MASTER THESIS

A framework for developing regional energy strategies for the built environment and the electricity sector with a focus on public participation

Case study: the Dutch RES program

Title	A framework for developing regional energy strategies for the built environment and the electricity sector with a focus on public participation; a case study applied to the Dutch RES program
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Abstract

The energy sector is the biggest CO2 emitting sector in the world with approximately 80% of the world's primary energy supply coming from fossil fuels. To change this reality, a radical energy transition is required which calls for strategic decision-making on different administrative levels. This requires a multi-stakeholder and multi-disciplinary approach as the energy transition has a major influence on many different sectors and stakeholders; think of the electricity sector, the industrial sector and the built environment and the many stakeholders that somehow depend on these sectors. A very important stakeholder of most of these sectors are citizens, like you and me.

Both the European union and national governments around the world aim at the regional level to govern the energy transition. This paper endeavored to develop a framework to facilitate policy makers in this decision-making process. Based on a comprehensive literature study on energy planning, an analysis of different theoretical perspectives on public participation in the energy transition and a case study on public participation in the Dutch RES program, this research developed the SREP framework. The framework is aimed at the process level and the participatory level of energy planning and is designed for developing medium-term and long-term renewable energy strategies. Users of the SREP framework can (among others) speed-up the energy transition, improve social acceptance, stimulate better decision-making and improve the perception of perceived procedural and distributive fairness.

Keywords: Energy transition, energy planning, strategic energy planning, public participation, SREP.

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ABREVIATIONS

- RES program: regional energy planning program of the Dutch national government.
- RES: the regional energy strategy that each region develops.
- NP RES: national program regional energy strategy which is the department that facilitates the different regions in developing the RES.
- Draft RES: draft version of the RES which is examined by PBL, explained in paragraph 3.2
- RES 1.0: the RES that is developed based on the Draft RES and the feedback from PBL
- NDC: nationally determined contributions which are the foundation of the Paris Agreement
- PBL: Planbureau voor de Leefomgeving. The Dutch Environmental Assessment Agency that advises the Dutch government on environmental policy and regional planning issues like RES.
- SREP framework: framework developed in this research project, oriented on strategic regional energy planning.
- SREP: Strategic Regional Energy Planning.

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1 INTRODUCTION

Since the Paris Agreement was signed in 2015 by 196 countries, each individual country is responsible for developing and implementing nationally determined contributions (NDCs). These NDCs are at the heart of the agreement and are about reducing national emissions and climate change adaptation. Together, all climate actions from these NDCs determine whether the world achieves the goal to limit global warming to 2 degrees Celsius above pre-industrial levels (United Nations, 2015).

Meanwhile, CO2 emissions, which is the biggest contributor to human-induced climate change, continues to rise with records measured in 2018 (Levin, 2019). The energy sector is the biggest CO2 emitting sector and is responsible for 25% of global greenhouse gas emissions due the high share of fossil energy sources that are consumed in this sector. In 1994, around 80% of the global primary energy supply came from these fossil fuels. This number remained unchanged in 2018 (Energypost , 2019). Besides, as energy is one of the main drivers for the world's economy, and human's population is likely to rise, it can be expected that global energy demand will increase (Torabi Moghamad , et al., 2019).

In 2018, electricity demand grew by 4% to a share of 20% in total final energy consumption worldwide and is positioning itself as the 'fuel' of the future (International Energy Agency, 2019) as the world steps back from carbon dioxide-intensive energy sources (Burger & Weinmann, 2013). An increasing demand for heating and cooling (Braungardt, Bürger , Zieger , & Bosselaar, 2019) as well as an increasing interest in electric vehicles (Hajer , 2011) will potentially accelerate the worldwide electricity demand.

Major events in the energy sector like the oil crisis of the 1970s and more recently, a growing interest in distributed intermittent renewable energy sources and the challenge of reducing CO2 emission call for policy making that incorporate strategic energy planning (Prasad, Bansal , & Raturi , 2014). Over the years, different approaches to energy planning emerged each with a different focus (environmental, social, technical, economic, geographical, geopolitical). This makes energy planning a multi-disciplinary discipline which requires a case specific approach that integrates different perspectives (Mirakyan & De Guio, 2013). Within the international literature on energy planning, three different levels of energy planning are recognized, which are the process level, the methodological level and the participatory level (Mirakyan & De Guio , 2014).

Especially the participatory level is gaining prominence in a society with empowered citizens with unprecedented responsiveness, learning ability and creativity (Hajer , 2011). Recent experiences with large scale onshore wind energy in the Netherlands emphasized the importance of this level (Akerboom, 2018). Ouhajjou et al. (2015) affirms this observation by stating that energy planning processes should focus on the actors of a planning process (participatory level) rather than on the actual content. Especially, since people today literary inhabit energy systems and large-scale energy transitions like the heat transition and the transition to renewable energy sources, which require socio-technical changes (Chilvers , Pallet , & Hargreaves , 2018), will have enormous consequences that affect humans (Miller , Richter , & O'Leary , 2015; Steg , Perlaviciute , & van der Werff, 2015). How citizens participate in energy planning processes highly differs as public participation can have many purposes, ranging from normative democratic purposes like empowering citizens (Gustafsson, Ivner , & Palm, 2015) to more instrumental purposes like better decision making (Coenen , 2008). The revised renewable energy directive 2018/2001/EU, aimed at helping the member states to meet their NDCs of the Paris Agreement, highlight the importance of a regional approach to stimulate

developments of renewable energy and to facilitate participation of local inhabitants and SMEs in renewable energy projects (European Union, 2018).

The Netherlands is one of the countries that signed the Paris agreement (United Nations, 2015) and developed national policies to meet the NDCs focused on reducing CO2 emissions. More concrete, the national Dutch government agreed in their coalition agreement that emission reductions will be the foundation for a new climate- and energy agreement to achieve the goals set in the Paris agreement (Dutch government, 2017). Accordingly, five different energy dependent sectors, among which the built environment and the electricity sector, were identified and five different so called 'climate tables' were formulated. For each table, the government organized dialogue sessions with businesses from the five sectors to formulate policy arrangements that would contribute to the overall goal of 49%-CO2 reduction by 2030 and 95% by 2050 (Dutch Government, 2019). The overall goal for the electricity table is to produce 70% renewable energy by 2030 (Dutch government , 2018). The goal for the built environment is to phase out natural gas consumption by 2050 (Dutch government , 2018).

The arrangements from these two climate tables are translated in a program called Regional Energy Strategies (RES program) in which the region, in line with the revised renewable energy directive 2018/2001/EU, is selected as a suitable scale to work on the spatial integration of onshore renewable energy sources and the electrification of the built environment. In total, 30 Dutch regions will work on developing a RES based on the national goals for both 2030 and 2050 (Dutch government , 2018).

1.1 Problem statement

Each region from the RES program develops a medium- to long-term strategy (a RES) in line with the desired deliverables that are provided by the National Program RES (NP RES) for 2030 and 2050. A strategic planning approach will show helpful in developing these strategies. This requires insights in and an understanding of the different energy planning approaches that are developed over the years. However, since the concept of strategic energy planning was introduced after the oil crisis of the 1970s, different energy planning approaches emerged, and energy models changed over time (Mirakyan , Lelait , Khomenko, & Kaikov , 2009). In addition to that, energy planning is becoming a complex multi-stakeholder and multi-disciplinary discipline as the energy value chains of many countries nowadays include multiple stakeholders; most national energy markets of European countries are liberalized and are becoming decentralized (Glachant, 2003). This also accounts for the Netherlands, as different governmental organizations, social partners and businesses join project teams to work on the RES program (Dutch government , 2018).

Another important stakeholder are citizens and citizens groups. 'Why', 'when', and 'how' to engage citizens in the development of a RES are important questions in which the different regions have great autonomy as the participatory level of RES is on a voluntary basis (Akerboom, 2019). The regional approach of the RES program isn't in line with the House of Thorbecke (which explains the organization and the responsibilities of the different administrative divisions in the Netherlands) which makes this program more challenging than regular municipal or provincial programs. Finally, developing technical feasible renewable energy alternatives and strategies is one side of the coin, but improving social acceptance is at least as important and a prerequisite of the RES program (Dutch government , 2018). This highlights the importance of public participation, methods of deliberation and good decision-making processes (Miller , Richter , & O'Leary , 2015).

To sum up, two major problems are identified:

- How to develop a long-term regional energy strategy for the built environment and the electricity sector (process level);
- How to engage the public in the development of a RES (participatory level).

1.2 Research objective

The aim of this research is to develop a framework to help regions develop a regional energy strategy for the electricity sector and the built environment, with a focus on the role of public participation. As the Dutch RES program is the case study of this research, the research context consists of the 30 regions that are requested to initiate and develop a RES. From a theoretical perspective, this research approaches the role of citizens in the energy transition from multiple perspectives to provide a strong foundation for the role of public participation in energy planning and the role of citizens in the RES program. Experts from different scientific fields are questioned about their perspective on to the role of citizens in the energy transition, their perspective on public participation in energy planning and their perspective on the role of citizens in the RES program. Besides, different stakeholders of the RES program that work on public participation related issues are part of this research.

The practical objective of this study is to develop a framework that can help and facilitate governments and organizations across the world to develop energy strategies comparable to the Dutch RES.

1.3 Research questions

Central in this research is the question “how can citizens be engaged and participate in strategic regional energy planning for the built environment and the electricity sector?”. Different sub questions are developed to arrive at an answer on this research question:

- What are different approaches to energy planning and which processes and different planning phases can be recognized for the Dutch RES program?
- How can different perspectives on public participation and different arguments for public participation in the energy transition and related policy programs be integrated in the participatory level of energy planning?
- How can the participatory level be integrated in strategic regional energy planning (SREP) in the case of the Dutch RES program?

1.4 Structure of this study

The **first chapter** of this research report introduced the research topic, the research problem and the different research questions that are central in this study. The **second chapter** elaborates on the research design of this research project by presenting the research strategy of this research report, including the selection of the case study. Besides, chapter two presents the research materials and

the data that was gathered, analyzed and presented in this research report. The final paragraph of chapter two presents important and ethical considerations that were acted upon during the research process. **Chapter three** introduces the case-study of this report, which is the RES program. In the first paragraph of **chapter four,** the concept of energy planning is presented, and the results of the desk oriented on different approaches of energy planning are presented. In the second paragraph of chapter four, challenges and issues of energy planning are discussed. The third paragraph of chapter four presents the process level of the RES program and finally, the fourth paragraph presents a conclusion to the first sub question of this research. **Chapter five** presents different approaches to the concept of public participation and provides an overview of different arguments for public participation. Accordingly, different theoretical perspectives on public participation are presented (the perspectives from the transition management and behavioral sciences). The third paragraph of chapter five presents the results of the case study with regard to public participation in the energy transition. Finally, the fourth paragraph presents a conclusion to the second sub question. In **chapter six,** the second part of the results of the case study of this research are presented and a conclusion to the third sub question is provided. **Chapter seven** provides a discussion of the research results in relation to the literature which resulted in the development of the SREP framework. Besides, a conclusion on the main research question is drawn up in the second paragraph of chapter seven. A reflection on the research findings and the research design is provided in **chapter eight**. This final chapter also provides recommendations for further research.

2 METHODOLOGY

This chapter elaborates on the research design of this research project. Verschuren and Doordewaard (2010) propose a step-by-step approach for designing a research project which is the theoretical framework for the design of this research report. The problem statement, research objective and research questions of this project and the different definitions that are used in this report are already presented in the first chapter of this report. The remaining steps of the research design, which are the research strategy, research materials and ethical considerations, are explained in this chapter.

2.1 Research Strategy

The research strategy explains the way this research is carried out by presenting the research approach and the methods that are used to process the research materials into answers on the different research questions that are presented in paragraph 1.3. Three considerations, which are breadth versus depth, qualitative versus quantitative and empirical versus desk-research are leading in this research strategy. First of all, the research objective of this research requires a broad understanding of the different perspectives on energy planning, the role of citizens in the energy transition and more specifically, the role of citizens in energy planning (Verschuren & Doorewaard, 2010). Therefore, this research analyzes the meaning that different interest groups and scientific disciplines ascribe to the role of citizens in the energy transition and in regional energy planning processes. This approach is in line with a qualitative research strategy (Yin , Introduction , 2003).

The different sub questions from chapter 1.3 incorporate aspects of a theory-oriented research as well as of practice-oriented research. This set-up requires both desk research and empirical research (Verschuren & Doorewaard, 2010). More concrete, this study analyzes the role of citizens in the energy transition from both a theoretical and an empirical perspective and applies the insights to solve the research problems that are presented in paragraph 1.1.

As this research aims to develop a framework, it qualifies as a design-oriented research. In a design-oriented research, different requirements can be distinguished. First of all, there is the functional requirement which is about the functions that the design should fulfill. As mentioned, the study object is the Dutch RES program, which function as a case study. However, the results and the conclusions of this study, the framework from chapter 7.2, is applicable to regions across the world that are challenged to develop a regional energy strategy to address national or international goals considering the energy transition. This generalization is explained later on in this chapter. Second, the contextual requirements are both social and political, as the proposed framework will be a tool for policy makers to design a regional energy strategy that incorporates the role of public participation. Third, the user requirements are quite scattered, as project teams working on regional energy strategies are likely to be highly multidisciplinary. This brings the challenge to develop a framework that suits multiple professions. Finally, the structural requirements are about the material and intangible requirements of the proposed design which are needed to meet the functional requirements. In this case, the structural requirements consist of available tooling, the knowledge level of the different stakeholders that join the regional project organization, their time availability and commitment and the allocation of financial resources (Verschuren & Doorewaard, 2010).

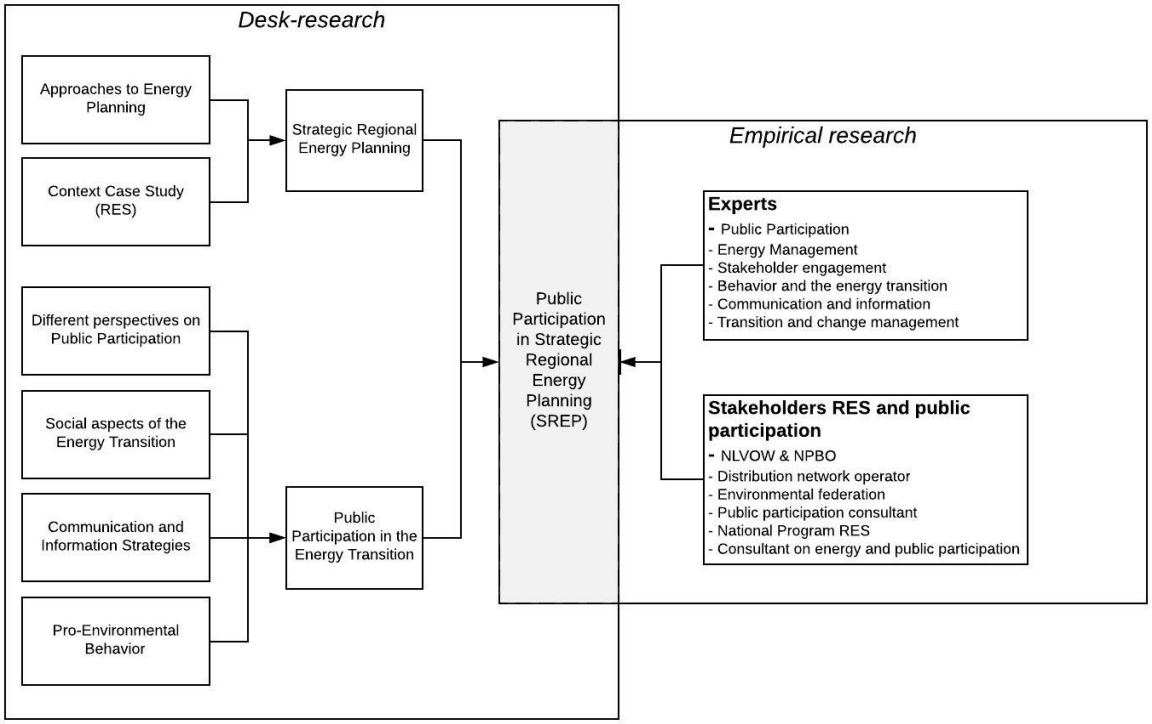

Figure 1. Conceptual model (own work).

Figure 1 presents the conceptual model of this research which incorporates the different theories that are analyzed in chapters four, five and six, the case study from chapter three and the empirical research of this study, presented in chapter five and six. The desk-research section presents the different theories and scientific disciplines that touch upon public participation in the energy transition. The empirical research section of the conceptual model presents the two groups of respondents that are engaged in the empirical part of this study. The next paragraph explains why this research applies the single case-study approach.

2.1.1 Single case study approach

For this study, the RES program is approached as a single case which is analyzed to develop meaningful answers on the questions that are presented in chapter 1.3. The RES program includes 30 Dutch regions that work on developing a RES. Accordingly, practitioners and academics from the fields of energy planning and public participation and professionals who have experience with the RES program or an individual region can be interesting sources of information. Rather than focusing on one of the single regions or potential differences between regions, this case study is oriented on the entire RES program. However, five regions are studied in greater detail, as the RES program includes 5 pilot regions that already experimented with developing a RES where other regions are at the start-up phase of the RES program at the start of this research. Within these pilots, there are learning processes at multiple dimensions that are interesting to analyze and incorporate in the design process of this study. The RES program is presented in more detail in chapter 3.

Case studies are per definition suitable for a qualitative research approach in which the results of the empirical research are interpreted and where possible compared with each other (Verschuren & Doorewaard, 2010). This qualitative research includes different perspectives and subjective meanings of individuals about the role of public participation in the energy transition. Rather than narrowing different perspectives in a few categories of ideas, this study relies on the different views of the respondents which allows to gain in-depth insights. This constructivist approach requires a research design with open-ended questions like presented in chapter 1.3 (Creswell, 2014).

The main research question "how can citizens be engaged and participate in strategic regional energy planning for the built environment and the electricity sector?" is an example of a research question that justifies a case study approach as "In general, case studies are the preferred strategy when "how" and "why" questions are being posted" (Yin , Introduction , 2003, p. 1). The research objective requires an in-depth understanding of the RES program which can only be achieved by performing an in-depth analysis that consists of a document analysis and semi-structured interviews with two groups of respondents (presented in Figure 1) (Liebermand , 2005).

According to Yin (2003), a case study is an empirical inquiry that studies a contemporary phenomenon in its real-life context and that relies on multiple sources in which information from the theoretical proposition guide the data collection and analysis. In line with this statement, chapters four, five and six include a theoretical framework that is required to sufficiently answer the specific sub question and that function as the basis for the quantitative data collection as well as for the data analysis. Theories about 'what' is being studied make the case study design more explicit (Yin , 2014). Therefore, the first sub question allows for an in-depth desk research about the different approaches to and conceptual models of energy planning.

Before these conceptual models are analyzed, different aspects of the RES program like the planning, the stakeholders and the deliverables of the RES program are being studied. The theoretical insights from the literature research are tailored to the conditions of RES which resulted a new regional energy planning approach, Strategic Regional Energy Planning (SREP) which is presented in chapter seven. In chapter five and six, the role of public participation in the energy transition is being studied. This step includes desk-research as well as an empirical research. This framework combines the process level and the participatory level and is applicable to research problems compared to the ones in this research.

Generalizing from the case study

In general, case-based theory developments have highly accurate portrayals of real-world issues, like regional energy planning practices, but little to no generalization across other contexts (Woodside , 2010). This implies that the framework that's being developed can only be generalized to issues that meet the case specific conditions of RES. Whereas statistical findings are often generalized to populations, cases can be generalized to circumstances or, like in this case, to a theoretical proposition (Wikfeldt, 1993; Yin, 2014). Figure 2 presents the relation between the different theories, the case study and the final theoretical proposition.

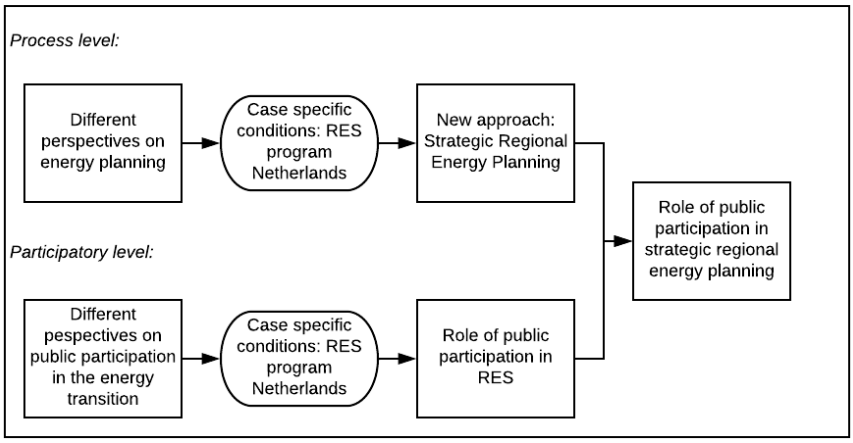

Figure 2. Generalizing: relation between the theories on the process level and the participatory level of energy planning, the case study and the final theoretical proposition (SREP) (own work).

2.1.2 Document analysis and semi-structured interviews

In principle, a single case-study strategy is approached from a qualitative perspective (Verschuren & Doorewaard, 2010). Examples of methods that suit such a qualitative research strategy are text and image analysis and interviews (Creswell, 2014). This case study applies empirical research and desk-research to formulate a meaningful answer on the research questions as this triangulation of research methods allows for a better understanding of the research context (Verschuren & Doorewaard, 2010). Besides, triangulation, which is the combination of different methodologies for studying the same phenomenon, can improve the external validity of the results. The desk-research consist of literature studies and an analysis of policy documents related to the RES program. Semi-structured interviews are the research method that is applied in this study.

Studies that incorporate interviews in a case study often opt for the more intensive face-to-face interviews with open questions (Verschuren & Doorewaard, 2010). This is also the case in this study as the respondents represent a variety of disciplines which require different approaches and questions. A strategic sample of respondents is engaged in this study which allows to approach the study context from different perspectives. A random sample of respondents could result in an atypical sample which would threaten the external validity of the results.

Finally, different interview structures can be distinguished and compared to each other based on the objectives of these structures (Longhurst , 2010). These different structures, which are structured, semi-structured and unstructured interviews, can be placed along a continuum of structured interviews with a predefined and standardized list of questions to unstructured interviews in which the conversation is structured by the informant rather than by the set questions. The interviews in this study are semi-structured interviews that apply some order but allow for an open response of the interviewees and allow the researcher to ask questions about issues that require extra attention and clarification. Another important argument to opt for a semi-structured interview is because this technique allows the interviewee to initiate topics themselves.

2.2 Research material

As mentioned earlier, a strategic sample of respondents is selected and engaged in this study as the purpose of this study is to approach the study context from different perspectives (Verschuren & Doorewaard, 2010). Longhurst (2010) states that respondents should be chosen based on their experience regarding the subject and their experience with the case study. In line with this, two groups of interviewees are identified (see figure 1). The first group includes scientists and practitioners from different (scientific) disciplines. The second group are stakeholders of the RES program that are somehow familiar with the role of citizens in this program. Think of Enexis, a distribution network operator, NMF, an environmental federation and the NLVOW and the NPBO, organizations that on with public participation in decision-making and public participation in onshore wind developments.

A predecessor of the RES program is a pilot program RES in which five regions experimented with the regional approach. In order to learn from these pilot regions, R. Schuurs and A. Schwenke were asked to evaluate on the performance of these regions and to write a report about the different lessons based on their observations (2017). These authors are also familiar with the role of public participation in RES and are part of the second group of interviewees. Table 1 presents the different respondents and their expertise.

The document analysis includes the RES handbook (Dutch government , 2018), the rapport written by R. Schuurs and A. Schwencke (2017) and the climate agreement of the Dutch government (Dutch Government, 2019).

Interviewee	Expertise	Organization
Group 1		
Dr. S. Akerboom	Lawyer and political scientist	University of Utrecht (UU)
H. Bahar	Senior analyst renewable energy markets and policy	International Energy Agency (IEA)
Dr. G. Perlaviciute	Scientific researcher on environmental psychology	University of Groningen (RUG)
Dr. L. Hajema	Communication specialist/manager	Hajema Communicatie
S. Buchel MSc	Researcher and advisor on transition management	DRIFT
D. Trampe	Associate lector customer insights	Hogeschool van Arnhem en Nijmegen (HAN)
Group 2		
D. Eerland	Consultant public participation and energy reduction	Buurkracht
J. Wolkorte	Project leader climate and energy	Natuur en Milieu Federatie (NMF)
A. Lodder	Energy and sustainability consultant	RoyalHaskoningDHV
H. Schimmel	Senior analysist energy transition	Enexis
R. Schuurs MSc	Independent researcher energy transition. Author of the report on the RES pilot regions	Self-employed
M. Spaan MSc	Project leader energy transition and coordinator participation	NP RES
R. Rietveld	Managing director	NLVOW and NPBO
A. Schwencke	Independent researcher energy transition. Author of the report on the RES pilot regions	Self-employed

Table 1. List with interviewees

2.3 Ethics

From an ethical point of view, norms and values are considered both during the interviews and the literature review, as well as during the data analysis and the presentation of the outcomes. First of all, it is important to consider and safeguard the objectivity of this research as both the University of Twente and Royal HaskoningDHV are engaged in the research process. On one hand, the research is

conducted to contribute to the body of knowledge while on the other hand, it is requested to acquire insights in solving a practical problem. Objectivity is an aspect of integer scientific research and is secured by holding an independent attitude. Integrity also entails honesty, transparency and confidentiality.

The researcher secured an honest attitude by reviewing articles from different scientific papers and by presenting divergent perspectives on the definitions and theories used in this research report. The different research steps are discussed with both Dhr. M.J. Jager and Dhr R. Idema of Royal Haskoning DHV and Dr. F.H.J.M. Coenen of the University of Twente and the results are presented in a transparent manner. An informed consent form is used during the interviews to safeguard the confidential and liable attitude of the researcher. Besides, acquired data is saved on a safe location to secure the privacy of the respondents. The interviews are written out in summaries of approximately five pages. Accordingly, these summaries are communicated with the concerned respondent for feedback before the summaries analyzed for the results section of this report. Finally, APA-style referencing is applied to respect the intellectual property of the authors and the different concepts and theories that are the theoretical foundation of this master thesis.

3 CASE STUDY

The Dutch government recognized the challenge of reducing CO2 with 49% in 2030. The national government choose to work together with market players in five different so called 'climate tables' with a common subject, which are electricity, built environment, industry, agriculture and mobility. Agreements between the government and market players that joined these tables are the basis for the Dutch climate agreement (Dutch Government, 2019). The RES program which is already shortly introduced in the first chapter of this report is a regional energy planning program that is initiated to develop a regional energy strategy (RES) based on agreements from the built environment and the electricity table. The RES program incorporates the heat transition in the built environment and the transition to renewable electricity production.

This chapter doesn't answer a sub research question yet but instead, introduces the case study of this research by presenting the results of the document analysis. The purpose of this chapter is to gain a better understanding of the RES program, it's political context, the required deliverables, the design principles and the envisioned role of public participation. Chapter 3.1 presents the agreements for the built environment and the electricity sector that are made in the Dutch climate agreement (Dutch Government, 2019). Chapter 3.2 presents the RES program based on an analysis of the RES handbook (Dutch government , 2018), the Greendeal Pilots Regional Energy Strategy (Green Deals , 2016) and a presentation of the NP RES on the role of citizens in RES (National Program RES, 2019). Finally, chapter 3.3 presents important points from the evaluation report of the RES pilot regions (IPO, VNG, Unie van Waterschappen, Rijksoverheid , 2017).

3.1 Dutch climate agreement

This paragraph will explain the agreements that are made with stakeholders of the built environment and the electricity sector, as these agreements are the foundation of the RES program.

3.1.1 Built environment

For the built environment, the main objective is to phase out natural gas usage. In order to achieve this by 2050, some agreements have been made and programs have been developed. First of all, the municipality is in the lead in this transition path. Each Dutch municipality develops a program that elaborates on a phased phase out of natural gas in the built environment for utility buildings and houses. This municipality program touches upon a phase out per neighborhood based on a specific timeframe and a specific tempo. Until 2021, this tempo should be at least 50.000 buildings per year and before 2030, 200.000 buildings per year (national level). To achieve this tempo, stakeholders develop arrangements and standards. An example would be a standard in Kwh/m2/year per specific buildings. For renovations, the climate agreement will provide standards and target values for isolation and ventilation. Next to that, the draft climate agreement guarantees that the taxes on natural gas will rise and taxes on electricity will decrease.

For utility buildings, the national climate agreement prescribes the goal of 50% Co2 reduction by 2030 and Co2 neutral utility buildings by 2050. Again, a given standard in Kwh/m2/year will be provided, differentiated based on different sectors and buildings. Over time, these standards will be

developed into legal norms. Legislation obligations will be harmonized and the environmental law considering investments in energy efficiency and energy consumption will be revised. This entails that companies have to report about their energy consumption and related measures every four years (for the first time July 2019). A workgroup consisting of multiple stakeholders will facilitate the utility market with useful benchmarks. Platform Duurzame Huisvesting will provide guidelines for this sector.

On the other side of the coin, the climate agreement talks about alternative sources of heat production for the built environment. Think of sustainable heat production and sustainable gasses, like biogas. The national government will upgrade the SDE subsidies to finance related initiatives. Finally, the climate agreement prescribes that the entire industrial sector will provide insights in their residual heat potential by 2019 which is considered as an alternative heat source.

3.1.2 Electricity sector

The overall goal for the Dutch electricity sector is to develop a CO2-free electricity system towards 2050. As by 2030 a large share of the electricity consumption is produced from renewable sources, energy security is an important focus point. 49 TWh should be developed as wind on sea and 35 TWh as renewables on land to achieve the goal of 49% CO2 reduction by 2030.

Offshore energy in the form of installed wind turbines play a major role in the Dutch electricity sector. The national government together with stakeholders developed an agreement on how to develop this 49 TWh (approximately 11 GW) of installed wind power by 2030 (Dutch Government , 2019). The climate agreement presents agreements that will facilitate the realization of wind on sea, think of permissions, tendering strategies and the constructions of proper infrastructure on sea (and the connection with land). In the end, consumers pay for the infrastructure developments trough tariffs which are charged to the end consumer. In order to come to a feasible business case and to reduce production costs, the national government focusses on research and design.

Next to the goals and strategies for wind energy on sea, the climate agreement set goals for renewable electricity production on land (35 TWh by 2030). As applies to the built environment as well, these goals and the related agreements are worked out on a regional level in the RES program in which each region defines their own renewable energy mix. Important arrangements between stakeholders of RES are categorized based on the content of these arrangements, which are renewable energy production, the related infrastructure, hydrogen, the methodology and the spatial integration of renewable energy sources. As for onshore renewable energy production, the agreements from the draft climate agreement focus on reducing hindrance from legislation, specific targets considering the planning and permission processes of renewable energy production, monitoring of the developments, data- and knowledge management, participation and spatial integration, cost structures and differences between regions, subsidy programs, measures to achieve cost reductions and cooperation arrangements with network operators and their role in the process.

The electricity infrastructure should facilitate the developments considering renewable electricity production. The electrification of the energy demand and the flexible electricity production from renewable energy sources are major challenges for the distribution and transmission grids. As for a flexible integration of sources like solar pv and wind energy, grid interconnection, storage capacity and flexible energy production are of great importance in order to provide energy security. Especially during extreme weather conditions. The national government made agreements with grid operators

about the Dutch Energylaw 1.0, monitoring challenges, feasibility studies and explorative studies which provide new insights (started with in 2019), different tasks and obligations, weather independent flexible production capacity and knowledge and innovation agendas.

In the draft climate agreement, hydrogen is seen as a key component for the energy system in the form of energy carrier, storage capacity and transportation of energy over long distances. Besides, hydrogen could be of great importance for the transitions within the mobility sector and the built environment. For now, the arrangements are mainly about measures for price reductions, research and innovation, explorations for feasible business cases for electrolyze, research about demand developments, transportation and storage infrastructure and legal implications.

3.1.3 Sum up

For the built environment, the methodology is mainly about developing standards per building type. In the electricity sector, the European Emission Trading System (ETS) is the most important control method. The minimum price for CO2 emission will increase, from €12,3 per ton CO2 in 2020 to €31,9 per ton CO2 in 2030, as well as the ETS price. Besides, the SDE+ (subsidy scheme) will be used until 2025. Finally, the current regulations and arrangements considering financial assistance for investments in renewable energy (in Dutch: salderingsregeling), will be reformed.

To finish with, the electricity sector formulated principles and made agreements about the spatial integration of the different identified measures and developments. These principles are: multifunctional land-use, matching supply and demand of renewable energy, combining different spatial challenges and developments and consider the local conditions in exploring possibilities for local renewable electricity production. The agreements for the electricity sector are about the jurisdictional level on which arrangements are worked out and implemented (the region), multifunctional land-use and pilots which are subsidized by the national government (Dutch Government, 2019).

3.2 Regional Energy Strategies (RES)

The agreements from the Dutch climate agreement that apply to the build environment and the electricity sector are translated into the RES program. Together with social partners, like local businesses, grid operators and citizens, regional strategies are developed for the generation of renewable electricity, the heat transition in the built environment and the storage and energy infrastructure required to facilitate the energy transition. Besides, the program is meant to organize long-term cooperation between different regional stakeholders. Finally, it is an input for environmental policies both on provincial and municipal level and a product in which regions describe which energy goals they plan to obtain and which deadlines they handle. The main objectives are to speed up the energy transition, cooperation, spatial integration and social acceptance (Dutch government , 2018).

3.2.1 RES content and deliverables

Principles

In RES, national goals are translated into regional strategies. 30 regions (see appendix I) will work on a strategy which combines the national goals for both the built environment and the electricity sector. A couple of principles are important in developing this strategy:

- Achieve the goals from the climate agreement with maximum spatial integration and environmental quality;
    - The Dutch Environmental Vision (NOVI) provides design principles for the spatial integration of the different measures from the RES program (Dutch Government, 2019);
- Other climate tables from the climate agreement can be considered as well in the RES program;
- Decreasing energy demand/consumption should be a leading principle in the RES (Dutch government , 2018);
- Provide insights in the required infrastructure including the related developments, both for storage and transportation of energy, and required financial investments;
- The start-document, the draft RES and the RES 1.0 has to be officially approved by the different governments and social stakeholders of the RES program;
- The different regions are challenged to outperform the national goals by combined effort of the different RES programs.

Deliverables

Regions deliver the draft RES the first of June 2020 and the RES 1.0 on the first of March 2021. PBL (in Dutch: Planbureau voor de Leefomgeving) will examine the different draft strategies on the goal attainment of the national target. Based on this assessment, regions develop a RES 1.0 and integrate this strategy in municipal and provincial environmental policies. The following content is expected in the draft RES:

- For the electricity sector:
    - A regional overview for renewable electricity production and related infrastructure;
    - A plan to include small scale Solar Pv on rooftops;
    - An overview of potentially suitable locations for the production of renewable electricity;
    - A brief overview of the process, including the different stakeholders that were consulted;

- For the built environment:
    - A quantitative overview of different available heat sources, heat demand and planned developments considering heat within the region;
    - A description of the connection between the demand of heat and the available sources, based on both time and costs;
    - A brief overview of the process, including the different stakeholders that were consulted and the cooperation arrangements between different stakeholders for the future;

- A proposal on how the region expects to link available sources, heat demand and infrastructure efficiently and affordably;
- A framework for assessing the different heat sources in the region.

In order to facilitate the different regions, the NP RES will provide maps and data with information about the current demand for electricity and heat and the future electricity and heat demand (both for 2030 and 2050). Besides, the NP RES will provide maps about the potential for biomass, geothermal energy, aqua thermal energy, wind energy, solar energy and related infrastructure. Finally, the NP RES has six program lines, which are knowledge sharing, data development, monitoring, distribution (of regional goals based on national goal), opportunities and threats and financial assistance.

Guidelines

The RES handbook provides guidelines for the different RES regions:

- Cooperation between municipalities, provinces, waterboards and ministries EZK (economy and climate) and BZK (interior and kingdom relations), social partners, business and society.
- Each RES is managed by a project group which consists of administrative representatives of the municipalities, provinces and waterboards, a representative of the net operator, social partners and business.
- RES is 'technology neutral'.
- Coherence and comparability between the different reports is of importance in order to assess and compare the different reports.
- Apply the four principles considering spatial integration, explained in the climate agreement (final paragraph in the review of the climate agreement).
- The RES focus on 2030 with a glimpse into 2050.
- Participation is an important theme with 50% local ownership as important principle.
- The draft RES is assessed by PBL based on the required content for both the built environment and the electricity sector including governance strategies.

3.2.3 Documents and planning

The RES handbook divides the planning process in five different phases, starting with the start-up phase and finishing with the implementation and monitoring phase. In between are the analysis, the development of the draft strategy (draft RES) and the development of the final strategy (RES 1.0). The start-up phase is mainly about analyzing the region-specific stakeholders and combining them in formulating project groups and working groups. This first phase led to the formulation of 30 different regions. Each region develops a start-document in which they approve the formation of the region and the commitment to work together on the RES. In phase two, the analysis phase, the region is analyzed based on energy consumption and -production, related CO2 production, energy efficiency potentials and the technical potential for sustainable energy sources and possible connections with different energy sectors. In the third phase, the outcomes of phase two are translated into a regional vision on the potential allocation of renewable energy sources, sustainable heat sources and related infrastructure. These three steps (see the chapter on deliverables) are the foundation of the draft

RES which is ready at the first of June 2020. Phase four is about the RES 1.0 which is ready at the first of March 2021. By the second half of 2021, each RES 1.0 is integrated into environmental policy. Phase five, the implementation phase, runs approximately from 2021 to 2030. Each specific project from RES should be permitted by January 2025 in order to start the developments (Dutch government , 2018) (Dutch Government, 2019).

3.2.4 Public participation in RES

In 2016, the Green Deal Pilots Regional Energy strategies was signed. In this deal, five pilot regions were selected to start experimenting with this new regional approach to speed up the energy transition and to organize the spatial implementation with local stakeholders (Green Deals , 2016). This green deal is the precursor of the RES program. According to Akerboom (2019), the Green Deal was an attempt to organize the spatial integration of onshore renewable energy sources on a regional level from a bottom-up approach to overcome the social resistance previously experienced in several onshore wind energy projects, as this social resistance was the result of top-down decision-making organized in the onshore wind policy of the Dutch national government (2014). In response, the RES program stimulates local governments to work on a strategic energy plan for their own jurisdictional region, in corporation with local and regional stakeholders.

A cyclic participation process is proposed in an annex on participation in the RES handbook to give guidance to the participation process during the development of the draft RES and the RES 1.0. The approach to process participation includes four steps, 1) analyses and ambition, 2) what and how much, 3) when and 4) where and how (Dutch government , 2018). These steps should be understood as guidelines instead of as a concrete participation method/procedure (Akerboom, 2019) as the different regions have a great deal of autonomy in developing their own participation plan of action.

The first step, analysis and ambition, includes an energy analysis to acquire a factual understanding of the environment and related social and technical challenges, a stakeholder analysis to gain a better understanding of the stakeholders and the development of a plan of action for the participation process about when, who and how to engage groups in the planning process. Important points to consider in the participation plan of action are: stakeholders should be engaged before important energy related decision are made, a socio-economic overview of society can help to engage with different groups of citizens, understand the differences between public participation in the built environment and the spatial integration of renewable energy sources, make use of existing public consultation moments and finally, give thought to participation set-up and the message towards citizens.

In the second step, about ‘what’ and ‘how much’, a participative planning process is proposed to develop a draft energy mix which incorporates the first (potential) locations for renewable energy production based on the analysis of the first step. Next to that, regional design principles and conditions for renewable energy projects should be developed based on local circumstances. Important points on public participation are: engage with a ‘broad group of stakeholders’ in developing the draft energy mix and the conditions for renewable energy projects, organize multiple regional and if necessary local design workshops, use tools to engage with different socio-economic groups and use existing forums and policy programs related to the quality of the living environment.

In step three, about ‘when’, the decisions from step two are put into an implementation strategy and a planning. It is advised to engage the different stakeholders in this process and to communicate the

developments with the different stakeholders. Finally, in step four about 'where' and 'how', the potential locations for renewable energy production from step one and two are worked out in more detail (specific renewable energy projects) by focusing on both the spatial implications and using the terms and conditions which are agreed upon in step two as the design principles. It is advised to facilitate project participation on a local level by facilitating co-creation with local citizen groups.

Together, the four steps form a design process which is, according to the RES handbook, creative, cyclic, adaptive, interactive and case specific. This process includes design methods like interactive design workshops and decision-making based on spatial analysis and mapping to assure stakeholder participation in each phase. Project participation is important when renewable energy sources are allocated and should consider social acceptance as the main objective, '50% local ownership' as condition for the different projects, combined municipal, provincial and regional visions and collaboration between municipalities in the allocation of renewable energy sources. Spatial design workshops that engage different stakeholders (among which citizens) in an interactive process to learn about the different challenges, different solutions and to learn about the different points of view are considered as an important tool for the different planning phases. As a result, it is expected that the participants of these sessions better understand the challenges, the (spatial) implications of the different solutions and create a sense of ownership.

Figure 3 presents the different approaches to public participation in line with the objectives of public participation in RES which are presented by the national program (2019) as an update on the RES handbook (Dutch government , 2018). This presentation also provided an overview with different levels of public participation, based on the different RES documents. This approach explains per planning phase the requested method of public participation, divided in the regional level, municipal level and project level (Annex III).

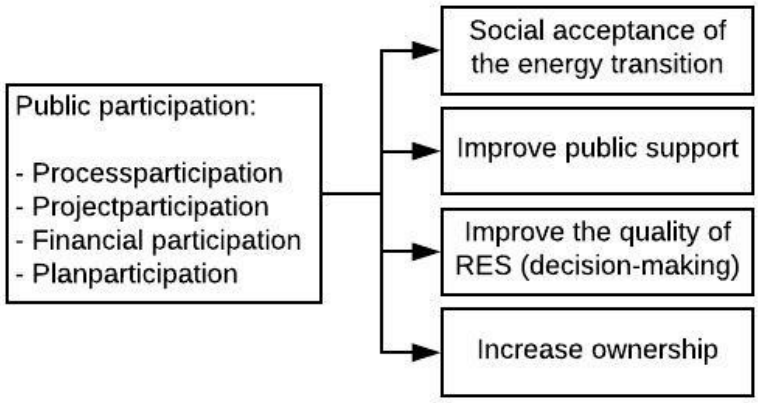

Figure 3. Public participation approach of the National Program RES (own work based on National Program RES, 2019).

3.3 Lessons from the pilot regions

The decision-making process and strategy development of the five pilot regions from the Green Deal Pilots Regional Energy Strategies (Green Deals , 2016) where studied in order to develop a guideline for the various regions of the RES program. The experiences are bundled in Rapport Slim Schakelen, developed by IPO, VNG, Unie van Waterschappen and the national government (2017). In total, 12 lessons are categorized in five phases. These phases are project preparations and organization, stocktaking and analysis, working on alliances and plans, decision-making and implementation. Each phase includes a set of lessons which are summarized in annex II.

For the first phase, project preparations and organization, three lessons are identified: create commitment for the strategy formation process, create a strong project organization and assure a flexible project design. For the second phase, it is important to define a clear starting point, to show and visualize the possibilities and to specify the participation and communication strategies. The third phase is about plan making and making alliances. In this phase, it is important to translate long-term abstract strategies into more concrete and transparent measures that fit in the time of office of governments (maximum of four years). Besides, it is important to consider the cyclic design of the strategy development process. The fourth phase is the decision-making phase, in which the strategies need to be translated into policy documents. It is important to consider which sections of the RES are translated into policy. Besides, in this translation phase, it is recommended to make connections with more tangible agendas of municipalities, like housing or healthcare. Next to that, it is important to consider the dependencies between regions that remain extant. Step five, the final step, is about the implementation of the energy strategy that is designed during step one until four. For this phase, it is very important that the designed strategy meets the long-term targets by executing concrete projects. This final phase requires a strong organization.

4 ENERGY PLANNING

"What are different approaches to energy planning and which processes and different planning phases can be recognized for the Dutch RES program?"

The research objective of this study requires an understanding of the concept of energy planning, including the different planning processes and planning phases that are recognized within the different approaches to energy planning. In line with this objective, the first sub research question allows for an in-depth analysis of the different approaches to energy planning. This chapter introduces the concept of energy planning and provides an overview of the literature that is relevant for answering this first sub-question.

As one of the identified problems is about developing long-term regional energy strategies, this paragraph starts by introducing the concept of energy planning. Accordingly, different approaches to energy planning like strategic energy planning, integrated energy planning and sustainable energy planning are studied and presented in a comparative set-up. Second, paragraph 4.2 presents a set of challenges and issues of energy planning based on the analysis of the conceptual approaches to energy planning discussed in paragraph 4.1. Paragraph 4.3 applies the theoretical foundation of paragraphs 4.1 and 4.2 to analyze the process level of RES based on a set of classification criteria (analytic). Finally, chapter 4,3 shortly introduces the four phases that are used to organize the different insights from this theoretical chapter and presents a conclusion to the first sub question. Annex IV presents the theoretical insights used to develop the process level of SREP (see chapter 7) in a categorized way.

4.1 Energy planning

Energy planning is practiced on multiple levels and scales and for multiple purposes. Besides, as will be explained later on, different energy planning approaches are applied in practice and accordingly, different energy models are being used. As explained in the introduction of this chapter, three different levels of energy planning can be distinguished: process level, participatory level and methodological level. Based on the characteristics of a study area, a suitable approach can be selected for the remainder of an energy planning process. Besides, it is important to understand the required output of the planning process before a certain planning approach and energy model are selected. Both steps, understanding the study area and understanding the different planning approaches and related energy models, require analysis that contribute to selecting a suitable approach.

The first paragraph of this chapter presents the different energy planning approaches. In line with that, a paragraph is dedicated to the classification criteria which should be understood in line with the context of the study area. Tools for understanding the study area are presented later on, in line with challenges related to energy planning.

4.1.1 Introduction to energy planning

Practicing energy planning requires an understanding of the concept of energy planning and the role that planners play in a planning process. Traditionally, rational planning consists of four steps, starting with an analysis of the current situation, continue with establishing goals and finishing with formulating actions and an evaluation of the consequences. Later on, this linear process of planning and designing was rejected and a more participative and holistic planning approach with attention for stakeholder's opinions and interest was accepted. With this form of collaborative planning, the role of planners shifted from technical expert to a role of mediator, coordinating the different stakeholders which are engaged in the planning process (Cajot, et al., 2017). The role of planner as mediator is also evident in energy planning.

The international literature about energy planning includes a lot of different approaches and related definitions and methods that are in line with these approaches. Different tools and models can be used in decision-making for a range of purposes and on a range of different levels (international, national, regional and local). Both within policy development and for practical matters, depending from both the tool design and the types of actors that use it (Bush & Bale , 2019). Next to that, energy planning can be performed on short-term (hours, days and years), medium-term (one to ten years) and long-term (more than 15 years). Medium-term energy planning is oriented on meeting energy demand for longer term by considering new production technologies. The purpose of long-term energy planning is to anticipate on changing energy demand by promoting new technologies and by stimulating grid developments and is considered as strategic planning (Prasad, Bansal , & Raturi , 2014). Most of these approaches help analysists to understand the complex energy sector by integrating thermal energy, electricity and natural gas and by developing scenarios about possible futures. This integration highlights the complexity of the transition of energy systems which calls for proper coordination between institutional levels and different sectors (Krog & Sperling , 2019).

Some policy programs and related policy goals cover the entire energy system whereas others focus on a specific energy source or chain of energy systems. Energy planning methods facilitate policy makers to steer the developments of the energy sector in order to fulfill these policy goals (Pfenninger, Hawkes, & Keirstead , 2014). Finally, energy planning can be conducted to increase the efficiency of an energy system (Viholainen , et al., 2016). In the next paragraph, different definitions and related conceptual models that cover medium-term and long-term energy planning are discussed and compared with each other.

4.1.2 Approaches to energy planning

Entire energy system

In chapter five of their book about renewable energy landscapes (2013), Stremke present an approach for developing long-term energy visions to design sustainable energy landscapes. They state that critical uncertainties, current project trends and intended change should be integrated in the design process of a realistic long-term vision. They developed a design-oriented step-by-step approach: 1) analyzing current conditions, 2) mapping near future developments, 3) illustrating possible far-futures, 4) composing integrated visions and 5) identifying energy conscious spatial developments (see figure 4). The first step, the analysis of the present conditions, is further explained by Müller et al. (2011) and divided in a) analysis of energy demand, efficiency and

sufficiency potentials, b) available energy potentials, c) socio-economic aspects of the region and d) analysis of the costs. They highlight the importance of community awareness and community ownership and rely on the involvement of local actors.

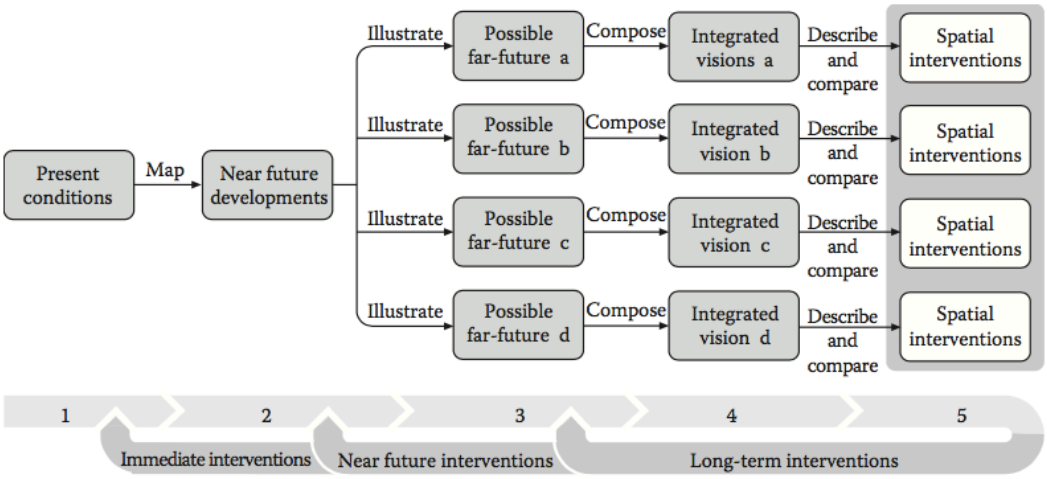

Figure 4. Five step approach to develop a long-term energy vision (Stremke , 2013).

In line with the concept of sustainable energy landscapes, Neves et al. (2015) present the concept of sustainable energy planning in which economic, social and environmental dimensions are integrated to plan how future energy needs can be satisfied. This concept is applied to a low-level administrative division and uses a reference scenario to build and compare alternatives on energy demand side actions and energy supply side infrastructure. The concept includes local actors like citizens and business for the purpose of transparency and legitimacy. Finally, scenarios and strategies are developed based on the alternatives and are assessed and weighted by well-defined environmental, social and economic objectives. They highlight the importance of including the values of local actors in the decision-making process to ensure transparency and to make well-weighted choices. The result is a social-technical approach to local energy planning consisting of nine steps that combine technical modelling methods with social tools for the involvement of local actors. Figure 5 present the nine steps and the different methods that are used per step. Besides, this overview includes the different moments in which local actors are involved.

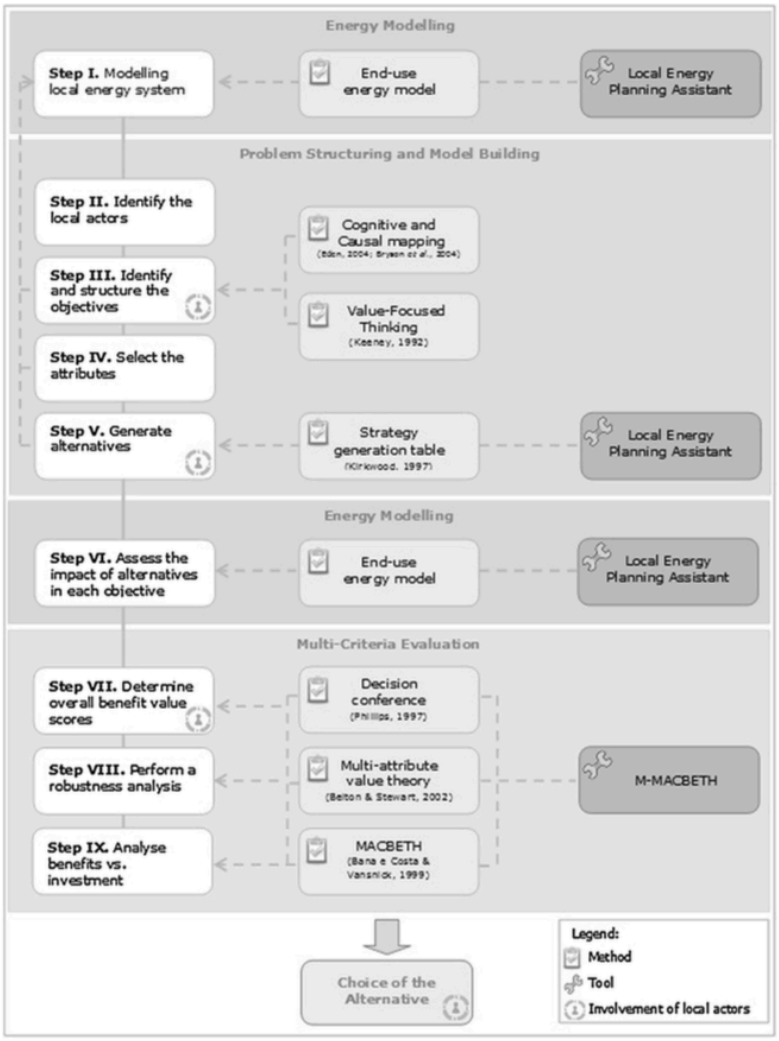

Figure 5. Methods and tools for sustainable energy planning (Neves, Leal, & Lourenco , 2015).

Krog & Sperling (2019) present the concept of strategic energy planning and compare different definitions of strategic energy planning and related tools and methods to improve the implementation of strategic energy planning. Based on their findings, strategic energy planning can be considered as a planning process in which the development of models and scenarios is central and which can be conducted on multiple levels. Furthermore, the lower the planning level (regional or local), the more complex the planning process. They continue by stating that the implementation of renewable energy sources is one of the key drivers in strategic energy planning and a combination of top-down and bottom-up perspectives is needed to fulfill the overall goals. Finally, a strategic energy plan with a long-term perspective is the main outcome of the planning process. Different levels of strategic energy planning, the elements, the tools and methods to arrive at strategic energy plans and different implementation tools are the basis of the research framework presented in figure 6.

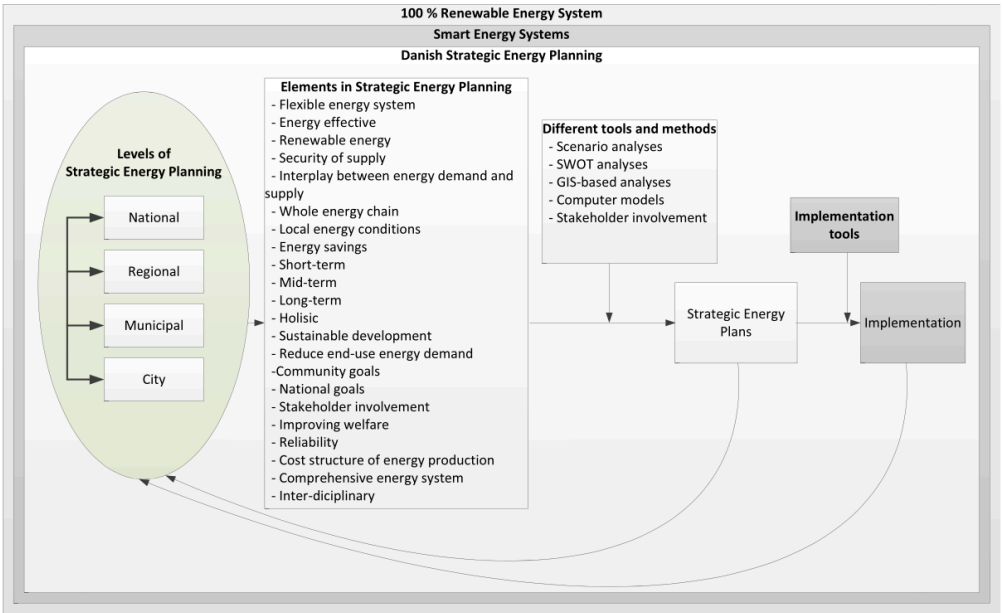

Figure 6. Theoretical framework of strategic energy planning (Krog & Sperling , 2019)

Next to sustainable energy planning and strategic energy planning, integrated energy planning (IEP) is one of the approaches to energy planning. IEP is defined as “an approach to find environmentally friendly, institutionally sound, social acceptable and cost-effective solutions of the best mix of energy supply and demand options for a defined area to support long-term regional sustainable development. It is a transparent and participatory planning process, an opportunity for planners to present complex, uncertain issues in structured, holistic and transparent way, for interested parties to review, understand and support the planning decisions” (Mirakyan & De Guio, 2013, p. 290). This definition includes the different objectives of sustainable energy planning (environmental, social and economic) and adds the institutional objective in addressing the mix of supply and demand. Besides, this definition of integrated energy planning is applicable to a specific area (which could be a given region) and is conducted in a participatory and transparent way for social acceptance purposes. It includes different methods, techniques, guidelines and activities to assist the user in conducting research and developing interventions. Finally, it addresses the multidisciplinary backgrounds of the participating users.

A next generation of IEP is regional integrated energy planning (RIEP). The definition is in line with the above-mentioned definition of IEP. However, where IEP can be applied to any given area, REIP includes the ‘region’ as the research context. Besides, the phased approach includes small feedback loops which makes the planning process both linear and cyclic. REIP highlights the importance of the planning process which is considered as more important than the actual content in achieving a strategic long-term plan. The process of RIEP is divided in four steps which are 1) preparations and orientation, 2) model design and detailed analysis, 3) prioritization and decisions and 4) implementation and monitoring. Mirakyan et al. (2009) present per step the objectives, sequence of analysis and underlying methodologies and tools (see figure 7). In (Mirakyan & De Guio , 2014), they analyze the different steps for the first planning phase.

Another variant on IEP is integrated energy planning in cities and territories (IEPCT) in which the same phased approach from figure 7 is used (Mirakyan & De Guio , 2014). In addition to the four phases, they identified three different levels which should be considered during the planning process: a participatory level, the process level and the methodological level. Comparable to the REIP

approach, Ouhajjou et al. (2015) highlight that the emphasis is put on the process and on the actors rather than on the actual structure and content of the planning process.

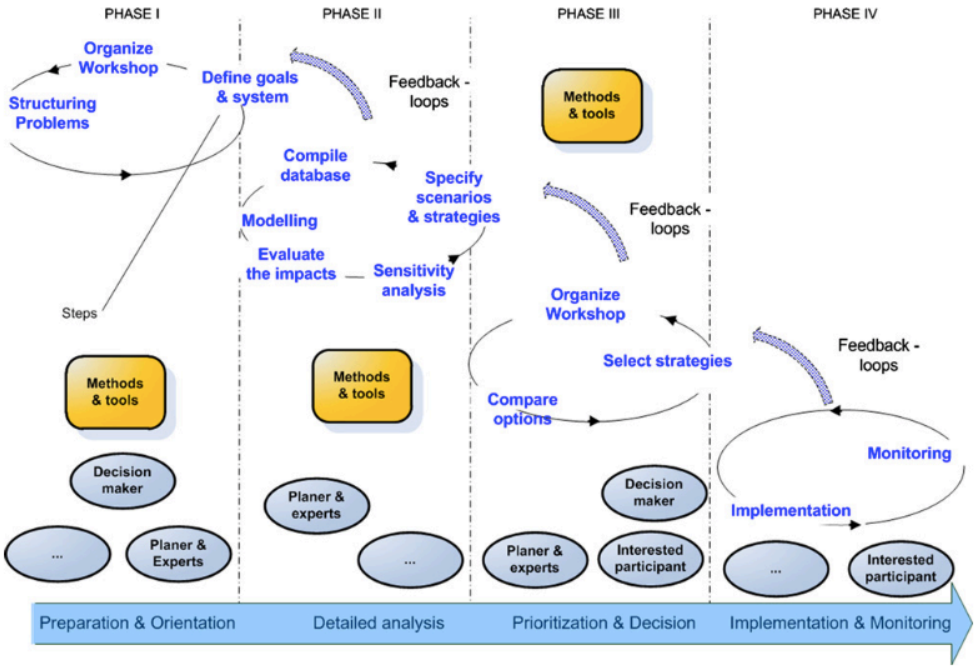

Figure 7. General procedure for regional integrated energy planning in cities and regions (Mirakyan & De Guio, 2013).

Finally, Lund (2014) proposes a theory called choice awareness strategies to facilitate a radical technological change to a smart renewable energy system (incorporating changes in demand technologies, efficiency improvements, integration of fluctuating renewable energy sources and smart electricity, thermal and gas grids). His approach highlights the connection between the planning process from a methodological perspective and the planning process from a participatory perspective by stating that it is important to "raise public awareness of the fact that alternatives do exist and that it is possible to make a choice" as this presents the importance of developing solid alternatives in an energy planning process (Lund, 2014, p. 35). His strategy consists of 1) designing concrete technical alternatives, 2) feasibility studies, 3) proposal of public regulation measures and 4) the promotion of new-corporate democratic infrastructure in non-chronical order, as presented in figure 8.

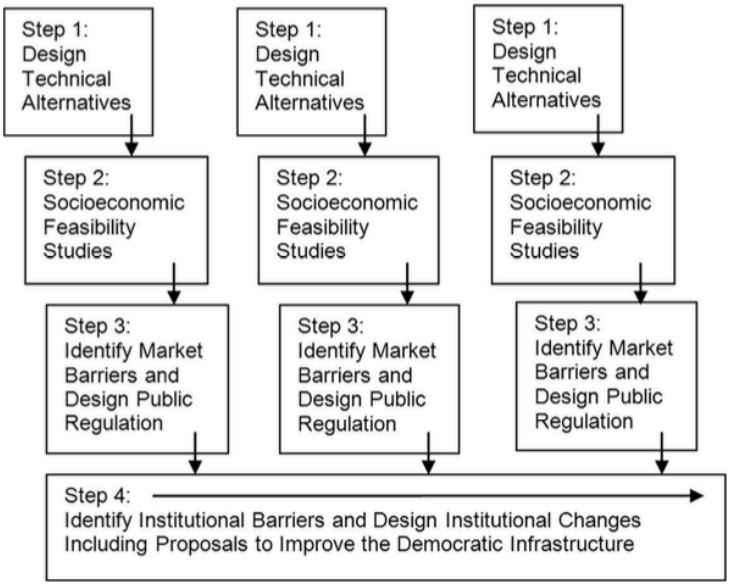

Figure 8. Choice awareness strategy, step by step research method (Lund, 2014).

Elements of the energy system

Whereas the previous approaches cover the entire energy system, the approach of (Brandoni & Polonara, 2012) focus solely on the demand and supply site initiatives for municipal energy planning. They propose three steps for the planning process: territorial diagnose of the local area (especially the electricity and heat sector), compilation and analysis of low-carbon measures and developing green-house gas definition targets. Renewable energy planning, which partly overlaps with sustainable energy planning from (Neves, Leal, & Lourenco , 2015) is also an approach that focus on a specific part of the energy sector, namely the integration of renewables. Terrados et al. (2009) suggest a renewable energy planning methodology based on multicriteria decision techniques, Delphi techniques and territorial and rural energy planning methods. By combining the strengths of three methods, they propose a basic structure that consist of seven steps which are 1) diagnose of regional energy system, 2) diagnosis configurations as SWOT matrix, 3) initial selection of strategies trough SWOT analysis, 4) validation and assessment of strategies by means of expert opinion, 5) ranking of alternatives by using MCDA, 6) reference plans analysis and 7) final strategies selection and targets establishment (see figure 9).

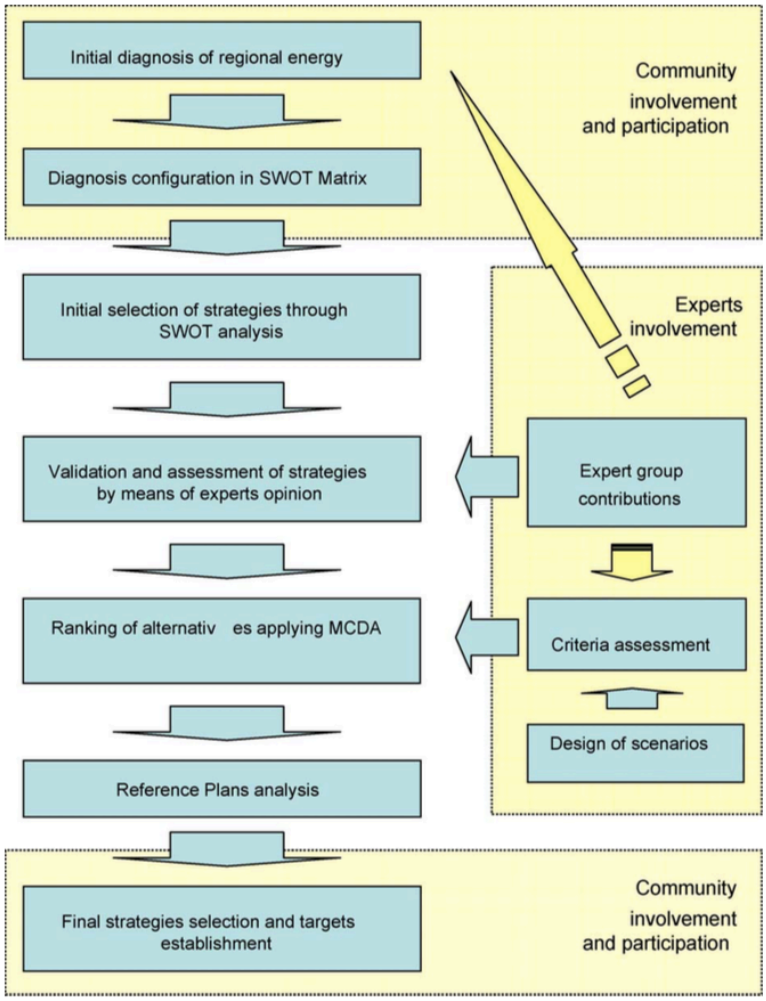

Figure 9. Conceptual model of renewable energy planning (Terrados , Almonacid, & Perez-Higueras, 2009).

(Pereverza, Pasichnyi, & Kordas , 2019) present a conceptual design for long-term planning approaches in the heating sector (and comparable sectors) by incorporating a set of three different overarching design principles: modularity, participatory modelling and transdisciplinarity. These design principles are applied to the participatory back casting method that is presented below. In their study, they highlight the importance of participatory modelling as this “would increase the sense of ownership and legitimacy of decisions taken and support implementation of new strategies” (Pereverza, Pasichnyi, & Kordas , 2019, p. 124). Each letter or combination of letters in figure 10 represents a step in the modular participatory back casting approach. These different steps, which can be adjusted based on socio-technical and socio-cultural contexts and project limitations are further explained and analyzed in Annex IV.

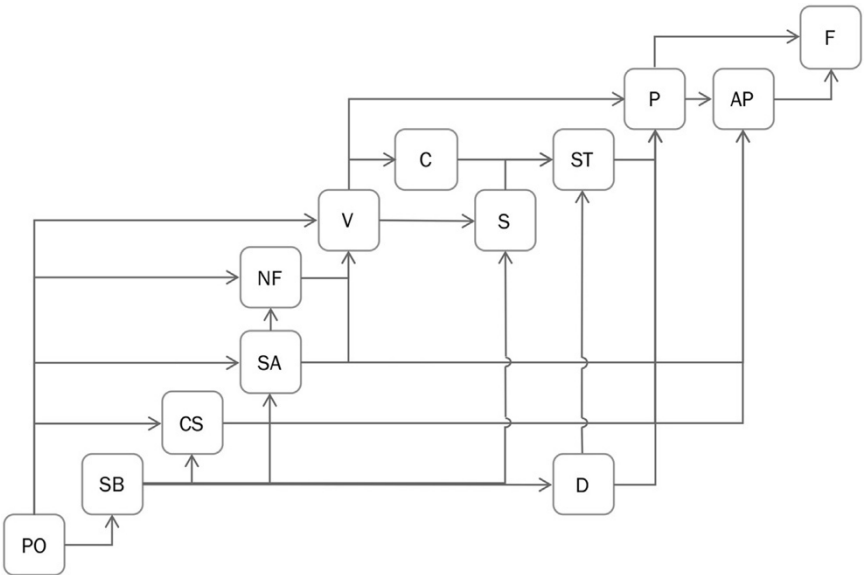

Figure 10. Modular participatory backcasting (mPB) (Pereverza, Pasichnyi, & Kordas , 2019)

The integration of new renewable energy sources in the electricity mix of places brings multiple challenges for the energy grid. These challenges are addressed by the profession of expansion planning that covers different applications like generation expansion planning (GEP), transmission expansion planning (TEP) and models that combine GEP and TEP Gacitua et al. (2018). These models and tools are mostly quantitative and less participatory than the energy planning approaches explained previously. Dagoumas and Koltsaklis (2019) zoom in on GEP methods by stating the importance of this method due the integration of renewable energy in the power sector. They provide a comparison of the different GEP models by focusing on the methodological approach.

Finally, due to the generation expansion of renewable energy sources, conventional energy sources will eventually phase out. The retirement of these conventional energy sources will require attention and appropriate planning to maintain the system's safety and reliability. Besides, retirement of old energy generators should be planned adequately and in line with the planned instalment of renewable generating capacity to overcome an imbalance of electricity supply and demand. To solve these issues, Shen et al. (2018) compare GEP, TEP and retirement planning models that share the objective to minimize the total costs including investment costs, operation costs, retirement costs, carbon emission costs and renewable energy generating ramping costs.

4.2 Challenges and issues of energy planning

As soon as energy issues are considered at a higher level than the individual building (block), take for example the neighborhood, city, municipality or regional level, energy planning becomes a more challenging practice (Cajot, et al., 2017). Krog and Sperling (2019) identified a set of challenges based on the Danish energy planning practices and compared them with challenges found in the international literature on strategic energy planning. Some of these challenges are: lack of funds and financial resources; cultural norms; high divergence in quality of strategic energy plans; plans lack local implementation strategies; local governments focus on local targets instead of national goals; lack of a clearly defined framework of energy systems; lack of skills; political will. Prasad et al. (2014) identified a set of risk, errors and uncertainties in energy planning and labeled public safety and

acceptance as the most important risks. Most of the other risks that they identified are in line with the uncertainties of energy planning: inaccurate results due incomplete or unavailable data and the risk of underestimating future uncertainties in energy models.

Cajot et al. (2017) labeled energy planning as a 'wicked problem' and thereby identified three categories of challenges. First of all, they identified a set of challenges due to multiplicity and heterogeneity of energy planning like the adoption of objectives and managing multi-stakeholder environments. The second category is about challenges due complexities and uncertainties such as data quality and accessibility, ongoing developments and innovations in technologies and political and administrative limitations. The final set of challenges is about the instability of energy planning, as energy planning is time-bound and dependent on different parameters. Sudden changes in society (as respond on sudden instability) could result in unpredictable conflicts. This uncertainty makes it difficult to predict and forecast future energy demand, especially for a long-time horizon (Torabi Moghamad , et al., 2019). If not addressed correctly, this simulation uncertainty can result in relevant errors in energy planning practices. Therefore, different approaches have been suggested to incorporate this uncertainty in energy models. An example is to present uncertainty in upper and lower bounds based on literature and expert knowledge. Another example is uncertainty characterization, which is about quantitative input uncertainty (Moret , Girones , Bierlaire , & Marechal , 2017).

Terrados et al. (2007) identified three key issues rather than problems by developing a strategic energy plan for the Spanish province of Jaén. First of all, participation of the community showed to be the most important factor in developing a successful strategic energy plan. Second, in assuring scientific consistency, a multidisciplinary approach was shown fundamental. Finally, the method selection for the diagnosis of the energy system (in this case SWOT) presents the current regional energy situation and provides a comprehensive outline of the optional strategies and their employment.

To finish with, a set of challenges are identified with regard to the selection and usage of energy models. First of all, many energy models which meet different requirements have been developed over the years. Selecting a model which that is in line with and useful for certain case specific conditions is a challenging task. Second, for energy expansion planning, it seems challenging to address the aspects that are relevant for a given study in detail while maintaining a holistic scope of the system as a whole. Third, Gacitua et al. (2018) explain that recent energy expansion planning models tried to incorporate human behavior, social-political barriers and indirect costs while these concepts are poorly defined and understood. Fourth, existing models are challenged by flexible demand which is driven by smart meters and decentralized energy production. Finally, integrating the intermittent supply of energy and related need for more temporal detail into energy models is considered as a challenge (Pfenninger, Hawkes, & Keirstead , 2014).

Challenges, risks, issues and problems	Explanation
Challenges	Lack of funds and financial resources
	Cultural norms
	High divergence in quality of strategic energy plans and plans lack local implementation strategies
	Local governments focus on local targets instead of national goals
	Lack of a clearly defined framework of energy systems
	Lack of skills
	Lack of political will
	Selecting an energy planning approach that meets case specific conditions
	Addressing the aspects that are relevant for a given study in detail while maintaining a holistic scope of the system as a whole
	Flexible demand driven by smart meters and decentralized production
	Integrating intermittent supply of energy in energy planning
Risks, errors and uncertainties	Social acceptance
	Inaccurate results due incomplete or unavailable data
	Underestimating future uncertainties in energy models
Wicked problems	Multiplicity and heterogeneity of energy planning: the adoption of objectives and managing multi-stakeholder environments
	Complexities and uncertainties: data quality and accessibility, ongoing developments and innovations in technologies and political and administrative limitations
	Instability of energy planning: energy planning is time-bound and dependent on different parameters
Key issues	Participation of communities
	Multidisciplinary approach to energy planning
	Proper method selection for the analysis of the energy system

Table 2. List with challenges, risks, errors, uncertainties, key issues and wicked problems related to energy planning

4.3 Process level of RES

Whereas chapter three introduced the political context of RES, the different design principles, deliverables, guidelines, the planning of RES and the envisioned role of citizens in RES (descriptive), this chapter analyzes the process level of RES based on a set of classification criteria (analytic). These criteria are based on the classification system presented by van Beeck (1999), applied by Hiremath et al (2007) to decentralized energy models. Accordingly, in combination with the theoretical insights from paragraph 4.1 and 4.2, this analysis of RES is the foundation for the process level of the framework that is presented in the conclusion of this research report: Strategic Regional Energy Planning (SREP) (see figure 11).

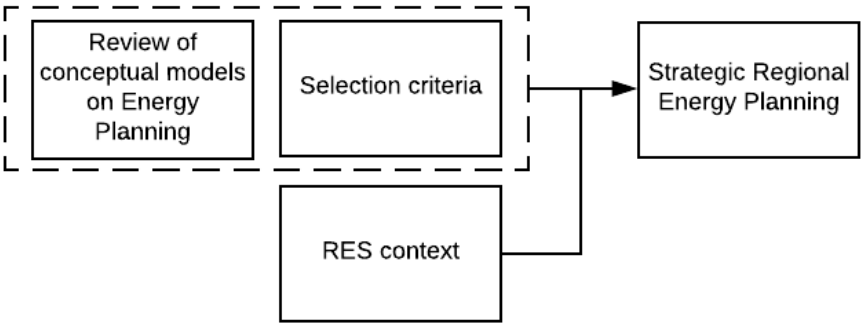

Figure 11. Relation between theory, the analysis of RES and SREP (own work).

4.3.1 General and specific purpose of RES

Based on the deliverables of RES, two general purposes can be considered in RES. The scenario analysis is the first option which can be applied to explore the future based on multiple scenarios. This approach is suitable for bottom-up programs and relies on assumptions instead of parameters from past behavior. In the case of RES, multiple scenarios can be developed based on different regional goals, both for the built environment and for the spatial implementation of renewable energy sources. For the built environment, scenarios like all electric, electric combined with heat nets, electric with hydrogen and hydrogen with biogas can be considered. For the spatial integration of renewable energy sources, scenarios like 100% renewable, 50% renewable and 25% renewable can be considered. Besides, this scenario analysis allows too incorporate different boundary rules, like restrictions on the amount of solar PV. Backcasting is the second general purpose that can be considered which consists of two steps. First, different visions of desired futures are developed. Second, based on these visions, this approach looks at what needs to be changed to accomplish such futures.

Both back-casting approaches and scenario analysis approaches require the development and the alignment of local and regional energy targets. As explained in paragraph 4.2, defining these targets and objectives comes with some challenges that apply to RES. First of all, RES is not established within administrative departments which makes the planning context more complicated (Cajot, et al., 2017). Next to that, it is challenging to develop regional programs that are in line with national goals. Therefore, Sperling et al. (2011) argue that central authorities should focus on a two-way

communication process in which local authorities contribute to the framing of strategic energy planning at a national level to overcome a mismatch between national and regional goals and plans. This multi-level approach can help to better identify opportunities for energy savings, alternative energy sources and technologies (Brandoni & Polonara, 2012).

Different methods to develop a regional target for RES can be considered. Müller et al. (2011) present the concept of energy autarky which is a framework for regions to achieve viability by generating energy locally. Three core principles in achieving energy autarky are the use of endogenous renewable energy resources instead of importing energy, decentralization of energy systems and increased energy efficiency in both the energy supply and demand side. The input of primary and secondary energy from outside a region is minimized in this approach. In this approach, long-term regional goals are developed in deliberation and collaboration with the local population. Integrated resource planning highlights that governments, consumer groups and other stakeholders should provide input to planning decisions and energy goals (Prasad, Bansal , & Raturi , 2014).

A more technical approach is presented by Domac et al. (2011). They apply the concept of integrated energy planning to the Karlovac County in Croatia by developing goals for the utilization of renewable energy sources based on the ratio between energy demand and the potential contribution of renewable energy sources. Projects and renewable energy sources are identified, evaluated and checked for their feasibility by technical staff from the county, municipality leaders and independent experts. This process resulted in the possible case specific contributions of each renewable energy source.

For the specific purpose, three approaches are identified for RES: the energy supply approach, the impact approach and the appraisal approach. Depending from the general approach (scenario analysis or back-casting), different alternatives should be developed based on the scenarios. These energy supply alternatives incorporate the consequences for heat/electricity grid. Accordingly, the impact approach is applied to visualize the consequences of the different alternatives. Impacts can include environmental impacts (for example: impact on landscapes, nature, air quality and reduced CO2 emissions), financial impacts (for example: investment costs, return on investments, and consumer energy prices) or social impacts (for example: distribution of wealth, potential revitalization of communities and jobs). Finally, the appraisal approach is concerned with comparing and appraising the different alternatives based on the impacts from the impact approach. These impacts are compared and appraised based on a set of preset criteria.

4.3.2 Geographical and sectoral coverage of RES

The geographical coverage of the RES program is the region, here referred to an area within a country. In the RES program, the regions differ in size as some regions correspond to the provincial level whereas other regions are a combination of a few Dutch municipalities that agreed to cooperate in a regional context. Often, the region is not an official jurisdictional entity like a municipality or a province and instead, is based on previous cooperation’s and inter-municipal policy programs on comparable issues (like mobility).

As for the energy sector and related issues like energy efficiency, renewable energy production and grid operations, concrete action plans are often developed on local and regional levels due to the decentralized nature of these issues (Cosmi , et al., 2015). According to (Neves, Leal, & Lourenco , 2015), energy is used locally to sustain local activities and therefore, local authorities like

municipalities should play a major role in energy planning. As citizens are more likely to interact with their local or regional government than with national or international governments, the local operational level brings the opportunity to address local social acceptance for energy related goals. The

Especially with the regional approach of the RES program, it is important to overcome mismatches between regions (Sperling , Hvelplund , & Mathiesen, 2011). Especially since the Netherlands still has a centralized electricity system which makes regions depend on each other for their electricity consumption. In essence, this holds that certain regions (production regions) produce electricity that is consumed in other regions (consumption regions). As the electricity produced in production regions is consumed nationally, this supply of energy has a great effect on the national energy security, making it a national instead of a regional matter. As a result, 'production regions' have less autonomy in developing regional energy strategies especially with regard to phasing out conventional energy sources. In line with this example of regional interdependence, new renewable energy sources and related infrastructure developments can negatively affect ecosystem(s) (services) (Grêt-Regamey & Hayek , 2013) which might be of national or international relevance. These points plead for interregional cooperation and in some cases, national coordination in the RES program.

As explained in chapter three, RES covers two sectors: the electricity sector and the (heat transition in the) built environment. For the electricity sector, RES is focused on the spatial allocation of renewable energy sources with a strong focus on the role of public participation in the decision-making processes, in line with the desire to achieve social acceptance. The built environment is mostly about the analysis of alternative heat sources, like geothermal, aqua thermic energy and residual heat potential. Both sectors incorporate a network analysis as the penetration of renewable heat and energy sources will impact regional electricity and heat grids. Figure 12 presents the different Dutch policy programs for both the heat transition and the electricity sector. The heat transition in the built environment is integrated in three different policy programs on the regional, the municipal and the neighborhood level. RES is currently the only program that facilitates the spatial integration of renewable energy sources, aside from the regular municipal, provincial and national spatial planning documents.

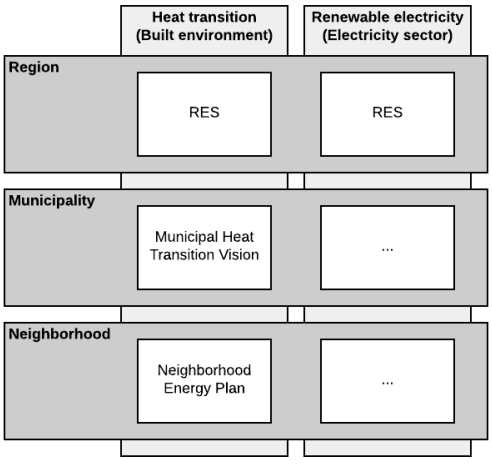

Figure 12. The RES program and other Dutch governmental policy programs on the heat transition and renewable electricity. (Own work)

4.3.3 Analytical approach of RES

RES is a program which requires a bottom-up energy planning approach, which is described in literature as the “optimistic” engineering paradigm, or the engineering approach (van Beeck , 1999). Engineering studies describe the considered technologies (based on the internal assumptions) and, in theory, only incorporate the technical aspects of the technologies. However, in reality, the best technical alternative isn’t the best technology as this engineering approach ignores possible constraints that have to do with the implications of different technical alternatives (environment, economic and social).

Regions differ among each other in terms of social, geographical, economic and political characteristics and each region has an unique energy system, unique infrastructural and socio-economic conditions and different stakeholders with related point of views. Based on both the bad experiences with top-down approaches (Grêt-Regamey & Hayek , 2013) and the recognition of the unique characteristics of regions, many countries, like the Netherlands, choose for a bottom-up approach by giving local governments more autonomy.

4.4 Conclusion to the first sub question

This chapter analyzed and presented the different perspectives on energy planning, a set of different conceptual models that are applied in the field of energy planning and different risks and barriers related to energy planning. Accordingly, RES is analyzed based on these theoretical insights. The analysis of RES has led to the identification of four planning phases: **I**: preparations and orientation, **II**: alternatives and detailed analysis, **III**: prioritization and decisions and **IV**: policy-making, implementation and monitoring. The different planning processes, steps, principles, techniques and modules applied in the papers discussed in paragraph 4.1 are categorized based on these four phases and accordingly, grouped in four tables that are presented in annex IV. These planning phases and processes are the foundation of the process level of the SREP framework that is presented in the chapter seven of this report.

5 PUBLIC PARTICIPATION AND THE ROLE OF CITIZENS IN THE ENERGY TRANSITION

How can different perspectives on public participation and different arguments for public participation in the energy transition and related policy programs be integrated in the participatory level of energy planning?

This chapter introduces the concept of public participation and different perspectives on and arguments for public participation in the energy transition. According to (Coenen , 2008), a functional or instrumental perspective on public participation can be distinguished from a more normative perspective. Therefore, the first paragraph starts with an explanation of the concept of public participation from both perspectives and incorporates connections with energy planning. First, a normative perspective of participation is presented by looking at the role of public participation in democracy and the legal implications of participation. Second, a functional perspective on participation is presented which is more pragmatic (Coenen , 2008) and better explains what the participation is intended to achieve and what exact participation outcomes are (Moynihan , 2003).

Chapter 5.2 continues with an explanation of the energy transition from a transition management perspective and from a psychological perspective. Different characteristics of the energy transition and strategies to promote the energy transition and the acceptability of this energy transition among citizens are explained. Chapter 5.3 presents the results of the empirical research with regard to the role of citizens in the energy transition, different arguments for and perspectives on public participation in the energy transition. Finally, chapter 5.4 summarizes the different findings and thereby formulates a conclusion on the second sub question.

5.1 Public participation

5.1.1 Participation and democracy, Rechtstaat and fundamental rights

Participation in governmental actions can be considered as a two-step process. Political participation, the right to vote and the right to be elected, is the first step and the starting point considered from a democratic perspective. Elected representatives incorporate the opinion of the public, the common good, which is different from personal preferences, whenever a decision has to be taken. This form of participation is in line with a representative democracy. Governments can apply two approaches to arrive at an understanding of this common good. Either, they use the outcomes of the first step, the open elections, to understand societal preferences. Or, governments apply the second step of participation in governmental actions, which are instruments of direct democracy, called referenda and citizen petitions. Referenda and citizens petitions are complementary to the representative democracy (Akerboom, Between Public Participation and Energy Transition: the case of wind farms , 2018).

Next to representative and direct democracy, another form of democracy that incorporates different styles of participation is the deliberative democracy, which is concerned with public debate and the way this debate influences the political agenda and decision-making (Akerboom, 2018). Deliberative processes can help people and governments to focus on the common good (Cohen & Sabel , 1997) and start to understand the relation between their perspectives and the interest of others. This

understanding requires a critical self-reflection and a fair orientation to the other which can only be realized with an encounter with the beliefs and values of other citizens (Rosenberg, 2007). Deliberation can achieve decisions that reflect all different perspectives that are likely to achieve higher levels of legitimacy, allow participants to compare values and experiences and consider a range of policy options (Canfield, Klima , & Dawson , 2015). From this perspective, participation can be considered as a hallmark of democracy as it legitimizes the exercise of state power through timely consultation (Office of the United Nations High Commissioner for Human Rights , 2015).

The rule of law, known as rechtstaat, is essential for public participation and ensures limits on the powers of government by assuring democratic and participatory decision making. Participation can be approached from a right-based perspective, in which participation is perceived as a procedural right of citizens. A requirement of effective public participation is to engage the public in an early stage of decision-making. In such 'an early stage', all options are on the table and participation can influence the outcome of the decision-making process (Akerboom, 2018).

From the perspective of energy planning, participation can be considered as a right to take part in the conduct of public affairs by exerting influence through dialogue and public debate (Akerboom, 2018). The report by the Office of the United Nations High Commissioner for Human Rights (2015) presents, among others, best-practices of participation in the conduct of public affairs. First of all, effective participation in political and public affairs is best ensured when it rests on a legal basis. Second, the right of participation depends on access to complete information and depends on transparency. To properly incorporate this point, information should be available in a manner that meets the most disadvantaged (consider language barriers, illiteracy and digital inaccessibility). Third, some states implemented consultative measures to involve organizations of underrepresented groups in decision-making processes. Fourth, meaningful decision should be tabled for discussion in order for participation to show the best results. Fifth, participation mechanisms are the most effective when they are aimed at building knowledge, rights awareness, confidence social capital and capacity of individuals and are premised on empowerment. And finally, it is important that the denial of participation in the conduct of public affairs should be open to challenge through courts at low costs.

5.1.2 Procedural and deliberative elements on public participation

In practice, procedural elements and elements of deliberation make up a set of questions that can be used ex ante to design a participation process, or ex post to evaluate a participation process. Akerboom (2018) presents three approaches of (Poisner , 1996), (Webler & Tuler , 2000) and (Fiorino, 1990) to assess public participation. These questions are presented in table 3. Next to these points, direct contact between participants and the government is important, as deliberation is a social process involving communication. Finally, outcomes of decision-making are only democratically legitimate if they are the object of reasoned agreement among others. This way, conversation can be perceived as the basic tool for political participation (Akerboom, 2018).

Who	What	How
(Poisner , 1996)	Questions about four deliberation elements and three procedural elements	1) Does the participation process encourage dialogue? 2) Does the process focus upon the common good? 3) Does the process develop critical reflection on the values underlying the proposal? 4) Does the process include civic virtue? 5) Do participants communicate in person? 6) Does the process involve citizens, as opposed to individuals hired to represent citizens? 7) Do the participants represent all significant sectors of the community?
(Fiorino, 1990)	Four evaluation criteria on public participatory methods	1) Participatory methods should allow for direct participation of amateurs. 2) Citizens should be able to codetermine policies in collaboration with governmental officials. 3) Participatory methods should provide a structure for face-to-face discussion over some period of time. 4) Citizens should be able to participate on some basis of equality with technical experts and administrative officials.
(Webler & Tuler , 2000)	Two meta criteria	1) Fairness: Four necessary opportunities for action for individuals: a) attend, b) initiate discourse, c) participate in discussion and d) participate in decision-making. 2) Competence: process focused on reaching mutual understand to reach agreement. Two important elements: a) way of gathering and sharing information and b) access to information. `

Table 3, questions and principles for developing or evaluating public participation processes from a normative perspective (Poisner , 1996), (Webler & Tuler , 2000) and (Fiorino, 1990).

5.1.3 Functional perspective on public participation

Normative perspectives on public participation focus on legal and democratic implications like fairness and legitimacy. Whereas this normative perspective can be unclear about the intended outcome of participation (Kweit & Kweit , 1981), the instrumental perspective is more concerned with the efficiency and intended outcome of public participation (Moynihan , 2003). Coenen (2008)

presents three categories with arguments for public participation in environmental decision-making from a functional perspective based on principle 10 of the Rio Declaration (United Nations, 1992), the Aarhus convention (1998) and studies by international organizations like the OECD (2001), the UN (2002), the EU (2002) and OAS (2001). These arguments are presented in figure 13. First of all, participation can reduce the level of conflict and increase the legitimacy of decision that are at stake. Second, participation will contribute to the quality of decision-making as public participation provides governments with information needed for the decision-making, public participation contributes to the systematic identification of problems that can be incorporated in the decision-making process and public participation contributes to the identification and assessment of alternatives. Third, participation can change people's behavior as people will learn about environmental issues during participation processes. These functional intended outcomes of public participation are in line with a deliberative participatory approach.

Figure 13. Categories of functional arguments for public participation (own work based on (Coenen , 2008)).

Coenen (2008) looks at the influence of participation on the quality of decision-making by providing an understanding of the quality of decisions, by explaining the purpose of decision-making and by looking at institutional arrangements and participation rules. Based on these insights, Coenen (2008) argues that public participation improves the substantive quality of the decision itself and can add to the quality of the analysis. Next to that, public participation in decision-making can broaden public support and thereby lead to a time-gain. Finally, public participation can reduce the level of conflict which will facilitate action and implementation. In this paper, these four functional arguments for participation are perceived as a means to improve the quality of decision-making (see figure 14). Ernst (2019) argues that normative process factors like procedural fairness, effectiveness and efficiency (integrated in table 3) and intermediate process outcomes of participation processes like trust and conflict resolution also improve the quality of decision-making.

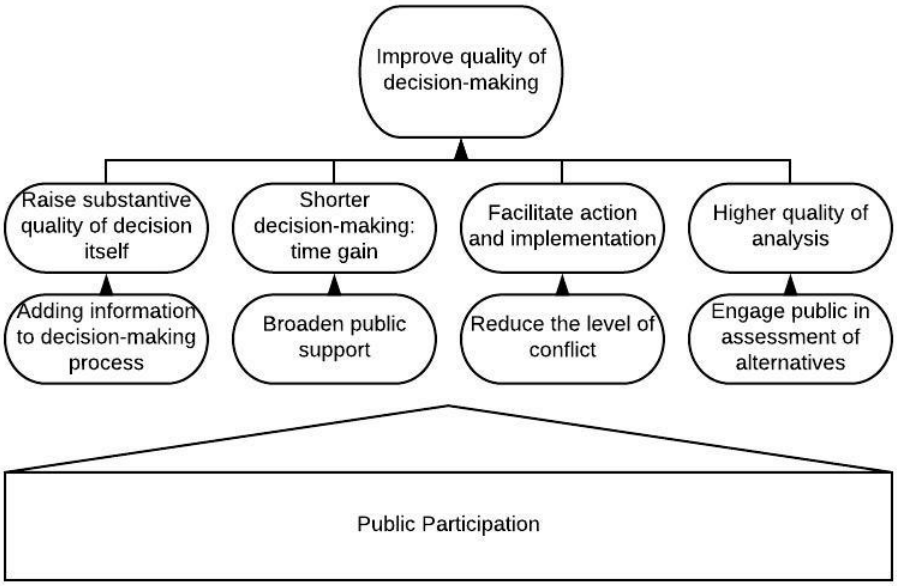

Figure 14. Functional arguments for public participation to improve the quality of decision-making (own work based on (Coenen , 2008)).

5.1.4 Pro's and con's of public participation

Public participation takes place because either, the public wants to express their opinion on specific matters and a government want to hear the public's opinion, most often related to governmental decision-making, or statutory law obliges a government to hear the public's opinion. Who participates strongly depends on the situation and the kind of decision. How and when participation takes place is for a large extent dependent on the legal implications.

On the one hand, public participation has many advantages, both normative and instrumental. To start with the first normative perspective, public participation has the potential to limit the gap between governments and society by offering a solution to democratic deficits like the exclusion of minorities in decision-making and the rise of political elitism by offering the public the possibility to directly address the government. Second, public participation provides the possibility to take care of specific details of decision making whereas democratic elections mostly concern general ideas and political directions. Third, public participation can cause the rebuilding of trust in governments. Fourth, decisions taken in procedures that involved the public are more likely to reflect societal preferences and are thereby more legitimate. Fifth, people involved in the decision-making process are able to deliver input and steer the process. This can lead to a better-appreciated decision which can result in less complaints and conflicts. It is however important to be transparent and manage the expectations of the public. It must be clear in the beginning how, why, in what way the public can participate, who can participate and about what the participation process is about (Akerboom, Between Public Participation and Energy Transition: the case of wind farms , 2018). Especially, since participation is not a matter of 'one size fits all'.

On the other hand, there are downsides or potential risks related to public participation. Governmental effectiveness is one of these downsides, mostly due the realization that the participation process needs a good design, which is costly and time-consuming. Next to that,

processes in which the public perceives their participation as useless can create distrust instead of trust. This highlights that conflict-solving is never guaranteed on forehand. Furthermore, too much public involvement can lead to confusion which can cause an impossible road to consensus. Public participation can take place on multiple levels but is most successful at lower governmental levels, like the province or a municipality. Increasing internationalized decisions-making makes this local participation more complex. A risk is here is that due international agreements and top-down decisions, there is no expectation that the public's input may lead to different outcomes. This threatens the acceptance of a decision (Akerboom, Between Public Participation and Energy Transition: the case of wind farms , 2018). This correlates with the theory of choice awareness (Lund, 2014), which addresses the conflict between real choices and fake choices. Finally, there are some limitations to public participation. First of all, participation is demanding for citizens, as it requires knowledge, capability, time and resources. Second, people might not have the intention to participate. Third and finally, there is the limitation of false expectations (Coenen , 2008).

5.1.5. Public participation and energy planning

Publicizing energy policies raises the question about who participates in which processes. Transitions that fundamentally transform physical geographies of energy consumption and production like in RES expand the array of stakeholders that are or want to be engaged in these processes. Citizens are one of these stakeholders. As Miller et al. (2015 p.37) state it, "the challenge is to create energy policy processes that encompass the envisioning, designing, deliberating, choosing, and making of future socio-energy systems and render possible partnerships between the energy industry and communities at all of these stages". Such policy processes can be designed by considering and incorporating the different functional arguments for and related outcomes of public participation in the process design. These public participation processes can meet normative arguments if the questions of table 3 are incorporated in the process design. However, the applicability of these questions and statements is dependent from the process level of energy planning as each step and decision in energy planning requires a different desired level of public participation. In line with this, the design of the process level of energy planning highly influences the participation process and especially, the possibility to incorporate public participation in energy planning. Based on the theoretical insights of chapter four and the first paragraphs of this chapter, the process level of energy planning should stimulate deliberation by providing opportunities for communities to get engaged in the design, assessment and appraisal of different alternatives (Lund, 2014).

5.2 Transition and behavior (change)

The energy sector is witnessing a major transition from a centralized fossil fuel-oriented sector to a more decentralized sector with penetration of renewable energy sources. Energy policies including medium- and long-term strategies are developed to give direction to this transition. In order to give direction to the energy transition, it is important to get a better theoretical understanding of the concept 'transition' and more concrete, the energy transition.

Transitions in general involve mutually coherent changes in practices and structures on multiple levels and in various disciplines and are inevitable entrenched in societies and cultures (Grin , Rotmans, & Schot , 2010). As energy policies are often about a desired future and (transition) paths

to achieve this future, an understanding of the concept 'transition' is beneficial for planners that are engaged in strategic energy planning processes. Besides, sustainability transitions have many characteristics related to social sciences (Köhler, et al., 2019). As this paper looks into the role of public participation in strategic energy planning, it is beneficial to understand these social science related characteristics of transitions.

5.2.1 Characteristics of transitions

Characteristics of transitions

In their book, Grin et al. (2010) perceive transitions as co-evolution processes which require changes in socio-technical systems. This characteristic requires both technical innovations as well as insights and understanding in the use of these technologies in society. Besides, Grin et al. perceive transitions as multi-actor processes including social groups, user groups and various interest groups. In energy planning, these groups should be identified and engaged in the planning process. The energy transition can also be perceived from a socio-institutional approach which was identified by Loorbach et al. (2017) and covers societal transitions and explains the current ways in which societies can be locked-in regimes which aren't open to innovative new energy sources. For the purpose of energy planning, technical innovations and their impact on society should be understood in order to stimulate the energy transition.

Transitions can be seen as radical shifts from one system to another, in which the term 'radical' refers to the scope of change instead of to its speed. Furthermore, transitions are long-term processes (up to 50 years) in which the organizational field is seen as the level of analysis (Grin , Rotmans, & Schot , 2010). The choice awareness theory of Henrik Lund (2014) deals with the concept of radical change (radical technological change), which he perceives as a change in more than one of the elements of technology: technique, organization, products and knowledge. If one of these dimensions is substantially changed, at least one of the other dimensions will follow. If this doesn't happen, the initial change will disappear over time. In other words, a radical change won't persist if just a single dimension changes over time. Meaning that an energy transition that solely occurs in the technical dimension won't succeed, as at least one of the other dimensions must follow.

The transition to a renewable energy system is considered a sustainable transition. Köler et al. (2019, p. 2) studied the characteristics of sustainable transitions, which are "open-endedness and uncertainty", "stability and change", "values, contestation and disagreement" and "normative directionality". Open-endedness and uncertainty refer to the uncertain future and the non-linear character of innovation processes. The relation between stability and change is one of the core issues of transition research and is about locked-in production and consumption patterns and path-dependent trajectories. As the energy transition is affecting both citizens and some of the largest industries (think of automotive, production industries, electricity sector), values, contestation and disagreement are important characteristics of this transition. In line with this, Lund (2014) argues that certain organizations, by Grin et al. (2010) perceived as regime-organizations, will seek to keep certain changes out of the agenda (due conflict of interest). Finally, since sustainability is a public good, and as the energy transition might poses a threat to existing organizations, individuals have little incentives to act in line with formulated energy targets. Normative directionality trough regulations, taxes, standards and subsidies is needed to shape the direction of the transition (Köhler, et al., 2019).

Common concepts of transitions

Next to these 'characteristics of transitions', Grin et al (2010) identified four common concepts of transitions. These concepts are co-evolution, the multilevel perspective, multi-phase and co-design and learning. In the energy transition, co-evolution refers to the different aspects and implications like technical, economic, environmental, sociological and institutional that interacts in a co-evolutionary way, meaning that the interacting elements themselves also change due the interaction. This concept moves beyond linear causality of different aspects (Loorbach , Frantzeskaki, & Avelino , 2017). The second concept, the multi-level perspective, touches upon the different levels of a transition process which are the innovative practices (niche experiments), structures (regime) and long-term trends (landscape). The third overarching concept is multi-phased, referring to four phases; pre-development phase, take-off phase, acceleration phase and the stabilization phase. Understanding these phases is a prerequisite for managing transitions and steering them in a certain direction. In addition to this four-phased approach, the X-curve presented by Loorbach et al. (2017), uses the phases of experimentation, acceleration, emergence and institutionalization and stabilization to explain build-up phases of new systems as well as the phases of optimization, destabilization, chaos, breakdown and phaseout to explain the breakdown of existing systems. Loorbach et al. (2017) applied this X-curve to analyze sectors in transition like the energy transition, based on the characteristics of the different phases.

The final and fourth overarching concept is about co-design and social learning. This concept highlights the importance of proper stakeholder engagement and proposes an interactive design process, engaging stakeholders in a process of social learning (Grin , Rotmans, & Schot , 2010).

5.2.2 Energy transition and behavior

Many characteristics of transitions (Grin , Rotmans, & Schot , 2010; Köhler, et al., 2019) are related to (a) desired (change of) human behavior and public acceptance of interventions and changes in (energy) systems. Or, as Steg, Perlaviciute and van der Werff (2015, p. 10) put it, in order to realize a sustainable energy transition, "we need to understand to what extent and under which conditions individuals are willing to accept and adopt renewable energy sources". As many regions shift from one energy system to another one (technique and products), both people's behavior and their understanding of the new energy system (organization and knowledge) must change to make the transition happen (Lund, 2014). This behavior change can be considered as a transition within the energy transition (Schulte & Bamberg, 2019). Therefore, it is interesting to look into social science-oriented strategies to promote such a behavior change and into the acceptability of energy policies and acceptability of changes in energy systems (Steg , Perlaviciute , & van der Werff, 2015).

Social strategies to promote the energy transition

Often, desired sustainable energy behavior involves discomfort, effort and can cost money with as a consequence that people are not motivated to act sustainable, unless some kind of personal benefit is involved. Therefore, external incentives like subsidies on desired behavior and taxes on undesired behavior are needed. Next to these structural strategies which are aimed at changing the circumstances in which behavioral decisions are made (and which are explained later on) (Abrahamse & Matthies , 2019), psychological strategies that target and enhance the motivation to engage in desired behavior can be applied. Durable behavior changes are more likely to occur when

strategies target people's individual intrinsic motivations to engage in such behavior (Steg , Perlaviciute , & van der Werff, 2015) and information strategies aimed at changing people's perceptions, knowledge, motivations and norms do exactly that (Steg & Vlek , 2009).

Accordingly, information is more likely to encourage sustainable behavior when it resonates with the central values of individuals from the target population and when information is tailored to the needs, norms, and perceived barriers of the target population. These central values of individuals are about goals that serve as guiding principles for the evaluation of behavior, people and events and about life-goals and are ordered in a system of value priorities (Steg , 2016). Four specific values are particularly important in the relation to norms, attitudes and behavior within the environmental domain: biospheric values, hedonic values, altruistic values and egoistic values. On one hand, biospheric values, which concern the quality of nature and the environment, and altruistic values, which concern the welfare of other human beings, positively correlate with pro-environmental attitudes, norms and behavior. On the other hand, hedonic values, which concerns improving one's feeling and reducing efforts, and egoistic values, which are about the costs and benefits that influence one's individual resources, are related to environmental unfriendly attitudes, norms and behaviors (de Groot & Thøgersen , 2019). These values should be considered when developing pro-environmental campaigns and communication strategies. For example, an individual with strong egoistic values would presumably appreciate information about the financial benefits in renewable energy projects. Whereas an individual with altruistic values will presumably appreciate information about the amount of CO2 reduction related to renewable energy projects.

Next to targeting these values, one can also moderate (social)norms in pro-environmental campaigns. These norms, which are about rules and standards that are understood by members of a group and refer to what other people think or do, can influence behavior when for example a social norm is made salient by stating which behavior is (not) desired or (not) appropriate (Keizer & Schultz , 2019). Social norms can be activated by information campaigns that for example include celebrities or groups of people that people associate themselves with that present what they consider as 'normal' or what they expect from people.

An understanding of people's values and insights in social norms that are embraced by people can provide input for information strategies. Next to this, feedback strategies appear to be effective in changing behavior (Abrahamse & Matthies , 2019), like reducing house hold energy consumption trough smart metering (Steg , Perlaviciute , & van der Werff, 2015). This is especially true in cases where feedback strategies increase a value's salience as people care about maintaining a good image of themselves (de Groot & Thøgersen , 2019). Next to these information strategies, one can also think about adding certain consequences to behavior, which are the structural strategies that were introduced earlier. These consequences can either be positive, as a reward to desired behavior, or negative, as a penalty for undesired behavior. People's values are related to the way people evaluate the consequences of renewable energy sources: strong biospheric values evaluate the consequences of renewable energy sources more positive compared to strong egoistic values (Perlaviciute & Steg , 2015). By changing the characteristics of an energy source, one can alter the consequences of an energy source that people value and thereby, one can influence the way people evaluate the energy source. Bamberg en Schulte (2019) combined some of these strategies in a series of four stages: predecision stage, preaction stage, action stage and postaction stage. Moving from one stage to another means to cross a threshold of setting a specific intention.

Acceptability of energy policies and acceptability of changes in energy systems

Public participation can stimulate social acceptability. From the perspective of acceptability of energy policies and changes in energy systems, it is important to understand which factors affect public acceptability. First of all, in general, people evaluate energy policies as more acceptable when it is expected that these policies have more positive than negative consequences. Second, people are more likely to accept policies when they support their important values (discussed above). This highlights the importance of understanding the target audience. Third, and a final point on personal values, interventions to strengthen public support are more effective if they target values that underlie people's evaluation and acceptability rating. Fourth, trust in involved parties plays a role in the acceptability of changes in energy systems, especially when people have little knowledge about these changes. Fifth, a fair distribution of costs and benefits, which can be achieved by lowering the costs and increasing the benefits, increases the acceptability. Sixth, when people perceive the decision-making process as fair and their involvement in this decision-making as sufficient, they are more likely to accept the proposed policies and changes in energy systems (Steg , Perlaviciute , & van der Werff, 2015).

5.2.3 Implications for public participation in energy planning

The common concepts of transitions and the characteristics of transitions discussed in this chapter provide guidelines for energy planning oriented on managing transitions and the role of citizens in energy planning. First of all, Lund (2014) highlights the importance of public participation in energy planning in which different alternatives should be developed and appraised. The energy transition touches upon the energy system which also incorporates consumers and institutions, people's values, behavior transitions, locked-in systems etc. At least two or more of the following dimensions, technique, organization, products and knowledge, have to change in order to realize a radical change (Lund, 2014). Public participation in energy planning should be aimed at the knowledge dimension by stimulating social learning.

Second, Grin et al (2010) state that governing transitions require a multi-actor approach. In the case of energy planning, citizens are an important actor and should be invited in the planning process based on normative arguments for public participation (for example to improve perceived distributive and procedural fairness) and functional arguments for public participation (for example to improve the quality of decision-making and to stimulate a change of behavior) presented and discussed in chapter 5.1. Different transition management instruments can be considered at different levels of decision-making which are categorized in four clusters of activities (see figure 15):

- Problem structuring and establishment of a transition arena: the transition arena is about multiple in-depth discussion oriented on a process of co-production of visions and agendas, joint goals and common strategies. Participants are frontrunners who have the ability to look beyond their own working area. Transition arenas stimulate the formation of new networks, partnerships and coalitions
- Developing sustainability visions, pathways and a transition agenda: frontrunners develop transition visions within a transition arena based on a process of variation and selection of different transition pathways.
- The initiation and execution of transition-experiments: different actors are engaged in transition-experiments with a social learning objective. Experiments measure to what extent projects contribute to the overall goals.

- Monitoring and evaluating the transition process: monitoring of transition management and the transition process within each phase to stimulate a process of social learning.

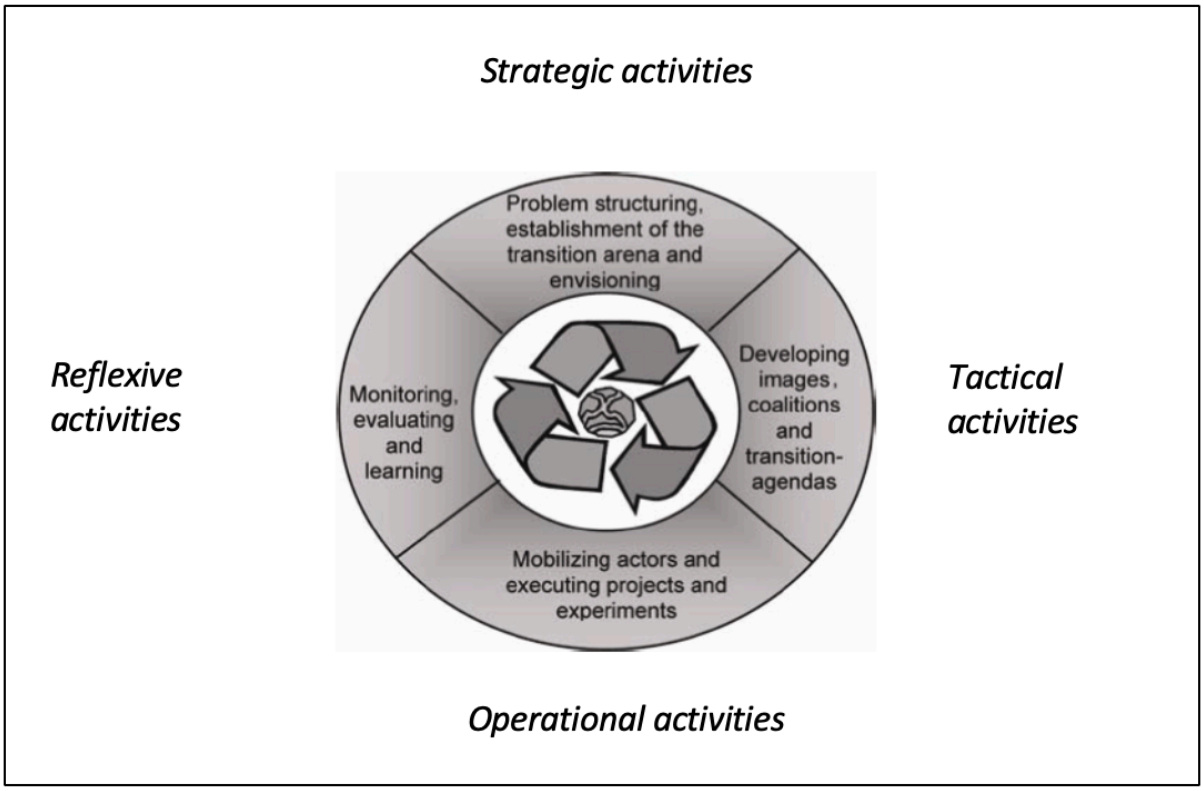

Figure 15. Cluster of activities in transition management (Loorbach , 2007).

Third, the energy transition includes values, contestation and disagreement and deals with citizens who have little incentives to act in line with renewable energy targets (Köhler, et al., 2019). In line with the concept of co-design and learning, public participation in energy planning should facilitate interaction between actors with different values and an alternative perspective on reality. “Through negotiation, adaptation, co-production and debate, actors change their own vision and redefine their own position and perceive the problem in a different manner (Grin , Rotmans, & Schot , 2010, p. 153).” Fourth, as policies and alternatives might poses a threat to citizens and organizations, normative directionality in energy planning should stimulate citizens to act in line with policy targets.

Whereas the transition management perspective mostly presented guidelines for the process design of public participation in energy planning, the behavioral science perspective provides guidelines for developing information strategies to promote a behavior change. First of all, information strategies should target people’s intrinsic motivation to participate in such behavior. This require information strategies that resonate with the central values of individuals from the target population (Steg , 2016). Second, pro-energy information campaigns can moderate (social)norms. These norms can influence behavior when a social norm, for example participating in decision-making in the energy transition, is made salient by stating which behavior is desired (Keizer & Schultz , 2019).

Besides, the behavioral science perspective presented guidelines for improving social acceptability that apply to public participation in energy planning. First of all, public participation can stimulate social acceptance by engaging citizens in energy planning based on a fair process (Steg , Perlaviciute ,

& van der Werff, 2015). Webler and Tuler (2000) provides necessary opportunities for action for individuals to stimulate a fair process which can be considered for the design of participation processes. Second, public participation should allow for input from citizens in the design of policies and strategies as people are more likely to accept policies when they support their important values.

5.3 Public participation in the energy transition from different perspectives

Chapter 5.1 and 5.2 presented different arguments for and different perspectives on public participation in the energy transition and energy planning based on a literature review. This chapter presents the results of the empirical research with regard to the role of citizens in the energy transition and the different arguments for and perspectives on public participation in the energy transition.

5.3.1 Role of citizens in the energy transition

Public participation

Two large developments in the field of public participation can be distinguished in the Netherlands. The first development was around the sixties, when public participation became an important topic within governments, especially in the bigger Dutch cities. On the one hand, this movement was caused by the extraordinary economic boost of the 1960s and the movements that began to resist against related developments like increased car ownership and related infrastructure developments, a growing population and thus a growing need for extra houses. On the other hand, around the 1960s, the youth went to universities and enjoyed a higher education than the older generations. As a result, the Dutch younger generations began to raise their voice about issues which they perceived as being important. The second development was around the 90s due a political win of liberal parties like D66 and the VVD, which valued older traditions different than there left winged predecessors. At the same time, different information channels like the local and regional and also (national) commercial television came up during this period which provided citizens with more and more information (Respondent Hajema).

Recently, the governance paradigm of complex processes with a strong societal impact has changed the relation between citizens and the government once again due an increasingly complex world. Initially, society initiated the function of a government as citizens or groups of citizens weren't able to govern the common good due a conflict of interest and due the complexity of the society that they were living in (Respondent Schuurs). However, nowadays, we live in a society that is requesting the exact opposite by asking governments for more autonomy and engagement in decision-making processes. Besides, the neo-liberal system caused the individualization of society with a focus on people's own responsibilities and self-reliance (Respondent Schimmel).

This paradigm shift is also about a shift from a top-down blue print for (traditional) efficiency towards a bottom-up approach with local solutions. The increasingly complex world requires a government that's able to differentiate and act case specific but meanwhile respects the equality of citizens. This is not in line with the way the government is organized, as governments are used to treat situations (projects and programs) in a standardized way. Besides, this paradigm shift should be reflected in the way citizens are invited in planning processes. This relation should be a partnership based on equivalency with respect for each other's role, interests and knowledge (Respondent

Schuurs). According to Rietveld, this require an approach that facilitate the participation of citizens in governmental decision-making. Rietveld refers to the 'Lobbycratie', which is a term that explains the way interest groups unite and represent themselves to influence governmental decision-making. Without public participation, there is not a single party that solely represent the interest of citizens as governments represent all stakeholder groups of a society (Respondent Rietveld).

Two categories of public participation in the energy transition can be identified. The first category is public participation in policy development and governmental actions, including targets setting and decision-making processes. A second category of public participation in the energy transition is active public participation by taking energy related measures (Respondent Akerboom). Next to that, there is a difference between project participation, process participation and financial participation. Differentiating between these different forms of participation is important as many organizations and governments confuse these terms (Respondent Schwencke).

Public participation in governmental action in the energy transition

The current energy transition is a perfect example of the complex world that we are living in (Respondent Schuurs). Especially, when compared with the gas transition of the Netherlands in the 1960s. During this transition to natural gas, the government decided what was going to happen and citizens simply accepted these decisions. Nowadays, people are only willing to cooperate if they are engaged and heard (Respondent Schimmel). Besides, the privatization of the energy sector made this sector more complex by introducing a strong commercial framework for decision making (Respondent Schimmel).

On one hand, governments should be able to act in line with the public's opinion. On the other hand, renewable energy projects directly influence people's lives and the environment where people live in. Therefore, citizens should be actively informed about the planning process and should have the possibility to raise their opinion (Respondent Schwencke). To add to that, by strictly following the theory, citizens should be engaged from the very first moment of such decision-making processes (Respondent Akerboom). This especially accounts for the implementation of the energy transition on regional and local levels (Respondent Buchel). Transitions like the heat transition force governments to take a step back to engage their citizens. This new approach opens up different opportunities for participation processes (Respondent Schuurs).

Currently, we are in a crucial moment of the energy transition in which the classic approach to public participation isn't enough anymore. This classical approach refers to consultation evenings, surveys and comparable measures that doesn't attract many people. These approaches often attract a select group of people that most often are positive towards the energy transition. However, the biggest groups of people, the ones that are less motivated to participate in and that are less positive about the energy transition, often don't feel engaged by these approaches (Respondent Buchel).

Active participation in the energy transition

A second category of public participation in the energy transition is active public participation of citizens. For example, by taking measures to reduce people's energy consumption and by producing renewable energy. According to Akerboom, research showed that these people often stimulate their neighbors and relatives to start with these measures as well. Citizens can also unite themselves in energy cooperatives (Respondent Akerboom). These active citizens should have an active role in policy programs like RES (Respondents Schwenkce, Schuurs, Wolkorte and Buchel).

5.3.2 Arguments for public participation in the energy transition

The literature review on public participation explained different perspectives on and arguments for public participation in the energy transition. These arguments can be divided in normative arguments and instrumental arguments and can be considered from the perspective of the citizens, as well as from the perspective of policy-makers.

Social acceptance

According to (Respondent Hajema), social acceptance consists of two parts. On the one hand, social acceptance is about support and commitment. On the other hand, social acceptance is about a lack of protest and resistance against the decisions that are at stake. In the case of the energy transition, it is often about the second variant as in many occasions, protests caused a lot of delay and negative energy (Respondent Hajema). Participation is a factor that influences the social acceptance of the energy transition. In other words, to what extend do people feel that they have a say in how the energy transition is developing (Respondent Perlaviciute).

Public participation is often time consuming. However, why would we consider a delay in a program or a project as a problem, when result in an improvement of the social acceptance and a in a more fluent process after the start-up phase (Respondent Rietveld)? This can imply that you win time as well. As an example, projects with a lack of public participation, like the onshore wind energy in Drentse Monden and Oostermoer, takes already more than 15 years due a lack of social acceptance. Besides, there are some examples where network operators have to protect the contractor that is working on the grid against protest and vandalism. The need for these safety measures is in the end the result of a lack of public participation which resulted in unpleasant situations (Respondent Schimmel).

According to Schimmel, it is important to be honest about the energy transition and the impacts of this transition. Don't tell people that the impacts of the energy transition aren't too bad and that the consequences will be better than expected. Instead, be honest and try to achieve a high level of social acceptance for the decisions that are at stake. But, 'What is social acceptance?', 'How do you measure social acceptance?' and 'What is an acceptable level of social acceptance?' are important questions. Especially since it is not solely about individual projects but about a transition to a new energy system. Next to that, it is difficult to regain social acceptance once it is lost in a previous occasion (Respondent Schimmel).

Social acceptance from all citizens is an ideal situation and at the same time unrealistic (Respondents Schuurs and Rietveld). In general, there will always be a small group of proactive people that want to be involved in the decision-making processes, a bigger mid-range that are fine with being represented by this group as long as they can raise their voice and share their opinions when they want to do so, and finally, there is a small group of citizens that are very hard to reach and that don't show any form of willingness to cooperate (Respondent Schuurs). Rietveld also divides society in three groups: a group of circa 20% that is no matter what pro energy transition, a group of 20% that is no matter what against the energy transition and a group of 60% that is more or less neutral. The 60% that is neutral at the beginning of a planning process is the most important group, as these people can walk from one side to another, depending from the planning process. Therefore, the focus is on providing the 60% group with enough knowledge and guidance to understand the challenge and to work to a design that is acceptable. As for the 20% that are against the energy

transition and related developments; don't spend too much time on trying to convince them. Next to that, the 20% that are extremely motivated and pro energy transition shouldn't influence the agenda to much as well. The goals is that the 20% that are pro energy transition, support the decisions and the 60% accept the decisions that are made (Respondent Rietveld). Taken this in consideration, it is important to realize that a decision is never 100% representative, as there will always be a group of people that think differently or that don't agree with the decisions that are at stake (Respondent Schuurs). However, it is still important to explain to this group of people that don't accept the decisions what is decided and why (Respondent Rietveld).

There are multiple conditions and variables that should be considered in public participation processes to achieve social acceptance. According to Hajema, the size of renewable energy projects as well as the design play an important role in social acceptance. Large projects with a big influence on the living environment can cause big resistance whereas relatively smaller projects that are co-created with local stakeholders and citizens and that incorporate the interest of local stakeholders as well as benefits for the local stakeholders can create social acceptance. The small-scale wind turbines in Groningen are a good example, where the idea is that the design of the windmill instead of other variables makes that people accept the developments (Respondent Hajema). Perlaviciute studied the social acceptance of onshore wind energy in the province of Groningen and found three conditions which showed to be the most important: people wanted to be able to use the renewable energy, people wanted to participate in the decision-making process and people wanted a fair distribution of costs and benefits. These findings show that people perceive both fairness and access to clean energy as important conditions (Respondent Perlaviciute).

Trust

In 2015, the NLVOW wrote the toolkit citizens participation for wind on land. The main conclusion is that citizens became highly educated (as stated by (Respondent Hajema) as well) and that citizens don't trust the government anymore (Respondent Rietveld). Besides, a study of Enexis found that many people are willing to participate in energy saving initiatives but don't do it yet because of mistrust in energy companies and contractors due bad experiences in the past and due uncertainty about future developments and financial benefits (Respondent Eerland).

Fairness

From the psychology perspective, it is known that the more people feel engaged in decision-making, the more people will perceive the process as being fair which will increase the acceptability of these decisions (Respondent Perlaviciute). There are two forms of fairness which are procedural fairness and distributive fairness. First of all, participation can improve the perceived procedural fairness. When people experience that their values are targeted, and their interest is taken into consideration in a decision-making process, this can lead to an improved perception of procedural fairness which can lead to social acceptance. The previous onshore wind program of the Netherlands shows the consequences of a lack of procedural fairness. In this case, a lot of back references were used to justify certain decisions that were already ratified in the past (Respondent Akerboom). This resulted in a lot of public resistance. Participation can also influence the distributive fairness which is about the distribution of costs and benefits. An example is financial compensation or the option to become a shareholder of renewable energy projects. These measures work in two directions, as people might value the financial benefits as well as the possibility to participate in decision-making due their co-

partnership. Denmark is an example of financial participation that lead to a higher level of social acceptance (Respondent Perlaviciute).

Good governance

Good governance is about treating each other with mutual respect, which is the foundation of administrative law and is based on a reciprocal relationship between citizens and governments. On the one hand, citizens hold the responsibility to be up to date about the different projects within their municipality in order to raise their voice about developments. On the other hand, governments should make sure that they are up to date of the different interests that are at stake and that they weight the different interest in order to save guard the public interest (Respondent Akerboom).

Reduce level of conflict

An important argument for public participation is to reduce the level of conflict, which is often about a conflict of interest which isn't incorporated properly. The IEA experiences a great deal of public resistance against wind energy in many countries in Europe. Both governments and private project developers should engage with citizens in decisions on the deployment of renewable energy sources, especially as wind turbines are becoming bigger and bigger with the result of increased public resistance against these developments (Respondent Bahar). This resistance is also experienced in the Netherlands as a result of the Dutch policy on onshore wind energy (Respondent Schimmel).

Another potential conflict of interest is about the production and consumption of renewable energy by individual households (participation in the energy transition by individuals). These initiatives completely change the way energy is produced and consumed, from a central system to a more distributed system with the consequence that people don't use the transmission and distribution electricity grid for their own energy consumption. This development raises the issue of who is going to pay for the electricity grid as this grid still has to be paid by someone, especially since the energy transition requires major investments in the electricity grid (Respondent Bahar). According to Schimmel, the current energy transition will be a bigger challenge than the industrial revolution, especially due these required grid developments (Respondent Schimmel).

Finally, the distribution of costs and benefits is an important factor that can reduce the level of conflict. As an example, the penetration of renewable energy sources and future carbon taxes can result in higher energy prices. According to Bahar, is not desirable that the consumers of this energy and especially the citizens are going to pay for these developments. Whereas some people will accept an increasing energy price, a lot of people don't. Citizens should be engaged in the development of subsidies schemes for the development of renewable energy sources to make these sources more cost-effective (Respondent Bahar).

Adding information to decision-making

The energy transition and especially the perceived need for this transition, is not felt by everybody, as climate change is still a debated issue and even people on really important positions, like the president of the United States, neglect the human impact on climate change. On top of that, people that do understand and agree with the human impact on climate change might perceive these impacts, like melting polar caps, to abstract (Respondent Hajema). However, there are also a lot of people that do feel the need of the energy transition. One of the findings of the study of

(Respondent Perlaviciute) in the province of Groningen is that most people in the province of Groningen are aware of the human impact on climate change. This implies that strategies that solely focus on the transfer of information won't lead to a higher level of social acceptance (Respondent Perlaviciute).

On the one hand, as developments often begin with an understanding of the need for these developments, public participation should provide citizens with the required information (Respondent Hajema). On the other hand, stakeholders of the energy transition should engage with citizens to receive information from them as well. Many projects from the Dutch policy program on onshore wind energy didn't understand the local context of these projects and thereby didn't incorporate the voice of local citizens in the design of such projects (Respondent Schimmel). Finally, sharing information with citizens is a prerequisite for evaluating alternatives in decision-making processes properly. Without this transfer of knowledge, people respond emotionally on initiatives instead of rationally and won't understand the need for renewable energy projects and even more important, won't accept it (Respondent Rietveld).

Engage public in assessment of alternatives

According to Rietveld, public participation in the Netherlands is at step five of the Arnstein Participation ladder, called placation (Dutch: inspraak*)* but should be at step six, which is partnership (Dutch: medezeggenschap). What Rietveld experiences is that many governments design projects and accordingly present these to their citizens. When they receive negative feedback, governments try to present the same project in a different way. Instead, decision-making should include the development of targets and the development and selection of alternatives to achieve this target. Rietveld highlights the importance of public participation in this process (Respondent Rietveld).

Akerboom states that regions should communicate the legal implications and boundaries with regard to the allocation of renewable energy sources with their citizens. For example, the required distance between wind turbines and buildings. By doing so, people will understand the foundation of the alternatives that will be developed as well as the conditions that form the context in which these alternatives are taken into consideration. These legal and contextual implications can be used to develop and share alternatives with the public. It is important to take in consideration that it is difficult to understand the concrete implications of 1 TWh if people don't know what this implies. Therefore, visualizations can be helpful. By visualizing different alternatives, people understand the differences between the alternatives better (Respondent Akerboom).

In the heat transition, the intention is to go into dialogue with the inhabitants of neighborhoods to show them the different alternatives that are considered as being feasible. An important question here is "how much influence does the municipality give to their citizens?". Next to the willingness of municipalities to engage citizens in this process, they still inhabit a strong default behavior focused on control (Respondent Schuurs). There might also be examples in which certain neighborhoods don't have alternatives to choose from. In this case, it is really important to be transparent about the findings and the decisions of previous processes (Respondent Eerland) by explaining why there is only one technical alternative feasible (Respondent Schuurs). This is in line with perceived fairness and procedural participation (Respondent Eerland). Schuurs states that in cases where only one alternative heat source is feasible, there can still be other variables that can be applied to give citizens a saying in the final design of the heat transition in their neighborhood. In the end, for many people, variables like financial benefits and ownership are more important than the decision about

the heat source. Besides, social acceptance is not only achieved by providing citizens with different alternatives, it is also useful to share information on forehand (Respondent Schuurs).

5.3.3 Different perspectives

Environmental psychology

The energy transition means that people have to reduce their energy consumption which requires a change of behavior, which is a psychological matter. A second issue is that is addressed in psychological studies is the social acceptability of renewable energy sources. A third field of study is the behavior change with regard to renewable energy consumption. People might have to shift to and pay for a new source of energy which may require them to alter their energy consumption based on peak and non-peak production. Fourth, there is the question of indirect energy use, like energy services, and the ways people use these services. The social acceptance part of energy related psychological studies applies to many different objects. For example, social acceptance of energy policies can be studied and in a broader sense, the social acceptance of the energy transition. Psychology is getting a really active role in energy related issues as the success of the energy transition depends a lot on the people, their behavioral change and their acceptability. In environmental psychology, it is usually about a conflict between personal interest, individual comfort and costs, versus environmental interest and interest for other people. Perlaviciute applies the Value-theory which include four values (Respondent Perlaviciute). This theory is explained in the theoretical review.

Communication and information

Communication and information strategies can play an important role in creating social acceptance. First of all, it is important to communicate the need for the RES and explain the consequences of doing nothing. Hajema states that it is important to go into dialogue with people that deny the need for programs like RES as the arguments that are the foundation of their opinion are often built on unreliable information sources. Second - and perhaps even more important, because positive loaded and therefore attractive - it is important to present a good story that is tailored to the target audience. This requires an understanding of the target audience. Often, people simply rely on online communications without targeting the information or the platform on the target audience. Third, trying to interest people for abstract matters is very difficult and therefore, policy strategies should assist in making abstract matters more concrete. Fourth, it is important to make information understandable and to use a proper size of the message (not solely a policy document of 30 pages) as people aren't willing to spend a lot of time to consume the information. As an example, Trump communicates over twitter where he uses 140 signs to share important issues (Respondent Hajema).

Law

Initiatives often face multiple legal challenges as the energy system isn't built for individual and cooperative initiatives. Of course, many subsidy schemes and other forms of financial incentives are developed and are currently extended towards 2021 or 2023. However, according to Akerboom, these incentives, which are temporal measures, show that governments don't dare to integrate energy cooperatives and energy producing individuals properly in law. Unintended, this is a

disincentive towards the cooperatives which, if facilitated properly, could be the start motors of the energy transition (Respondent Akerboom).

As the RES program and the outcomes of the RES aren't legally binding, these outputs will have to be incorporated in formal policy documents. It is conceivable that regions choose to work on the RES program with different social stakeholders except for citizens, and that they include the public solely in the official policy implementation phase. In this case, regions will refer to decision made in the various planning processes when citizens question certain decisions. This will negatively influence the perceived procedural fairness and increases the polarization with regards to the public opinion on the energy transition. This is exactly what happened in the planning process of the national policy on onshore wind energy (Respondent Akerboom).

It is important that governments treat their citizens with decency and that citizens hold the same position in decision-making as the other social stakeholders. Either, representatives of citizens join the project groups directly or spatial design workshops are organized for citizens and the output is used in the decision-making within the project groups. However, as the RES program doesn't have any legal foundation, citizens cannot invoke their rights when they feel that they aren't sufficiently heard (Respondent Akerboom).

Transition management

From a transition management perspective, co-creation and the engagement with frontrunners are important. According to Buchel, representativeness builds on the motivation to engage everyone that has a stake in a decision-making process. However, it seems almost impossible to design a project which meets this statement. Therefore, it makes more sense to engage people based on strategic decisions instead. This group can consist of pro-active people with specific ideas or a vision about the energy transition, like the social entrepreneurs and energy cooperatives. These people can be engaged in the RES in co-creation sessions or in a focus group. On a local level, it is possible to engage with individual citizens as well, on a regional level, this a different story (Respondent Buchel).

This strategic selection of citizens brings the issue of social acceptance, as inclusiveness is also acknowledged as a core concept of transitions. It is difficult to tell how to deal with this dilemma as each transition has winners and losers. How to deal with these 'losers' of transitions and with public resistance against energy related issues is a difficult matter (Respondent Buchel).

5.3.4 Engage with citizens

Schuurs explains that participation processes should be a way of engaging the environment in difficult matters like the spatial integration of renewable energy sources (Respondent Schuurs). Akerboom states that regions in the RES program should actively approach their citizens about the RES program as people are often not aware of this program. The moment people are invited in a planning process, they feel engaged throughout the whole process and therefore, it is important to continue the participation process as long as the program is ongoing (Respondent Schuurs). Different methods can be considered to engage citizens in the energy transition.

Address people's values

Targeting communication strategies to people's values can motivate people to participate. Policy strategies can help to address people's values. Based on research of (Respondent Perlaviciute), it was found that when decision-making is at a really early stage in a planning process, there is much more focus on altruistic and biospheric values, both in the policy document as in the ways of engaging people. In such abstract visions, the concrete impacts, which most often address egoistic and hedonic values aren't clear yet. As a consequence, it could be that certain people don't feel attracted to participate in a decision-making process as their values aren't addressed (Respondent Perlaviciute).

Hajema states that on the one hand, it probably won't be difficult to engage people in decision-making processes about the energy transition as these interventions have an influence on people's living environment and people do have an opinion about this. However, on the other hand, the RES program seems a very abstract program which doesn't directly attract people. In order to engage people, it is important to make information more concrete and tailored to people's important values. This makes it important to incorporate multiple values in the design of policy strategies (Respondent Hajema). Policy programs should incorporate this dilemma (Respondent Schuurs). It might be possible to address this dilemma by organizing thought experiments about the exact consequences of abstract decisions (Respondent Perlaviciute).

Differentiate in communication

It is important to attract different groups of people that are part of society in order to reach decision-making processes with a high level of representatives (Respondent Eerland). Accordingly, in order to engage people, it is important to understand the target audience. Delving into the characteristics of the target audience is very important but challenging as the target audience is nowadays highly differentiated as citizens can't be categorized and distinguished that easy anymore. Besides, people use various information sources (Respondent Hajema).

Differentiation requires a good understanding of the target audience. The moment projects are initiated on a lower level, like municipalities, differentiation models can be useful to divide 'the citizen' in different groups of citizens. In the marketing sector, this differentiation leads to personas, which are profiles that represent different citizen groups (Respondent Hajema). According to Trampe, this differentiation is normal in the marketing world but quite new in public communications sector (Respondent Trampe).

For the heat transition, it is important to understand the different households and types of citizens that live in the study-area. The outcomes of this analysis can be used to differentiate the public participation approaches into more case specific approaches that match with the characterization of these households (Respondent Buchel).

There are different methods to differentiate between citizens and to obtain actual data about these citizens (Respondent Trampe). These approaches have multiple advantages. First of all, with information about the citizens of certain neighborhoods, like provided by the Citisens model, citizen initiatives, together with their municipality, can approach citizens more efficiently (Respondent Schuurs). Second governments that use these methods obtain more information compared to a uniform approach that engage citizens the same way. Besides, inhabitants of specific neighborhoods can be invited to think about a suitable approach to engage the rest of the inhabitants. Third, these methods can be useful as a tool to explain the diversity of people to citizens that are already engaged in a planning process. Fourth, these models could be used to differentiate between communication

approaches. It is plausible that by using different information channels and sources to reach specific personas, a participation process can become more successful (Respondent Lodder). Accordingly, policy strategies can be tailored to the target audience (Respondent Wolkorte).

The consultancy firm Citizens came up with a citizens segmentation approach based on the variables 'trust in politics and institutions' and 'engagement with the living environment'. Based on these variables, they developed eight personas that can be used by governments that want to attract a broader and case specific audience. This approach can be used on any level (Respondent Trampe). Buurkracht uses the Motivaction mentality model which is based on demographic aspects, norms and values and is a little broader than the Citizens model. Another technique applied by Buurkracht is a social network analysis of individuals that are already engaged in the process. Central in this analysis are the questions 'who do you know and what can this person contribute?' (Respondent Eerland). Lodder worked on a project where they differentiated based on age, as the older generations, who experienced the transition from coal to natural gas, were identified as an interesting group (Respondent Lodder).

Differentiation is also important in the level of participation. Some citizens desire to be engaged in developing and writing the plans whereas other citizens are interested in the process and want to participate in dialogue sessions but are too busy to actually work on the energy plan. Finally, there is a group that only want to be informed (Respondent Wolkorte).

Differentiation strategies can be applied in the RES program for a couple of reasons. First of all, regions can better predict which groups of people will be attracted by the RES program and who will feel affected, by understanding the different segments that live in these regions. Second, segmentation can be used to understand how these people would like to be engaged in the RES program and more concrete, whether they are interested to join spatial design workshops. Third, the segmentation can help in defining different ways to approach different groups of citizens and to communicate with them. Finally, segmentation provides a picture of the expected input from the different groups of people. The line of thinking is: citizens segmentation allows for targeted communication strategies → higher level of public engagement → higher level of social acceptance for the decisions that are made (Respondent Trampe).

Due a lack of insights in the different personas that live in a municipality, municipalities don't communicate strategically neither in a segmented way. As a consequence, municipalities experience that they communicate with a very homogenous group of people, 'the usual suspects', which are not representative for the local social context. If municipalities want to attract the un-usual aspect as well, they should differentiate in their communication strategies (Respondents Rietveld, Trampe, Lodder and Hajema).

Representativeness

In public participation, representativeness is a much-discussed topic. According to Schwencke, it is important to ask the question "who is representing which interest group and does he/she really represent the interest of this group?" (Respondent Schwencke). According to Rietveld, there is not a single party that solely represent the interest of citizens (Respondent Rietveld). Sometimes, energy cooperatives join the RES project organization with a limited number of representatives who have the mandate to act on behalf of the cooperatives from this region. An important question is 'who are representing the energy cooperatives, what is their mandate and on behalf of whom do the cooperatives join the RES project groups?' (Respondent Schuurs). Energy cooperatives never represent the entire society as they often attract the usual suspects (Respondent Akerboom).

However, cooperatives can also be engaged as a group of active citizens that can stimulate others, even if the level of representation is limited (Respondent Schuurs). Akerboom states that the representatives of citizens that join the project organization often represent a different group than the citizens that will have to deal with the effects of such decisions (Respondent Akerboom). Wolkorte compares this issue with politics: people can join organizations but if they have the feeling that their interest isn't represented, they can start their own organization (Respondent Wolkorte). Finally, Buchel states that representativeness builds on the motivation to engage everyone that has a stake in a decision-making process. It seems almost impossible to design a project which meets this statement. From transition management, it makes more sense to engage people based on strategic decisions instead (Respondent Buchel).

Make it concrete and be honest

In engaging citizens in the energy transition, it is important to be concrete and honest. The impacts of climate change as well as the energy transition are abstract phenomenon. As a result, not many people feel engaged with these developments (Respondent Perlaviciute). The RES is an abstract document as well. By making it concrete, people can be triggered (Respondent Hajema). "What are the options and implications of specific projects and specific locations?" (Respondent Schwencke). It might be possible to organize thought experiments about the exact consequences of abstract decisions (Respondent Perlaviciute).

Next to that, as part of the RES program, incentives on desired behavior and disincentives for undesired behavior could be considered (Respondent Hajema). Second, Buchel states that abstract decisions that are at stake can be translated to local consequences which will result in more concrete effects for local citizens (Respondent Buchel). Third, in the RES program, there is also the tension between long-term goals and short- and medium-term actions. An example is the region Holland-Rijnland, where they signed an energy agreement in 2014. The project organization formulated an ambitious concrete long-term goal of 0,8 Pj of wind energy but struggled with the next step: allocating these wind turbines. This experience shows the importance of translating abstract goals to concrete measures at the start of the planning process (Respondent Schwencke). Fourth, it isn't useful to come up with interesting and romanticized stories about revitalization of neighborhoods when the real story is actually about the heat transition and the phasing out of natural gas (Respondent Schuurs). Finally, expectation management is important as people need to understand which issues are open for public consultation and which aren't; don't give false hope (Respondent Wolkorte). Participation can be used as a tool to manage these expectations by highlighting the challenges and conditions (Respondent Rietveld).

5.4 Conclusion to second sub question

The energy transition reflexes the complex world that we nowadays live in which requires a bottom-up energy planning approach with local solutions and room for public participation. In this chapter, different arguments for public participation in energy planning are identified and discussed. An important argument for public participation is that public participation in energy planning can increase the quality of decision-making (see figure 14). This requires a process that allows participants to add information to decision-making and that engage citizens in the assessment of alternatives. As knowledge is an important dimension of the energy transition, energy planning should facilitate information sharing and learning in two directions. In line with these findings,

citizens should be invited in the development, the assessment and the appraisal of different alternatives. These alternatives aren't necessarily technical alternatives as for many people, variables like financial benefits and ownership are more important than the renewable energy source itself.

Next to that, public participation in energy planning can reduce the level of conflict and reduce public resistance which improves the quality of decision-making. The level of conflict can be reduced by engaging citizens in energy planning from the very first moment and by organizing dialogue groups before protest groups are initiated. Conflicts are often about a conflict between personal interest/the interest of regime organizations, individual comfort and costs, versus environmental interest and the interest of other people and organizations. To reduce public resistance, disagreement and conflict, energy planning should engage citizens based on co-design and learning and facilitate interaction between actors with different values and an alternative perspective on reality.

Finally, an important argument for public participation in energy planning is to improve social acceptance. Like the previous arguments for public participation, social acceptance also improves the quality of decision-making. On the one hand, social acceptance is about a lack of conflicts. On the other hand, social acceptance is about support and commitment. Public participation in energy planning can improve support and commitment by incorporating people's values in the design of alternatives and by assuring a fair participation process (procedural fairness) and a fair distribution of benefits and costs (distributive fairness); dialogue (see table 3 for design principles for dialogue) is required as solely sharing information won't improve the social acceptance. Social acceptance from all citizens is an ideal situation and at the same time unrealistic. In the energy transition, there is always a small group of citizens that don't show any form of social acceptance. To improve social acceptance, it is important to provide the group of citizens that is neutral at the beginning of a decision-making process with enough knowledge and guidance to understand the challenge and to work to a design that is acceptable. Participation processes that engage different groups of society have a bigger influence on social acceptance than processes that only attract and engage the usual suspects. For this reason, information and communication should be tailored to the target audience. Besides, as abstract decisions don't trigger citizens to participate in decision-making, information should be concrete and should incorporate hedonic and egoistic values.

6 PARTICIPATORY LEVEL OF RES

How can the participatory level be integrated in strategic regional energy planning (SREP) in the case of the Dutch RES program?

This is the final chapter before the conclusions of this report is presented. The chapter presents the results of the empirical research with regard to the role of public participation in the Dutch RES program. The results discuss the scale of public participation, the different participation methods that can be considered for RES, the phase of public participation and the differences between public participation in the heat transition and public participation in the spatial allocation of renewable energy sources in the case of the RES program. The last chapter formulates a response on the third sub question.

6.1 Role of citizens in RES

6.1.1 Heat transition versus spatial integration of renewable energy sources

Public participation in heat related developments in the built environment is requires a different process than participation in the spatial integration of renewable energy sources and related infrastructure. The heat transition in the built environment has a bigger impact on people's life than the transition to renewable energy sources because it involves their homes and may lead to additional living costs (Respondent Schwencke). On the other hand, the decision whether a citizen receives residual heat from the industry 10 km away from someone's house or from a combined heat and power station 5 km away is less relevant for a citizen compared to the allocation of wind turbines which potentially will be installed close to someone's house (Respondent Spaan).

The interaction between the policy programs in the heat transition, which are the RES, the municipal heat transition vision or the neighborhood energy plan, is interesting with regard to the role of citizens in these different levels (Respondent Buchel). Public participation in the heat transition is crucial as it requires investments and changes in people's homes which ask for an active approach for the next 20 to 30 years (Respondent Schuurs). From the perspective of the heat transition, the RES program is only relevant for the identification of potential heat sources as the RES program doesn't really focus on energy consumption and the reduction of this energy consumption. Next to the RES, municipalities develop heat plans for neighborhoods that together form the municipal heat transition vision. Akerboom expects that the RES provides the municipal heat plan with information (Respondent Akerboom).

Lodder states that the RES program won't involve the public in decision-making processes about the heat transition (Respondent Lodder). Akerboom agrees with this by stating that public participation in the heat transition happens on a lower administrative level than the RES (Respondent Akerboom). On the one hand, Buchel agrees with Lodder and Akerboom as the regional level might be to abstract to individual citizens. On the other hand, Buchel can imagine that citizens would like to be engaged on the regional level as people might think that the decisions on this level will impact their living environment. In the end, the participation approach is highly dependent from the local sensitivity (Respondent Buchel).

The heat transition vision that each Dutch municipality will develop is a strategic document that includes the specific neighborhoods within the municipality (Respondent Lodder). The heat transition vision is abstract with generic classification of alternatives like heat pumps, heat nets, residual heat usage etc. that can be considered for the different neighborhoods of a municipality. According to Wolkorte, these visions don't cover the social characteristics of a neighborhood nor cover implementation strategies. The neighborhood energy plan considers the individual household level which result in an implementation plan. Different social stakeholders like the network operator and the municipalities contribute to the development of neighborhood energy plans by sharing their insights with citizens (Respondent Wolkorte).

Coording to Wolkorte, the relation between the concrete neighborhood and municipal level and the strategic RES level is a matter of the chicken or the egg. Some municipalities like Groningen conducted a lot of preliminary research and thereby know quite good how their municipal energy mix and related challenges look like. In this case, municipalities like Groningen can easily communicate with the RES project group what the RES can expect in terms of their contribution in renewable energy production. However, some municipalities aren't that far and probably will receive information from the RES (Respondent Wolkorte).

The RES program will have to incorporate the friction between interest on different scales, such as the interest of individual households, the interest neighborhoods, villages, cities, regions and provinces. Transparency between these different levels is key as it is key that the different levels understand the decision-making boundaries under which decisions for specific levels are made. If this is done properly, regions and municipalities will be challenged with cases in which neighborhoods come up with socially accepted alternatives that are less interesting from a financial perspective but have a better support from and match with the community. It takes political leadership to act upon this alternative value set. Each level should understand the responsibilities that they share with the other levels (shared responsibilities and ownership) in order to agree on decisions which are not directly in line with their own interest (Respondent Schuurs).

In the RES handbook, the role of participation is organized from a bottom-up perspective without too much steering from the national program RES. On the one hand, this approach is quite logic as local governments know their citizens better than national government. On the other hand, it could be the case that the national government didn't want to manage public engagement by themselves as they experienced this challenge in the national policy on onshore wind energy. Due the bottom-up approach of the RES program, the local municipalities hold the responsibility to incorporate all citizens in the decision-making process. Finally, it isn't a problem if some participation initiatives don't goes as expected, as long as governments have the sincere intention to engage their public. According to Sanne, governments stand stronger in situation where they fail trying, compared to situations where they simply don't engage with the public. On the other end of the spectrum is insincere participation, which result in situations where focus groups are initiated but never heard. Asking someone's time and effort for nothing is the worst governments can do (Respondent Akerboom).

6.1.2 Participation method

Project managers of RES organizations should be aware of the added value of a clear process design and about the role of participation, in which the different phases of a RES process are highlighted as well as the decisions that are made in each phase and by whom (Respondent Swencke). Different public participation methods can be considered for the RES program and the different interviewees expressed their interest for different approaches. According to Rietveld, a different participation method should be considered for each planning phase (Respondent Rietveld).

Public participation based on co-creation

In the RES program, intensive participation measures should be considered, and pro-active citizens should be actively involved. Co-creation is a suitable approach to attract more people and to fight resistance, as this approach makes use of people's insights and knowledge level and give people trust by creating a sense of ownership. This approach can result in local solutions that fit the local conditions which makes co-creation really valuable. However, cocreation is more expensive than the traditional approach to public participation. Co-creation is functional on a local level, like neighborhoods, city districts and villages, whereas on a regional level, it might be more challenging to engage with individual citizens in design workshops that apply the concept of co-creation (Respondent Buchel).

The approach of the Dutch participation coalition

The participation coalition consist of a handful of parties, Energie Samen, Buurkracht, NMF, LSA Bewoners and Hier Opgewekt, that know how to organize participation processes. These parties organized themselves into the participation coalition and assist the different RES regions with public participation matters. Besides, they facilitate municipalities with their heat transition vision. Next to that, the participation coalition assist local energy cooperatives to organize and professionalize themselves. As these energy cooperatives represent a part of the population, NMF tries to organize a seat at the RES table for them. Finally, the participation coalition provides guidelines for the spatial integration of renewable energy sources to preclude the destruction of landscapes (Respondent Wolkorte).

The participation coalition can approximately spend one Fte in each region to facilitate the project team with insights on participation matters. However, currently, only 30% of the regions use this support from the participation coalition. The advantage of the participation coalition, from a national perspective, is that they have an efficiency potential as they operate in many regions and thus can apply the lessons learned in one region to other regions. This is more effective than a set-up in which each individual region approaches participation matters individually (Respondent Spaan). Besides, Wolkorte experienced that local governments are willing to engage the public in their decision-making process in the energy transition but don't know how to organize this (Respondent Wolkorte).

Methods to stimulate local ownership

Local ownerships, and more specifically, 50% local ownership is a design principle for the RES program. The participation coalition perceives local ownership in three different ways. First, it is about the planning process (from plan to implementation). Second, it is about the design of

renewable energy projects and third, local ownership can be in the form of the final exploitation of a renewable energy project. For the first level, the participation coalition would like to see that citizens who for example represent a neighborhood, are financially compensated for their work in order to develop a level playing field with the other parties that join the conversations. For the second level, local ownership means that citizens join the conversations about the specific renewable energy projects (Respondent Wolkorte). Lodder worked on a project in which they tried to create a hype by engaging with active citizens and consequently, make these active citizens co-owners of the heat transition in their municipality. Thereby, it was expected that these co-owners would stimulate the other group of less activate citizens to join this fashion (Respondent Lodder).

Rietveld states that people who participated will become ambassadors of the results as they experienced the difficulty of the challenges at stake (Rietveld). Finally, for the third level of local ownership distinguished by the participation coalition, local ownership means that citizens get the opportunity to invest in renewable energy projects. However, local ownership is always an option instead of a prerequisite (Respondent Wolkorte). Lodder experienced that citizens underline the 50% local ownership principle that is included in the RES handbook by stating that they want to share in the benefits of these initiatives as they have to deal with the costs (degradation of landscapes) as well (Respondent Lodder). Besides, Local ownership can also create positive spin-off effects for the environment if the financial benefits are reinvested in societal issues like renovations of important social real estate (Respondent Eerland).

Engage cooperatives in the RES program

Many citizen initiatives are engaged in the Dutch energy transition. A strong benefit of citizen initiatives is that they know the regional inhabitants and they know what people perceive as being important better than any other stakeholder (Respondent Schuurs). This also accounts for cooperatives. The advice of Wolkorte is to make use of this existing social infrastructure and central figures that have a good network in the study area (Respondent Wolkorte). According to Schwencke, it is important that energy cooperatives are heard when they come up with reasonable alternatives. These people should be actively involved in the decision-making process (Respondent Schwencke).

Schuurs states that governments should take local heat cooperatives and initiatives seriously and use them to, on the one hand, inform other citizens and share knowledge and, on the other hand, to organize them and engage citizens in this heat transition. An important issue are the different neighborhood initiatives that are initiated and run parallel to the municipality programs. Municipalities cannot neglect these initiatives. At the same time, it is difficult to tell them to stop their activities for the moment and to wait for the municipality to develop its decision-making framework. In these cases, it is important to facilitate these pro-active cooperatives to stimulate and implement no-regret alternatives, for example to reduce energy consumption in the community. In neighborhoods where there aren't energy cooperatives, it is important to make participation a relevant issue by stimulating community building around relevant topics like energy poverty, living quality, et cetera (Respondent Schuurs).

Stimulate dialogue with citizens

Dialogue sessions are an important tool in the energy transition. Lodder works on a project in Friesland called Wijken en Dorpen van de Toekomst where multiple dialogue sessions will be organized to engage citizens in the heat transition. In these sessions, it is important to share information and to learn people that alternative heat sources aren't suitable in each situation.

Knowledge sharing is an important aspect of the acceptance of future measures as this can improve the understanding of why decisions are made the way they are made. These sessions are a matter of co-creation which allow citizens to be part of the decision-making process (Respondent Lodder). Rietveld calls the approach of co-creation, joint fact finding: instead of presenting the government's way of thinking, it is important to organize dialogue sessions between governments and stakeholders. Rietveld states that it is important to anticipate on the real questions of stakeholders instead of simply presenting solutions for perceived problems. During these dialogue sessions, different stakeholders should go in discussion and share their knowledge and information, as this most likely will raise new questions and insights (Respondent Rietveld). Akerboom states that it is important that the issues that are addressed by citizens in these design workshops are taken serious in the decision-making process and that eventual feedback on these issues is communicated with the citizens (Respondent Akerboom).

Dialogue sessions with citizens can be initiated for multiple reasons. Rietveld states that these groups and sessions can be organized to prevent organized protest groups by recognizing on forehand that citizens affected by wind projects aren't represented properly in decision making processes (Respondent Rietveld). Akerboom states that these sessions can be initiated to go into dialogue with citizens and to motivate people for the heat transition. The heat transition is vulnerable of motivated citizens as governments cannot oblige citizens to phase out their natural gas consumption. Even when just one technical alternative, which isn't a real alternative, is feasible, it is still important to go into dialogue to explain what will be happening and to communicate why this single alternative is feasible and why the others aren't (Respondent Akerboom).

Engage key figures and leaders

According to Schimmel, key figures who understand the social environment and the case specific conditions should be engaged and interviewed to understand the social environment of a renewable energy program. It is important to ask questions like 'what is important in this area?' and 'which emotions and values will be important to consider when we intervene in the environment?'. These key figures can explain what is important in these regions and which points should be incorporated in the design of a renewable energy project (Respondent Schimmel). The village Terheijden in the municipality Drimmelen is an example of a village where cooperatives are working on the goal of energy neutrality. The main success factor of this project is the project developer who knows the social environment and who chose to work together with a local cooperation that also knows the social structure of this specific village. Municipalities cannot fulfill this role as municipalities don't have the resources and the social networks to do so (Respondent Schuurs).

Spatial design workshops

Spatial design workshops are a variant of co-creation and participative design and should provide the participants with enough room for creativity and interpretation. According to Buchel, these sessions should be initiated at the start of a planning process, before renewable energy targets are formulated (Respondent Buchel). Schimmel states that it is important to inform citizens that their environment and thus the landscape is going to change due the spatial integration of renewable energy sources. People should be asked how they would like to see this change. First of all, multiple variants should be presented, as just a single alternative is not desirable. Second, the division of benefits and burdens should be open for dialogue. Third, these spatial design workshops are a

suitable moment for municipalities to check whether their policies are in line with the local values and requirements. (Respondent Schimmel).

According to Schwencke, it should be explained on forehand how these workshops should look like, what the purpose is and what the status of the results will be. Next to that, a proper stakeholder analysis should be used as input for inviting people to these workshops. This analysis can be used to explain who is and who isn't invited (Respondent Schwencke). Applications and digital tools can help to understand the local context and identify local stakeholders that should be engaged in these workshops (Respondent Schimmel).

Who should be invited is an important dilemma, with on the one hand a polder system where everyone participates with the consequence of small steps and watered-down ideas versus on the other hand, less participation, bigger steps and more vigor. From the transition management perspective, the Dutch 'Polder system' is often criticized as transitions require radical changes, people that dare to make decisions and power to implement (Respondent Buchel). It is important to handle the outcomes of spatial design workshops with prudence, as many workshops result in maps with the allocation of windmills and solar parks which can cause resistance (Respondent Schwencke, Respondent Schimmel). According to Schimmel, these workshops are a timely process which in the end will result in more social acceptance. Therefore, he would like to see that governments incorporate these sessions in their approach and that governments plan plenty of time to work with these tools to communicate with local stakeholders (Respondent Schimmel).

Applications and tools can help to visualize and understand the implication of renewable energy sources. These insights can be very well combined with the identified social values and issues from local communities (Respondent Schimmel). Maps with clear zones and demarcations can highlight the complex challenge of spatial integration of renewable energy sources (Respondent Schwencke). France initiated a mapping approach in which layers with different functions were combined with specific design principles in order to discover suitable locations for onshore wind energy. However, these maps didn't deal with the social acceptance of the allocated zones and as a result, this plan was confronted with local opposition (Respondent Bahar).

Distribution network operators have a facilitating role in the energy transition which implies that many new electricity lines and electrical substations will have to be constructed. These developments require social acceptance as in the end, these developments also intervene in people's living environment. Schimmel highlights the importance of including these grid developments in the spatial design workshops which makes it possible to work more efficiently. Thereby, the consequences of alternatives for the electricity grid becomes part of the design of these alternatives. From a financial perspective, it is important to realize that grid developments are paid with public money, as distribution network operators are financed with tax money. The higher the costs, the higher the taxes will be. This directly influence the social acceptance (Respondent Schimmel). Grid operators are often part of the RES project groups. Akerboom states that it is important to consider that the interest of grid operators may conflict with the preferred alternative of citizens. In this case, it is important that grid operators and citizens go in dialogue to create mutual acceptance (Respondent Akerboom).

Public participation in the project organization of the RES program

The project organization of RES regions is extremely complex with multiple governmental organizations like the province, municipalities and waterboards that formulate the regional organization. Sometimes, external non-governmental parties, like network operators, housing

associations and environmental organizations, also join the project organization. This is also a form of participation which is different from process or project participation. In this case, stakeholders become part of the organizational structure with an official seat at the table. This organizational set-up is case specific and depends on the regional context (Respondent Schwencke). According to Wolkorte, individual citizens shouldn't be part of the project organization of the RES as they are represented by parties like energy cooperatives, LTO and NMFs that do join the project organization. However, the project organization can arrange and organize bigger meetings and thereby invite the individual citizen (Respondent Wolkorte). Buchel states that parallel to the RES program, bottom-up initiatives often work on innovative projects and techniques. These bottom-up initiatives should have a seat at the RES-table as these are the desired projects that should scaleup. There should be plenty of room in the strategy development process for these innovative approaches as these reflect what is already happening in a region (Respondent Buchel).

Environmental advisory councils and focus groups

Rietveld is in favor of environmental advisory councils (Dutch: Omgevingsraden and Omgevingsadvies raden) which are organized stakeholder groups that go in dialogue with each other. It is the responsibility of governments to organize these sessions whereas the council should have an independent chairman. These councils incorporate the right to bid and the right to challenge, which are rights that imply that others should be able to challenge an initiative before it is decided that the project will be accepted. In other words, a government should not simply accept a renewable energy alternative without providing society the option to bid as well (Respondent Rietveld).

Based on a stakeholder analysis, different stakeholders join an environmental advisory council. Think of energy cooperatives, NGOs, entrepreneurs, municipalities, citizens etc. Citizens are organized in two different ways. First of all, citizens are represented by representatives of organizations that represents the village interests and that organized themselves already. Second, citizens are represented by representatives of a citizen forum. This citizen forum is initiated for citizens that are somehow related to a program or a project and who are not organized yet. The citizens forum should be organized externally, and the representatives of these citizen platforms should be invited to join the environmental advisory boards. Everyone that is affected by a program or a project is invited in the citizens forum and the representatives of this forum communicate with the other stakeholders that have a chair in environmental advisory boards (Respondent Rietveld).

Early warning system

Rietveld pleads for an early warning system that includes citizens, a group of approximately 100 people, who monitor the implementation of the climate agreement and provide feedback whenever they feel that the implementation is not in line with the agreements (Respondent Rietveld).

6.1.3 Phase of participation

Research showed that public participation in major decisions has a bigger influence on social acceptance. However, the same research showed that people want to be engaged in the decision-making around concrete projects and that people don't feel the need to be engaged in decision-making on more abstract visions. This is striking as in these early phases; major decisions are made (Respondent perlaviciute).

In the RES program, process participation can be divided into participation in the spatial implementation of renewable energy sources, and process participation in the heat transition in the built environment (in neighborhoods), which should be approached as two different forms of process participation. The process participation of the spatial implementation of renewable energy sources can be organized in three phases. In the first phase, the preparation phase, the environment is analyzed. In this step, a broad range of different stakeholders can be engaged. The outcome of this area-based phase is a selection of potential locations for renewable energy production. This selection is worked out in more detail in the second participation phase, which includes more concrete project participation. Finally, when concrete projects are identified, the project participation will be more formal and in line with legally binding participation procedures. In the end, after the public is consulted, governments as appointed authorities make the final decisions. Currently, governmental representatives sometimes appear to use participation methods to postpone official decision-making because they are scared of triggering a public outcry (Respondent Schwencke).

According to Rietveld, citizens should be engaged in the very first phase of the RES program by organizing a focus group. This implies that citizens should also be engaged in developing the plan of action. Not a single region engaged citizens in the start-up phase and not a single citizen group was involved in writing an action plan as there was simply not enough time to do so (Respondent Rietveld). Rietveld proposes three participation methods, the citizens forum, a focus group, and an environmental advisory board. Per planning phase, a different approach is recommended, as is explained in the toolkit participation provided by the NLVOW (Respondent Rietveld).

After a RES is written, the different municipalities will have to translate the decisions made in the RES program to local projects and integrate them into local policies. Public participation is key in this translation process (Respondent Wolkorte). This step requires great attention as the region is not an official jurisdictional body or appointed authority and neither has decision-making power. This implies that the decisions made on the regional level will have to be implemented in municipal and provincial policy programs which can result in friction between regional decisions and local implementation. Besides, this translation of the decision from RES to policy, in the current situation, will have to go through the regular spatial planning procedures including legally binding public consultation etc. Finally, the entire planning process takes multiple years, from the allocation of potential locations for renewable energy production until the implementation of these locations in policies. The risk here is that people who aren't engaged in the initial allocation process, a couple of years later, won't accept the implementation of these decisions. This risk can be tackled by being transparent in the decision-making process by communicating and justifying each step (Respondent Swencke).

6.2 Conclusion to third sub question

This chapter presented the results of the empirical research with regard to public participation in the RES program. The first paragraph explained the difference between the heat transition in the built environment and the spatial integration of renewable energy sources, with regard to the role of citizens in these issues. For the heat transition, the RES program is oriented on the identification of alternative heat sources, the analysis of current and future heat demand and the potential connection between the alternative sources and the heat demand (see also paragraph 3.2.1). Processes oriented on the heat transition in the RES program aren't suitable for public participation as these processes require system analysis and technical assessments (phase I of SREP), rather than

decision-making that allows for co-creation and dialogue (phase II, III and IV of SREP). Besides, the heat transition in the built environment is addressed in municipal heat transition visions and neighborhood energy plans. Both process participation, project participation and financial participation methods can be considered for the development of these visions and energy plans.

For the electricity sector, the RES program is oriented on the identification and prioritization of locations that are suitable for onshore renewable energy production. This decision-making process allows for public participation during the four planning phases of SREP that are identified in chapter four.

The second paragraph of this chapter presented different methods for public participation in the RES program: dialogue sessions based on co-creation, the national approach of the Dutch participation coalition, methods oriented on stimulating local ownership, engage cooperatives, methods that engage key figures and leaders, spatial design workshops, public participation in the RES project organizations, an early warning system, environmental advisory councils and focus groups. Depending from the phase of RES and the desired outcome of the participation process, discussed in the different paragraphs and the conclusion of chapter 5, different participation methods can be considered. In the next chapter, different methods are combined with the process level of SREP oriented on the spatial integration of renewable energy sources.

Finally, chapter 6.1.3 presented different thoughts on the phase of public participation. Whereas public participation in major decisions has a bigger influence than public participation in less impactful decisions, people don’t feel the need to be engaged in abstract decisions. In order to engage citizens from the beginning of the RES program and to engage them in major decisions, it is important to make decisions as concrete as possible.

7 DISCUSSION AND CONCLUSION

7.1 Discussion

In this chapter, the SREP framework is presented. The SREP framework incorporates the heat transition in the built environment and the spatial integration of renewable energy sources. SREP is oriented on the process level and the participatory level of energy planning. The process level of SREP is in line with the conditions and deliverables of the RES program discussed in chapter three and is designed based on the different approaches to and conceptual models of energy planning presented in chapter four and categorized in annex IV. The participatory level of SREP is developed based on the literature study and the results of the case study presented in chapter five and chapter six. In line with the objective of this study, the SREP framework is developed to facilitate policy makers in developing and fulfilling medium-term (one to ten years) and long-term (more than 15 years) policy goals related to the penetration of renewable energy sources and the heat transition in the built environment.

The SREP framework is the result of a discussion of the results presented in previous chapters and the theoretical framework presented in chapter four and five. In the next paragraph, the process level of SREP is explained based on the four phases that are identified in paragraph 4.4 of this export. Afterwards, the participatory level of SREP is presented.

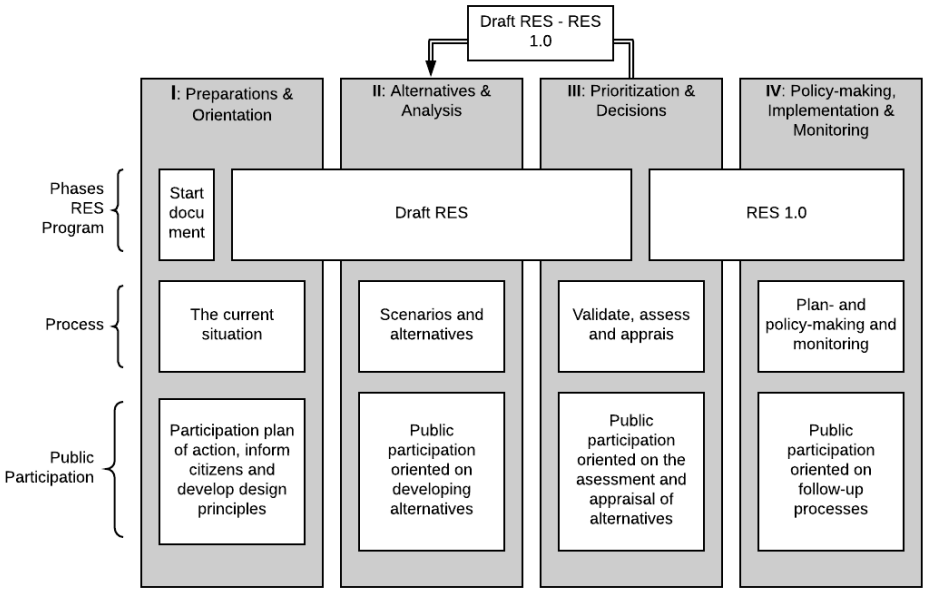

Figure 16, Four planning phases of SREP (own work)

7.1.1 Process level of SREP

Four planning phases are identified for the SREP framework. These phases are **I) Preparations & Orientation**, **II) Alternatives & Detailed Analysis**, **III) Prioritization & Decisions** and finally **IV) Policy making**, **Implementation and Monitoring** (figure 16). The next paragraphs introduce the different planning phases and present the actions from a process level perspective. The different tables in Annex II are the theoretical backbone of the content of this paragraph.

Phase I: Preparations & Orientation

Stakeholder and social analysis

A stakeholder analysis can be performed for multiple reasons. First of all, a stakeholder analysis can be conducted to identify leaders, innovators and early adaptors (Müller , Stämpfli , Dold, & Hammer , 2011). Second, the stakeholder analysis can be performed to identify the (different groups of) people that have a stake in SREP. Accordingly, these stakeholders can be grouped in standard stakeholders and interest groups (Neves, Leal, & Lourenco , 2015). The analysis can identify how each actor affects, is affecting or is interested in SREP. In line with this, the societal needs should be understood (Pereverza, Pasichnyi, & Kordas , 2019). Factor C, developed by the Dutch government, can be used as a method to identify the stakeholders, the stake of these groups, their 'influence' on the decision-making process by using the Rings of Influence tool and the relations between the different groups by developing a network analysis (CommunicatieRijk, 2019). The output of this analysis should be used as input to construct a regional project team. Accordingly, a 'leader' should be selected as the project manager and each project member should share and assure their commitment (IPO, VNG, Unie van Waterschappen, Rijksoverheid , 2017). Local governments know the businesses and citizens better than other governmental organizations. Therefore, municipalities should be in the lead with these analyses.

Analysis of the environment and the energy system

Most energy planning approaches incorporate an analysis of the environment which includes an analysis of the energy system (Stremke , 2013; Mirakyan & De Guio, 2014; Müller , Stämpfli , Dold, & Hammer , 2011; Neves, Leal, & Lourenco , 2015; Terrados , Almonacid, & Perez-Higueras, 2009; Brandoni & Polonara, 2012; Marinakis, Doukas , Xidonas, & Zopounidis, 2017). Based on these sources, the analysis should consist of the regional landscape characteristics, the regional energy system and the boundary conditions of SREP.

First of all, an analysis of the landscape characteristics is useful to understand the regional context as the different alternatives that are developed in Phase II are assessed based on, among other variables, the impacts of these alternatives on the landscape characteristics in phase III. This analysis should include an analysis of the different functions, related restrictions and boundaries. Second, the regional energy system/energy balance is analyzed. This analysis should include the energy demand per sector and per energy source:

- Historical energy demand
- Current energy demand
- Different end-use conversion technologies
- Different energy services

- Future energy demand based on:
    - Socio economic variables
    - Evolution of energy services
    - Shift in end-use conversion technologies and the efficiency of these technologies

The energy supply per energy source:

- Historical energy supply
- Current energy supply
- Renewable energy potential
- The electricity grid
- Energy efficiency
- Energy sufficiency potential
- Autochthonous energy supply potential
- Amount of CO2 emitted in energy sector, excluding the mobility sector

Based on these analyses, system boundaries should be analyzed and explained. This information can be combined in a conceptual model of the regional energy system with conformity assistance. A Sankey diagram can be used in this case.

Analysis of trends and (near future) developments

The analyses of the previous paragraph mostly explain the current conditions which don't include future developments. However, an analysis of trends, policies and developments can provide a glimpse of the near future (Stremke , 2013) (Terrados , Almonacid, & Perez-Higueras, 2009). A special focus is be placed on low-carbon initiatives that are developed within the region and the current state of the art socio-technical system and related features. Finally, smart practices (spatial targeting and synergies) are analyzed.

Targets/objectives, risks, barriers and challenges

The analysis of the energy system and the identified trends and developments are input for the identification of targets, risks and barriers. First of all, different problems of the energy system are identified based on these analyses. Accordingly, different sustainability challenges are identified (Pereverza, Pasichnyi, & Kordas , 2019). Second, the objectives of the SREP planning process are discussed and based on these objectives, a long-term most desirable final result (MDFR) is proposed. Accordingly, this MDFR is structured in three quantitative categories: environment, social and economic. These categories allow for a better understanding of the MDFR. Finally, barriers to reach the MDFR (goal-attainment) are studied (Mirakyan & De Guio, 2013). The issues, challenges and wicked problems presented in chapter 4.3 can be used to guide this process.

The MDFR is not the final goal that the region will present to the national government. Rather, it is a picture of the most desirable future in terms of renewable energy supply which is used to explore and understand the technical implications of this scenario before citizens are engaged in the planning process. In phase III, based on the scenario analysis, the final objective is developed in cooperation with the different social stakeholders.

Design principles and attributes

In this step, design principles are developed. These design principles are leading for the design of the supply alternatives in the next planning phase of SREP. As the supply alternatives should reflect the societal preferences, the design principles should be co-created with citizens, based on their local insights and preferences (IPO, VNG, Unie van Waterschappen, Rijksoverheid , 2017). Besides, the design principles should match the approach of the national policy program (Mirakyan & De Guio , 2014). In the case of the RES program, these design principles are explained in the RES handbook (Dutch government , 2018) and the Dutch Environmental Visions (NOVI) (Dutch Government, 2019). The environmental analysis also provides input for these design principles. Finally, attributes that determine the goal attainment of the MDFR are studied (Neves, Leal, & Lourenco , 2015). These attributes are weighted variables that allow for the appraisal of alternatives in phase III.

Phase II: Alternatives & Detailed analysis

Scenario development/desirable future vision

Scenarios or different desirable futures are developed (Marinakis, Doukas , Xidonas, & Zopounidis, 2017; Stremke, 2013; Pereverza, Pasichnyi, & Kordas , 2019). The back-casting approach, explained in paragraph 4.3.1, is used in this case in which multiple desirable futures are developed based on the environmental conditions and the current energy mix, the trends and near-future developments and the national targets from the RES program. Multiple scenarios are developed in order to develop and explore multiple pathways/alternatives to arrive at the different desirable futures. Scenarios that can be considered are the MDFR, energy autarky in year X and an equal regional share of the national target for renewable energy production.

Supply alternative development

Different alternatives are developed based on the scenarios that are identified. These alternatives present means of achieving the different scenarios by incorporating the design principles that are developed in phase I (Stremke , 2013; Neves, Leal, & Lourenco , 2015; Lund, 2014; Pereverza, Pasichnyi, & Kordas , 2019). Two different rounds of alternatives are considered. First, alternative locations for renewable energy production are developed. In phase III, environmental, social and economic impacts of the alternative locations are studied and accordingly, the different zones are appraised based on the attributes of phase I. Accordingly, the preferred alternative (zone) is worked out in more detail (project) with short-term concrete actions that consider the term of office of politicians (IPO, VNG, Unie van Waterschappen, Rijksoverheid , 2017). Both the first round of alternatives and the second round of alternatives are visualized which makes them more concrete.

Phase III: Prioritization & decisions

Impact assessment

In the third phase of SREP, the technical alternatives are assessed based on the environmental (think of variables that are included in EIAs like impact on landscape, nature, air quality and reduced CO2 emissions), economic (investment costs, financial benefits for the environment and effects on electricity prices for citizens) and social impacts (distribution of wealth and potential revitalization of

communities) of these alternatives. Part of the assessment are the impacts on the electricity grid and the related developments, like new transformers and electricity cables and the problem. Next to that, the different alternatives are assessed based on the different design principles and attributes that are decided upon in the first planning phase. The impact assessment results in a quantitative overview of the impacts of the various alternatives.

Appraisal of the alternatives

The different alternatives should be compared to each other and ranked (Terrados , Almonacid, & Perez-Higueras, 2009) based on the output of the impact assessment. The different objectives can be weighted to measure the overall score of each alternative in order to select the alternative with the highest score (Neves, Leal, & Lourenco , 2015). The relation between the benefits of each alternative and the overall investment can be analyzed by developing an investment-benefit graph. The results can be verified by conducting a robustness analysis (Marinakis, Doukas , Xidonas, & Zopounidis, 2017; Neves, Leal, & Lourenco , 2015). Finally, one alternative is selected based on the different analysis. Market barriers that hinder the implementation of this alternative are studied (Lund, 2014), short-term regulation measures are proposed and a pathway to implement this desired future is analyzed (Pereverza, Pasichnyi, & Kordas , 2019).

Repeat phase II and III

The first round of scenario's, alternatives, the impact assessment and the appraisal are on a zonal level. The result is a regional overview with preferred alternative zones, suitable for the production of renewable energy. Accordingly, these zones will have to be worked out in more detail. For phases II.a and IIa, different alternative zones are suggested, assessed and appraised. For phases II.b and III.b, alternative projects within the preferred zones are suggested, assessed and appraised. The result is a regional overview of the preferred projects.

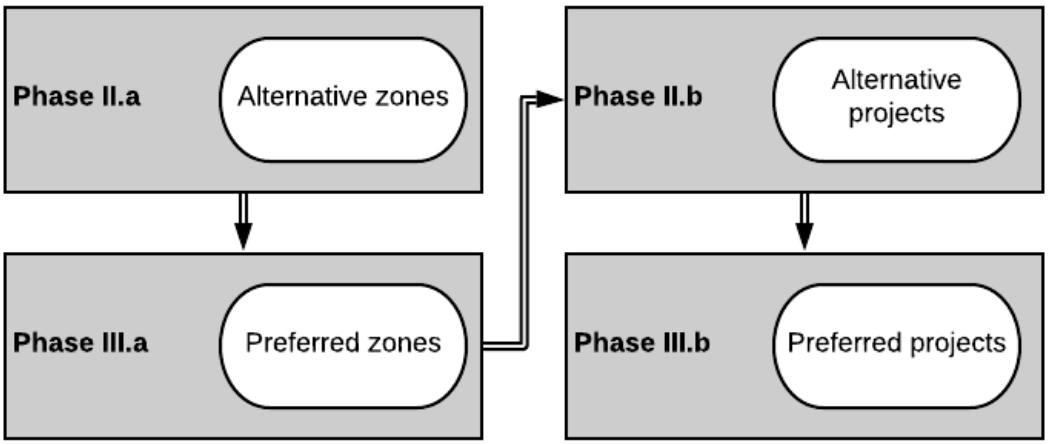

Figure 17. Output of phases II.a, II.b, IIIa and III.b and the relation between the phases (own work).

Phase IV: Policy making, Implementation & Monitoring

Plan making

An implementation plan is developed based on the alternatives that are selected and appraised (Mirakyan & De Guio, 2013). This implementation plan includes a review of the planning process and the stakeholders and were engaged during the planning process. The implementation plan includes a short-term action plan (Pereverza, Pasichnyi, & Kordas , 2019) which considers the term of office of politicians (IPO, VNG, Unie van Waterschappen, Rijksoverheid , 2017). Besides, the plan making processes should connect with municipality portfolios like housing and energy and institutional barriers are identified. The regional dependence should be understood and the decisions that will be integrated in policy documents are already considered (IPO, VNG, Unie van Waterschappen, Rijksoverheid , 2017). Finally, this program is presented to the national government.

Policy making

The strategy developed in the RES program isn't automatically implemented in provincial or municipal policies and therefore, SREP provides guidelines for this implementation trajectory. First of all, it is important that municipalities and provinces are engaged in the four planning phases of the SREP framework to tackle a lack of political will during the policy making process. In line with this, it is important that the different municipalities and eventually, the different provinces assure their commitment within the project organization at the start of the phase I. Second, it is important that the policy making process of the different municipalities is monitored by the regional project organization. This has a couple of reasons. First of all, some smaller municipalities might lack the power to implement due little resources and skills. Second, the regional approach allows for an efficiency gain in the permission process. Third, during the policy making process, municipalities might have the tendency to focus on their own interest and thereby, neglect the regional agreements. Finally, both the outline, the time horizon and the quality of the local policies might differ from each other.

Monitoring

Projects are developed and implemented in municipal and provincial policies. Accordingly, each region organizes follow-up activities to communicate and monitor the implementation process. The implementation process is monitored by measuring the goal-attainment (Mirakyan & De Guio, 2013; Pereverza, Pasichnyi, & Kordas , 2019).

7.1.2 Participatory level of SREP

An important aspect of the SREP framework is the participatory level. This level is oriented on the role of citizens in the decision-making processes that are presented in the previous chapter. The participatory level of SREP is designed based on the theoretical insights and the results presented in chapter five and six and is developed to:

- speed up the energy transition;
- improve the quality of decision-making by:
    - adding information to decision-making and by sharing information with citizens;
    - improving social acceptance;
    - engaging citizens in the assessment of alternatives;
    - reducing disagreement, resistance and protest;

- stimulate a behavior change by:
    - triggering citizens to actively participate in decision-making processes;
    - motivating people to reduce household energy consumption;
    - improving a sense of local ownership;
- improve the perceived procedural and distributive fairness of citizens.

The next paragraphs present different issues that are found to be important with regard to the objectives of the participatory level of SREP. These issues aren't categorized in the four phases of SREP for the simple reason that many guidelines apply to multiple phases.

The participatory level and the process level of SREP are intertwined

The design of the participatory level of SREP is strongly related to the process level of SREP. The process level reveals the various decision-making moments within the development of a regional energy strategy which are important moments for public participation. The decision-making moments explained in paragraph 7.1 in combination with the desired outcome of the participatory level of SREP presented above are the foundation of the participatory level of SREP. This approach leaves some space for alteration as the design of the participatory level and especially the design of actual participation methods is highly dependent from the desired outcome of these methods; users of the SREP framework should decide which desired outcomes presented above meet case-specific conditions and preferences. From this perspective, the participatory level of SREP discussed in this paragraph should be interpreted as a guideline to design and manage the participatory level of SREP in practice.

Acknowledge the role of citizens in SREP

Before a participation plan of action can be developed, there are a couple of points that should be discussed and understood within a regional project organization. First of all, the management team of a regional project organization should discuss and study the impact of the energy strategy that is under development on citizens living in the study area (Respondents Schwencke, Perlaviciute and Hajema). Second, it should be understood that the complex society that we live in is requesting more autonomy and engagement in decision-making processes which requires a bottom-up approach with local solutions and a participation plan of action that meets this request for engagement (Respondents Schuurs, Hajema and Rietveld). Third, there are two approaches to public participation in the energy transition: participation in decision-making and active participation (frontrunners like energy cooperatives) (Respondent Akerboom). The participatory level of SREP is mostly oriented on public participation in decision-making. However, frontrunners of the energy transition like energy cooperatives should also play a role in the decision-making process as these 'active participants' have the ability to communicate with and motivate other citizens to participate in SREP. Besides, these frontrunners can contribute to the quality of the final energy strategy as they most likely have plenty experience with SREP related issues (Respondents Schwenkce, Schuurs, Wolkorte and Buchel).

Finally, the following contradistinctions should be considered by the management of regional project organization: first, public participation that builds representativeness and inclusiveness can increase the social acceptance but can lead to watered-down strategies (Respondent Buchel), whereas participation oriented on frontrunners can speed up the energy transition but can also lead to more vigor (Respondent Buchel). As transition management is oriented on a radical change (Lund, 2014), this perspective on public participation promotes a frontrunner-based approach as presented in the

conclusion to sub question two (Grin , Rotmans, & Schot , 2010). On the other hand, many other respondents plead for an approach that engage citizens in the planning process from the very first moment (see paragraph 6.1.3). Second, an important consideration is that public participation in major decisions can have a bigger positive impact on social acceptance than public participation in less significant decisions. However, research showed that citizens that feel engaged in these rather abstract decisions. This requires an approach that is oriented on the target audience of SREP (Respondent Perlaviciute).

Understand and engage the target audience

The stakeholder analysis presented in paragraph 7.1 identifies the different stakeholders of SREP. An important stakeholder are citizens. In order to engage these citizens in the SREP process, it is important to understand the target audience (Respondent Hajema). Therefore, a citizens analysis that is oriented on the socio-economic aspects of the energy system (Müller , Stämpfli , Dold, & Hammer , 2011) and that differentiates citizens based on a classification system should be part of the stakeholder analysis (IPO, VNG, Unie van Waterschappen, Rijksoverheid , 2017). The result of the analysis is a spatial overview of different groups of citizens, based on a set of variables (like norms and values, engagement with the environment, preferred communication source, income, status of real estate etc.) which allow for more efficient communication during the planning process (Respondent Trampe). This segmentation can be used for communication purposes which can result in a better reflection of society during participation processes (Respondents Rietveld, Trampe, Lodder and Hajema). A better representation might result in higher levels of social acceptance (Respondent Trampe), increased perceived procedural fairness (Respondent Akerboom) and an increased quality of decision-making (see figure 14). The citizens analysis can best be performed by municipalities within a region as municipalities might know their citizens better than higher administrative levels (IPO, VNG, Unie van Waterschappen, Rijksoverheid , 2017).

In order to understand the main target group of SREP, citizens are once more differentiated in three subgroups: a group of frontrunners, citizens who actively participate in the energy transition and who are ‘no matter what’ in favor of SREP, a big mid-range with citizens that have a somewhat neutral opinion about the energy transition and about SREP related developments. Finally, there is a small group of citizens that are very hard to reach and that don’t show any form of willingness to cooperate (Respondents Rietveld and Schuurs). During the planning process of SREP, the participatory level should focus on providing the mid-range group with enough knowledge and guidance to understand the challenge and to work to a design that is acceptable (Respondent Rietveld).

Communicate with citizens during SREP

Citizens play an important role in the SREP framework. The different perspectives on the role of citizens in the energy transition presented in chapter five and the role of citizens in energy planning presented in chapter six revealed the importance of communication and exchange of information. The table below presents different purposes of information exchange, the direction of the information exchange and the phase of SREP in which this exchange of information plays an important role.

Information exchange from governments/regional project organizations to citizens serves multiple purposes. First of all, information exchange should facilitate in answering the ‘why’ of an energy

strategy as developments often begin with an understanding of the need for these developments (Respondent Hajema). Second, by explaining the 'why', citizens and even municipalities learn about the sustainability problems of the current energy system and the shared responsibility that they have to solve this problem (Respondent Schuurs). Third, communication tailored to the target audience can engage citizens in SREP and stimulate a behavior change, as strategies that target people's motivation to engage in such behavior can stimulate a durable behavior change (Steg , Perlaviciute , & van der Werff, 2015). Accordingly, information is more likely to encourage sustainable behavior when it resonates with the central values of individuals from the target population and when information is tailored to the needs, norms, and perceived barriers of the target population (Steg, 2016). For this purpose, information can be differentiated based on the persona's and should be tailored to the values of people. In line with this point, many decision-making processes are about abstract targets (biospheric and altruistic) that many people agree upon. Therefore, people don't feel the need to participate in these decision-making processes (Respondent Perlaviciute). However, the consequences of these visions, for example the spatial integration of renewable energy sources, can trigger protest and disagreement. To engage citizens from phase I of SREP, it is important to make abstract visions more concrete (Respondent Hajema) and to incorporate egoistic and hedonistic values (Respondent Perlaviciute) in the exchange of information; 'what's in it for me'.

Finally, without the exchange of information, people can respond emotionally on initiatives instead of rationally and won't understand the need for renewable energy projects and even more important, people won't accept it (Respondent Rietveld). Besides, knowledge, and especially the exchange of knowledge, is an important dimension of facilitating a radical change (Lund, 2014).

Exchange of information	Purpose exchange of information	Phase exchange of information
Government/project organization SREP → Citizens	Explain the 'Why?' of SREP	I
	Engage citizens in SREP	I
	Facilitate a rational consideration	I – IV
	Improve perception of ownership and shared responsibility	I – IV
Citizens → Government/project organization SREP	Improve the quality of decision-making	I – IV
	Improve perceived distributive and procedural fairness	I – IV
	Incorporate important values in the energy strategy	II, III
	Improve social acceptance	I-IV

Table 4. exchange of information between the regional organization/government and citizens.

Public participation in SREP should also incorporate the exchange of information from citizens to the regional project organization/government (lower rows of table 4). This requires participation

methods that stimulate dialogue between citizens and between citizens and experts. Table 3 in paragraph 5.1.2 provides questions that can be understood as design principles for developing such methods. Later on in this discussion, the purpose of dialogue is explained, as well as the different purposes of the exchange of information from citizens to the regional project organization/government.

Public participation in the project organization

The stakeholder analysis that is explained in the paragraph above provides input for developing the regional project organization, which is highly case specific (Respondent Schwencke). The information from the stakeholder analysis can be used to consider the role of public participation in the project organization of a region. There are multiple alternatives to public participation in the project organization. First of all, in the Dutch case, a national coalition is initiated that consist of a handful of companies that focus on public participation in the energy transition (Respondent Spaan). This coalition is organized on a national level but can assist regions with the participatory level of SREP (Respondent Wolkorte). As the participation coalition operates in many regions, it has the ability to constantly monitor the participatory level of SREP and thereby assure efficiency gains.

Second, frontrunners like local energy cooperatives can be engaged in SREP. These organizations are familiar with regional circumstances and know the social infrastructure better than any other organization (Respondent Schuurs). Frontrunners can communicate with citizens (Respondent Wolkorte) and stimulate other citizens to participate in SREP. Often, these organizations work on innovative projects and techniques which are the desired projects to scaleup in a region (Respondent Schuurs and Buchel). Representatives of these cooperatives can join the project organization or join a working group that is responsible for the participatory level of SREP. Finally, if a focus group is organized during SREP, representatives of this focus groups can be engaged in the project organization of SREP (Respondent Rietveld).

Stimulate local ownership

Local ownerships, and more specifically, 50% local ownership is a design principle for the RES program (Dutch government , 2018). This design principle has implications for the participatory level of SREP and the eventual design of the energy strategy that is developed (Respondent Wolkorte) (more specifically, the distribution of costs and benefits (distributive fairness) within this strategy).

In order to create a sense of local ownership, citizens should be invited in the planning process of SREP (process participation). By stimulating social learning and dialogue, citizens learn about the sustainability problems and become co-owner of these problems (Respondent Rietveld and Lodder). Besides, local ownership means that citizens get the opportunity to invest in renewable energy projects (financial participation) (Respondent Wolkorte). Financial participation can create positive spin-off effects for the region if financial benefits are reinvested in the region (Respondent Eerland). However, local ownership is always an option instead of a prerequisite (Respondent Wolkorte).

Public participation and communication plan of action

The regional project organization should be aware of the added value of a clear process design that incorporates the participatory level of SREP (Respondent Swencke). Accordingly, it is important to engage and communicate with citizens based on a plan of action that is developed in the first phase of the planning process. Expectations management, transparency and clarity are important drivers

for this plan of action which can be developed based on the stakeholder analysis, the citizens analysis, the identification of risks and barriers, the identified desired level of engagement, the different decisions per phase and the desired outcome of SREP. Some of the desired outcomes of the participatory of SREP presented in the introduction of this paragraph conflict with one another. This requires a strategic discussion about the main focus of the participatory level of SREP (see the second issue of this discussion). For example: optimally improve social acceptance and accept smaller steps in the regional energy transition versus facilitate a more radical transition and accept less social acceptance (Respondent Buchel).

Different participation methods can be considered for the decisions that are made within SREP. Figure 16 presents the main focus of the participatory level for each phase. For each phase and for each decision presented in paragraph 7.1, a different level of participation is required. Some decisions simply require communication and the exchange of information (see table 4), whereas other decisions ask for dialogue. It is important that the desired level of participation is clearly communicated with citizens (Respondent Swencke).

Stimulate dialogue

Some of the desired outcomes of the participatory level of SREP require dialogue and public participation that allow for co-creation, joint fact-finding and a process that facilitate interaction between actors with different values and opinions. Such a process oriented on deliberation can help people and governments to focus on the common good (Cohen & Sabel , 1997) and start to understand the relation between their perspectives and the interest of others. As concluded in paragraph 5.1.5, the process level of SREP stimulates deliberation by providing opportunities for communities to get engaged in the design, assessment and appraisal of different alternatives (Lund, 2014). In the transition management, this process is referred to as social social learning. The process of social learning is facilitated by transition arena's, transition agenda's, transition experiments and monitoring of the transition process (see chapter 5.2.3) (Grin , Rotmans, & Schot , 2010).

Dialogue should be oriented on a partnership between citizens and governments (Respondent Rietveld) and serves multiple desired outcomes. First of all, dialogue in important decisions can improve the perception of a fair process and thereby improve social acceptance (Respondent Perlaviciute). Second, public participation oriented on dialogue has the ability to incorporate a conflict of interest and thereby, reduce the level of conflict (Respondent Bahar). A reduced level of conflict can facilitate the implementation of the energy strategy that is developed (Coenen, 2008). Third, dialogue can provide a better understanding of the local context and can incorporate the voice of citizens in the design of an energy strategy (Respondent Schimmel). This can improve the quality of the analyses that are part of SREP. Besides, when people experience that their values are targeted, and their interest is taken into consideration in a decision-making process, this can lead to an improved perception of procedural fairness which can improve social acceptance (Respondent Perlaviciute).

The process level of SREP provides opportunities to engage citizens in the planning process. The first decision that allows for dialogue is the identification of design principles and attributes in phase I. A stakeholder analysis can be suitable as input for inviting people to these workshops (Respondent Swencke). In phase II of SREP, dialogue is oriented on the development of alternatives. These sessions are oriented on two main subjects: sharing the different variables for the development of alternatives as well as receiving feedback on these variables and sharing the spatial limitations and technical implications of the different renewable energy sources. Based on the input of these

sessions, different alternatives can be developed in line with the different scenarios that are identified earlier in phase II. This approach can result in alternatives and solutions that fit local conditions. An important aspect of these sessions is that people learn why certain designs and energy sources aren't suitable on specific locations (knowledge dimension of the energy transition). Next to citizens, different social stakeholders should join these sessions to facilitate dialogue. Finally, it is important to anticipate on the real questions of citizens and other stakeholders instead of presenting solutions for perceived problems (Respondent Rietveld).

The third and the fourth dialogue sessions are organized in phase III to evaluate the different alternatives that are developed in phase II. The different alternatives are presented in a visualized way and the different impacts of each alternative are explained. During these sessions, citizens are asked to reflect on the alternatives, based on the attributes that are co-created in the first dialogue sessions. The result of the session is feedback on the various alternatives which is used to rank the alternatives and to select the preferred alternative. This process is explained in more detail in the paragraph about 'appraisal of the alternatives' in chapter 7.1.

Monitoring

Follow-up activities are organized to facilitate the monitoring process (Pereverza, Pasichnyi, & Kordas , 2019). An 'early warning system' system can be initiated that includes citizens, a group of approximately 100 people, who monitor the implementation of the different projects and provide feedback whenever they feel that the implementation is not in line with the agreements (Respondent Rietveld). Besides, the participatory level of SREP and the social learning process are monitored for each planning phase to understand the transition process of SREP (Grin , Rotmans, & Schot , 2010).

7.2 Conclusion to the main research question

How can citizens be engaged and participate in strategic regional energy planning for the built environment and the electricity sector?

The main objective of this research is to develop a framework to help regions develop a regional energy strategy for the electricity sector and the built environment, with a focus on the role of public participation. The result is the SREP framework that is presented in chapter 7.1. The simple answer to the research question is 'by implementing the SREP framework'. However, as already mentioned in chapter two of this report, case-based theory developments have highly accurate portrayals of real-world issues, like regional energy planning practices, but little to no generalization across other contexts (Woodside , 2010). This implies that the SREP framework is only applicable to regions that are challenged to develop a regional energy strategy that meet the conditions of the RES program.

In order to generalize the SREP framework to other regions across the world, other than the regions covered in the RES program, regions should meet a set of characteristics. This case-to-case transfer, more often referred to as transferability, requires a description of the case study as to allow users of the SREP framework with inferences about extrapolating the findings of this research (Polit & Tatano Beck, 2010). First of all, the RES program is initiated by the Dutch national government, is developed based on the Dutch national climate agreement and is executed on a regional level (Dutch

government, 2019). As this regional level isn't in line with the Dutch administrative structure (house of Thorbecke), SREP is managed by a highly multi-stakeholder regional project organization in which both municipalities and social stakeholders have a seat. Second, the RES program is orientated on the spatial integration of renewable energy sources and the identification of alternative heat sources. In the SREP framework, there is great attention paid to the spatial integration of renewable energy sources. Regions that want to apply the SREP framework should be challenged with comparable issues. Third, SREP is developed for cases that require a transition from one situation to a new (desired) situation. The participatory level of SREP is developed to manage this transition process in which values, disagreement, social acceptance and protest are important factors and drivers. Fourth, the participatory level of SREP is designed based on the four objectives of the participatory level presented in the introduction of chapter 7.1. Regions that choose to work with the SREP framework should be willing to invest time and money in the organization of the participatory level. Finally, the SREP framework is developed to facilitate policy makers in developing and fulfilling medium-term (one to ten years) and long-term (more than 15 years) policy goals related to the penetration of renewable energy sources and the heat transition in the built environment.

8 REFLECTIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This chapter reflects on the findings of this research, the research design and the research process of this research project. The limitations of this research project in combination with the findings presented in previous chapters are the foundation of the recommendations for future research that are presented in the final paragraph of this chapter.

8.1 Findings

The findings of this study largely meet the research objectives that were set up beforehand. A better understanding of the concept of energy planning is achieved, as well as a better understanding of different perspectives on the role of citizens in energy planning. Both the theoretical study and the empirical research have contributed to the development of the SREP framework that is presented in previous chapter. The SREP framework might contribute to a better understanding of the role of citizens in energy planning and can help governments and organizations across the world to develop energy strategies comparable to the Dutch RES. Therefore, it can be justifiably argued that this study successfully achieved its objectives that make it relevant for society and academia.

To achieve more balanced and inclusive findings, it could have been done better by including more respondents in the case-study of this research. Whereas an important part of the research are the different perspectives on public participation in energy planning, little respondents per perspective were interviewed. Time limitations were the main constraint in this short-coming. A second limitation to the findings of this study is the selection of respondents. The respondents were selected based on the theories that were studied and based on the connections of Dhr. R. Idema and Dhr. M.J. Jager, both supervisors of the whitepaper that is developed based on this research. One could argue that the selection of respondents could have influenced the outcomes of this research. However, by assuring an objective and critical attitude during both the research phase and the writing phase, this effect is minimized. A third limitation to the findings is that the literature research was not adequately performed before conducting the research; the different phases of SREP weren't defined yet and besides, the theoretical research on public participation wasn't concluded. This resulted in unfocused questions and answers by respondents. This limitation could have been prevented by scheduling a feedback moment with Dr. F.H.J.M. Coenen before the empirical research was started.

A fourth limitation to the findings of this research is the focus of the research. This research is oriented on the process level and the participatory level of energy planning whereas a third level of energy planning, the methodological level (Mirakyan & De Guio , 2014), was neglected in this research as this level wasn't in line with the objectives of this research. Besides, this focus was required considering the time constraints of this research. A final limitation to the findings of this research is the lack of insights in the applicability of the SREP framework. The process level of the SREP framework is developed based on a literature research on energy planning and a document analysis on documents about the RES program, a reflective report on the five pilot regions of the RES program and policy documents that explain the political landscape of the RES program. The participatory level of the SREP framework is developed based on a literature review and the case-study of this research. Accordingly, the SREP framework can be applied to cases that meet the case specific conditions that are explained in the previous chapter. However, the SREP framework isn't

applied to a real-life case. Besides, little feedback is received on the SREP framework. As a result, little is known is about the applicability of the SREP framework.

8.2 Methodology

Although chapter two justifies the chosen research approach, there are still some comments related to the methodology of this research that could be made in retrospect. First of all, qualitative research is always subject to the interpretation of the researcher (Verschuren & Doorewaard, 2010). This comes with some limitations of this research approach: during the interviews, the researcher could have unintentionally steered the answers of the respondent. Next to that, during the data analysis phase, the researcher interpreted the data and grouped the data based on the objective of this research. It could be the case that the researcher didn't include certain parts of the data in the research report which were of importance to the respondents. Besides, the interviews were held in Dutch whereas the transcripts are written in English. By translating the audio recordings of the interviews from Dutch to English, some information might have been lost. However, to tackle these risks, the final transcripts were communicated with the respondents who provided these transcripts with feedback. This reduced the risk of subjective interpretation of the data that was collected. Finally, the researcher made several decisions with respect to the design of this research; during the selection of the case and the respondents and during the interpretation of the data. These decisions influenced the design of the SREP framework to a large extent and could be questioned by other researchers.

In line with the previous comment, the case study of this research can be criticized. The case study of this research, which is explained in great detail in chapter 3 of this research, is the RES program of the Dutch government which covers 30 Dutch regions that work on developing a RES. Besides, the case study includes 5 pilot regions that experimented with the RES approach. As explained in chapter 2, the main research question and the research questions of this report allows for a case study approach. However, the researcher could have selected a set of RES regions as case study instead of studying the entire RES program. A case study oriented on a set of actual RES regions would potential result in more in-depth knowledge about these cases and a better argumentation for the selection of the respondents. Besides, the researcher chose to approach the RES program in a single case-study approach, whereas the RES actually consists of 30 individual cases, each working on a RES with different stakeholders, different objectives and with a different approach. A case study in which different RES cases are compared to one another would potentially raise important insights about the case specific conditions and accordingly, about the transferability (see the chapter 7.2) of a standardized approach like the SREP framework. However, the description of research design in chapter 2, the 'thick' description of the RES program in chapter 3 and the conditions under which the SREP framework can be applied to other cases improves the transferability of the SREP framework as well (Polit & Tatano Beck, 2010).

Finally, the decision to write this research report during an internship at Royal HaskoningDHV has had some implications for the research. First of all, both the assigned supervisor of the University of Twente and the supervisors of Royal HaskoningDHV provided the researcher with valuable feedback and insights. This definitely improved the validity of the research design and the quality of the final research report. However, the researcher also experienced the challenge of writing two separate documents at once; both an academic research and a more practice-oriented white-paper. This approach had some major implications on the time-planning of the researcher. Whereas a research

project with a practice-oriented approach allows for a relatively strict time planning, a theory-oriented research certainly does not.

8.3 Recommendations for future research

Based on the conclusions of chapter seven and the reflections from previous paragraphs, some recommendations for future research are identified. First of all, future research could be oriented on applying the SREP framework to either a RES region or another region that meet the conditions that are discussed in paragraph 7.2. This research should apply the SREP framework in a case-study, study the implementation process and evaluate on the results. Accordingly, the findings of this future research should be compared with the results of this research to improve the validity of the SREP framework. Second, future research could be oriented on the methodological level of energy planning and more specifically, the methodological level of the SREP framework. The findings of this future research could contribute to the integrality of the SREP framework. Third, future research could be oriented on the financial implications of applying the SREP framework into practice, compared to an energy planning approach with little focus on the participatory level. Fourth, as the research objective of this research was to develop an energy planning framework for both the process level and the participatory level of energy planning, there was little time to study specific participation methods in great detail. Future research could look into (a) specific participation method(s). Finally, this study mainly focused on public participation in energy planning oriented on the spatial integration of renewable energy sources. Future research could be oriented on public participation in the heat transition in the built environment, which is most likely managed on a municipal or even a neighborhood level instead of the regional level (which is the organizational level of the SREP framework).

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APPENDICES

Annex I: division of the regions of the RES program

Indeling regio's RES

Regio Achterhoek
Aalten, Berkelland, Bronckhorst, Doetinchem, Montferland, Oost Gelre, Oude IJsselstreek, Winterswijk

Regio Alblasserwaard
Giessenlanden, Gorinchem, Molenwaard

Regio Arnhem / Nijmegen
Arnhem, Berg en Dal, Beuningen, Doesburg, Druten, Duiven, Heumen, Lingewaard, Nijmegen, Overbetuwe, Renkum, Rheden, Rozendaal, Westervoort, Wijchen, Zevenaar

Regio Amersfoort
Amersfoort, Baarn, Bunschoten, Eemnes, Leusden, Soest, Woudenberg

Regio Drechtsteden
Alblasserdam, Dordrecht, Hardinxveld-Giessendam, Hendrik-Ido-Ambacht, Papendrecht, Sliedrecht, Zwijndrecht

Regio Drenthe
Aa en Hunze, Assen, Borger-Odoorn, Coevorden, De Wolden, Emmen, Hoogeveen, Meppel, Midden-Drenthe, Noordenveld, Tynaarlo, Westerveld

Regio Flevoland
Almere, Dronten, Lelystad, Noordoostpolder, Urk, Zeewolde

Regio FoodValley
Barneveld, Ede, Nijkerk, Renswoude, Rhenen, Scherpenzeel, Veenendaal, Wageningen

Regio Friesland
Achtkarspelen, Ameland, Dantumadiel, De Fryske Marren, Dongeradeel, Ferwerderadiel, Harlingen, Heerenveen, Kollumerland en Nieuwkruisland, Leeuwarden, Ooststellingwerf, Opsterland, Schiermonnikoog, Smallingerland, Súdwest Fryslân, Terschelling, Tytsjerksteradiel, Vlieland, Waadhoeke, Weststellingwerf

Regio Goeree-Overflakkee
Goeree-Overflakkee

Regio Hart van Brabant
Dongen, Gilze en Rijen, Goirle, Heusden, Hilvarenbeek, Loon op Zand, Oisterwijk, Tilburg, Waalwijk

Regio Groningen
Appingedam, Bedum, De Marne, Delfzijl, Eemsmond, Groningen, Grootegast, Haren, Leek, Loppersum, Marum, Midden-Groningen, Oldambt, Pekela, Stadskanaal, Ten Boer, Veendam, Westerwolde, Winsum, Zuidhorn

Regio Holland Rijnland
Alphen aan den Rijn, Hillegom, Kaag en Braassem, Katwijk, Leiden, Leiderdorp, Lisse, Nieuwkoop, Noordwijk, Noordwijkerhout, Oegstgeest, Teylingen, Voorschoten, Zoeterwoude

Regio Hoeksewaard
Binnenmaas, Cromstrijen, Korendijk, Oud-Beijerland, Strijen

Regio Midden-Holland
Bodegraven-Reeuwijk, Gouda, Krimpenerwaard, Waddinxveen, Zuidplas

Regio Noord-Holland Zuid
Aalsmeer, Amstelveen, Amsterdam, Beemster, Beverwijk, Blaricum, Bloemendaal, Diemen, Edam-Volendam, Gooise Meren, Haarlem, Haarlemmerliede en Spaarnwoude, Haarlemmermeer, Heemskerk, Heemstede, Hilversum, Huizen, Landsmeer, Laren, Oostzaan, Ouder-Amstel, Purmerend, Uithoorn, Velsen, Waterland, Weesp, Wijdemeren, Wormerland, Zaanstad, Zandvoort

Metropoolregio Eindhoven
Asten, Bergeijk, Best, Bladel, Cranendonck, Deurne, Eersel, Eindhoven, Geldrop-Mierlo, Gemert-Bakel, §Heeze-Leende, Helmond, Laarbeek, Nuenen; Gerwen en Nederwetten, Oirschot, Reusel-De Mierden, Someren, Son en Breugel, Valkenswaard, Veldhoven, Waalre

Regio Noord Holland Noord
Alkmaar, Bergen (NH.), Castricum, Den Helder, Drechterland, Enkhuizen, Heerhugowaard, Heiloo, Hollands Kroon, Hoorn, Koggenland, Langedijk, Medemblik, Opmeer, Schagen, Stede Broec, Texel, Uitgeest

Regio Noord- en Midden Limburg
Beesel, Bergen (L.), Echt-Susteren, Gennep, Horst aan de Maas, Leudal, Maasgouw, Mook en Middelaar, Nederweert, Peel en Maas, Roerdalen, Roermond, Venlo, Venray, Weert

Regio Noord-oost Brabant
Bernheze, Boekel, Boxmeer, Boxtel, Cuijk, Grave, Haaren, Landerd, Meijerijstad, Mill en Sint Hubert, Oss, s-Hertogenbosch, Sint Anthonis, Sint-Michielsgestel, Uden, Vught

Regio Noord Veluwe
Elburg, Ermelo, Harderwijk, Hattem, Nunspeet, Oldebroek, Putten

Regio Rivierenland (Fruitdelta)
Buren, Culemborg, Geldermalsen, Lingewaal, Maasdriel, Neder-Betuwe, Neerijnen, Tiel, West Maas en Waal, Zaltbommel

Regio Rotterdam-Den Haag
Albrandswaard, Barendrecht, Brielle, Capelle aan den IJssel, Delft, Hellevoetsluis, Krimpen aan den IJssel, Lansingerland, Leidschendam-Voorburg, Maassluis, Midden-Delfland, Nissewaard, Pijnacker-Nootdorp, Ridderkerk, Rijswijk, Rotterdam, Schiedam, s-Gravenhage, Vlaardingen, Wassenaar, Westland, Westvoorne, Zoetermeer

Regio Stedendriehoek/cleantechregioi
Apeldoorn, Brummen, Epe, Heerde, Lochem, Voorst, Zutphen

Regio Twente
Almelo, Borne, Dinkelland, Enschede, Haaksbergen, Hellendoorn, Hengelo, Hof van Twente, Losser, Oldenzaal, Rijssen-Holten, Tubbergen, Twenterand, Wierden

Regio U10/U16
Bunnik, De Bilt, De Ronde Venen, Houten, IJsselstein, Leerdam, Lopik, Montfoort, Nieuwegein, Oudewater, Stichtse Vecht, Utrecht, Utrechtse Heuvelrug, Vianen, Wijk bij Duurstede, Woerden, Zederik, Zeist

Regio West-Brabant
Aalburg, Alphen-Chaam, Baarle-Nassau, Bergen op Zoom, Breda, Drimmelen, Etten-Leur, Geertruidenberg, Halderberge, Moerdijk, Oosterhout, Roosendaal, Rucphen, Steenbergen, Werkendam, Woensdrecht, Woudrichem, Zundert

Regio West-Overijssel
Dalfsen, Deventer, Hardenberg, Kampen, Olst-Wijhe, Ommen, Raalte, Staphorst, Steenwijkerland, Zwartewaterland, Zwolle

Regio Zeeland
Borsele, Goes, Hulst, Kapelle, Middelburg, Noord-Beveland, Reimerswaal, Schouwen-Duiveland, Sluis, Terneuzen, Tholen, Veere, Vlissingen

Regio Zuid-Limburg
Beek, Brunssum, Eijsden-Margraten, Gulpen-Wittem, Heerlen, Kerkrade, Landgraaf, Maastricht, Meerssen, Nuth, Onderbanken, Schinnen, Simpelveld, Sittard-Geleen, Stein, Vaals, Valkenburg aan de Geul, Voerendaal

IJsselmeergebied
Het IJsselmeergebied is toebedeeld aan omliggende gemeenten dus regio's.
Zie voor gemeentegrenzen in het IJsselmeergebied: www.rws.nl
Dit wordt verder uitgewerkt in de volgende handreiking.

Annex II: Analysis of the pilot regions

Phases and lesson	Explanations
1	Project preparations and organization
1.1: create commitment for the strategy formation process	In order to create commitment for the process, it is important to continue to work with the current networks and relations and to highlight the benefits of the regional level. Big municipalities can assist small ones and rural areas can help urban areas in their electricity production. Next to that, the organization should be led by a 'leader' with an extensive network and political influence. Besides, this person should be an expert in connecting the different private and public stakeholders. With a strong leading figure, it easier to obtain commitment, which is essential, as the region doesn't have real decision-making authority.
1.2: create a strong project organization	The structure of the project organization is of great importance. Often, there are three layers: a control group, a program team and multiple working groups. The engagement of multiple stakeholders stimulates the commitment. Unbiased independent process management is shown important. Make sure that the different stakeholders share and assure their commitment.
1.3: Be flexible	Start with the expectations, goals and tasks but assure a flexible project design, as the process isn't linear. This also requires a flexible plan of action.
2	Stocktaking and analysis
2.4: clear starting point	Understand the region and the stakeholders, their interests and policies. Local policies also provide boundaries and conditions for the strategy formation process. Next to that, it is important to understand the challenge a region is facing and to understand the factors which can be influenced.
2.5: show the possibilities	Multiple pilot regions used spatial design workshops by inviting a selected group of people to visualize the spatial consequences of the energy transition. It is really important to consider the role of this process as well as the outcomes, as this method is relatively new and isn't regularly applied in the energy sector. For organizing such spatial design workshops, it is advised to answer the following questions upfront: what do we want to achieve? Who do we invite and why? What can/do we do with the results and how do we communicate these results? Stay connected with the participants of the different workshops and assure that most stakeholders are engaged. Presenting extreme scenarios helps to trigger people.

2.6: mission work	The energy transition is extremely complex with multiple stakeholders. Understand how to approach different interest parties and use different communication strategies.
3	Alliances and plan-making
3.7: make it concrete	Long-term abstract goals won't work. So, make it more concrete and transparent to engage the public. Be aware of the friction between long-term visions and short-term achievements in line with the term of office of politicians. Some regions developed leading design principles which function as boundaries for the strategy developing process.
3.8: it is a cyclic process	The results of the planning process, the content, is important. However, safe-guard the continuity of the planning process and create conditions as the planning process is highly cyclic due its complexity.
4	Decision making
4.9: from strategy to policy	As the region is not an official political jurisdiction, the RES is not a policy document and is not automatically enforced by law. Therefore, it is important to consider which decisions and aspects of the strategy should be integrated. The regional energy strategy can also function as a source for decision-making and policy-making.
4.10: make the connection with other policy fields	The energy transition will become more socially accepted and get more support when energy related issues are connected with municipality issues like health care, housing, spatial planning etc.
4.11: assure the commitment of stakeholders	Translate the long-term strategy to concrete short-term actions. Good intentions are important, as well as strong decisions. Understand that certain developments outside the region can affect the region (dependency)
5	Implementation
5.12: continuity in the implementation process	Make sure that the strategy is translated into projects. The biggest challenge is the organization of the energy transition.

Analysis of the pilot region based on the rapport Slim Schakelen (IPO, VNG, Unie van Waterschappen, Rijksoverheid , 2017)

Annex III: different levels of public participation

Document	Regional level	Municipality level	Project level
Start document	Stakeholders are invited in the project group, advisory boards and workgroups	Share information about RES with municipal council, citizens and companies	Share information about RES in existing renewable energy projects
Draft RES	Engage stakeholders in developing design principles and a regional bid	Public participation processes on design principles for renewable energy projects trough spatial design workshops and online information sharing	Share information about RES in existing renewable energy projects
RES 1.0	Stakeholders develop RES 1.0 based on draft RES and develop a plan of action for the implementation	Public participation on policy development. Include energy initiatives	Project participation based on the conditions from the RES 1.0
RES2.0	Engage stakeholders in the implementation and monitoring	Both citizens and companies are engaged in the implementation of RES	Project participation based on the conditions from the RES 1.0

Different levels of public participation per RES planning phase (National program RES, 2019)

Annex IV: Four planning phases of SREP

Phase I. Preparations and orientations

Source	Process level	Participatory level	Methodological level
(Stremke , 2013)	I. Analyze the current conditions: landscape characteristics, present energy system, renewable energy potentials	Planners, designers, energy experts and experts from the study region	Visualize in GIS Maps
	II. Mapping Near future developments: analyze current trends, policies and developments. Interview policy makers		Visualize in GIS Maps
(Mirakyan & De Guio, 2013)	I. Preparations and orientation: Identify relevant issues and trends, perform an analysis of the past and present situation, structure the problems of the energy system, create a shared vision and sustainability goals, describe the main barriers for goal-attainment, develop the first conceptual model, inform the stakeholders and the media	Decisionmakers, planners and experts.	Analysis of the best-practices of other places. SWOT and SSM to identify the context of the decision problem and disclose objectives for each stakeholder.
(Mirakyan & De Guio , 2014)	Current, historical and possible future are described in general terms by looking at the energy system, problems and potential solutions. Requirements: first analysis of the system, conceptual model with system boundaries and conformity assistance		System operator and conformity checklist
	Define the most desirable final results (MDFR): objectives and attributes of imaginable ideal structures. Requirements: shared objectives and an objective hierarchy		Value tree
	Identify barriers to reach the MDFR and the link between the barriers, solutions and objectives. Requirements: identify initial options and solutions. Develop a network of problems, solutions and objectives. Disclose the contradictions behind the problems		Contradiction solving approach OTSM-TRIZ
(Müller , Stämpfli , Dold, & Hammer , 2011)	Identify 'leaders', engage 'innovators' and 'early adopters', pilot projects, long-term development goals as intensions, analysis of: energy demand, efficiency and sufficiency potential, availability of (renewable) energy potentials, socio-economic aspects, cost and finance	'Leaders', 'innovators and 'early adopters', experts, public	Public workshops, hearings,
	I. Modelling the local energy system: diagnose current energy system		Local Energy Planning Assistant (LEPA) tool

(Neves, Leal, & Lourenco , 2015)	including: sector, energy services, energy carriers, end-use conversion technologies, energy services. Forecast future energy demand based on: key socio-economic variables, evolution of energy services needs, shift of end-use conversion technologies, efficiency of end-use conversion technologies		
	II. group the stakeholders: standard stakeholders and interest groups. Identify how each actor affects, is affecting or is interested by the problem.		
	III. identify and structure the objectives in three categories: environment, social (quality of life) and economic development.	Important to involve Local actors	Interviews with local standard stakeholders, cognitive and causal mapping, means-ends objective procedure, review energy plans of other places
	IV. Select the attributes. These attributes determine the goal attainment by quantifying the objectives of the previous step		
(Terrados , Almonacid, & Perez-Higueras, 2009)	I. deep diagnose of regional energy system, focus on autochthonous energy source potential	Community involvement and participation	
	II. Arrange energy system diagnosis in accordance with a matrix basis (SWOT)	Community involvement and participation	SWOT
(Brandoni & Polonara, 2012)	I. Territorial energy diagnosis of the local area. Analysis of energy demand and supply based on the regional energy balance.		Both top-down and bottom-up data input
	II. Assessment of low-carbon initiatives developed by the municipalities.		
(Marinakis, Doukas , Xidonas, & Zopounidis, 2017)	Baseline Energy and emissions inventory which is about the amount of CO2 emitted in the energy sector within the region.		
	Analysis of general characteristics like general information, information on the municipal sector and local energy production.		
(Frantál, et al., 2018)	Understand the typology of smart practices. Spatial targeting (negative cost land and low cost land) and providing synergies (infrastructure, local economy, environment, land-use and heritage)		
(Pereverza, Pasichnyi, & Kordas , 2019)	Problem orientation. Formulate a problem and identify the key sustainability challenges		Analysis of trends, sustainability assessment of current solutions

	Define system boundaries of the socio-technical system (spatial, sectoral etc.) trough explicit discussion and selection		LCA and process-based description of the system
	Analyze the current state of the socio-technical system and its relevant features		Descriptive statistics
	Stakeholder analyses to identify the actors that can be affected or can affect the problem		Power-impact analysis and analysis of actor roles
	Identify the societal needs and current and future systems functions		'Why?' question techniques
(IPO, VNG, Unie van Waterschappen, Rijksoverheid , 2017)	I. Project Preparations and organization: Create commitment from different municipalities. Select a 'leader' as project manager. Make sure that all stakeholders share and assure their commitment. Star with the expectations and targets but be flexible		
	II. Stocktaking and analysis: Understand the region, the stakeholders, the policies and the factors that can be influenced. Understand how to approach the different stakeholders (differentiate)		
(Dutch government , 2018)	I. Start-up phase. Stakeholder analysis to identify region specific stakeholders. Formulate project groups.		Start-document to approve commitment from the stakeholders
	II. Analysis phase. Analyze the regional energy consumption, - production, energy efficiency potential and technical potential for renewable energy sources		

Phase II. Alternatives and detailed analysis

Source	Process level	Participatory level	Methodological level
(Stremke , 2013)	III. Illustrating possible far future. Possible long-term developments are analyzed and visualized by using scenarios studies		Scenario studies and GIS visualizations
	IV. Compose four integrated visions based on the scenarios from planning phase II. Turning the possible futures (scenario) into pathways of desired futures (visions). Participants contribute to the visions.	Collaboration between experts, policy-makers and stakeholders	Design charrettes with multiple alternatives to help to sustain a constructive interaction

(Mirakyan & De Guio, 2013)	II. develop a detailed conceptual model of the planning process. Collect and interpret the information that is developed. Establish a computer tool based on the conceptual model. Detailed analysis and impact assessment of historical, present and future situations. Uncertainty and sensitivity analysis and develop scenarios. Comprehensive impact assessment of different scenarios. Develop strategies for the different scenarios. Review phase I. Inform the media and affected groups		Different quantitative tools to analyze and assess the impacts on energy systems
(Neves, Leal, & Lourenco , 2015)	IV. Select the attributes that measure the degree to which an objective is achieved.		Local Energy Planning Assistant (LEPA) tool
	V. Generate alternatives that represent means of achieving the objectives and targets (like a minimum reduction of greenhouse gas emissions)		
(Terrados , Almonacid, & Perez-Higueras, 2009)	III. Use a SWOT analysis to generate strategies for improving current situation. Confront internal quadrants (S/W) with external quadrants (O/T) that lead to four kinds of strategies	Experts involvement	SWOT
(Lund, 2014)	I. Design technical alternatives which are related to the fulfillment of policy goals.		EnergyPlan
(Marinakis, Doukas , Xidonas, & Zopounidis, 2017)	Development of the Alternative Scenarios of Actions based on a knowledge-based process.		
	Develop a list of criteria (environmental: CO2 emissions reduction and effects on natural environment, social: contribution to employment and social costs, economic: weighted costs of energy savings and investments costs for municipality)		
	Modify the scenarios based on public consultation by integrating the stakeholder's views on alternative scenarios. First, identify the stakeholders. Second, prioritize by working out their power and interest. Third, plan how to communicate with the different stakeholders	Public consultation	
	The authorities develop an aspiration level		
(Poggi, Firmino , & Amado , 2018)	Integrate different information layers for assessing spatial implications and land requirements of each renewable energy technology and possible energy mix		GIS

(Pereverza, Pasichnyi, & Kordas , 2019)	Create a desirable future vision		Brainstorming and storytelling
	Specify the vision by quantifying criteria that specify the decision		Brainstorming and quantification
	Generation of a solution space by exploring the alternative solutions		Storytelling, morphological method
	Identification of trends and uncertainties which are external forces than can impact the system		Brainstorming and uncertainty-impact assessment
(IPO, VNG, Unie van Waterschappen, Rijksoverheid , 2017)	III. Alliances and plan-making. Make long-term abstract goals concrete to engage the public. Consider the term of office of politicians. Develop design principles. Be aware of the cyclic character of the process.		

Phase III. Prioritization and Decisions

Source	Process level	Participatory level	Methodological level
(Stremke , 2013)	V. Identifying spatial Interventions that should be implemented		1) identify and illustrate possible energy conscious interventions in tables, graphs and maps 2) comparative analysis.
(Mirakyan & De Guio, 2013)	III. Review phase I and II. Reformulate the goals of phase I. Review the strategies and solutions of phase I and II. Multi-criteria Decision analysis for each strategy. Recommend a master plan based on the different strategies in the different scenarios.	Interactive planning process with different actors with varying interests	MCDA-method, based on the targets developed in phase I
(Neves, Leal, & Lourenco , 2015)	VI. Assess the impact of alternatives in each objective based on the attributes that are identified in phase II (IV). The different objectives should be weighted to measure the overall value score per alternative. This allows to select the alternative with the highest score.		Local Energy Planning Assistant (LEPA) tool
	VII. Determine overall benefit value scores	Decisions conferencing to develop a shared understanding of the problem, create a sense of common purpose and gain commitment	M-MACBETH approach

	VIII. Perform a robustness analysis of the results obtained	Local actors	MDCA
	IX. Analyze the relation between benefits of each alternative and the overall investments. Visualize a investment-benefit graph.		M-MACBETH
(Terrados , Almonacid, & Perez-Higueras, 2009)	IV. Validation and assessment of strategies by means of experts opinion	Expert group	Delphi method
	V. Ranking and comparing alternatives	Expert group	MCDA method
	VI. Reference plan analysis by extrapolating national targets to regional context	Expert group	
	VII. Final strategies selection to be incorporated in the plan and targets establishment for each renewable energy source	Community involvement and participation	
(Lund, 2014)	II. Socio-economic feasibility studies to verify which alternatives fulfil the political goals in the best way.		Concrete institutional economics
	III. Identify market barriers to the implementation of the socioeconomic least cost solution design short-term public regulation measures like taxes and subsidies		
(Marinakis, Doukas , Xidonas, & Zopounidis, 2017)	Evaluate the alternative's implications to the environmental, economic and social axes described in step II		MCDA
	Robustness analysis		
(Pereverza, Pasichnyi, & Kordas , 2019)	Solution testing and selecting one solution		Criteria testing, sensitivity testing, sustainability testing and modelling
	Pathway. Define changes that are required to achieve the desired future		Brainstorming and modelling
(IPO, VNG, Unie van Waterschappen, Rijksoverheid , 2017)	IV. Decision-making. Connect with municipality issues like health care, housing etc. Translate long-term visions to short-term action. Understand the regional dependence. It is important to consider which decisions and aspects of the strategy should be integrated in policies as RES is not an official policy document		
(Dutch government , 2018)	III. Translate the steps from phase I and II into a draft strategy and vision (draft RES)		

Phase IV. Policymaking, implementation and monitoring

Source	Process level	Participatory level	Methodological level
(Mirakyan & De Guio, 2013)	IV. Develop individual programs or projects. Consider issues about timing, risks and money. Compare the results of the implemented strategies with the targets (monitoring). Inform the stakeholders about the progress. Continue to monitor the progress		
(Lund, 2014)	IV. Identify institutional barriers of a general nature like the lack of knowledge, proper institutions		
(Pereverza, Pasichnyi, & Kordas , 2019)	Develop a short-term action plan in line with the pathway that is designed		Project management techniques
	Design follow-up activities and monitor the implementation. Monitor the participation per module.		Brainstorming and follow-up interviews
(IPO, VNG, Unie van Waterschappen, Rijksoverheid , 2017)	V. Implementation. Translate the strategy in real projects		
(Dutch government , 2018)	IV. Translate the Draft RES to the RES 1.0 based on the feedback of the national government (NP RES). Make the allocation of renewable energy and related infrastructure more concrete. Higher detail level.		
	V. Develop concrete projects. Arrange the permits and monitor the implementation		

Annex V: Summaries of the interviews

Table 1 of this report provides a list with the interviewees of this research. Each interview is summarized in a report of three to five pages. These summaries can be requested by contacting the researcher.