operational management and survive as an organization. The board consists of three members who work on a voluntary basis. They sometimes receive expense reimbursements or small compensations on the basis of certain projects. When the new direction is established, more board members will be sought after.

4.1.4.2 Governance context

GR was founded in 2014 and has helped to create the local and regional network of community energy at the eight municipalities in the region Rivierenland. GR was founded bottom-up and represents around 30 initiatives in the region, mostly at the table of the Regional Energy Strategy (RES). They partake in different steering and region groups of the RES. Most of the initiatives in the network of GR are related to energy, but some are active with nutrition, mobility and agrarians. GR focuses mostly on the network side and increasing participation in the region. They view ESR as an important partner, which facilitates the regional cooperation between initiatives related to business cases and practical project matters. GR receives virtually no financial compensations. Some municipalities in the region view GR as an important partner, because they can help them with certain issues for which they do not have the knowledge themselves.

The regional collaboration process in the RES causes problems. Regions do not usually have to collaborate and decide on large matters at the regional level. Because it is new in the Netherlands, getting acquainted to this process of collaborating has taken a long time. Because GR has gained significant experience and has been around for a while now, regional collaboration in Rivierenland is increasingly succesful. In the RES, GR has helped to define the principles which contribute to projects running more smoothly. In turn, GR has deliberated these principles in various meetings with housing cooperatives, governmental bodies and the distribution network operator. GR lobbies a lot, at the national, provincial, regional and municipal level. Within the RES, GR represents the initiatives and therefore indirectly residents. Other representatives in the RES are for instance the province, the water boards, the employers organization VNO-NCW, the eight municipalities of the region, Greenport Gelderland and LTO (Agriculture and Horticulture). These are partners from GR as well.

The extent of the governance context of GR is extremely high, with a score of 8 out of 8. The coherence of the governance is very high, with a score of 7 out of 8. The flexibility of the governance context is adequate, with a score of 5 out of 8. All in all, the degree of supportiveness of the governance context of GR has a score of 20 out of 24, which comes down to a 8.3 out of 10.

Quality of governance regime → Governance dimension ↓	Extent	Coherence	Flexibility
Levels and scales	Green	Green	Yellow
Actors and networks	Green	Green	Green
Problem perspectives and goal ambitions	Green	Yellow	Yellow
Responsibilities and resources	Green	Green	Yellow

Table 8: Results of the supportiveness of the governance context of Gebiedscoöperatie Rivierenland

4.1.4.3 Integration

GR was founded on the one hand to be an advocate for community energy in the region (lobbying), on the other hand to build a collaboration ecosystem between initiatives in the region as a network organisation. They have a seat at the table at RES meetings as advocate for community energy initiatives. They do not focus only on energy, but also on other themes (housing, nutrition, mobility, social cohesion, finance). However, energy started to require more and more attention and became the most prominent point of focus. Also because on the other themes often times other interest groups are active in the region, with whom they do not want to interfere. They lobby at the national, provincial and regional level, all to contribute to the local and/or regional need. They have also conducted feasibility studies, worked out example projects and organised some masterclasses to increase knowledge. In terms of the priority of the activities of GR, the attention shifted more and more towards energy, because it was uncharted. Within their attention they do not necessarily focus on the practical side of the energy transition, but rather on making the connections between parties and building trust and legitimacy. Slowly the connection with agrarians (food) and mobility is gaining more attention, but e.g. housing and health still has little attention. It was easier and also necessary to focus on energy, as was discovered along the road by the board members. . The degree of integration of the initiative based upon the typology is 'slightly integrative'.

Barriers: GR notices the integration of objectives generally does not occur much yet, initiators are mostly looking at how it works and how to organize the processes around it. This makes it difficult as a network organization such as GR to effectively support integration of objectives by community energy. Another barrier is most initiators want to find out things themselves and are somewhat quirky. Somewhere along the road initiators start to realize the complexity and the need to collaborate. This elucidates another barrier: transitions to new forms take time and space to materialize. In the eyes of GR, initiators are often times highly educated and involved individuals, but often lack the knowhow and available time to realise the energy transition and adopt an integrative nature. It takes too much time before they realise the need to collaborate across the region as a whole. The most prominent factor which explains why GR has focused primarily on community energy initiatives and less on initiatives with other objectives, is the fact they have only three volunteers working as a network organization for a whole region. Additionally, administrative collaboration on renewable energy was uncharted and started to naturally occupy the primary attention of GR.

Physical structure	Their members are around 25 initiatives in the 8 municipalities in the region Rivierenland. The region has almost 250.000 inhabitants and a surface of about 3000 square kilometres
Social structure: objectives	Statutory objectives relate to improving the wellbeing and prosperity in the region via sustainability. The focus is on administrative collaboration, improving communication and knowledge on financing, by building trust and legitimacy between actors
Social structure: re-investing profit & paid staff	Income is used to maintain proper operational management. Only 3 board members, who are unpaid
Degree of supportiveness of the governance context	Extent 8/8. Coherence 7/8. Flexibility 5/8. Overall score: 8.3/10
Integration: activities	Activities revolve around being a network/lobbying organization for initiatives in the region. Energy is their primary focus, but not the only focus. GR also focuses on housing, nutrition, mobility, social cohesion, finance and health. They lobby at the national, provincial and regional level
Integration: priorities	Initially the goal was to cover all themes, but the attention shifted more and more towards energy and building trust coalitions of stakeholders. Slowly the connection is made with agrarians and mobility, but housing and health still does not gain much attention of GR.
Degree of integration	Slightly integrative
Barriers	Integration of objectives is still unknown territory for most initiators, which makes supporting integration as a network organization difficult. Quirkiness of initiators is a barrier too, as well the large amount of time transitions take. Manpower is a prominent barrier for GR, which together with the unexploredness of renewable energy processes naturally led them to focus more on renewable energy itself

Table 9: Results of the organizational structure and degree of integration of Gebiedscoöperatie Rivierenland

4.1.5 Energie Samen Rivierenland (ESR)

4.1.5.1 Organizational structure

Physical structure: ESR has six member cooperatives, which have a municipality in the region as their working area. Their geographic span is the same as GR: almost 250.000 inhabitants and a surface of about 3000 square kilometres.

Social structure objectives: The focus of the objectives of ESR is on energy, not on other broad regional or sustainability objectives. ESR is there to help when things are better handled across municipal borders, and adopts a 'commercial' approach. Their primary objectives relates to

integrating elements of a sustainable energy system with each other and coming to a regional sustainable and affordable energy system. They want to enable the energy transition from a bottom up and participatory approach, because it increases the likelihood that it happens successfully. It is not necessarily a goal but more a hope, that by involving people in the energy transition and empowering them, that it affects other domains too.

Social structure re-investing profit: In 2021 ESR has a revenue of €1.8 million overall, combined for all of the provided services. Their members are local community energy initiatives, who pay an entrance fee of €5000. Next to that, they receive provisions for services the initiatives use, like collective purchasing. They are starting with a sustainable materials shop, for which they also receive provisions. The income is used to pay their employees, for operational management of the organization and if profits are made, member cooperatives can be paid. ESR employs 24 paid staff members, of which not everybody works fulltime. It comes down to about 15-16 FTE. They also have a group of about 50 volunteers who work as energy coaches. Next to that, ESR employs 2 energy advisors who work for the energy counter who provide in depth advice. ESR has four board members.

4.1.5.2 Governance context

ESR is the umbrella organization of community energy initiatives in the region Rivierenland. These initiatives have residents and companies as their members. ESR was founded as a regional company to facilitate cross-municipal collaboration through services and consultancy. Initiatives can become a member by paying an entrance fee of €5000 to make use of the services of ESR. Once the entrance fee is paid, the initiatives can obtain provisions from ESR. They profit from their membership of ESR. Member initiatives are co-owners of ESR. Since the beginning of 2022, ESR collaborates with numerous parties in Tiel, such as an education institution and a store in which sustainable materials are exploited together with a commercial party. Most of the income of ESR is received via subsidies, usually for specific activities. ESR also offers services in exchange for money to municipalities and the province. The consultancy services of ESR are not free, except for consumers.

The employees of ESR will work on projects only if they see the sustainable benefit of it. Municipalities sometimes find their approach strange. They view employees of ESR as their consultant, but ESR believes they do not always have to listen exactly to what the municipality wants. ESR witnesses that certain ecological provincial requirements for new solar parks are a hindrance of the business case and thus the energy transition. Especially because no additional funding is provided to integrate such requirements.

ESR participates in various networks. They collaborate with Energie Samen Gelderland and the national Energie Samen. ESR also shares their lessons with initiatives outside the region. ESR provides them with services via a feasibility study and a provincial subsidy. ESR also plans on collaborating with the regional energy bank, which will be founded to help out people with limited incomes to be able to pay their energy bills. ESR is represented in the RES via GR and is actively in contact with the province and the municipalities of the region. In general, this collaboration works well. The cooperation between ESR and GR is fruitful: ESR feeds them with knowledge so they can better take on their lobbying role, whereas GR generates projects for ESR. Due to GR, ESR is known and approachable by various boards across the region. Both ESR and GR play a prominent role in the energy transition in the region.

The extent of the governance context of ESR is high, with a score of 6 out of 8. The coherence of the governance context is very high, with a score of 7 out of 8. The flexibility of the governance context is high too, with a score of 6 out of 8. All in all, the degree of supportiveness of the governance context of ESR has a score of 19 out of 24, which comes down to a 7.9 out of 10.

Quality of governance regime → Governance dimension ↓	Extent	Coherence	Flexibility
Levels and scales			
Actors and networks			
Problem perspectives and goal ambitions			
Responsibilities and resources			

Table 10: Results of the supportiveness of the governance context of *Energie Samen Rivierenland*

4.1.5.3 Integration

ESR is also located in the region Rivierenland. ESR is focused on the practical matters of the energy transition in the region and provides services for local community energy initiatives. ESR is comparable to a consultancy company, but with a cooperative nature. They help member cooperatives with projects in various roles, e.g. as project leader. One of their first activities was hosting an energy counter, in Geldermalsen. In the energy counter, practical advice is given to inhabitants for sustainability measures in houses. ESR also founded the energy counter for the region Rivierenland was founded, which is partly managed by ESR. Next to that, ESR advises governments on the heat transition. Additionally, ESR focuses on developing solar and wind projects. They do not exploit these projects, but provide services in terms of advice, hands or capacity. A new activity is exploiting a store where they sell sustainable materials, together with a commercial party. The consultancy services ESR provide cost money for which a bill is sent. Consultancy for consumers, such as the energy counter, is however free. ESR also provides consultancy services to companies for a fee, but this is not their core business. In addition, ESR receives provisions for activities they host in the region, e.g. on collective purchasing actions. Some employees are consultants for municipalities, sometimes for the region as a whole. ESR also interacts with local businesses and education institutions, with the goal to educate students to help realise the energy transition.

In terms of the priority: the focus is on renewable energy and the energy transition. The concept of trias energetica is leading here, which focuses on using less energy, smarter energy and no fossil energy. The organization believes the government or other organizations should provide resources for other societal goals or goals related to e.g. nature preservation. Their experience is that looking into different aspects of biodiversity or other objectives can be a hindrance for realizing the energy transition. They are willing to incorporate such goals if resources are provided with that aim. The degree of integration of the initiative based upon the typology is 'not integrative'.

Barriers: ESR has to spend a lot of time on internally getting people along with their plans, which they sometimes view as a disadvantage of the cooperative form of their organization. A barrier for integration of objectives is that a variety of new requirements emerge, such as nature improvement for solar parks for instance, without making extra resources available for the implementation of such requirements. ESR views this as a hindrance for the energy transition and indicates they are perfectly willing to implement other objectives, but financial resources should be made available for that. Another barrier ESR experiences within their projects is the fact governments are scared to impose

measures and an underdevelopment of the principle of the pollutant pays. The final barrier is the circulation of fake news and nonsense. The primary barrier which stands in the way of ESR becoming more integrative, is their lack of striving to attain objectives more broadly. The organization appears very effective and skilled in terms of realizing the energy transition in the region Rivierenland, because this is their objective.

Physical structure	6 member cooperatives in the region. Almost 250.000 inhabitants and a surface of roughly 3000 square kilometres
Social structure: objectives	Integrating elements of a sustainable energy system with one another and coming to a regional sustainable and affordable energy system. Enabling the energy transition from a bottom up/participatory approach
Social structure: re-investing profit & paid staff	Income is used to pay employees and for operational management of the organization. It is used for their projects. Paid staff consists of 24 people, around 15-16 FTE. About 50 volunteers work as energy coaches and there are 4 board members
Degree of supportiveness of the governance context	Extent 6/8. Coherence 7/8. Flexibility 6/8. Overall score: 7.9/10
Integration: activities	Hosting an energy counter, providing consultancy services to governmental organizations and commercial parties for a fee, to consumers for free. Starting a new store in which they sell sustainable materials. Hosting collective purchasing actions and helping member cooperatives in various roles. Collaborating with businesses and education with the goal to educate students to help realize the energy transition. Supporting with policymaking as well
Integration: priorities	Focus on renewable energy/energy transition. Trias energetica: less energy, smarter energy and no fossil energy. They are willing to provide services if they see an intrinsic ambition to increase sustainability. ESR incorporates other goals only if resources are provided to do so
Degree of integration	Not integrative
Barriers	Time it takes to get people along, new emerging requirements for projects without extra funding. The primary barrier for integration of objectives is their focus on realizing the energy transition

Table 11: Results of the organizational structure and degree of integration of Energie Samen Rivierenland

4.1.6 Grunneger Power (GP)

4.1.6.1 Organizational structure

Physical structure: GP has slightly over 2000 members. The work area is the municipality of Groningen, which has 232.652 inhabitants in 2021 and occupies 197.96 square kilometres.

Social structure objectives: GP was founded to collectively enhance the sustainability in Groningen. The main purpose is to increase social cohesion and sustainability, GP sees this as the way to realise the energy transition. The goal is to help groups, not necessarily individuals. Their official goal is: "From trust in the force of Groningen, working together on a fair energy system, for everybody".

Social structure re-investing profit: The cooperative form was chosen because it is a democratic form where you can unite people and work as a company/venture. The profit of GP goes partly back to projects, there are no payments to members. Since many projects have an integrative nature, it can be stated most of their revenue is re-invested towards multiple objectives. GP sells energy through their cooperative energy company EnergieVanOns, which is 11% of their income. The rest is project income. Membership is free, people can financially join projects via crowdfunding. The revenue target of 2022 is €1.2 million. For a community energy initiative this amount of income is considerably substantial. They use a part of it to pay their 16 employees. GP has three voluntary board members and also has a group of 24 energy coaches, most of whom work voluntarily.

4.1.6.2 Governance context

GP collaborates a lot with the municipality. GP is generally quite happy with their local government. GP is also looking how to work together on large scale insulation with the municipality. Collaborating with the municipality can sometimes be difficult as well. GP does not always agree with the municipality or other partners. GP rarely works together with the province. GP sells energy through EnergieVanOns. GP also guides four other cooperatives in the learning community. GP wants to help other cooperatives with knowledge, which are usually relatively new or small cooperatives. GP involved an expert group to look at how to increase biodiversity and experiences are shared in this learning community. They are also working together with the Warmtestad, which is the renewable utilities company owned by the municipality. GP also works together with Natuur en Milieufederatie Groningen and the Groninger Energiekoepel, where knowledge is connected and shared. At the national level Energie Samen, Buurtwarmte, Coöperatie Home and HIER Opgewekt are partners. The self-steering method of GP makes it so they have a director who is the outside face of GP and internally the representation of employees towards the board.

Various actors pay for the plans of GP, so they can be executed. This occasionally goes via subsidies. Sometimes the municipality provides capacity (e.g. a city ecologist providing recommendations on biodiversity in solar parks) or subsidies. With a new big project GP sometimes has to hire new people, for which they ask the municipality to provide them with resources. Sometimes the municipality does not see the division of responsibilities clearly. However, generally the goal of the municipality is the goal of GP, so mostly this is in alignment. The municipality tries to stimulate solar energy and place solar panels in large solar parks. They help companies, corporations (housing) and people. Initiatives in the municipality can use energy coaches from the municipality. The instruments the municipality has, are changing laws and regulations, providing subsidies and raising awareness. The municipality determines the conditions for a solar park and made it mandatory to pay attention to biodiversity when constructing new solar parks.

The extent of the governance context of GP is very high, with a score of 7 out of 8. The coherence of the governance is very high as well, also with a score of 7 out of 8. The flexibility of the governance

context is somewhat adequate, with a score of 5 out of 8. All in all, the degree of supportiveness of the governance context of GP has a score of 19 out of 24, which comes down to a 7.9 out of 10.

Quality of governance regime → Governance dimension ↓	Extent	Coherence	Flexibility
Levels and scales	Yellow	Yellow	Red
Actors and networks	Green	Green	Green
Problem perspectives and goal ambitions	Green	Green	Yellow
Responsibilities and resources	Green	Green	Green

Table 12: Results of the supportiveness of the governance context of Grunneger Power

4.1.6.3 Integration

GP conducts a great deal of different activities. The initiative is occupied with developing cooperative solar parks and solar roofs and their maintenance, solar panels for tenants, energy coaching, raising awareness and educating about energy saving and sustainable energy, coaching owners associations (VvE's) to become more sustainable, guiding a cooperative heat network, guiding/coaching neighbourhood initiatives, guiding and supporting other (production) cooperatives in the region and also outside the region, exploring wind energy options (Windplatform), maintenance of charging stations, recruiting customers for energy companies and organizing events. GP was once engaged in a research project about heat pumps. One team within GP focuses on building initiatives in neighbourhoods, one on project development. Those are the two main teams, but there is also a team which focuses on the maintenance of assets. Examples of assets are the contracts and making sure everything remains operational. One team is occupied with the heat transition (Buurtwarmte). GP also sells energy via EnergieVanOns. In many solar projects attention is paid to biodiversity as well.

Since the initiative was founded, the approach is to couple energy to the social aspects. They are always busy with increasing social cohesion, so people get to know each other and are more likely to do things together. In e.g. solar projects, biodiversity is also seen as something important to increase public support. GP is constantly in conversation with residents, conducting surveys et cetera. They have destoned solar parks, and in one park used tiles to create a sort of bee wall with sand and stone. Seeds were planted and plants were installed by the fences. Together with Warmtestad and the municipality they are busy with things like light reflecting roads to enable energy saving and a safer road. In regards to the heat network, they are still in the design phase. Currently, GP is mostly talking to residents, explaining what it will look like in one's backyard and how plugging in works. Next to energy coaches, GP hosted a sort of insulation pilot with 4-5 student houses, a so-called Energy Challenge. Employees have a lot of freedom to serve the main goal of GP according to their opinion via self-managing teams. GP is a so called 'goal organisation'. They have a goal and everything they do serves that purpose. This is their main priority in terms of how goals are integrated. Increasing biodiversity is for instance integrated in many renewable energy projects, so multiple goals are integrated in multiple projects. GP sees it as reaching their main goal: realising the energy transition and increasing social support. The degree of integration of the initiative based upon the typology is 'extremely integrative'.

Barriers: GP has experienced the pandemic to be a barrier, as it has caused a delay in certain projects. Another barrier is the fact it is currently a time of imaging and people quickly form an unnuanced opinion on the energy transition. The more extreme narratives are pushed, the more difficult it becomes to reach and to bind to the large middle group. National laws and regulations sometimes change too quickly and sometimes too slow, or sometimes ineffectively, which heavily affects the planning, projects and business cases of GP. The cooperative nature of GP and the associated internal democratic processes make it so sometimes it takes too long to reach considerable progress, despite it contributing to more social support for the energy transition. Collaborating in this regard with the municipality and being aware of this, is a process which takes a lot of time, through trial and error. These barriers seem mostly related to the energy transition itself, but their projects have an integrative nature outside of renewable energy goals and all aim to achieve greater social cohesion. Because of that, these barriers are also barriers hindering the integrative nature of GP.

Physical structure	GP has slightly over 2000 members. The work area is the municipality of Groningen, which has 232.652 inhabitants and occupies 197.96 square kilometres.
Social structure: objectives	The objective is to collectively enhance sustainability in Groningen, i.e. increasing social cohesion and sustainability.
Social structure: re-investing profit & paid staff	Profit goes back partly to projects, which have an integrative nature. 11% of their income is generated via EnergieVanOns, the rest is project income. People can financially join projects via crowdfunding. Income is also used to pay their 16 employees. GP has 3 voluntary board members and a group of 24 energy coaches, who mostly work voluntarily
Degree of supportiveness of the governance context	Extent 7/8. Coherence 7/8. Flexibility 5/8. Overall score: 7.9/10.
Integration: activities	Development and maintenance of cooperative solar parks and solar roofs, solar panels for tenants, energy coaching, raising awareness and educating about energy saving and sustainable energy, coaching owners associations to become more sustainable, guiding a cooperative heat network, neighbourhood initiatives and supporting other cooperatives inside and outside the region, exploring wind energy options, maintenance of charging stations, increasing biodiversity in projects, selling energy via EnergieVanOns. All of their activities relate to coupling energy with social cohesion and making people come together.
Integration: priorities	Priority is to realise the energy transition and increasing support for it by enabling people to do this together. Self-steering teams exist within GP which have their own perspective of reaching this goal. This goal in general is the priority, different paths to reach it are allowed

Degree of integration	Extremely integrative
Barriers	Project delays due to the pandemic, unnuanced extreme opinions and narratives being pushed, ineffective laws and regulations which often change untimely, a lot of talking to internally get people along.

Table 13: Results of the organizational structure and degree of integration of Grunneger Power

4.1.7 Overview of results of the six cases

Initiative	Integrative nature	Physical structure (membership size, inhabitants in work area, geographic span)	Objectives (broad or not)	Re-investing profit (broad or not) & paid staff	Supportiveness governance context (score out of 10)
GP	Extremely integrative	2000 members, 232.652 inhabitants, 197.96 square kilometres.	Broad	Broad & paid staff	7.9
Grou 2030	Very integrative	600-700 members of PBG, 5750 inhabitants, 25.17 square kilometres	Broad	Broad & no paid staff	6.7
Grieneke	Very integrative	250 households, more than 500 households as inhabitants, 16.57 square kilometres	Broad	Broad & no paid staff	7.9
CP	Integrative	79 households, 500 inhabitants, around 13 square kilometres	Broad	Broad & no paid staff	3.8
GR	Slightly integrative	Around 25 member from the region. Region has almost 250.000 inhabitants, surface 3000 square kilometres	Broad	Not broad & no paid staff	8.3
ESR	Not integrative	6 member cooperatives in the region. Almost 250.000 inhabitants and a surface of roughly 3000 square kilometres	Not broad	Not broad & paid staff	7.9

Table 1416: Overview of the results of all cases in terms of integration, organizational structure and the supportiveness of the governance context

4.2 Cross-Case Analysis

In this section, the results of the analysis are compared. The relationships between organizational structure and the degree of integration, as well as between the supportiveness of the governance context and integration, are compared in an attempt to arrive at meaningful exploration of the relationships. To address this, the individual relationships between physical organizational structure and the degree of integration and social organizational structure and the degree of integration respectively are analysed first. Then, these results are combined to explain the overall result of organizational structure on the degree of integration. Subsequently, the effect of the supportiveness of the governance context on the degree of integration is compared. The section concludes with the overall effect of organizational structure and the supportiveness of the governance context on the degree of integration by the initiatives.

4.2.1 Physical organizational structure and integration

The six initiatives have different characteristics in terms of physical organizational structure. Grou 2030, CP and Grienko are relatively small in terms of physical structure with a membership of between 79 and 700 members and a geographic span between 13 and 25.17 square kilometres. In these areas, between 500 and 5000 inhabitants reside. On the other side of the spectrum is GP, with over 2000 members, occupying 197.96 square kilometres, with a population of over 232.000. GR and ESR cover an even larger area, of around 3000 square kilometres. Their membership sizes are difficult to compare to those of the other initiatives, as their members are other community energy initiatives and not residents itself. ESR has six member cooperatives which paid an entry fee and GR essentially lobbies for all of the initiatives in the region, which are roughly 30. The region Rivierenland has around 250.000 inhabitants.

The results of physical organizational structure are mixed. The two least integrative initiatives, ESR and GR, cover the largest geographic span. However, the initiative with the subsequent largest geographic span is GP, which has the highest integrative nature. When comparing the geographic span of GP and the remaining three initiatives, there does appear to be a correlation between their integrative nature and geographic span. GP occupies the largest area (197.96 square kilometres), followed by Grou 2030 (25.17 square kilometres), Grienko (16.57 square kilometres) and CP (13 square kilometres). This order is identical when comparing their integrative natures. GP, namely, has the highest integrative nature, followed by Grou 2030, Grienko and lastly CP. Precisely the same correlation exists between membership size and integrative nature, with the exception of the two initiatives in Rivierenland. Therefore, when these two initiatives are excluded, the characteristics of physical organizational structure show that if their size increases, be it in geographic span or membership size, so does their integrative nature. This provides modest evidence of the effect of physical organizational structure on the integrative nature of community energy. It also provides an indication physical organizational structure may positively affect the integrative nature of community energy only to a certain extent. Perhaps, after reaching a certain size, it starts to negatively affect the ability of community energy to adopt an integrative approach.

4.2.2 Social organizational structure and integration

The results of social organizational structure show that striving to broadly attention the objective of improving the liveability of a community via climate mitigation is an important factor in regards to the extent to which community energy has an integrative nature. Only ESR does not strive to reach this and this initiative has the lowest integrative nature of the six initiatives. The results also portray the importance of re-investing profits broadly in regards to integration, seeing as the four most integrative initiatives do re-invest profits broadly, whereas the two least integrative initiatives do not. The link between whether or not an initiative has paid staff and their integrative nature is less simple to determine. Both GP and ESR employ paid staff and they are the initiatives with the highest and lowest degree of integration respectively. Though, the remaining four initiatives are mostly

considerably integrative and they all do not employ paid staff. This shows that, in this study, integrative community energy generally does not employ paid staff. However, the study does provide an indication that having paid staff in combination with striving to broadly improve the liveability of a community enables community energy to be more integrative.

4.2.3 Physical and social organizational structure and integration

Physical structure on its own does not provide conclusive results in explaining the extent of integration. ESR and GR are the two largest initiatives with indirectly the largest membership numbers and which cover the largest geographic area. These two initiatives have the lowest integrative nature of the six initiatives. If these two initiatives were to be excluded from the sample, however, a clear correlation between physical structure and integration exists. Then, larger initiatives with more members, covering a larger geographic area, have a higher integrative nature than initiatives with less members and a smaller geographic span.

The two least integrative initiatives do not re-invest profits to generally increase the wellbeing of their regions, it is instead used to maintain proper operational management or to increase the size of renewable energy projects. The other four initiatives, which are the four initiatives with the highest integrative nature, do re-invest their profits to increase the general wellbeing of their communities. This helps to explain why the two largest initiatives in terms of physical structure have the lowest score in terms of integrative nature, despite physical structure appearing to be a determinant of integrative nature for the other four initiatives. Only if an initiative re-invest profits broadly, physical structure helps to explain the variation between initiatives in terms of their integrative nature.

4.2.4 The supportiveness of the governance context and integration

The relationship between the supportiveness of the governance context and the degree of integration is similar to the relationship between physical organizational structure and integration. The two least integrative initiatives, ESR and GR, have the two highest supportiveness scores. This implies a negative relationship between the supportiveness of the governance context and the degree of integration. However, when ESR and GR are excluded, a correlation exists between the supportiveness scores and the degree of integration. With the remaining four initiatives, the more supportive the governance context is, essentially the higher the degree of integration is as well. The least integrative initiative of the four, CP, has by far the least supportive governance context. Subsequently, Grou 2030 and Grieneke are both 'very integrative' initiatives, with supportiveness scores of 6.7 and 7.9. The most integrative initiative, GP, also has a supportiveness score of 7.9. Based upon those scores, Grieneke and GP should be equally integrative, yet GP is 'extremely integrative'. For the four most integrative initiatives, the results show a positive correlation between the supportiveness of the governance context and the degree of integration. However, this correlation is not equally strong as the correlation between organizational structure and the degree of integration.

4.2.5 Organizational structure, the supportiveness of the governance context and integration

On its own, both physical organizational structure and the supportiveness of the governance context seem to not bring forth a conclusive explanation in regards to the integrative nature of community energy. ESR and GR, the two largest initiatives in terms of physical structure and having the two highest supportiveness scores, are the least integrative initiatives. Perhaps after reaching a certain size as community energy, it becomes increasingly difficult to adopt an integrative nature. For the other four initiatives, the integrative nature increases when their physical structure size increases. Similarly, their integrative nature increases when the governance context is more supportive. CP still manages to be more integrative than ESR and GR, despite being small in size and having by far the least supportive governance context. This can mostly be explained due to the fact CP does re-invest profits broadly, whereas ESR and GR do not. The factor of re-investing profits broadly seems to play a

very large role in explaining the integrative nature: this is present at the four most integrative initiatives and it is absent at the two least integrative ones. GR does have broad objectives and ESR does not, which helps to explain the initiative is more integrative than ESR.

It could be expected that if the supportiveness of the governance context of CP increases, so too would their integrative nature. The initiative relied on agrarians for solar roofs and on regulations to install windmills. Due to unfortunate circumstances, which are directly related to their governance context, CP has mostly been unable to increase project size and revenues. As a result, they have been able to adopt only a somewhat limited broad approach in terms of integrating objectives. Only one of the four most integrative initiatives has paid staff, which is GP. This initiative essentially has all of the components to be integrative. Their physical structure size is large, it has broad objectives, it re-invests profits broadly, paid staff is present and their governance context is quite supportive. Combining these aspects leads to the explanation that GP is the most integrative initiative of the six. This provides an indication that if community energy has broad objectives, re-invests profits broadly and it has a supportive governance context, employing paid staff can help to become even more integrative.

5 Conclusion and Discussion

5.1 Conclusion

This study set out to answer the research question “How does the organizational structure of community energy influence the integration of societal and spatial objectives by community energy and how is this integration affected by the supportiveness of the local governance context?”. Three sub questions were constructed to guide the research. Answers to these sub questions can be found below. The answers to the sub questions are integrated, enabling the main research question to be answered. The research design of this study comprises a qualitative exploratory comparative case study research, using cases of six community energy initiatives: Grieneke, Grunneger Power (GP), Energie Samen Rivierenland (ESR), Gebiedscoöperatie Rivierenland (GR), Coöperatie Pingjum (CP) and Grou 2030. The Governance Assessment Tool was used to assess the governance context of the cases.

5.1.1 Sub question 1

The first sub question is “To what extent does community energy pursue other societal and spatial objectives than renewable energy generation and which barriers, if any, prevent the integration of multiple objectives?”. The researcher has designed a typology of five classifications pertaining to the integrative nature of the selected cases. This typology ranges from not integrative to extremely integrative. GP is extremely integrative, Grou 2030 and Grieneke very integrative, CP is integrative, GR is slightly integrative and ESR is not integrative.

Barriers related to integration are tied to general barriers of community energy and the renewable energy transition, because if an initiative is unable to increase project sizes, it is generally unable to systematically increase revenue and re-invest it in other societal or spatial objectives. The experienced barriers by the initiatives are related to grid congestion, financial barriers and organizational capacity by both community energy and the municipality it operates in, misalignment of laws and regulations with the activities of community energy, the difficulty of reaching people in times of a pandemic and the extent to which the participatory nature of community energy is time-consuming. Essentially, the more an initiative is able to lift these barriers, the better it is able to integrate objectives.

5.1.2 Sub question 2

The second sub question is “How does the organizational structure of community energy influence the integration of societal and spatial objectives by community energy?”. This study distinguishes between social organizational structure and physical organizational structure. Indicators of social organizational structure are the broadness of the objectives of the initiative, revenue allocation and the amount of paid staff. Indicators of physical organizational structure are geographic span and membership size.

The study illustrates that when initiatives do re-invest profits to broadly increase wellbeing, physical organizational structure helps to explain the variation of integration between these initiatives. The larger the size of the initiatives which do re-invest profits in their communities, the higher the integrative nature. More or less the same accounts for striving to broadly increase the wellbeing of an area and an integrative nature, with the exception of GR. This initiative does strive to broadly improve the wellbeing of its members via sustainability. However, the initiative occupies such a substantial area with relatively little personnel and income, that it becomes more difficult for them to adopt an integrative approach. With more income, profits could be re-invested towards more than operational management, for instance towards recruiting and paying personnel. This could help them to cover more themes and therefore adopt a broader and more integrative approach. In this specific case, their large size in terms of physical organizational structure is more of a hindrance than

a benefit. This helps to explain why the initiative does not necessarily succeed in terms of adopting an integrative nature and it could be an indication physical structure is only positively correlated with the degree of integration up until a certain size.

This study also demonstrates the importance of re-investing profits broadly when an initiative wants to increase its integrative nature. ESR does have a substantial income but it does not desire to re-invest profits in a broad sense. Consequently, the initiative excels in terms of renewable energy projects but lags behind the other initiatives in realizing integration. In case they would strive to re-invest in goals more broadly, it is likely they would rank far higher in terms of integrative nature on the list of initiatives. Next to this, this study portrays that integrative community energy generally does not employ paid staff. However, the study does provide an indication that when initiatives re-invest profits broadly and have broad objectives, having paid staff helps to realize more integration.

5.1.3 Sub question 3

The third sub question is "How does the degree of supportiveness of the local governance context influence the integration of societal and spatial objectives by community energy?". The researcher has given supportiveness scores on a scale of 1 to 10 to the initiatives. The scores vary between initiatives. Most of the initiatives have a rather supportive governance context, with CP being a clear exception and Grou 2030 scoring somewhat lower than the other four initiatives. The order of the most supportive governance context to the least supportive governance context is: GR with an 8.3; GP, Grieneke and ESR all with a 7.9, Grou 2030 with a 6.7 and CP with a 3.8.

The two least integrative initiatives, ESR and GR, have the two highest supportiveness scores. As for the remaining four initiatives, a positive correlation does exist. The most integrative of the four, GP, has the most supportiveness governance context together with Grieneke, with a score of 7.9. Grou 2030 and Grieneke are the two subsequent most integrative initiatives. Grou 2030 does however have a lower supportiveness score than Grieneke, of 6.7. The least integrative one, CP, has the least supportive governance context. This shows that when ESR and GR are excluded, the supportiveness of the governance context is positively correlated with the degree of integration. However, the supportiveness of the governance context on its own does not explain the variation in integration between all of the initiatives. A positive correlation only exists when zooming in at the four most integrative initiatives.

5.1.4 Answer to the main research question

The main research question is "How does the organizational structure of community energy influence the integration of societal and spatial objectives by community energy and how is this integration affected by the supportiveness of the local governance context?". To answer the main question and come to an overall conclusion of this study, parts of the answers to the second and third sub question are taken and then integrated. Some aspects of social organizational structure help to explain why physical organizational structure and the supportiveness of the governance context do not lead to a more integrative nature for some cases.

When looking at the general effect of aspects of both physical and social organizational structure independently on integration across all of the initiatives, two aspects of social organizational structure help to explain the degree of integration. These aspects are striving to broadly improve the liveability of a community and re-investing profits broadly. The results indicate especially re-investing profits broadly is a strong determinant of integration by community energy. Furthermore, employing paid staff on its own does not explain the integrative nature of community energy in the general sense. Physical structure and the supportiveness of the governance context do not explain the variation in the degree of integration across all initiatives either.

When zooming in on the four initiatives which re-invest profits broadly, physical structure is positively correlated with integrative nature. As for these broadly re-investing initiatives, a positive correlation also exists between the supportiveness of the governance context and the integrative nature. Only one of these four initiatives employs paid staff, which is the most integrative initiative. Therefore, this study indicates employing paid staff can help community energy to realize more integration, under the condition the initiative does re-invest broadly and does have broad objectives. In addition to this, the results of the study show there could be a certain limit in physical structure size related to being able to effectively realize integration. The two least integrative initiatives have the largest sizes of all initiatives, which could indicate it becomes too difficult to adopt an integrated approach when covering a large area.

5.2 Discussion

This section addresses the discussion of the results of this study. First, the implications of this study from both an academic and a practical perspective are explained. Then, recommendations are provided to both community energy initiatives which seek to realize more integration, as well as to governmental officials collaborating with community energy. Consecutively, the limitations and strengths of this study are described. The section concludes with directions future research should head towards based upon the results and implications of this research.

5.2.2 Implications of the research

The conclusions drawn in this research show that striving towards broad objectives leads to a more integrative character of community energy. This matches with the study concerning climate policymaking by Karlsson et al. (2020), who find that ‘taking several goals into consideration simultaneously when designing policy’ is the main argument co-benefits are not achieved. It also ties into what Ruggiero et al. (2018) observe, seeing as they find community energy which looks to increasing renewables while achieving societal simultaneously is better able to realize integration of various objectives.

The conclusions drawn in this research especially implies re-investing profits broadly leads to more integration by community energy. This can only occur if profits are made in the first place. This is why CP has not been able to adopt an immensely integrative nature, despite re-investing profits broadly and striving towards broad objectives. Due to their limited income, they have had to focus on a couple of themes and adopt a narrower focus than certain other initiatives. Community energy needs to be facilitated to engage in renewable energy projects with a certain degree of urgency, as their primary method to realize integration of objectives is by re-investing profits. These profits are generally only obtained if renewable energy projects have materialised. Accordingly, there is a role for local governments and civil society to facilitate community energy to realize profits. The results of this study imply that if stakeholders which operate in the governance context of community energy want the initiative to become more integrative, should focus on enabling community energy to realize profits and should try to influence them to re-invest these profits broadly.

The results of this study imply that if community energy wants to realize integration, it is vital they deploy broad objectives. Community energy realizes more integration of objectives if their own objectives are broader than merely aiming to achieve renewable energy generation. Next to simultaneously attaining different types of objectives, which has a positive effect on the local community on its own, having broad objectives can also assist in gaining public support for an initiative. This can also result in more memberships, larger project sizes and more renewable energy generation as a result. In addition, the results of this study portray that if community energy wants to realize integration, it is crucial they focus on generating profits as soon as possible. Only if profits are made, they can be re-invested towards different themes, which will result in more integration.

The results of this research also show that initiatives which cover a smaller area than 197.96 square kilometres are the most effective at realizing integration. This is in line with the findings by Berka and Creamer (2018), who find medium to large size community energy projects are best able to deliver sustained socio-economic benefits. Therefore, the study provides an indication that if an initiative wants to realize integration of objectives, it should choose not to cover an area larger than 197.96 square kilometres. Consequently, the advice for local governments and civil society is to facilitate smaller initiatives with a geographic span of not more than 197.96 square kilometres, if they want to facilitate integration by community energy.

5.2.3 Limitations and strengths

A limitation of this study is the fact all selected cases are located in the Netherlands. It is unclear whether or not the results can be replicated to other countries. Perhaps the way society and governance are organized in other countries allows for a better or worse ecosystem in which to realize integration. Another limitation is the fact integration of objectives by community energy is fairly novel and under-researched, which has forced this research to have a qualitative nature. If more initiatives become integrative and it is a more established concept in the literature as well, it would be useful to make quantitative comparisons. This study has zoomed in on six cases, which could entail results are not generalizable to larger sample sizes. Another limitation of this study relates to the fact the selected cases are not necessarily representative of all community energy initiatives. These cases were selected due to their integrative nature and the results could be different if more initiatives were included which are not integrative.

A clear strength of the study is that it has pioneered in terms of comparing both social and physical organizational structure with the integrative nature of community energy. It has laid a foundation on this specific topic, which enables more thorough future analyses. This can in turn help policymakers with a richer body of knowledge which can be used to create more inclusive and more integrative communities via integrative community energy. Another strength of this study is that the researcher attempted to focus only on initiatives with an integrative nature. Consequently, the explanatory variables of integrative community energy could be explored and the research gap of the relationship between organizational structure and integrative community energy could be filled.

5.2.4 Future research

The results of this study call for a number of pathways to focus future research on. This study provides an indication that having paid staff in combination with striving to broadly improve the liveability and re-investing profits broadly leads to more integration. GP is the only included initiative which meets aforementioned conditions and it is also the most integrative one. Therefore, it leaves to wonder whether or not including more integrative initiatives with paid staff would lead to the same results. Future research should include more integrative initiatives which employ paid staff, to see whether or not paid staff has a positive effect on integration.

Furthermore, this study shows that physical organizational structure is correlated with integration for the four smallest initiatives up until a geographic span of 197.96 square kilometres. This relationship does not exist not for the largest two initiatives, which have a geographic span of 3000 square kilometres. Thus, future research should include cases with a geographic span somewhere between 197.96 and 3000 square kilometres, to see if bigger initiatives than GP can still be effective in terms of realizing integration. Future research could help to explain whether or not a certain physical structure size indeed is too large to realize significant integration by community energy. Additionally, future research could include GR as a case once again. They do have broad objectives and seem to mostly not re-invest profits broadly because they do not have the resources to do so. Perhaps they have acquired a more adequate income in a few years' time and can re-invest profits broadly. Consequently, GR might be able to be much more integrative at that point, despite covering a very

large area. This could shine a new light on the relationship between physical organizational structure and integration and either re-confirm the findings of this study, or show that a large physical structure size is less of a barrier to realize integration as compared to re-investing profits broadly.

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