Master's Thesis – master Innovation Sciences

Lessons for the formulation and execution of mission-oriented innovation policy

A comparative case study of regional energy strategies in the Netherlands

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Abstract

This study aimed to provide lessons that could help improve future mission formulation and mission execution. Literature on Mission-oriented Innovation Policy (MIP) was used to help determine what practices can be used on a regional level to decrease the characteristics of wickedness regarding mission formulation and mission execution. This study focused on the mission to reduce greenhouse-gas emissions by at least 49% in 2030, compared to 1990 levels. For the regional level, the Dutch Regional Energy Strategy (RES) program has been the focus. This study performed a comparative case study analysis of three regions within the pilot RES program, namely Friesland, Midden-Holland and West-Brabant.

To guide the research and analysis of the results, a conceptual framework was constructed. The framework consisted of the characteristics of wickedness; 1) contestation, 2) complexity and 3) uncertainty for mission formulation as well as mission execution. Through literature, important aspect of MIP were identified and used as building blocks. These building blocks were; 1) diverse stakeholder engagement, 2) impact and measurement, 3) portfolio of instruments and 4) flexible and proactive management. These building blocks for more successful MIP were used to conceptually understand how the regions tried to overcome the characteristics of wickedness. This research has contributed to the theory by extending the theoretical insights on the building blocks for successful MIP. Additionally, this study focused on a feedback loop. By reflecting on the effects that experimentation and learning processes and external processes had on the level of wickedness, this study explored which activities are important for effectively building up a feedback loop.

Ultimately, this study has provided managerial implications in the form of 13 generic tentative lessons that were focused on improving mission formulation, mission execution and the buildup of a feedback loop to overcome the characteristics of wickedness.

1. Introduction

It has long been recognized that innovation has the ability to spur economic growth and prosperity (Mazzucato, 2018a; Hekkert & Wesseling, 2018). Moreover, the performances of most developed economies rely disproportionately on sectors that are research and innovation-intensive (Allas, 2015). This induced a traditional innovation policy typically focusing on economic growth. In recent years, there has been an increasing realization that innovation is not solely a tool for economic development, but also for overcoming societal problems (Schot & Steinmueller, 2018; Hekkert & Wesseling, 2018). This has led to an expansion in the rationale for innovation policy to more explicitly contribute to tackling these societal challenges, such as climate change and improving public health and wellbeing (Mazzucato, 2017; Boon & Elder, 2018). The move towards this challenge orientation is considered as part of the next generation of science, technology and innovation policy (Kuhlmann & Rip, 2018).

Present-day challenges which are complex, interconnected, urgent and require insights from many perspectives are typed 'wicked' problems or 'grand challenges' (Mazzucato, 2017; Kuhlmann & Rip, 2018). These challenges are systemic in nature and have complex feedback loops (Goetheer et al., 2018). Such challenges are not strictly technological, as they also require behavioral and systemic changes (Perez, 2015; Frenken, 2017). It has been argued there is no one-size-fits-all policy approach to address these 'wicked' problems (Alford & Head, 2017; Wanzenböck et al., 2019). The degree and type of 'wickedness' depends on the dimensions of stakeholder contestation, problem complexity and problem uncertainty (Alford & Head, 2017; Wanzenböck et al., 2019). Overcoming these 'wicked' problems and realizing sustainable economic growth requires rethinking the role of the government and public policy, by not only funding the 'rate' but also envisioning the 'direction' of innovation (Mazzucato, 2017; 2018a). This calls for a new justification of government intervention that goes beyond fixing market failures (Mazzucato & Penna, 2015; Kattel & Mazzucato, 2018; Weber & Rohracher, 2012). Challenge-led innovation policy is about creating and shaping markets (Mazzucato, 2017; Weber & Rohracher, 2012). Missions are a powerful tool to do this.

The concept of mission-oriented innovation policy (MIP) has emerged to help direct innovation in ways that help overcome societal problems (Mazzucato, 2017; 2018a; Wanzenbock et al., 2019). MIP responds to the 'grand challenges' by focusing on concrete problems that require system-wide transformation across different sectors, and involves partnerships between different actors (Mazzucato, 2017; 2018b). Moreover, MIP provides theoretical building blocks to orchestrate knowledge and expertise and reach a pre-defined objective through a multitude of actions (Mazzucato, 2018a). Missions reduce the complexity, uncertainty and contestation of big societal problems (Kuhlmann & Rip, 2018; Wanzenböck et al., 2019). As a result, a mission not only has a clear direction, but is also characterized by a clear definition, qualified and if possible quantified (Goetheer et al., 2018). This study distinguishes two different phases involved in MIP, namely mission formulation and mission execution. Therefore, this study acknowledges MIP as the process of defining objectives and the underpinning policy measures in later stages to realize these objectives.

MIP emerged in the 1960s and was used for ambitious technical challenges, such as putting a man on the moon (Wanzenböck et al., 2018). These challenges were technical and whether the goals were achieved or not was indisputable (Foray et al., 2012). Even though current grand challenges are more complex, policymakers have much to learn from these kind of technical missions (Mazzucato, 2015; Foray et al., 2012). However, it seems that the 'wickedness' of grand societal challenges could cause major obstacles for innovation policy makers (Weber & Rohracher, 2012; Wanzenböck et al., 2019). This implies that our present understandings, instruments, and practices of innovation policy are not sufficient to address grand challenges (Kuhlmann & Rip, 2018). This unveils an interesting opportunity for research. Even though literature argues that similar mission-oriented programs are an appropriate response to grand challenges, this should also be supported by empirical studies. There has been

substantial empirical research on technological missions, however, the empirical basis for the notion of societal missions is largely lacking. This study addresses this gap in literature.

In addition, missions require a design and a level of implementation that matches the scope of the challenge and the scale of solutions (Goetheer et al., 2018). Therefore, missions are ought to play an important role on different levels of innovation policy (Mazzucato, 2018a). Addressing missions at the 'right' policy and governance level that matches challenges and possible solutions sometimes requires an exclusively national, supra-national (European Union) or even global approach. However, more often, missions are layered and have a supra-national, national and often also a sub-national dimension (Goetheer et al., 2018). Effective policy for these layered missions requires a coherent and coordinated approach (Goetheer et al., 2018). At the supra-national level, it is suggested that the mission approach can add a new lens to European research and innovation (R&I) to help steer investments in a more focused, problem solving manner. Furthermore, Europe's unique multilevel governance system is highly suitable for MIP as member states and sub-national regions can experiment within larger EU-wide missions (Mazzucato, 2018a). This causes MIP at the national level and the sub-national level to be vital. In this study, a sub-national region consists of one or multiple municipalities in the Netherlands and is, from now on, referred to as a region.

Until recently, there has been very limited attention to MIP at the regional level. Empirical study is needed, given the institutional diversity of regional settings. Challenges do not present themselves similar for every region (Wanzenböck & Frenken, 2018). Disregarding the knowledge about local conditions, more likely leads to one-sided problem definitions insufficient for tackling their full wickedness (Wanzenböck & Frenken, 2018). Tailor-made, bottom up, regional policy based on prevalent regional structures is essential. Moreover, there is a need to understand how to effectively formulate and execute missions on the regional level. This study addresses this gap of knowledge by critically analyzing how MIP is used at the regional level.

Furthermore, due to the wickedness of societal challenges, a mission is not a single project (Mazzucato, 2018b). A mission often consists of several generations of mission-oriented programs. In order to achieve the necessary system and behavioral changes, there is a need for research, experimentation and innovation (Goetheer et al., 2018). Yet, their success will depend on the processes that collects, analyzes and nurtures the lessons and data resulting from experiments and innovation (Mazzucato, 2018b). Furthermore, external technological or societal developments needs to be monitored (Goetheer et al., 2018). Moreover, evaluation is an integral part of the mission and vital for the ongoing implementation of innovation (Mazzucato, 2018b). Therefore, it is necessary to determine how to integrate insights, provided by internal and external developments (Goetheer et al., 2018). As this research focuses on the regional level, it studies how lessons resulting from regional mission-oriented programs are nurtured and integrated into new versions of regional mission-oriented programs. As such, remarks concerning the learning process can be made. This learning feedback loop is the third focus of this research.

To address these gaps of knowledge, this study looks into a formulated societal mission considering climate change. The mission is to reduce greenhouse-gas emissions by at least 49% in 2030, compared to the 1990 levels (Nijpels et al., 2018; Nijpels et al., 2019). This mission can be used for this study, since it has been acknowledged by multiple levels of governance. The European Parliament adopted a resolution on the climate summit in Paris at the EU level. At national level, the Netherlands later acknowledged the missions objectives legitimacy in the form of a national Climate Agreement (Nijpels et al., 2018). This recently drafted national Climate Agreement contains a package of measures and instruments, with the active support of as many contributing parties as possible, in order to realize the political reduction target of 49% in 2030 with the broadest achievable political and social support (Nijpels et al., 2019). One of the instruments drafted in this national agreement is the so-called Regional Energy Strategy (RES). The RES is used to engage participation at regional level. Within the

RES program, regions are exploratively searching for a region-specific package of measures with the broadest possible social support, which has the active support of as many contributing stakeholders as possible and with which the political reduction target of 49% in 2030 could be achieved (Schwenks & Schuurs, 2017d).

What is the Regional Energy Strategy?   *Box 1*

With the signing of the Paris climate agreement, the Netherlands has linked itself to the joint ambition to achieve 49% CO_2 reduction in 2030. As a result, there is, among others, an enormous societal task in the field of the energy transition. To set things in motion, forty organizations signed the Dutch Energy Agreement in 2013. Thereafter, an Energy Agenda was drawn up in 2016 with five transition paths as the basis for this policy development; electricity, heat for built environment, mobility, industry and agriculture. It was acknowledged that there were differences within these pathways in the nature of the assignments and the political level in which policies should be organized.

The pilot RES program took place from June 2016 to October 2017 and consisted of 5 pilot regions (Schwenke & Schuurs, 2017d). The RES program was a collaboration between the Ministry of Economic Affairs (EZK), the Ministry of Infrastructure and the Environment (IenM), the Ministry of the Interior and Kingdom Relations (BZK), the Association of Dutch Municipalities (VNG), the Dutch Water Authorities (UvW) and the Interprovincial Counsel (IPO). In one year, the pilot regions developed a RES in which civil society organizations, the business community, municipalities, provinces and water authorities determine regional energy objectives, the saving and generation potential, commitment among regional stakeholders, a set of regional energy projects contributing to energy neutrality, their planning and their spatial and economic impact. The program was an explorative approach to investigate the value of the regional level as a contribution to the climate agreement and focused on the five transition paths. The regions could, at their own discretion, choose to reduce the complexity by focusing on less of the sectors in order to keep it manageable This has been done since it was clear the regional level was to play an important role in the Dutch climate agreement (Nijpels et al., 2018).

Insights provided by the pilot program were used as input for further development of the regional level. Ultimately, the climate agreement obligated the RES. This resulted in a country-wide program of 30 regions of which the RESs are being developed since the start of 2019. This new generation RES focuses on choices about the generation of 35 TWh renewable electricity, the potential for sustainable heat sources and concrete plans to bring together supply and demand of electricity and heat through infrastructure.

This study focuses on the regions in the pilot RES program and how their designs match with building blocks for successful mission formulation and mission execution as defined in MIP literature. Moreover, this study critically reflects on how these building blocks for successful MIP have been used within the RESs and analyses their effects on the characteristics of wickedness. This analysis forms the basis for tentative lessons. Therefore, this study contributes to the empirical basis of MIP for societal missions on the regional level. Furthermore, this pilot RES program should be seen as one generation of a mission-oriented program. In fact, there has been an evaluation after the pilot program in order for lessons to be integrated into a new nation-wide program. By critically reflecting on this process, this study addresses the third and final acknowledged gap of knowledge. Ultimately, this study uses the building blocks for more successful MIP to conceptually understand how regions tried to overcome the characteristics of wickedness during mission formulation and mission execution. It does so by answering the following research question:

What can be learned from the Dutch pilot regional energy strategies for future formulation and execution of mission-oriented innovation policy?

To answer this question in depth, this study incorporates several sub-questions:
- How did the different pilot RES regions derive their own respective missions?
- How were the building blocks for successful MIP used in the pilot RES regions?
- How have the lessons from the pilot program been integrated?
- What external influences have been of interest to the mission?
- To what extent have the characteristics of wickedness been altered due to the pilot program and the feedback loop?

These questions will be answered through a comparative case study analysis in which three RES regions are extensively evaluated. The analysis is based on a new analytical framework resulting from the combination of policy planning literature and MIP literature. To arrive at a coherent analysis, qualitative data generated through interviews, policy documents and mission evaluation reports is integrated. The analysis consists of three parts. First, three regions who participated in the aforementioned pilot RES program are extensively analyzed. These pilot RES regions are Friesland, Midden-Holland and West-Brabant. The research provides insights in the characteristics of wickedness and additionally how MIP is used to overcome this wickedness. A critical review provides lessons for the formulation and execution of MIP. Second, the feedback loop, consisting of the internal learning processes and external influences, is analyzed. This provides lessons for how a feedback loop should be build up. Finally, the updated characteristics of wickedness for the nation-wide RES program are provided to understand in which aspects these have changed due to the pilot RES program and the feedback loop. Resolving the main question contributes to knowledge how to address MIP at a regional level. As this helps to tackle societal challenges in the future this is where the main social relevance lies.

In the next section, the concepts of wicked problems and MIP will be discussed, of which a conceptual framework will be build. This framework will be operationalized in the methods and explained how it can be used for analysis. In addition, the methods includes explanation on research design and data collection. The data analysis will focus on the aforementioned RES-regions. The results section will cover this analysis exhaustively and sums up findings from this study. Based on these results, an answer to the research question will be formulated in the conclusion. Finally, in the discussion and limitations section, a reflection will be given on the performed study.

2. Theory

In this chapter, first the urgency for a new form of innovation policy is explained. Second, the wickedness of societal problems and their solutions is contextualized. Then, MIP is introduced to reduce this 'wickedness'. Next, the feedback loop is introduced followed by the urgency of the regional level. Finally, the conceptual framework is presented to give overview how these theories are used for this research.

2.1 The need for a new generation of innovation policy

During the past decades two transformations have influenced innovation policy significantly (Kattel & Mazzucato, 2018). First, the emphasis on non-technological innovation, in particular in the context of grand societal challenges, is growing (Fagerberg, 2017). Second, this new focus induced a shift from solely fixing systems to shaping and transforming them (Weber & Rohracher, 2012). Moreover, innovation policy is shifting from the quantity and rate of innovation towards the quality and direction of innovation (e.g., whether innovations help mitigate climate change) (Mazzucato, 2018b; Kattel & Mazzucato, 2018).

Literature has labelled this shift towards societal challenge-oriented policies as 'a new generation of innovation policy for grand challenges' (Edler & Boon 2018; Kuhlmann and Rip 2018), 'new mission-oriented policy' (Mazzucato 2017; 2018a; 2018b), and 'transformative innovation policy' or 'innovation policy 3.0' (Schot and Steinmueller, 2018; Hekkert & Wesseling, 2018). In this broader context, missions have emerged as the primary approach for road mapping innovation to tackle grand challenges. These policy missions are by definition about direction and concrete problems to be solved (Kattel & Mazzucato, 2018). In brief, a set of defining characteristics shared between the approaches has been identified (Wanzenböck et al., 2019).

First, the challenge-oriented innovation policies are directed towards the 'wicked problems' or grand societal challenges. The defined Sustainable Development Goals are an ambitious expression of this shift in focus (Kattel & Mazzucato, 2018). Second, the role of innovation policy in mission-oriented context differs from conventional innovation policy (Wanzenbock et al., 2018). Formerly, fixing market and structural system failures stood central. This shifted with the emergence of socio-technical innovation system thinking (Weber & Rohracher, 2012). Innovation policy is now seen as a major actor in supporting directionality, coordination, reflexivity and demand articulation (Weber & Rohracher, 2012; Boon & Edler, 2018; Mazzucato, 2017). Third, these new mission-oriented approaches require new and decentralized governance modes (Wanzenbock et al., 2018). An enlarged diversified set of stakeholders are influencing and being influenced by the policy agenda (Borras and Edler 2014; Kuhlman and Rip 2018; Kattel & Mazzucato, 2018). Supra-national organizations, such as the UN and the OECD, and social movements increasingly play an important role in shaping the innovation policy agenda alongside governments, academia and the business sector (Kuhlmann & Rip, 2018; Kattel & Mazzucato, 2018). In addition, regional public and societally-led actors, such as consumers and innovation users, are ought to be necessary to include (Fischer, 2012; Wanzenböck & Frenken, 2018; Wanzenbock et al., 2018).

Challenge or mission formulation is increasingly acknowledged as a political process (Edler and Nowotny, 2015). However, it remains difficult how to direct innovations within existing policy frameworks, as it requires structures capable of dealing with conflicts emerging along core values of societal actors (Kattel & Mazzucato, 2018; Kuhlman & Rip, 2018). This can be explained with the fact that societal challenges vary considerably in scale and scope. Former literature describes determinants of wicked problems causing policy issues and problem structures in innovation policy (Alford & Head, 2017; Carley & Christie 2017; Wanzenböck et al., 2019).

2.2 Contextualizing wicked problems

The concept of 'wicked' problems emerged in the 1970s critiquing general theory of planning (Rittel & Webber, 1973). Finite problems tackled by science are seen as 'tame' as their elements are definable and solutions are verifiable (Alford & Head, 2017). In contrast, modern social problems are complex, unpredictable, ill-defined and require political judgements and are therefore 'wicked' (Mazzucato, 2017; Kuhlmann & Rip, 2018; Alford & Head, 2017. Therefore, it has been argued there is no one-size-fits-all policy approach to address 'wicked' problems (Alford & Head, 2017; Wanzenböck et al., 2019).

Rittel & Webber came up with 10 characteristics of the 'wickedness' of problems to conceptualize that challenges may differ greatly (1973). Since then multiple authors have attempted to condense and simplify this list by grouping the key ideas. This research builds on topologies and distinctions of characteristics of 'wickedness' by earlier policy literature (Alford & Head, 2017; Wanzenböck et al., 2019). Conceptually disentangling these characteristics by their problem and solution structures can be useful, as these structures can be seen as two separate dimensions which can be worked on in any order (Wanzenböck et al., 2019). The characteristics of 'wickedness' used are contestation, complexity and uncertainty (Alford & Head, 2017; Wanzenböck et al., 2019) The wickedness of societal problems can be described as;

- *stakeholder contestation* referring to the lack of homogeneity in terms of how stakeholders perceive the problem (claims, values and framings) or the inherent interest-differentiation and dysfunctional power-distribution causing stakeholder divergence.
- *problem complexity* refers to the multidimensional nature of the problem, in which the division of responsibilities in institutional or geographical terms to address a problem is hard to determine. Especially if multiple actors, policy domains and governance levels are at play.
- *problem uncertainty* points to the lack (scientific) knowledge on the main causes, consequences and effects of a problem, as well as the lack of specific knowledge on the risks and damages of action and non-action or the knowledge fragmentation across different stakeholders.

This implies that a higher amount of stakeholder contestation, problem complexity and problem uncertainty increase the level of wickedness of a problem, thus increasing difficulty in how to direct innovations within existing policy frameworks. Literature often assumes that every problem statement is linked to a solution (e.g. Alford & Head, 2017). However, the conceptualization of solutions is critical to determine why they diffuse or not diffuse, and how these processes can be supported by policy (Wanzenböck et al., 2019). A growing consensus on a problem statement does not entail that views, on how to best address the problem, align between different stakeholders. Therefore, despite a relatively clear problem definition, solutions can still suffer from degrees of contestation, complexity and uncertainty (Wanzenböck et al., 2019). The wickedness of solutions can be explained as follows:

- *Stakeholder contestation* can emerge if different stakeholder groups have strong and diverging views on the best way to tackle a problems, based on their institutional or cultural context. Furthermore, vested interests can cause contestation since stakeholders can have investments in one particular solution. These differentiating interests can lead to the refusal of a technically feasible solution.
- *Solution complexity* refers to the fact that technological solutions need to be integrated with organizational, institutional and social innovations to induce systemic change. It calls for combining new technologies, new governance institutions and behavioral change ((Wanzenböck et al., 2019).
- *Solution uncertainty* refers to fragmentation of knowledge on the feasibility of a solution, or the fact that multiple solutions seem to be possible and promising (technological, organizational, institutional, social) without indication which works best in reasonable time. A lack of clarity about effects and side-effects of (technical or societal) innovations can reduce

the legitimacy and broad acceptance, and set back the development and diffusion of effective solutions (Sengers et al. 2010).

Consequently, this implicates that a higher amount of stakeholder contestation, solution complexity and solution uncertainty increase the level of wickedness of a problem, thus leading to more diverging views on potential solutions (Wanzenböck et al., 2019).

2.3 Missions to reduce wickedness

The concept of MIP has emerged as the primary approach to help overcome societal problems in an ambitious and concrete way (Mazzucato, 2017; 2018a; Wanzenböck et al., 2019). MIP sets ambitious, daring and at the same time realistic goals in relation to the relevant challenge (Goetheer et al., 2018). As a result, a mission not only has a clear direction, but is also characterized by a clear definition, qualified and where possible quantified (Goetheer et al., 2018). Moreover, MIP provides theoretical building blocks to orchestrate knowledge and expertise and reach a pre-defined objective through a multitude of actions (Mazzucato, 2018a). Well-formed missions can make vague societal challenges more concrete. As a result, MIP has the potential to increase the speed of finding solutions for societal challenges (Goetheer et al., 2018). Moreover, a good interpretation of MIP can reduce the complexity, uncertainty and funnel stakeholder activities, diminishing the 'wickedness' of a challenge. Finding and implementing solutions with legitimacy and broad acceptance for a problem of high societal importance is a central goal of MIP (Wanzenböck et al., 2019).

This study distinguishes two different phases involved in MIP. The first is the formulation of the mission. This phase consists of the problem and solution definition. This is chosen since, for typical wicked problems, it is assumed that the definition of a problem and the definition of a solution do not emerge as two chronologically different processes. Literature suggests that the problem and solution emery gradually or even conversely, when a solution is in search for a problem (Wanzenböck et al., 2019). This process should lead to the formulation of an adequate mission, including solutions (arrow 1). The second phase is the execution of the mission, consisting of all actions taken to develop and diffuse the solutions (arrow 2). This study argues that non-linearity takes place between the two phases. In addition, this dynamic framework consist of a feedback loop from the execution of mission to the formulation of mission. This feedback loop in incorporated, since it is assumed that new insights provided by experiments, innovation or external societal changes can lead to reformulation of the mission (Goetheer et al., 2018). This feedback loop is shown in arrow 3. This framework is shown in figure 1.

figure 1: the dynamic framework

To understand how regions perform in the phases of MIP, this study builds on typologies and distinctions made by earlier literature (Mazzucato, 2018a; 2018b; May et al., 2013; Alford & Head, 2017; Kuhlmann & Rip, 2018). Since selecting missions that matter to society and stimulate innovation across multiple sectors is a highly complex task, these studies provide key criteria to help policy makers choose missions that are ambitious, engaging and achievable. In addition, lessons have been provided to guide the formulation and implementation of missions and MIP (Goetheer et al., 2018; Mazzucato, 2018b).

This study identifies four dimensions as building blocks for successful MIP, during the entire process of mission formulation and mission execution. These building blocks are based upon the aforementioned criteria and lessons. The used dimensions are; diverse stakeholder engagement, impact and measurement, portfolio of instruments and flexible and proactive management. These are articulated for both mission formulation and mission execution.

2.3.1 Building blocks for successful mission formulation

The mission formulation phase consists of the definition of the problems and the definition of the solutions. This process should lead to the formulation of an adequate mission, including solutions. This process starts with determining the problem. Societal relevance, urgency and potential impact normally play an important role in determining which societal challenges have to be addressed (Goetheer et al., 2018). In terms of problem definition, the goal of MIP is to provide direction to a problem by being goal-oriented, measurable and time-bound (Mazzucato, 2018a). Therefore, the determined societal problem has to be converted to a mission. Missions have one clear definition, qualification, are time-bound and have daring and realistic goals (Goetheer et al., 2018).

In terms of solution definition, the goal is to arrive at a structure that is clear and agreed upon by many stakeholders (Wanzenböck et al., 2019). This structure could consists of technological innovation, institutional change, social innovation and also behavioral change (Goetheer et al., 2018). A good understanding of both challenge and possible solutions is vital and is in this study considered as the entire process of mission formulation. The building blocks for more successful MIP for the mission formulation are shown in table 1.

Table 1: building blocks for more successful MIP for mission formulation

Building blocks	Description
Diverse stakeholder engagement	Broad political commitment and widespread stakeholder support, improves the potential impact of missions and leads to public and private investments (Mazzucato, 2018a). As knowledge is often fragmented, inclusion of stakeholders and co-creation is needed (Kuhlmann et al., 2016; Alford & Head, 2017). By picking those organizations across the economy that are 'willing' to engage, governments determine the direction of growth throughout the innovation chain, creating the potential for greater spillovers across sectors (Mazzucato, 2018b). Missions should be framed in such a way that sparks activity across multiple scientific disciplines, different industrial sectors and different types of actors (Goetheer et al., 2018).
Impact and measurement	This contains the need to define a concrete target and measurable time-bound objective. Missions should be inspirational with wide societal relevance, containing ambitious but realistic research & innovation actions (Mazzucato, 2018a, Goetheer et al., 2018). Goetheer et al., 2018). Missions often have cross-sectoral and cross-science impact. Challenge oriented foresight is necessary to scrutinize future opportunities (Boden et al., 2012; van Doren, 2015). Therefore, missions require an exploratory and experimental approach and "can do" mentality (Goetheer et al., 2018).
Portfolio of instruments	A mission is not a single project, but a portfolio of actions in which multiple solutions can contribute to the mission. Ongoing projects should be the basis for a diverse set of activities with a focus on complementarities, while avoiding duplication. This diagnosis should be used to devise concrete strategies, novel institutions, new linkages and behavioral change. This will guarantee that public funding is allocated to a diverse set of activities with a focus on complementarities (Mazzucato, 2018a). Mission should be neutral towards the solution in terms of technologies and knowledge areas involved (Boon & Edler, 2018). Missions should prevent premature lock-in in specific technologies or unproven solutions (Goetheer et al., 2018).

Flexible and proactive management	A high degree of flexibility and adaptability is required to allow the possibility to change course if there is a risk that the objective will not be achieved. Coordinating parties need to deal with contestation, non-linearity, and bifurcations in developments in relation with mission formulation (Kuhlmann and Rip, 2018). It requires capacities and expertise to understand the causes of the problem and tackle them (Alford & Head, 2017). If the managers lack particular knowledge, with respect to other stakeholders, their relative power changes (May et al., 2013).

This implicates that if the lessons for more successful MIP are met, it lowers the level of contestation, complexity and uncertainty of the problem & solution definition. This, diminishes the characteristics of 'wickedness' in the problem as well as the solution side. It could be that during this phase, a lot of uncertainties arise that need to be solved during this stage. However, it also occurs that this happens in the next stage, because stakeholders settle on a mission as there is no time to wait. In addition to this mission formulation, MIP should be looked from the perspective of mission execution. This combination truly reveals the different dynamics involved in the directionality and intentionality of MIP.

2.3.2 Building blocks for successful mission execution

When the problem and solution structure have been defined, the mission execution phase follows. The goal of MIP in this phase is executing the defined solution structures to realize widely adopted innovation and systemic change. Therefore, governing mechanisms for the execution stage of a mission need to be incorporated. These consist of policy instruments to organize, coordinate and evaluate the mission (Goetheer et al., 2018). Due to layerdness of missions, it may occur that a mission goal is partly determined by a higher policy and governance level (Goetheer et al., 2018). Therefore, an important question when organizing the mission execution is which organizational form and structure is most appropriate (Goetheer et al., 2018). The aim should be to manage the mission execution in such a way that the characteristics of contestation, uncertainty and complexity can be understood and tamed (Daviter, 2017). However, due to the ambitious nature of missions, various pitfalls can occur during mission execution. Therefore, the building blocks for more successful MIP should also be analyzed during the stage of mission execution. For the mission execution these are explained in table 2.

Table 2: building blocks for more successful MIP for mission execution

Lessons	Description
Diverse stakeholder engagement	Missions involve a wide group of stakeholders, including movements in civil society. The essential consideration here is whether the involved stakeholders are able to address the problem properly (May et al., 2013). This depends on the division of tasks and responsibilities among stakeholders. Diverging strategic intentions, expectations or opinions of actors, which have been suppressed during the mission formulation may considerably impede effectiveness of a specific mission as well as the wide acceptance of innovative solutions (Borras and Edler 2014, Kuhlmann and Rip 2018).
Impact and measurement	Appropriate indicators and monitoring frameworks to measure progress. The use of intermediate milestones is critical to keep track of progress towards the mission objective. Realtime data, publicly available, on progress on the milestones will keep a sense of urgency, achievement and motivation among actors (Mazzucato, 2018b). The intermediate milestones should be used to decide whether changes in mission formulation, policy and governance are required (Goetheer et al., 2018).
Portfolio of instruments	Flexible variety of projects, actions and instruments for achieving the mission goals and intermediate milestones. A portfolio of projects would be managed to stimulate experimentation, cross-learning and changes in behavior. Evaluation is an integral part of the mission and feed into the ongoing implementation and management of projects and funding (Mazzucato, 2018b). A wide range of policy instruments by public mission-oriented organizations along the entire innovation chain is needed. These instruments include public investments, law and regulation setting, subsidies, loans, tax instruments, training and public information (Goetheer et al., 2018).
Flexible and proactive management	Capabilities in public organizations to effectively coordinate and provide direction to stakeholders when implementing missions are essential. It is crucial to be able to implement the portfolio of instruments by coordinating the efforts of the network of stakeholders through the state's convening power, brokering of trust relationships, and the use of targeted policy instruments (Mazzucato, 2018b). The trend is for much of the in-house knowledge to be outsourced to third parties (Mazzucato, 2018b). While some outsourcing is fine, it is also crucial for public organizations to experiment with both bringing in new expertise and changing everyday routines and processes to build dynamic organizational capabilities (Foray

	et al., 2009). In budgetary terms, there should be a possibility to increase the budget for a mission if there are indications that extra investment could make the difference between reaching a mission objective or not (Mazzucato, 2018b).

This implicates that if the lessons for more successful MIP are met, it lowers the level of wickedness of the mission execution by diminishing the amount of stakeholder contestation, solution complexity and solution uncertainty. However, as described above, this study argues that non-linearity takes place between the two phases. This dynamic framework consist of a feedback loop from the execution of mission to the formulation of mission, since it is plausible that complications during execution lead to reformulation of the mission. One can imagine that some stakeholders deviating from the stated mission or lobby for reformulation, causing new interests in the mission formulation phase.

2.3.3 Feedback loop

Due to the wickedness of societal challenges, a mission is not a single project (Mazzucato, 2018b). A mission often consists of several generations of mission-oriented programs. In order to achieve the necessary system and behavioral changes, there is a need for research, experimentation and innovation (Goetheer et al., 2018). Corrective and adjusting actions based on new insights are vital to keep new generations of policy effective and maintain broad political commitment and widespread stakeholder support (Goetheer et al., 2018). Moreover, evaluation is an integral part of the mission and vital for the ongoing implementation of innovation (Mazzucato, 2018b). Therefore, this study acknowledges a feedback loop from the execution of the mission to the formulation of the mission. This feedback loop in incorporated, since it is assumed that new insights provided by experiments, innovation or external societal changes can lead to reformulation of the mission (Goetheer et al., 2018). As literature in this area is not yet sufficiently developed to formulate a concrete hypothesis, this study is of explorative nature. This study assumes two different processes able to initiate this feedback loop.

Experimentation and learning processes
This process consists of internal changes which are mostly of incremental and optimizing nature. It is to be expected that through experimentation and learning processes new insights will come about the different building blocks for successful MIP. These new insights can emerge as part of activities during the mission formulation and execution phase. Furthermore, frequent, transparent and independent monitoring and evaluation is essential to create new insights.

External processes
This consists external changes which are based on internal input. This should be seen as developments on at the supra-national and national level based upon results of the regional level. Moreover, new insights due to mission-oriented programs translate into policy changes. These corretice and adjusting actions based on new insights are vital to keep new generations of policy effective (Goetheer et al., 2018). Therefore, these new insights constitute external factors that influence the next generation of MIP. These can significantly alter the sub-national level and lead to more fundamental changes. Processes which can initiate a feedback loop are; policy changes, new strategic visions or changes in regulations. When such processes are not the result of the mission and develop independently due to external effects they should not be seen as part of the internal feedback loop.

2.4 The urgency for the regional level

Wicked-problems are usually framed as problems that require large-scale innovative efforts in order to come up with appropriate solutions. Therefore, as it is argued, it is more efficient to address global societal problems at a supra-national level (Wanzenböck & Frenken, 2018). However, given the complex nature of societal problems and the institutional diversity of local settings, challenges do not present themselves as the same for every region. Missions require a design and a level of implementation that matches the scope of the challenge and the scale of solutions (Goetheer et al., 2018). Despite labels of 'grand' and 'global', the challenges remain contextual. Missions are layered and have a supra-national, national and often also a sub-national dimension (Goetheer et al., 2018). Therefore, a case can be made for an inverse 'geographical hierarchy' of innovation policy and provide supporting sub-national policies that are challenge-oriented and contextual rather than generic and systemic (Wanzenböck & Frenken, 2018).

This notion is in accordance with the subsidiarity principle, which is one of the guiding rules determining the division of political responsibilities between regions, countries and the European level. Subsidiarity implies that political action is to be taken at the lowest level where it proves to be necessary. Democratic principles underlying subsidiarity even state that decisions are to be taken "as closely as possible to the citizens" (Wanzenböck & Frenken, 2018). The possibility of active political participation, accountability and legitimacy of action are mentioned as criteria in determining political responsibilities (Borrás and Edler 2014).

Wanzenböck & Frenken (2018) summarized conditions under which MIP should be organized at the regional level. Firstly, when the objectives of the challenges are specific to local conditions and circumstances the regional level is vital. Secondly, when motives are finding effective ways to tackle local contextual problems, improving democratic decision making or increasing variety the regional level is adequate. Thirdly, when solution are small-scale, tailor-made and therefore contextual the challenge should be adressed regionally. Finally, when the problem is contested and requires responsiveness to citizens and multi-stakeholder participation in formulating the needs and search paths the regional level works accelerating (Wanzenböck & Frenken, 2018).

2.5 Conceptual framework

To understand how regions performed this study builds on typologies and distinctions made by earlier literature. The building blocks for more successful MIP were used to conceptually understand how the regions tried to overcome the characteristics of wickedness. This is done by reflecting on whether the building blocks for more successful MIP, diminish the dimensions of wickedness.

Therefore, the various theoretical subsections are combined into a single conceptual framework. This provides an explorative framework to gain insight which aspects of the MIP can be improved. The framework can be seen in figure 2. This framework describes the two sides of a mission divided in the mission formulation and mission execution. On the mission formulation side, the building blocks for successful MIP in a region influence the dimensions of problem wickedness as well as solution wickedness. This process should lead to the formulation of an adequate mission (arrow 1). This implies that regions which make better use of the building blocks for successful MIP are more able to formulate adequate missions. On the mission execution side, MIP after mission formulation is analyzed. The characteristics of the lessons for more successful MIP in a region influence the solution wickedness during this process. Furthermore, the framework consist of a feedback loop from the execution of mission to the formulation of mission (arrow 3). This feedback loop in incorporated, since it is assumed that new insights provided by experiments, innovation or external societal changes can lead to reformulation of the mission (Goetheer et al., 2018).

This research is interested in lessons for better implementation of a mission and therefore best practices. This can be seen as the entire process of the mission formulation and mission execution (arrow 4). As this study is of explorative nature, it is possible that results are found next to the building blocks for more successful MIP.

Figure 2: Conceptual framework: characteristics for best practices in missions

To make this theory practical this study looks into a formulated societal mission considering climate change. The mission is an overall reduction of at least 49% of greenhouse-gas emissions by 2030 compared to 1990 levels. As this mission has been constructed at a supra-national level (EU) and has now reached articulation at sub-national level it is highly practical for the goal of this report.

3. Methods

3.1 Research Design
This research consists of a qualitative research design, with an explorative nature. By the means of an in-depth qualitative analysis, this study aims identify lessons to implement MIP for missions formulation and mission execution more successfully. As this study is interested in causal relationships between the building blocks of MIP and the characteristics of 'wickedness', the aim of this study is to explore how MIP in the different regions has been functioning. Examining diverse stakeholder engagement, impact and measurement, portfolio of instruments and flexible and proactive management, and linking this to the theory indicates where regions have been performed inadequate. Furthermore, this study aims to identify lessons on how to form of a learning feedback loop.

This study consists of three parts. First, a comparative case study analysis critically reflects on three pilot RES regions and how MIP is used to overcome the characteristics of wickedness. This review provides lessons for the formulation and execution of MIP. Second, the feedback loop, consisting of the internal learning processes and external influences is analyzed. This provides lessons for how a feedback loop should be build up. Finally, the updated characteristics of wickedness for the nation-wide RES program are provided to understand in which aspects these have changed due to the pilot RES program and the feedback loop. The unit of analysis for this research are the regions and the main unit of observation are the actors involved.

3.2 Data collection
3.2.1 Sampling strategy
The three sub-national RES regions, Friesland, Midden-Holland and West-Brabant, have been chosen as sample for this research. These regions are an adequate sample, as they proactively participated in the in a pilot-RES program in 2016. As this pilot program has been monitored and evaluated, process descriptions and policy documents are available. These regions have had different outcomes of the pilot-program. Therefore, reflecting on how the building blocks for successful MIP has been used, is of scientific value. Moreover, these three pilot RES regions are precursors of the nation-wide RES program. Therefore, this study analyses how the characteristics of wickedness from the nation-wide RES program have been updated versions of the characteristics of wickedness of the pilot RES regions.

To arrive at a coherent analysis, qualitative data generated through interviews, policy documents and mission evaluation reports is integrated. For this analysis, the sample for the interviews is based on generic purposive sampling. To create a well-balanced view the sample of interviews contains different stakeholders. First, distinction is made between governmental, societal and private actors. Second, distinction is made in terms of participation. This participation is either during the pilot program, during the successive nation-wide program or during both. Finally, interviewees have either been acting in a specific region or at the national level. At the national level they are thus involved in the governance structure of the pilot RES program and/or the nation-wide program.

As a result, the interviewees are representative for 1) one the three pilot RES regions, 2) the organization of the pilot RES program and 3) the organization of the nation-wide program. This way they should provide an elaborate and unbiased perspective of the different stages of this study. In total, this study has conducted 14 interviews. An overview of the interviewees is shown in table 3.

Interviewee	Governmental/Societal/Private	Pilot RES / Nation-wide	Specific Region / National
1	Societal	Pilot RES + Nation-wide	Midden-Holland
2	Governmental	Nation-wide	West-Brabant
3	Governmental	Nation-wide	National
4	Governmental	Pilot RES + Nation-wide	National
5	Private	Nation-wide	National
6	Private	Nation-wide	National
7	Societal	Pilot RES	Midden-Holland
8	Private	Pilot RES	Friesland
9	Private	Pilot RES	Pilot RES
10	Governmental	Pilot RES + Nation-wide	Pilot RES
11	Governmental	Nation-wide	National
12	Societal	Nation-wide	National
13	Governmental	Pilot RES	West-Brabant
14	Societal	Pilot RES + Nation-wide	Friesland

3.2.2 Approach

This study consists of semi-structured interviews. An interview guide is structured and tweaked per interview in several ways to make it applicable for interviewing the different kind of actors. One focus is on the stakeholders participating in the pilot RES program, how they experienced the characteristics of wickedness and used the building blocks for successful MIP and how these have altered the nation-wide program. The other focus is on stakeholders since the end of the pilot RES program, how they experienced the characteristics of wickedness and used the building blocks for successful MIP and how these differ from the pilot RES program. Both interviews are conducted in Dutch, as this is the mother tongue of both interviewees and researchers.

3.3 Operationalization

This study is interested in causal relationships between the building blocks of MIP and the characteristics of 'wickedness'. The building blocks for more successful MIP are used to conceptually understand how the regions tried to overcome the characteristics of wickedness. Therefore, reflecting on the effects that the building blocks had on the level of wickedness is vital. Table 4 distinguishes several component of the characteristics of wickedness. By applying these components, the effects of the building blocks for successful MIP are transparent. Furthermore, differences in the level wickedness between the pilot RES program and the nation-wide program can be clearly demonstrated. Whether these components of the characteristics of wickedness have been decreased, is determined by the interviews, policy documents and mission evaluation reports is integrated.

Table 4: the components of the characteristics of wickedness

Characteristics of wickedness	Mission Formulation	Mission Execution
Contestation	- lack of homogeneity in perceiving the problem - interest-differentiation causing stakeholder divergence	- diverging views on how to tackle a problem - diverging views on responsibilities and division of tasks to tackle a problem - diverging strategic intentions

	- dysfunctional power-distribution causing stakeholder divergence - diverging views on how to tackle a problem	
Complexity	- multidimensional nature of the problem - difficulty in determining the division of responsibilities in terms of stakeholders, policy domains and governance levels - the need for new technologies, new governance institutions and behavioral change	- multidimensional nature of the problem - difficulty in determining the division of responsibilities in terms of stakeholders, policy domains and governance levels - the need for new technologies, new governance institutions and behavioral change
Uncertainty	-scientific knowledge on the main causes, consequences and effects - lack of specific knowledge on the risks and damages - knowledge fragmentation across different stakeholders - fragmentation of knowledge on technical, organizational, institutional and social solutions	- fragmentation of knowledge on technical, organizational, institutional and social solutions - lack of clarity about side effects of technical or social innovations

Using the conceptual framework as guideline, the interviewees are asked how certain MIP building blocks were carried and how this affected the characteristics of wickedness. The questions are open-ended and aimed at understanding the practicalities of MIP among the involved stakeholders. This implies that the questions asked are including as little theoretical jargon as possible. Afterwards, the answers are coded and analysed, and linked back to the theory. Table 5 provides an overview of questions.

Examining government, societal and private stakeholders, which have been participating in either the pilot RES program or the nation-wide program or both, helps to identify activities during the whole cycle of the mission. To understand how the building blocks of mission success have related to the characteristics of wickedness all have to be analysed. Table 5 provides an overview of the used questions.

Table 5: Operationalization

Concept	Questions
Mission Formulation	**Pubic Stakeholders**
Characteristics of Wickedness	
Stakeholder contestation	How was lack of homogeneity in terms of perceiving the problem resolved? How were problems with interest differentiation resolved?
Problem complexity	How has the multidimensional nature of the challenge been a problem? What did the division of responsibilities for the mission look like?
Problem uncertainty	Was there enough available knowledge on the causes, consequences and effects of the problem? Were the risks and damages of action and non-action known?
Building blocks for successful MIP	

Diverse stakeholder engagement	Was there an intended number of different kind of stakeholders? How have the 'willing' stakeholders been selected? How does the mission spark different actors?
Impact and measurement	How has the mission been defined? Does the mission entail a concrete target and measurable time-bound objective? How has challenge foresight been used?
Portfolio of instruments	How has the portfolio of actions been composed? Which actions and solutions have been chosen and why? Which actions and solutions have specifically not been chosen and why?
Flexible and proactive management	How well does the managing party understand the causes of the problem? How well does the managing party understand solutions for the problem? How does the coordinating party deal with developments in the environment in relation to the mission formulation?

Mission execution

Characteristics of Wickedness	
Stakeholder contestation	How where the stakeholders diverging in their views on the best way to tackle the mission handled? How have vested interests caused contestation? Have vested interests caused to the refusal of technical feasible solutions?
Problem complexity	How have solutions been integrated with organizational, institutional and social innovation to start systemic change?
Problem uncertainty	How was knowledge fragmented on the feasibility of a solution? Were there multiple solutions that seemed promising without indication which worked best?

Building blocks for successful MIP	
Diverse stakeholder engagement	How are stakeholders involved in the mission? How are divisions, tasks and responsibilities divided among stakeholders? Have suppressed diverging intentions, expectations or opinions of actions played a role?
Impact and measurement	How are indicators used to monitor the progress? How are intermediate milestones used to keep a sense of urgency and motivation among stakeholders? How are intermediate signposts used to decide whether changes in mission formulation are required?
Portfolio of instruments	How does the variety of projects, actions and instruments contribute to achieving the mission goals and milestones? How is the portfolio of projects managed? How are different parts of the mission evaluated? How are public investments along the innovation chain used?
Flexible and proactive management	What capacities are used to effectively coordinate stakeholders? How are the efforts of the network of stakeholders managed? How have institutions experimented with new expertise and daily routines?

Feedback loop

Diverse stakeholder engagement	What has there been learned in terms of stakeholder involvement? How are lessons incorporated into new policy?
Impact and measurement	What has there been learned in terms of impact and measurement? How are lessons incorporated into new policy?
Portfolio of instruments	What has there been learned in terms of portfolio of instruments? How are lessons incorporated into new policy?

Flexible and proactive management	What has there been learned in terms of flexible and proactive management? How are lessons incorporated into new policy?

3.4 Data analysis

Analyzing the interviews has been done by firstly transcribing the interviews, remarking the most important answers and statements in a summary. The explorative nature of the research demands focuses on a large number of interviews and sharp analysis. This requires iteration to form separate conversations into patterns and clear messages. The transcripts from the interviews are converted into data through an open coding process. Qualitative codes are essence capturing and essential elements of the research story (Miles et al., 2013). By descriptive coding the primary topics of the excerpts are summarized. In vivo coding is used when the participants' own language is applicable. Analysis of similarity and regularity is used to find connections among the different statements

3.5 Quality indicators

3.5.1 Reliability

The stability of results over time indicates the reliability. This implies that specific results, or answers, will not differ at different time periods when the same method of data gathering is performed. As the research is based on interviews and the data therefore highly depends on the input from the interviewees, it is unlikely that identical data will be extracted at a different point in time.

3.5.2 Validity

Measurement
In the process of asking a question to analyzing the answer, various moments can result to bias. As the interview is semi-structured, follow-up questions may result in skewed data. During the coding process, summarizing and analyzing for similarity and regularity are sensitive for the subjectiveness of the researcher. Additionally, it is most important that the message of the qualitative data is preserved, as the primary outcome of this research relies on what is being said, not so much on how many say it.

Internal
Interviews are conducted with several public and private stakeholders. Interviewing a wide range of perspectives may increase internal validity as it decreases potential bias of interviewing only one side of the collaboration. This division will be in as much equal numbers as possible, to provide multiple perspectives on the matter.

External
This study uses a conceptual framework aimed at broad concepts, which is applied to conduct analyses on different sub-national regions in the Netherlands. This implies that results will be influenced by Dutch government, law and institutions. In countries where these external factors are similar, this research might be useful.

4. Results

In the following section, the results of the performed study are described. This section first describes the build up towards the pilot RES program (section 4.1). Hereafter, the three pilot RES regions are analyzed. The mission formulation and mission execution are described separately, but with the same build up. First, the context of wickedness it described. Second, a summary of the analyzed cases is provided. This analysis, links the building blocks of the theoretical framework to the concepts of wickedness. Finally, the three cases are critically reflected on. In these critical reflections, tentative lessons are proposed. The mission formulation is described in sections 4.2. The processes during mission execution are described in section 4.3. Hereafter, the feedback loop is described. This loop consists of events since the pilot-RES phase, which have contributed to the currently used RES approach. A distinction is made between the learning processes and the external processes. Ultimately, these processes are critically reflected on to provide tentative lessons for future feedback loops. The feedback loop is described in section 4.4.

Furthermore, the tentative lessons for mission formulation and mission execution are integrated into more generic lessons. The same is done with the lessons for the different processes in the feedback loop. This integration is provided in section 4.5. Following, this study analysis how the context of wickedness has been updated for the RES regions in the nation-wide program with respect to the pilot RES regions. This way it is visualized what the effect of the pilot RES program and the feedback loop has been.

4.1. Shaping the pilot-RES program

The goal of the pilot-RES program was to determine a long-term strategy, with a step-by-step plan to be energy-neutral in 2050 (Schwenke & Schuurs, 2017d). This involved determining the energy objectives, the energy saving and generation potential, increasing support of and cooperation between regional stakeholders, create an overview of current sustainability projects and make strategic choices to accelerate the regional energy transition (ODMH, 2017b; NPRES, 2018).

The pilot-RES program took place from June 2016 to October 2017 and consisted of 5 pilot-regions (Schwenke & Schuurs, 2017d). The regional level, as a political level, did not yet have a formal status with regard to legislation and regulations in the Netherlands at the time. Therefore, the program was an explorative approach to investigate the value of the regional level as a contribution to the climate agreement. This has been done since it was clear the regional level was to play an important role in the Dutch climate agreement (Nijpels et al., 2018). The pilot-RES focused on the possibilities within the five sectors that were included in the climate agreement. These sectors were built environment, mobility, industry, agriculture and electricity (Nijpels et al., 2018). It was acknowledged that the nature of the assignments and the political level in which policies should be organized, differed per sector. Therefore, the regions could, at their own discretion, choose to reduce the complexity by focusing on less of the sectors in order to keep it manageable (4, 8). As a result, the program has been searching for a package of measures with the broadest possible social support, which has the active support of as many contributing stakeholders as possible and with which the political reduction target of 49% in 2030 could be achieved (Schwenke & Schuurs, 2017d).

The RES-program was a collaboration between the Ministry of Economic Affairs (EZK), the Ministry of Infrastructure and the Environment, the Ministry of the Interior and Kingdom Relations, the Association of Dutch Municipalities (VNG), the Dutch Water Authorities (UvW) and the Interprovincial Counsel (IPO). The VNG acted as coordinator of the entire program (ODMH, 2017b). After the pilot-phase the regions had a (draft) energy strategy that included the energy objectives, the saving and generation potential, commitment among regional stakeholders, a set of regional energy projects contributing to energy neutrality, their planning and their spatial and economic impact. Some regions have gone further than others. However, with a huge drive from the government and social partners,

all regions have worked hard to make a firm start on the regional energy transition (Schwenke & Schuurs, 2017d).

Within the MIP processes, the pilot-RES regions have encountered the different characteristics of wickedness and have shown strengths and weaknesses in terms of the building blocks of the theoretical framework. This section discusses how the regions performed during the pilot-RES, and examines bottlenecks within the mission process.

4.2. The mission formulation in the pilot RES program

4.2.1. The context of wickedness towards a sound mission formulation

In the attempt towards a sound mission, regional stakeholders encounter varying aspects of wickedness. With regard to _contestation_, there is generally a lack of homogeneity in terms of how stakeholders perceive the problem. For climate change, the majority of governmental and societal stakeholders acknowledge it to be a major concern for which appropriate action is needed (1). However, when stakeholders actually lose market share or have to make investments to solve a wicked problem, dedication reduces and interest-differentiations arises (2). For the energy transition, one interviewee noted that the vast majority of inhabitants and actors are not at all devoted. Moreover, they only accept radical change when it is feasible, affordable, without too much hassle and with a fair distribution of benefits and burdens (2).

The question is how to achieve stakeholder homogeneity. It is hard to determine what roles the different stakeholders have to take, since mission formulation is of explorative nature. This may cause diverging views concerning the responsibilities of governmental and non-governmental stakeholders. Moreover, this could lead to a dysfunctional power-distribution. These differentiating interests can even lead to the refusal of a technically feasible solution. However, the stakeholder involved should not only be a coalition of the willing. There should also be stakeholders who have deviant beliefs, even if that causes friction (7, Hale, 2011).

Complexity points to the multidimensional nature of the problem. This indicates that determining the scope of a mission is often challenging (5). The integrality of a wicked problem must be considered (5). This includes a consideration of which industrial sectors have to be accounted for. Furthermore, it is considered complex to determine the division of responsibilities, in institutional or geographical terms, to address a problem. This is correlated with the diverging views concerning the responsibilities of governmental levels and the associated mandates. This complexity leads to differences in organizational structure and responsibilities (12).

In addition, complexity refers to the fact that a set of technological solutions needs to be integrated with organizational, institutional and social innovations. To induce systemic change, there should not solely be looked at one solution, but at a comprehensive set of technologies (4). With respect to climate change, these new technologies have quite a social and political impact. This is due to the spatial nature of the energy transition (7). Whether the assignment is at national, regional or local level, the spatial task always occurs in someone's backyard (6).

Uncertainty points to a lack in knowledge considering the problem as well as a solution. For climate change, problem and urgency awareness is increasing among society (2). Specific stakeholders who are truly specialized or have an environmental background understand climate problematics. However, the average civil servant, for example, has little knowledge concerning the causes, consequences and effects of climate change (9).

In contrast, the knowledge about specific actions and size of the task is often lacking. For a part, this is inherent to the explorative nature of missions. There is often no indication what solutions works best in reasonable time. Clear, tailored governance is needed to set out guidelines (Goetheer et al., 2018).

Fragmentation of knowledge on the feasibility of solutions often leads to technical discussions. As a result, technical approaches for transitions have been the norm in the Netherlands over the past decades (9). However, organizational, institutional and social aspects are also vital for the feasibility of a solution. A lack of clarity about effects and side-effects of (technical or societal) innovations can reduce the legitimacy and broad acceptance, and set back the development and diffusion of effective solutions

4.2.2. How the regions used the buildings blocks for mission formulation

The three regions are analyzed in order to find out how they performed during the mission formulation. This study uses the building blocks for more successful MIP to conceptually understand how the regions tried to overcome the characteristics of wickedness. This analysis is build up in such a manner that actions or non-actions performed in the regions are accommodated under the building blocks. This way it can determined how certain activities had effect on the characteristics of wickedness. The complete in-depth analysis of the three cases can be found in Appendix 1.

This section provides an overview of the extensive case descriptions of the mission formulation in the selected pilot RES regions. This overview is presented in table 6. Here the building blocks are linked to the level of wickedness. This is done by reflecting on the effects that the building blocks for mission formulation had on the level of wickedness. Positive effects on the level of wicked are marked green and negative effects on the level of wickedness are marked red.

Table 6: mission formulation within the pilot RES regions

Friesland		Midden-Holland		West Brabant	
Diverse stakeholder management					
No existing structures to build on	+ complexity	No usage of existing structures	+ complexity	Existing structures to build on	- complexity - contestation
Rejection of responsibility	+ complexity	Stakeholder analysis	- contestation - uncertainty	Political commitment	- contestation
Limited political commitment	+ contestation			Stakeholder analysis	- contestation - uncertainty
The formation of a steering group	- contestation - uncertainty	The formation of a steering group	- contestation - uncertainty	The formation of a steering group	- contestation - uncertainty
Lack of a formal status of the pilot RES	+ contestation + complexity + uncertainty	The leaving out of important stakeholders	+ contestation	Lack of knowledge among small municipalities	+ uncertainty
Contestation between large and small municipalities	+ contestation + complexity			Contestation between large and small municipalities	+ contestation + complexity
Impact and measurement					
Current state energy analysis	- uncertainty	Well executed energy analysis	- uncertainty - complexity	Well executed energy analysis	- uncertainty
A minimal analysis (no	No - complexity	Lack of concrete goals	+ contestation + complexity	Concrete goals	-contestation - complexity

potential & technologies)	- uncertainty		+ uncertainty		-uncertainty
Lack of concrete goals	+ contestation + complexity + uncertainty	Lack of realism in proposed plans	+ contestation		
Clear regional scope	- complexity	Clear regional scope	- complexity	Clear regional scope	- complexity
Portfolio of instruments					
Insufficient analysis of ongoing and planned projects	No - complexity - uncertainty	Insufficient analysis of ongoing projects	No - complexity - uncertainty	Insufficient analysis of ongoing projects	No - complexity - uncertainty
Allocated funding (external manager, workshops)	- uncertainty	Allocated funding (external manager, workshops)	- uncertainty	Allocated funding (external manager, workshops)	- uncertainty
The complete refusal of new wind turbines	+ contestation + complexity				
Flexible and proactive management					
Well-functioning external program manager	- contestation	Inadequate managerial structure	+ contestation	Well-functioning external program manager	- contestation
lack of formal ownership	+ contestation + complexity + uncertainty	lack of formal ownership	+ contestation + complexity + uncertainty	Disucssion concerning structure	+ contesation

4.2.3. Critical reflection on the use of the buildings blocks for mission formulation

This section provides tentative lessons for future mission formulation. These tentative lessons are based on a critical reflection on how the three pilot RES regions made use of the building blocks for mission formulation. This section is build up in such a manner that first a tentative lesson is introduced, after which an explanation is provided.

Tentative lesson 1: where possible, make use of existing regional cooperation structures to leverage their legitimacy

With respect to _diverse stakeholder engagement_, the pilot-RES regions differed in terms of existing regional cooperation structures. The regions Friesland and Midden-Holland were not able to build on existing governance structures. As a result the division of geographical responsibilities had to be determined and new governance structures had to be formed. The legitimacy of existing structures reduces contestation and complexity.

Tentative lesson 2: create commitment and a sense of involvement among all types of political stakeholders

Political commitment turned out to be important for the regions. It assures homogeneity in terms of how governmental stakeholders perceive the problem and decreases problem contestation. The regions had different experiences with the political commitment. In Midden-Holland and West-Brabant the municipalities were positive about the RES. However, in Friesland the program manager and coordinators signaled persistent restraints among municipal and provincial administrators. Organizing stakeholders in both Friesland and West-Brabant acknowledged differences in capacity and knowledge between big and smaller municipalities. The consideration in terms of power distribution is inherent difficult. Overrepresentation of bigger municipalities may decrease uncertainty, however it increases contestation as smaller municipalities feel neglected.

Tentative lesson 3: create an organization with mandate, knowledge and authority with the right balance between public and private stakeholders to ensure a regional sense of ownership

In all regions, the coordinating stakeholders acknowledged that as many of the relevant stakeholders as possible had to participate. Since it was believed that the energy transition was not solely a governmental issue, societal and private actors had to be involved (4). As a result all three regions formed a steering group, consisting of key regional stakeholders and front runners in the energy transition. This decreased levels of uncertainty and contestation. A well-balanced steering group with mandate is vital as it creates a sense of ownership among regional stakeholders.

Tentative lesson 4: a systematic stakeholder analysis is needed to ensure that no key stakeholders are left out

In the build up towards that steering group, a stakeholder analysis was executed. Program managers in Friesland and West-Brabant experienced the needed stakeholder analysis as a time-consuming activity. Interviewees noted that this resulted in a rather loosely stakeholder analysis (8,9). In both Friesland and Midden-Holland this caused discussions whether the steering committee was a good reflection of important stakeholders (14). In Friesland smaller municipalities did not feel heard and in Midden-Holland property owners, project developers and representatives of nature and landscape management felt they were insufficiently involved. Overall, various interviewees stated that the approach off the pilots was to governmental. This was an aspect with clear room for improvement (4, 5, 9, 10).

Tentative lesson 5: a formal status of the RES process is needed to make stakeholders more interested in participating and improve stakeholder involvement.

The lack of a formal status of the region and the RES-strategy made it not always easy to interest stakeholders in participating (Schwenke & Schuurs, 2017d). This caused contestation, solution complexity and solution uncertainty. Several interviewees noted that stakeholders had to get acquainted to each other (5, 9, 14).. This was said to be inherent to the explorative nature of the pilot RES program (5). It did became clear that achieving that stakeholder involvement through exchanging experiences, acknowledging that one needs each other and respecting other stakeholders' courses of action were successful contributions of the pilot RES (4, 5). However, these could have been more efficient with a formal status of the RES program.

Tentative lesson 6: provide an analysis of the existing situation and future possibilities to determine the regional task

In terms of *impact and measurement* the pilot-RES regions were expected to have the long distance ambition of energy neutrality in 2050 (Winsemius et al., 2017; de Gelder et al., 2017a; ODMH, 2016). In order to understand what that meant, all three regions provided a concrete diagnosis of the current

energy usage and a distribution over the different sectors. In addition, an autonomic growth up to 2050 was and potential energy savings as well as their effect on the energy demand for 2050 were calculated. These calculations decreased problem uncertainty in all three regions.

Tentative lesson 7: provide a regional specific mission formulation with concrete and measurable targets

All three regions described the task in various components. For Midden-Holland and Friesland these remained qualitative. This makes success interpretative and hard to quantify. Without specific targets and timing, it is not possible to determine success, failure or progress (Mazzucato, 2018a). Therefore, the mission formulation of Midden-Holland and Friesland cannot be seen as adequate. Several interviewees noted that that has truly been a learning point for the pilot-RES phase (5, 9, 11). A more specific and explicit approach was needed, since concrete mission formulation with measurable targets decreases the aspects of wickedness.

Tentative lesson 8: clear guidelines from higher governmental levels are needed to keep regional missions ambitious but realistic

At the start of the pilot-RES, the regions were expected to automatically look at the five sectors in line with the climate agreement. The assignment was to look at how the energy transition could be given a push which was not imposed from the National level, but originated bottom-up from the regional level (11). The guidelines were unclear on feasibility of goals, scope and division of responsibilities. These vague guidelines have caused extensive discussions about the scope, sectors and scale of the RES to address their targets, thus increasing the aspects of wickedness. The regions themselves had to keep the mission ambitious but realistic.

Tentative lesson 9: determine which aspects of the mission the regional level can actually impact to create a realistic scope

The regions made calculations for the different sectors to decide which they could really have impact on (Schwenke & Schuurs, 2017d). Friesland and West-Brabant chose not to account for industry, agriculture and mobility. These sectors were as nation-wide and 'above regional level' (Winsemium et al., 2017; de Gelder et al., 2017a, p. 31). Furthermore, incorporating these sectors would made the ambitions to be energy neutral in 2050 unrealistic (Posad, 2017b). These decisions decreased the problem complexity for the regions in terms of geographical responsibilities. Midden-Holland used all five sectors for their RES. However, it was noted that the sectors of industry, mobility and agriculture should be probably be organized by higher level governments (ODMH, 2017b; Posad, 2017a). The region stated that if all possible technologies were used optimally, Midden-Holland could become a net producing region. Experts dubbed these plans as unrealistic (Schwenke & Schuurs, 2017b).

Tentative lesson 10: ongoing regional projects should form the basis of a complementary set of activities to realize the mission

In terms of *portfolio of instruments*, virtually no municipalities had drawn up a comprehensive vision before the pilot-RES phase. Therefore, a portfolio of ongoing and planned regional projects related to energy transition had to be made. Together, these projects form the basis of the future RES. It was however difficult for the regions to realize a comprehensive set of projects and their status of development. As a result, it might have occurred that already made progression was lost. This increased the solution uncertainty.

Tentative lesson 11: top-down funding should be used to devise regional bottom-up strategies, cross-learning and novel institutions which contribute to realizing the mission

For concrete strategies, the ministries of Economic affairs guaranteed funding for the pilot-RES regions. The VNG allocated funding for diverse activities (10). The VNG used it for how they had imagined the pilots and supported program managers, knowledge, expertise and workshops (10). They made the set of activities mandatory, since they believed it to be helpful for the pilot-RES regions (10).

Tentative lesson 12: possibilities for realizing the regional mission should be presented in a technology neutral manner to prevent premature lock-in

Neutrality towards solutions in term of technologies differed per pilot-RES region. Midden-Holland and West-Brabant were neutral towards solutions and provided an overview of the potential of the different possible technologies (Posad, 2017a; Posad, 2017b). However, in Friesland political and social debates from the recent past led to the refusal of new wind turbines. As a result, Friesland choose to not make a translation of required renewable energy towards the potential of different techniques (8; Winsemius et al., 2017). The consideration here was to avoid contestation. However, as a result the solution complexity became higher and practically unfeasible.

Tentative lesson 13: coordinating parties need to deal with contestation in relation with mission formulation due to a lack of formal ownership of the problem

In terms of *flexible and proactive management*, all regions used a coordinator from within the region. However, all regions had their specific problems with the coordinators. Friesland used a combination of a region coordinator VNG (municipality Leeuwarden) and province Friesland (Brouwer, 2016a). However, there was a of formal ownership. In Midden-Holland Environment Agency (ODMH) took on the coordinating role. However, as executive body, it factually had no power and no independent decision-making mandate. It has been argued that this structure was inadequate (3, 9, 11). In West Brabant the regional network organization RWB was the coordinator. However, during the pilot, cooperation on sustainability within RWB was under discussion. The municipalities distrusted the existing structure of the RWB. That gave contestation, which the RWB had to deal with.

Tentative lesson 14: a program manager with the capacities and expertise to effectively design, coordinate and assure the project organization is vital for mission formulation

During the pilot-RES phase all three regions made use of an external program manager. The manager had to coordinate and persuade stakeholders for their support (10). These program managers proved to be vital for the RES-process to keep the pace, keep stakeholders involved, design the process, ask the right questions and help to make choices (9, 11). Furthermore, the program manager in Friesland viewed assurance of the mission process and creating ownership as his core tasks (Schwenke & Schuurs, 2017a). As the result the program managers decreased contestation and problem uncertainty. Quality in which, differed per region in terms of operating style, sensitivity of administrative relationships and personal level (9). In Friesland, several sources noted that the program manager' his energy and the dynamic he created were an important success factors (8, 9, Schwenke & Schuurs, 2017a). West-Brabant even noted that the pilot-RES probably never would have gotten off the ground without their program manager (Schwenke & Schuurs, 2017c).

4.3. The mission execution in the pilot RES program

4.3.1. Context of wickedness towards mission execution

In the attempt towards executing the mission, stakeholders encounter difficulties in differing actions taken to develop and diffuse the solutions.

Stakeholder _contestation_ emerges when different stakeholder groups have strong and diverging views on the best way to tackle a problems. Even though all stakeholders value sustainable energy, they come from different interests (Schwenke & Schuurs, 2017c; 8). One interviewee (5) noted that governance is a difficult task when private parties solely care for their private interest and sustainable parties emphasize their interest on speed. With this in mind, a private producer of solar fields will always recommend solar panels as the right solution. This causes diverging views on the enormous efforts that have to be made to generate sustainable energy (4).

For energy transition, civilians often approach the transition from a cultural context in which a regional identity is important (14). However, when the focus is even more local, inside the region municipalities have diverging opinions (Schwenke & Schuurs, 2017d). Stakeholders are convinced actions have to be taken, however due to the NIMBY principle spatial integration is an obstacle (6). In terms of energy transition it is often seen that municipalities have diverging opinion, for example to find space for a solar park. It is really crucial to have the right strategic approach, and in that way conduct the right dialogues. Potentially, it is possible that those differentiating interests could lead to the refusal of a technical solution as a whole (2,9).

Solution _complexity_ refers to the fact that multiple technological solutions need to be integrated with organizational, institutional and social innovations to induce systemic change. It calls for combining new technologies, new governance institutions and behavioral change (Wanzenböck et al., 2019). This explains why the refusal of a technical solution makes mission execution practically unrealizable. Capabilities to effectively coordinate and provide direction when implementing missions are essential. This is because creating systemic change is an explorative process.

Missions, such as climate change, often entail transition in different industrial sectors and there call for new governance structures. Different sectors have diverging dynamics making it very hard to compare the policy contexts. This increases the solution complexity even more (9, Posad 2017b). Furthermore, the development process of a mission is often linked, influenced and potentially input for parallel mission oriented programs (Schwenke & Schuurs, 2017c). One interviewee noted that it is the art of ensuring that you make the connections between different solutions within a region (2).This is important for forming new generations of mission-oriented programs.

Solution uncertainty refers to fragmentation of knowledge on the feasibility of a solution. For the energy transition often lack the imagination of the amount of sustainable energy needed for the objective. The energy transition has consequences for the landscape whereby no strategy is set in stone (Schwenke & Schuurs, 2017d). Stakeholders are largely also unaware of the fact that one energy system is going to be replaced by another and which tasks and responsibilities are involved (4). They assumed the that multiple solutions seem to be possible and promising (technological, organizational, institutional, social) without indication which works best in reasonable time.

There are also developments, in terms of innovations, hanging above the market, which cause stakeholders to be cautious. By being an early mover now, one can set an example which might become the new standard. However, there is the risk it is not the new standard, which will cause investments later in the process. (12). A lack of clarity about effects and side-effects of (technical or societal) innovations can reduce the legitimacy and broad acceptance, and set back the development

and diffusion of effective solutions (Sengers et al. 2010). This also indicates that this iterative discovery process can reduce legitimacy and broad acceptance of new technologies and new governance structures.

4.3.2. How the regions used the buildings blocks for mission execution

This section provides an overview of the extensive case descriptions of the mission execution in the the selected pilot RES regions. This overview is presented in table 7. Here the building blocks are linked to the level of wickedness. This is done by reflecting on the effects that the building blocks for mission formulation had on the level of wickedness. Positive effects on the level of wicked are marked green and negative effects on the level of wickedness are marked red. The complete in-depth analysis of the mission execution of the three cases can be found in Appendix 2.

Table 7: mission execution within the pilot RES regions

Friesland		Midden-Holland			West Brabant	
Diverse stakeholder management						
Contestation between large and small municipalities	+ contestation + complexity	Good inclusion and division of responsibilities of stakeholders	- contestation - uncertainty		Contestation between large and small municipalities	+ contestation + complexity
Lack of faith in how the mission involved a wide group of stakeholders	+ contestation + uncertainty	Stakeholders feeling neglected	+ contestation		Discussions about the core tasks of the regional structure	+ contestation
Different intentions public and private actors	+ contestation	Different intentions public and private actors	+ contestation		Lack of knowledge and cautious approach	+ uncertainty
Lack of knowledge among responsible stakeholders	+ uncertainty	Fear by private stakeholders for new requirements by public stakeholders	+ contestation		Being left out of the mission formulation, the business community no longer wanted to join	+ contestation
Impact and measurement						
Overal lack of mission strategy (investment plan, strategic agenda)	+ uncertainty	Strategy for future monitoring	- uncertainty		The RES had the character of an advise and not of a strategy	+ uncertainty
Lack of overall assurance	+ contestation + uncertainty	Attempt for assurance through a covenant	- contestation - uncertainty		Problems with political assurance by the province	+ contestation
		Rejection of political	+ contestation		Lack of overall assurance	+ contestation

	(red)	assurance by the province	(red)			+ uncertainty (red)
Portfolio of instruments						
Lack of economic analysis	+ uncertainty + complexity (red)	Spatial analysis	- uncertainty (green)		Spatial analysis	- uncertainty (green)
Incomplete spatial analysis	No - uncertainty (red)	Lack of legitimacy of workshops	+ contestation + uncertainty (red)		No clear choices for projects or conflicting claims to prevent solution contestation	+ uncertainty (red)
Inadequate workshops	+ uncertainty + contestation (red)	Concrete list of projects	- uncertainty (green)		Lack of feasibility of overview of projects	+ uncertainty (red)
Flexible and proactive management						
Dependence on external program manager	+ uncertainty (red)	Dependence on external program manager	+ uncertainty (red)		Experimentation with new regional entity	+ contestation + uncertainty (red)
Increase budget for supporting services	- contestation - uncertainty (green)	A lack of funds for decision-making and follow-up process	+ contestation + uncertainty (red)		Searching for the best regional construction to build up capabilities	- uncertainty (green)

4.3.3. Critical reflection on the use of the buildings blocks for mission execution

This section provides tentative lessons for future mission execution. These tentative lessons are based on a critical reflection on how the three pilot RES regions made use of the building blocks for mission execution. This section is build up in such a manner that first a tentative lesson is introduced, after which an explanation is provided.

Tentative lesson 15: a regional feeling of mutual dependence among governmental stakeholders is beneficial for mission execution

For <u>diverse stakeholder engagement</u>, the division of tasks and responsibilities among political stakeholders has been difficult in the regions. Differences in knowledge and capacity often has led bigger municipalities to have diverging strategic intentions, expectations or opinions with respect to the other municipalities. However, the municipalities need each other to accomplish these intentions. Municipalities around the big cities, for example, possess the space that the cities need for generating renewable electricity (Schwenke & Schuurs, 2017d).

Tentative lesson 16: a formal status of the regional mission process is needed to give legitimacy and make stakeholders dedicated to the chosen strategy

The lack of a formal status of the region and the RES-strategy made it not always easy to interest stakeholders in participating (Schwenke & Schuurs, 2017d). This caused contestation, solution complexity and solution uncertainty. In addition, non-governmental stakeholders have often been pessimistic concerning the used mission approach. They did not approve of the chosen involvement of a wide group of stakeholders This indicates that the RES-process was still questionable and was not yet seen as legitimate. Therefore, the lack of a formal status of the RES-process increased the levels of contestation, complexity and uncertainty.

Tentative lesson 17: the governance structure should be organized in such a manner that a wide group of stakeholders is able to contribute knowledge and expertise in order to realize mission execution

The RES should involve a wide group of stakeholders in a diverse governance structure with different levels of responsibility. This inclusion of stakeholders should lead to a decrease solution uncertainty. However, determining a good division of tasks and responsibilities among stakeholders seemed hard since the diverse actors have different capacities and interests behind their imposed objectives (8).In addition, there has been doubt whether the responsible stakeholders have the ability to address the problem properly. The responsible stakeholders often lacked knowledge on the energy transition and its opportunities (9, Schwenke & Schuurs, 2017a). This caused solution uncertainty and contestation. As a result, stakeholders took a fearful, cautious and sometimes paralyzing approach. This led to risk avoiding behavior and lack of decisiveness (Schwenke & Schuurs, 2017a).

Tentative lesson 18: *strategic intentions of public and private stakeholders need to be aligned so that both groups see the added value of regional cooperation*

Furthermore, all regions experienced contestation between private and governmental stakeholders. The vast majority of private stakeholders does not think in terms of long-term strategies, but focuses on work for the short term (Schwenke & Schuurs, 2017a). It was said that companies don't want to talk, but simply want to get started. Moreover, private stakeholders found the approach too governmental. Both led to varying schools of thought about the energy transition. The RES can therefore be seen as a multiple negotiation situation. One interviewee noted that the mission makes the group and vice versa (8).

Tentative lesson 19: private stakeholders should be involved as soon as possible in the mission process to prevent reluctance to participate during later stages

In both Midden-Holland and West-Brabant, a number of important stakeholders felt insufficiently involved in the pilot. In West-Brabant this led to the business community not willing to join the RES process (Schwenke & Schuurs, 2017c). Private stakeholders disagreed with the approach of the pilot RES to start with the government. Since the approach was already put on paper when the business community was approached, they did no longer want to participate in the mission execution.

Tentative lesson 20: a concrete strategy which makes explicit decisions is needed to achieve further steps

The lack of a concrete, specific and explicit approach was felt in all regions in terms of *Impact & measurement.* Friesland has been the worst case in that matter, as they never truly reached mission execution. There was an overall lack of decision making and to be taken follow-up steps. Furthermore, West Brabant had too qualitative and non-obligated actions. This causes the RES to have the character of an advise. It solely outlined the framework, lines of thought and offered an assessment framework (de Gelder et al., 2017b). The covenant of Midden-Holland contained the results of the inventory,

analysis and awareness-workshops and provided a list of short term projects (ODMH, 2017b). However, in general there were little definite tracks in which it was clear who did what and when (9).

Tentative lesson 21: political assurance is vital to set milestones at well-timed moments in order to create a concrete process that strengthens awareness, urgency and ownership

In the regions there has been a lack of assurance within the regional governmental structure. Assurance is the formal commitment throughout a long-term process to ensure that stakeholders keep the made agreements. These decision-making moments are vital to maintain momentum and keep a sense of urgency and ownership in the process (5, 8, 9). Assurance is vital to decrease *solution contestation*, since stakeholders have officially agreed with a chosen strategy. Furthermore, assurance decreases *solution uncertainty* as it provides a public knowledge base that all stakeholders can fall back on. By recording decisions at given moments it becomes less person-dependent. This prevents a process from coming to a halt (9).

Tentative lesson 22: overriding higher-level political interests have to be taken into account in order to create bottom-up political assurance

All regions had problems with political assurance. In Midden-Holland the pilot-RES proposed agreements that did not correspond to the provincial policy (3,7). As a result, the province did not commit to the RES-process even though it was a vital stakeholder. In West-Brabant the province was also probably not going to sign the RES, which made municipalities worried. In addition, governmental assurance took place somewhere at the end of 2017. It was highly questionable whether that would actually lead to decision-making, with new municipal elections in March 2018. Eventually, all three regions experienced some form of standstill or gap after the pilot-RES (1, 3, 5, 9, 10).

Tentative lesson 23: a spatial analysis is vital to create awareness of the impact of possible solutions

The *portfolio of instruments* contained actions and instruments for achieving the mission goals and milestones. As the VNG was in the lead during the pilots, they funded diverse activities (10). One important instrument to stimulate interaction and cross-learning was in the form of spatial- and energy-workshops. Several compulsory workshops were imposed, in which the spatial component always stood central (3, 4). This entailed the space in the region above and below ground. The awareness that every region is actually full, with functioning objects, was lacking. To spatially integrate wind turbines or solar fields one has to account for space claims other than energy such as; water storage, nature areas and houses among others (4; Schenke & Schuurs, 2017c). That assignment requires concern and possible new law and regulations. That growing awareness has been a vital contribution of the public instruments.

Tentative lesson 24: it is vital to share regional tasks and potential solutions in such a delicate manner that they ensure the acceptance of regional stakeholders and prevent contestation

Stakeholders reacted in varying ways to the workshops. Some wondered what it all led to. It was not clear what the next steps were and how the workshops fitted into the context of the pilot process. This lack of clarity about effects reduced the legitimacy of the workshops. This was in line with the lack of a formal status of the RES-process. Furthermore, the lack of neutrality towards solutions in term of technologies had its impact on the spatial analysis and possible actions and projects (4). There were no vision maps in which choices have been made between conflicting space claims. This was done to avoid solution contestation. In Friesland, this resulted in a spatial analysis solely done in outline. RES Midden-Holland and West Brabant did create spatial maps containing with various initiatives and projects that could contribute to the collective regional objective. However, in both regions feasibility

was unclear. No regions has taken account for political positions, or financial considerations. Therefore, to prevent solution contestation, a decrease in *solution uncertainty* was not possible.

Tentative lesson 25: Regional public organizations and institutions have to build up organizational capabilities to remain independent of third parties

For *flexible and proactive management* the program manager is vital in keeping pace, keep parties involved and design the process. In all regions management has taken an prominent role within the RES-process. In Friesland and Midden-Holland the external program managers have been found useful as it provided knowledgeable and supportive dynamics in the process. However, it became apparent that knowledge and therefore the essential capacities in governmental organizations was rather low (8, 9). Moreover, in Midden-Holland and West-Brabant there has been critique on the regional coordinators (Schwenke & Schuurs, 2017b; Schwenke & Schuurs, 2017c). Much attention has been paid to the question of what type of implementing organization could guarantee continuity in the longer term. It was even suggested to create an entire new entity. The question here was what the best construction was to build up the needed organizational capabilities in order to decrease solution uncertainty. The discussions about the reorganization of RWB have strongly influenced the process and the ideas about the implementation of the RES. (Schwenke & Schuurs, 2017c). This should therefore be seen as solution contestation.

Tentative lesson 26: stable funding is needed to guarantee the continuity of mission progression

Due to low capacities in governmental organizations there were concerns about the era after the pilot, when that support was no longer available (Schwenke & Schuurs, 2017a). In both Friesland and West-Brabant budget for implementing the pilot proved insufficient. More budget for external support turned out to be needed to make the desired quality feasible.

4.4. The feedback loop in the build up towards the nationwide RES-program

In October 2017 the pilot-RES program ended. It can be debated whether or not the pilot-RESs can be called a success. This is due to the fact that, prior to the pilot, it has been left open what specifically determines success. It has remained vague how the pilots were rated. If success means, determining a long-term strategy, with a concrete step-by-step plan to be energy-neutral in 2050, then the pilot-RESs were not successful. However, when success is defined as gaining experience with an approach at the regional level to contribute to the climate agreement, then the RESs can be considered a success.

According to interviewees, success depends on what interests are attached to the pilot. Valuable lessons have been learned during the pilot-RES (4, 5, 9, 11). The greatest added value of the pilot-program has been called the increase in sense of urgency among stakeholders (5, 10). In addition, steps have been made in terms of determining energy objectives and increasing support of and cooperation between regional stakeholders (10). Furthermore, the pilot has been valuable for the legitimacy of the regional level in the energy transition.

After the pilot program, the organization of the nationwide RES program gradually changed into the preparation phase, which all 30 regions in the Netherlands have to participate in. This preparation phase ended in december 2018, after which all 30 regions had to start their inventory and analysis phase. The process all 30 regions are going through since january 2019 is significantly different than that of the pilot regions in 2016.

This is caused by a, in the theory described, feedback loop. This section discusses the developments causing that feedback loop in a chronological order. These development have been set in motion during the pilot-RES phase and have continued on in the build up towards the inventory and analysis phase of the country wide RES program. A distinction is made between 1) evaluation processes as part of the pilot program (experimentation and learning processes), 2) the growing public awareness and the resulting climate agreement (independent external processes) and 3) the establishment of the national program RES as a new governmental organization (dependent external processes). Ultimately a critical reflection provides tentative lessons for future feedback loops.

4.4.1. Experimentation and learning processes

This section describes how experimentation and learning processes have led to new insights about the building blocks for successful MIP. First, it is inherent to the explorative nature of the pilot RES program that activities within the regions lead to new insights. As result, regional key stakeholders have build up a knowledge base of tacit knowledge due to their new experiences. This knowledge has emerged by first hand learning and resided within the stakeholders themselves (11). Therefore, it is often described as a vital factor to keep these key stakeholders involved (10, 11). This will provide decreased levels of *problem and solution uncertainty.* Using their build up knowledge base in terms of regional cooperation will give a head start for the new RES program. Moreover, keeping these stakeholders involved should be seen as using existing regional cooperation structures. This decreases levels of *contestation and complexity.*

Second, new insights emerged as part of activities of an evaluative nature. Namely, as initiator of the pilot-RES, the VNG has had independent researchers monitor the RES program. Evantuentially, these researchers have drawn up an independent evaluative report considering the pilot-RES program. The goal of this report was to summarize the different processes and forms of experimentation that took place in the explorative pilot-phase in the form of lessons for future Regional Energy Strategies. This has resulted in the publication; Lessons for a Regional Energy strategy "Slim Schakelen" (Schwenke Schuurs, 2017d). This report should be seen as an evaluative tool. Such a report lowers the levels of *problem and solution uncertainty* as it provides a knowledge base that all stakeholders can fall back on. The provided lessons all contribute to the reducing of *problem* and *solution uncertainty*. Individually, these lessons show actions and insides to reduce one or several aspects of wickedness. Therefore these lessons are linked to the concepts of wickedness of the theoretical framework to indicate.

In general , the report emphasized the added value of the pilot-RES towards the 49% CO_2 reduction in 2030 and energy neutrality in 2050. The report did so by stating that the RESs were an important step towards the acceptance and understanding of the impact of the energy transition and the challenges and opportunities it provides (Schwenke & Schuurs, 2017d). Furthermore, the report highlighted the benefits of the pilot-RESs in terms of cooperation between regional stakeholders (Schwenke & Schuurs, 2017d). Altogether, the report underlined that the Dutch region-level is important to discuss a strategy for the energy transition. The region was named a level of scale at which cooperation and implementation of the energy transition is necessary. The experiences in the pilot regions underlined the advantage of that scale (Schwenke & Schuurs, 2017d).

To make this general description more explicit, the report distinguished twelve lessons divided over 5 phases of strategy development. The 5 phases were described as project preparation and organization, inventory and analysis, alliance and planning, decision making, and execution (Schwenke & Schuurs, 2017d). Furthermore, it was indicated, as a separate lesson, that a stakeholder analysis was necessary. The lessons are given in table 8. A more extensive description of these lessons is provided in appendix 3.

table 8: lessons by the evaluation tool

	Lesson	Influence on wickedness
Project preparation and organization		
1	'acquire commitment before the strategy process'	- contestation
2	'ensure a powerful project organization'	- contestation - uncertainty.
3	'organize the process flexible'	- contestation

	'the stakeholder analysis'	- contestation
Assessment and analysis		
4	'determine the starting point of the region'	- complexity - uncertainty
5	'make the possibilities transparent'	- uncertainty.
6	'carry out mission work'	- contestation
Alliance and planning		
7	'make it concrete'	- uncertainty
8	'acknowledge that a strategy is a cyclical process'	- uncertainty - contestation
Decision making		
9	'anchor the strategy'	- uncertainty - contestation.
10	'link the assignment with other policy files'	- complexity - uncertainty
11	'make sure that stakeholders commit'	- contestation
Execution		
12	'apply continuity to the implementation organization'	- uncertainty

Ultimately, these lessons and the report have been presented at the final congress of the pilot RES program. It has been said that even though the lessons seem obvious, they are often not included in practice (Schwenke & Schuurs, 2017d). There has been some critique on the lessons.

First, stakeholders mentioned that certainly not all findings in the regions have been documented (2). This is said to be due to a lack of communication between the regions and a total absence of normative management from the VNG and EZK (8). This can thus be traced back to the identified lack of guidelines during the mission formulation in the pilot RES. These lack of guidelines led to increased levels of *contestation, complexity and uncertainty.* The resulting insufficient documentation leads to a less than optimal knowledge base and learned lessons. Stakeholders mentioned that the lessons have been mostly about the content of the program on micro level instead of meta level (5). The pilots have not been utilized optimally in their opinion. In sum, a lack of guidelines leads to a reduced feedback loop.

Second, the lessons are described as limited, general and sometimes too abstract (2,5). Despite the fact that these lessons were based on an evaluation for which interviews have been conducted, this is said to be caused by the limited usage of key regional stakeholders. It is suggested that, next to being used as information source for this report, regional stakeholders should have been used in some sort of advisory group or expert pool (5, 7). This way tacit knowledge, build up during the pilot program, could have been passed though in a more efficient way. Namely, next to these general lessons, the regional stakeholders could have provided more in depth personal experiences. These experiences would have been useful for the nation-wide program, since all non-pilot regions go through the same kind of experiences.

As an example, one interviewee noted that civil servants normally only make one regional spatial analysis or have one wind turbine park build (7). Since they then know how to tackle such tasks efficiently or know what not to do, it useful to be able to approach them as 'experts' (7). Furthermore, the same reasoning works, among others, for a well performed energy analysis, how to address private actors in an efficient and politically correct way or how to best address the assurance process. Since this has not been done, the levels of *problem and solution uncertainty* were decreased less than they could have been.

4.4.2. Independent external processes

Since the start of the pilot regions in 2016, social awareness of climate change and the need for energy transition is said to be growing. This has been growing mostly independently of the RES. It should be seen as implications of media attention, European and national political debates and the negotiations concerning the Dutch climate agreement (3, 10). Together these have caused a decrease of *problem uncertainty* among stakeholders, with respect to the start of the pilot-RES. Furthermore, the concept 'region' has become common knowledge within the governmental stakeholders (3, 9, 10). There is now consensus that there should be a regional cooperation even though the concept region did not exist two years earlier during the start of the pilot RES program.

Parallel to the pilot-RES phase, the Dutch national government has been working on the Dutch climate agreement. After a concept climate agreement in 2018, the final version has been postponed several times. This has said to affect the legitimacy and image of the climate agreement (5). Furthermore, the objectives have been adjusted several times. As long as that objective moves, it is difficult to create an implementation program (5). Together, the adjustments and postponements increased *solution uncertainty.*

Ultimately, the definitive climate agreement has been constructed in 2019. This national climate agreement is the national specific formulation of the international climate agreements of Paris in 2015. To reach the goal of 49% CO_2 reduction in 2030 compared to 1990 levels and energy neutrality in 2050, agreements considering the 5 sectors have been made (Nijpels et al., 2018). To achieve systemic changes several forms of cross-sectoral cooperation between public and private parties have been described as necessary. One of these forms of cooperation is the RES. The RES was not solely described as necessary, but also as obligated (Nijpels et al., 2019). This formal acknowledgement provides the RES with legitimacy and a decreased the *problem and solution uncertainty.*

The climate agreement described the RES as a process in which governments, societal partners, network operators, the business community and where possible the residents make regional choices (Nijpels et al., 2019). The regions make choices considering projects for the generation of sustainable electricity (35 TWh), the heat transition in the built environment (from fossil to sustainable sources) and the required storage and energy infrastructure. The focus of the nationwide RES program is thus on the sectors of electricity and built environment. When a region so wishes, measures for the sectors of mobility, industry and agriculture can be incorporated. This is a different scope with respect to the pilot-RES. It decreased the level of *problem complexity* as now regional stakeholders have clear guidelines what should be incorporated within the RES. It makes the RES framed more strict than the pilot-RES creating an entirely new context (10, 11). These guidelines are said to be developed due to the dynamics that arose after the pilot-RES (11). Furthermore, by being determined in national policy, this scope decreases the *problem and solution contestation* on a regional level.

The RES has a multiple function. First of all, the RES is a product in which the region describes which energy objectives must be met and in what period. Secondly, the RES is an important instrument for organizing spatial integration with social involvement. Thirdly, the RES is a way to organize long-term cooperation between all regional parties (Nijpels et al., 2019). Due to its difficulty, it is of great importance that RES regions are properly supported. Therefore, it was proposed to form a new governmental institute for regional support.

4.4.3. Dependent external processes

During the second half of 2018 a new governmental policy program was formed. This mission oriented policy program was named the National Program RES (NP RES) and named itself an program office. The NP RES is managed by the three umbrella organizations (the VNG, IPO and the Dutch Water Authorities) and the ministries of EZK and BZK (NP RES, 2019a). The NP RES was established with the goal to originate a portfolio of projects to support the 30 nationwide RES-regions. These projects consist of, among others, information meetings, courses and manuals. The NP RES is said to be the pivotal point between the Climate Agreement and the region for which the experience of the pilot program have been crucial (5). Moreover, it was supposed to help with utilizing the lessons of the pilot RES program. The NP RES should be seen as a tool to decrease *problem and solution uncertainty* and *contestation*

During the feedback loop, the NP RES has provided a manual RES in 2018. In this manual the objective, stakeholder group, an explanation of the RES and a step-by-stap plan were described. This manual can be seen as a groundwork for a working RES (NP RES, 2018). The results of the pilot-RES regions have contributed to the guidelines set out in this manual. Furthermore, the lessons provided by the 'slim schakelen' report have also been taken into account. The importance of this manual should not be underestimated as it decreased the *problem and solution uncertainty.* The manual provided explanations of the goals and tasks of the RES, participation, roadmaps, governance structures, collaboration, parallel processes, data and monitoring and more (NP RES, 2018).

Furthermore, it provided legitimacy for the regional level by stating that regions had different characteristics in terms of industrial, agricultural or even the urban structure. Regions were said to have their own identity. Furthermore, entrepreneurship and civilian initiatives were said to flourish on the regional level. In addition, the spatial nature of technological solutions was said to go beyond municipalities, but is often smaller than the province (NP RES, 2018).

Ultimately, the NP RES provides supportive actions along the entire development process of the RES. These supportive actions are based upon the results and lessons learned from the pilot RES program (5). It facilitates and supports the regions in providing a clear framework for the task, constructing comparable and addable RESs and step-by-step further development of a common data and information base. The NP RES offers the regions a platform to share knowledge and challenge each other to make better plans. This support can be subdivided into 5 themes (NP RES, 2019a);

- *Process and organization*: involving the organization of stakeholders in the region, the organization of a decision-making process and what the roles of the governments themselves are and what a good decision-making process looks like.
- *Spatial planning*: involving the many question concerning the generation of sustainable energy becoming visible in the landscape.
- *Potential, data and technology*: the NP RES provides information in the form of data, clear calculation rules and assumptions.
- *System efficiency*: this contains support for regions to gain insight into the costs of certain choices, the availability of (sustainable) sources and into the applicability and capacity of the network.
- *Information about the RES and the climate agreement*: here the NP RES provides knowledge about the agreements made in the climate agreement with regard to the RES. This entails question about planning, process and goals.

4.4.4. Critical reflection on the feedback loop

This section provides tentative lessons for making the most of future feedback loops. These tentative lessons are based on a critical reflection on how the feedback loop has been shaped in the build up towards the nationwide RES program. This section is build up in such a manner that first a tentative lesson is introduced, after which an explanation is provided.

Tentative lesson 27: evaluation and monitoring tools are vital to create a knowledge base and stimulate cross-learning

For *experimentation and learning processes*, the VNG has had independent researchers monitor the pilot RES program. This resulted in an report, which should be seen as a evaluative tool. This report provided lessons considering the mission progress in the pilot RES region and therefore provided a knowledge base stakeholders could fall back on. This report has been vital for reducing the *problem and solution uncertainty and complexity* as it stimulates cross-learning. Individually, these lessons show actions and insides to reduce one or several aspects of wickedness.

Tentative lesson 28: In order to efficiently benefit from evaluation and monitoring tools, clear guidelines from higher governmental levels are needed at the start of a mission-oriented program

Stakeholders mentioned that not all findings in the regions have been documented. This was due to a lack of guidelines at the start of the pilot RES program, which increased levels of *contestation, complexity and uncertainty.* The resulting insufficient documentation leads to a less than optimal knowledge base and learned lessons. Therefore, guidelines are needed to efficiently set up a feedback loop and decrease *problem and solution uncertainty.*

Tentative lesson 29: to fully benefit from build-up tacit knowledge, key stakeholders should be involved in the feedback loop

Regional key stakeholders have built up a knowledge base of tacit knowledge during the mission formulation and execution in the pilot RES program. Therefore, it is often described as a vital factor to keep these key stakeholders involved (10, 11). However, these key stakeholders have been used insufficiently during evaluation processes. It is suggested that, next to being used as information source for this report, regional stakeholders should have been used in some sort of advisory group or expert pool (5, 7). This way tacit knowledge, build up during the pilot program, could have been passed though in a more efficient way. Namely, next to these general lessons, the regional stakeholders could have provided more in depth personal experiences. As a result, tacit knowledge, build up during the pilot program, has either been lost are could have been passed though in more efficiently.

As an example, one interviewee noted that civil servants normally only make one regional spatial analysis or have one wind turbine park build (7). Since they then know how to tackle such tasks efficiently or know what not to do, it useful to be able to approach them as 'experts' (7). Furthermore, the same reasoning works, among others, for a well performed energy analysis, how to address private actors in an efficient and politically correct way or how to best address the assurance process. Since this has not been done, the levels of *problem and solution uncertainty* were decreased less than they could have been.

Tentative lesson 30: a formal status of the regional mission process provided by a higher governmental level is needed to give legitimacy and make stakeholders dedicated

In terms of *independent external processes*, parallel to the pilot-RES phase, the Dutch national government has been working on the Dutch climate agreement. This should be seen as a result of growing societal awareness of social awareness of climate change and the need for energy transition. This climate agreement formally acknowledged the RES as needed to achieve systemic changes and cross-sectoral cooperation between public and private stakeholders. Furthermore, the climate agreement set a different scope for the RES program with respect to the pilot RES. This formal

acknowledgement and new guidelines decreased the contestation, complexity and uncertainty of the RES process.

Tentative lesson 31: the formation of mission oriented policy programs is vital to offer a platform to share knowledge and further develop an information base

In terms of <u>*dependent external processes*</u>, a new governmental policy program was formed. This resulted from guidelines provided by the climate agreement and learning processes of the pilot RES program. This organization was established with the goal to originate a portfolio of projects along the entire development process of the RES, such as information meetings and courses. Moreover, it was supposed to help with utilizing the lessons of the pilot RES program. It did so by providing a manual RES and a platform to share knowledge and challenge each other to make better plans. A mission oriented organization should be seen as a tool to decrease *problem and solution uncertainty* and *contestation.*

4.5. The integration of tentative lessons

In this section the retrieved tentative lessons for mission formulation, mission execution and the feedback loop are integrated into more generic tentative lessons. These should be seen as key lessons for the entire mission process that can be subtracted from the pilot RES program. It is possible that there are aspects for successful MIP that are not mentioned due to their lack of visibility within the pilot program. However, these lessons provide a solid base for key aspects to improve on for regional mission formulation and execution.

These generic tentative lessons have been retrieved by comparing the tentative lessons for specific building blocks for successful mission formulation and for mission execution and their results on the characteristics of wickedness. As a result, it has often been possible to determine more generic tentative lessons associate with one specific building block for the entire mission process. Therefore, most generic tentative lessons can be traced back to one building block for both formulation and execution. When this method proved to be insufficient, tentative lessons from diverging building blocks with similar effect on the different characteristics of wickedness have been assembled. This proved to be a sufficient method. It provided the possibility to assemble tentative lessons which contain similar tools or thought, but were associated with different building blocks. By applying these two steps of analysis, ten generic tentative lessons have been identified. Together, these generic tentative lessons comprise all the aforementioned tentative lessons for mission formulation and mission execution. Furthermore, several generic tentative lessons have been retrieved by comparing the tentative lessons for the different processes in the feedback loop and their results on the characteristics of wickedness. All generic tentative lessons as well as the numbers of the tentative lessons they were generated from are shown in table 9.

Table 9: generic tentative lessons

	Generated from	Generic Tentative Lesson	Impact on wickedness
1	*1 , 10*	*ongoing projects and existing structures should form the basis for a regional mission*	- contestation - complexity - uncertainty
2	*2, 13, 15*	*creating political commitment and a regional feeling of involvement and ownership is beneficial for mission progression*	- contestation
3	*3, 17*	*to ensure a regional sense of ownership an organizational structure should be created with mandate, knowledge and authority with the right balance between public and private stakeholders*	- contestation - complexity - uncertainty
4	*4, 18, 19*	*to prevent the reluctance to participate, private stakeholders should be involved as soon as possible in the mission process to see the added value of regional cooperation*	- contestation - uncertainty
5	*6, 7, 9, 20*	*creating a mission with specified regional targets and a realistic scope is needed to provide a concrete strategy*	- complexity - uncertainty
6	*5, 8, 16, 22*	*higher governmental levels should provide the regional mission process with a formal status and clear guidelines to create legitimacy and dedication among regional stakeholders*	- contestation - complexity - uncertainty
7	*21*	*political assurance is vital to set milestones at well-timed moments in order to create a concrete process that strengthens awareness, urgency and ownership*	- contestation - complexity - uncertainty
8	*11, 26*	*to guarantee the continuity of mission progression stable top-down funding is needed to devise regional bottom-up strategies and cross-learning which contribute to realizing the mission*	- uncertainty
9	*12, 23, 24*	*it is vital to share sensitive regional tasks and their potential solutions in such a delicate manner that the acceptance among regional stakeholders is promoted and resistance is reduced*	- contestation - uncertainty
10	*14, 25*	*an external program manager helps to effectively design and coordinate the organizational structure, but should not prevent regional public organisations from building up capabilities to remain independent of third parties*	- contestation - uncertainty
The feedback Loop			
11	*27, 28, 29*	*in order for the vital evaluation and monitoring tools to function optimally, clear upfront guidelines for the mission-oriented program and involvement of key stakeholders is needed*	- complexity - uncertainty
12	*30*	*a formal status of the regional mission process provided by a higher governmental level is needed to give legitimacy and make stakeholders dedicated*	- contestation - complexity - uncertainty
13	*31*	*the formation of mission oriented policy programs is vital to offer a platform to share knowledge and further develop an information base*	- contestation - uncertainty

4.6. New context of wickedness towards mission formulation

This section provides changes in the context of wickedness towards mission formulation between the national RES program and the pilot RES program. Due to the experiences within the pilot RES program and the feedback loop, several aspects of the characteristics of wickedness have been decreased.

In terms of _contestation,_ there is still lack of homogeneity in terms of how stakeholders perceive the problem is encountered. However, over the span of two years, since the start of the pilot RES program towards the start of the nation-wide RES program, there has been a significant growth in governmental, societal and private stakeholders which acknowledge climate change to be a major concern for which appropriate action is needed. (1, 12). However, it remains that, when stakeholders actually lose market share or have to invest to solve a wicked problem, dedication reduces and interest-differentiations arises. (1, 12).

For the nation-wide RES program it is more clear which different stakeholder have to participate. A list of which regional stakeholders have to be involved in the RES processes has been provided as a result of the evaluation tools (Schwenke & Schuurs, 2017d). In addition, a manual for the participation process has been formed. This functions as a tool to handle diverging views on how to build up the RES process. It is acknowledged that there are still stakeholders with deviant beliefs with respect to the RES process. It is suggested that these stakeholders have to be involved as early as possible within the RES process, as otherwise they will feel no ownership for the RES process. This is vital, since it is acknowledged that all regional stakeholders are necessary to fulfill the ambitions of the RS (NP RES, 2018). Furthermore, the new formal status of the RES process is vital to decrease contestation. Regions now have the obligation to form a RES. As a result, discussions concerning the correctness of the RES approach are meaningless.

Complexity points to the multidimensional nature of the problem. The pilot RES regions focused on the possibilities within the five sectors that were included in the climate agreement, and could at their own discretion make choices concerning these sectors. As a result, the pilot RES program has been searching for the right scope. For the nation-wide program this scope has been clear upfront. The focus of the nationwide RES program is on the sectors of electricity and built environment. When a region so wishes, measures for the sectors of mobility, industry and agriculture can be incorporated (Nijpels et al., 2019). This indicates that determining the scope is less complex. In addition, the nation-wide program is more aware of parallel processes. The manual provided by the NP RES has provided an overview of related societal challenges (NP RES, 2018). This is to focus on complementarities, while avoiding duplication.

Furthermore, it is less complex to determine the division of responsibilities. During the pilot RES program there were differences in organizational structure and responsibilities (12). However, within the climate agreement, it has been agreed upon how regional governmental stakeholders have to form a RES. It is acknowledged that a program team with a program manager is required (NP RES, 2018). Furthermore, it is suggested that a steering group is to be formed as well as which governmental, societal and private stakeholders have to be involved in the organizational structure (NP RES, 2018; Schwenke & Schuurs, 2017d). Moreover, this has given clarity on which governmental levels should be involved in which manner. The complexity of the need to integrate technological solutions with organizational, institutional and social innovation remains. However, stakeholders are more aware of this aspect of complexity with respect to the start of the pilot RES program (5, 14).

In terms of _uncertainty_, problem and urgency awareness has been increasing among society (1, 2). This awareness was largely lacking at the start of the pilot RES program (2). Furthermore, since the start of the pilot RES program, the knowledge about specific actions and size of the task has grown. This is due to the guidelines from the national governmental level. The delimitation of the regional goals are much

clearer and assured due to the lessons provided by the pilot RES program (6). Moreover, the ambition of 35 TWh has now been defined.

The awareness that knowledge concerning regional solutions is fragmented among regional stakeholders is growing (1). Furthermore, the clear legitimization of the RES process decreases solution uncertainty. In addition, the support provided by the new mission oriented policy program offers a platform to share knowledge and further develop a public information base. This caused a decrease of uncertainty with respect to the start of the pilot RES program.

4.7. New context of wickedness towards mission execution

This section explains changes in the context of wickedness towards mission execution.between the national RES program and the pilot RES program. Due to the experiences within the pilot RES program and the feedback loop, several aspects of the characteristics of wickedness have been decreased.

In terms of _contestation,_ different stakeholder groups still have strong and diverging views on the best way to tackle a problems. Even though all stakeholders value sustainable energy, they come from different interests (Schwenke & Schuurs, 2017c; 8). This is due to their private interest. The differences between private and public stakeholders still remain. These private interests are very regional dependent. As a result, there is a lack of guidelines in how to address these. This is a aspect that makes the step from strategy towards execution and implementation so difficult (5).

Moreover, due to the NIMBY principle spatial integration is an obstacle (6). New laws on spatial restrictions have to be adopted. However, these take a long time. This emphasizes the importance of the manual for the participation process which has been formed (NP RES, 2018). However, as all 30 are going through the mission execution simultaneously, best practices in terms of participation processes have yet to be discovered.

In terms of   complexity the need to integrate technologies, governance institutions and behavioral change to induce systemic change has remained the same. However, due to the new scope of the nation-wide RES program, there is more delimitation. Furthermore, for the nation-wide RES program, there is a clear roadmap. This roadmap consists of several phases which contain the same timeframe for all 30 regions. This process is iteratief, since it is assumed to be necessary to further sharpen and adjust the goals (NP RES, 2018). This, so called, 'phasing' is important since capacity problems are assumed to become vital (5, 14). As all 30 regions will make the step from strategy towards implementation at approximately the same pace the spatial integration of new technology is problematic (11, 14). This is why the phasing and feasibility of RES plannings is to become an issue (5).

In terms of_ uncertainty, knowledge on the feasibility of solutions has grown. Due to the growing awareness, there is an increase in funding and research. Furthermore, the NP RES is an immense influence on the growing public knowledge base. There is new data available in terms of the potential of technologies and their combinations (NP RES, 2018). Furthermore, analytical maps and data sets have been provided to all 30 regions. These are based on "best available knowledge" from an inventory at a number of private companies (NP RES, 2018). In addition, network operators are involved. They determine the consequences for the infrastructure with the strategies that emerge during the RES process NP RES).

In addition, there is a lot of focus on evaluation and monitoring. This is an significant difference with respect to the pilot RES program. This is done in order to make sure, that regional results are in line with higher governmental policy. In addition, it adds to the growing public knowledge base as all results are shared and made transparent (NP RES). Furthermore, it addresses the phasing and feasibility problem.

5. Conclusion

This study has used the literature on MIP to help determine what practices (building blocks) can be used on a regional level to decrease the characteristics of wickedness for mission formulation and mission execution. It does so by answering the following research question:

What can be learned from the Dutch pilot regional energy strategies for future formulation and execution of mission-oriented innovation policy?

This study answers this question by focusing on three regions within the pilot RES program, namely Friesland, Midden-Holland and West-Brabant. These regions investigated the value of the regional level and tried to determine a long-term strategy to be energy-neutral in 2050. To evaluate how the regions performed, this study builds on typologies and distinctions made by earlier literature.

The building blocks for more successful MIP were used to conceptually understand how the regions tried to overcome the characteristics of wickedness. By reflecting on the effects that the building blocks had on the level of wickedness, this study assisted in exploring activities that are important for decreasing the characteristics of wickedness. Furthermore, this study focused on the feedback loop which followed after the pilot program. By reflecting on the effects that experimentation and learning processes and external processes had on the level of wickedness, this study explored which activities are important for effectively building up a feedback loop.

Ultimately, this study has identified a total of 26 tentative lessons that could help improve future mission formulation and mission execution. In addition, six lessons for the buildup of a feedback loop have been identified. These have been integrated to a total of 13 generic tentative lessons for MIP, which together give answer to the research question. The 13 generic tentative lessons, together with short corresponding explanations and their effects on the characteristics of wickedness are presented in table 10.

Table 10: generic tentative lessons for more successful MIP

	Generic Tentative Lesson
1	***Ongoing projects and existing structures should form the basis for a regional mission***. – A mission should make use of existing regional cooperation structures. As a result, the division of responsibilities is more easily determined and no new governance structures have to be formed. In addition, building on the success of ongoing projects will give a mission a head start. The legitimacy of existing structures and ongoing projects reduces *contestation, complexity* and *uncertainty*. Failing to build on already made regional progress could lead to duplication or the loss of already acquired knowledge.
2	***Creating political commitment and a regional feeling of involvement and ownership is beneficial for mission progression.*** –Assuring homogeneity in terms of how governmental stakeholders perceive the problem is vital and decreases *contestation*. This process of creating political commitment has been coherent with the inherent difficult process of power distribution among political stakeholders. A well balanced division of tasks and responsibilities among political stakeholders creates a regional feeling and a sense of mutual dependence. As a result, *contestation* decreases. Moreover, it creates the feeling that all stakeholders are 'owner' of the made progression. Furthermore, the regional coordinating parties should have the support of the regional political stakeholders to enhance cohesion. Without this regional feeling, diverging strategic intentions or opinions arise and cause *contestation.*
3	***To ensure a regional sense of ownership, an organizational structure should be created with mandate, knowledge and authority with the right balance between public and private stakeholders***. – Societal missions are not solely governmental issues. Therefore, societal and private actors have to be involved. Therefore, an organizational structure has to be created with a well-balanced division of responsibilities among stakeholders. A well balanced organizational structure is vital as it creates a sense of ownership among regional stakeholders. In addition, the responsible stakeholders should possess adequate knowledge and capabilities and should have

	mandate to speak for certain stakeholder groups. An organizational structure which possesses these aspects decreases *contestation, complexity and contestation*. An structure lacking of these aspects causes *contestation, uncertainty* and often a lack of decisiveness.
4	***To prevent the reluctance to participate, private stakeholders should be involved early in the mission process to see the added value of regional cooperation***. – At the start of a mission, a stakeholder analysis is vital to create overview of all relevant private stakeholders. Because of the varying school of thought between public and private stakeholders, it is vital to include private stakeholders early in the process. This decreases *contestation and uncertainty*, since the formed organizational structure is regionally supported and is not seen as too governmental oriented. Due to the diverging strategic intentions of public and private stakeholders, a multiple negotiation process should be formed at the start instead of halfway through the mission process.
5	***Creating a mission with specified regional targets and a realistic scope is needed to provide a concrete strategy.*** – In order to understand the long term ambitions of a mission regions have to provide an specific regional analysis of the current state of a region and future possibilities. Such calculations decrease the uncertainty. Based on this analysis, regional specific quantifiable targets divided over various components have to be determined. This includes a realistic scope of aspects of the mission the regional level can actually have impact on. A specific and explicit approach reduces *complexity and uncertainty*. A lack thereof, leads to was an overall lack of decision making and to be taken follow-up steps.
6	***Higher governmental levels should provide the regional mission process with a formal status and clear guidelines to create legitimacy and dedication among regional stakeholders***. – For a regional mission, clear guidelines on feasibility of goals, scope, political assurance and division of responsibilities should be provided by higher governmental levels as this decreases *contestation, complexity and uncertainty*. It decreases discussions on scope, sectors and scale. Furthermore, the provided legitimacy create awareness, participation and dedication among private stakeholders.
7	***Political assurance is vital to set milestones at well-timed moments in order to create a concrete process that strengthens awareness, urgency and ownership*** - Assurance is the formal commitment throughout a long-term process to ensure that stakeholders keep the made agreements. These decision-making moments are vital to maintain momentum and keep a sense of urgency and ownership in the process. Assurance is vital to decrease *contestation,* since stakeholders have officially agreed with a chosen strategy. In addition, assurance decreases complexity since it anchors the division of responsibilities. Furthermore, assurance decreases *uncertainty* as it provides a public knowledge base that all stakeholders can fall back on. By recording decisions at given moments it becomes less person-dependent. This prevents a process from coming to a halt.
8	***To guarantee the continuity of mission progression stable top-down funding is needed to devise regional bottom-up strategies, cross-learning and novel institutions which contribute to realizing the mission.*** – Due to the explorative nature of missions, private stakeholders are often unwilling to invest. Therefore, top-down funding is vital to start mission progress. This could be used on supporting external program managers, expertise and workshops. Funding is a tool to create new knowledge and therefore decreases *uncertainty*. Without funding mission-oriented programs often come to a halt, due to a lack of in-house capacities.
9	***It is vital to share sensitive regional tasks and their potential solutions in such a delicate manner that the acceptance among regional stakeholders is promoted and resistance is reduced.*** – The systemic changes that are needed for societal mission goals often evoke contestation among stakeholder. This causes a lack of neutrality towards solutions in term of technologies. It is important to stimulate interaction and cross-learning to create acceptance and reduce resistance. This reduces contestation and uncertainty. However, this new awareness should be attended very carefully. Often, to prevent solution *contestation*, a decrease in *solution uncertainty* is not possible immediately, but should be addresses with several activities.
10	***An external program manager helps to effectively design and coordinate the organizational structure, but should not prevent regional public organizations from building up capabilities to remain independent of third parties*** – External program managers are used to coordinate and persuade stakeholders for their support. These program managers are vital to keep the pace, keep stakeholders involved, design the process, ask the right questions and help to make choices. Furthermore, creating assurance of the mission process and ownership among stakeholders are his core tasks. As the result good program managers decrease *contestation and uncertainty*. However, this can cause knowledge and therefore the essential capacities in governmental

	organizations to be rather low. It is vital that a program manager does not prevent regional public organizations from building up own organizational capabilities. Otherwise, they will become dependent on third parties.
The feedback loop	
11	***In order for the vital evaluation and monitoring tools to function optimally, clear upfront guidelines for the mission-oriented program and involvement of key stakeholders is needed.*** - Evaluation and monitoring tools are vital to create a knowledge base and stimulate cross-learning. It provides lessons considering the mission progress and therefore creates a public knowledge base stakeholders could fall back on. This decreases *complexity and uncertainty*. However, in order to efficiently benefit from evaluation and monitoring tools, clear guidelines from higher governmental levels are needed at the start of a mission-oriented program. Furthermore, it is important to involve regional stakeholders since they can provide in depth knowledge due to personnel experiences.
12	***Tentative lesson 30: a formal status of the regional mission process provided by a higher governmental level is needed to give legitimacy and make stakeholders dedicated.*** **-** A formal status should be seen as a tool for and a result of growing societal awareness. It acknowledges the need to achieve systemic change. This provides legitimacy and creates more cross-sectoral cooperation between public and private stakeholders. This formal acknowledgement and new guidelines decreased the *contestation, complexity and uncertainty.*
13	***Tentative lesson 31: the formation of mission oriented policy programs is vital to offer a platform to share knowledge and further develop an information base***. – New governmental policy program often result from guidelines provided by higher governmental levels and internal learning processes. A mission oriented organization should be seen as a tool to decrease *problem and solution uncertainty* and *contestation.* It is supposed to help with utilizing the lessons of earlier generations mission-oriented programs and provides a platform to share and build up knowledge.

6. Discussion & Limitations

The pilot RES program has been phase one to include the Dutch regional level into the total strategy towards energy neutrality in 2050. Time will tell in what way future RESs are formulated and developed. This study has provided managerial advice in the form of 13 generic tentative lessons that were focused on improving mission formulation, mission execution and the buildup of a feedback loop to overcome the characteristics of wickedness. These have been extensively presented in table 10 in the conclusion of this study.

The use of the regional level in the Netherlands is relatively new. Therefore, there is value in knowing how to improve the different building blocks for successful MIP on the regional level. This research has extended the theoretical insights on the building blocks for successful MIP. This should be seen as the main theoretical contribution of this study. Moreover, this study has been explorative in how to use the building blocks for successful MIP on the regional level.

The literature on the building blocks for successful MIP proved to be a suitable framework for this study. The four building blocks were diverse stakeholder engagement, impact and measurement, portfolio of instruments and flexible and proactive management. The use of all four building blocks been encountered in the regions. Ultimately, their varying success led to the generic tentative lessons. Friesland encountered immense difficulty with diverse stakeholder engagement, which led to an overwhelming degree of contestation. Midden-Holland made use of an inadequate managing structure, which increased contestation and complexity. Overall, all regions lacked good use of portfolio of instruments which increased uncertainty and complexity. Moreover, West-Brabant made good use of impact and measurement during the mission formulation. However, inadequate diverse stakeholder engagement during the mission formulation undid that progress. This shows that the combination and coherence of all four building blocks for successful MIP is vital. This is what makes the step from strategy towards execution and implementation so difficult.

Furthermore, this study acknowledged that, next to the four building blocks, the concept of (political) assurance has proved to be vital for regional MIP. Within the result section assurance has been accommodated within impact and measurement. However, it is named as one of the core tasks of the flexible and proactive manager. It effects diverse stakeholder engagement due to the influence on commitment and legitimacy. Without assurance, impact and measurement does not function. Furthermore, assurance influences portfolio of instruments due to its effect on funding and projects. As a result, this study argues that the process of (political) assurance could be seen as a fifth building block for successful MIP due to the coherence with the other four building blocks. Moreover, without assurance made mission progress comes to a halt, making it increasingly more important in further stages of a mission. Therefore, more research is needed to better understand the impact of (political) assurance on MIP and how it interacts with the other four building blocks for successful MIP.

Furthermore, the regional level proved to be theoretical applicable. The objectives were specific to region conditions and circumstances. The three regions differed in their characteristics of wickedness. Friesland had an overwhelming degree of contestation with respect to the other two regions. In addition, the organizational structure and thus complexity differed in all three regions. Furthermore, the regions had different characteristics in terms of industrial, agricultural or even the urban structure. Regions were said to have their own identity. Furthermore, entrepreneurship and civilian initiatives were said to flourish on the regional level. This could not have been analyzed on a national level. Furthermore, support and ownership proved important on the regional level. Single municipalities often lacked the knowledge and capacity. The spatial nature of solutions goes beyond municipalities, but is often smaller than the province or even national level and therefore is contextual for the regional level.

In addition, this study has found results that were not focused on during the pilot RES program, but do impact the success of MIP. First, the focus has not been on technological innovations. The focus has mainly been on developing social support, structures and projects for the implementation of these technologies. These should be seen as social innovations. It is interesting to note that on the EU level the focus is mainly on R&I policy and the development of technologies. Therefore it can be wondered whether the EU level and the regional level should be seen as to opposed extremes on the MIP spectrum. Moreover, diverse stakeholder engagement has been central in the RESs and showed the immense focus on social innovation. It has not been determined within literature, but this given might be characteristic for the regional adaptation of societal missions. More study is needed to provide the empirical basis to back-up this hypothesis.

Furthermore, with the focus being on implementing technology solution, there has been a complete lack of attention towards behavioral change. This is vital since theory states that decreasing complexity of solutions calls for combining new technologies, new governance institutions and behavioral change. Therefore, overlooking behavioral change should be seen as a huge shortcoming of MIP. It can be wondered which governmental level is most adequate to address behavioral change. The EU level seems inadequate, since there is no mandate within its organization to make decisions concerning behavior. The national level is partly appropriate, since it can provide new law and regulation setting. However, regions have their own identity and are said to be the appropriate level to increase entrepreneurship and civilian initiatives. Furthermore, diverse stakeholder engagement and social innovation have been the focus of the RESs. Therefore, this study argues that the region is the appropriate level to effectuate behavioral change. How the regional level should specifically address behavioral change is an interesting opportunity for further research.

This study acknowledges that, being of explorative nature, a complete overview of possible lessons for the building blocks for successful MIP may not have been realized. More in-depth research may determine even more lessons, however this study is of the opinion that the conceptual framework provides a broad and sufficient overview of lessons aimed at improving the building blocks for successful MIP. Adding to this statement, this study does acknowledge that an enlargement of the interviewee sample could have improved the quality of available data. This study has focused on three regions within the pilot RES program. However, to create an even more in-depth overview in further studies it should be recommended to analyze even more regions. By reflection on a mission-oriented program through more angles, the robustness of results improves which can work positively on the outcomes of the study.

In addition, it should be noted that the fact that the nation-wide RES program is still in development can be seen as limiting. As a result, it could not be analyzed what the differences in wickedness between the pilot RES program and the nation-wide program were during MIP output. Therefore, the practical influence of the pilot RES program and the feedback loop on the characteristics of wickedness cannot be determined. This should be determined by further study when the nation-wide RES program has progressed into a new generation of mission-oriented programs.

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Appendices

Appendix 1: How the regions used the buildings blocks for mission formulation

Case 1: region Friesland
Diverse stakeholder engagement & Flexible and proactive management

Pilot-RES region Friesland included 24 municipalities. There was no formal regional partnership in the region. Until the start of the RES pilot, cooperation on the theme of of energy within the region was limited (Schwenke & Schuurs, 2017a). The fact that there were no existing structures to build on indicates more *problem complexity*.

The fact that the pilot got off the ground was to the large extent the merit of the preceding alderman of Leeuwarden, who personally put a lot of effort into it and managed to activate her extensive administrative network. In addition, a delegate of an independent consultancy firm was recruited as the program manager with funding of the VNG. The program manager focused primarily on the connection and the commitment of stakeholders (Schwenke & Schuurs, 2017a). With his energy, he created a dynamic in the process which was acknowledged as an important success factor (8, 9, Schwenke & Schuurs, 2017a). The program manager viewed assurance of the mission process and creating ownership as his core tasks (Schwenke & Schuurs, 2017a). Therefore, the usage of a good program manager led to less *problem and solution stakeholder contestation.* Furthermore, a combination of a region coordinator VNG (municipality Leeuwarden) and province Friesland participated as coordinators (Brouwer, 2016a). The coordinators focused primarily on the internal political processes and organization of the RES-process (Schwenke & Schuurs, 2017a). However, there was no formal ownership. For the province, normally the designated candidate, this process was too sensitive to take a leading role (Schwenke & Schuurs, 2017a). This rejection of responsibility indicates an increase in *problem complexity*.

Political commitment for cooperation on the transition turned out to be an issue. The commitment of governments that signed the regional agreement was limited to an obligation of effort of official support per organization. No obligation to achieve a result or acceptance of the outcomes were guaranteed. The program manager and coordinators signaled persistent restraints among municipal and provincial administrators (Schwenke & Schuurs, 2017a). This was fueled by earlier experiences with respect to renewable energy projects and scarcity of resources in terms of time, money and capacity. This implicates a high degree of *problem and solution stakeholder contestation.*

Persistent to bring ambition and energy in the process, the steering group was composed of early movers from the business community, societal parties and governments containing "CEO-level with support and authority" with political influence and mandate (Schwenke & Schuurs, 2017a). To be selected for the steering group, personal involvement and commitment towards the energy transition was found decisive. This ambitious attitude also served as a counterbalance to political reluctance (9). The formation of this steering group led to more knowledge and public support and therefore decreased *contestation and uncertainty.*

Bringing together these diverse interests, insights and world views in the steering group proved to be very time-consuming (Schwenke & Schuurs, 2017a). This was caused by the fact that stakeholders were asked to cooperate on a new product that was a mixture of private, public and social input and had no formal status (Schwenke & Schuurs, 2017a). The lack of a formal status of the pilot-RES decreased legitimacy and increased *solution uncertainty, solution complexity and contestation.* The steering

group consisted of administrative representatives of municipalities, the province, the water authorities, network operator Alliander, business community, local initiatives and societal parties. The eventual governance structure as presented in the 'Friese Energie Strategie' is shown in figure 3:

*Figure 3: the governance structure. Reprinted from: '*Brouwer, B. (2016, 15 december)a. *'Presentatie Friese Energiestrategie uitgebreid'* [PowerPoint slides]. Retrieved from:
file:///C:/Users/Acer/Downloads/Presentatie%20Friese%20Energiestrategie%20uitgebreid.pdf

Leeuwarden, a large municipality, encompassed the required capacity and expertise for such a complex transition. In contrast, this was scarce in the smaller municipalities (Schwenke & Schuurs, 2017a). This resulted in an overrepresentation of Leeuwarden in terms of decisive power. This caused discussions whether the steering committee was a good reflection, since smaller municipalities did not feel heard (14). However, the majority of municipalities did not see the energy transition as an opportunity and development possibility. Knowledge and capacity were bottlenecks, so a lot of help was needed (9, Schwenke & Schuurs, 2017a). This should be seen as *problem complexity* in terms of division of responsibilities, fueled by a high degree of *problem uncertainty*, leading to an increase in *contestation.*

Portfolio of instruments

As all regions, Friesland received funding to organize the RES-process. This was used to hire the program manager and in later stages for knowledge and expertise workshops. This helped decreasing the *problem uncertainty*. Pilot-RES region Friesland was exceptional, since the province refused to talk about new wind turbines as an technological option (Schwenke & Schuurs, 2017a). This veto was a political choice, fueled by earlier experiences with regard to wind energy which have damaged the relationship of trust between municipalities and the province. This damage resulted from a top-down organized wind turbine park, which neglected bottom-up initiatives and led to resistance among inhabitants (Hoogendoorn, 2017). This was also the reason, the province viewed this RES-process as too sensitive to take a leading role (Schwenke & Schuurs, 2017a). These earlier experiences have thus caused an immense form of *solution contestation.* In addition was the fear of public resistance of large-scale sustainable energy projects enormous (8, 9, 5).

This 'ban' on talking about wind energy was nuanced by a statement from the province emphasizing that if the ideas for wind energy came from the region itself, they be part of future workshops. However, due to the sensitivity, it was still consciously abandoned. Even though it is dubbed unwise to declare wind energy a taboo, at the same time it was seen unwise to include elements in the RES which evoke so many emotions (Schwenke & Schuurs, 2017a). Thus, to avoid contestation, the *problem*

complexity became higher. It was acknowledged that changes in the course of the RES, could eventually revise this decision.

An analysis of current and planned projects related to energy transition was made. It became apparent that their combined added value was neglectable, due to a lack of organization. Therefore, the question of how the various initiatives had to come together to make the RES a total strategy remained difficult (Schwenke & Schuurs, 2017a). As a result, *solution uncertainty* remained.

Impact and measurement

An energy analysis was executed to calculate that the energy usage in Friesland was approximately 60 PJ (Brouwer, 2016a). This quantity was distributed over built environment (45%), agriculture (5%), industry (17%) and mobility (34%) (Winsemius et al., 2017; Brouwer, 2016). For clarification it was noted that this amount of renewable energy was equal to 18.000 hectares of solar fields or 2.100 4MWe wind turbines (Brouwer, 2016a). In addition, it was the estimated that the demand for electricity in Friesland would become 34 PJ in 2050 (Winsemius et al., 2017). These numbers were based upon a detailed scenario in line with the assumptions of the Counsel for the living environment and infrastructure (Rli). Their figures have been recalculated for Friesland (Winsemius et al., 2017). This analysis decreased the *problem uncertainty*. However, this analysis did not contain a breakdown of possible technologies or potential input from stakeholders nor formal acceptance of tasks (Schwenke & Schuurs, 2017a). This was the result of the sensitivity with respect to wind energy. By neglecting this, it was omitted to reduce *solution uncertainty and complexity*.

The projected results for the pilot-RES lacked concrete targets and measurable time-bound objectives. Ultimately the results of a regional energy strategy for the long term (up to 2050) were said to include 1) Commitment and ownership of companies, social organizations and governments, 2) A process approach for responding to future opportunities and technology and 3) Process agreements about to be taken measures and decisions (FES, 2017; Brouwer, 2016a). These were not goals in themselves, but solely processes to exploit opportunities and should therefore not be seen as proper mission formulation. This lack of concreteness increased *all aspects* of solution wickedness, as in later stages characteristics of wickedness could be disputed.

This lack of concrete objectives was also said to result from the difficulty to determine which of the sectors, included in the climate agreement, had to be focused on in the RES. For example; in Friesland agriculture was an important sector with 78% of the area consisting of agricultural land. There is a definite link to CO2 reduction and energy transition when looked at possible bio fuel savings and the potential space for wind turbines or solar fields (14). It was stated that, upfront, there was no clear picture of what had to be delivered in terms of form and content of the strategy. As a result, there was a lack of focus, both in terms of course and process (Schwenke & Schuurs, 2017a, 8). Therefore, the lack of clear guidelines in the RES-program have caused *contestation, complexity as well as uncertainty.* Ultimately, it was chosen for the RES-program to focus on built environment and electricity. The sectors of industry, mobility and agriculture were said to be national tasks (Winsemius et al., 2017). This scope reduced the *problem complexity*.

In summary, the lack of existing regional structures and the rejection of responsibility by known regional stakeholders increased the problem complexity. The use of an external program manager and the formation of the steering group successfully decreased the level of contestation and uncertainty. However, the lack of a formal status of the regional level, and thus the RES-process, negatively increased contestation, solution complexity and solution uncertainty. The relationship between smaller and bigger municipalities and the difficult political commitment showed high levels of contestation. In addition, the immense contestation caused by earlier experiences even led to a 'ban' on wind turbines and thus to the refusal of a technically feasible solution. This increased the solution

complexity. As a result, the limited energy analysis was not able to diminish the levels of complexity and uncertainty. The lack of clear guidelines in the RES-program was also said to have caused contestation, complexity as well as uncertainty. The focus on built environment and electricity decreased the problem complexity.

Case 2: region Midden-Holland

Diverse stakeholder engagement & Flexible and proactive management

Pilot-RES region Midden-Holland consisted of 6 municipalities of which 5 had a already existing common agreement. The municipalities committed upfront to the pilot-RES and possessed decision-making mandate (Schwenke & Schuurs, 2017b). Municipality Aphnen a/d Rijn was administratively linked to another region but participated in the Midden-Holland pilot. It was striking that energy was not yet a theme on the strategic agenda. This was due to the consideration that 'energy issues' were not core tasks of a regional partnership, but should be tackled locally (Schwenke & Schuurs, 2017b). Ultimately, it has been decided that the theme of energy transition could not be linked to the existing cooperation structure in the region. The fact that there was a structure for cooperation which was not used for the RES, indicates an increase in *problem complexity*.

The Midden-Holland Environment Agency (ODMH) took on the leading role in the RES-process. However, as executive body, it factually had no power and no independent decision-making mandate. The pilot-RES has been placed with ODMH for pragmatic reasons. As an implementation organization it is close to practice, has expertise in the field of sustainability and has built up a strong network with municipalities (Schwenke & Schuurs, 2017b). RES-region Midden-Holland was the only region where an environment agency was the driving force in the pilot (1). Other pilot regions have, as far as possible, aligned themselves with existing administrative partnerships. It has been argued that this structure was inadequate as ownership was lacking (3, 9, 11). This increased the levels of *contestation* and *problem complexity*.

The region has been looking for a suitable program manager for quite a long time. Ultimately, the process was led by a program manager from an external consultancy firm and the regional coordinator, an ODMH policy officer. The program manager focused on external relations (non-governmental) and the regional coordinator was more internally focused (1, Schwenke & Schuurs, 2017b). This was the result of a process in which the VNG, providing allocated funding, urged for an external party. Overall, this funding helped decreasing the *problem uncertainty.* However, the ODMH wanted to take on a stronger role itself stating 'we must ultimately implement the RES ourselves' (Schwenke & Schuurs, 2017b).

The pilot started with representatives from the six municipalities, the province and the water authorities. After a stakeholder analysis performed by ODMH, based on their existing network, energy cooperatives, the network operators, private stakeholders and housing corporations were added to form a wider group of key stakeholders (Schwenke & Schuurs, 2017b; 9). These stakeholders formed the steering group (ODMH, 2017a; Schwenke & Schuurs, 2017b). Together, these were the major energy consumers and the front runners in the energy transition. Their task was described as establishing the ambitions and translate these into spatially viable plans and an administrative agreement (Schwenke & Schuurs, 2017a). Forming such a steering group should be seen as a tool to reduce *contestation and uncertainty.* The used process organization is represented in figure 4;
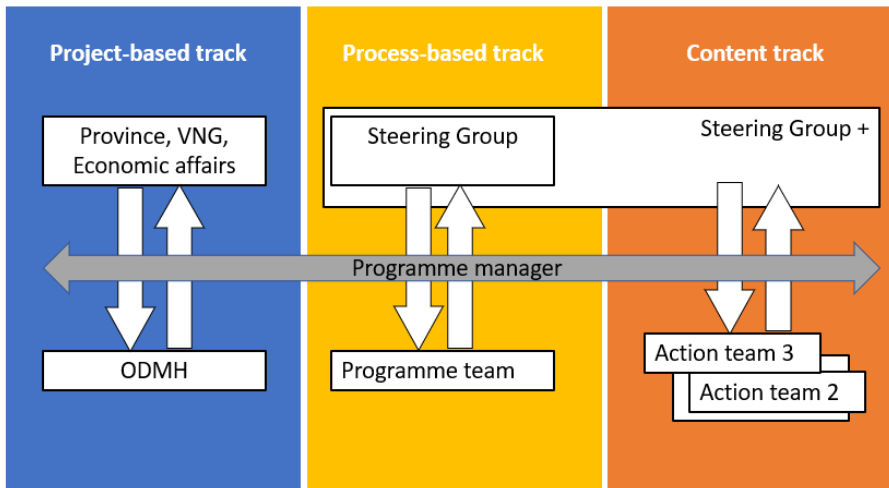
Figure 4: proces organization. Reprinted from: ODMH. (2017, march)a. *'Factsheet, Regionale Energiestrategie Midden Holland'*. Retrieved from: file:///C:/Users/Acer/Downloads/factsheet-regionale-energiestrategie-midden-holland.pdf

The analysis for potential stakeholders, executed by the program manager, has been experienced as a time-consuming activity. One-to-one conversations with potential stakeholders proved to be necessary to see who was or was actively involved in energy transition (Schwenke & Schuurs, 2017b). This analysis thus led to a decrease in *contestation and uncertainty* Despite this, a number of important stakeholders felt they were insufficiently involved in the pilot. This applied for property owners, project developers and representatives of nature and landscape management. This is important since the latter parties are generally critical of wind and solar parks (Schwenke & Schuurs, 2017b). The leaving out of important stakeholders in the steering group, could lead to *contestation* in later stages of the mission.

Impact and measurement & Portfolio of instruments

During the pilot-phase the region had the ambition to be energy-neutral and 'almost' fossil-free by 2050 (1). The aim of the pilot was working in collaboration with all relevant stakeholders on 1) the realization of the intended CO2 reduction in the short term and 2) on merging all insights, developments and plans into a coherent strategy to achieve the ambitions in the long term (ODMH, 2016). These goals remain rather qualitative and can hardly be seen as a good mission formulation. This lack of concreteness maintained room for *all aspects* of solution wickedness.

To support these vague statements with a concrete diagnosis, an energy analysis has been executed (Posad, 2017a). This showed that the region used 23,9 PJ of energy on a yearly basis of which only 2% was generated sustainably (Posad, 2017a; ODMH, 2016). Using the index of the Dutch planning agency for the living environment (PBL), this energy use would increase to 27,5 PJ in 2050 (ODMH, 2017b). However, applying a 30% potential energy saving, a substantial energy demand remained of 18.9 PJ for 2050. For this analysis, all five sectors were used (Posad, 2017a). However, the region noted that the sectors of industry, mobility and agriculture should be probably be organized by higher level governments (ODMH, 2017b). This decreased the level of *problem complexity*. This analysis explored the possibilities of the energy transition in terms of renewable energy. The region acknowledged that if all possible techniques are used optimally, Midden-Holland could become a net producing region. With a potential energy generation of 36,5 PJ, much more electricity can be generated than is required (ODMH, 2016). This has been visualized in figure 5. This diagnosis helped decreasing the *uncertainty*. Furthermore, it portrayed the *solution complexity* of the RES.
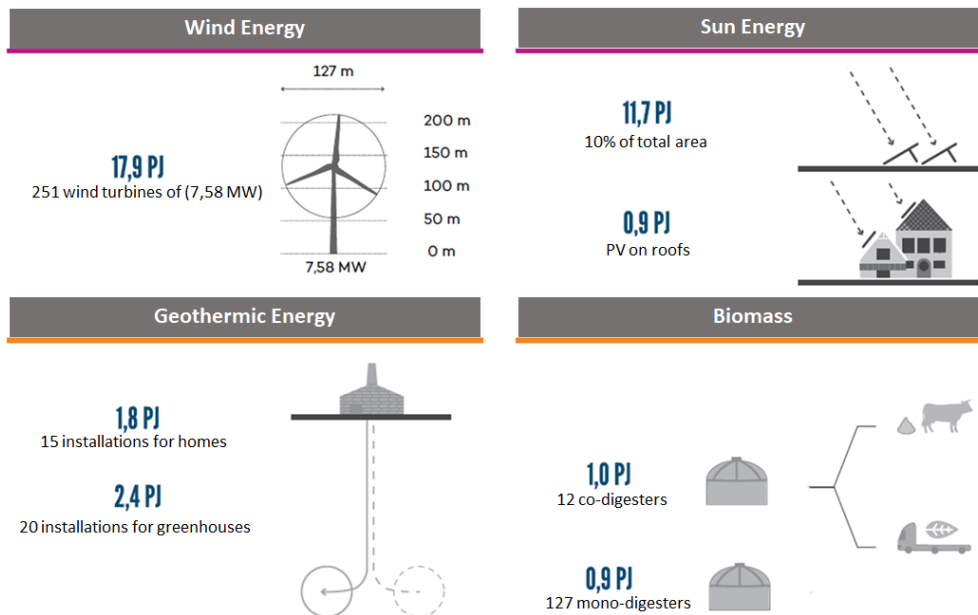
Figure 5: potential maximum output, per source. Reprinted from: Posad. (2017, may). *'Samenvatting Regionale Energiestrategie Midden-Holland'*. Retrieved from: file:///C:/Users/Acer/Downloads/Samenvatting%20Regionale%20Energiestrategie%20(RES)%20%20Midden%20Holland.pdf

However, experts stated that wild plans and ideas were being launched, most of which were unrealistic. This caused an increase in *contestation.* This was seen as a result of the qualitative nature of the ambitions. As a result few concrete plans emerge (Schwenke & Schuurs, 2017b). The region tried to refer to energy projects that were already underway. It was however difficult to find out how far other projects have progressed, what the chances of success were and who the initiators were. This caused an explanation of the project overview to be missing in the policy report (Schwenke & Schuurs, 2017b). As a result, *solution complexity* and *uncertainty* remained an issue.

In summary, the fact that the RES did not use the existing regional structure for cooperation indicated an increase in problem complexity. In addition, the organization in which ODMH was in the lead was not seen as legitimate by several stakeholders. This caused an increase in contestation and uncertainty. The formation of the steering group successfully decreased the level of contestation and uncertainty. However, when such a steering group misses important stakeholders it leads to contestation. The energy analysis helped decreasing the uncertainty. The choice to focus solely on electricity and built environment reduced the problem complexity. However, due to a lack of concrete realistic plans, solution complexity and uncertainty were not reduced.

Case 3: region West-Brabant

Contractor and Coordinator of the pilot was the RWB (Region West Brabant), a network organization of the 18 municipalities. RWB is a public body funded by the participating municipalities (Schwenke & Schuurs, 2017c). In West-Brabant, there was a long-term existing regional cooperation on the themes of energy and sustainability. These themes were seen as priority tasks of the regional strategic agenda, and have, prior to the pilot, been anchored administratively in RWB programs (Schwenke & Schuurs, 2017c). The fact that there was an existing structure to build on indicates less *complexity* and *contestation.*

However, during the pilot, cooperation on sustainability within structure of the RWB was under discussion. The municipalities were positive about the RES, but distrusted the existing structure of the RWB. This increased *contestation*. This resulted in poor mutual relationships on sustainability dossiers

and influenced the RES process negatively (Schwenke & Schuurs, 2017c). This was striking, since the RES pilot was intended to strengthen regional cooperation. The administrators of the municipalities wanted to return to the core tasks (economy, mobility, labor marked and space) and considered a new joint arrangement for sustainability. This indicated an increase in *solution complexity*.

The municipalities saw the RES as a strategically important project. In terms of political commitment, all signed a letter of intent for participation in the pilot in February 2016. This decreased *problem contestation.* However, the small municipalities were said to have no idea what they were signing for, both in terms of process and scope of the assignment (Schwenke & Schuurs, 2017c). This showed high levels of *uncertainty.* In general, there was tension between large cities and smaller municipalities. Large municipalities have their own knowledge and capacity, however they also need smaller municipalities*.* This created *contestation.*

RWB noted that without Consultancy firm Overmorgen, which functioned as external program manager, the pilot-RES probably never would have gotten off the ground (Schwenke & Schuurs, 2017c). This external support greatly increased the perseverance. An advantage of the external party was that it stood at some distance of other stakeholders. However, it must not neglect regional sensitivities. Therefore, a regional coordinator needed to be someone who knew the region well and could manage regional support. Such a program manager decreases levels of *contestation*.

As there was information available from previous processes, RWB was of the opinion that an extensive inventory phase was no longer necessary. However, the program manager insisted on this inventory to generate an overview of potential stakeholders. The program manager has had discussions with the most important parties in order to get a better understanding of the expectations of the pilot. This process led to an decrease in *contestation and uncertainty*. It was however mentioned that several stakeholders questioned what the formal and legal status of the RES-program was. This increased *solution complexity and solution uncertainty.* Eventually a steering group was formed with administrators of the province, water authorities, a housing corporation, network operator Enexis, ROC West Brabant, an official from economic affairs and as chairman RWB (Schwenke & Schuurs, 2017c).

The steering group was instructed to set up the definitive cooperation organization as quickly as possible in which the steering group had to take on the role of regional alliance (de Gelder, 2017b). The steering group has been experienced as positive. Because of their knowledge and experience, they regularly had more vision and experience than the municipalities (Schwenke & Schuurs, 2017c). As a result, such a steering group decreases the level of *contestation* and *uncertainty*.

Impact & Measurement and portfolio of instruments

As all regions, West-Brabant received funding to organize the RES-process. This was used to hire the external program manager and in later stages for knowledge and expertise workshops. This helped decreasing the *problem uncertainty*. Ultimately, the region had the ambition to be energy-neutral by 2050 (de Gelder et al., 2017a). Consultancy company Posad, provided a concrete diagnosis of the region and stated that energy neutrality was not (yet) a realistic target (Posad, 2017b). To support these statements, an energy analysis has been executed (Posad, 2017b). This showed that the region used 111 PJ of energy on a yearly basis. With an autonomic growth this would be 123 PJ in 2050, based on the index of the Dutch planning agency for the living environment (PBL). After applying potential energy savings, a substantial energy demand remained of 95 PJ for 2050. However, it was calculated that, when all possible techniques were used optimally, West Brabant had a maximum generation perspective of 70 PJ. This analysis explored the possibilities of the energy transition in terms of

renewable energy. These calculations have been visualized in figure 6.This diagnosis helped decreasing the *problem and solution uncertainty* and visualized the solution complexity.
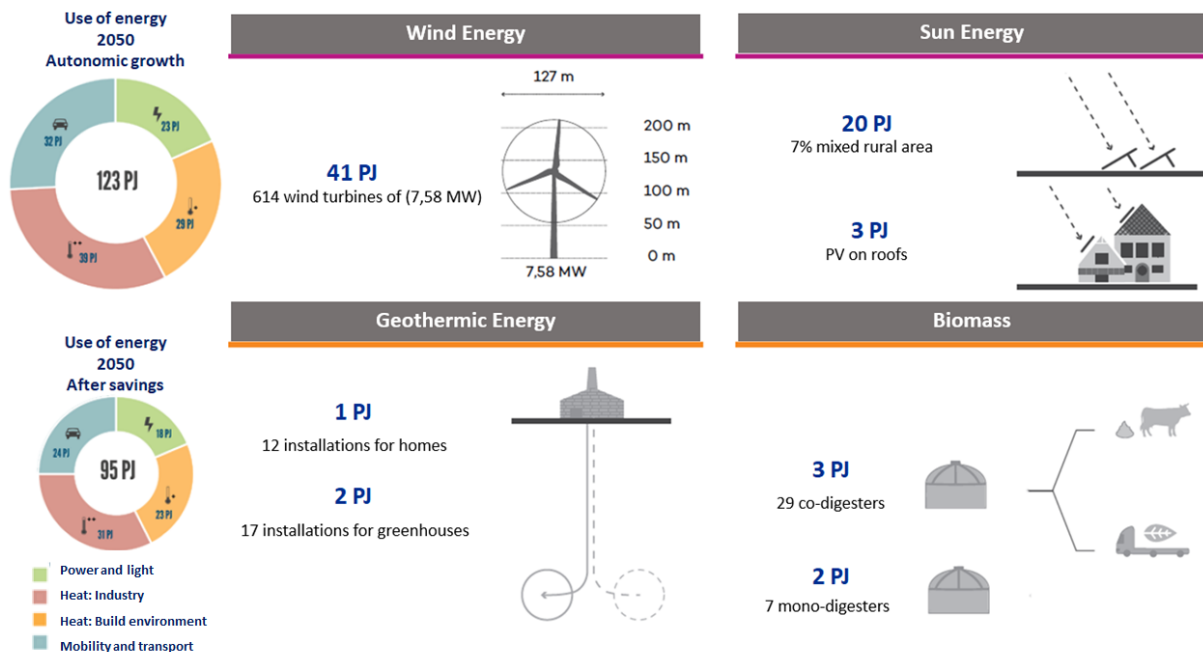

Figure 6: Factsheet usage of energy and potential for renewable energy. Adapted from; Posad. (2017, may). *'Energie en Ruimte West Brabant'*. Retrieved from:

http://energietransitiewb.nl/wp-content/uploads/2017/08/170530_POSAD_1638_rapport_West-Brabant_Lowres.pdf

The region described the task as 1) save 28 PJ in total, which amounts to approximately a 25% saving of the expected energy consumption in 2050, 2) focus on the sustainable generation of the 95 PJ demand that remains and 3) generate a new awareness and ownership that are needed to achieve an energy-neutral region in 2050 (de Gelder et al., 2017a). These clear goals diminished the level of *contestation*.

There have been extensive discussions about the scope, themes and scale of the RES to address this immense target. The region has aligned itself with the national transition paths. An important criterion for determining whether a project or sector fell within the scope of the regional strategy was the degree of influence of regional parties and ownership. For example, the region has little influence on transport through the region or the energy-intensive industry. These are issues for which it is up to the national government. However, it was striking that the mobility and industry sector presented a considerable share in the energy consumption of the region (Posad, 2017b). The pilot-RES ultimately chose to focus on electricity and built environment (de Gelder et al., 2017a). By determining the division of responsibilities the *problem complexit*y was reduced.

In summary, the fact that the RES was able to use a existing governmental structure reduced the problem complexity. However, the structure of RWB was not seen as legitimate. This caused an increase in contestation. The political commitment in the region decreased contestation, however problem and solution uncertainty was high due to a lack of knowledge within smaller municipalities. The use of an external program manager, the executed stakeholder analysis and the formation of the steering group successfully decreased the level of contestation and uncertainty. However, stakeholders questioned the lack of a formal status of the RES-process. This negatively increased solution uncertainty and solution uncertainty. This energy analysis helped decreasing the problem and solution uncertainty. In addition, the concrete targets decreased contestation. By determining the division of responsibilities the problem complexity was reduced.

Case 1: region Friesland

The official reports of the pilot-RES stated that no stakeholder is solely responsible for this regional task. Municipalities, the province, water authorities and regional partners were to make choices together (Winsemius et al., 2017). However, the division of tasks and responsibilities among stakeholders has been difficult in Friesland. The municipality of Leeuwarden together with the province, often had diverging strategic intentions, expectations or opinions with respect to the other municipalities (14). This caused *solution contestation*. It has been said to be a repetitive situation, as there has often been struggle between the province and municipalities (14). Furthermore, Friesland is characterized by 408 different municipalities that have a great sense of community (8; Winsemius et al., 2017).

To overcome contestation, directing the entire RES-process and making agreements about roles was needed. The RES-document noted that a precondition is that there is sufficient capacity and knowledge and expertise at the various organizations to fulfill their role (Winsemius et al., 2017). This to ensure a lower level of *solution uncertainty.* However, this emphasis appeared to be insufficient. The chairman of the constituted steering group turned out to be unable to give much direction to the steering group. This caused the process to have a slow start (Schwenke & Schuurs, 2017a).

In addition, representatives of local initiatives were pessimistic as they thought that the used approach would not lead to a conclusive strategy. They were of the opinion that small group of stakeholders should have been used for the principles and structure after which other parties should have been made co-responsible (Schwenke & Schuurs, 2017a).. They did not approve of how the mission involve a wide group of stakeholders, including movements in civil society. This indicates that the RES process was not yet seen a adequate. The lack of a formal status of the RES-process and lack of formal ownership play an important role in this. This increased the level of *contestation, complexity and uncertainty.*

Furthermore, the perspectives in terms of technology and private or organizational interests differed to greatly (Schwenke & Schuurs, 2017a). Representatives of private stakeholders noted that companies that regard sustainability as a marketing term differ too much from governmental organizations. They stated that the vast majority does not think in terms of long-term strategies, but focuses on work for the short term (Schwenke & Schuurs, 2017a). This increased *contestation.*

The program manager was convinced a process had started that could not be stopped anymore due to the new urgency awareness (Schwenke & Schuurs, 2017a). However, there has been doubt whether the responsible stakeholders have the ability to address the problem properly. A definite lack of knowledge among politicians and political organizations was noted. This caused an increase in *solution uncertainty*. One interviewee dubbed lack of insight into social consequences and risks as paralyzing (8). The diverging expectations in combination with a lack of knowledge led to risk avoiding behavior and lack of decisiveness (Schwenke & Schuurs, 2017a).

In terms of *impact and measurement*, the pilot-RES Friesland never truly reached mission execution. This is embodied by the statement in the final pilot RES report that the next step would be to answer the 'how' question (Winsemius et al., 2017, p. 4). The program manager noted that it was gradually realized that a substantive strategy was not feasible at that moment. As a result, at the end of the pilot phase, there were no short-term and mid-term action plan, no financing, budget designation or investment agenda. There was an overall lack of decision making (Schwenke & Schuurs, 2017a). Therefore, *solution uncertainty* was not decreased. In the final report there was a timeline with set milestones. However, descriptions on how to get there were lacking (Winsemius et al., 2017). This was

partly the result of a lack of assurance (*'borging'*) within the regional governmental structure. Assurance is the formal commitment throughout a long-term process to ensure that stakeholders keep the made agreements. Several interviewees named assurance vital to maintain momentum and keep a sense of urgency and ownership in the process (5, 8, 9). Assurance is vital to decrease solution contestation, since stakeholders have officially agreed with a chosen strategy. Furthermore, assurance decreases solution uncertainty as it provides a knowledge base that all stakeholders can fall back on.

However, in Friesland governmental assurance was not on the agenda until October 2017. It was highly questionable whether that would actually lead to decision-making, with new municipal elections in March 2018. This led to an increase in *solution contestation and solution uncertainty.* Ultimately, the RES was introduced in October 2017 in different political bodies, with a agending character and a lack of substantive details (Schwenke & Schuurs, 2017a).

In terms of a *portfolio of instruments* there has not been an economic impact analysis on the opportunities that the energy transition offered. The program manager considered it to early and not useful, due to the many uncertainties and the lack of clear choices (Schwenke & Schuurs, 2017a). Therefore the *solution uncertainty and solution complexity* were not decreased.

The VNG did fund diverse activities in the region. They supported the region with money and provided actually agreed upon amounts for mandatory workshops (10). Preparation of the spatial-workshops (*'ruimte-atelier'*), considering the spatial integration of renewable energy, took more time than had been estimated. Moreover, the budget for external support turned out to be insufficient, making the desired quality not feasible. This resulted in a spatial analysis of the region solely done in outline. Therefore, *solution uncertainty* was not decreased as much as possible. This analysis has also not been mapped in the workshops due to political sensitivities with respect to wind turbines (Schwenke & Schuurs, 2017a). Therefore, stakeholder contestation stopped a reduction of *solution uncertainty*. Furthermore, despite their explorative nature, the number of goals that the studios intended to achieve turned out to be (far) too large for the limited time: (1) promoting awareness among stakeholders, (2) jointly explaining the task, (3) gaining insight into the spatial implications and (4) make a link with social and economic themes and agendas such as poverty, shrinkage (Schwenke & Schuurs, 2017a).

In terms of *flexible and proactive management*, the external program managers has been found useful as it provided knowledgeable and supportive dynamics in the process. However, it was noted that the mission could not be solved by external help. It required mobilizing regional specific organizational capabilities. Support from the national level is said to be welcome as long as it does not lead to dependence. The region must feel as the owner of the process (8). This is why there were concerns about the era after the pilot, when that support is no longer available (Schwenke & Schuurs, 2017a). This dependence on the external program manager increased *solution uncertainty.*

Furthermore, both budgeted capacity and budget for implementing the pilot proved insufficient. The deployment of coordinators was greater than expected and the commitment at municipal level has also been exceeded by a factor of 2 to 3. The available budget has been increased by around 25%, in particular to enable additional services of the program manager and for guidance of the spatial-workshops (Schwenke & Schuurs, 2017a). This increase of budget therefore decreased *contestation and solution uncertainty.*

Case 2: region Midden-Holland

The pilot-RES tried to involve a wide group of stakeholders, including movements in civil society, in several ways. There was a broad steering group which steered the program team and action teams. The steering group included provincial administrators, network managers, municipalities, water authorities, energy cooperatives, a housing corporation, horticultural association and LTO-Noord and the sustainability platform (companies) (1, Schwenke & Schuurs 2017b). This inclusion of stakeholders should lead to a decrease in *contestation and solution uncertainty*.

In the steering group diverging strategic intentions, expectations and opinions of actors have been an issue. A lot is said to be viewed from within the stakeholders' own operations, for example sunroofs or small wind turbines (Schwenke & Schuurs 2017b). This has increased the *contestation*. As a result there are varying schools of thought about land use for energy generation. LTO-Noord was in favor of solar cells on roofs instead of on agriculture land. However, other stakeholders noted that farmers must decide themselves whether they want to use their land for solar panels or wind turbines (Schwenke & Schuurs, 2017b).

Furthermore, a number of important stakeholders felt insufficiently involved in the pilot. Nature and environmental organizations, landscape management, project developers and real estate owners were not represented in the steering group. As a result, their opinions have been suppressed during the mission formulation. This indicates high levels of *solution contestation*. In addition, a tension between the broad stakeholder process (participation process) at the front and formal decision-making at the back was noted. The risk that the city councils will set new requirements and conditions in the decision-making phase is noted. Hereby, they will frustrate the process that other participants who have provided input on. This indicates high levels of *contestation*.

It was originally foreseen that the decision-making would take place in September 2017 in the form of the signing of a Climate Covenant. However, this was postponed until the end of 2017. Members of the steering group thought it was better to delay formal agreements as otherwise, members of stakeholder groups were not sufficiently included (Schwenke & Schuurs, 2017b). The members of the steering group showed awareness for possible *solution contestation*. It was feared that a covenant could put too much pressure on stakeholders, with the risk that they would drop out, when development of cooperation relationships and organization with broad support was forced (Schwenke & Schuurs, 2017b). The short lead time of the pilot was said to be a concern from the start.

For *impact and measurement*, two months after the pilot ended, in December 2017, the region drew up the postponed covenant to record the agreements on cooperation and assure follow-up (ODMH, 2017b). This was based on the insights that much more had to be done, that cooperation could be done better and could faster lead to results, in particular the ultimate goal (ODMH, 2017b). The covenant aimed to assure the results achieved in the pilot and guarantee further steps. Furthermore, it had the objective to commit all relevant stakeholders to the goals of 2050 (ODMH, 2017b). Therefore, the covenant should led to a decrease is *solution contestation.*

It contained the results of the inventory, spatial analysis, workshops and provided a list of short term projects. Moreover, it included an economic impact analysis on the opportunities that the energy transition offered. The impact was calculated for the domains of employment, the labor market, education and financial impact (ODMH, 2017). This way the covenant decreased *solution uncertainty*. In addition, the covenant emphasized the importance to continuously monitor the result during the follow-up phases. This way, it was said to be possible to check, evaluate and adjust recorded agreements where necessary (ODMH, 2017b). To this end, Midden-Holland has started to use an monitoring tool. In the future, monitoring should lead to a decrease in *solution uncertainty* as it analyses what solutions work best in reasonable time.

However, ultimately this needed political assurance did not take place. This was caused by the fact that the pilot-RES proposed agreements that did not correspond to the provincial policy (3,7). As a result, the province did not commit to the RES-process even though it was a vital stakeholder. This caused an almost insurmountable form of *solution contestation*. This occurred even though a provincial administrator was part of the steering group. Therefore, this emphasized the importance of mandate to truly represent a stakeholder group.

As a result, there were immense concerns about the continuity of the RES-process. In terms of *flexible and proactive management* it was necessary to reserve manpower and resources for the follow-up process, decision-making by the municipalities. However, no money or resources were arranged, for a follow-up process at the end of the pilot-RES. This increased the level of *solution uncertainty and contestation.* Expectation were it would stand still for at least half a year until after the elections (Schwenke & Schuurs, 2017b). These fears, have become reality as several interviewees noted there has been a clear gap between the pilot and follow-up phases (1, 3, 9). This so called vacuum was partly the result of the elections after which ODMH had to start over with recreating a political commitment. This entails that the political assurance had not taken place adequate.

Another reason for this gap was said to be the coordination structure within the region. There had been critique on the management within the OMDH as they had no mandate (Schwenke & Schuurs, 2017b). RES-region Midden-Holland was the only region where an environment agency was the driving force in the pilot (Schwenke & Schuurs, 2017b). The essential capacities in public organizations and institutions to effectively coordinate and provide direction to stakeholders when implementing missions were therefore lacking. This caused an increase in *solution uncertainty*. Interviewees noted that when the program manager left, the collaboration stopped (3,9).

In terms of *portfolio of instruments*, RES Midden-Holland has organized three workshops with a designing and open character. The workshops were subdivided into different groups: based on stakeholder type, theme (wind, sun, heat, saving, biomass), type of landscape (city or outlying area) and area (sub-regions) (1). The outcomes of the studios were summarized in two maps in which projects were spatially drawn: one for the short term and one for the medium term and partly visualized in image impressions. This decreased the level of *solution uncertainty*. Extensive reports are available for the first two workshops. The material has been processed in the report: RES Midden-Holland (Schwenke & Schuurs, 2017b).

Stakeholders reacted in varying ways to the workshops. The open approach with scenarios was called inspiring and inviting of free and creative thinking. At the same time, some wondered what it all led to as it was not clear what the next steps were and how the workshops fit into the context of the pilot process. Clear program management was missing in their opinion. This lack of clarity about effects reduced the legitimacy of the workshops. This was in line with the lack of a formal status of the RES-process. Together, this increased the *contestation and solution uncertainty*. Furthermore, it was noted that it took too long for the next workshop to be organized. This interrupted the thinking process and made it difficult to stay motivated (Schwenke & Schuurs, 2017b).

Despite that, various initiatives and projects that could contribute to the collective regional objective were launched during the meetings, workshops of the pilot. A director has been appointed for each project and the first follow-up steps have been mapped. The degree of progress differs enormously per project (ODMH, 2017b). 9 projects were listed in the covenant as examples (ODMH, 2017b, p. 14). This decreased the level of *solution uncertainty*. However, there was a clear lack of projects involving with behavioral change.

Case 3: region West-Brabant

In October 2017 the final RES-document named 'ONS2050' was offered to the partners in the region (de Gelder et al., 2017b). During the RES an inventory of stakeholders had been carried out, however it has not been recorded explicitly. In the final document, the RES distinguishes between the 4 specific groups. These '4 Os' were entrepreneurs, education, enterprising inhabitants and the government (de Gelder et al., 2017b). It remained unclear how the municipalities have been involved. Municipalities have been informed in several ways, however during the pilot-phase it became clear that was insufficient. This caused *contestation*. There has been a concern about political support (Schwenke & Schuurs, 2017c). In general, there was the classic tension between large cities and smaller municipalities. Large municipalities have their own knowledge and capacity, but they also realize that they need smaller municipalities (Schwenke & Schuurs, 2017c). However, they differed in strategy in terms of administrative context. This is relevant because the administrative cooperation that was arranged under RWB was under discussion. Several municipalities wanted to get sustainability out of the regional core tasks, which was at dispute with the RES-pilot (Schwenke & Schuurs, 2017c). This caused *solution contestation*.

The workshop monitor noted that, in general, a lack of knowledge among the stakeholders is present. Time would be needed to build that up (Schwenke & Schuurs, 2017c). This is a dilemma, because the stigma of talking groups is not what they wanted. The province was an important stakeholder as it already had an energy agenda and an energy implementation program. However, the province was said to take a fearful, cautious and ambivalent approach. This causes it to be not sufficiently clear what will happen with the RES (Schwenke & Schuurs, 2017c). This showed a high level of *solution uncertainty.*

Furthermore, the business community was difficult to involve in the process. It was said that companies don't want to talk, but simply want to get started. The business community in the region was well organized and represented by the regional organization BZW. However, BZW was deliberately not involved in the pilot. They disagreed with the approach of the RES pilot starting with the government, with money already arranged. The approach was already put on paper when BZW was approached. At that time, the BZW no longer wanted to join. Moreover, they found the approach far too governmental, with too many discussion groups (Schwenke & Schuurs, 2017c). This showed a high level of *solution contestation.*

In terms of *flexible and proactive management*, much attention has been paid to the question of what type of implementing organization could guarantee continuity in the longer term. Several options have come by; a place in the new RWB, or a construction where the energy theme is removed from the government. The question here was what the best construction was to build up the needed organizational capabilities in order to decrease *solution uncertainty.* However, the discussions about the reorganization of RWB have strongly influenced the process and the ideas about the implementation organization of the RES. (Schwenke & Schuurs, 2017c). This should therefore be seen as *solution contestation.*

In the draft RES (June 2017) a choice was made for the creation of a new entity; Foundation ONS2050 (de Gelder et al., 2017c). This foundation had to give shape to implementation work with other stakeholders. This showed flexible management and a sense of experimentation. However, there was a lot of restraint towards the idea. Municipalities preferred to place the RES in an existing entity instead of creating a new one (Schwenke & Schuurs, 2017c). In addition, question remains including to what extent stakeholders other than the government would be part of the board and what mandate this

organization should receive (Schwenke & Schuurs, 2017c). Therefore, this experimentation led to more *contestation and more solution uncertainty*. As a result the foundation was only shortly mentioned in the final RES document as a potential form of cooperation which was to be explained in the appendix (de Gelder et al., 2017c).

In terms of *impact and measurement* on June 28 2017 the draft RES named 'ONS2050' was offered to the partners of the RES which was followed up by the final version in October 2017 (de Gelder et al., 2017a; de Gelder et al., 2017b). The proposed strategy consisted of seven qualitative guiding principles. The principles gave substance to the task of creating new awareness and necessary ownership (principles 1-2) and the way in which energy saving and sustainable generation could be realized (principles 3-7) (de Gelder et al., 2017b).

In addition the pilot-RES contained an implementation agenda with 8 necessary actions (de Gelder et al., 2017b). However, these actions stayed too qualitative and were not obligated. This causes the RES to have the character of an advise. It solely outlines the framework, lines of thought and offers an assessment framework (de Gelder et al., 2017b). As a result, the *solution uncertainty* was not decreased. The REs-document did contain the energy analysis as described above. However, social costs and benefits analysis were still needed. This furthermore increased the *solution uncertainty*.

The decision-making phase was named tricky. The province was probably not going to sign the RES, which made municipalities worried (Schwenke & Schuurs, 2017c). Municipalities with an established energy policy were expected to endorse the RES, others for whom the energy issue was new were expected to have more difficulty with it. This increased *solution contestation*. The regional coordinator acknowledged that the decision-making phase was underestimated. As he said they did no pay sufficient attention to the internal processes of the municipalities it was possible nothing would happen (Schwenke & Schuurs, 2017c). Private stakeholders stated they didn't expect much. They were afraid, as there were elections in the near future, new alderman would be selected and everything had to be done all over again (Schwenke & Schuurs, 2017c). Eventually, the RES process would indeed partially come to a standstill after the elections. Therefore, this lack of assurance resulted in an increase of *solution contestation and solution uncertainty*.

In terms of *portfolio of instruments* there was a lack of an overview of projects, however some examples were given in the RES (de Gelder et al., 2017b p. 4). A spatial analysis has been executed by an external consultancy company. It was based on a database with a calculation model with which energy system choices and the spatial consequences were calculated. (Schwenke & Schuurs, 2017c). There was an extensive overview of projects and ideas in the spatial map, feasibility of which was however unclear.

The energy and spatial analysis used a 'design research' as method. This was noted to be a relatively common tool in architecture and spatial planning, but new for the energy sector (Posad, 2017b). In short it means that a selected group of stakeholders in 2-3 sessions (workshops) collectively and from different perspectives map out the opportunities, possibilities and consequences of the energy issue, given spatial frameworks and preconditions. This resulted in a number of maps and future scenarios that supported the strategy-making process (Schwenke & Schuurs, 2017c). This decreased *solution uncertainty.*

However, there was not yet a "vision map" in which choices have been made between conflicting space claims. This was done to avoid solution contestation. Therefore, policy legal preconditions, political positions of the province and municipalities or financial reasons have not been considered. The intention was that all space claims would be visible in one map, including conflicting claims /

bottlenecks. Space claims other than energy have not been mapped such as water storage, tree cultivation, etc. (Schwenke & Schuurs, 2017c). Therefore, to prevent solution contestation, a decrease in *solution uncertainty* was not possible.

The workshops did not provide insight into the economic and social costs and benefits, such as employment financing and benefits. This was experienced as a miss, after which an additional budget was requested. This was possible as there was a lot of money available for the energy transition (Schwenke & Schuurs, 2017c). This additional budget ultimately leads to a decrease in *solution contestation.*

The first phase was called **project preparation and organization**, in which lesson 1 was; *'acquire commitment before the strategy process'*

This was the instruction to join existing regional cooperation structures, relationships and traditions. Since the region is no formal layer of government the added value should be made clear. The pilot regions show that the RES primarily offers a platform to efficiently organize knowledge and capacity. Regional key persons can be of great importance bringing together different interests. Commitment before the strategy thus decreases *contestation.*

Lesson 2 was; *'ensure a powerful project organization'*

It should be carefully considered which parties and especially which people are involved in the project organization. It is important to have someone with the right knowledge and mandate. The project organization often consists of a management group, a program team with a program manager and region coordinator. A broad representation with important stakeholders reinforces the commitment, but can also make the organization less efficient. Furthermore, a professional independent process management has been of great value in the pilot regions. A powerful project organization decreases levels in *contestation and uncertainty.*

Lesson 3 was; *'organize the process flexible'*

Creating a strategy is not a linear process. The assignment, the duration and the uncertainties in the approach require continuous coordination, a learning approach and shared ownership among the stakeholders involved. The expectations, beliefs and interests of different people and parties differ. The expectations, goals, tasks and approach must also be clearly formulated in advance. It is an important task of the program manager to manage expectations. This will decrease *contestation*.

Intermezzo; *the stakeholder analysis*

After these three lessons the value of a good stakeholders analysis was explained. The proposed analysis consisted of three steps; 1) make a list of all possible stakeholders, 2) make an inventory of everyone's interests and position in to the task and 3) Choose the parties with the most impact on the success of the phase you are in. A good stakeholder analysis decreases contestation.

The second phase is **assessment and analysis**. Lesson 4 was; *'determine the starting point of the region'*

This contains an analysis of the existing dynamics. This entailed looking at ongoing initiatives. However, this was hard, due to lack of databases and missing information about the benefits is missing. Furthermore, this is the determination of the assignment. Which is a regional translation of the national task. In addition, it should be determined what aspects the region can influence. Decide sharply what the region really has influence on and what the scope of the strategy should be. This decreases the levels of *problem complexity and problem uncertainty.*

Lesson 5 was; '*make the possibilities transparent'*

As the energy transition has consequences for the landscape, choices are going to be made in the strategy. Making it visible too early can increase contestation. The pilot-RES regions organized energy and spatial workshops for stakeholders to map the possibilities and spatial consequences of the energy transition. This decreases *solution uncertainty*.

Lesson 6 was; *'carry out mission work'*

Calculating the regional task does not mean that it is automatically accepted as ambition or goal. Most people are hardly prepared for its size and complexity. Acceptance requires a lot of effort from the

project organization. This lesson emphasizes the careful manner which should be used to create awareness and acceptance. Take the time and resources required for this into account. This decreases *contestation*.

The third phase is **alliance and planning**. Lesson 7 was; *'make it concrete'*

The task of the regional energy transition is large and complex. Abstract goals in petajoules and CO_2 tons do not appeal to the people involved. To give the strategy a face there should be focus on alliances that are forming or projects and measures that will take shape in the coming years. Make concretely what is feasible and realistic given the assignment and when what can be achieved. This decreases *solution uncertainty.*

Lesson 8 was; *'acknowledge that a strategy is a cyclical process'*

No strategy is set in stone. The energy transition requires an approach that is based on progressive insight and continuous learning and adjustment. Therefore continuity of the process in the longer term should be ensured. This way lasting cooperation between all parties involved, development and sharing of knowledge, ensuring sufficient capacity and resources, and administrative involvement is ensured. This decreases *solution uncertainty and contestation.*

The fourth phase is **decision making.** Lesson 9 was; *'anchor the strategy'*

The region is not a formal administrative layer. The strategy can therefore only be translated into policy through decision-making in the political bodies of the participating governments. Ensure that the strategy is well anchored in administrative and political processes. It decreases *solution uncertainty and solution contestation.* The pilot shows that decision-making is difficult.

Lesson 10 was; *'link the assignment with other policy files'*

The energy transition is not just about energy. It is, among others, also about housing costs, health, landscape design and investments in industrial innovations. That means that the RES actually has common ground with almost all administrative core tasks. The energy strategy achieves results by linking the assignment to the goals and agendas of all administrative core tasks. This provides a greater knowledge base and thus decreases *solution uncertainty.*

Lesson 11 was; '*make sure that stakeholders commit*'

Even though a strategy has broad support, without an agenda in which the task is translated into concrete measures and projects for the coming years, it remains just a report. Stakeholders have to commit to implementation, by drawing up and signing a cooperation agenda together, to make the strategy stick. This way contestation is *decreased*.

The translation of the strategy into a cooperation agenda can only be successful, when it is realized that it depends on developments outside the region. The national government is a very decisive actor for the effectiveness of a regional strategy. Legislation and regulations can reduce non-committality, communication and information can contribute to reinforcing public urgency.

The fifth phase was **execution**. Lessen 12 was; *'apply continuity to the implementation organization'*

Organizational power is needed to achieve implementation. Ensure that the strategy leads to the realization of the set goals in the coming years and that the plans and projects are implemented or adjusted. The long vision period of the RES requires an adaptive approach and flexible organization of cooperation with stakeholders. New stakeholders must be able to connect and integrate, and social and technological innovations must be able to find a place. This should decrease *solution uncertainty.*