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Is the Regional Energy Strategy programme a useful tool to a renewable energy system?

Strategic assessment of usefulness of the Regional Energy Strategies in the path to 35TWh large-scale wind and solar power production in 2030.

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Abstract

The enhanced greenhouse effect is evident and gets worse every day. Tonnes of CO2 are still emitted every day into the atmosphere intensifying this process. 196 countries signed the Paris Agreement in 2015, developed to reduce the emission of CO2. The Netherlands has signed the Klimaatakkoord in 2019 which is legally enforcing a 49% decrease of CO2 emissions in 2030 and 95% reduction in 2050. To reach this goal, the Regional Energy Strategies (RES) programme is developed. This programme is based on a bottom-up approach where the regions develop their own strategy to transition from using fossil fuels to renewable energy. The goal of this programme is to produce at least 35TWh of renewable energy in 2030.

This moment is coming soon and the process is costly. Therefore it is essential to have efficient policy-making processes and effective processes that can guide this transition to a sustainable future. This study gives insights in the usefulness of the RES programme by elaborately discussing results of an analysis that covered all thirty strategies (almost 3000 pages). The analysis is based on six criteria found to be essential in prevailing energy strategies, transition theory literature, strategic planning literature and operational planning theory.

The findings show that the RES programme can be considered a useful tool to achieve the national goal of producing 35TWh in 2030 with large-scale wind and solar power on land, as it has generated an estimated output of over 50TWh. Overall it was found that the development processes of the strategies can be improved by including an energy saving strategy, developing a visionary character that also has a long-term focus and by including supraregional collaboration. The current developed strategies are preliminary and require central government intervention to remain executable. The RES programme can find its strength in the bottom-up planning approach and its iterative character that enable continuous improvements.

Key concepts: Strategic Planning, Regional Energy Strategies, Bottom-up planning, Energy Transition, strategic assessment.

List of abbreviations

GHG	Greenhouse gases
Kwp	Kilowatt-peak
LT-LEDS	long-term low GHG emission development strategies
CO2	Carbon dioxide
NDCs	nationally determined contributions
NIMBY'ism	Not In My Back Yard -ism
NOVI	Nationale Omgevingsvisie
NPRES	Nationaal Programma Regionele Energie Strategie
TWh	Terrawatt-hour
PBL	Planbureau voor de Leefomgeving
REAP	Rotterdam Energy Approach & Planning
RES	Regionale Energie Strategie
VROM	Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieu

1. Introduction

1.1. Background and relevance

The current scientific paradigm is evident about global climate change as a result of the enhanced greenhouse effect. Greenhouse gases (GHG) are emitted into the atmosphere by combustion engines and other fossil fuel burning systems such as coal-fired power plants (Mackay, 2009). To limit the effects of this climate change, less GHG must be emitted into the atmosphere. This requires new technical infrastructure and systems as well as a revised institutional, economic and political systems (Rijksoverheid, 2019). Such a transition can be fuelled by agreements and treaties signed and obeyed by multiple nations. One of the most known treaties is the Paris Agreement of 2015. In this Agreement, 196 parties have agreed upon the goal to limit the increase in temperature by a maximum of 2 degrees Celsius, compared to pre-industrial levels (United Nations, 2015). To achieve such a goal, radical changes have to be made mainly in the energy system that we use every day. Fossil fuels have to be replaced by renewably produced energy that is produced without the emission of GHG. Such a transition affects the everyday life of everyone and does not happen overnight. It requires a lot of investments, institutional changes, awareness, and willingness to adapt.

The Netherlands is trying to do their part by striving to reduce the emission of greenhouse gases into the atmosphere with 55% in 2030 compared to the emission in 1990 (Rijksoverheid 2019a). The Netherlands has been involved with the energy transition since 2001 (VROM, 2001), but has made strict goals in the subsequential agreements. The most far-reaching agreement is the Dutch Climate Agreement of 2019, which is a nationwide agreement that follows up onto the 2015 Paris Agreement. The most important goal of this agreement is to reduce GHG emissions with 49% in 2030 compared to 1990. The Klimaatakkoord (2019) states that this is only possible if we see this challenge as a societal transition. Society and economy are facing changes that affect the way we eat, live, work and transport ourselves. Over 100 parties have collaborated together, working and thinking together about changes and measures that we can make to reach the goals of greenhouse gas emissions, resulting in the Klimaatakkoord (2019). In the next chapter this climate agreement will further be discussed.

To reach the goals set by the 2019 Dutch Climate Agreement, entire systems have to be redesigned and society should adapt to more renewable lifestyles. This requires new technical infrastructure as well as revised institutional, economic and political systems (Rijksoverheid, 2019). Such radical changes call for transitions in our systems and society. Such transitions do however not occur out of the blue and to the contrary, they can even be managed. The first two paragraphs sketch the official obligation for such a transition, but the question is about how such a transition will be started and completed. The next chapter will elaborate more on the academic background of governance during transitions.

Translating goals from a Climate Agreement into actual policy and implementation is a complex task. One of the outcomes of the Dutch Climate Agreement is that thirty so-called energy regions have to present their plans which illustrate the capabilities of each region to contribute to goals set in the climate agreement, called the Regional Energy Strategies (RES) programme. This will include the plans on where, how much and in what form renewable energy sources will be developed and what other measures are taken to contribute to the energy transition. This bottom-up planning approach is used to contribute to the amount of projects that could actually be developed since the spatial planning of renewable energy sources can be a very complex process with a high rate of failure (de Roo, 2007). A

recognized example of a programme that endured high public rejection is the development of 45 wind turbines in the Veenkoloniën area in the province of Drenthe enforced by the central government in The Hague (RTV Drenthe, 2017).

The main goal that was aimed for when designing the RES programme was to develop and realize renewable energy sources and a sustainable electricity grid whilst integrating these in the built environment (NPRES, 2019) To be more explicit: the main goal is to generate at least 35TWh of electricity by wind energy and large-scale solar energy (at least 15kWp) on land and inland waters by 2030 (Matthijsen et al., 2021).

The idea is that regional authorities are better capable to estimate where and in what forms renewable energy sources can be developed in their regions than the central government can. All energy regions give an overview of their potential renewable energy sources which in total add up to the potential amount of renewable energy produced in the Netherlands. This number shows the renewable energy potential in the Netherlands and gives an indication of whether the Netherlands is on track to achieve the aforementioned goal set by the Klimaatakkoord (2019).

The process of setting up the RES is divided into three main phases. First, a concept RES is made that was submitted the first of October of 2020. This version contained rough information about the location, size and method of building renewable energy production sites. The second phase is the RES 1.0 which will have more concrete and implementational plans than the concept version, the RES 1.0 is submitted before the first of July 2021. The next step is the RES 2.0, which would be even more elaborate then the RES 1.0 and might have adjustments made to the 1.0 version to increase the success rate. The 2.0 version does also include detailed changes and interventions that have to be made to the electricity grid and storage locations. The idea behind those different phases is that changes can be made to alter the development of the RES whilst in process.

The necessity of reaching the climate goals is evident, but it is however unclear what methods work best to achieve these goals. And at what cost and with what sacrifices do we want to achieve these goals? There is no unlimited supply of funding, available building grounds, or support base for the implementation of renewable energy sources. As the RES programme is still in it's concept phase (at time of writing), it is unclear whether the programme can be considered a useful tool in the process to reaching the goals. This study will try to gain insights in the usefulness of the RES programme as a tool to combine the challenges of spatial planning and governance to develop useful strategies.

1.2.Research framework and outline

The main goal of this study is to gain insights into the usefulness of the RES approach to achieve the goals which have been set in the Dutch climate agreement of 2019. This study is done by analysing the strategies developed by all thirty regions based on six criteria provided by the theoretical framework.

The question that is put central in this study is:

To what extent can the Regional Energy Strategies (RES) programme considered useful for achieving the goals for large-scall renewable energy production on land set in the 2019 Climate Agreement of the Netherlands?

The following sub-questions have been formulated that will provide a substantiation for answering the main research question:

- *In what context does the RES programme play a role?*
- *What are Regional Energy Strategies?*
- *What can be considered useful planning approaches for achieving long-term goals?*
- *Which criteria can be used in the assessment of thirty RES documents?*

Academic and societal relevance

The central aim of this study is to compare the strategies suggested by the concept versions of the RES programme with energy strategies and (strategic) planning principles provided by academic literature. This comparison gives insight in the policy-making process and in the level of usefulness of the RES programme. The results from such an assessment might validate the theories found in academic literature or give insights in the level of up-to-datedness of such academic literature. This is useful to the scientific community as it provides new knowledge to a scientific subject that is undergoing rapid change.

Transition and strategic planning theory discussion has potentially revealed five criteria that can be used for generic strategy assessments. These criteria give an indication in the degree in which important characteristics of strategies can be recognized. These five criteria can be complimented with context-specific criteria to assess strategies specific for different planning disciplines.

This study can help to achieve the goals set in the Klimaatakkoord (2019) by providing an analysis of the concept RES. Comparing practicable strategies with theoretical strategies can show possible weaknesses and strengths of the current strategies. Following-up, this comparison can provide the strategies formulated in the RES programme with useful remarks that could improve the usefulness of the RES programme. The RES programme is an iterative programme that has integrated processes that enable improvements made in the programme. This study contributes to this iterative process by providing an evaluation of the first phase of the programme and present recommendations for the RES 1.0 and RES 2.0.

Reading guide

This first chapter 'Introduction' has provided a general introduction to this study. Chapter 2 'Positioning the RES in the theoretical perspective' will present necessary background information to the topic at study and how it relates to the theoretical perspective. Prevailing energy strategies, transition theory, strategic planning theory and operational planning theory provide the theoretical perspective and was used to determine the characteristics of strategic energy planning. The chapter ends with the conceptual model that has been used as a research guideline during this research Chapter 3 'Methodology' presents the research design, data collection strategy and research methods of this study. The results that have been found during the analysis have been presented along the structure of the conceptual model in Chapter 4 'Results'. The results are given meaning through an extensive discussion in Chapter 5 'Discussion'. The findings of the theoretical framework and discussion will provide the author with the right perspective to answer the sub and main research questions in Chapter 6 'Concluding the research'. Additionally, this chapter will present the authors reflection on the RES programme in it is bigger context and on the research process that was experienced.

This document finishes with the references that have been used to validate allegations made by the author. The Appendix provides the visualization of the RES documents analysis and the RES analysis summaries for each individual region.

Figure 1: All thirty energy regions. Source: De Informatiekaart

2. Positioning the RES in the theoretical perspective

This chapter will position the RES in the theoretical perspective. To have a clear understanding of the subject at study, background information is provided. Firstly, the background of the RES programme is discussed and how it relates to the 2015 Paris Agreement. Secondly, the relation between energy and space is discussed to illustrate the complexity of the spatial planning of renewable energy. Following up, the characteristics and goals of the RES programme is discussed to emphasise the challenge it forms.

The challenges that are formed with the RES programme are put into theoretical perspective by firstly discussing three established energy strategies found in the Netherlands. These strategies are developed by various academics as a result of decades of efficient energy research and can contribute to the RES programme by illustrating how efficient energy systems are organized. Secondly, the relation between spatial planning and renewable energy sources is discussed and concludes that there is a conflict in planning theory. In a try to find an adequate planning approach, transition theory is discussed. The characteristics of transition theory indicate that strategic planning is a useful approach. Different characteristics presented by multiple authors of strategic planning theory are discussed. It was additionally found that operational planning theory provides insights in the relation with short-term actions and planning.

This theoretical perspective has presented the author with multiple characteristics that could be corresponding to strategic energy planning. A selection of these characteristics is made on based on relevance for a useful programme. This leads to the criteria that are used in the assessment of the RES programme.

2.1.Background

On December 12th of 2015, 196 parties signed the Paris Agreement. This agreement is an international and legally binding treatment for participating countries that is developed to limit the effects of climate change (United Nations, 2015). The main goal of this agreement is to limit the warming of the earth to 2 degrees Celsius and preferably with 1.5 degrees Celsius, compared to pre-industrial levels (United Nations, 2015). Limiting the warming of the earth is supposed to be done by decreasing the emission of greenhouse gases (GHG) into the atmosphere as a result of a co-operative climate policy between all parties (Seo, 2017). This limitation is necessary to prevent alarming anthropogenic interference with the climate system such as the flooding of densely populated (coastal) regions (Seo, 2017). By signing the treaty, each participating party was obliged to submit their plans in 2020 for cutting out CO2 emissions in the future. In those plans it is stated what actions would be taken to accomplish the goals of the Paris Agreement and these get renewed every five years with increasingly more ambitious targets. (United Nations, 2015). These plans are called nationally determined contributions (NDCs) and the execution of these plans is mandatory by the Agreement (United Nations, 2015). Participating countries are also requested to formulate plans with a more long term vision, called long-term low GHG emission development strategies (LT-LEDS) (United Nations, 2015). These are unlike the NDCs not mandatory but do invite parties to think about their vision for a sustainable future and possibly affect other participating parties to also formulate ambitious goals.

One of the NDC's that the Netherlands has developed is called the Klimaatakkoord (2019) and describes the goals of the Netherlands to achieve the targets set by the Paris Agreement (2015). The main goal of the Klimaatakkoord (2019a) is to enable a reduction of GHG emissions. This is done by aiming for a 49% decrease of emissions in 2030 compared to

the GHG emission level of 1990 and a 95% decrease in 2050 (Rijksoverheid, 2019). To achieve this target, over a hundred parties have worked together since 2018 on a variety of measures, policies and plans.

The objective to realize such a CO2 emission reduction by 2030 on a national scale requires coordinated efforts of all CO2 emitting sectors and other (local) responsible parties. This can be seen as both top-down and bottom-up planning, at which the goal is formulated on a national scale and the implementation of plans lies with local authorities, according to Londo & Kramer (2019). On the national level, agreements are made with every involved sector or party that correspond with the degree in which the sector is involved with the emission of CO2 gases, the potential reduction of CO2 per sector and also the national challenge (Londo & Kramer, 2019). This top-down approach enables the central government to develop generic policy and provide guidelines for local governments (de Roo, 2017). The Klimaatakkoord (2019) acts as the national government's policy and provides regional authorities with guidelines on how to approach this CO2 reduction challenge. It is essential to distinguish that the Klimaatakkoord only consists of agreements and guidelines for regional authorities to follow and it does not entail what actual measures will be taken. The implementation of the Klimaatakkoord (2019) is done following a bottom-up approach where regional authorities provide incentives, measures and plans to develop renewable energy sources (Londo & Kramer, 2019).

2.2. Relation between energy and spatial planning

To reach the goal of the Klimaatakkoord (2019), reducing CO2 emissions, it is essential to switch to an energy system that is not dominantly reliant on fossil fuels such as coal, gas and oil. This goal is set apart from all the other reasons why a more sustainable energy supply is needed such as: rising fossil fuel tensions, oil price volatility, geopolitical tensions or environmental externalities caused by extracting fossil fuels (Scholten & Bosman, 2015). A majority of the CO2 that is emitted into the atmosphere comes from the burning of fossil fuels to produce electricity and therefore the energy sector is a logical place to start decreasing CO2 emissions (Van Kann, 2015). The energy sector is responsible for a large share in the CO2 emissions. However, at the same time it's responsible for keeping every sector, most of the society and economy running and can therefore not abruptly be shut down (Gordijn et al., 2003). This issue raises the need for alternative renewable energy sources such as wind or solar power.

Changing to a system that relies mostly on renewable energy sources such as wind and solar power comes with several challenges. The first and foremost challenge is one which has spatial complications: renewable energy sources have low energy density compared to fossil fuels and therefore the spatial footprint of renewable energy is very high, according to Smil (2015), at least a hundred times as big as a fossil fuel energy system. In dense urban counties, such as the Netherlands, it can be problematic to find available space for renewable energy sources. Add to this that not every location is suitable for renewable energy production. Wind energy is for example heavily reliant on the amount of (constant) wind power to be profitable (SenterNovem, 2007) and therefore is better suitable for coastal regions or places on open sea (Gordijn et al., 2003). Solar energy is in contrast less locationally bound but does require more open space. Renewable energy sources are therefore more locationally bound and require more open space than fossil energy sources (Van Kann, 2015).

Van Kann (2015) states that fossil fuel based energy systems are relatively unnoticeable in the landscape in comparison to renewable energy systems. The reason behind this is twofold: most fossil fuels that are used in the Netherlands are imported from abroad, and therefore affect the Dutch landscape minimally (Van Kann, 2015). Secondly, the fossil

fuel based energy system that is used in the Netherlands is underground built infrastructure such as the gas network whilst renewable energy sources, mostly wind energy takes a prominent role in the skyline (Pol et al., 2006). Public resistance arises when renewable energy sources are developed in a region that is populated and is believed by inhabitants that this has impacts for (esthetical or monetary) image of the region, this movement can be referred to as NIMBY'ism (Not In My Back Yard).

Wind and solar power affect the landscape to different degrees. Wind power has a relatively low spatial footprint, compared to solar power, but affects the landscape by disturbing the skyline as a result of its height. Additionally, building-free zones have to be considered around wind turbines to prevent excessive externalities such as noise or cast-shadow and therefore increase the indirect spatial footprint (Gordijn et al., 2003).

Another spatial challenge that is caused by a transition from fossil fuels to renewables is caused by path-dependency based electricity grid design problems as grid capacity limits are reached (Verbong et al., 2002). The current electricity grid is designed to handle a one-way flow of electricity from centrally placed fossil fuel based power plants to the users of electricity (Van Sluis, 2018). The current production of electricity happens in central places, like a coal-fired power plant and then gets distributed to the edges of the electricity grid, the households. The design of the electricity grid can therefore be seen as a centralized and top-down organized system (Van Kann, 2015). Renewable energy sources are however scattered across the Netherlands and adding such intermittent sources of energy causes a bi-directional flow of electricity through the grid which reduces efficiency in the grid. At this moment, there are already capacity problems on the grid which prevents new solar parks to be built in areas in the province of Groningen, Drenthe, Gelderland and Brabant (Enexis, 2020).

Moraga-González and Mulder (2018) state that the demand for electricity is rising as a result of the electrification of society. Van Kann (2015) concludes that a demand for electricity causes an even bigger demand for scarce space. Renewable energy sources occupy more space than fossil fuel based systems and this will have big consequences in the future development of renewables.

Considering the spatial challenges and implications of a renewably based energy system it can be concluded this challenge is becoming more complex. The spatial implications of the energy transition are extensive and need attention. The main challenge is to find suitable locations to develop renewable energy sources. To be more specific, suitable locations on land or inland waters that can be used by large-scale (>15kWp) solar parks or wind energy. The tool that was designed for this challenge is called the Regional Energy Strategy (RES) and this can be seen as one of the spatial implementational plans of the 2019 Klimaatakkoord (NP RES 2019).

2.3. Regional Energy Strategies

The introduction has already stated the relevance of transitioning to a renewable energy system. Multiple incentives and measures from the Klimaatakkoord (2019) have spatial implications such as the construction of solar or wind farms (NPRES, 2019). The RES functions as guidance for the spatial implications of renewable energy sources for energy regions. Every RES document is unique, as it's specifically made for each energy region and consists of area-specific incentives and measures on how to develop renewable energy sources in each region. The goal of the RES programme is to realize at least 35 TWh of renewable electricity sources in 2030 (NPRES, 2019). The RES can be seen as the (spatial) implementation plan for each region on how and where to develop renewable energy sources.

The 35TWh goal is part of a bigger challenge as it only entails the production of large-scale solar and wind production on land. If the 35TWh goal is achieved in 2030 it will contribute accordingly to the goals set in the Klimaatakkoord (2019).

From a governance perspective it was considered that the region is the most suitable governmental level to execute the plans necessary to complete the goals of the Klimaatakkoord (2015) by developing large scale wind and solar power sites on land. Such renewable energy sites can have high societal and environmental impacts on the region and can therefore accompany public resistance. The idea behind the RES programme is that local authorities, in collaboration with close citizen participation, are better capable of distinguishing suitable and potential sites for such energy initiatives. All 30 RES documents have been carefully developed with a wide array of stakeholders such as involved municipalities, provinces, waterboards, grid operators, local energy initiatives and working groups (Rijksoverheid, 2018). This is called a bottom-up approach and intends to increase public support for renewable energy sources '*in their backyard*'.

In essence, a RES document consists of an overview of the current, future and potential large-scale renewable energy sources on land. Within the RES, only large-scale solar and wind projects on land are considered. Projects based at sea or projects smaller than 15Kwp are part of another programme and will therefore not be included in the RES programme. All regions already have large scale renewable energy sources, these are listed as current projects. Within most regions, several large scale projects have already been planned but are not yet realized, these are called pipeline projects. Some regions also have pointed out areas within their region that have been selected to host projects in the future, these are potential (search) areas. The combination of the current projects, pipeline projects and potential projects is called their regional bid (in TWh), and the total sum of all regions must add up to at least 35TWh. To put this amount in contrast, if the 35TWh goal will be reached, it can provide for 12.8 million homes in the Netherlands as the average home in the Netherlands uses 2730 kWH a year, or account for one third of the total electricity consumption in the Netherlands (CBS, 2020).

The RES is a newly set up programme that originated from the Klimaatakkoord (2019). Not all regions have the budget, time and expertise to develop a complete energy strategy at once. The RES programme is an iterative programme and is therefore cut up in several stages which are the Concept RES, the RES 1.0 and the RES 2.0, etc. The Concept RES is a provisional bid from the regions that will indicate the total effort of all Concept RES' in the Netherlands. As the word concept describes, it's a first draft, a sketch, a try-out. No decisions or plans made in de Concept RES are final and can still be changed. The main goal of the Concept RES is to let regions meet with energy policy and estimate the provisional bid which also included that the regions needed to identify new potential locations for renewable energy development. The Concept RES had to be submitted to the NPRES by the first of June, 2020. At the first of march, 2021, the RES 1.0 had to be submitted. The 1.0 version has worked out most of the details that were still unclear in the Concept version and more importantly, it is a democratically binding document between the region and the central government. It is however only legally binding when integrated in the Spatial Development Vision. As a result, local authorities have to implement the agreements made in the RES 1.0 into their local policy and spatial planning. The RES 2.0 is a further elaboration and possible revision of the RES 1.0 and needs to be handed in at first of March 2023. The 2.0 version includes potential new insights or developments in heat sources or locational choices and decisions will be made on new grid infrastructure and/or storage sites. Versions that will be developed after the 2.0 version will be renewed and updated versions.

The name of the programme suggests that it aims to develop energy strategies. But what is known about energy strategies and when can something be considered a strategy. The following section describes three energy strategies to provide examples to understand the topic in the bigger context. Additionally, discussing the energy strategies reveals characteristics of energy strategies that could be used to clarify the context in which the RES programme is put.

2.4.Energy strategies

People have been working with different sources of energy for tens of thousands of years and have evolved extensive knowledge about energy and how it works. Since the industrial revolution, the knowledge of energy has increased exponentially. But only since a couple decades, the knowledge about efficient energy usage has risen. Current energy systems have become more efficient because of the energy strategies that were developed and these energy strategies can also contribute to transition to a renewable energy system. Energy strategies can be seen as the result of decades of studying efficient energy usage and should therefore be recognized in the RES programme to indicate that the wheel is not being invented twice. This section gives an overview of some of the energy strategies that are eminent in the Netherlands and can contribute to the assessment of the topic at study.

Trias Energetica

The Trias Energetica is a well-known energy strategy in Dutch policy works that was developed by Kees Duijvestein (TU Delft) in 1996 and coined Trias Energetica by Lysen in 1979 and consists of three steps to use energy in a more renewable way (van Leeuwen et al., 2017). The method was originally developed for the building sector but does also apply to energy systems on the macro level (Entrop & Brouwers 2010). This strategy is often used by authorities to develop policy aiming to reduce the use of fossil fuels in energy systems (Van Kann, 2015)

The steps of the Trias Energetica are based on Duijvestein (1993) and Lysen (1996) in Van Kann (2015).

1. The first step is to reduce the demand for energy by using energy in a rational fashion that prevents unnecessary use of energy.
2. The second step is to use renewable energy sources for the remaining demand of energy.
3. The final step is to use fossil energy sources as efficiently and clean as possible.

The first step is relevant to spatial planning as a smaller demand of energy reduces the spatial need for renewable energy forms as mentioned before ('Energy is space' by Van Kann, 2015 p. 82). Following up on this, if less energy is demanded, less energy needs to be generated with renewable sources. The second step is relevant in an energy strategy as the production of renewable energy is space intensive.

The last step shows the essential demand for (renewable) energy, with the result that residual energy is produced (in the form of warmth, kinetic or else). The residual energy can most likely be used by other processes and in turn reduce the total demand of energy and is therefore of vital in spatial planning (Van Kann, 2015).

REAP

The Rotterdam Energy Approach and Planning (REAP) was presented by Tillie and Van den Dobbelsteen (both employed at the TU Delft) in 2009 and served as a strategy for the ambitious vision of the city of Rotterdam to reduce its CO2 emissions by 50% in 2025. The REAP is based on the aforementioned Trias Energetica strategy but adds the New Stepped Strategy. This adds an intermediate strategy in between step 1 and 2 of the Trias Energetica and entails a strategy that focuses on waste products (Tillie et al., 2009).

The added step focuses on the optimal usage of used forms of energy (heat, water, other materials). The idea behind this is that (industrial) processes often produce a lot of energy waste which can most likely be used by other processes or functions. In other words, if the energy waste of a process can foresee another function or process with energy, a total reduction in the demand of energy is realized (Van Kann, 2015). This process can continue itself in a cascading pattern until the residual energy is no longer usable by processes of functions and therefore used in the most efficient way. Increasing the efficiency of energy reduces the overall need for energy and this in turn reduces the need for fossil fuels according to the Trias Energetica (Tillie et al., 2009). Making spatial functions operate symbiotically in terms of energy is an opportunity, which can reduce the energy demand through rational use of space and energy (Van Kann, 2015)

The second additional strategy of the REAP, in comparison to the Trias Energetica, is to ensure that waste is returned to the environment to serve as a source for other organisms, assuming it is guaranteed safe (Tillie et al., 2009).

Tillie et al. (2009) describe that the steps of the REAP apply to different scalar levels in the urban environment, building, neighbourhood, region and city level. This creates a two-dimensional overview of the energy system where horizontal (steps of the strategy in relation to each other) and vertical (different governance levels) integration is essential to optimize the strategy. The multi-level perspective model (de Roo, 2013; van der Brugge, 2015; Geels & Kemp, 2000) also applies in the REAP and emphasizes its relevance.

Groningse Energieladder

The Groningse Energieladder was introduced in 2008 and supported by the first Dutch astronaut Wubbo Ockels with the main goal to transition to an energy neutral Groningen in 2025. The Groningse Energieladder consists of five steps that should help Groningen reach its energy usage goal (Gemeente Groningen, 2007). The first and most important step of the strategy is to give preference to activities that do not use energy at all (example given: cycling does not require energy, e-bikes excluded). Activities that do not need energy require no more efficiency upgrades, or renewable energy at all. The second step is to reduce the demand for energy. This strep was also found in the Trias Energetica and REAP strategy. The third and fourth steps also correspond to the other strategies: use renewable energy if needed and use fossil fuels in an efficient way. The fifth step of the Groningse Energieladder is to compensate for the usage of fossil fuels. The idea behind this is that fossil fuels cannot be excluded from our energy system and therefore need to be compensated by capturing and storing CO2 (both chemical and natural: trees) (Gemeente Groningen, 2007).

It can be concluded that both REAP and the Groningse Energieladder strategies are related to the original Trias Energetica. Using energy efficiently to prevent unnecessary generation of energy is the main lesson to be learned. It can therefore be considered that

having an (related) energy strategy as part of the RES might increase the efficiency of the programme and will thus be seen as a criteria in the assessment.

2.5. Conflict in planning theory

The previous section has described the background for the RES approach and prevailing energy strategies. These energy strategies are however generic and cannot be applied in specific programmes such as the RES. The question then arises about the approach that should be followed to develop such a specific strategy. This section will explain the governance aspects of developing a specific strategy.

De Roo (2007) describes that a planning approach can be dependent on several factors that can be found in spatial planning processes. These factors include the type of goals that are formulated, the amount of involved actors, the level of complexity and the kind of development of the spatial planning issue (linear vs. non-linear). De Roo (2007) has developed a method to determine which planning approach is suitable for a spatial planning issue. To put it plainly, de Roo (2007) has identified the two most common planning approaches into a spectrum: the technical rationale and the communicative rationale. The technical rationale is based on the assumptions that planning processes can be predicted and controlled and results in a top-down approach that has its focus on a single goal and does not include the involvement of other actors (de Roo, 2007). The communicative rationale, which is described by de Roo (2007) as the counterpart planning approach to the technical rationale, is an approach that is based on handling uncertainties, strives for multi-functionality and involvement of multiple actors and follows a more bottom-up style (de Roo, 2007).

It can however be said that this spectrum is not applicable to the RES programme as this programme is following a hybrid planning approach where it follows both bottom-up and top-down structures. Additionally, the goal that has been set in the programme can be seen as a single fixed goal. The execution of this goal is done by individual energy regions developing spatial plans in their own region, together with involved actors, forming a bottom-up planning process. To summarize, the RES has a clear single goal but is aiming to achieve this goal with a process that is based on participation and integration of functions.

Following up, if we overlay the characteristics of the RES as a process with the two planning approaches described by de Roo, we can see that this leads to a mismatch. Such a mismatch can emerge as the scientific theory is not in line with the planning challenge. According to de Roo (2000), when a planning issue has a single fixed target, like the RES has, it also has hierarchical characteristics that results in a top-down approach without the involvement of multi-actors. The implementation of the RES is however a process that evolves in a bottom-up pattern and involves multiple actors whilst still aiming to achieve a single target. It can therefore be concluded that both the rational and communicative approach do not fit to the planning issue at stake.

The appearance of new complex planning issues, such as the energy transition or climate adaptation, overarch the capacity from both the local and national governments and require hybrid planning approaches. Such a hybrid approach can be used to benefit from strengths from both approaches. This hybrid approach is a modification to the work of de Roo (2007) and brings a new approach to the spatial planning discipline that can be used in newly emerging planning challenges.

The model of de Roo (2007) also assumes that processes develop in a linear pattern and this pattern can be recognized in normal evolutions of processes. Changing an entire energy system can however be seen as a transition from one system to another rather than a regular evolutionary process that follows a linear pattern (de Roo, 2007). Such a transition

from one system to another does not evolve in a linear fashion but follows a more exponential pattern that will eventually rule out the older system and rebalances (Van der Brugge et al. 2015). Approaching the planning issues caused by the implementation of an energy transition with governance theory of de Roo (2007) might be inadequate.

As a clarification, a transition can be seen as a word to describe a change, but this study considers a modification from a fossil fuel based system to a renewably powered energy system more than a change. Therefore, the word transition is used as the concept in which it refers to a significant change from one system to another (Loorbach, 2010). A transition does not happen overnight and requires intensive steering and a long-term vision to change an entire system. Transition theory might therefore give insights in the development of non-linear processes such as an energy transition as transition theory assumes non-linearity in developments.

2.6. Transition theory

The previous section illustrated that the governance model originating from de Roo (2007) might not capture the full potential of the energy transition. In contrast to the governance model, transition theory can perhaps play an important role in understanding the essential elements as transition theory has different views on time-scale it represents and the process in which developments evolve.

Van der Brugge et al. (2015, p.166) describe a transition as "*a process of the co-evolution of markets, networks, institutions, technologies, policies, individual behaviour and autonomous trends from one relatively stable system state to another*". Rotmans et al. (2000) state that the different aspects of a transition arena can positively reinforce each other and describe this as a co-evolutionary process. According to Loorbach et al. (2008), transitions have three characteristics: transitions are large-scale technological, economical, ecological, socio-cultural and institutional developments that influence and reinforce each other, transitions are long-term processes (at least 25 years) and within transitions there are interactions between different scale levels.

In transition theory, three concepts are considered critical by Van der Brugge et al. (2005): multi-stage, multi-level and transition management. According to Van der Brugge et al. (2005) a transition can be developing in four different speeds of change that imply in what phase the transition is at. In chronological order, the phases are: pre-development phase, take-off phase, acceleration phase and finally the stabilization phase and these phases describe the multi-stage model (Van der Brugge et al., 2005 & Rotmans et al., 2001). This change evolves in a non-linear pattern which roughly follows a s-curve (Loorbach et al., 2008). If this s-curve is followed for the energy transition, it should reach a moment where different developments positively reinforce each other and cause the transition to move forward to the acceleration phase. Such developments could entail regime level changes in energy policy such as the RES, which can positively reinforce other developments. Such developments can be innovations in renewable energy technology such as a decrease in the price of electric cars as a result of legislation that bans the building of new combustion engine cars (Klimaatakkoord, 2019). The concept of energy can be different depending on time, place or manifestation and therefore Van der Brugge et al. (2005) argue that the integration of different strategies is essential to capture the multiplicity of energy. A successful strategy should therefore not stand alone but be integrated with other sectors and (governance) levels to reach the acceleration phase instead of ending in a deadlock situation.

Loorbach et al. (2008) describe that a single development can intertwine with other developments at other scale levels of society and positively reinforce each other and that it is therefore important to recognize the different scale levels at play. This model is called the multilevel model and is based on Geels & Kemp (2000) who divide the different levels into niches, regimes and socio-technical landscapes. Sustainable transitions come with social issues that affect the entire society and economy and therefore the corresponding governance strategies should apply to all levels of and include a wide range of actors to successfully fulfil the transition (Loorbach et al., 2008).

The last concept which is highlighted by Van der Brugge et al. (2005) is the concept of transition management which is a governance approach that is rooted in the concepts of governance and complex systems theory (Loorbach, 2010). Van der Brugge (2005, p.167) describes the theory behind transition management as: "*Transition management is based on coordinating multi-actor processes at different levels, aiming at long-term sustainability through the creation of a joint problem perception and long-term vision, innovation networks and experimental playgrounds*". A successful strategy that follows the ideas of transition management should arise from a multi-actor process that has a long term vision whilst facilitating innovation, knowledge-development and evaluation in the transition arena. It can however be discussed that this is useful from a theoretical perspective, but accounts less for a case such as the RES programme where the transition arena consists of 30 regions.

Transition theory gives insights in how a transition can develop to the next phase. If we look at the implications provided by the Klimaatakkoord (2019) and the corresponding RES with such a transition theory perspective we can see similarities such as the multi-levelness, non-linearity of its development and need for integration. As Van der Brugge & Rotmans (2007) describe, a transition is a long-term process that takes up to at least 25 years. To prevent a lock-in, authorities can use policies, knowledge, capital and technology to enhance the transition and steer it in the right direction (Van der Brugge et al., 2005).

Transition theory as mentioned by Van der Brugge et al. (2005) discusses transition management, possibly indicating that transitions can be managed. This is however paradoxically linked to the other characteristics of transitions by Loorbach et al. (2008) and Van der Brugge et al. (2005). They state that transitions evolve with non-linear development and have a high degree of uncertainty. Such characteristics indicate that the long-term development of transitions cannot be easily managed and unforeseen developments can easily alter the path of the transition. This does however not mean that transitions cannot be adjusted or steered, and therefore it is suggested in this study to refer to this process as facilitation of transitions, instead of transition management.

To summarize, facilitating a transition requires a long-term vision, a multi-level perspective and a planning approach that stimulates integration in the planning process. These characteristics are not explicitly present in traditional planning approaches and creates the need for alternative planning approaches.

2.7. Strategic planning

The previous sections it is articulated that the switch from a fossil fuel based energy system to one of renewable energy can be considered a transition and Van der Brugge & Rotmans (2007) stated that a transition is a long term process whilst Van der Brugge et al. (2005) remarks the possibility of steering the transition. Facilitating long-term adjustments to enhance the transition can best be done by accompanying a strategy or strategic planning that fits the needs and characteristics of the wanted transition to prevent a lock-in situation, as

described in transition theory. The RES is one of the Dutch strategies for the spatial implementation of renewable energy sources into the current energy system. This raises questions about what strategic planning is and how it can be characterized and applied within the RES programme.

The popularity of strategic spatial planning theory amongst scholars has varied in the last decades. Albrechts (2004) stated that strategic spatial planning was no longer a main planning instrument at the end of the millennium. Mäntysalo et al. (2015) however describe that strategic spatial planning has gained interests again amongst theorists and spatial planners. The reason behind this return of spatial planning instrument can be found in the large scalar increase of metropolises and corresponding expansion of mobility networks and evolving communication and digitalization (Mäntysalo et al., 2015). The evolution of the mobility network (car dependency) has led to enhanced levels of GHG emissions and the digitalization has in turn led to a change of how our energy system operates (Mäntysalo et al., 2015). Both developments led to institutional fragmentation and the segregation of urban systems showed the vulnerability that these urban structures have (Mäntysalo et al., 2015). As the previous section has indicated, traditional planning approaches are not suitable anymore for new spatial planning themes such as energy transition, climate adaptation, sustainability, nitrogen issues or marine spatial planning and require new approaches such as strategic planning.

The current spatial planning approaches are deemed unable to tackle these persistent problems and this invited scholars such as Albrechts and Balducci to reconsider other planning approaches, such as strategic spatial planning (Mäntysalo et al., 2015). Strategic spatial planning was considered the spatial planning instrument that could oversee the limitations of traditional planning approaches, such as a lack of long-term vision-making, by having an approach that was content specific (Albrechts & Balducci 2013), and be able to tackle the challenges that had emerged (Mäntysalo et al., 2015).

A RES, Regional Energy Strategy, reveals the idea that it is a strategy itself. But does the name of the concept capture its own content? In other words, is the RES truly a strategy? This question is relevant as the literature has suggested characteristics of strategic planning, but can these characterise also be found in the empirical side of this study.

Albrechts (2004), who can be considered a key scholar in his field of work, describes that there is not a singular definition of strategic planning and that the approach entails multiple concepts. Bryson and Roering (1996) also mention that strategic planning cannot be described as a single concept or planning instrument but needs to be considered a multitude of tools, instruments and concepts that need to be altered and adjusted to specific situations in time and place. To conceptualize the degree of strategic planning it is therefore necessary to identify multiple characteristics of strategic planning. Albrechts (2004) states that 'strategic' implies that some decisions or actions are prioritized above others in the planning process that is supposed to be a fair, well-educated and rationalized response to planning challenges in the short, medium and long term.

A multitude of scholars have tried to conceptualize the idea of strategic spatial planning. A comprehensive overview of some of the suggested characteristics is provided by de Roo (2013, p. 107) "Strategic plans are primarily visionary in character, and therefore have the broadest horizon. This purpose of this type of plan is to place political and administrative intentions in a policy context, within which the various ambitions relating to different policy areas are indicated, and in which the stakeholders are approached in order to convince them of the necessity and/or importance of the intentions, the general objectives resulting from those

intentions, the desired effect on the wider community and, finally, the path to achieving this." Or by Albrechts (2004, p. 753) "The end product consists of an analysis of the main processes shaping our environment, a dynamic, integrated, and indicative long-term vision (frame), a plan for short-term and long-term actions, a budget, and a strategy for implementation". These scholars indicate that strategic planning has the characteristics that showed essential for new complex planning issues described before.

Within strategic planning theory, a multitude of characteristics of strategic planning have been recognized by several prominent authors. Table 2.1 provides an overview of the characteristics of strategic spatial planning that have been identified.

Characteristic	**Scholar(s)**
(Long-term) visionary character	Albrechts, 2004; Albrechts & Balducci, 2013; de Roo, 2013; Healey 2009; Healey, 1997; Mäntysalo et al., 2015.
Adaptive capacity	Albrechts 2004; Albrechts & Balducci, 2013; Healey 2009
Action oriented	Albrechts & Balducci, 2015; Mäntysalo et al., 2015.
Dynamic problem descriptions / recognitions	Albrechts and Balducci, 2013; Mäntysalo et al., 2015.
Multilevel governance	Albrechts, 2004; Albrechts & Balducci, 2013; De Roo, 2013; Healey, 1997; Mäntysalo et al., 2015.
Broad horizon	Albrechts 2004, Albrechts & Balducci, 2013; de Roo, 2013; Healey 2009.
Budgetary information	Albrechts, 2004; Albrechts & Balducci, 2015.

Table 2.1: characteristics of strategic planning.

The general characteristics of strategic spatial planning can however differ from strategic planning for specific disciplines or even per strategy. Not every characteristic of strategic planning can be found in a strategy that is focused on transitioning from one energy system to another. For example, strategic planning within the software discipline has a different view on what can be considered long-term, as to what is considered long-term in transitions in energy systems.

This research has recognized five characteristics from the strategic planning approach that can overlap with the characteristics found in transition theory. These characteristics can be found in the table below corresponding the literature that substantiate these characteristics. These five characteristics are considered to be essential for the assessment of appropriate and useful strategic energy planning and are therefore used as criteria in the Concept RES analysis.

Characteristics	**Authors**
(Long-term) visionary character	Albrechts, 2004; Albrechts & Balducci, 2013; de Roo, 2013; Healey 2009; Healey, 1997; Loorbach et al., 2008; Mäntysalo et al., 2015; Van der Brugge et al., 2005.
Broad horizon	Albrechts 2004, Albrechts & Balducci, 2013; de Roo, 2013; Healey 2009.
Plan for implementation	Albrechts & Balducci, 2015; de Roo, 2013; Mäntysalo et al., 2015.
Budgetary information	Albrechts, 2004; Albrechts & Balducci, 2013; de Roo, 2013

Multilevel perspective	Albrechts, 2004; Albrechts & Balducci, 2013; de Roo, 2013; Healey, 1997; Loorbach et al., 2008; Mäntysalo et al., 2015; Van der Brugge et al., 2005.

Table 2.2: criteria identified for generic strategic assessment

Strategic planning that merely focuses with a long-term perspective is missing the link with the implementation of projects in the present and will thus not be effective. Strategic planning should therefore be linked with operational and tactical planning to translate a long-term vision to the implementation of projects in the near future. Operational and tactical planning among other things influence plans for implementation and have therefore already been integrated in the table above.

2.8. Operational planning

The previous section has distinguished that strategic planning is characterized by a long-term vision, a multi-level governance approach and most especially a policy-making approach. Strategic plans miss out on concreteness and are therefore less suitable for the implementation of the plans (de Roo, 2013). The strategic vision is used to formulate a tactical or operational plan that entails the plans to identify the necessary actions that can be carried out on a short- or medium-time span (de Roo, 2013). The tactical plan provides insights into the involved stakeholders, the financial budgetary information of the planned actions and places the actions on a timeline (de Roo, 2013). The question can however be raised about the effectiveness of strategic planning if it is not linked to short term tactical or operational planning which includes actions or measures that are executed on the short term. A strategy, such as the RES, should therefore also be linked to executable planning approaches which can be considered the means to the strategy's end. If there is no link between those planning approaches it can be said that the process which is desired by the NP RES leads to no actions or measures. If the RES misses this link, it is an ineffective strategy as the vision cannot be realized.

De Roo (2013) further mentions the operational planning process. The operational planning process is at the executional level and forms the implementation of the strategic plan. During the operational planning process the vision is transformed into short- and medium-term actions that have a higher level of concreteness as the strategic plans (de Roo, 2013). With an operational plan, the time limit is set and the boundaries of the object are clearly defined (Albrechts, 2004). With an operational planning process comes a clear set of details and instructions on how to reach the wanted goal of the project (de Roo, 2013). Implementation plans are formed with operational planning processes and translates the vision from strategic planning to executable plans. The timespan with operational planning is therefore shorter than of strategic planning.

Strategic, operational and tactical planning have been common planning approaches for a couple of decades (Albrechts, 2004). In this study, it was however found that strategic energy planning is not common yet as academic literature is limited. With the goals set in the Paris Agreement in mind, more strategic energy planning is likely to happen and this raises the need for academic research into strategic energy planning. The five characteristics found by the author of this study in strategic planning theory can potentially be considered as the foundation for all strategic plans and can be applied to other spatial planning challenges that require strategy making.

2.9.Conceptual Model

Figure 2 is the conceptual model that is used in this study. It presents the theories and concepts used and how these relate to the assessment of the Concept RES assessment. The conceptual model gives an indication that the RES programme put central in this study, complimented by the energy context. From context, prevailing energy strategies have been discussed and is considered to be one of the criteria. Transition theory gave insights in the duration of transitions and indicated that the management of such transitions require a corresponding time-span, which could also be found in strategic planning. Additionally, transition theory also indicated the importance of the multi-level perspective and visionary character. From strategic planning theory five different criteria were deduced. From which two criteria were commonly found in transition theory, and the plan for implementation criteria was also recognized in operational planning theory. Operational planning theory was found essential through the need for short-term implementation of long-term vision.

Following the structure of this conceptual model improved the legitimacy of this study by showing the relatedness of the criteria. Having multiple academic theories as the foundation for the RES assessment reduced the change of the author being short-sighted. However, despite this research strategy, the research limitations resulted in a compact selection of criteria which was made with the best academic intentions.

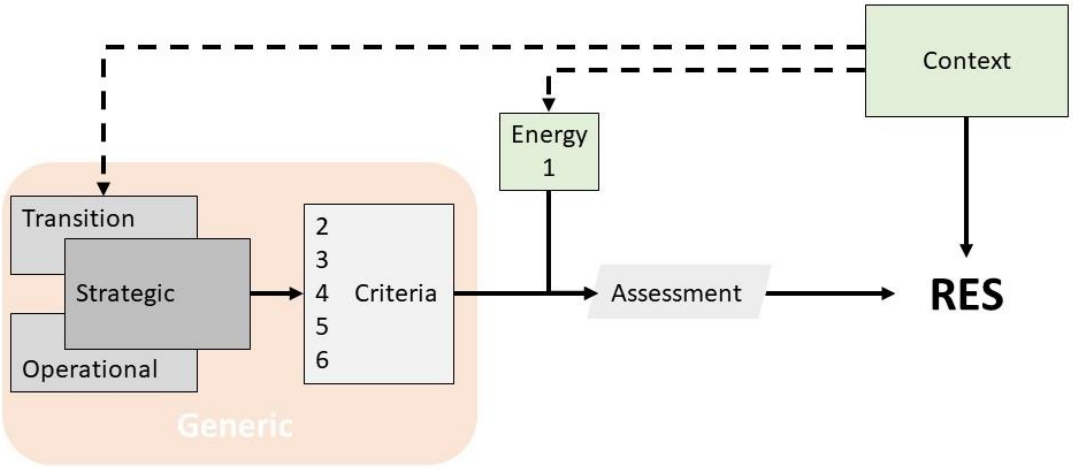

Figure 2: Conceptual model. Made by author.

3. Methodology

The previous chapter has outlined the theoretical perspective that was used in this thesis to give academic meaning to the analysis. This chapter will discuss the methodological approach and gives insights in the research design, the study design, the selection of the study subject and demarcation information, data analysis methods and ethical considerations. The methodological framework is designed with the intent to inform the reader on the systemics, structure and research strategy of this study and to help answer the research question. The following research question is formulated:

To what extent can the Regional Energy Strategies (RES) programme considered useful for achieving the goals for large-scall renewable energy production on land set in the 2019 Climate Agreement of the Netherlands?

To gain understanding in subject at study. The following sub-questions have been formulated:

- In what context does the RES programme play a role?
- What are Regional Energy Strategies?
- What can be considered useful planning approaches for achieving long-term goals?
- Which criteria can be used in the assessment of thirty RES documents?

3.1.Research design

This study uses a qualitative research approach to identify what criteria are deemed essential for a useful energy strategy. The RES programme is a multi-year process that evolves and can therefore be better understood by looking for patterns, similarities and differences. Furthermore, the Concept RES documents can be seen as precursors of legally binding policy based on co-creation of projects, plans and measures which are better identified with qualitative research design. Qualitative research also fits better in cases, such as an analysis of a year-old programme, that are relatively new and have not yet been a topic of research extensively before (Strauss & Corbin, 1990).

This study will conduct an analysis of the Concept RES documents that were released in 2020 and collected in 2021 and can therefore be considered a cross-sectional research strategy (Salkind, 2010). The concept RES documents are part of a continuous programme that gets renewed and develops adjusted and updated documents but due to limited time, this study is restricted to only the Concept RES documents. The results found in this study are therefore only applicable to the Concept RES documents and describe the most recent strategies at this time of writing (June, 2021).

3.2. Case study design

Within the RES programme, thirty regions are identified that have developed their own and unique strategies. This study has used all thirty regions in its analysis and can therefore be considered a full-with research. Using such a research design enhances the reliability, legitimacy and objectivity of the results and the results show an accurate representation of the programme (McLeod, 2010). By using all cases in this study it was possible to prevent a need for generalisation of the study results. The combination of reliability and lack of generalisation can be considered the strength of this research design. The disadvantage of using a full-width research design is that the analysis is limited to a certain depth.

The different regions are put in alphabetical order in the analysis and whilst mentioning the regions in the results it does not give meaning to some sort of hierarchy between the regions other than alphabetically.

3.3. Topic selection and scope

The reason to choose for this study lies within its everyday societal and academic relevance. The Netherlands is legally bound to achieve the goals set in the 2019 Klimaatakkoord and requires a transition that does not occur overnight. Using strategic spatial planning in a substantiation for the analysis of so-called regional energy strategies links the theory with practice and adds relevance to this study. Additionally, no qualitative analysis based on academic insights has been conducted for the Concept RES programme to the knowledge of the author. The reason for choosing an analysis based on Dutch regional energy strategies lies within practical reasons: the documents are written in the Dutch language and publicly provided digitally by Dutch authorities.

The scope of this study excludes certain aspects of the RES programme. These aspects have already been analysed by the national authority Planbureau voor de Leefomgeving (PBL) (Matthijsen et al., 2021). These aspects include: public participation, public support, spatial quality and the 'Regionale Structuur Warmte'. The grid capacity analysis is only mentioned in this study when considered relevant for other criteria as the network is the responsibility of grid operators, and is to complex for the scope of this study.

3.4. Methods of data collection

This study includes two data collection methods, a document analysis and an expert interview. Such a combination can strengthen the research results and give more in-depth insights in the subject at study as Shoaib & Mujtaba (2016) argue. These research methods complement each other and contribute to a better research design. The document analysis provided broad insights in the RES programme. The ex post expert interview has provided both validation and remarks for the findings of this study and contributed to a more in-depth discussion (Yin, 2017).

3.4.1. Documents

The data collection method of all thirty regions can be easily generalized as almost all documents were downloaded from the websites of all regions in April of 2021. Only the Concept RES Groningen was requested by mail as it had already been updated to the RES 1.0 version online.

Executing a document analysis has some advantages. Documents are considered stable, as they are most likely not to be updated and can therefore be analysed and referred to for a longer timespan (Gray, 2014). Additionally, (government) documents can most likely to be considered accurate and factual.

The documents have all been uploaded to the websites in 2020 as the official deadline for proposing the Concept RES was in October 2020. Some documents are every extensive (maximum of 331 pages) and some were more compact (minimum of 23 pages) and added up to 2803 pages in total. The Concept RES documents can be found in the Google Drive folder, corresponding to this study, or can be freely downloaded from the websites of participating regions. Underneath is a list of the regions that participated in the RES programme and have thus been analysed in this research.

Achterhoek	Fruitdelta Rivierenland	Noord-holland Zuid
Alblasserwaard	Goeree-Overflakkee	Noordoost Brabant
Amersfoort	Groningen	Noord-Veluwe
Arnhem-Nijmegen	Hart van Brabant	Rotterdam-den Haag
Cleantech Regio	Hoeksche Waard	Twente
Drechtsteden	Holland-Rijnland	U16
Drenthe	Metropoolregio Eindhoven	West-Brabant
Flevoland	Midden Holland	West-Overijssel
Foodvalley	Noord- en Midden Limburg	Zeeland
Friesland	Noord-holland Noord	Zuid-Limburg

Table 3.1: list of RES regions.

The author is aware of possible reporting bias in the Concept RES documents. There is a possibility that the authors of the RES documents have not accurately described the efforts of the region for the RES programme. This reason is in twofold: firstly, there is a possibility that authors of the Concept RES documents have over emphasised some of the regions intentions or actions to improve the (political) image of the ongoing process. Secondly, authors of the Concept RES documents might have (deliberately) chosen to not present all actions and processes within the RES programme. It should therefore be considered that there is a possibility that regions have undertaken actions or processes whilst not being noted in the documents and thus influenced the results of the assessment. An example provided by Matthijsen (2021) is that most regions are most likely to be in contact with adjacent regions, whilst this was only sometimes found in the documents. This could have had an impact on the assessment. It's however not possible to validate all the Concept RES documents and therefore it is, with caution, assumed that the documents are correct and complete.

3.4.2. Interview

The second method of data collection is an expert interview. This interview is conducted ex post with the intention to gain more in-depth insights in the subject at study as well as to validate, or reject findings. An interview has the advantage of being flexible and providing original and insightful data specifically for the subject at study. The researcher should however consider possible response bias for whatever reason (Gray, 2014).

The interview was conducted with Dr. Jan Matthijsen, currently a senior academic researcher at the PBL specialised in climate, air quality and energy. Dr Matthijsen is main author of a publication used in this study and has conducted an analysis of the Concept RES documents. The qualifications and current research agenda of Dr. Matthijsen indicate that the interview can be considered as an expert interview.

Dr. Matthijsen was directly contacted via LinkedIn with the request to discuss the preliminary findings of this study. This approach was chosen to prevent that possible bureaucracy at the PBL would distort the request of the author. Additionally, the author has experienced that this is often found to be a fast and direct communication medium. An appointment was made to meet via Zoom software as the COVID-19 virus restrictions prohibited a face-to-face meeting. This did however not influence the interview as both participants were both in possession of adequate digital infrastructure. The expert was asked for permission to be recorded during the interview and gave permission, with the condition that the recording was not distributed in some sort. Dr. Matthijsen was provided the

preliminary findings of this research and a summary of this study via email before the interview. The interview was semi-structured based which allowed the interviewee to also address broader context whilst the interviewer keeps control over the content (Gray, 2014).

During the semi-structured interview, preliminary results have been discussed and the expert has provided new insights in the discussion. The recording of the interview was used by the author of this study to compliment or contradict findings and come to new insights.

3.5.Methods of data analysis

The Concept RES document analysis was executed based on six criteria: the degree in which the region had considered an energy strategy, the degree in which a visionary character was identified, the degree in which the region had used a broad horizon, the degree in which plans for implementation were found, the degree to which a budgetary vision was identified and to what extent the regions included their multi-level perspective. Table 3.2 shows the criteria, and their origin, that will be used in the assessment of the Concept RES documents. The selection of criteria is in line with the design of the conceptual model.

Criteria	**Origin**
Energy strategy	Trias Energetica, REAP, Groningese energieladder
Plan for implementation	Strategic planning, Operational planning
Budgetary information	Strategic planning
Broad horizon	Strategic planning
Visionary character	Transition theory, Strategic planning
Multi-level perspective	Transition theory, Strategic planning

Table 3.2: Criteria and their origin used in the assessment.

The criteria are rated from none (where no or almost no information was provided on the criteria), to low (where criteria are mentioned without any/ little further consequences), moderate (if the criteria was identified with follow-up consequences) and high (if the region showed extensive details about consequences for the criteria). The appendix includes a visualisation of the score of each criteria per region. Additionally, the appendix includes short summaries that substantiate these ratings.

The first step that is done in the analysis is reading all documents based on the alphabetical order of the region name. Whilst reading, remarks have been made on sections of text that indicated something about one of the six criteria. After finishing reading the document, a table is filled in that summarizes the findings categorized per criteria and with corresponding page numbers. The author developed a Google Drive folder that allows readers to automatically see what sections in the Concept RES documents are used to evaluate the strategy. This means that readers can directly see what is the validation for the interpretation of the author is in the RES documents. An invitation to this folder can be requested at l.butz@student.rug.nl. These summaries can be found in the appendix. The summaries are used to give a score for each criteria for each individual Concept RES document. These scores can also be found in the summaries. It is therefore controllable for each score what substantiation was of the author for this score. It should however be kept in mind that this is based on the interpretation of the author and can differ on the details with someone else's

opinion. With the completion of this stage of the analysis, an overview of the scores is made that resulted in table 4. This table visually shows patterns along regions or criteria.

3.6.Ethical considerations

To ensure the legitimacy of this study and keep its academic value ensured there is a need to consider two things:

1. This study is not aiming to inspect the strategy of an individual region with the intent to grade the individual region. The strategies are individually analysed to give insights in the total process and current status of the RES programme. The author is aware of the current concept-status that the RES programme is in at time of writing and understands that this is not the definitive version. A goal of this study is to contribute to the iterative process of the RES programme as the constructive analysis can be used to possibly enhance future RES documents.
2. The author has conducted research in an independent manner and has no emotional, jurisdictional or financial relations with any region that could affect the results. The analysis and corresponding scores are however partly based on the authors intuition while reading the Concept RES document as the criteria are qualitative in nature and can therefore not accurately be measured. This process however did follow a consistent manner. To ensure that the document analysis was subject to influence caused by a specific order, a secondary analysis moment will be done that checks results for legitimacy.

4. Results

This section will describe the results found during the RES document analysis. The conceptual model has provided six criteria that have been analysed for each region. The results from each criteria is presented below. The results will be presented in the same order as was found in the conceptual model. The next chapter will discuss the results.

4.1. Energy Strategy

From the analyses done on all thirty RES regions, it stands out that most regions actively seek to follow one or more energy strategies that are distinguished in the theoretical framework. Most regions have a priority on the energy saving aspect which is found most prominently in the Trias Energetica, coined by Lysen. There can however be found a clear division in the degree of what actions are taken to seek such energy savings. In the regions Flevoland, Goeree-overflakkee, Groningen, Hart van Brabant, Holland-Rijnland, Metropoolregio Eindhoven, Noord- en Midden Limburg and Zeeland it was found that that energy saving strategies were not only prioritized but were also translated into practice by developing programmes for homeowners, providing information by digital platforms or neighbourhood coaches or by setting up funds that can be used by homeowners to isolate their buildings.

The regions of Arnhem-Nijmegen, Fruitdelta Rivierenland, West-Overijssel are lacking an energy strategy or have only briefly mentioned that measures like energy saving are important without mentioning a strategy to achieve such ambitions. The remaining regions have either gotten a low or moderate score on the energy strategy. The regions that have received a low score often mentioned an energy strategy, such as energy saving, but yet are missing the link with implementation in practice. These regions are aware of the necessity of an energy strategy but have not yet worked out how this translates into actual strategies.

The regions that have scored moderately, such as Achterhoek, Alblasserwaard, Foodvalley, Friesland, Hoeksche Waard, Noordoost-Brabant and the Cleantech region most often mentioned their energy strategies and goals but were lacking detailed information on the methods that will be used to reach those goals. It stood out that some regions such as Noord-Holland Noord, Cleantech Regio or Zeeland had set more ambitious goals for their regions regarding CO2 emission than was agreed upon in the Klimaatakkoord (2019) by setting goals such as reaching 95% reduction earlier than 2050 or by aiming for 100% reduction.

Additionally it is found that regions that lack an energy strategy also seem to score low on the other criteria. This can be seen in the regions of Arnhem-Nijmegen, Drechtsteden, Fruitdelta Rivierenland, U16 and West-Overijssel.

4.2. Visionary character

The second criterion that is discussed in the Concept RES analysis is having a visionary character. The analysis pointed out clear distinctions between most regions. Only Flevoland and Rotterdam-Den Haag have highly considered their visionary character in the development of the concept RES document. These regions have actively considered that the RES programme is not ending in 2030 but sketched a vision until 2050, which is aimed to be the year in which every region needs to be almost energy neutral. These regions have included plans and objectives for the period between 2030 and 2050 which contribute at reaching the set goals. This can be seen as long-term strategic planning.

One-third[1] of the regions did however not show a visionary character in the development of the concept RES and showed no additional long-term vision. Within this group, a distinction can be seen between regions that have noted that such a long-term vision will be included in the RES 1.0 and RES 2.0 document and between regions that did not include such a side note.

Some regions have not included any detailed plans for after 2030 but have recognized other important issues that might arise in the future. The region Holland-Rijnland for example noted that the mobility sector is changing rapidly and that the RES should anticipate this in the plans for 2030 and beyond. The region Midden-Holland noted that in the coming decades peat-oxidation is going to increase which leads to additional CO2 emissions (Erkens et al., 2016), that will need to be compensated for to achieve carbon neutrality and thus anticipate this with the RES strategy accordingly. The Noordoost Brabant region stated that as a result of innovation and development of air conditioning devices and higher temperatures experienced in cities (Kleerekoper et al., 2012) it can lead to unforeseen higher electricity demand. Such considerations that these regions made were not obliged by the NPRES to be included but are however used to develop the Concept RES document and therefore contribute to the visionary character of the RES document.

Nine regions[2] have got a moderate visionary character according to the concept RES analysis. These regions acknowledge the essence of a long term vision but are often lacking the translation from vision to practice. Some of these regions, such as Friesland, estimated their future energy demand in periods after 2030 to estimate what their renewable energy production needs to be and adapted their bid accordingly to these estimations.

4.3.Broad horizon

The third criterion called broad horizon is not often found in the concept RES documents. Flevoland and Goeree-Overflakkee can be considered front-runners in this topic. Both regions actively pursue a strategy that is not limiting its options in the future. These regions acknowledge the importance of energy storage solutions such as hydrogen and other technologies and make sure that these options are not left out in the development of future RES documents.

These regions as well as West-Brabant also prevent so-called path-dependency by blocking measures that have permanent effects on the energy system or landscape. The RES is designed in such a way that it is flexible and can adapt to future developments and innovations. Some regions such as Drechtsteden, Fruitdelta Rivierenland, Noord-Veluwe or Zeeland have used scenario-planning to design different scenarios and developed measures, plans and incentives accordingly. Additionally, Achterhoek and Flevoland have included measures that guarantee a process that determines whether wind turbines have to be replaced or broken down instead of one on one replacement.

The region Midden-Holland has strictly stated (p. 12,14/15) that less developed energy carriers such as biogas and hydrogen will not be seen as viable options in their region in the coming decade whilst most other regions (Rotterdam-Den Haag, p. 32) strongly support

[1] Alblasserwaard, Amersfoort, Drechtsteden, Drenthe, Goeree-Overflakkee, Groningen, Hart van Brabant, Hoeksche Waard, Noord-Holland Zuid, West-Overijssel.
[2] Achterhoek, Friesland, Midden-Holland, Noord-Holland Noord, Noord- en Midden Limburg, Noord-Veluwe, Cleantech Regio, Zeeland, Zuid-Limburg.

the development of such energy systems and are even considered vital in future energy supply.

4.4.Plan for implementation

The concept RES documents have been analysed based on their plans for implementation as the implementation phase is essential in achieving actual results and thus give an indication of effectiveness. Here, large differences can be found between the regions regarding plans for implementation of renewable energy sources. Most regions have not yet made decisions on what regions are suitable for renewable energy production let alone actual plans for implementation. The Flevoland Region states that it has not yet had enough time with its stakeholders and citizens to already point out detailed locations but that these plans will be included in the RES 1.0. The U16 region also lacks detailed information on what locations will be used for renewable energy as can be seen in figure 4.1. Contrary, Friesland has already identified detailed locations that are suitable for renewable energy production together with its inhabitants and stakeholders, as seen in figure 4.2. These differences can also be seen in the difference in details in maps provided by the regions to show potential locations to develop renewable energy sources.

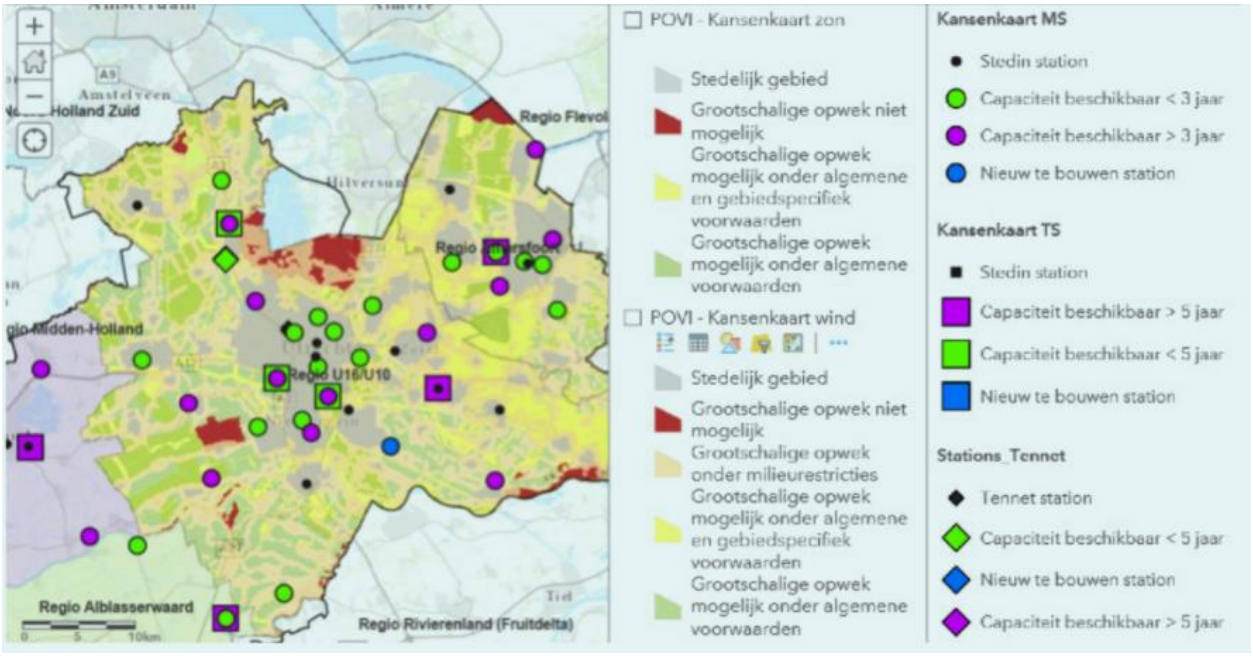

Figure 4.1: Map of U16 of potential areas for renewables. Yellow and green areas represent potential areas for renewables. Source: Concept RES U16.

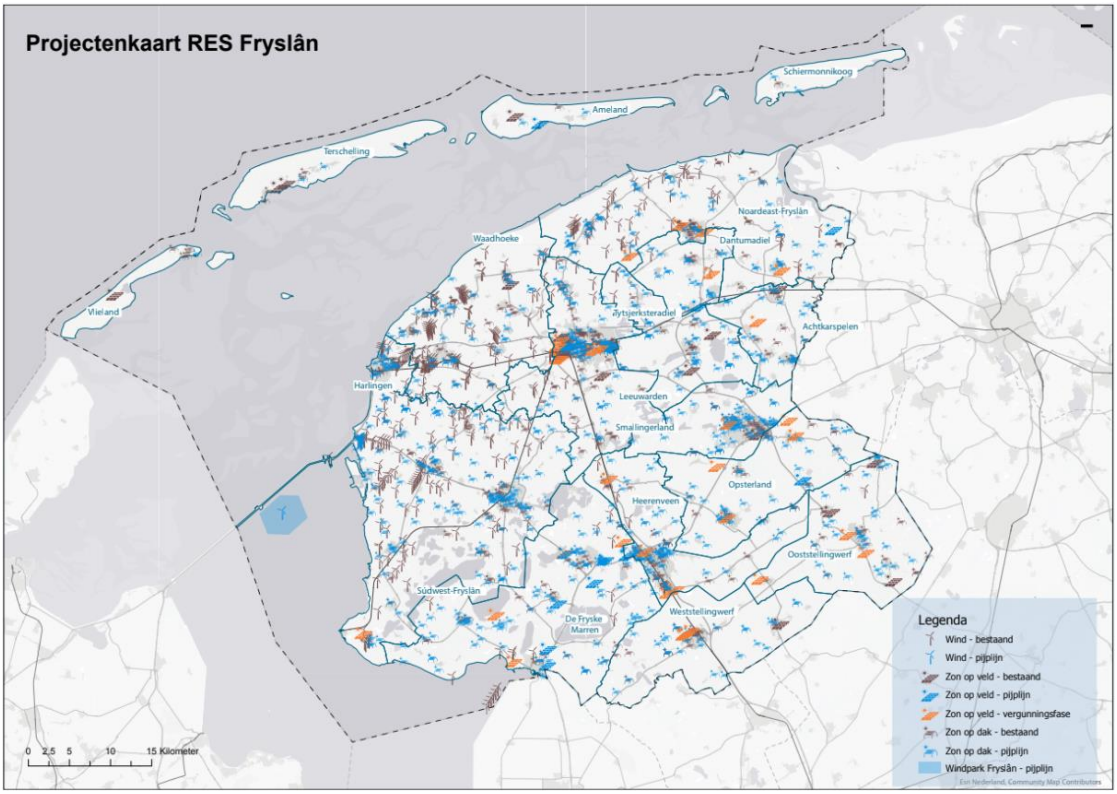

Figure 4.2: Project map of Friesland. Source: Concept RES Fryslân.

Most regions have used citizen and stakeholder participation to design so-called 'Zonneladders' or 'Energieladders' which help determine policy makers which locations are considered most suitable. The ladders describe the options that have most public support and which locations are no-go zones for renewable energy. On almost all preference-ladders it is solar power on (commercial or residential) buildings that is most preferred. These ladders have been designed with the help of the public and therefore can possibly increases public support.

4.5.Budgetairy vision

In most of the Concept RES documents, almost no information was found on the topic of budgetary vision. Most regions have stated that they have not yet (been able to) include a budgetary vision in the concept RES document and that more detailed information will be included in the RES 1.0 and RES 2.0. The only region that was found in de Concept RES analysis that has included a budgetary vision is Zeeland that stated (p. 21) that the Zeeland Region will not be able to execute plans and projects that are developed during the RES programme without the financial aid of the State. The region noted that not all goals will be reached if the central government is not offering financial aid. Financial aid can be necessary for developing and RES documents and/or for the implementation of the plans.

Some regions like Drenthe, Goeree-Overflakkee or Zeeland have already set up funds for homeowners to borrow money to invest in energy savings measures or for initial setting up phases of new projects. Most regions have indicated that they strive for co-ownership of new energy projects between project developers and local inhabitants of the region. The 50/50 ownership-concept is often used by regions to financially involve local inhabitants in new projects. This concept ensures that the people living near such new energy projects become 50% owners of the park and thus enjoy (financial) benefits of new parks, not only disadvantages such as environmental externalities.

Almost all regions (except Noord-Veluwe) have included an analysis made by grid operators to examine possible grid capacity problems caused by implementation of renewable energy. This analysis showed, if and where, problems would arise on the grid and often also included what technical measures could be taken to solve such problems. These measures however mainly consisted of building new transformator equipment and installing new cables into the ground, with an average building timespan of 7 to 10 years (Dagblad van het Noorden, 2019). Grid efficiency is put high on the RES agenda which determines what areas can be transformed more efficiently into potential production sites. These locations are close to a grid connection that provides enough capacity for the new park to deliver peak loads back to the grid.

The analysis concluded that all regions will foresee capacity problems in the (near) future, or are already experiencing problems at this moment (Netbeheer Nederland, 2020). Increasing grid capacity can be done in multiple ways. For example by using smart grid networks, allowing peak-hour capacity to be used, use storage solutions such as batteries or by directly connecting new renewable energy projects to its demand. However, physically expanding and strengthening the current grid by laying additional cables in the ground and by building extra transformator stations is seen as an essential and unavoidable move. This is however costly. These costs are for the account of the grid operators which in turn will redirect these costs to users of the grid. During the development of the Concept RES grid investment costs are not included whilst this might cause financial problems which can lead to delays in the development of new energy projects. Figure 4.3 gives an indication of the grid capacity problems, especially in areas with a low population density. These areas are also more appealing for project developers as more suitable ground is available. This study will not go into detail any further in the grid capacity topic as this is limited by the scope of this study.

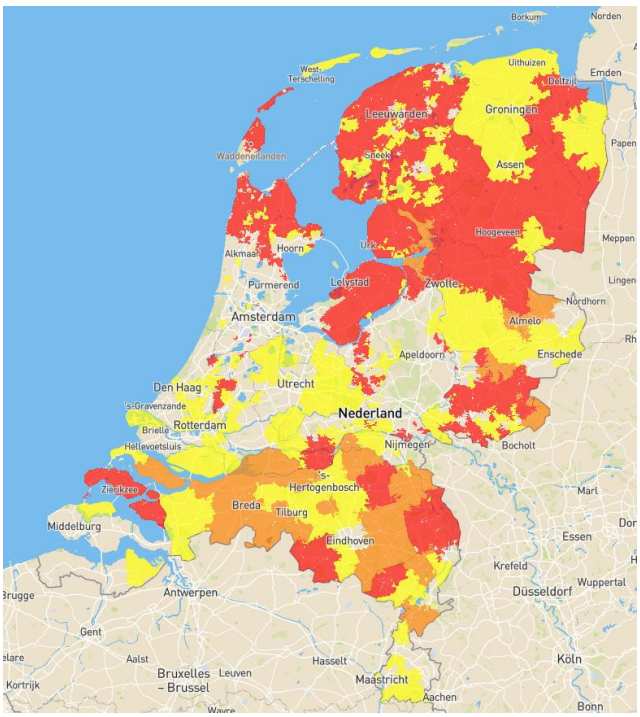

Figure 4.3: grid capacity in the Netherlands. In yellow areas, grid capacity problems are likely in the near future. Orange indicates non-structural capacity problems and red indicates no more grid capacity is left for new projects. Source: Netbeheer Nederland.

4.6.Multi-level perspective

During the analysis of the multi-level perspective criterion obvious differences were found between regions. The regions Holland-Rijnland, Noord-Holland Noord, Noord-Holland Zuid, Metropoolregio Eindhoven and Rotterdam-Den Haag explicitly showed the importance of a multi-level perspective as part of the RES programme. These regions acknowledge the essence of close collaboration with the national government, other regions and municipalities within the region. Contrary, regions such as Alblasserwaard, Flevoland, Goeree-Overflakkee, Midden-Holland, Noord- en Midden Limburg, Noord-Veluwe, U16 and Zeeland lack the multilevel perspective in their concept RES. The Midden-Holland region however states that it recognizes their lack of multi-level perspective and aims to improve this in the RES 1.0 and RES 2.0.

Almost all regions see a big role for the national government in the execution of the RES programme. There are regions that acknowledge a lack of civil capacity within their own region to coordinate the design and execution of the RES programme such as Alblasserwaard or Amersfoort and therefore request additional civil capacity from the central government. Additionally, most regions have clearly noted what they are demanding of the national government on the topics of legislation, policy, financial aid, stimulation of innovation and collaboration between governments. Some of these regions, such as Metropoolregio Eindhoven, U16, West-Brabant, West-Overijssel or Zeeland, have even stated that their current RES might not be achievable without the involvement of the national state. There also lies big challenges for local and national grid operators to expand the grid to provide enough transport capacity. The national grid operator is connected to local grid operators which can span over multiple energy regions. This leads to inter-regional collaboration based on grid infrastructure.

The analysis of inter-regional collaboration showed that multiple regions have collaborated with surrounding regions such as Groningen, Drenthe and Friesland to prevent externalities caused by current and future activities near the borders of these regions. Other regions such as Clean-tech Regio, Noord-Veluwe and Fruitdelta Rivierenland (Gelders EnergieAkkoord) previously already had collaborations with each other to work on energy goals.

It was found that in nine regions[3] there was a clear indication of a top-down based bid for renewable energy production. A top-down based bid like the one of Amersfoort (p. 32) is based on the idea that Amersfoort uses 0.6% of the total electricity demand of the Netherlands and therefore aims to develop 0.6% of the 35TWh that was set as a national goal. The region of Drechtsteden (p. 17) has decided on a bid based on size of population, land area and electricity demand. Drenthe (p. 14) has used a bottom-up approach which is based on the input of the municipalities within the region to come to a final bid. Another 14 regions[4] have used a bottom-up approach. The rest of the regions have not given a clear indication of the approach used.

Table 4.1 is a visualisation of the results found during the analysis. All thirty regions have been listed and provided with a colour scheme. The first column gives an indication of

[3] Amersfoort, Drechtsteden, Hart van Brabant, Hoeksche Waard, Midden-Holland, Noord-Holland Noord, Noordoost Brabant, Cleantech regio and U16.

[4] Achterhoek, Drenthe, Flevoland, Foodvalley, Friesland, Goeree-Overflakkee, Groningen, Noord-Holland Zuid, Noord-Veluwe, Fruitdelta Rivierenland, Rotterdam-Den Haag, West-Brabant, West-Overijssel, Zeeland, Zuid-Limburg).

the approach that was used in the bidding process. The green squares represent the degree to what the criteria were present in the Concept RES documents. The legenda underneath shows to what degree the criteria were recognised in the Concept RES documents.

	Region	Energy strategy	Visionary character	Broad horizon	Plan for implementation	Budgetairy vision	Multi-level perspective	Pages
1	Achterhoek							52
2	Alblasserwaard							80
3	Arnhem Nijmegen							42
4	Amersfoort							88
5	Drechtsteden							49
6	Drenthe							237
7	Flevoland							59
8	Foodvalley							62
9	Friesland							25
10	Goeree-Overflakkee							23
11	Groningen							153
12	Hart van Brabant							80
13	Holland Rijnland							47
14	Hoeksche Waard							50
15	Midden-Holland							134
16	Noord-Holland Zuid							331
17	Metropoolregio Eindhoven							60
18	Noord-Holland Noord							257
19	Noord- en Midden Limburg							176
20	Noordoost Brabant							41
21	Noord-Veluwe							90
22	Fruitdelta Rivierenland							42
23	Rotterdam-Den Haag							38
24	Cleantech Regio							47

25	Twente							56
26	U16							66
27	West-Brabant							47
28	West-Overijssel							28
29	Zeeland							133
30	Zuid-Limburg							210
	Total							2803

Bottom-up		Top-down	
None	Low	Moderate	High.

Table 4.1: the visualisation of the results and legend. Made by author.

5. Discussion

This chapter will discuss the results found during the analysis of the 30 RES regions which can be found in chapter 4. The result of this research will be discussed with a spatial planning and governance perspective. This spatial planning perspective is conceptualized in this study by discussing the policy, place and process. These concepts are translated into practice by the next three themes: the NP RES approach, geographical and economical characteristics and the process from guideline to RES.

This chapter will start off with an explanation of the NPRES approach and corresponding remarks. The discussion will start with the differences and similarities found between the NPRES and the RES documents (policy). Afterwards the geographical explanations will be presented and the effect geography has had on the development of different RES documents (place). Finally, an overview of the most insightful differences and similarities will be presented that illustrate what different approaches were followed by the regions (process).

5.1. NP RES

The National Programma Regionale Energie Strategieën (NP RES, 2019) has provided a guideline in October 2019 that can be used by developers of RES documents to develop a useful strategy. The guideline follows five main themes that together serve the goals set in the Klimaatakkoord (2019):

1. Possibilities for regional renewable energy production and regional energy saving potential.
2. The translation from such possibilities to concrete locations, projects and further plans for implementation.
3. Concertation over the possible use of heat sources
4. Effects of measures for the electricity grid.
5. Already completed projects and current plans.

These themes are elaborated on in the guideline of the NP RES and form the basis for RES developers to design a strategy that will be followed to achieve their own set of energy goals within the set time. The NPRES guideline has been developed on the basis of five pilot projects for 5 RES regions. The NP RES guideline provides the regions with information on what is requested by the NP RES and what methods can be used to successfully present a complete RES document. The guideline does however not have to be seen as a legally binding structure for the RES documents, additionally, the NP RES guideline states (p. 16) that regions are challenged to use an out-of-the-box mentality (for example the effect of peat oxidation in RES Midden-holland, p. 13) and provide their own additional input if considered useful for achieving their objectives. Regions can also consult market parties that can help develop a RES document. As a result, not all RES documents are exact reproductions of the guideline presented by the NP RES. This section will describe the differences and similarities that were found between the RES documents and the NP RES guideline and will help to identify the weaknesses and strengths of the RES programme. This can be seen as a combination of a theoretical (criteria) and practical (NP RES guideline) insights in the RES programme.

5.1.1. Similarities

It was found that the NP RES (p. 9) did not prioritize a long-term vision. The guideline states that the RES programme should have a vision until 2030 and where possible to 2050. The NP RES explicitly stated that having a vision to 2050 is optional. This is remarkable as a strategy in planning theory per definition has a long-term vision according to (Albrechts, 2004, Albrechts & Balducci, 2013, de Roo, 2013, Mäntysalo et al., 2015, Healey 2009; Healey, 1997). The lack of a long-term vision was correspondingly only a handful times found in the Concept RES documents. The emphasis was not put on this long-term vision which might cause problems for investors, policy makers, innovators etc. who use a long-term vision to anticipate plans for today. Additionally, with a limited time horizon, future plans or projects could possibly be jeopardized or excluded as a result of path-dependent measures that are developed in the short term (Verbong et al., 2002).

Only a handful of regions, for example Flevoland and Rotterdam-Den Haag, went the extra mile and have actively included a long-term vision (2050) in their strategy. It can be concluded that the RES programme is most predominantly operational and tactical of nature with a limited strategic vision regarding time horizon. The RES 1.0 and 2.0 can be improved by obtaining both a short- and long-term vision. Contrary, lacking a long-term vision for 2050 will likely have limited effects for the goals set in 2030 by the 2019 Klimaatakkoord.

The Klimaatakkoord (2019) states that the energy regions are collectively responsible for achieving the goal of producing 35TWh with renewable energy sources. If the goal was not met with the cumulative bid of all regions, there would be another possibility for the regions to review their bid to achieve the goal. If the goal would still not be met, a distribution of leftover MWh's would be done over all regions based on their regional characteristics. This could be unfavourable for regions that based their bid on their absolute potential limits.

Considering this, questions could be asked about the legitimacy of the regional bids that have been done. The cumulative bid of all regions exceeds 50TWh, whilst most regions have got no clear indication of what exact areas will be available and suitable for renewable energy production. The results show that most regions explicitly state that the bid is preliminary and highly dependent on other conditions such as aforementioned State involvement. Add to this that the NP RES (p. 33) challenges regions to make ambitious estimations about the potential of renewables in their region. The NP RES guideline explicitly instructs regions (p. 25) to make a bid that is not necessarily defensive or strategic. This is remarkable as the NP RES advises to make a non-strategic bid for a region's energy strategy. Deliberately adjusting the regions bid to favour the cumulative bid can result in a high amount of un-achievable goals that in turn give a distorted image of the national challenge. Contrary, Matthijsen (2021) pointed out that a possible explanation for this can lie in the ambition of involved parties as the RES programme can also be seen as an important step to a renewable future and thus result in ambitious parties that want to accelerate the transition. More transparency and more details in the RES 1.0 and 2.0 and future assessments can help decrease speculations about the total bid.

5.1.2. Differences

Many regions such as Flevoland (remarkable as this region has lowest energy saving potential due to lack of industry and youth of homes), Goeree-overflakkee, Groningen, Hart van Brabant, Holland Rijnland, Metropoolregio Eindhoven, Noord- en Midden Limburg and Zeeland have presented extensional energy saving strategies and programmes. This did not

have a priority in the NP RES guideline (p. 16), although it is considered an important first step in the NOVI (NPRES p. 71). The NP RES stated that energy saving strategies do not have to be considered in the RES as there are already goals for energy savings on a national level. This raises questions why the development of renewable energy is preferred to be governed on a regional scale but reducing the energy demand is national policy. It can be argued that energy saving strategies could be integrated in the strategies for the development of renewable energy. Contrary, it can also be argued that the energy system is too complex to be seen as a system that can be integrated and thus separation of subjects is necessary.

Remarkably, the RES analysis has indications that regions that did not include an comprehensive energy strategy are also lacking behind on other criteria. The following regions are lacking an energy strategy and are also missing out on the other criteria: Arnhem-Nijmegen, Amersfoort, Drechtsteden, Midden-Holland, Fruitdelta Rivierenland, Twente, U16, West-Overijssel. The regions[5] that included a complete energy strategy with executable programmes and such have scored higher on other criteria as well. This could be explained by the idea that a comprehensive energy strategy requires regions to acquire more information about the current energy system, energy demand, users and future potential in its region which can give meaning to the other criteria. Matthijsen (2021) pointed out that this could be a possible explanation, but that the experience regions have with energy strategies could also play a role in this difference. Some regions, such as Groningen, Friesland, Flevoland or Zeeland, have extensive experience in energy systems and might therefore have a leading role.

The NP RES programme has mentioned the financial aspect of the measures that regions will undertake. The NP RES guideline mentions the affordability of programmes and projects but does not elaborate more on this aspect. The RES document analysis concluded that almost no region has incorporated this aspect in the RES. Lacking financial insights can possibly be explained by a lack of concreteness of plans and therefore are not able to make estimations about costs and possible revenues, lack of civil capacity to execute this task (such as Amersfoort) or a lack of priority for the RES programme in the region.

The RES 1.0 and RES 2.0 should pay attention to the financial impacts that measures will have in regions. A lack of financial insights into plans can have negative effects for the development of renewables if the costs turn out higher than expected. Not only does this lead to reduced renewable electricity production, it also decreases the attractiveness of investing into new projects by project developers and investors, who are ultimately at the basis of the development of renewable energy projects (Flyvbjerg et al., 2018). A lower degree in implementation of projects might have negative impacts for the usefulness of the RES programme. Matthijsen (2021), however states that this will most likely not have mayor impacts until 2025 as the SDE-subsidy provides financial aid for renewable energy projects.

The NP RES guideline (p. 44) advises regions to consider supraregional collaboration to increase effectivity in the developing and executional phase of the RES. Supranational collaboration can lead to consensus about regional developments that might affect adjacent regions, for example developing wind parks near regional borders or using grid capacity that is reserved for multiple regions. Furthermore, the NP RES guideline mentions that the RES can also function as a facilitator of collaboration between municipalities, provinces, water

[5] Flevoland, Goeree-Overflakkee, Groningen, Hart van Brabant, Holland-Rijnland, Metropoolregio Eindhoven, Noord- en Midden Limburg, Zeeland.

boards, national governments and grid operators which can lead to enhanced decision making in topics with mutual interest. A minority of regions have actively pursued collaboration with other regions or governmental layers. It can therefore be said that the RES programme can enhance its usefulness by improving collaboration with other regions and authorities. The regions Holland Rijnland, Noord-Holland Noord, Noord-Holland Zuid, Metropoolregio Eindhoven and Rotterdam-Den Haag can function as best practice examples for having a multi-level perspective for lagging or less developed regions as their design of the Concept RES can be applied to other regions as well.

The NP RES guideline is however less clear about collaboration with the central government. It mentions that collaboration with the central government is possible if preferred by the region. Most regions however mention what they consider should be provided by the state in terms of additional legislation, policy, financial aid, stimulation of innovation and ironically also collaboration with other authorities. The majority of regions express that future projects will be jeopardized if the State does not actively comply with the requested demands. If projects are revoked due to such problems it can threaten the national goal of generating 35TWh renewable energy and thus reduce usefulness of the programme. By indicating what is being demanded by the central government can provide useful information on what areas to increase intervention.

The NP RES programme is positive about renewable gases in the future energy system. Contrary, some regions, such as Midden-Holland, do not consider these gases as viable options for the near (2030) future. The NP RES guideline provides a vision about incorporating flexibility for future technologies such as hydrogen or other renewable gases in the RES. The contrast between the NP RES guideline and the strategy of a region like Midden-Holland could be explained by geographical characteristics of the region, this will further be explained in the next section. The relation between the policy side of the RES programme and context-specific characteristics such as geography or economy is typically found in spatial planning as spatial planning is about linking space with people, functions and policy.

5.2. Geographical and economical characteristics

One of the reasons that the RES programme was introduced is that regional authorities are better capable of making context-specific decisions. The Netherlands has been divided into thirty different regions with each region having its own geographical and economical characteristics. These characteristics have influenced the possibilities in the region for creating an RES. This section will describe differences found in the RES document analysis based on geographical and economical characteristics.

5.2.1. Renewable gases

The NP RES guideline states that renewable gases such as (green or blue) hydrogen or biogases will play a big role in the energy systems of the future. Introducing hydrogen into the current energy system requires adjustments to the system such as storage or transport facilities for hydrogen or a reinforced electricity grid for the production of hydrogen. The role that hydrogen will play in the future will however be dependent on the supply of hydrogen, which in turn is dependent on raw materials (electricity) and available infrastructure (Notermans et al., 2020) As a result, not all regions are equally suitable for the use of hydrogen in the short-term. Groningen en Rotterdam-Den Haag both host large industrial complexes, sea ports and

infrastructure networks that are viable for energy carriers like hydrogen. These characteristics make those regions suitable for the future development of hydrogen systems as the aforementioned necessities for hydrogen use are available. It is no coincidence then that these regions both have plans to become large players in the world of hydrogen in the Netherlands and possibly in Europe as well. In contrast, the region Midden-Holland has explicitly stated in their RES not to incorporate any renewable gases in their energy system within the next ten years as the region does not see any potential for hydrogen (production) in the region. The region consists of the municipalities of Bodegraven-Reeuwijk, Gouda, Krimpenwaard, Waddinxveen and Zuidplas. None of these municipalities host any large industrial complex, have connection to a seaport or are connected to heavy energy networks. It is therefore understandable that the region does not rely on renewables gases in their strategy.

The difference in vision about a renewable gas such as hydrogen illustrates the benefits of a bottom-up planning approach that has been used in the RES programme. It underlines the relevance of making context-specific policy for complex challenges such as an energy transition and increases efficiency in the process.

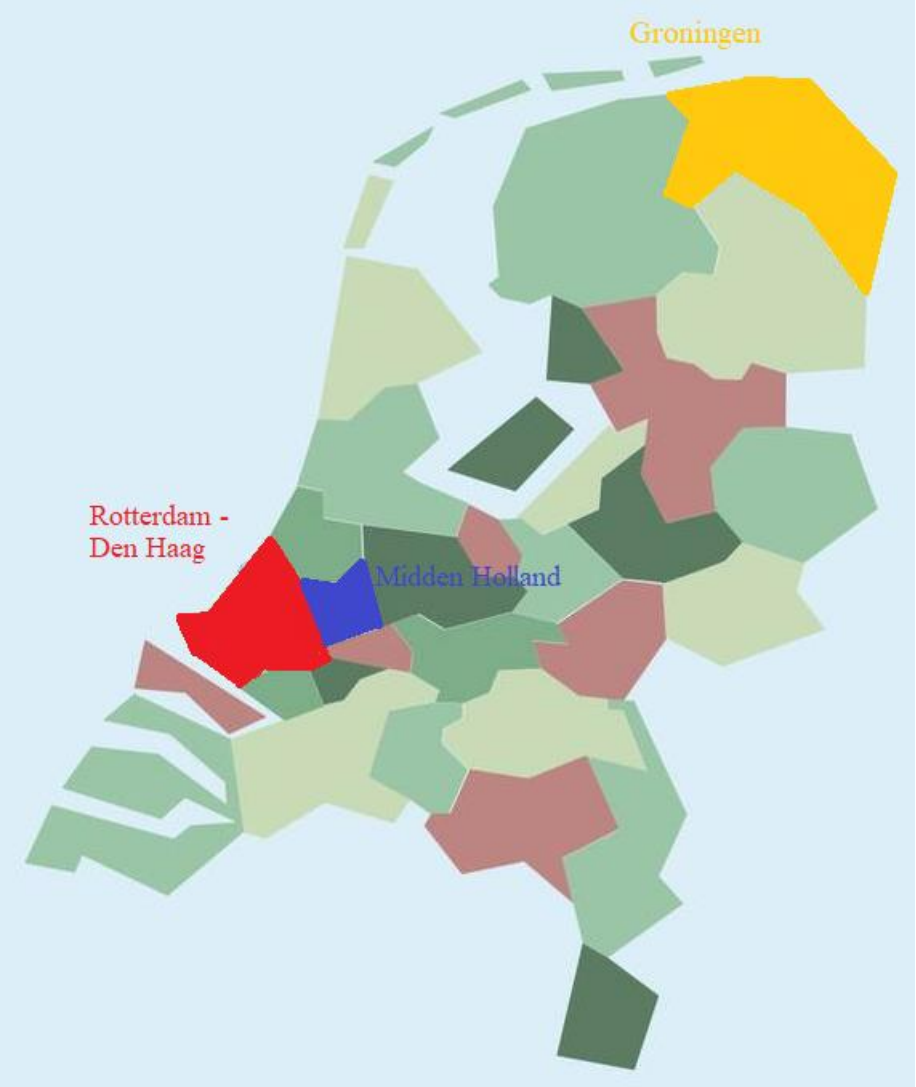

Figure 5.1: Groningen, Rotterdam – Den Haag and Midden-Holland region. Source: Nationaal Programma RES, edited by author.

5.2.2. Ambitions

Geographical characteristics can provide a region with more potential options for renewable energy production. For example, the Flevoland region has large areas of agricultural land with high wind potential for the production of renewable energy. In contrast, the Twente region has less beneficial geographical characteristics. In this region there are on average less sunshine hours and the average wind speed is also lower (p. 12). This has direct implications for the system-efficiency of renewable energy sources that rely on sunshine hours and wind to function. Despite unfortunate geographical conditions the region still has large ambitions for the production of renewable energy in 2030 (p. 12). Despite geographical characteristics, there is another possible explanation for differences found in the (approach of) RES documents. This explanation can possibly be a difference in ambition between regions. As the ambition of the regions cannot directly be measured, is this section based on qualitative data found in the RES analysis. Additionally, underlying reasons that did not come to light in the RES analysis could give a possible explanation for the discussion underneath.

To illustrate, the following regions explicitly showed to have ambitious goals for the RES programme and these regions have done more ambitious bids for their region than was averagely expected by the NP RES: Achterhoek, Flevoland, Groningen and Rotterdam-Den Haag. More elaborately, the Achterhoek region has stated that it has the ambition to be energy neutral in 2030 and is on track to achieving this goal (p.6). Flevoland has done a bid of 4,76TWh (13,5% of total NP RES goal) whilst it is the second smallest province based on population. Groningen has a rich energy history which left negative impacts in the last decade but still has the ambition to become the next renewable energy hub of the Netherlands and host one of the first energy-neutral seaports of the world (p. 12). The region is already considered the frontrunner in both solar energy on roofs as large-scale solar parks (p. 17). Rotterdam-Den Haag region has set goals to become the biggest hydrogen producer and user in Europe (Notermans et al., 2020; RES p. 32). To achieve a higher ambition it can be said that this requires higher efficiency as well. It might show that above-mentioned regions will execute the RES programme with a higher rate of efficiency as a region is more reliant on matching opportunities. This could also be found in the REAP project which has a focus on efficiency of energy and also had an ambitious goal of reducing the energy demand by 50% in 2025 (Tillie et al., 2009).

The above mentioned regions show the possible potential of the RES programme. They have set more ambitious goals than was expected and strive to be front-runners in the energy transition by choosing a context tailored approach that utilizes the region's beneficial characteristics. This outcome can be seen as the benefits of choosing for a bottom-up approach as is formulated by the RES programme.

The RES document analysis however also indicates that some regions might have less ambitious goals than other regions whilst having potential economical or geographical advantages. The RES document analysis showed that the U16 region possesses enough potential areas to generate renewable energy and enough grid capacity for new projects to be connected to. This led to a research ambition of 3.6TWh. The region however did a bid of 1.8TWh, based on a top-down approach that followed an estimation of the NP RES beforehand. Besides a considerably lower bid than will likely be possible, other indicators also suggest a lacking ambition. The plans for implementation are still very unclear as the region only vaguely has provided potential areas for renewable energy production. Is strongly dependent on the central government to achieve its current goal of 1.8TWh. The region does however not clearly mention what it is dependent on, besides a demand that the government

will invest more in technical innovations and "additional powers for local authorities" (p. 26). In the section where the region mentions the different opportunities, several unconvincing and mostly vague phrases are used: "seems achievable", "see opportunities", "we see potential for wind turbines along infrastructure", "many municipalities see opportunities for solar fields", "see potential for renewable electricity" (freely translated from p. 7). These reasons might suggest that the U16 is not using its full potential to serve the goal of the Klimaatakkoord (2019), but underlying explanations might come to light if further research is conducted. These reasons could be the reason for the current bid and advocate for a bottom-up RES approach as the central government would likely miss those explanations as well. Contrary, it might also be possible that the region does not prioritize the RES programme because of financial constraints, political situation (VVD, FvD, CDA are not known for progressive climate policy), or lack of citizen support.

Both examples of different levels of ambition show the potential of a bottom-up approach like the RES programme. Opportunities found in Groningen, Flevoland or Rotterdam-Den Haag can be fully utilised by the regional authorities but also regions that seem to have a less ambitious strategy such as U16 can benefit from context-specific policy to prevent enforcing regions to participate in the energy transition or prevent civil unrest if plans are unwanted.

5.3. Process

This chapter started off with similarities and differences that were found between the guideline provided by the NP RES and the analysed RES documents. The guideline provided by the NP RES is however not a blueprint for all regions to follow in the development of their own RES, as the name reveals, it's a guideline. The RES document analysis revealed differences and remarkable observations that cannot be categorized as comparisons between NP RES guideline and RES document or as geographical and economical characteristics. The following observations can be seen as the result of different processes that were used by regions or can be categorized as general remarks

5.3.1. Production type

The RES programme is based on the production of land-based, renewable wind energy and large-scale solar energy (>15KWp, around 60 PV-units). Regions are within those boundaries however free to choose between the different options such as: different size wind turbines, solar parks with mono- or multifunction, solar installations on roofs or solar parks on areas without any other use (garbage dumps, water purification plants, along infrastructure, on inland waters etc.).

The Concept RES document analysis has indicated that almost all regions have a strong preference for solar energy over wind energy. Only Flevoland has indicated that it has plans to develop more wind power than solar power, although this can be deduced from the geographical characteristics and the historic relation to wind power. The fact that most regions have a preference for solar energy is remarkable as wind power is a more efficient method for generating renewable energy than solar energy due to its smaller footprint. It is however found that most regions have indicated that their inhabitants have a preference for solar energy as this limits environmental externalities and therefore is solar power more efficient on a political basis. Adding to this, most regions that have designed a 'Zonneladder'

with their inhabitants and stakeholders found that the leading preference is for solar energy based on (industrial) roofs and along public infrastructure networks.

Solar energy has less visible impacts for the environment but has some disadvantages compared to wind power. The first and most important reason is that solar energy generates a more intermittent output pattern as a result of fluctuating solar input during the day (Mackay, 2008). At night, no solar energy is being generated whilst wind power generates a more consistent energy output. The current electricity grid is already facing a lack of transport capacity in most regions, adding more specific intermittent sources such as solar power only disbalances the grid further which can lead to a peak overload and limits the development of new projects (Enexis, 2020; Mackay, 2009). Facilitating grid capacity or smart grid solutions is however the responsibility of grid operators but this can be costly and time-consuming and should therefore be limited if possible.

That almost all regions have a preference for solar power over the more efficient option of wind power and despite geographical characteristics shows the added value for a bottom-up approach like the RES programme. The RES documents have been developed with close attention for citizen participation and involvement of relevant stakeholders. Including citizen participation and stakeholder involvement might have influenced the choice for solar energy and this contributes to citizen support which in turn results in higher percentage of completed projects (Aaen, Kerndrup & Lyhne, 2016; Huijts et al., 2012).

5.3.2. Bidding approach

The previous section ended with a note on citizen participation in the development of the RES documents. Following up, the NP RES does not have a preference for a renewable energy production bid that is either based on a top-down or bottom-up approach as long as the region actively seeks citizen participation in the process. Chapter 4 has provided some examples of both approaches. The RES document analysis has given indications that regions that have used a bottom-up approach have more successfully developed a RES document, according to the criteria found in Chapter 2. Although no hard statistics can be derived from the RES analysis, it appears that the regions that were considered lagging behind have used a top-down approach. The regions that have previously been considered lagging behind are: Amersfoort (top-down), Drechtsteden (top-down), Drenthe (bottom-up), Midden-Holland (top-down), Fruitdelta Rivierenland (bottom-up), Twente (approach not clear) and U16 (top-down). The approach that regions have followed can be found in the RES analysis scheme in the Appendix.

The distinction between the regions that have used a top-down approach and a bottom-up approach can point out two things. First, it underlines the relevance of the bottom-up approach that is used by the national government to reach the goals set by the Klimaatakkoord (2019) as this method is probably more effective in developing a strategy to reach renewable energy production goals. Secondly, it seems that regions that have used a bottom-up approach did more elaborate research on the questions at stake which gave useful insights for developing a RES document. To illustrate, a region that has done a bottom-up bid had to do research into the possibilities for renewable energy production locations and methods and involve citizen participation to gain insights in the wishes of the public (plan for implementation). Additionally, to estimate future energy demand an evaluation of current demand is needed, this brings forward that an energy strategy is needed to limit future

demand (energy strategy) and that intermittent sources need storage solutions (broad horizon). Questions about potential locations for energy production or questions about storage solutions require intervention from the central government and collaboration with other governmental levels (multi-level perspective). Correspondingly, it was found that the regions that did include accurate maps or locational information scored higher on the criteria analysed in this study. A region that has used a top-down approach based on, for example, current energy demand, might have done less thorough research into these topics which can result in a less effective and efficient RES. Matthijsen (2021), however pointed out that besides this possible explanation there could also be other explanations that have not come to light yet.

5.3.3. Central government intervention

In one of the previous sections, it was discussed that more than half the regions[6] have delivered a production bid in their Concept RES document that is only achievable with the intervention of the national State in some way. Most often demands that are mentioned are renewed legislation, extra subsidies and increased intervention in supraregional cases such as grid capacity problems or large-scale heat-networks. That a majority of all regions are dependent on State intervention can indicate two things. One is that the current legislation and financial aids such as subsidies are not up-to-date and limit the development of the energy transition or that current policy is inadequate. The other one is that the regions are not as well capable of developing and executing a RES programme as was previously estimated. If the second option is at hand, it could be the case that the bottom-up approach used in the RES programme is not fully suitable for such a complex challenge as the energy transition. Either way, both options require more intensive intervention from the national State to guide the RES programme to a successful end.

[6] Arnhem-Nijmegen, Amersfoort, Drechtsteden, Drenthe, Friesland, Hart van Brabant, Holland-Rijnland, Midden-Holland, Noord-Holland Zuid, Eindhoven, Noordoost Brabant, Fruitdelta Rivierenland, Cleantech Regio, Twente, U16, West-Brabant, West-Overijssel, Zeeland.

6. Conclusion

This study has aimed to identify the usefulness of the RES programme as a tool to develop large-scale wind and solar power on land in the Netherlands. A theoretical framework has been established which provided the necessary criteria used in the assessment of the Concept RES documents. The methodology that was developed for this specific research helped the author to systematically analyse all documents whilst maintaining a high level of accuracy and allowing for validation of findings. The full-width research design has resulted in findings that could have been unnoticed in a case study. The results are discussed following a familiar reasoning logic in the spatial planning discipline by illustrating the relation between policy, place and process. This has given the author understanding of the results which is necessary to answer the main research question. Starting off, an overview is given of the findings per criteria. Lastly, the main research question is answered.

6.1. Criteria

The theoretical framework has provided six criteria that are considered essential for strategic planning. This conclusion will connect the theoretical based criteria with the empirical findings. Additionally, it was found that five criteria (visionary character, broad horizon, plan for implementation, budgetary vision and multi-level perspective) can be used to assess generic strategic planning. Complementing these criteria with context related criteria can potentially provide an assessment for other strategic plans, for example strategic water management.

The first criteria that was used in the analysis was the degree in which a region had used an energy strategy, which was mainly derived from the Trias Energetica (Duijvestein, 1996). It was found that having an energy strategy integrated in the RES could potentially increase the usefulness of the RES programme by improving the developing process. Although regional differences can be pointed out, around half of the regions used this strategy whilst developing their RES and it seems that this contributed to their overall strategy. To draw accurate conclusions, future research into this topic is advised.

Theoretical insights in transition theory and strategic planning theory pointed out the relevance of having a visionary long-term character (Albrechts, 2004; Albrechts & Balducci, 2013; Mäntysalo et al., 2015; Van der Brugge et al., 2005). This criteria can benefit the process on a long-term time scale. This vision can prevent future path dependency related problems, but is no guarantee. It was found that most regions could improve their visionary character by increasing their perspective to a future further ahead. The lack of visionary character has however got limited empirical implications for the RES programme as the goals are to be reached in 2030.

Although strategic planning theory (Albrechts, 2004; Albrechts & Balducci, 2013) suggested that having a broad horizon is advised in strategic planning, it was found to be less important in RES programme. Despite there are differences found between the regions in their degree of having a broad horizon, it did not specifically relate to the usefulness of the RES programme in its goal of generating 35TWh in 2030. The RES programme approach does however allow regions to benefit from specific geographical or economical characteristics and corresponding opportunities as a result of context-based bottom-up planning.

The analysis showed an overall lack of insights in financial aspects in the RES documents. This could be explained by the concept phase the programme is in and by concise

attention in the NP RES guideline. Additionally, the SDE-subsidy could have also played a role, as it is providing financial back-up for projects until 2025 and therefore decreases the need for budgeting processes. Including a financial vision in the future RES documents might however increase the usefulness of the programme as it limits the amount of projects that are cancelled due to financial constraints. This will play a more important role after 2025.

Having a multi-level perspective was found to be useful in long-term strategic planning (Albrechts, 2004; Albrechts & Balducci, 2013; Mäntysalo et al., 2015). The Concept RES assessment indicated that the multi-level perspective is relevant in multiple ways. Firstly, it can be concluded that supraregional collaboration might possibly increase the usefulness of the RES programme as less projects will be cancelled. Secondly, it was found that the development of the programme is highly dependent on central government intervention in the arenas of legislation, financial aid and policy. Thirdly, developing a RES with a bottom-up planning approach seems to be related to increased usefulness of the programme. This could be determined by future research in this topic. These findings underline the chosen governance approach that is being used in the RES programme. It can be concluded that using this approach helps to benefit from context-specific characteristics and increased insights in the regional energy system. However it needs to be considered that not all regions can equally benefit from such an approach if lacking the (civil) capacity.

6.2. Usefulness of the RES programme

This study has done a full-width analysis of the Concept RES documents to identify what can make a programme such as the RES more useful. It was found that the RES programme can be considered as a useful tool as its main goal, to plan for at least 35TWh of renewable large-scale projects on land, was amply reached with a total bid of over 50TWh. This bid is still in a preliminary stage as most projects and plans are not established yet. The total bid can be affected by a number of reasons.

Firstly, possibly disproportionate bids that favour the total bid made by regions can give a distorted image of the actual capacities of the regions. Additionally, a lack of plans for implementation can negatively influence the success-rate the programme if projects and plans turn out to be impracticable. Thirdly, as regions lack the financial insights in the costs of projects and plans, unexpected costs could arise that can potentially cause unfavourable consequences for the RES programme. Finally, partial absence of a multi-level perspective is likely to limit the effects the programme. Supraregional collaboration and state intervention are possibly found to be essential for a useful strategy.

The RES programme is a new approach that is still in the concept phase and can therefore be altered to be beneficial for the strategies. The development process could be enhanced by integrating an energy strategy in the RES and by including a multi-level perspective. Developing an energy strategy supplies useful insights in the current and future energy system that will help with the development of a RES. Having a strategy based on a bottom-up approach was identified as a possible reason for better strategic plans.

Overall, it was found that Flevoland, Goeree-Overflakkee and Zeeland have already produced useful strategies to complete the goals of the RES programme. These regions have showed to understand the relevance of including an energy strategy, developing a long-term vision and by having a broad horizon. The strategies of these regions can possibly be strengthened by integrating a multi-level perspective, including more budgetary information

about the projects and more plans for implementation. These examples can be used by other regions to benefit from in future RES documents.

The RES programme is based on an iterative process that allows for adjustments to be made that increase the efficiency in the development of the programme and the effectiveness of strategies. Many regions and authorities are still new to the implications of the energy strategies and expertise still needs to be diffuse. The Concept RES is a solid basis for further developments in anticipation to the RES 1.0 and RES 2.0. The challenge is not yet over, but a big step towards a renewable energy system has been made.

7. *Reflection*

In this section, a reflection will be made on the research findings, process and topics. This reflection gives insights in the opinion of the author of this study and contributes to the critical academic process.

7.1. Reflection on research process and outcome

Doing research is a process. And every process has its ups and downs. Accordingly, the research process of this study also had ups and downs.

This research was conducted in a time where COVID-19 restrictions affected everybody's life. By doing a document analysis it was unnecessarily to come into contact with people as a data collection method. A document analysis has the advantage that it can be done at any time as it is not linked to a meeting. Conducting an analysis of all Concept RES documents was however a very time consuming process as the documents exceeded a total of 2800 pages. It was tried to prevent inaccurateness in this reading process by dividing the task into smaller tasks and to regularly check results for accuracy and by an additional validation through an expert interview. The assessment is done on the basis of the interpretation of the author. It can however be the case that some might disagree with some of the scores that regions received. As mentioned before, the strength of this study lies within the width of the research. The results are based on general findings and cannot be related back to single scores in the assessment.

Theoretical insights in long-term planning approaches have delivered the majority of the criteria used in the assessment. These criteria have been selected from a list of characteristics found in transition theory, strategic planning theory and operational planning theory. These theories combined have a lot of characteristics, but due to the limited scope (time) only a selection has been used in the assessment. The criteria have been selected by the author based on fittingness, measurability and appropriateness. This process is however based on choices made by the author, and can therefore differ from other assessments. It is not suggested in this study that the selection of these five criteria is flawless. A different selection of criteria could have resulted in different findings.

7.2. Recommendations for future research

The previous section has discussed the reflection on the findings of this research. It was found that this research has limitations and therefore can imply that additional research is preferred. First of all, to limit researcher bias, it can be advised that the analysis is conducted with multiple researchers to try to prevent researcher bias in the assessment. Additionally, researcher biases can be limited if research is done into the documenting process of the regions.

The findings of this research also imply that there future research opportunities exist. Most findings are based on the interpretation of the author and can only indicate certain suspicion or thoughts of the author. Future research can add concreteness to the findings. Additionally, an assessment could be conducted based on extra criteria to broaden the view of the study.

Most obvious, future research is advised in the RES 1.0 and RES 2.0 versions. The RES 1.0 has just been published by the regions at this time of writing. An assessment of this version could give insights in the process from the Concept RES to an eventual RES 2.0.

References

Aaen, S. B., Kerndrup, S., & Lyhne, I. (2016). Beyond public acceptance of energy infrastructure: How citizens make sense and form reactions by enacting networks of entities in infrastructure development. *Energy Policy*, *96*, 576-586.

Albrechts, L. (2004). Strategic (spatial) planning reexamined. *Environment and Planning B: Planning and design*, *31*(5), 743-758.

Albrechts, L. (2015). Ingredients for a more radical strategic spatial planning. *Environment and Planning B: Planning and Design*, *42*(3), 510-525.

Albrechts, L., & Balducci, A. (2013). Practicing strategic planning: In search of critical features to explain the strategic character of plans. disP, 49, 16 – 27.

Bryson J. M., Roering W. D. (1996). "Strategic planning options for the public sector", in *Handbook of Public Administration Ed*. J L Perry, 2nd edition (Jossey-Bass, San Francisco, CA)

CBS (2020). Energieverbruik particuliere woningen. Retrieved from: https://opendata.cbs.nl/statline/#/CBS/nl/dataset/81528NED/table?fromstatweb

Dagblad van het Noorden. (2019). Wankel energienet kan stroom van windmolenparken in Emmen niet opslaan. *Drenthe*.

De Roo, G. (2000). Environmental conflicts in compact cities: complexity, decision making, and policy approaches. *Environment and Planning B: Planning and Design*, *27*(1), 151-162.
de Roo, G. (2013). *Abstracties van Planning: Over processen en modellen ter beïnvloeding van de fysieke leefomgeving*. Coöperatie InPlanning UA.

De Roo, G. (2017). *Environmental planning in the Netherlands: too good to be true: from command-and-control planning to shared governance*. Routledge.

Enexis. (2020). Gebieden met schaarste voor teruglevering op het energienetwerk. Retrieved on 22-03-2021 from: https://www.enexis.nl/zakelijk/duurzaam/beperkte-capaciteit/gebieden-met-schaarste

Entrop, A. G., & Brouwers, H. J. H. (2010). Assessing the sustainability of buildings using a framework of triad approaches. *Journal of Building Appraisal*, *5*(4), 293-310.

Erkens, G., van der Meulen, M. J., & Middelkoop, H. (2016). Double trouble: subsidence and CO 2 respiration due to 1,000 years of Dutch coastal peatlands cultivation. *Hydrogeology Journal*, *24*(3), 551-568.

Flyvbjerg, B., Ansar, A., Budzier, A., Buhl, S., Cantarelli, C., Garbuio, M., Glenting, C., Holm, M.S., Lovallo, D., Lunn, D., Molin, E., Rønnest, A., Stewart, A. & Van Wee, B. (2018). Five things you should know about cost overrun. Transportation Research Part A: Policy and Practice, 118, 174-190.

Geels, F., & Kemp, R. (2000). Transities vanuit sociotechnisch perspectief. *Maastricht, MERIT*.

Gemeente Groningen, (2007). Routekaart Groningen Energieneutraal+ 2025, Gemeente Groningen, Groningen.

Gordijn, H., Verwerst, F., van Hoorn., A. (2003). Energie is ruimte, Ruimtelijke Planbureau, *NAi Uitgevers, Rotterdam*

Gray, D.E. (2014). Doing Research in the Real World (3rd edition). London, UK: SAGE Publications Ltd.

NP RES (2019). Handreiking 1.1. Handreiking voor regio's ten behoeve van het opstellen van een Regionale Energiestrategie. Den Haag.

Healey, P. (1997). Collaborative planning: Shaping places in fragmented societies. Macmillan International Higher Education.

Huijts, N., Molin, E., & Steg, L., (2012). Psychological factors influencing sustainable energy technology acceptance: A review-based comprehensive framework. Renewable and Sustainable Energy Reviews (16). 525-531.

Kleerekoper, L., Van Esch, M., & Salcedo, T. B. (2012). How to make a city climate-proof, addressing the urban heat island effect. *Resources, Conservation and Recycling*, *64*, 30-38.

Laukkonen, J., Blanco, P. K., Lenhart, J., Keiner, M., Cavric, B., & Kinuthia-Njenga, C. (2009). Combining climate change adaptation and mitigation measures at the local level. *Habitat international*, *33*(3), 287-292.

Londo, M. & Kramer, G.J. (2019). Ruimtelijke opgaven door klimaatbeleid.

Loorbach, D. (2010). Transition management for sustainable development: a prescriptive, complexity-based governance framework. *Governance*, *23*(1), 161-183.

Loorbach, D., Van der Brugge, R., & Taanman, M. (2008). Governance in the energy transition: Practice of transition management in the Netherlands. *International Journal of Environmental Technology and Management*, *9*(2-3), 294-315.

MacKay, D. (2009). Sustainable Energy-without the hot air. UIT cambridge.

Mäntysalo, R., Kangasoja, J. K., & Kanninen, V. (2015). The paradox of strategic spatial planning: A theoretical outline with a view on Finland. *Planning Theory & Practice*, *16*(2), 169-183.

Matthijsen, J. (2021) Expert interview on validation of findings with L. Butz, 30 June, 2021.

Matthijsen, J., Chranioti, A., Dignum, M., Eerens, H., Elzenga, H., van Hoorn, A., Tennekes, J. & Uyterlinde, M. (2021). Monitor concept-RES. Een analyse van de concept-Regionale Energie Strategieën. PBL-publicatienummer: 4297. Den Haag: PBL

McDonough, W. & Braungart, M. (2002). Cradle to Cradle - Remaking the Way We Make Things, NorthPoint Press.

McLeod, J. (2010). Theory-building case studies. In McLeod, J. Case study research: In counselling and psychotherapy (pp. 157-189). London, UK: SAGE Publications Ltd.

Moraga-González, J. L. & Mulder, M. (2018). Electrification of Heating and Transport: A Scenario Analysis for the Netherlands Up to 2050. *Moraga, JL and Mulder, M., Electrification of heating and transport*.

Notermans, I., van der Have, C., van Raak, R., & Rotmans, J. (2020). Hydrogen for the Port of Rotterdam in an International Context.

Pol, E., Di Masso, A., Castrechini, A., Bonet, M. R., & Vidal, T. (2006). Psychological parameters to understand and manage the NIMBY effect. *European Review of Applied Psychology, 56(1)*, 43-51.

Rijksksoverheid (2018). Handreiking Regionale Energie Strategieën. Den Haag: Rijksoverheid.

Rijksoverheid (2019a). Klimaatakkoord. Den Haag: Rijksoverheid

RTV Drenthe (2017). Kamp houdt vast aan windmolens in Veenkoloniën. Retrieved from: https://www.rtvdrenthe.nl/nieuws/117645/Kamp-houdt-vast-aan-windmolens-in-de-Veenkolonien.

Roo, G. de & Porter, G. (2007). Shifts in Planning Practice and Theory: From a Functional Towards a Communicative Rationale. Fuzzy Planning - The role of actors in a fuzzy Governance environment (pp.103-113). Aldershot: Ashgate.

Rotmans, J., Kemp, R., & Van Asselt, M. (2001). More evolution than revolution: transition management in public policy. *foresight*.

Scholten, D., & Bosman, R. (2016). The geopolitics of renewables; exploring the political implications of renewable energy systems. *Technological Forecasting and Social Change, 103*, 273-283.

SenterNovem (2007). Cijfer en tabellen 2007. SenterNovem. Utrecht.

Shoaib, S., & Mujtaba, B.G. (2016). Use It or Lose It: Prudently Using Case Study as a Research and Educational Strategy. American Journal of Education and Learning, 1(2), pp. 83-93.

Seo, S. N. (2017). Beyond the Paris Agreement: Climate change policy negotiations and future directions. *Regional Science Policy & Practice, 9*(2), 121-140.

Smil, V. (2015). Power Density. A key to understanding energy sources and uses. Cambridge. MIT Press.

Strauss, A.L., & Corbin, J. (1990). Basics of Qualitative Research. Thousand Oaks, CA: SAGE Publications.

Tillie, N., Van Den Dobbelsteen, A., Doepel, D., Joubert, M., De Jager, W., & Mayenburg, D. (2009). Towards CO2 neutral urban planning: presenting the Rotterdam Energy Approach and Planning (REAP). *Journal of Green Building*, *4*(3), 103-112.

United Nations (2015). Paris Agreement.

Van der Brugge, R., & Rotmans, J. (2007). Towards transition management of European water resources. *Water Resources Management*, *21*(1), 249-267.

Van der Brugge, R., Rotmans, J., & Loorbach, D. (2005). The transition in Dutch water management. *Regional environmental change*, *5*(4), 164-176.

Van Kann, F. (2015). *Energie en ruimtelijke planning, een spannende combinatie: over integrale ruimtelijke conceptvorming op een regionale schaal met exergie als basis*. [S.n.].

Van Leeuwen, R. P., de Wit, J. B. & Smit, G. J. M. (2017). Review of urban energy transition in the Netherlands and the role of smart energy management. Energy Conversion and Management, 150, 941-948.

Van Sluis, B. (2018). Groot probleem: Voetbalclub wil zonnepanelen, maar krijgt deksel op neus (Enexis kan de stroom niet kwijt). Dagblad van het Noorden.
Verbong, G., Van der Vleuten, E., & Scheepers, M.J.J. (2002). Long-term electricity supply systems dynamics. A historic analysis. Netherlands.

Vereniging van Nederlandse Gemeenten (2017). Lessen voor een regionale energiestrategie - slim schakelen. *Ruimtevolk*.

VROM (2001). Een wereld en een wil; werken aan duurzaamheid. Nationaal Milieubeleidsplan 4. Den Haag: Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieu (VROM).

Yin, R. K. (2017). Case study research and applications: Design and methods. SAGE Publications.

List of Concept RES documents used

Concept RES Achterhoek
Concept RES Alblasserwaard
Concept RES Amersfoort
Concept RES Arnhem-Nijmegen
Concept RES Cleantech Regio
Concept RES Drechtsteden
Concept RES Drenthe
Concept RES Flevoland
Concept RES Foodvalley
Concept RES Fryslân
Concept RES Fruitdelta Rivierenland
Concept RES Goeree-Overflakkee
Concept RES Groningen
Concept RES Hart van Brabant
Concept RES Hoeksche Waard
Concept RES Holland-Rijnland
Concept RES Metropoolregio Eindhoven
Concept RES Midden Holland
Concept RES Noord- en Midden Limburg
Concept RES Noord-holland Noord
Concept RES Noord-holland Zuid
Concept RES Noordoost Brabant
Concept RES Noord-Veluwe
Concept RES Rotterdam-den Haag
Concept RES Twente
Concept RES U16
Concept RES West-Brabant
Concept RES West-Overijssel
Concept RES Zeeland
Concept RES Zuid-Limburg

Appendix

Visualization of the RES document analysis

	Region	Energy strategy	Visionary character	Broad horizon	Plan for implementation	Budgetairy vision	Multi-level perspective	Pages	Status document
1	Achterhoek							52	Document
2	Alblasserwaard							80	Document
3	Arnhem Nijmegen							42	Document
4	Amersfoort							88	Document
5	Drechtsteden							49	Document
6	Drenthe							237	Document
7	Flevoland							59	Document
8	Foodvalley							62	Document
9	Friesland							25	Document
10	Goeree-Overflakkee							23	Document
11	Groningen							153	Document
12	Hart van Brabant							80	Document
13	Holland Rijnland							47	Document
14	Hoeksche Waard							50	Document
15	Midden-Holland							134	Document
16	Noord-Holland Zuid							331	Document
17	Metropoolregio Eindhoven							60	Document
18	Noord-Holland Noord							257	Document
19	Noord- en Midden Limburg							176	Document
20	Noordoost Brabant							41	Document
21	Noord-Veluwe							90	Document

22	*Fruitdelta Rivierenland*							42	Document
23	*Rotterdam-Den Haag*							38	Document
24	*Cleantech Regio*							47	Document
25	*Twente*							56	Document
26	*U16*							66	Document
27	*West-Brabant*							47	Document
28	*West-Overijssel*							28	Document.
29	*Zeeland*							133	Document
30	*Zuid-Limburg*							210	Document
	Total							2803	

Table 4: visualization of assessment results. Made by author.

Bottom-up		Top-down	
None	Low	Moderate	High.

Table 5: colour scheme corresponding to table 4

RES analysis summary per region

Link to Google drive folder with corresponding remarks can be requested at l.butz@student.rug.nl

Achterhoek			Document
	Score	**Notes**	**Source**
Energy Strategy	Mod	Has developed some energy saving programmes.	17, 22
Visionary character	Mod	Is planning to be energy neutral in 2030 (more ambitious than national target). Phased out wind turbines can be replaced or removed, both possibilities are open.	6, 19, 20, 32,
Broad horizon	None		32
Plan for implementation	Low	Preference for solar on roofs and on locations that are close to a grid connection. Uses a Zonneladder to determine what locations are preferred. Actively tries to find locations that cause less congestion problems by balancing supply and demand.	14, 17, 21, 26, 44
Budgetary vision	None		26

Multi-level perspective	Mod	Bottom-up bid. Is partly dependent on the actions of the State regarding military practice grounds. Acknowledges the essence of multi-level perspective.	7, 11 21, 33

Alblasserwaard			Document
	Score	**Notes**	**Source**
Energy Strategy	Mod	Saving energy. Betting on energy free options such as cycling. Has some programmes to stimulate energy savings.	10, 14, 26, 50
Visionary character	None		67
Broad horizon	Mod	Stimulates innovation in new techniques. Considers energy storage a viable solution.	10, 35
Plan for implementation	Low	Has some ideas on what regions are potential sources.	10, 23, 30, 31, 54
Budgetary vision	Low	Financial impact will only be considered in RES 1.0 and 2.0	7,3 75
Multi-level perspective	Low	Recognize the importance of a multi-level perspective. The region acknowledges the lack of collaboration at higher authoritarian levels. Bid is based on space and current possibilities.	37, 75

Arnhem Nijmegen			Document
	Score	**Notes**	**Source**
Energy Strategy	None		
Visionary character	Low	Has a vision for 2050 to be energy neutral.	
Broad horizon	Low	The region is flexible towards different storage solutions.	27
Plan for implementation	Low	Clear map of the different locations that have potential or restrictions. Use an energy ladder to determine the locational preferences. Pledges for system efficiency regarding the energy grid.	10, 21, 11, 21, 25

Budgetary vision	None		
Multi-level perspective	Mod	The region is pleading for collaboration on higher authoritarian levels. Is clear on what to demand from the State. Mixed top-down and bottom-up bid.	3, 7, 9, 31, 38

Amersfoort			Document
	Score	**Notes**	**Source**
Energy Strategy	Low	The region uses Trias Energetica as their strategy. No further elaboration on the topic.	16 (ook in bijlage pag 16).
Visionary character	None		
Broad horizon	Low	Is flexible towards multiple new energy sources in the future.	31
Plan for implementation	Low	Map of potential areas for energy production. Not very concrete.	44
Budgetary vision	None		
Multi-level perspective	Mod	The region recognizes a lack of governmental capacity in its own region and makes a request to the state for help. Bid is based on a top-down approach. Acknowledges the importance of multi-governmental collaboration.	18, 29, 32

Drechtsteden			Document
	Score	**Notes**	**Source**
Energy Strategy	Low	Energy strategy that focuses on energy savings and small-scale renewables. No details on how the energy is going to be saved.	11, 22, 35
Visionary character	None	2050 energy neutral.	
Broad horizon	None		
Plan for	Low	Plans are formed to translate the RES into an executable programme. Potential energy regions are described. Semi-detailed	20, 39, 40

implementation		maps for potential regions to develop renewables.	
Budgetary vision	None		
Multi-level perspective	Mod	Top-down bid. Recognize the importance of multi-level governance and direct involvement of the State. Strives for good collaboration with neighbouring regions.	17, 36, 41, 42

Drenthe			Document
	Score	**Notes**	**Source**
Energy Strategy	Low	Uses tactics found in both the Trias Energetica as in REAP.	51
Visionary character	None		
Broad horizon	Low	Stimulate innovation in new storage techniques. Hydrogen is considered very likely to be used as an additional tool to combat grid capacity	45
Plan for implementation	Low	Maps for new and current projects. Adapts the strategy on where to place renewables depending on grid efficiency.	43, 69
Budgetary vision	Low	Set up a fund to kickstart new projects.	34
Multi-level perspective	Mod	Bottom-up bid. Distinguishes conditions that need to be reevaluated by the state such as legislation and policy.	14, 30, 47, 57

Flevoland			Document
	Score	**Notes**	**Source**
Energy Strategy	high	Complete chapter on energy saving with programmes and plans for each sector (note: region with one of the lowest energy savings potential).	3, 31
Visionary character	high	Are aware that policy has to be made for the (long-term) future. Have sketched an image of 2050 and designed plans to reach that image.	6, 41
Broad horizon	high	Stimulate innovation in storage technology and hydrogen. Keep options open for what happens with used up wind power (replace, or remove). Plans from the region to discover possibilities of	6, 42, 43

		energy storage.	
Plan for implementation	none	Accurate plans are missing in the Concept RES but will be included in RES 1.0.	36
Budgetary vision	none		
Multi-level perspective	low	Bottom-up bid.	33

Foodvalley			Document
	Score	**Notes**	**Source**
Energy Strategy	Mod	Save 1.5% energy each year until 2030. Most municipalities have their own programmes to save energy. Has a small chapter on energy saving in the RES but lacks implementational plans.	
Visionary character	Low	Situational sketch for 2050 is made.	9
Broad horizon	Low	Alternative technologies are considered as viable options for the future	21
Plan for implementation	Low	Clear views on what sites renewables have to be developed	33
Budgetary vision	None		
Multi-level perspective	Mod	Collaboration between authorities has been described in another document. Bottom-up bid on energy savings and production per municipality. Collaboration with other RES regions is needed since they might have effect on each other	10, 15, 61

Friesland			Document
	Score	**Notes**	**Source**
Energy Strategy	Mod	A strategy to reduce energy demand with 1% each year by isolating households.	19
Visionary character	Mod	Clear goal of the RES: decreasing CO2 emissions to reach goals by the Klimaatakkoord (2015). A calculation has been made for the energy demand and supply until 2050 on which their bid is	10, 18

		roughly calculated.	
Broad horizon	Mod	Stimulating innovation by facilitating laboratoria at the Islands to examine self-sufficiency. Also high number of local incentives with technical and social advancements	10
Plan for implementation	Low	Detailed map on page 7 with locations of (potential) energy locations	7
Budgetary vision	None		
Multi-level perspective	Mod	Vague description of the bottom-up bid strategy. Clear vision on what is being requested of the State in terms of legislation and policy.	14, 15

Goeree-Overflakkee			Document
	Score	**Notes**	**Source**
Energy Strategy	High	Actively informing households with coaches and programmes on how to lower their energy demand.	18
Visionary character	None		
Broad horizon	High	Wide array of innovative initiatives such as alternative sources and storage options. Names the importance of evaluation in the process so that ambitions and goals can be reached.	17-21, 22
Plan for implementation	Mod	Detailed map for current and future energy sources	13
Budgetary vision	Low	The region rents out cheap money for homeowners to increase sustainability of their houses.	18
Multi-level perspective	None	Bottom-up bid.	4

Groningen			Document
	Score	**Notes**	**Source**
Energy Strategy	High	Reducing the demand of energy by isolating homes. The region	20

		has designed a programme for this initiative.	
Visionary character	None		
Broad horizon	None	Sees hydrogen gas as important aspect in future energy system.	
Plan for implementation	Mod	Ideas that small settlements can be self-sufficient, if wanted to, which limits the pressure on the grid. The region has a clear view on what type of locations they want to develop energy sources and how to combine those with other functions. In appendix: clear overview of planned activities with accurate locations	13, 33, 28b
Budgetary vision	None		
Multi-level perspective	Mod	Bottom-up bid. Collaboration with Northern regions to eliminate externalities as a result of incentives placed around borders. The region acknowledges that some aspects oversee the capabilities of a single municipality and pledge for more a regional approach (geothermal energy)	8, 10, 41, 45

Hart van Brabant			Document
	Score	**Notes**	**Source**
Energy Strategy	High	Total chapter on saving energy with extensive programmes and plans to execute them.	14
Visionary character	None		
Broad horizon	None		
Plan for implementation	Low	Locations are known for soon to be realized new initiatives. 'Zonneladder' is used to determine whether new solar fields can be developed.	20, 32
Budgetary vision	None		
Multi-level perspective	Mod	Top-down bid. Bottom-up bid (31). Overview of what is being requested by the Region from the State	19, 31, 77

Holland Rijnland			Document
	Score	**Notes**	**Source**
Energy Strategy	High	Goal for every municipality to save 11% (2014-2030). Complete chapter on energy saving per sector in the built environment and measures. REAP approach for heat. Choosing for mobility options that require no energy	13, 16, 24, 34
Visionary character	Low	Recognizes the importance of emissions by the mobility sector and acts on this.	
Broad horizon	Low	Stimulating new techniques	
Plan for implementation	None		
Budgetary vision	None		
Multi-level perspective	High	Clear demand for the State regarding energy savings goals. Clear demand for the State to adapt policy for building in the 'Groene Hart'. Acknowledge the essence of collaboration between different governmental levels, stakeholders, and citizens. No clear distinction in the approach followed for the bid of the region.	18, 27, 35

Hoeksche Waard			Document
	Score	**Notes**	**Source**
Energy Strategy	Mod	The region uses the Trias Energetica as their strategy. It aims to save 25% in 2040 compared to current levels.	10
Visionary character	Non		
Broad horizon	Low	Allowing for alternative potential energy sources such as waterpower or hydrogen that can contribute to the goals of 2030 or 2050.	47
Plan for implementation	Low	Location is known for wind parks ‘in de pijplijn’ (map).	21
Budgetary vision	Non		

Multi-level perspective	Mod	Top-down bid based on national energy demand. The region describes the points of interest for this RES for the province.	15, 37

Midden-Holland			Document
	Score	**Notes**	**Source**
Energy Strategy	Low	Saving energy is the regions priority, however no indications have been given on the amount of savings or on the strategy to fulfill this priority, this will be done in RES 1.0	29
Visionary character	Mod	Also addresses other important issues such as peat oxidation that releases considerable amounts of CO2. The region has set its own goals for 2050 (climate- and energy neutral and almost without fossil fuels).	13, 14
Broad horizon	Low	The region rules out the use of hydrogen as a technology for the coming decade. This limits the broad horizon.	12 & 14
Plan for implementation	Low	Reasonable detailed map for (already) planned projects. Energy project ladder that describes which locations are preferred to be developed as energy production sites.	28, 29-31
Budgetary vision	Non		
Multi-level perspective	Low	Addresses the need for adaptations on legislation and policy by the State. Acknowledges the lack of contact with higher authorities. Top-down approach.	13, 18, 23

Noord-Holland Zuid			Document
	Score	**Notes**	**Source**
Energy Strategy	Low	Has a strategy focused on saving energy. Actual implementation is missing.	
Visionary character	None		
Broad horizon	Mod	Sets limits to plans that enable path-dependency. The region facilitates experimental playgrounds and innovations.	11, 27

Plan for implementation	Low	Has ideas on what regions are suitable for renewables and which locations are less. Map on future plans	12, 31
Budgetary vision	None		
Multi-level perspective	High	Bottom-up bid. Demands for the State regarding policy and legislation. The province acts as the facilitator of close collaboration between subregions. The region has collaboration with surrounding regions to streamline their projects so they don't interfere with other regions. They recognize the multi-level perspective.	9, 13, 14, 26, 46

Metropoolregio Eindhoven			Document
	Score	**Notes**	**Source**
Energy Strategy	high	Chapter on energy savings with plans and programmes that actively help this goal.	21
Visionary character	low	The region uses a long-term strategic vision while developing the RES.	15
Broad horizon	low	Experimental playgrounds for energy sources along infrastructure. Actively aims to prevent projects that are irreversible to keep options open for 2050.	31
Plan for implementation	mod	Map for potential areas. Municipalities in the energy region will follow the plans of the RES by implementing those in municipality plans.	33
Budgetary vision			
Multi-level perspective	high	The region has a clear vision on what is needed by the State to successfully fulfill the RES. Big subsection on this aspect. No clear distinction in the approach of the bid.	49

Noord-Holland Noord			Document
	Score	**Notes**	**Source**

Energy Strategy	Low	Vague strategy on energy savings	
Visionary character	Mod	The region and municipalities within that region have set their own (more ambitious) goals regarding renewable energy production. Prevent path-dependency in their plans by not ruling out any options.	20
Broad horizon	None		
Plan for implementation	Low	Map of potential areas and future projects. Is clear on what areas are suitable and which areas are not.	9, 11
Budgetary vision	None		
Multi-level perspective	High	The province acts as the facilitator of close collaboration between subregions. The region has collaboration with surrounding regions to streamline their projects so they don't interfere with other regions. They recognize the multi-level perspective. Approach seems to follow a top-down strategy.	8, 12, 25

Noord- en Midden Limburg			Document
	Score	**Notes**	**Source**
Energy Strategy	high	The Region aims to lower its energy demand by isolating homes, changing our behaviour and using energy smarter. Goal to reduce energy demand by 25% (2030-2015). Use of the Trias Energetica as the main guideline. Chapter on energy saving with a strategy and programmes to execute.	11, 3, 42
Visionary character	mod	Chapter on the views on the period of 20230-2050:For electricity: mobility, natural gas free impact, flexibility in the grid. Views on trends and innovations: storage, hydrogen, higher need for recycling of new wastestreams (solarpanels, double glas, isolation.	
Broad horizon	low	Open to new technologies and opportunities	63
Plan for implementation	low	Potential areas are vague.	13
Budgetary vision	none		
Multi-level perspective	low	Collaboration with surrounding energy regions. No clear description of the approach that has been followed to reach the	41

		suggested bid.	

Noordoost Brabant			Document
	Score	**Notes**	**Source**
Energy Strategy	mod	The region aims to save up to 21% elektricity in 2050 and 10% in 2030 (not very ambitious). A working group will be set up that aims for energy savings.	9, 41
Visionary character	low	Considers a higher demand for cold as a result of more airco installations as summers get hotter. Own digital database that allows tracking of energy usage and production.	10, 38
Broad horizon	none		
Plan for implementation	low	Map with search areas for wind and sun energy.	19, 20
Budgetary vision			
Multi-level perspective	mod/low	Top-down approach bid. Bottom-up approach for localisation of potential areas. Within the region municipalities discuss their steps and projects to have a transparent picture of the effects on regional scale. Agreements made in the RES are pinnend in local planning policy. Clear overview of what is being demanded by the State in terms of legislation, finance and policy. The regional level has a facilitating role for local level authorities.	4 & 11, 18, 22, 37, 39, 41

Noord-Veluwe			Document
	Score	**Notes**	**Source**
Energy Strategy	None/ low	Mentions the idea of saving energy, no concrete ideas.	
Visionary character	Mod	Within own plan, already wanting to have 55% CO2 reduction in 2030 (1990). Already considers planting trees to compensate CO2 emissions.	11, 13
Broad horizon	Low	Has a broad vision towards future technologies and innovations	13
Plan for implementation	Low	Have worked out three scenario's that can be implemented.	

Budgetary vision	None		
Multi-level perspective	Low	Bottom-up bid. Together with municipalities and public organizations have already organized a Energy Agreement.	9, 11

Fruitdelta Rivierenland			Document
	Score	**Notes**	**Source**
Energy Strategy	None		
Visionary character	Low	Also part of a regional energy collaboration before the RES.	9
Broad horizon	Low	Innovative technologies such as apps and websites to increase transparency of projects and plans for the coming years.	34
Plan for implementation	Low	Have designed energy ladders which indicate what areas are suitable for energy production. Have three scenario's for new energy sources.	24, 27
Budgetary vision	None		
Multi-level perspective	Mod	Gelders Energie Akkoord, a collaboration between relevant partners in the area. Has an overview of points that are on the agenda of the State. Bottom-up bid.	3, 34, 35

Rotterdam-Den Haag			Document
	Score	**Notes**	**Source**
Energy Strategy	low	Uses the REAP approach as the energy strategy	23
Visionary character	high	Sketches a desired image for 2050 with for example CCS techniques being developed. Integrates the energy transition with a reduction in the emission of particulate matter. Have sketched an overview of the future energy system in 2030-2050.	13, 22, 33
Broad horizon	Mod	Stimulates innovation and research (into new fuels). The region is aware of a modal shift that causes unforeseen changes in energy demand. The region claims to have best position to further develop sustainable gases like greengas and hydrogen.	15, 17, 32

Plan for implementation	None		
Budgetary vision	None		
Multi-level perspective	High	Bottom-up bid. Acknowledges the essential role of multi-level perspective to enhance policy making for spatial planning and processes. Collaboration between regions that share borders with 'Het Groene Hart'. The region facilitates knowledge exchanges, and exchanges of expertise along the involved municipalities. Goals and targets which the Province is working on.	13, 17, 20, 24, 34

Cleantech Regio			Document
	Score	**Notes**	**Source**
Energy Strategy	Mod	Use Trias Energetica as a leading energy strategy. To reach the goals set by the region a large energy demand reduction is needed.	34
Visionary character	Mod	Region has made targets more ambitious than targets from the Klimaatakkoord (2019). Is strongly stimulating innovation in finance, storage solutions, hydrogen and gas use free neighbourhoods.	7
Broad horizon	Low	The region assumes that solar power will be more effective after 2030 and thus will generate more electricity.	14
Plan for implementation	Low	Usage of Zonneladder to determine where to develop solar power installations.	11
Budgetary vision	None		
Multi-level perspective	Mod	Top-down bid. Part of Gelders Energie Akkoord. The region recognizes the flaws of current policy and has views on the role of the State in fulfilling the goals of the RES programme.	7, 33

Twente			Document
	Score	**Notes**	**Source**
Energy Strategy	low	Uses coaches to help people save energy in their homes.	4, 31

Visionary character	low	Promoting itself as a knowledge region and strives for innovation. Combining challenges such as climate adaptation with challenges caused by the energy transition.	4
Broad horizon	none		
Plan for implementation	low	Has a strategy to reach the total bid on what kind of locations energy has to be developed.	5
Budgetary vision	none		
Multi-level perspective	Mod	Acknowledges the need for (inter)national collaboration of governments. States what is wanted from the State.	50

U16			Document
	Score	**Notes**	**Source**
Energy Strategy	Low	Aims to start lowering the energy demand by isolating houses.	10b
Visionary character	Low	Also takes into account the needed human capital in 2030-2050.	27
Broad horizon	Low	Stimulates innovation and research. Wants the State to invest more in technical innovations.	27
Plan for implementation	Low	Has a vague idea on where to develop renewables.	20
Budgetary vision	None		
Multi-level perspective	Low	Collaboration with the State is needed to successfully achieve the bid. Top-down bid.	7, 12, 26

West-Brabant			Document
	Score	**Notes**	**Source**
Energy Strategy	Low	Aims to reduce energy demand on neighbourhood level.	5, 17
Visionary character	Low	Aims to start producing electricity with innovative ideas by 2030.	

Broad horizon	High	Aims to develop a flexible RES strategy that can adapt new technologies and innovations.Clear plans on what innovations to push forward and experimenting with those innovations.	13, 25
Plan for implementation	Low	Map of energy potential per municipality. List of activities that need to happen for the RES 1.0	8
Budgetary vision	Low	The region is keen to make it possible for society to financially benefit from energy initiatives and make it financially attractive to participate in projects.	29
Multi-level perspective	Mod	Developed needs from the State to guarantee the execution of all projects. Bottom-up bid	7, 31

West-Overijssel			Document.
	Score	**Notes**	**Source**
Energy Strategy	None		
Visionary character	None		
Broad horizon	None		
Plan for implementation	None	Municipalities have not yet positioned potential areas for energy production.	8
Budgetary vision	None		
Multi-level perspective	Mod	Demands updated policy and financial measures from the State to successfully complete the RES projects. Bottom-up bid. Acknowledges the multi-level perspective by already working together for some years.	5, 6, 9, 16

Zeeland			Document
	Score	**Notes**	**Source**
Energy Strategy	High	Aims to reduce CO2 emissions by 34% in 2030 mostly done by isolating houses and having more efficient industrial processes. Use a variant of the Trias Energetica as their main energy strategy. Have several programmes running to help lower the energy demand.	

Visionary character	Mod	Also takes into account the role of (a shortage) of human capital in their plans. Have developed more ambitious plans than the RES programme provides.	16
Broad horizon	High	Stimulate innovations by setting up design competitions. The region is flexible in applying new technologies. Stimulate innovation by hosting experimental playgrounds. Seen sustainable gases as a viable option for remaining energy demand of (monumental) houses. Take energy production by water into account as a serious option and stimulate innovation and research.	18, 23, 25, 50, 71
Plan for implementation	Low	List of actions needed per sector. Zonneladder is used to determine potential locations.	71
Budgetary vision	mod	Acknowledges it needs financial help from the State to complete energy projects. Chapter on financing the RES programme. Funds will become available for people to use and improve the sustainable character of their houses.	21, 25
Multi-level perspective	Low	Have designed working groups between the region and the state to facilitate participation. State is needed to execute all planned projects (policy, law, finance). Bottom-up bid.	6, 18, 21

Zuid-Limburg			Document
	Score	**Notes**	**Source**
Energy Strategy	Mod	Uses Trias Energetica	32
Visionary character	Mod	Is aiming to be energy neutral in 2040.	32
Broad horizon	None		
Plan for implementation	Low	Locations are somewhat defined	
Budgetary vision	None		
Multi-level perspective	Mod	Acknowledges the multi-level perspective and the different roles local authorities can have. Bottom-up bid.	14, 15