



Participatory Governance in Cape Town

An insight into the policy domain of solar water heaters for low-income areas

Renske Koster
S1007420

Beachelor Thesis Geography, Planning and Environment (GPM)
Faculty of Mangement, Radboud University Nijmegen

Supervisor: S.A. Veenman
Second Reader: M. Kaufmann

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Executive summary

This study began with the challenges South Africa is facing when it comes to its renewable energy strategic implementation and its reduction of energy poverty. One of the strategic interventions to deal with these challenges is the rollouts of solar water heaters (SWHs) in low-income areas. SWH technology has the potential of providing many environmental, social and economic benefits by providing the poor with renewable systems that provide access to hot water. When the local community who receives the SWH systems participates in the governance and development of such projects the benefits increase and the implementation runs more successful.

Even though SWHs provide people with many benefits, the existing SWH rollouts have experienced many barriers. These barriers have led to the stop of the national SWH program, and therefore, the goal set by the DoE to install 1.25 million SWH by 2019 will not be met. The freezing of the national SWH program resulted in the fact that currently also local authorities and initiatives have abandoned SWH implementation. However, still, a lot can be learned from projects rolling out SWHs on a local level as these projects hold essential information on which future decisions regarding the implementation of SWHs can be made.

In Cape Town, the rollout of SWHs in Kuyasa is one of the most successful attempts. This success is directly related to extensive community engagement in the project. To learn how this high level of participatory governance influenced the barriers and opportunities faced during the design and implementation of the project the following question was raised:

How does participatory governance, in terms of the different levels in the policy arrangement approach, influence barriers and opportunities in the rollout of SWH projects in low-income areas in Cape Town, South Africa?

To answer this question, The case of Kuyasa is compared to the case of Joe Slovo. Joe Slovo serves as an example of little participatory governance and community inclusion throughout the project. The cases of Kuyasa and Joe Slovo have been selected to analyze the scope of the issue about the specific situation in the City of Cape Town. To analyze the issues data is collected through the methods used semi-structured interviews, and short informal conversations with respondents and experts involved in the cases, documents analysis of governmental and commercial sources, and observation at one of the project sides are used.

The theory central for the analysis of the influence of participatory governance is the Policy Arrangement Approach (PPA) (Buclet & Godard, 2013), which defines policy in four dimensions: actors, resources, rules, and discourses. The dynamics of these dimensions influence the state of the policy domain over time. In combination the dimension participatory governance the barriers and opportunities faced by SWH rollout project for low-come are analyzed.

The two projects are carefully described in the within-case description. The within-case description describes the context by addressing the chronological progress of the policy domain over time. In the case of Kuyasa, the community was engaged with the project from the start which led to a strong acceptance and support of the local community. This led to the fact that barriers such as sourcing funding or appropriate technologies could be overcome during the development of the project from design to implementation. In contrast, Joe Slovo was not able to gain the support of the local community since they did not engage the community in the design of the project. The lack of community engagement eventually leads to the delay of the project and the failure to implement all SWHs initially planned. Both projects explored the opportunity of employing the community in the project, however, in Kuyasa the project implementation was run for 98% by the local community compared to 33% in Joe Slovo which led to more acceptance and a high level of community engagement in Kuyasa.

Afterward, the research performs a cross-case analysis according to the four dimensions of the PPA. The research revealed that the power position of the actors the local community indicates the level of participatory governance. The power position of the local community can be enhanced through the resources of correct community engagement strategies and local awareness community on SWH benefits. For developing these resources, the project leaders need to be aware of the positive effect participatory governance has on the success of the project. Another way of improving the power position of the local community in the governance and development of SWH rollout project is through the use of informal rules such as voluntary agreements. Because informality plays an essential role in the low-income community in South Africa, the project leaders should adapt to this form of arranging agreements and collaboration.

The conclusion explains that participatory governance can have a positive influence on the barriers and opportunities experienced in SWH rollout project for low-income areas in Cape Town, South Africa. In terms of inclusion, transparency, access to information and energy education and awareness the Kuyasa project shows that the inclusions of participatory governance in the design and implementation helps to overcome barriers such as the sourcing of funding, and the convincing of the local community to support, and accept the project as well as to explore the opportunity to employ the local community in the project.

SWH rollout project leaders should include the local community in the project through local employment and informal consultation sessions guided by the community itself. Also, projects should communicate their objectives and procedures in a transparent way. The communication and information provided should be made accessible through word of mouth by local project leaders. For the community to participate in the governance and development of the project, they should be educated about the benefits of SWH. These educational programs should be run by local government leaders to provide the right information which can be understood by the community. In conclusion, extensive and correct community engagement results in SWH projects that have the potential to provide people with the means to be more independent, better skilled, and socially better positioned.

The recommendations focus on the increase of participatory governance in future SWH rollout projects for low-income areas in South Africa. The development of correct community engagement strategies for project leaders is most important in the increase in participatory governance. These strategies can be realized when the knowledge on best practice cases on all level is shared. The sharing of knowledge will create more awareness on the positive effect participatory governance can have. The awareness of the local community about the benefits of SWH can also be enhanced through the sharing of knowledge. The community of Kuyasa can play an essential role in the sharing of knowledge with other communities. This form of bottom-up initiatives will be most successful since communities will be able to relate to each other and translate the relevant information in a way which is most suitable.

Preface

I want to use this occasion to thank everyone that has helped me to finish my thesis and therefore pre-master's degree. Even though, the primary focus of this thesis was to prepare myself for my master program I have enjoyed researching SWH rollouts in Cape Town, South Africa.

First, I would like to thank my supervisor, Sietske Veenman, for her great help during the full process of writing my thesis. The constructive feedback was essential for my process, and it helped me to push myself further and to explore different areas of interest. I am grateful for the engagement with my process and my full thesis.

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Renske Koster
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Glossary and abbreviations

DoE = Department of Energy

DoHS = Department of Human Settlements

GIZ = Deutsche Gesellschaft für Internationale Zusammenarbeit

NSWHP = National Solar Water Heater Program

PPA = Policy Arrangement Approach

SEA = Sustainable Energy Africa

SSN = SouthSouthNorth

SWH = Solar Water Heater

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1 Introduction

This chapter indicates the objective of this research and its relevance. First, background on the topic is provided in the problem statement, which provides fundamental information on which decisions regarding the objective of the study are based. Second, the research objective is specified as well as the research questions to be answered by the study. Third, the scientific relevance is described, indicating relevant existing scientific literature and its shortcomings. The gaps in existing research leave room for the study to provide new insights and contribute to the body of knowledge regarding Solar Water Heater (SWH) rollouts for low-income areas. Fourth, the societal relevance is discussed. In this part, arguments regarding the importance of this research for sustainable social development are provided.

1.1 Problem Statement

In the 18th and 19th centuries, industrial revolutions produced carbon-based industry initiatives that now interfere with just about all features of human life (Kritzinger & Covary, 2016). Research has found that these carbon-based practices have contributed to anthropogenic climate change (Allen et al, 2000; Karl and Trenberth, 2003; Tett et al 1999). The concentration of greenhouse gasses (GHGs) causing anthropogenic climate change, such as Carbon dioxide (CO₂), increases with the burning of fossil fuels like coal and oil (NASA, 2018). The energy sector plays a significant role in the decrease of GHG emissions, which is required to diminish the impacts of climate change.

In South Africa, the energy sector is mainly focused on the exploitation of fossil fuels. Electricity is provided by the national utility Eskom, which primarily generates electricity through coal-fired power plants (Hermanus, 2017). Eskom has a monopoly on the generation, transmission, and distribution of electricity in the country, which leads to the slow uptake of renewables in the energy mix (Afrane-Okese, 2009). Even though the national government has tried to influence Eskom for it to utilize renewable sources of energy, it has not been successful up to this point (Hermanus, 2017).

The energy sector in South Africa is facing two problems with the sustainable generation and supply of energy. First, economic development and the rise in the population require substantial increases in energy production. Until now, the energy sector has been dealing with this increase in demand by building new coal-fired power plants (Covary & Kritzinger, 2016). Mainly caused by the use of fossil fuels, GHG emissions in South Africa grew by 44% from 1990 to 2012 (Climate Links, 2018). As a result, in 2015, South Africa became the 12th largest emitter of CO₂ in the world and the largest emitter in Africa (Department of Energy, 2015). To deal with future increases in the demand for electricity, South Africa should explore renewable sources of energy to prevent further increase in GHG emissions (Sebitosi, 2008).

Second, lack of access to energy remains another major issue. Since South Africa is a developing country, not everyone has access to electricity. The country is struggling to electrify more impoverished regions; however, this requires considerable capital investment (Pegels, 2010; Goldman, 2010). Since electricity for poor households is subsidized by the state, this capital investment is not only required to build infrastructure (Sustainable Energy Africa, 2010). With the development of low-income areas in South Africa, there are opportunities and challenges with regard to renewable energy. Solutions need to focus on the challenges in the energy sector and decreasing energy poverty while, at the same time, reducing carbon emissions.

A solution to decrease carbon emissions and provide South Africa's rising indigent population with access to renewable energy is the democratization of the energy sector. Energy democracy focuses on empowering poor communities by providing them with renewable energy systems (Chartier, 2015). When poor communities have access to renewable energy systems, they become less dependent on national utilities or the government and are in charge and responsible for their own services (Fairchild, et al., 2017). A way of achieving a democratic energy system is through

participatory governance. The participation of communities in governance and the development of renewable energy projects hold many benefits. An increased level of power in the decision-making process results in a system in which poor communities become more resilient and take on more powerful positions (Szulecki, 2018).

An intervention that can support the development of a democratized energy system provides poor communities with access to solar water heaters (SWHs). Solar water heaters generate hot water through renewable electricity derived from solar power, and safe Greenhouse gas emissions. In addition, providing people with access to hot water brings them tremendous social benefits, such as comfort and savings on electricity (Ward & Walsh, 2010).

The deployment of SWHs was taken up as part of the South African National Energy Efficiency Strategy of 2005. The Department of Energy (DoE) set up a national solar water heater program (NSWHP) in 2009-2010 that aims to support the uptake of 1.25 million SWHs by 2019 through three subprograms: the social program, the insurance program, and the voluntary program (Department of Energy, n.d.). Both the insurance and voluntary program focus on the uptake of SWH by high-income consumers; however, the social program supplies fully subsidized SWH systems to low-income areas. The social program aimed to address the country's electricity challenge, mitigate greenhouse gas emissions, create employment and alleviate poverty (Afrane-Okese, 2009). However, the program was frozen in 2015 due to a lack of funding. Currently, only 424,790 SWH systems have been rolled out under the program (Moodley, 2015). Even though the NSWHP is about to fail in its goal to roll out 1.25 million SWH systems by 2019, on the local level, there are examples of projects that illustrate the success of the program. According to Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), in projects where community engagement measures were taken, employment and training of the local community were successful. They also indicate that Households saved between 8 to 100kWhs per month, and 98% of people indicated an increase in life quality (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2015).

The City of Cape Town is one of the progressive municipalities that has implemented SWH rollouts for low-income individuals. An example is the Kuyasa project. Even though this project demonstrates that there are challenges that need to be overcome in the implementation of SWHs, there are many environmental, social, and economic benefits realized. Carl Wesselink, the implementer of the Kuyasa project, indicated that community engagement led to success in the implementation of project and increased awareness about renewable energy solutions in the community (Wesselink, personal communication, May 16, 2018). The participation of the community in the governance of SWH rollout projects for low-income areas should, therefore, be studied as an important factor influencing the opportunities and barriers in such projects.

The Kuyasa project illustrated and explored the barriers to and opportunities for the implementation of SWHs. Developing an understanding of how participatory governance can influence opportunities and barriers with regard to the implementation of SWHs for low-income areas in Cape Town is crucial for the development of more successful SWH rollout projects.

1.2 Research Objective

This research project aims to gain insights on the effect of participatory governance as part of the energy democracy framework in the policy domain, concerning SWH rollouts for low-income areas in Cape Town, South Africa. The research question raised is as follows:

How does participatory governance, in terms of the different levels in the policy arrangement approach, influence barriers and opportunities in the rollout of SWH projects in low-income areas in Cape Town, South Africa?

To answer this research question, the following sub-questions were formulated:

In terms of participatory governance, what are the roles of the main actors over time?

In terms of participatory governance, which resources are used over time?

In terms of participatory governance, which rules are applicable over time?

In terms of participatory governance, what discourses can be seen over time?

In terms of participatory governance, how do the dimensions policy domains influence barriers and opportunities in SWH projects in low-income areas?

1.3 Scientific Relevance

Even though the implementation of SWH is related to both technical and societal challenges, research regarding SWH systems focuses mainly on technological development and efficiency issues, for example (Wang, Wansheng, Qui, Zhang, & Zhao, 2015; Nuntaphan, Chansena, & Kiatsiriroat, 2009). Looking specifically at scientific research in the implementation of SWH systems in South Africa, Donev, van Sark, Blok, and Dintchev (2012) researched potential GHG emission savings. Specifically in Cape Town, Du Toit (2010) researched the opportunities and barriers to SWH implementation. However, neither study takes into account principles of energy democracy nor dimensions of participatory governance. Research by Wlokas (2011) focuses on energy poverty reduction and an increase in quality of life in Cape Town and Port Elizabeth. Even though this study by Wlokas indicates some empowerment of low-income communities, it does not take into account the influence of participatory governance.

Scientific research on the complete theory of energy democracy or participatory governance does not focus specifically on SWHs nor South Africa. Research on energy democracy in Växjö, Sweden does reveal existence of initiatives that demonstrate the influence of the framework on the municipality's policies (Chartier, 2015). However, that research does not explicitly focus on the participation of the community in the governance of these initiatives. Delina (2018) researched the implications of energy democracy and public engagement in Thailand. Even though this research has a strong focus on community engagement, the dimension of participatory governance, as included in the conceptualization of the theory by Szulecki (2018), is not used. Since this study is the first to include participatory governance as explained in the energy democracy theory, this could generate new insight on how this dimension can apply to scientific research.

No earlier scientific research has been conducted using the Policy Arrangement Approach (PPA) to analyze SWH projects in South Africa. Studies concerning the policy domain of SWH in South Africa do not take into account the actual dynamics of actors, resources, rules, and discourse. However, a study by Covary and Kritzing (2016) demonstrates the policy issues with the NSW, that gives insight into one of the policy programs influencing the policy domain. Research on the city of Cape Town's part in the rollout of SWH systems also presents valuable elements of the policy domain. However, this research does not explicitly focus on social SWH programs (Dubresson, 2013). By studying the dimensions of the PPA in the context of SWH rollouts for low-income areas, new knowledge can be generated on the dynamics of the policy domain.

Studies evaluating SWH projects and programs are performed by consultancies and governmental organizations. For example, GIZ (2015) created a review of best practices for SWH implementation by local governments. This review analyzes the practice of these projects. However, it was not performed by an independent organization and is not peer-reviewed. The study was also limited to few interviews with municipal staff and does not take into account the other actors involved (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2015). It is therefore important that scientific research analyzes the development of SWH projects.

Accordingly, prior research has not considered the full theory of energy democratization and participatory governance when studying policy, nor the dynamics of the policy domain affecting the use of SWH systems in low-income areas. This research studies this matter in order contribute to the general public's scientific understanding of the influence of participatory governance on the dynamics of the policy domain of SWH rollouts of low-income areas in Cape Town, South Africa.

1.4 Societal Relevance

To improve the current situation, it is essential that one understand the opportunities and barriers of existing SWH projects for low incomes. Analyzing what prevents the current development of SWH projects and what stops the system from improving is an important step in support of the energy democracy movement in Cape Town and South Africa.

A better understanding of the influence of participatory governance on barriers and opportunities in the policy domain can lead to an increase in SWHs rollouts, the success of SWHs, and the democratization of the energy sector in South Africa. The inclusion of participatory governance in the development of SWH rollouts in low-income areas could lead to more successful rollouts and therefore may lead to an increase in SWH projects. An increase in participatory governance could create a more democratic energy system in which poor communities are active participants that are empowered through access to and ownership of renewable energy systems. The inclusion of these principles in the rollouts could lead to more resistant communities, a decrease in energy poverty, and a reduction of carbon emissions.

This study aims to create awareness amongst all levels of the government, project implementers, and funders on the importance of participatory governance principles in the development of SWH rollouts for low-income areas. The practical advice and recommendations as a result of this research could support the local and national government in the creation of implementation strategies of SWH rollouts as well as policies that support the implementation process. All government levels, as well as project implementers, would be able to make better-informed decisions on actor allocation, required resources, and potential policies. Better informed decision-making on these elements may lead to structural reforms, which are required to change the currently dominant policy arrangement.

2 Theoretical Framework

The next chapter provides a detailed explanation of the theoretical concepts used in the study. First, the theory of energy democracy and the three dimensions are explained. These theories guide this research. Second, the PAP used to shape the approach of this study is explained with an in-depth discussion of the four dimensions.

2.1 Energy Democratization

According to Fairchild, “energy democracy is a way to frame the international struggle of working people, low-income communities, and communities of color to take control of energy resources from the energy establishment and use those resources to empower their communities—literally (providing energy), economically, and politically” (Fairchild, et al., 2017, p. 34). The essence is that decentralized and socially controlled energy systems have to be created for a more just, equitable, sustainable, and resilient economy. The energy democratization movement goes beyond the replacement of fossil fuels with renewable sources as it strives for social and political justice and the empowerment of fragile communities (the Center for Social Inclusion, 2010). The movement also includes the democratization of national public enterprises through an expansion of local initiatives that generate and distribute renewable energy and repeal previously-privatized power utilities (Morris & Jungjohann, 2016).

Szwed and Maciejewska (2014) of Warsaw’s Green Institute issued a manifesto of “Energy Democracy.” This manifesto builds on the technological possibilities of creating a renewable energy sector and a society that has control over energy resources. The combination of societal empowerment and the transformation of the energy sector is not only understood in relation to increased civic participation but also societal ownership. This transformation is based on the movement from centralized control and ownership to decentralized production and governance of energy.

The elements of energy democracy that existing definitions identify are increased citizen participation in decision-making, community, and public ownership, and positive co-benefits such as a better quality of life through employment, health, or sustainability (Szwed and Maciejewska 2014; Antal 2015, Sweeney et al. 2015; Kunze and Becker 2014). Szulecki (2018) has transformed these elements into a conceptual, analytical tool by breaking down energy democracy into three dimensions: popular sovereignty; participatory governance; and civic ownership. Energy democracy is operationalized with specific indicators to allow for comparisons and the design of policy change leaning towards the energy democracy ideal (Table 1). The proposed criteria can be used to analyze and create policies in different regions or situations. The concept of energy democracy is a multi-scale concept, which connects all governance levels (Szulecki, 2018).

Conceptualization of Energy Democracy

Main dimensions	Components	Indicators
Popular sovereignty	Citizens as recipients of energy policy Citizens as stakeholders Citizens as accountholders	
Participatory governance	Inclusiveness Transparency Access to information Energy education and awareness raising	Incorporation of public consultations at all levels Due process and clear procedures Reporting on legislation and deliberation Existence of dedicated educational programs
Civic ownership	Civic ownership of power generation Civic ownership of transmission/distribution infrastructure	

Table 1: Conceptualization of Energy Democracy. Modified from conceptualizing energy democracy. (p. 39) By Szulecki, K. 2018. *Environmental*

2.1.1 Popular Sovereignty

The dimension of popular sovereignty indicates that citizens are active participants in the energy sector. Popular sovereignty specifies that the ultimate power lies in the hands of people, as they are responsible for the election of representatives in a democratic system (Thompson, 2005). Regarding the energy sector, it is implied that citizens are both consumers and producers of electricity and are therefore essential stakeholders that influence how energy is produced and consumed. For example, the consumer influences the price and quality of the service and influences, as well as the energy sector as a whole. Policies are therefore required to support consumers in their roles as both producers and consumers and allow them to influence the way energy is produced and serviced (Szulecki, 2018). Popular sovereignty can be assessed through the following components: citizens as recipients of energy policy, citizens as stakeholders, and citizens as accountholders (Szulecki, 2018). Popular sovereignty can be seen as the level of influence the consumer has over both the consumption and the production of energy, as well as the existence of policies and support schemes that support them in this role.

2.1.2 Participatory Governance

Participatory governance indicates how the community is engaged in the governance of renewable, decentralized energy initiatives. In general, the concept of participation is strongly related to the discourse of development and democratic governance. Gaventa (2004) argues that community participation in development projects is strongly related to democratic governance. In the case of renewable energy projects, communities are made aware through educational programs that incorporate transparency in governance practices. According to Newig (2009) the community should be actively included in the decision-making process, and there should be a high degree of transparency during this process. This is, for example, related to the availability of information through reports on legislation. He also argues that communities should be engaged in the process of making new legislation and should be informed about the process through which legislation is made. All stakeholders should be aware of the procedures and the process of engagement should be due. Participatory governance can be assessed through the following component: inclusiveness, transparency, access to information, and energy education and awareness raising (Szulecki, 2018).

These components together indicate the extent to which the community can participate in the governance of SWH projects.

2.1.3 Civic Ownership

Civic ownership describes the shift in power relations. According to Skelcher (2010) civic ownership indicates a dominant position of the consumer or community due to ownership of transmission and distribution infrastructure. He argues that since consumers invest in their own infrastructure, they take on a dominant position in producing and distributing energy. This infrastructure is mostly owned in cooperation between consumer and municipalities which together own the grid. Szulecki (2018) indicates that consumer and municipalities cooperate with each other through share ownership and collaborate to produce and distribute electricity. Civic ownership can be assessed based on the following components: civic ownership of power generation and civic ownership of transmission/distribution infrastructure (Szulecki, 2018). The elements indicate the level of ownership the community has over SWH projects.

This research focuses solely on the dimension of participatory governance as this falls under the scope of the study. This dimension focuses on community engagement and the position of power the community holds. This element is essential as SWH rollouts are typically organized by government organizations and departments which hold a strong power position. Therefore, the dimension of participatory governance can analyze how these power structures can be influenced and which role the local community can take on. In the Kuyasa project, the community was actively engaged and the project is seen as one of the most successful. Therefore, it is expected that when SWH project has a high level of participatory governance they are better received and benefits for both the community and the municipality are higher. By analyzing the level of participatory governance and the influences, it can have on the policy domain it will become evident if participatory governance and positively influence SWH rollouts for low-income areas in Cape Town.

2.2 Policy Arrangement Approach

To better understand the governance of SWH systems in low-income areas in Cape Town, it is important to research the policy arrangement, which involves the momentary stabilization of the organization and substance of a policy domain (Arts & van Tatenhove, 2004). Studying the policy domain necessitates an institutional analysis of the dynamics between structure and agency (Arts, Leroy, & Jan, 2006).

According to Arts, Leroy, & Jan (2006) three underlying concepts of PPA influencing all four dimensions of the policy domain are institutionalization, policy arrangement, and political modernization. First, institutionalization refers to the creation of social structures through behavioral patterns and the social structures' simultaneous influence on social behavior. These social structures are relatively rigid, but they can be reconstructed. Second, policy arrangement is the content and organization of these structures seen at a specific moment in time. Third, political modernization refers to social change as a consequence of economic and political processes such as individualization and globalization, which affect relations between civil society, market, and the state. The three concepts are included in the PAA theory, which allows for an inclusive framework for analysis.

The two main aspects of policy arrangements are organization and substance, which are used to analyze change and stability in the policy domain (Arts & van Tatenhove, 2004). The first concept of organization as described in Giddens structuration theory has three dimensions: agents, rules, and resources. The second concept substance is operationalized as discourse. Through the four dimensions – actors, resources, rules, and discourses – the complexity of society and the underlying

influences of modernization can be analyzed in the policy domain. These four dimensions used to analyze the policy arrangement of SWH systems in low-income areas in Cape Town. These dimensions are strongly interconnected, and changes in one, of the dimensions work through to the others. The PPA theory focuses on the analysis of structural processes influencing and changing the dimensions of the policy arrangement and options for desirable and legitimate interventions.

2.2.1 Actors

The first dimension of the theory used for this research includes actors. Actors are those involved in the decision-making process for the policy arrangement of SWH in low-income areas in Cape Town. The relevant actors and the power relations differ per field and period because they are subject to change. The power relations between the different actors also provide essential information regarding the state of the policy arrangement (Oteman, Wiering, & Helderman, 2014). A lack of power to change specific structures might result in the stability of the domain (Liefferink, 2006).

The actors in the field of SWH systems might be diverse and hold different positions of power. The dominant actors who benefit from the stable situation may be likely to prevent change (Kaufmann, Mees, Liefferink, & Crabbé, 2016). Actors are mostly part of organizations such as government departments or NGOs operating on different levels, such as local or national levels. These actors are directly involved in the design and implementation of the project. Another important group of actors is the local community as the receiver of the SWH systems. Locating the relevant actors and their relationships with each other is vital in order to study the other dimensions. Analyzing actors helps to create an overview of the field and provides context for resources, rules, and discourses.

2.2.2 Resources

To better understand the power relations between the actors involved, the resources these actors depend on are analyzed. The resources are related to the actors and analysis of them helps provide an understanding of the dynamics between the two.

Resources are systems of power that refer to the ability of actors to mobilize resources to achieve specific outcomes (Arts & van Tatenhove, 2004). These resources can either be physical or non-tangible. Park (2015) indicates that physical resources for intervention and withdrawal include money, technology, and materials. Since SWH rollouts for low-income areas are intended for the public good and have little economic incentive for investment, the source of funding is critical. Even though technology and materials are important for the implementation of SWH, these are of less importance as they are widely available.

Examples of non-tangible resources are access to information and knowledge, political influence, responsibilities, and decision-making power (Kaufmann, Mees, Liefferink, & Crabbé, 2016; Oteman, Wiering, & Helderman, 2014). In the case of SWH projects, access to information and decision-making power are essential resources that can be utilized. These resources are also strongly interconnected and may depend on each other. For example, access to funding results directly in a stronger political position. Together, both types of resources can provide insight into the dimension of resources and its relation to the other dimensions.

2.2.3 Rules

The third dimension, rules, refers to the possibilities and constraints of agents to act appropriately and legitimately. The rules determine the procedures, tasks, and division of competencies to outline how specific outcomes are achieved (Arts, Leroy, & Jan, 2006).

A division between formal and informal rules can be made. Formal rules are fixed in legal documents. In many Third World countries with weak judicial systems, formal rules are difficult to enforce (Pargal & Wheeler, 2016). An example of a formal rule for the implementation of SWH is the South African National Standard (SANS 10400 XA), which requires that all new buildings include

sustainable water-heating technologies (Dobson, 2015). This regulation is not powerful since stakeholders are not well aware of its existence, and it is not enforced correctly.

Due to the less dominant position of formal rules, informal rules take on an important role. Additionally, formal and informal rules strongly influence each other. For example, often informal rules are created when formal rules are not enforced properly (Oteman, Wiering, & Helderma, 2014). In the case of SWH, the implementation of informal rules, such as voluntary agreements made between projects and the communities during the development, influence the inclusion of the community in the process.

How quickly these rules can be changed, enforced, or broken influences the policy domain and is influenced by actors and resources (Mahoney and Thelen, 2009). For example, the community's knowledge of the existence of formal or informal rules influences the stability of the existing rules. Actors continually draw upon rules that provide them with guidelines to (re)produce and transform policy arrangements (Arts & van Tatenhove, 2004). Relevant rules influence the policy domain, which can provide critical information on the relations between actors and their choices.

2.2.4 Discourses

The last dimension, discourses, includes ideas and concepts that influence actions. Discourses on policy concepts or general storylines give meaning to policy arrangement (Arts & van Tatenhove, 2004). Only groups of people can create and adopt discourses. These discourses influence the actions of more individuals (Liefverink, 2006).

The relevant discourse influencing the policy domain of the SWH project for low-income areas revolves around the transition to renewable energy systems. The idea that renewable energy, in contrast to the use of fossil fuels, is the optimal way forward is an important concept that drives actions in this field. Studying the dominant discourses in policy arrangement provides information about the changes in dominant ideas and concepts influencing the policy domain. The dynamics between discourses and the other three dimensions demonstrate why actors have influenced the policy domain as it is.

2.3 Conceptual Model

The conceptual model is a structural visualization of the theory applied in the research context. In Figure 2, the relations between the dimensions of participatory governance, policy arrangement, and the policy domain are presented. All four dimensions are related to each other, and these dynamics shape the policy domain. A change in a single dimension affects the other dimensions as well as the policy domain itself.

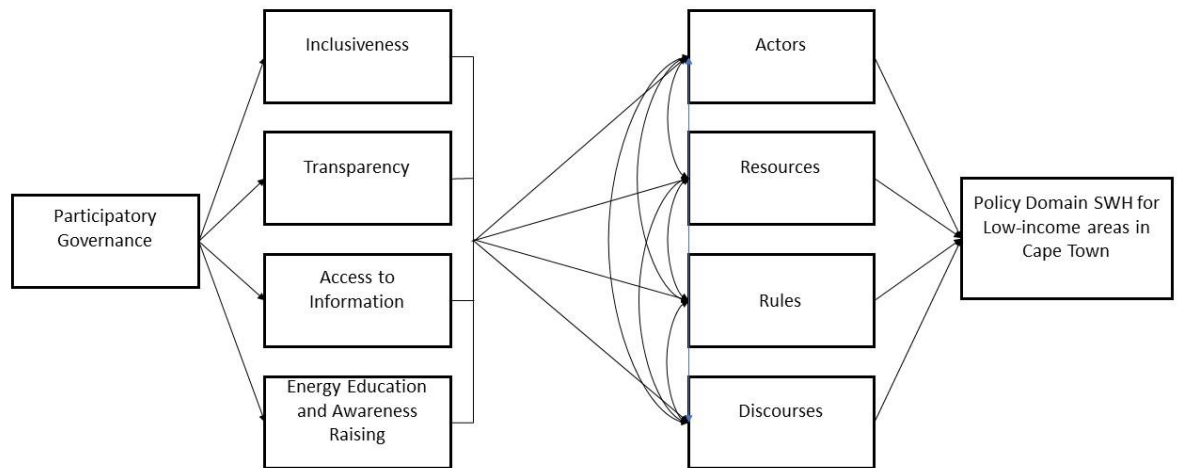


Figure 2: Conceptual Model

3 Methodology

The following chapter explains the methodological choices made to answer the research question. The first section elaborates on why this case study has been chosen as an appropriate research strategy. After that, the chapter explains why specific cases have been selected for this study. The third part focuses on the gathering of data and explains the type of information that is required to answer the research question. The final section of this chapter explains the data analysis procedures and programs applied for this study. In brief, a detailed description of the methodology ensures the reliability of the study so that the research can be replicated based on the information provided in this chapter (Lewis, 2015).

3.1 Research Strategy

This research aims to demonstrate how participatory governance can influence barriers and opportunities in the policy domain of SWH for low-income areas. The following research question has been raised:

How does participatory governance, in terms of the different levels in the policy arrangement approach, influence barriers and opportunities in the rollout of SWH projects in low-income areas in Cape Town, South Africa?

To answer the research question, an appropriate research strategy needs to be selected.

Qualitative research can be conducted using different strategies. Cresswell (2018) describes five approaches to qualitative research design: narrative research, phenomenology, grounded theory, ethnography, and case study. To answer the research question, in-depth insight into the phenomena of SWH rollouts in low-income areas is required.

To gain an in-depth understanding, it is essential that this text study the phenomena surrounding its development over time. These rollout projects were developed starting in 1999 and have gone through distinctive phases that encountered different barriers and opportunities. For this study on SWH rollouts overtime, the PPA theory was selected to guide the analysis, focusing on different dimensions. To analyze how these dimensions have developed, a longitudinal study is required. A time frame of 19 years has been selected for the analysis of the complete development of the SWH rollout projects up until today. It is essential to study the project over the complete period of development since the policy domain is influenced in different ways at different stages.

Since the research question focuses on the analysis of how different dimensions have developed over time, the case study research strategy has been selected. The dimensions of actors, resources, rules, and discourses are specific to a particular case. Case study research is used because it explores a subject holistically and provides one with an understanding of a complex issue through the analysis of a specific case (Zainal, 2007; Bassay, 2004). An in-depth analysis of a specific case allows for a detailed study of how the different dimensions of the PPA approach have developed over time.

For a comparison of the results of the analysis and analysis of the phenomenon, two cases were selected. A multiple case study strategy was selected to develop a more compelling story and conduct more robust research. The multiple case study approach illustrates the problem from multiple angles and allows for comparison between cases as the same procedure is used for each case (Yin, 2003).

A critique of the case study strategy is the limit to generalization of the results to other contexts, as well as the possibility that the researcher influences the interpretation of the data (Yin, 2003). Since this research aims to provide recommendations on the implementation of future SWH projects for low-income individuals in a specific context, the research results should not be generalized. However, for this study, it is critical to ensure that the conclusions drawn are robust and valid. Therefore, close attention was paid to the validity and reliability of the research, which is explained in section 3.3.

3.2 case selection

In response to the research question and for the analysis of the policy domain of SWH systems for low-income areas, appropriate cases were selected. Instrumental cases were chosen to explore the influence of participatory governance on Cape Town's SWH for low-income and the policy domain. With an instrumental case, the researcher focuses on an issue and then selects cases to illustrate this issue (Creswell & Poth, 2018). Since the study was instigated by the significant problems of SWH implementation, it is important that the cases illustrate this broader problem. This project studies two cases that chosen using two types of case selections: best practices and criteria.

Best practice

The case selection process starts with a selection of the best practice, which is defined by a high level of participatory governance in an SWH project for low-income areas. Sustainable Energy Africa (2017) highlighted the Kuyasa project as one of the leading SWH projects for low-income areas in South Africa because of the way the project has engaged the community. Compared to other SWH rollout projects in Port Elizabeth and Johannesburg, for example, the Kuyasa project has established a positive relationship with the community, which was strongly based on transparent communication and local leaders' ability to influence the project (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2015). The SWH rollouts in Johannesburg and Port Elizabeth focused mainly on the scale of the implementation and spent little or no time on community engagement. According to Holle Wlokas, researcher on renewable energy and community engagement, the projects in Johannesburg and Port Elizabeth were just about installing one SWH after another without informing people of their potential benefits and the implications of the project (Wlokas, personal communication, May 7, 2018). Deutsche Gesellschaft für Internationale Zusammenarbeit (2015) also indicated the success of the community engagement approach of Kuyasa. Although the Kuyasa project faced technical challenges during its implementation, it was indicated as having one the best practices during the GIZ team's analysis (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2015). It is, therefore, necessary to analyze the Kuyasa project as a best practice case to analyze the effect of participatory governance on the policy domain.

Criteria

For more robust research, the best practice case of Kuyasa should be compared to other case. Defining the second case in the selection process is based on three criteria: geographic location, size, and access to information. The reason for the selection of a second case is that previous research did not indicate another SWH project with a high level of participatory governance. Therefore, any other case could serve as an example of a project with a low level of participatory governance. However, selecting any other SWH project would result in an unreliable comparison and affect the results of the research negatively (Seawright & Gerring, 2008). In avoidance of misinterpretations, the set criteria aim to exclude any external factors that could deceive the researcher in the analysis of the effect of participatory governance on the policy domain of SWH rollouts for low-income areas.

For an accurate comparison between the two cases, it is essential for their features to be similar. The most critical factor in determining similarity is geographic location. Since Kuyasa is a district in the municipality of Cape Town, the first criteria is that the second case should also be a district in the same municipality.

According to a study by GIZ, Cape Town has had two major SWH rollout programs related to low-income, namely Kuyasa and Joe Slovo (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2015). Research also indicated another SWH project in Cape Town, the Nyanga SWH project. The Nyanga SWH project is solely described in Sivuyile Maboda's master's thesis (2011), which analyzed the development of the low-income area of Nyanga, Cape Town.

To decide if the Joe Slovo or the Nyanga case should be analyzed, the researcher used the criteria of size and access to relevant information. These criteria were selected because the project

differs most in these two areas. The first significant difference between the Joe Slovo and Nyanga project is the size. The Joe Slovo project implemented over 2,000 SWH (National Department of Human Settlements, 2014), while Nyanga only installed 100 (Maboda, 2011). Since the Kuyasa project installed 2,309 SWH, the Joe Slovo project is more similar in size than the Nyanga project and can more accurately serve as a comparison.

The second significant difference between the Joe Slovo and Nyanga project is the availability of relevant documents. Joe Slovo is an SWH project that is part of a larger human settlement project called the N2 gateway. Since the implementation of SWHs is part of a larger project, more information is available. Examples of the available information include monthly newsletters communicating important information to the community as well as an extensive lessons-learned document that includes detailed information on the processes and details of implementation. Such detailed information on the number of SWH installed or amount of people employed is relevant for more in-depth questioning during the interviews. However, the information provided in the newsletters can provide even more relevant data as this is a direct source of information on the level of participatory governance. Since there is no alternative documentation on the Nyanga project besides the master's thesis by Madoda, the study is limited regarding the development of an in-depth understanding of the case. Based on the size and the availability of relevant information, the Joe Slovo case was selected for the study.

The Kuyasa and Joe Slovo case were chosen to provide an analysis of participatory governance and its influence on the barriers and opportunities in the policy domain of SWH rollouts for low-income areas in Cape Town. Since both projects target a specific district in the municipality of Cape Town, their geographical locations are displayed in Figure 3. The map demonstrates that even though the projects are located in the same municipality, the distance between both districts and the direct distance to the city center of Cape Town are large. The following paragraphs give some critical information on both cases.

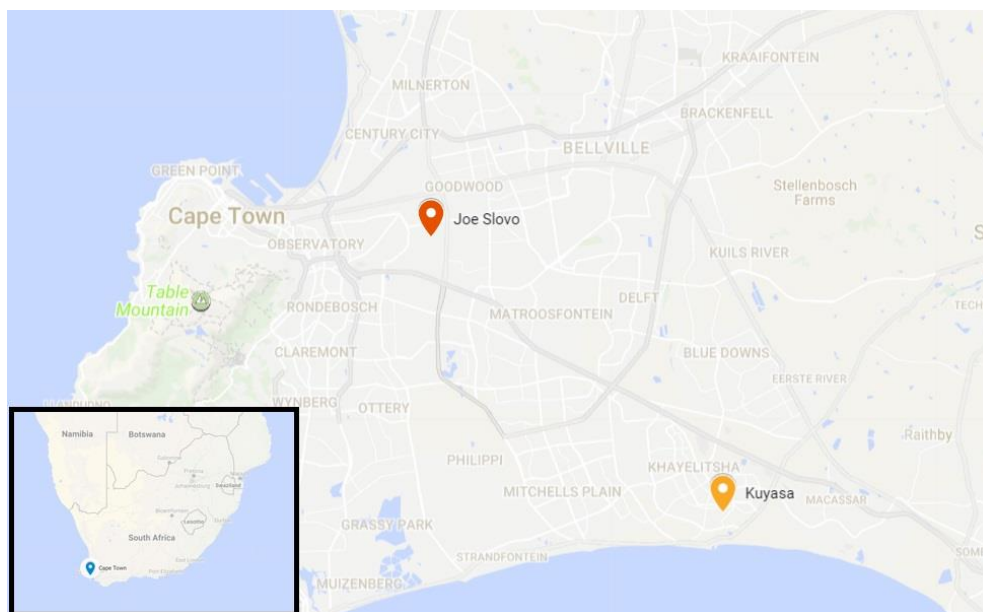


Figure 3: overview of the locations of the cases. From Google Maps. (2018). *Map case location*. Retrieved from <https://goo.gl/z46S7511>

Kuyasa

The district of Kuyasa is located in Khayelitsha, approximately 30 kilometers southeast of Cape Town's city center (Figure 3). Khayelitsha is the largest informal settlement in Cape Town and was created at the end of the apartheid era (Schoor & Scholtens, 2015). The majority of the people live in shacks. However, some live in formal low-income Reconstruction and Development Program (RDP) houses

(Goldman, 2010). Even though areas of Kuyasa are electrified, households do not have access to plumbing or running water. Water is collected in buckets from sanitation areas and heated up in large kettles for body washing, cooking, and cleaning (Wlokas, personal communication, May 7, 2018). This process is time consuming and requires a significant amount of electricity, which is why most water is used cold (Wlokas H. L., 2011). There are few formal services such as transportation or hospitals, and because the district is located far from the city center, people are not close to economic opportunities. Around 70% of the population is unemployed, and most children do not receive higher education (The Unit for Religion and Development Research, 2011).

The Kuyasa SWH project is the first SWH project for a low-income area in South Africa. The project aimed to implement 2,309 SWH systems to improve the living conditions of the people in Kuyasa by providing them with a sustainable method to access hot water (Goldman, 2010). The project engaged the local community through the involvement of residents in the project and transparent communication. The project ended in 2010.

Joe Slovo

Joe Slovo is poor district located in the larger area of Langa, approximately 10 kilometers from the city center of Cape Town (Figure 3). According to local resident Mbuyiseli this large informal settlement was built even before the apartheid era in 1927 to house the black working class (Mbuyiseli, personal communication, May 12, 2018). The government built large buildings to house the people living there. Mbuyiseli also indicates that over time, the population increased, and people started to build informal shacks in the area. Currently, as in Kuyasa, most people live in informal settlements. Since Joe Slovo is located closer to the city center, the area has access to economic opportunities, and there are more formal services such as transportation systems and schools (SAMSET – Supporting Sub-Saharan African Municipalities with Sustainable Energy Transitions, 2015). Even though people have better access to economic opportunities, the unemployment level is similar to that of Kuyasa. Similar to Kuyasa, all houses are electrified, but 90% of them do not have access to running water (Sustainable Energy Africa, 2014).

The Joe Slovo SWH implementation project falls under the larger human settlement project, the N2 gateway. The N2 gateway is a project that builds free low-income housing. Even though the project aimed to implement 2,886 SWH, it only managed to install 1,572 and is currently finishing up the final installations (National Department of Human Settlements, 2014). Due to failed attempts to collaborate with the community, the project was left unfinished and failed to meet its objectives.

3.3 Data gathering

Data on the selected cases was retrieved to answer the research question. The information required to answer the research question is based on the experiences of people involved in the design, development, and implementation of the projects. The experiences of people directly involved in the project hold essential information on how the dimensions of the policy domain have changed overtime. For example, the project leaders know how they have engaged the local community in the project. However, for insight on the effect of participatory governance on dimensions of the policy domain, multiple data sources were used to retrieve information on the experiences of the people involved in the project.

According to Vanschuren and Doorewaard (2015), a researcher can use diverse methods to collect data, such as interviews, the study of documents, and observation. All three types of data collection methods were applied. The methods used include semi-structured interviews and short informal conversations with respondents and experts involved in the cases, document analysis of governmental and commercial sources, and observation of one of the projects.

For the reader, researcher, or participant to determine if findings are accurate, it is essential that the research be valid (Creswell & Miller, 2000). The use of multiple data sources is important to ensure the validity of the research. Creswell (2014) recommends the triangulation of different data sources of information, which was taken into account in this project's the research. This indicates that

at least three different methods of data collection need to be used to ensure the validity of the research.

3.3.1 Document analysis

The analysis of important documents provided background information that helped the researcher conduct the interviews. For example, documents provided factual information necessary to describe the cases accurately. Since this information did not have to be obtained through the interviews, it allowed for more in-depth, open questions essential to understanding how the interviewee experienced the case. Documents that were used for the analysis are policy documents, research report, and newsletters. The documents were retrieved through either extensive desk research or through the respondents in the interviews. These documents provided factual information, such as numbers of SWH implemented, budgets, and timelines about the cases as well as insights into communication strategies and policy targets.

Multiple policy documents are analyzed, including, for example, the Cape Town Energy and Climate Change Strategy. These strategic documents provide information on the current legislative development and target for GHG reductions and energy poverty reduction (City of Cape Town, 2006). These figures are necessary to understand the formal and informal rules on the local level and provide context to the development in the specific cases.

In the case of Joe Slovo, Annie Orgill, the project manager, provided a research report on the project. This important document is the N2 Gateway lessons-learned (National Department of Human Settlements, 2014). This research report is not publicly available; however, it does contain practical information on the case, such as results from a community survey, and analyzes the community acceptance of the SWH systems. This factual information was important in accurately describing the case.

Another document that provides information on the Joe Slovo case is the N2 Gateway Community newsletters (Department of Human Settlements, 2013). These newsletters offer a form of communication between the project and the community, and therefore, can be analyzed regarding transparency and access to information, which are important indicators of the level of participatory governance.

3.3.2 Interviews

To gain an in-depth understanding of the experiences of people involved in the projects, semi-structured interviews were held with an expert and respondents. The stakeholders who are involved in the project know how the projects have developed regarding participatory governance and the dimensions of the PPA and their personal opinions and experiences with the projects.

To gain a better understanding of the general development in the policy arrangement, an expert interview was conducted. This expert was directly involved in both cases selected as well as other SWH projects for low-income areas. The interview aimed to become aware of the actors involved in the cases and to understand the more recent development that had been taken place which were not documented. The expert provided information regarding essential actors, and from there the snowball sampling method was applied to allocate the right respondents and experts to be interviewed.

The respondents are the actors involved in a case on behalf of an organization such as the local government and NGO's. Nevertheless, it was experienced that respondents who were involved in one case also have some experience with the other case. This can be explained because there are limited people with experience in this field in the Cape Town area, as well as the fact that some actors like the City of Cape Town have a role in both projects. Therefore, some respondents provided valuable information on both cases.

For each case, multiple but not all actors allocated were interviewed. The selected respondents as shown in appendix 1 all represent an essential actor type. These actor types are project leaders and the local authority. The other two actor types the receiver and the funder of the project were not interviewed. Even though interviewing all actor groups would have contributed to the

robustness of the study, the project leaders were able to provide enough valuable information that also included the positions of the receiver and the funder.

In both cases, two respondents represented the project leaders and one the local authority. The project leaders are the government department and the NGO who led the project design and implementation. These actors provide detailed information on how the project has developed over time about their personal experience. Due to the fact that these stakeholders were the directors of the project they were actively involved in the project and had significant knowledge on how the dimensions of the PPA developed over time. The local authority was not as actively involved in the project, and therefore, provide more specific information about their role and experience in the project. This information was valuable to develop an accurate understanding of their role in the project.

Even though the method of interviewing is required to obtain in-depth knowledge on experiences, performing semi-structured interviews puts the internal validity of the study at risk (Barriball & While, 1994). To ensure the validity of the study appropriate tools, processes, and data are selected to answer the research question (Leung, 2015). To enhance the validity, every interview is conducted in the same manner. To do so, a semi-structured interview guide is constructed. The interviews are semi-structured according to the four dimensions of the PPA theory (see Appendix 2). Even though the interviews are structured there remains room for additional information and surprises. The interviews are semi-structured to collect comparable data from all cases. To structure the interviews, an interview guide is prepared containing open-ended questions based on the four dimensions of PPA. In the process of the research, the interview guide updated as new insights entered. All interviews are recorded with the permission of the participant. According to Yin (2009), the documentation of data and procedures increases the reliability of the study.

Short informal discussions

To ask questions of two important stakeholders which were not available for interviews two short informal conversations were held during the African Utility Week Conference. One of the actors is the Department of Energy (DoE) which hold an important governmental position as this department creates legislation for SWHs. The short conversation provided with new information on the current state of a national program for SWH and legislative developments. This information is essential to provide a context in which the cases are developed.

The other conversation was with a master student who recently interviewed one of the main actors in the Kuyasa project. This actor Ndamane is a resident and led the implementation on behalf of the project and can, therefore, provide valuable information on how the community was engaged. Due to circumstances, the actors could not provide a full interview. Nevertheless, this short conversation provided valuable information from the perspective of the actor. Nevertheless, the length of the conversation and the accuracy of the documentation is much lower than with the interviews. These conversations were not recorded. Therefore, a summary of the conversations created right after and noted taken during the conversation are used in the study.

3.3.3 Observation

In addition to the interviews and document analysis, observation at the Joe Slovo case has been made to support the understanding of the information retrieved. No observations were made on the Kuyasa case because it was not saved to visit the site at the time of the study. The research would have been more robust if both cases were observed. Nevertheless, enough information was provided on the Kuyasa case during the interviews.

An observation of the Joe Slovo project has been made through an organized tour provided by two residents. Since the intention of the researcher were identified beforehand the collection of data was through overt observational research (Lewis, 2015). By indicating the intentions of the researcher, the observation can be influenced both positively and negatively. For this observation it

allowed the local tour guide to focus his information on the project. The observation aimed to discover the current situation regarding the project and the reflection from the community upon the project.

The observation was unstructured as this allowed for the observation to take unexpected directions that may be relevant to the study (Banson, 2009). During the observation, notes have been made on the physical conditions of the urban fabric and information provided by the tour guide which is transformed into a summary of the observation right after. To structure the notes, the following dimensions indicated by Spradley (1980) have been used: Space: the physical place or places, Actor: the people involved, Activity: a set of related acts people do, Object: the physical things which are present. These dimensions helped to create a detailed description of the case.

3.4 Data analysis

To derive to correct conclusions based on the information collected the data is analyzed systematically. The data is analyzed using a within-case description, a cross-case description, and a general conclusion. The two cases are extensively described based on the phases of project design, implementation, and current situation. These distinctive phases allow the analysis of the development in the policy domain over time. The cross-case analysis compares the two cases consistent with the four PPA theory dimensions taking into account the influence of participatory governance on the barriers and opportunities. The general conclusion focuses on the specific influence of participatory governance on the policy domain. To provide this conclusion, the cases are analyzed according to the four dimensions of participatory governance.

All the data collected is analyzed by the use of the program Atlas TI. The interview transcriptions, observations, notes, and documents are upload to the program and are coded. Coding organizes and groups similarities in the data and can, therefore, indicate patterns (Saldana, 2008). During the first cycle coding, the method of open coding has been applied. Creswell (2018) indicates that open coding is the process of going through the data coding everything that may seem relevant. The aim is to mark all relevant information in the form of words, sentences or paragraphs. Though open coding more than 300 codes were established which needed to be reanalyzed and merged or split when necessary. This helped to organize the information, and through the process of open coding, the data was analyzed for the first time. This analysis created the first patterns in the data that guided the development of the research and the second cycle of coding.

During the second cycle coding which is the reorganization and condensing a vast number of open codes into main categories, axial coding has been used to analyze the codes and create code groups. Axial coding describes a code group's properties and dimensions and explores how the groups relate to each other (Creswell & Poth, 2018). The code groups are structured according to the dimensions of the PAA; actors, resources, and rules as well as according to the dimensions of participatory governance; inclusiveness, transparency, access to information, and energy education and awareness raising. Besides code groups for the different dimensions of the theories used code group for the opportunities and barriers were used to be able to answer the research questions. Through the reorganization and the creation of the code groups essential actors, resources, and rules are indicated, and the connection between the dimensions is analyzed. The code groups guided the information used to build the conclusion by grouping relevant information to the specific dimension. Through the process of organizing the data in code groups, it became clear how participatory governance influences the barriers and opportunities faced in the specific projects.

4 National and Local Developments

To understand the development in the specific cases, it is important to place them in the context of relevant national and local programs and legislation. The national and local developments surrounding SWH rollouts in Cape Town provide information that gives context to the cases. Therefore, this chapter will first provide relevant information on the national SWH program. Second, the national legislation on SWH is analyzed. Third, the national framework for the building of subsidized low-income housing is discussed. Fourth, information is provided on the SWH strategy of the City of Cape Town, and it is broad initiatives to support SWH rollouts.

4.1 National Solar Water Heater Program

In 2009, the minister of energy introduced the National Solar Water Heating Program (NSWHP) which targeted to install one million SWHs by 2014 (Department of Energy, 2015). This program was created to accelerate rollouts of SWHs to achieve the DoE's ambitious target of meeting 50% of South Africa's residential water heating through SWH technology by 2020 (Sustainable Energy Africa, 2010). Three markets were indicated based on current water heating services levels and household income levels. The first is high-income households which have electric geysers. The second market is middle/low income with or without geysers. Moreover, the third market is low-income households who do not have access to geysers and sometimes electricity (Kritzinger & Covary, 2016). The last market is brought under the social program component which provides low-income households with free SWH systems. Nevertheless, the social program component was halted in 2013 due to lack of available capital (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2015).

The barriers of the program such as the unclear objectives, technical issues, and lack of leadership and correct management also led to the abandonment of the program. The program began as a load reduction program but shifted to a social program with job creation and household services as the primary objective (Sustainable Energy Africa, 2010). Problems of the program are also characterized by poor quality installations. "The early installations were also often characterized by 'fly by night' companies out to make a quick profit, who would source the cheapest, imported systems and undertake poor quality" (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2015, p. 44). Another reason for the failure of the program could be linked to the weak leadership position of the DoE and Eskom (DEA, 2010).

The program is now at the stage where the focus is on how to revive the program and improve on the implementation. For example, issues with maintenance in the past led to discussions on how to maintain and repair the systems for the new rollouts. The DoE wants to move forward the program even though there were challenges in the past because it recognized the benefits that it provided to people (Dlamini, personal communication, May 15, 2018).. This mainly is the social benefits of providing people with access to hot water.

4.2 Regulation

In 2011, SANS 10400 XA regulated the inclusion of energy efficiency intervention in all new South African buildings, including subsidized low-income housing. One of the regulation's requirements is that at least 50% of the water heating should be from an energy-efficient source (Dobson, 2015). Since the intervention mentioned above requires additional capital outlay, this regulation has a direct impact on the budget required to serve low-income households in South Africa (National Department of Human Settlements, 2014). Since the national government does not provide capital to implement SWH in subsidized low-income houses, projects struggle with the implementation of the regulation. Nevertheless, the implementation of this legislation can result in the installation of 12,500 SWHs or heat pumps annually in the Western Cape (Sustainable Energy Africa, 2010).

Although the national government took on the initiative of developing regulation to support the uptake of SWHs, the regulation was not adequately enforced. No measures were taken to make project developers or individual households comply with the new regulation (Sustainable Energy Africa, 2010). Since there was also little awareness of the existence of the regulation, its implementation has contributed little to the uptake of SWHs (Donev, van Sark, Blok, & Dintchev, 2012).

4.3 RDP Policy Framework

The Reconstruction and Development Program (RDP) is a social, economic policy framework that supports development in South Africa. The RDP was created right after the apartheid era ended and aimed to support the building of a democratic and non-racial South Africa (ANG, 1994). This policy framework focuses on many aspects of development. One is the building subsidization of low-income housing for black South Africans who were forcefully removed from the city centers and relocated to the edges of the city. The areas on the edges of the city populated by black or colored South Africans were not developed formally (Department of Energy, 2015). The population has built informal settlements, and little to no services such as transportation or hospitals are available (ANG, 1994).

Since the establishment of the RDP framework, the poor population has the right to a government low-income subsidized house. "The RDP endorses the principle that all South Africans have a right to a secure place in which to live in peace and dignity. Housing is a human right. One of the RDP's priorities is to provide for the homeless" (Corder, 1997, p. 13). Due to limited funding, the government builds as many houses as possible to be able to provide as many people with homes as probable. Due to this strategy, the quality of the houses is low, and little attention is paid to building sustainable human settlements that can provide people with access to positive examples of the urban fabric.

4.4 City of Cape Town's SWH program

The city of Cape Town has a target of installing 300,000 SWHs by 2015 (the City of Cape Town, 2016). The main vehicle is through a city-endorsed mass rollout implementing agents and low-income programs. According to Anton Cartwright, the environmentally conscious people working for the city of Cape Town pushed the issue forward. Sarah Ward, who is currently the head of the Energy and Climate change in the city of Cape Town, was the leading figure pushing for incentives around low-carbon technologies (Cartwright, personal communication, May 28, 2018).

According to Cartwright the city of Cape Town provided three incentives to promote the installation of SWHs. The first incentive was a legislative bylaw to mandate the use of SWH for new buildings. However, the legislation did not get passed. According to Cartwright it was blocked mainly because of the potential for revenue loss. The second incentive was to use the budget to spend on SWH projects. However, the city could not compete with the bank on the level of interest rates. The third incentive was an information and quality insurance campaign. The city provided a quality certificate for suppliers, which helped people choose the correct suppliers (Cartwright, personal communication, May 28, 2018).

The city of Cape Town currently does not push for the uptake of SWHs anymore as it is unsure about their added value and their potential compared to its investment requirements. According to Sarah Ward, SWHs do deliver a service. However, there are some challenges that are only now becoming visible, since the SWH implemented five-to-seven years ago require ongoing maintenance and repair. Additionally, SWH generally requires a higher level of knowledge and ability to fix it compared to an ordinary geyser (Ward, personal communication, May 8, 2018).

Another challenge is the fact that the electrification of houses has cost the city a great deal of money, and this investment has not yet fully recouped. According to Megan Euston-Brown, the director of Sustainable Energy Africa (SEA), this also leads to the hesitance of Sarah Ward and the city to continue the rollouts of SWH (Euston-Brown, personal communication, May 25, 2018).

5 Within-case Description

The following chapter provides a case description for each of the two cases. It describes the cases chronologically, addressing the context of their previous and current situations. Both projects have gone through distinctive phases with opportunities and barriers. The projects are described, starting from the design to the implementation and then the current stage. The development of the full projects is described chronologically according to the influence of participatory governance on the barriers and opportunities in each stage.

5.1 Kuyasa

The following actors are referenced throughout this case description.

Type actor	actor
Local authority	City of Cape Town (owner)
Project leaders	Mr. Zuko Ndamane (local implementer)
	South African Export Development Fund (SAEDF), Carl Wesselink (design + implementer)
	SouthSouthNorth (NGO), Steve Thorne (design + consultancy)
Receiver	Community of Kuyasa
Funding	National expended public works program (EPWP) through the Department of Environmental Affairs and Tourism (DEAT)

5.1.1 Project Design

To provide people with access to hot water in a sustainable way, the Kuyasa project was developed. From 1999 to 2002, Steve Thorn, who worked from the NGO SouthSouthNorth (SSN), developed the idea for the project for Cape Town that would implement SWHs in Kuyasa. The initial aim of the project was to retrofit 2,309 RDP houses with SWHs (Sustainable Energy Africa, 2010). The project aimed to engage with the community of Kuyasa from the first day. During the design of the project, ideas were presented to the community for them to provide feedback. This consultation session was held with people who were interested in the project and had signed up to get more information. The information was provided in presentations by Thorne and others from SSN and led to the inclusion of the community from the start of the project (Epp, 2009).

In 2003, the project was designed in collaboration with Cape Town and the community of Kuyasa. The project design was tested during a pilot phase, which included ten houses. Around the same time, Carl Wesselink became aware of the project via Thorne and was so amazed by its potential that he decided to commit to developing and implementing the project on behalf of SAEDF. Wesselink aimed to revolutionize South Africa's low-income housing by showcasing how SWH could improve the urban fabric and the lives of poor South Africans (Wesselink, personal communication, May 16, 2018).

Through Wesselink, Zuko Ndamane, who had been working as a research assistant in a poverty alleviation project at the University of Cape Town, became employed by the project. Ndamane, as a resident of Kuyasa, was inspired by the project's desire to improve local living conditions (Goldman, 2010). He became the person who would lead the local implementation and run the project on the ground, working closely with Wesselink. Since Ndamane is a resident of Kuyasa, he was able to

communicate the community's perspectives to Wesselink and was also able to translate Wesselink's intentions to the community for them to be received well.

An opportunity during the project design phase was the inclusion of the local community in the project through direct employment. The project aimed to not only provide people with energy-efficient technologies, but also to train them in installing and maintaining the systems (Wesselink, personal communication, May 16, 2018). By training people, the project provides them with job opportunities for the future as well. In total, Kuyasa had 100 employees. Ninety-eight people were employed directly from the community of Kuyasa (Wesselink, personal communication, May 16, 2018). Wesselink and his secretary were the only people from outside of Kuyasa that were directly employed by the project (Wesselink, personal communication, May 16, 2018). As the project further developed, it was decided that besides the direct employment in the project, the mother of every household would be employed to assist the installation team. This was agreed upon during a spontaneous information session held by Ndamane (Goldman, 2010). The project and the community agreed on the role of the mothers of the households during the installment. The fact that every household was employed by the project increases the interactions between the local community and the project.

At this stage, two significant barriers were faced. First was the convincing of the entire community of Kuyasa to support and accept the project. The second barrier included the gathering of funding to be able to implement the whole project. To convince the whole community of Kuyasa to get on board with the project was challenging. At first, the community was unaware of the benefits SWH could provide them. Mainly through efforts in communication through Ndamane, the community changed its perspective and started to support the project once they understood the benefits it would bring them (Goldman, 2010). To convince the community, Ndamane organized community meetings where he would present information on the project and its benefits. During these meetings, the community was able to ask direct questions, which helped to reduce their worries (Wesselink, personal communication, May 16, 2018). This type of mouth-to-mouth communication was beneficial especially since the information was provided by a member of the local community (Wesselink, personal communication, May 16, 2018).

The second barrier was the sourcing of funding to implement the whole project. By 2006, Thorne was able to secure approximately R24 million (1.5 million euro) in public funding from the national DEAT (Goldman, 2010). This money was collected through the EPWP, which is a job creation program. However, this was not enough to implement the project. To retrieve money from a different source, Ndamane convinced the community to contribute to the project's fund. Every household would pay 30 rands (2 euros) a month, which contributes to managing continuous funding to cover the costs of maintenance and repairs (Goldman, 2010). There were no challenges convincing the community to contribute because Ndamane explained that people would get much better service for their money (Wesselink, personal communication, May 16, 2018). Another measure taken to convince the community to provide financial contributions was the agreement that the community would be allowed to sell their house, including the SWH, at any time they wanted. This agreement was voluntary and directly arranged between Ndamane and the community leader (Wesselink, personal communication, May 16, 2018). Since the community was provided with enough correct information on the benefits of the SWHs, they were willing to contribute to the project, which resolved the funding barrier.

Even though the project was able to convince the local community to contribute financially, the challenge was to collect this contribution. Since the project would receive capital from 2,309 individual households, a system was needed to collect this contribution in a safe manner. The only solution the project could find to collect the money was to deduct the contribution from the salaries the households were going to receive during their employment in the project. A voluntary agreement was made between the local community and the project that instead of being paid for their work, they would not have to contribute to the project for two years (Wesselink, personal communication, May 16, 2018). The money that the project was meant to spend on job creation then went back into the

project in terms of the community contribution. Since this money only covered the contribution for two years, no more money from the local community's contribution was collected, and this has led to challenges in developing the project further.

5.1.2 Implementation

Due to the barriers faced in the project design stage, it took five years before the actual 2,309 SWH could be implemented (Epp, 2009). During this delay, Ndamane continued to inform the community of the progress during information sessions. In 2008, this resulted in the implementation of the full project, and the installation of 2,309 SWH was started. The community still supports the project. The initial idea was that Cape Town would be responsible for the implementation; however, due to the significant role Wesselink took upon himself, he ran the implementation on behalf of SAEDF. From this moment, Cape Town did not have an active role in the project. However, they remained the owners (Goldman, 2010). The implementation of the SWHs was, therefore, run directly by the project leaders and the community.

A primary opportunity for the project to employ the local community was already explored during the design phase. However, during the implementation of the project, this opportunity was actualized. The community was engaged in the implementation of the project through their employment as mentioned earlier. The project was required to employ the community with 30% of the initial budget of 33 million rands (2.1 million euro) needed to be spent on job creation and skills development (Goldman, 2010). This was demanded since the funding came from the national expended public works program. Mainly unemployed community members were trained in carpentry, electrical and plumbing skills. In-sourced technical experts provided the training and spent a week with the team until they were able to perform the installations. Additional outsourced accredited training was provided so that workers could get a certificate. In addition, an energy-efficient technology training was given targeting 2,309 people, which was given by Ndamane and this team (Goldman, 2010). This training was well received since it was provided by people from the local community. The local staff members who conducted the training were able to translate the information in a way that reached the community well, and the community was able to understand the information provided.

Due to the fact that the local community of Kuyasa was employed in the project, there were the main people running the project on the ground. This resulted in better implementation as people cared about the quality of the implementation, jobs and assets they were given, and were simultaneously the receivers of the project. The project was organized in a way that no one would make money out of it so that it would purely be in the benefit of the local community. Wesselink communicated this transparently throughout the implementation process, which helped to establish trust within the community. According to Wesselink, there has not been any political kickback or protest from the community because of this transparent communication and stable relationship (Wesselink, personal communication, May 16, 2018).

The primary barrier to the implementation was the use of the most suitable and affordable technology for the project. During this time, there was little affordable local production of SWH in South Africa. The first 750 systems were sourced from China (Wesselink, personal communication, May 16, 2018). The purchase of an SWH that was locally produced was complicated for 3,000 rand (192 euros) until a "Genenergy" SWH was sourced approved by the South African Bureau of Standards (SABS) (Goldman, 2010).

After two years of implementation, the first 750 SWH sourced from China started to have technical issues. The quality of the units was poor, and systems rusted and broke down. The rusted non-operating systems became a safety hazard to the community and needed to be taken down (Wesselink, personal communication, May 16, 2018). However, since the project did not have any available capital to take the systems down, the owners of the project stepped in to supply this funding (Ward, personal communication, May 8, 2018). The community was understanding regarding the technical failure of the systems. Once the systems demonstrated technical issues, they did not want

to lose them because they valued the benefits they provided. People held on to the SWH for as long as possible. The community did not blame Wesselink and Ndamane for the system failures, which was mainly due to the benefits that the services still partly provided and the fact that communication with the community about this issue has always been transparent. Ndamane informed the community of the fact that some systems were of lesser quality and that the project would do everything to repair them (Swartz, personal communication, May 15, 2018). The engagement between Wesselink, Ndamane, and the community created a sense of ownership and responsibility in the community for the SWH (Goldman, 2010). They felt that it was also their responsibility to repair the SWH and deal with the issue.

5.1.3 The Current Situation

The implementation of the project was completed in 2010. The aim was to expend the project and maintain jobs through maintenance and repair work. However, the barrier of the access to available funding emerged again. Since the funding was spent and no new funding was retrieved, the project has not continued, and many people employed by the project have lost their jobs. However, Ndamane still wants to develop the project further, retrofit more homes and replace the broken systems. He has only not been able to retrieve new funding (Swartz, personal communication, May 15, 2018). This lack of available funding is related to the fact that around the time of completion, the national government froze the SWH program. This sent a message that SWH rollouts were not the right investment. Currently, there have been no new incentives to reinvest in the SWH project, and therefore, the project has not continued.

To continue to explore the opportunity of local employment, the project tried to maintain jobs and continue the project by setting up a tourism strategy. Since the project received much international attention for being one of the most successful SWH projects, people were eager to visit the project site. People employed in the project would provide guided tours, giving information on the project to anyone who was interested. However, after a year people were not as interested in the project anymore. The attention that was given to the project decreased once the project was fully completed. Additionally, the topic of SWH was not as popular as it used to be anymore, and people moved on to looking at other incentives. Thus, the tourism side of the project was canceled in 2012 (Wlokas, personal communication, May 7, 2018). This initiative to maintain job opportunities and engagement with the community failed, and the project was officially canceled.

Wesselink has now moved on from the project and is involved in the implementation of SWH as part of a community engagement project at the Hoop wind farm. An element that was improved based on Kuyasa was that the local community was provided with job opportunities differently. Kuyasa employed people directly through the project. However, in the Hoop wind farm, people are supported in creating their own businesses that supply labor and expertise to the project. This way people learn to manage and sustain their own businesses that can drive the whole community towards better economic development (Swartz, personal communication, May 15, 2018).

5.2 Joe Slovo

The following actors are referenced throughout this case description.

Type actor	Actor
Local authority	Western Cape Provincial Government of Human Settlements (Implementation Agent)
Project leaders	Sustainable Energy Africa, Andrew Janisch (Energy Efficiency & Sustainability Adviser)
	The Housing Development Agency (HAD) (project manager)
	The National Department of Human Settlement (NDHS), Annie Orgill (project manager)
Receiver	Community of Joe Slovo
Funding	Danish International Development Assistance Agency (DANIDA)

5.2.1 Project Design

In 2004, the design of the Joe Slovo project started. The Joe Slovo project is part of an overarching N2 gateway project, the national flagship housing project of the National Department of Human Settlements (NDoHS). This project aimed to showcase new approaches to sustainable housing delivery in the country under the Integrated Reconstruction and Development Program (IRDP) initiative. The Joe Slovo project included progressive elements, which focused on urban design and energy efficiency. As part of the energy efficiency incentives, SWH are taken up by the project. The implementation of SWH is in line with the South African National Standard SANS 10400 XA, which requires that all new houses provide 50% of the total water heating through sustainable sources (Sustainable Energy Africa, 2014). Since this regulation is not enforced correctly, little attention was paid to the regulation during the implementation stage of the project.

During the project design stage, Annie Orgill was appointed as project manager of energy efficiency elements by the NDoHS. Orgill worked closely together with a technical team coming from the Housing Development Agency (HDA) (Orgill, personal communication, May 22, 2018). The initial aim of the project was the development of sustainable subsidized housing and was not explicitly related to the improvement of social conditions. This is mainly because the project was set up by the NDoHS, which is responsible for the development of IRDP houses.

The local community of Joe Slovo was the receiver of the project. However, they were not included in the project design. The community was informed about the project only after the completion of the project design. At this stage, formal information sessions were held to inform the community about how the project was going to be implemented. During these information sessions, there was no room for input from the community on the design of the project.

Since the national government does not provide funding for the implementation of SWH, the project experienced a barrier in terms of retrieving enough funding to incorporate SWH. Additionally, because the project has a limited budget, it was challenging to build as many houses as possible while still including low carbon technologies. The limited budget resulted in the sourcing of funding for SWH from the Danish government under DANIDA. The Danish government believed that through their experience, implementing SWH was a positive initiative to reduce carbon emissions and provide people with access to hot water. Apart from providing the funding, the Danish government did not

play an active role in the development or implementation of the project (Orgill, personal communication, May 22, 2018).

During the design of the project, Orgill worked closely together with Andrew Janisch who worked for the SEA. Janisch consulted for the project in the implementation of low carbon technologies. At the same time, Janisch pushed for the incorporation of a local employment strategy. He believed in the opportunity that the community could benefit from the implementation of SWH in many ways, including an increase in social positions through job creation and economic opportunities through training and business creation (Orgill, personal communication, May 22, 2018).

Janisch's consultation led to the incorporation of the local employment strategy in the project design. This strategy dictates that local unskilled labor can form up to 33% of the SWH installation team (Sustainable Energy Africa, 2014). In Joe Slovo, 6 of the 18 installation staff members were local unskilled laborers. The six members of the local community were provided with formal labor agreements. However, arrangements for the type of work and the hours were made through voluntary agreements. These voluntary arrangement between the installers and the locally employed crew were important for them to establish real job opportunities and learn the craft. Members of the local community were trained and capacitated to perform the function of necessary maintenance and were the first "go to" people whenever a problem arose (National Department of Human Settlements, 2014). This employment of the community was taken up by design mainly for practical reasons and was less focused on making a difference and improving social conditions within the community.

5.2.2 Implementation

The NDoHS appointed the provincial government, DoHS, as the projects implementation agent. The role of the provincial government was to implement and procure the project because the land on which the houses are built belongs to the provincial government.

The progress of the implementation was communicated to the local community through monthly newsletters. The NDoHS and HAD created these newsletters to engage the community in the process. Information was provided on resident experiences, introduction to the maintenance team, and explanations of specific procedures. Additionally, other relevant information such as issue-indicated tips on what to do in a legal dispute with the project was communicated (Department of Human Settlements, 2018). This newsletter provided the community with access to relevant information to evaluate the project. Nevertheless, Orgill indicated that most of the community was not aware of the existence of the newsletter. The people who did receive the newsletter did not pay much attention to it (Orgill, personal communication, May 22, 2018).

During the implementation of the project, the main barrier experienced was the resistance in the community to the overall project. The community protested against the project because they did not want to leave their land temporarily or permanently due to the building process. For the building of the houses, the people living on the land in informal settlements would have to temporarily relocated to Delft. Delft is a township much farther away from the city, a kind of wasteland, where there are no hospitals or schools. However, the government is not able to build houses for all people who have built shacks on that land, as shacks are compact. This also resulted in people having to leave the area (Visagie, personal communication, May 10, 2018). While the conflict between the project and the community of Joe Slovo has a large underlying story, the lack of community engagement and consultations in the project design was responsible for the lack of identification of these issues before the implementation started. This barrier eventually led to a delay in the project and resulted in the fact that not all the planned SWH were delivered.

Over time, the problem has increased as young men coming for the eastern cape have started lives and built their shacks in Joe Slovo. These people also contributed to the problem as they did not want to move and contribute to the community. Due to the increasing conflict, the problem has also become a legal problem were both the people of Joe Slovo and the project sew each other. The legal results require the project has to give people similar living environments, which they cannot provide

because other areas are much less developed and not as close to economic opportunities and facilities as Joe Slovo.

Even though this challenge does not directly apply to the implementation of SWH, not being able to build the intended houses has largely delayed the placement of the SWHs. Currently, the project is in its last year, and the money for the implementation of SWH is partly not being spent. The money that has not been spent has to be returned to the Danish as this is donor money. Solutions were explored to utilize the money to the fullest and benefit the community. Ideas of buying SWHs in bulk and storing them until the houses build were explored but turned down. Since the project has so far been delayed, this would have been a disaster due to high storage costs and the risk of damages and theft (Orgill, personal communication, May 22, 2018).

An opportunity with the implementation of the project is the employment and training of unemployed residents of Joe Slovo. During the installations of the systems, local jobs were created. Besides the six laborers that were utilized over a period of approximately six months the contractor provided unaccredited training to two local community members so that they could be available for any maintenance issues that arise. Training was both theoretical and practical and was conducted by the core installers. The SWH manufacturer also provided benchmark training for competency at the commencement of the project (Orgill, personal communication, May 22, 2018). The contact numbers of the maintenance team were handed to the homeowners during the “Happy Letter” distribution. The Happy Letter is a document signed by each homeowner validating that the SWH has been successfully installed and is in 100% working condition. When an issue arises with an SWH System, the homeowner contacts the maintenance staff directly (National Department of Human Settlements, 2014).

A program to teach the community about the sustainable interventions they were receiving was run by the provincial government. For this programming, community liaison officers (CLOs) were trained to run the program. The essential elements from this program included an understanding of how an SWH works, the effect of weather on SWH performance, and information on how using the hot water from the SWH saves electricity. A voluntary agreement was established between the community and the project that at least 75% of the households would participate in this program. Nevertheless, 50% of the households participated in the program (Orgill, personal communication, May 22, 2018). This can be related to the dissatisfaction of the local community with the project's objectives.

5.2.3 the current situation

Currently, 1,572 SWH installations have been made in Joe Slovo, although this should have been 2,886. Due to the protests from the community, the project has been delayed by four years. Currently the last SWH are being installed, which also implies that the six people employed on the installation team will lose their jobs. Responsibility for the maintenance for the coming ten years will be with the installation companies who have signed contracts for this period. The two people from the community employed by the installers to perform and assist with maintenance issues will remain active (Orgill, personal communication, May 22, 2018).

Two surveys to assess the community's satisfaction with the installations of the SWH were conducted. The first barrier currently influencing the project is that the in a second winter survey, people demonstrated dissatisfaction with the SWHs, as they did not provide them with hot water most of the time. According to Euston-Brown from SEA, “the feedback this time around was quite lukewarm, and I'm using that literally and figuratively, people were like it does not help them very much” (Euston-Brown, personal communication, May 25, 2018).

The reasons presented for why people were dissatisfied with the SWHs in the winter could be related to the fact that the size of the system is quite small. A 250 l unit could benefit someone much more than a 100 l unit, especially in Cape Town where there is little direct sunlight during the winter (Euston-Brown, personal communication, May 25, 2018). Another factor has to do with basic human psychology. People get used to the service of the SWH and experience this as standard. People always

want more and better, and they have developed an appreciation for the service (Euston-Brown, personal communication, May 25, 2018). Another barrier was the failure of the educational programs and the lack of general community engagement. When people are not well aware of how the systems operate, or what benefits systems are supposed to bring, this can lead to dissatisfaction.

An opportunity the project is currently exploring is sharing the lessons learned from the development and implementation of the project with other municipalities in the Western Cape. This sharing of the knowledge was a formal requirement by the Danish Government. Orgill has therefore established relationships with other municipalities, which she visits to communicate her experience with the project (Orgill, personal communication, May 22, 2018).

Another recent development is that the people of Joe Slovo see building houses as business opportunities. People who have received an RDP house, are renting this one out and remain living in their shack. They prefer living in their shack which they have built themselves and have been used to living in it for many years. By renting out their RDP house, they are able to receive an extra source of income, which they can spend on basic needs such as food (Mbuyiseli, personal communication, May 12, 2018). The extra source of income brings people opportunities. Nevertheless, the informal settlement remains. This development was not predicted during the project design stage and can also be related to the lack of community involvement in this stage.

6 Cross-case Analysis

The following chapter analyzes the two cases based on information given in the case descriptions. The analysis is structured according to the four dimensions of the policy arrangement approach mentioned in chapter two. In doing so, the analysis reveals the influences of participatory governance on the barriers and opportunities in the policy domain of SWHs.

6.1 Actors

In both cases, similar actor types were involved in the policy domain of SWHs for low-income areas. These actor types are project leaders, local community members, local authorities, and funders. However, the actual actor who was part of the project makes that there has been a different uptake of participatory governance. The difference in the participation of the local community in the projects leads to the fact that the projects face different barriers and opportunities.

6.1.1 Project Leaders

For both projects, multiple organizations like government departments and NGOs took on roles as project leaders. Through collaboration, these organizations pushed the project forward, arranged the necessary resources, and developed and implemented the project. Even though this actor type can clearly be distinguished in both cases, the actors themselves are different. The leading organizations in the projects are governmental departments or organizations as well as NGOs. The reason that these projects are set up by these types of actors is that they supply SWH for free and for the benefit of the public good. The two different types of organizations collaborate because they can provide different kinds of resources required for the different stage of the project.

Both cases feature different organizations and individuals that have taken on roles as project leaders, mainly because the projects were developed with different initial objectives in mind. For instance, Kuyasa was developed with the idea of improving local conditions in the community, and Joe Slovo with the idea of developing sustainable RDP housing. The differences in objectives resulted in the different ways in which project leaders engaged and included the local community.

For instance, during the design phase of Joe Slovo, the NDoHS did not include the community because their initial aim was to design sustainable houses (Orgill, personal communication, May 22, 2018). At this stage, the NDoHS was also not aware of the barriers the project was going to face during the implementation stage and how the engagement of the community could have influenced these barriers. Therefore, the combination between starting the project without the focus on the local community and lack of awareness of the importance of participatory governance led to a lack of community engagement in the Joe Slovo project.

In the case of Kuyasa, the project design and implementation were strongly influenced by individual project leaders operating under a particular organization. Wesselink and Thorne, on behalf of SAEDF and SSN, influenced the development of the project, letting their objectives and ideas direct the design. Wesselink's personal desire to improve the living conditions of South Africa's poor through the implementation of SWH led to the inclusion of the community in the process of designing and implementing the project (Wesselink, personal communication, May 16, 2018).

6.1.2 The Local Community

The local communities of Joe Slovo and Kuyasa were the receivers of the SWH systems and were involved in the project through consultation sessions and employment. The extent to which the community was involved in the project by project leaders differs strongly per case. The level of participation is directly related to the role of the community and the level of influence the community has on the different stages of the project.

The local community of Kuyasa was involved in the project from the start through consultation sessions (Goldman, 2010). Later during the design phase, when the project was able to get the support

of local resident Ndamane who further explored engagement of the community . The involvement of Ndamane in the project also led to better results as he was able to translate the community's needs to Wesselink and communicate the value of the SWHs to the community (Wesselink, personal communication, May 16, 2018). Ndamane had a strong position of power, creating more community participation in the development of the project. The level of inclusion of the local community during the implementation phase was extremely high as the project was primarily run by the local community itself. The extensive employment of the local community increased their influence on the project.

In contrast, the community of Joe Slovo was not involved in the development of the project, which led to challenges in the implementation. When the implementation of the project started, the community fought against the project as a result of conflicts over human settlements (Visagie, personal communication, May 10, 2018). Since the relationship between the project and the community was not optimal, the acceptance of the SWHs was lower in Joe Slovo than in Kuyasa. Even though the local community was employed in the project and information sessions were held, appreciation for the SWHs was low (Euston-Brown, personal communication, May 25, 2018). These measures to engage the community in the project were not strong enough to align the objectives of the project with those of the community.

6.1.3 Local Authority

Since the projects were implemented at the local level, the local authority had a significant role in the project. The project leaders worked together with the local authorities on the design and implementation of the project. However, for both projects, this was a different local authority. The Kuyasa project fell under the city of Cape Town as it was situated in this municipality (Goldman, 2010). Since the land of Joe Slovo belongs to the Western Cape province, the project was led at this level. The municipality of Cape Town was little involved in the Joe Slovo project due to the more significant role of the province (Visagie, personal communication, May 10, 2018). The local authorities in both projects fulfilled different roles and influenced the project's development in different ways.

In the case of Kuyasa, the city of Cape Town owned the project (Ward, personal communication, May 8, 2018). During the project design, Thorne worked together with the city as he designed the project with the idea that the city would be the implementer. However, during the development, the city became less involved in the project, as Wesselink on half of the SAEFD took over the responsibility over the implementation (Wesselink, personal communication, May 16, 2018). Even though the city of Cape Town was not actively involved in the project, authorities remained the owners and were held responsible. This was demonstrated when the city had to take care of taking down the broken systems when the project ran out of money to do so (Swartz, personal communication, May 15, 2018).

A different role of the local authority can be seen in the case of Joe Slovo. The provincial government was only involved in the Joe Slovo project during the implementation phase, which led to the limited influence of the government on the initial direction of the project (Visagie, personal communication, May 10, 2018). However, during the implementation stage, the provincial government had significant responsibilities in the procurement and implementation of the SWH as they set up educational programs and sourced the right installers (National Department of Human Settlements, 2014). Their efforts to engage the community through educational programs and the employment led to some community inclusion in the project.

6.1.4 The Funder

The funders of the project were different national and international organizations ,which both had different objectives and influenced the project in different ways. Since the funding did not directly come from the project leaders, but through a different organization, these organizations played a different role in the project. The funders were not actively involved in the project implementation,

but did supply the most critical resource and imposed specific rules, which are taken into account in the project design.

For Kuyasa, the funder was DEAT. This organization supplied the money from its Public Works Program, which funds job creation and is not particularly interested in low-carbon initiatives (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2015). This resulted in the employment of as many local people as possible in the project. The employment of the community benefits the project as more people got directly engaged. Nevertheless, the jobs that were created were not sustained, and the objective of long-term job creation was not met (Swartz, personal communication, May 15, 2018).

In Joe Slovo, the funding came from the Danish government, which provided the money mainly for the implementation of SWHs in the project. The Danish government believed in the value of SWH as low-carbon technology that also provides social benefits to the poor (Orgill, personal communication, May 22, 2018). The Danish government influenced the project by requiring that the knowledge be shared with other municipalities in the province. This led to the sharing of valuable knowledge and incentivized other municipalities to develop better SWH projects (Visagie, personal communication, May 10, 2018).

6.2 Resources

The resources enabling the successful rollout of SWH in low-income areas were strongly related to specific actor groups and the project development over time. Physical resources are most critical resources required to implement SWHs. Participatory governance can influence this resource as is demonstrated by the Kuyasa case. The two non-physical resources, local awareness of SWH benefits and knowledge of community engagement strategies, are directly related to the inclusion of participatory governance in the project. The non-physical resources played an essential role in influencing the barriers and opportunities faced by SWH project for low-income areas.

6.2.1 Funding

The most critical resource was the funding of the SWH projects. Substantial capital investment was required to purchase the SWH systems before they could be implemented and pay for the installations once they were finished. As these projects provided SWH to the poor for free, there was no monetary incentive to invest. Only organizations that serve the public good would supply this capital. The government of South Africa has no budget allocated for SWH implementations in low-income areas, and therefore SWH projects face difficulties retrieving this capital from other sources (Sustainable Energy Africa, 2010).

A solution to partly finance SWH rollouts and lower the investment requirements is the collection of contributions from the community. A household could pay a certain amount per month for the SWH since their electricity costs were going to, and they would receive a better service. Since the SWH project, thousands of SWH have been installed. A small contribution per household can largely contribute to funding the project.

The Kuyasa project demonstrated that this model of reducing investment requirements through the financial contribution of the community works. Due to extensive community engagement, the community was willing to provide a financial contribution. Ndamane explained to the community during information sessions that they would receive better value for their money. The transparent communication and inclusion of the community in the project led Ndamane being able to convince the community to contribute to the project financially and thus enable the implementation of the project (Wesselink, personal communication, May 16, 2018). However, the challenge was to collect these contributions. Since there was no safe system for collecting, the money could not continuously be collected, and the maintenance and replacement of the systems could therefore not be financed through the project (Goldman, 2010).

6.2.2 Knowledge on Community Engagement Strategies

Community engagement strategies are essential resources in the successful implementation of SWH for low-income areas. Since Kuyasa is the only example of correct community engagement, it can be seen that other SWH projects do not have correct community engagement strategies in place. Lessons learned from the community engagement strategy of Kuyasa can be used to inform future SWH projects. The implementers and the whole community of Kuyasa are important actors in the distribution of this knowledge. Rules can also serve to enforce the implementation of community engagement strategies.

Since the Kuyasa project had a community engagement strategy in place from the beginning of the design phase, the project was successful in its implementation and was able to overcome specific barriers and create opportunities. Thorne and Wesselink created the community engagement strategy together with Ndamane during the design of the project. In this strategy, transparent communication and the inclusiveness of community in the design and implementation took on a central role (Goldman, 2010). Communication was also successful because Ndamane, as a resident, was able to relate to the community and translate their needs. Since the implementation was run by the local community, the project was received better, and the results of the implementation were successful (Wesselink, personal communication, May 16, 2018).

The project design and implementation in Joe Slovo did not significantly engage with the community. This is mainly because the community was not included in the project design (Orgill, personal communication, May 22, 2018). Later on, after the implementation stage, the project has encountered issues, which could have been predicted and tackled if leaders had consulted the community beforehand. The fact that the community was only engaged in implementation stage resulted in a lack of trust between the community and the project. The way the Joe Slovo project engaged the community in the implementation stage was through local employment. Even though this strategy element is similar to Kuyasa, only 33% of the labor used came from the local community (National Department of Human Settlements, 2014) compared to 98% in Kuyasa (Wesselink, personal communication, May 16, 2018). The level of local employment in Joe Slovo was low and could not contribute to the community engagement significantly.

6.2.3 Local Awareness of SWH Benefits

As for overcoming the barriers and creating opportunities in the rollouts of SWHs for low-income areas, a critical resource is the awareness of the benefits SWHs provide. Currently, low-income communities do not know how SWH can improve their lives and save them money (Wlokas, personal communication, May 7, 2018). When SWH are installed without educating the local community about their general workings and benefits, they become valueless objects that are not used to their full potential and are not appreciated (Euston-Brown, personal communication, May 25, 2018). It is, therefore, necessary to educate the local community about SWH through training programs. These training programs are therefore also essential parts of the community engagement strategy. In more general terms, access to information can create local awareness. Once the community has access to information that can explain the benefits of SWH, they can appreciate the systems and use them to their full potential.

In Kuyasa, during the implementation stage, one member of every household was given an energy-efficient technology training. This training focused on educating the local community on what an SWH is, how it is appropriately operated, and how it is used most effectively. The training was provided by Ndamane and this team of local community members (Goldman, 2010). Since the information was provided by people from the community, the information was presented in a way that engaged the community and brought the informal across properly. This training resulted in the fact that the people from the community still have a tremendous appreciation for the systems and feel responsible for maintaining them (Wesselink, personal communication, May 16, 2018).

The local community of Joe Slovo also received extensive training on the SWH systems. This training focused mainly on the practical implications and workings of the systems. The program was run by the provincial government who trained members of the community to conduct the training sessions. The training sessions, however, only reached 50% of the households, which led to a lack of appreciation for the systems among part of the community (National Department of Human Settlements, 2014). The reason that the program only reached 50% of the community is the weak voluntary agreement made between the community leaders and the project (Orgill, personal communication, May 22, 2018).

6.3 Rules

Since the SWH project was designed and implemented by different governmental institutions, formal rules like building regulations had a significant influence on the barriers and opportunities. However, because formal regulations are not enforced properly in South Africa, informal rules between the project and the community play a significant role. Essential rules in both cases are labor contracts and implementation agreements. The establishment of informal rules apart from the existence of formal rules is essential for participatory governance to influence the barriers and opportunities in the project.

6.3.1 Regulation SANS 10400 XA

In 2012, The national government of South Africa implemented a building regulation that required all new houses to meet the minimum energy efficiency requirements. Part of the SANS 10400 XA regulation energy efficiency requirement is that 50% of water heating must come from renewable sources (Department of Energy, 2015). This directly called for the use of SWH as this is the best technology to achieve this goal. This regulation applies to all new buildings in South Africa, including government-funded, low-income housing projects. As the interventions mentioned above require additional capital outlay, this regulation had a direct impact on the budget required to deliver to low-income households in South Africa. This regulation has been partially ignored by low-income housing projects, and the “business as usual approach” has been adopted (Sustainable Energy Africa, 2010). The regulation has also not been appropriately enforced, which is why this formal rule had a limited effect on the barriers and opportunities faced by SWH projects.

For Kuyasa, this regulation did not apply as the project was implemented before 2012. In the case of Joe Slovo, this regulation did apply during the implementation of the project. During the project design SWHs were used mainly because of their potential to improve the living quality of the local community and improve energy efficiency. Little attention was paid to the regulation requirements due to the lack of enforcement. Although Joe Slovo does meet this criterion because of the implementation of SWHs, the project was only able to do so because of the funding that was sourced from the Danish government (Department of Human Settlements, 2013).

6.3.2 Labor Contracts

An essential rule through which participatory governance can create opportunities and take away barriers in the implementation of SWH in low-income is the inclusion of labor contracts between the project and the community. An essential element in which the local community participates in the development of the project is through local labor. Agreements made on the employment of the local community are partly fixed in the legal contract, as well as through voluntary agreements between the project and the community. These agreements allowed the project leaders and the local community to collaborate based on the indicated fixed roles and tasks.

For the Kuyasa project, the employment of the community happened formally, mainly because the funding program required this. The Public Works Program that supplied the funding required the project to spend 30% of the total budget on job creation and skills development. All the

people were legally employed in the project and were provided with an extensive legal labor contract (Goldman, 2010). Although people were officially employed by the project, the agreements on the type of work, the involvement, and expectations were all made voluntarily. For example, the mother of every household was officially employed by the project, while she was only asked to be home and help with the installment during the day of implementation. There were no fixed working schedules or tasks set in these contracts, but during information sessions, agreements were made on the specifics of the work the community would provide (Wesselink, personal communication, May 16, 2018). Formally, the project was supposed to pay for all the labor involved in the project. However, a voluntary agreement was reached that the money could be used as part of their contribution to the project. Therefore, the labor did not receive money but a free SWH and the improved service that this provided.

In the case of Joe Slovo, the labor contract was established during the implementation stage. All the labor agreements for formal agreements were set in contracts (National Department of Human Settlements, 2014). This was mainly due to the formal setting of the project and the influence of the NDoHS. Informal agreements were made between the installer and the local laborers. These agreements contained the type of work they were supposed to do and their level of involvement in the project, for example (Department of Human Settlements, 2018). Another crucial agreement was made between the project and two members of the community who were responsible for maintenance tasks once the implementation was finished (Orgill, personal communication, May 22, 2018).

6.3.3 Voluntary Agreements

Informal rules in the form of voluntary agreements between the project and the community influenced the way the community is engaged in the project and can, therefore, influence the barriers and opportunities experienced at different stages. These voluntary agreements are established during both the design and implementation of the project at consultations meetings. During these meetings, the project and the community collaborate to agree on different subjects like implementation procedures or contribution collection. These agreements were established alongside the development of the project, and they are not initiated only by project leaders but in true collaboration between the actors of the local community and the project leaders.

In Kuyasa, the most crucial voluntary agreement was the accord on the financial contribution the community would give to the project. This agreement was established during a consultation session in the design phase between Ndamane and the local community. Due to transparent communication, this agreement was reached without any difficulties (Goldman, 2010). This agreement helped the project with regard to resources, but also established mutual trust and willingness to collaborate further. During the implementation stage, other voluntary agreements were made. For example, an agreement was established that ensured that the local community would be able to sell their house including the SWH whenever they wanted to (Wesselink, personal communication, May 16, 2018).

Voluntary agreement in the case of Joe Slovo focused mostly on the participation of the community in the education programs. Since the community was not happy with the project's design, their willingness to participate in the education programs was low. The project established voluntary agreements with local leaders to ensure that enough people participated in the programs to educate people about the SWHs. The agreement stated that 75% of the community would participate in the project (Visagie, personal communication, May 10, 2018). Although this agreement stipulated that only 50% of the people participated (National Department of Human Settlements, 2014). This can be related to the weak relationship and collaboration between the community and the project. The fact that this agreement could be broken easily demonstrates that the community engagement was not strong, and the creation of voluntary agreements does not contribute to the creation of opportunities or the decrease of barriers faced during the project.

6.4 Discourse

Since SWH projects are part of the broader systemic transformation and shift to a renewable energy system, it is expected that the large discourse on renewable energy influence the SWH project. A study on underlying discourses demonstrated that renewable energy is an essential factor in the development of the projects. However, once the project was being implemented, the focus shifted to the larger social benefits SWH provide.

Renewable Energy

Studying the discourses demonstrated that the design of the SWH rollouts were strongly related to and influenced by the discourse on renewable energy. Around 2005, the South African government committed to the transformation of its energy sector, which at that time relied solely on fossil fuels (Hermanus, 2017). The development of SWH projects was seen as an easy-to-implement, low-cost intervention that could contribute to the uptake of renewable energy technologies and decrease GHG emissions (Kritzinger & Covary, 2016). Since this renewable technology was relatively cheap and accessible, it posed as a useful intervention for low-income areas for them to take part in this energy sector transformation.

The SWH projects Kuyasa and Joe Slovo were initiated by project leaders because they believed in the necessity of the renewable energy transformation. All project leaders wanted to contribute to this systemic change by setting up projects that utilized the benefits of SWH and demonstrated its possibilities through implementation. This discourse sturdily influenced the project design since the use of SWH guided the required resources at this stage (Orgill, personal communication, May 22, 2018; Wesselink, personal communication, May 16, 2018). The required funding for the implementation of the project caused considerable barriers to the design and implementation of the project.

During the implementation of the Kuyasa project, the discourse on renewable energy became less dominant. Since the project mainly focused on improving the living conditions of the local community, it was discovered that the SWH had significant co-benefits such as the improvement of comfort, health, and free time. These benefits were more significant than the environmental benefits, such as GHG emission reduction. The positive social benefits influence the development of the project in the later stage of the project. Wesselink argues that from a renewable energy perspective, SWH are not as important anymore as other technologies. Solar PV, for example, has become more accessible. However, for a social development perspective, SWHs should be implemented in future projects (Wesselink, personal communication, May 16, 2018).

7 Conclusion

This research aims to provide insight on the effect of participatory governance on the policy domain concerning SWH rollouts for low-income areas in Cape Town, South Africa. The following research question raised:

How does participatory governance, regarding the different levels in the policy arrangement approach, influence barriers and opportunities in the rollout of SWH projects in low-income areas in Cape Town, South Africa?

In response to the research question, the conclusion ill elaborates on the influence of participatory governance on dynamics of the policy domain, which are affecting the barriers and opportunities SWH rollouts are facing. First, a summary is provided of the three most significant barriers and opportunities. Second, the dimensions of participatory governance influencing the barriers and opportunities in the policy domain are analyzed. Only the indicators influencing the barriers and opportunities experienced are taken into account. Subsequently, the chapter reflects on the findings of the research presented in chapter six on the participatory governance aspect of the energy democracy theory addressed in Chapter two. Then, recommendations for further research and improvements for the policy domain are presented.

7.1 The Barriers and Opportunities Experienced

The research shows that the rollouts of SWH are facing many barriers like the sourcing of funding, the convincing of the local community and the sustaining of local job creation. At the same time, the projects hold the opportunity to improve the living conditions of the local community through the creation of local jobs and the implantation of SWHs. The barriers and opportunities are related to the state of policy domain during a specific time.

During the project design, the significant challenge in SWH projects for low-income areas was the sourcing of proper funding. Since the projects were supplying South Africa's poor population with free SWH to improve the quality of lives, while at the same time reducing GHG emissions, there was no economic incentive for investment. Only organizations operating in the public good were willing to fund these SWH projects for low income. However, the capital they had to invest was limited.

The barrier faced during both the design and the implementation of the projects was convincing the local community to accept and support the objectives of the project. The local community was not aware of the benefits SWH could provide them. Due to their little knowledge of the technology, the local communities were suspicious of the implementation and the overall project's objectives. It is essential to align the objective of a project with that of the local community and build a robust cooperative relationship.

During the implementation of the project, this cooperation between the local community and project can be further explored through the incorporation of local employment in the project. By including the local community in the implementation of the project, better results can be achieved. As both the receivers and implementers of the project the local community is empowered through skills development and the use of the SWH systems. However, once the implementation stage is completed sustaining the job remains an important barrier that needs to be overcome.

7.2 Participatory Governance

This research demonstrates that the barriers and opportunities experienced through the rollout of SWH were related to the level of community engagement and inclusion. When the community participates in the design and development of SWH rollouts they are more successful. This form of

community engagement influences power structures between actors, demands more nonphysical resources, build on more informal rules, and causes a shift in discourse.

The concept of participatory governance is one of the three core dimensions in the energy democracy theory, as explained in chapter two, and is strongly focused on the inclusion of the local community in the decision-making process. The components of this dimension are inclusiveness, transparency, access to information, and energy education and awareness. The components each have different indicators, displayed in Table 2 in Chapter two, which are used during the analysis. For this analysis, only the indicators influencing the barriers and opportunities were taken into account. In exploration of the influence of energy democracy on the dynamics of the policy domain, is concluded in all four components of participatory governance.

7.2.1 Inclusiveness

The following indicator explains the inclusion of the community in the decision-making process: incorporation of public consultations at all levels. The community is included in the decision-making the process through community meetings and local employment, which influences the barrier of community acceptance and funding and creates opportunities for employment of the local community.

Consultation sessions were vital resources in including the community in the governance of the project. The difference between the consultation sessions in Kuyasa and Joe Slovo was that in Kuyasa, this session was held during the design of the project and created alongside the development. In Kuyasa, the process of setting up these consultations sessions was not predefined but happened somewhat spontaneously alongside the development of the project. The fact that these consultations sessions were not explicitly developed beforehand points to the informal rules based on which the project was designed. The consultations sessions that were created alongside the development of the project led to better communication and inclusion of the communities in the development of the project. A direct result of the consultation sessions was that the barriers to convincing the community to support the project and source the required funding were overcome. During these consultations, the community of actors and project leaders were able to come together and arrive at a voluntary agreement that the community would support the project through the provision of capital.

Another way that the community was consulted and included in the decision-making process of the project was through exploration of the opportunity of employing the local community. In both cases, the local community of actors was employed by the project. However, in Kuyasa project implementation was run 98% by the local community, compared to 33% in Joe Slovo. The difference in local employment is directly related to the formal requirement made by the funder. These formal requirements improved formal rules on which the employment strategy was based. The employment of the local community led to the notable inclusion of the community in the project and therefore, resulted in more appreciation of the SWHs.

The example of Kuyasa demonstrates that by including the community in the project, starting from the design phase, through the means of consultations and employment, the acceptance of the project is much higher. The project leaders were responsible for providing the resources for consultation sessions. These consultations sessions were developed using the informal rule of creating sessions that are suitable to convince the community to support the project and take away the barriers to community acceptance and sourcing funding. To explore the opportunity of creating local employment, the project leaders need to extensively include the actor of the local community in the project. This opportunity can be enforced through formal rules that the funder can impose on project leaders.

7.2.2 Transparency

The transparency of the project for the community is described by the following indicator: due process and precise procedures. The transparency is related to communication about the procedures of the

project. In both cases, the procedures and phases of the project were communicated with the community. However, transparent communication was more effective in Kuyasa, through Ndamane.

In Kuyasa, challenges in the development of the projects resulted in insecurities and long waiting periods during which no information could be shared. For example, there was a delay in the implementation of the project due to difficulties with sourcing the funding. Therefore, Ndamane had to reassure the community that the project was going to be implemented during this delay. This reassurance was done through transparent resource communication by Ndamane. Wesselink indicates that the resource of transparent communication in the project was one of the most critical successful factors of the project (Wesselink, personal communication, May 16, 2018). Since Ndamane was able to provide the resource of transparent communication, the barrier of getting the support from the local community was overcome because the community appreciated project leaders for being open and honest about their objectives and procedures.

In Joe Slovo, the transparency of the project's objectives and procedures were only communicated starting from the implementation stage. The project design phase was not transparent because the community was not being informed or included in the decision-making process of this stage. During the implementation, the procedures of the project were transparent to the community as they were communicated through the formal channels that were direct from the top down. However, this formal rule of providing communication through fixed information sources that were created with little influence from the community itself led to little appreciation among the community for the project. The little appreciation of the project led to the barrier of convincing the community to support the project, which was not overcome.

Even though both projects communicated their procedures and developed due processes, the research demonstrates that due to the lack of transparency about the project design and the use of formal rules such as fixed communication methods, Joe Slovo was not able to overcome the barrier of convincing the community to support the project. The Kuyasa project was more effective in employing transparent communication, mainly because of the efforts of Ndamane, which resulted in high levels of appreciation and the support of the local community. Transparent communication in the Kuyasa project resulted in the fact that the barrier of community acceptance and support was overcome.

7.2.3 Access to information

The community's access to information can be explained using the following indicator: reporting on legislation and deliberation. Access to information about outcomes of decision-making processes for the projects was organized well. Nevertheless, since the information was communicated through different measures, the information was not always appropriately received.

For Kuyasa, Ndamane led the communication between the project and the community, which was mainly through word of mouth. The fact that the information was provided through word of mouth indicates the informal rules on how the project was developed. Since Ndamane is a resident, he was able to communicate well with the community on behalf of the project. Ndamane was able to provide the local community with the information that was useful for them and information that they requested, which proved to be an essential resource in overcoming the barrier of convincing the community to support the project and collect the required funding. The community was able to receive the necessary information and was able to decide to support the projects by means of collaboration on finance.

In Joe Slovo, the communication was run through the formal rule of official information strategies. For example, the project leaders provided a monthly informative newsletter that targeted the whole N2 gateway project. Since this information was provided in the form of writing and in a top-down structure, it was not always well received by the community. Orgill indicated that many community members were not even aware of the existence of the newsletter (Orgill, personal communication, May 22, 2018). The fact that this formal information strategy was not effective in reaching the community resulted in little acceptance of the project.

The research demonstrates that not only the resource access to information was essential in the participation of the local community in the project design and implementation. However, the way the information is communicated plays a much more significant role. The Kuyasa case indicates that information should be provided by an actor within the community through informal rules and word-of-mouth because this has proven to be most effective. The effective communication of information resulted in more trust between the project and the community, which influenced the local community's acceptance of the project and can help overcome challenges in retrieving funding.

7.2.4 Energy education and awareness

The project's supply of energy education and awareness can be assessed through the indicator: the existence of dedicated educational programs. Both projects implemented educational programs and employed the local community in the project to educate the community about the value of SWH. The education programs and the employment led to the exploration of the opportunity of employing the local community in the project and reduced the barrier of convincing the community to support the project.

In Kuyasa, the resource of an educational program was successful as it created substantial appreciation for the SWH. This appreciation was created because the education program was implemented by the local community employed in the project. The informal procedures point to informal rules guiding the development of the educational program. The development of the program was led by Ndamane, who was successful in communicating the necessary information to for them to appreciate the SWHs. Another successful element of the program was that the mother of each household received resource training because of their employment in the project. Employing as many people as possible in the project provides opportunities to educate as many people as possible, which can result in the high level of appreciation for the project.

In Joe Slovo, the homeowners' education program was run by the provincial government who trained community liaison officers (CLOs) to run the program. The education program helped with the acceptance of the SWH, but since it only reached 50% of the population, it was not enough to adequately communicate and bring across the value of the SWH. Since the community did not fully appreciate and value the systems, they did not use them to their full potential and did not achieve the maximum social benefits.

Even though both cases had the energy education and awareness programs in place, their effectiveness differed. The educational program in Kuyasa was able to create opportunities regarding local employment and helped the project overcome the barrier of convincing the community to support the project. The success of the education program in Kuyasa was related to the fact that the program was developed by Ndamane who was able to educate the community through the informal development of a program created by and for the local community.

7.3 Recommendations

The conclusions drawn from the research results can be translated into practical recommendations for all government levels, project developers, and implementers. In addition, these recommendations are provided to guide future research on the topic.

7.3.1 Practice

Based on the research results, practical advice can be drawn to help actors develop better SWH rollout projects. These practical recommendations can support the government in its design and development of new and better SWH projects embracing the principles of participatory governance. Awareness of the importance of increasing the levels of participatory governance could stimulate this

development of better SWH rollouts, which can contribute to national GHG emission targets and the improvement of living conditions of South Africa's poor populations.

The organization of SWH rollouts by the project leaders should shift to a more community-driven approach. It is essential that actors, such as project leaders and local authorities, obtain knowledge on how to develop and implement the right community engagement strategies. This resource plays a significant role in the creation of successful SWH rollouts since it enables projects to reduce barriers and create new opportunities. Knowledge of correct community engagement strategies could help create a second resource, which is the local community's awareness of the benefits of SWHs. Once the local community understands how SWH can be utilized and improve their livelihoods, they are more likely to use it to their full potential. The research on Kuyasa serves as a best practice case, which shows how vital this engagement is. Members of the Kuyasa community can also share their knowledge on the benefits of SWHs with other communities. This may create demand for SWH, and communities can request SWH on RDP housing. Obtaining those two resources could help project leaders, local authorities, and the local community collaborate to develop successful SWH rollout projects.

Another critical step in the development of SWH rollouts is the sourcing of funding. Since these projects were organized for the public good, there was little economic incentive to invest. The Kuyasa project demonstrated that through correct community engagement, the community can be willing to financially contribute, which reduces the need for capital investment. Future SWH rollouts should explore this way of sourcing funding as well as it reduces the investment amount required to set up the project. It is important that voluntary agreements are made between the project and the local community for this funding to be obtained. These voluntary agreements allow for the establishment of mutual agreements, which can be created through correct community engagement strategies.

An opportunity that should be explored by project leaders is that of local employment. Through extensive local employment, community engagement can be improved, and the implementation of the project can be more successful. The local community can also benefit from job creation as this provides them with a means to develop a professional career and be trained to perform a specific job. For successful employment of the local community in a project, a formal labor contract, as well as voluntary work agreements, need to be developed. For more sustainable job creation, SWH rollout projects can also support the development of a local business that can be employed by the project for implementation and maintenance.

7.3.2 Future Research

Additional research should focus on two different areas to improve SWH rollout projects. First, future research could analyze the influence of all the dimensions of energy democracy on the policy domain of SWH for low-income areas. This research demonstrates how the policy domain is influenced by energy democracy, but only with regard to participatory governance. Future research could investigate how the full scope of energy democracy influences the policy domain. Including the concepts of civic ownership and popular sovereignty in the scope future research should indicate how the complete theory of energy democracy can influence the policy domain of SWHs. It is expected that all energy democracy elements can have a positive influence on the rollout of SWH, which is why this issue needs to be future researched

Second, future research should analyze international best practice cases of energy democracy inclusion in SWH projects. Since this research is only focused on the city of Cape Town's SWH rollouts for low-income areas, finding inspiration from international best practices is important. Currently, the South African-German Energy Program (GIZ-SAGEN) has researched this area in collaboration with the SEA. However, this research only focuses on best practice cases within South Africa and is not independent nor scientific (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2015). Researching international examples could hold valuable information on developments in South Africa.

Nevertheless, it should not be forgotten that the context of the project plays an essential role in the success of the implementation.

8 Reflection

This reflection discusses the process of the research and the way was conducted. Conducting the research has not been much of a burden. In fact, I enjoyed the process of taking the interviews and analyzing first-hand information. However, I did struggle with the aspects of working with a scientific framework and time management.

Since my education did not previously require me to write a scientifically correct thesis, I struggled with the scientific requirements and process of designing and conducting research. I had never used a scientific theory before to direct my research. This process of getting to understand the purpose of using theory and application was difficult for my research. I feel I now have a better understanding of the purpose of using scientific theories and feel much more comfortable applying them in my future research. Additionally, the aspects of validity and relevance were new to me. The courses on qualitative and quantitative methods have me understand these concepts and apply them during my thesis. I now understand how important these elements are to scientific research and can evaluate the quality of other scientific research.

During my research, I learned that the cases I had selected had already been more intensively researched than I had initially understood. When conducting my first interviews, I was told that many South African master's and bachelor's students had selected similar cases and that there were also extensive documents created by different organizations like the SEA, which analyzed the projects. Therefore, I have used these sources to gain insight into the practicalities of the cases and used my interviews to discuss more recent developments to provide new insights into the current policy domain. I planned to interview people from the local communities who either received an SWH or were part of the implementation process. I am disappointed that this part of my research has not been realized, as this would have given me better insight into the participatory governance aspect of my study. Nevertheless, the information that I was able to retrieve during my other interviews gave me enough information to work with,

Since I conducted my research in South Africa, I spent some time focusing on my personal development and experience of the country. I am extremely grateful to have been able to conduct my research in South Africa because it provided me with the possibility of experiencing a country and learning about its economy, history, politics, and culture from a researcher's point of view. I have learned a great deal about the structures in South African society, which I value not only for my research but also as a global citizen. This also led to some delay in the analysis of my data and writing of my thesis. Due to the limited time I spent in Cape Town, I have focused my efforts on conducting and processing my primary data. I partly analyzed this data during my time in South Africa. However, some of my analysis was conducted after the interviews. It would have been better to have fully analyzed the data during this period as I could have used this knowledge and understanding to guide my research. I do believe that I have collected relevant and rich data that supports my analysis and conclusions.

Overall, this research project helped me improve my scientific research skills, while appreciating the process of researching and gaining in-depth knowledge on the subject. It helped me apply an abstract theory to a real-life case, after which conclusions can be drawn once again on a theoretical level. It has been great practice for my master thesis.

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Appendix

Appendix 1: interviewees

Expert

Holle Wlokas

07-05-2018

Wlokas is a social scientist who works in the field of community development, especially linked to the renewable energy sector. Wlokas's master thesis was focused on the alleviation of energy poverty in Kuyasa and worked on social research in Joe Slovo.

Respondents

Carl Wesselink

16-05-2018

Wesselink originally a human right lawyer was the lead implementer for Kuyasa and one of the leading characters in the design and development of the project. Wesselink currently works for SouthSouthNorth.

Sarah Ward

08-05-2018

Ward was worked on low income energy issues since 1993 and is currently the head of energy and climate change and the low income energy services branch for the city of Cape Town and has been involved in both Kuyasa and Joe Slovo phase 3.

Anton Cartwright

28-05-2018

Cartwright is an economist at the African Centre for Cities, University of Cape Town, as well as, the founding director of Credible Carbon and organization that sells credits from South African poverty alleviating carbon mitigation projects, under which is Kuyasa since 2014.

Eugene Visagie

10-05-2018

Visagie is the Deputy Director for Policy & Research at the Western Cape provincial department of Human Settlements and was involved in the implementation of Joe Slovo phase 3.

Annie Orgill

22-05-2018

Orgill was appointed by the national department of Human Settlements to be the project manager for energy efficiency in the Joe Slovo Phase 3 project.

Megan Euston-Brown

25-05-2018

Euston-Brown is the director at Sustainable Energy Africa (SEA) and has worked in the area of sustainable energy development since 2003. She has been involved in the research on Joe Slovo on a consultancy base.

Informal conversations respondents:

Kyle Swartz

15-05-2018

Swartz is a master student at the Sustainable Development at the Sustainability Institute, Stellenbosch University. His research included the SWH implementation at the Hoop wind farm as part of the REIPPPP community development program.

Thuli Dlamini

15-05-2018

Dlamini is with the Economics Department at the Independent Power Producer Office and was represented at the national Department of Energy stand at the African Utility Week conference.

Appendix 2: Interview Guide

Introduction	
Intro	• Introduce my self • Introduce my research + case • Explain the concept of the policy domain • Show appreciation of proving the time and effort to contribute • Explain that the interview will take around 45 minutes
Goal and purpose of the interview	• Gain more insight into policy surrounding SWH projects for low incomes • Dialogue is important to discover the dynamics between different elements in the policy domain • Personal experiences within the development of a certain case
Subjects	• The interview is chronologically structured according to your involvement in the development of the case
Confidentiality	• With permission the result from the interview will not be anonymous • De data will only be available to myself and my supervisor and the thesis will be available to the university, all information is stored safely to prevent fraud.
Recording	• With permission the interview will be recorded in audio in order to transcribe the interview for analysis
Subjects, main and sub questions	
1. introduction	• Can you introduce yourself and your professional background? • How have you become aware of SWH projects? • Can you briefly describe the SWH (case) project(s)? • How are you involved in this project? • How would you describe your role in the development? • Can you give some examples of tasks/activities you were involved in? • Did you have previous experience with SWH (other projects)? • How have you been involved in these projects?
2. context and development leading up to SWH (case) project(s)	• Can you explain briefly the energy situation in SA in 2005?

	• How was the (case) SWH project(s) a response to the situation at that time? • How was the project first initiated? • Can you give some examples of the most important moment in the development phase of the project? • By whom was the project initiated? • Which roles did these stakeholders have? • How were activities divided at this stage? • Can you provide some examples of your own activities on which you collaborated with other stakeholders? • How would you describe the collaboration between the stakeholders? • How did stakeholders communicate with each other (through which resources and for what reasons?) • How did stakeholders come to agreements on how to develop the project? • Can you briefly describe how decisions are made? • Who had authority to make decisions? And why? • To initiate the project which financial resources were required? • To initiate the project which knowledge and skills were required? • To initiate the project which infrastructural resources were required? • To initiate the project which social contacts and certain authority were required? • Who provided these financial, skills, infrastructure, socials contacts? • Which resources did you contribute that support the development of the project? • How did these resources contribute to the development of the project? • Did you depend on other resources supplied by other stakeholders? • Can you give some examples? • How did handle these situations? • What was missing at this stage of the project which were hindering the development? • What made the development of the project difficult? • How did you deal with the lack of resources? • Who could have potentially supplied these resources? • Why did these parties withhold from supplying these resources?
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3. the implementation phase of the SWH (case) project(s)	• What lead to the transition from development/preparation to actual implementation of the project? • Who was responsible for the implementation of the project? • Who else was involved in the implementation? • Are there any new stakeholders who entered the project at this stage? And why? • How did these new stakeholders contribute to the process? • Are there any stakeholders who left the project at this stage? And why? • Did the communication between the stakeholders change from the preparation to the implementation stage? • What were the barriers during the implementation? • Were there any strategic changed made during this process due to barriers faced? • Have you face personal barrier during the implementation? • How did you handle these barriers? • Were there any formal rules/regulations which hindered the implementation? • Who created/implemented/enforced these rules? • Were there any rules/regulations missing in order to implement the project successfully? • Did these rules apply to the local or national level? • Can you provide some examples of situation in which you required formal rules to support the project? • Did you take any action to implement or change rules to favor the implementation? • Were there any new resources required at this stage which were not available to the project before? • Who could have provided these resources? • During the implementation were there any informal routines, customs, or agreements between the stakeholders? • How did these influence the implementation?
4. finishing implementation and reflection	• After implementation what responsibilities and tasks remained in control of the project (maintenance, local support, etc.)? • How was the project reflected on? • Did the reflection on the project already happen during the implementation or only after? • How did the reflection influence the implementation? • Were there any formal rules that influenced or structured the reflection process? • Which stakeholders were involved in the reflection process? • Which tasks did these stakeholders hold?

	• How was the reflection communicated? • To whom was the reflection communicated? • What were the learning points highlighted by the reflection? • What were the successes highlighted by the reflection? • Was there an internal reflection on the organization of the project? • What were the most important resources that supported the reflection process? • Were there any resources lacking in order to reflect and analyze the project correctly? • How can the reflection support similar project in the future?
Conclusion	
Closing the interview	• Are there any issues you miss during this interview? • Would you like to share information which has not been discussed yet
Ask for other contacts	• Can you provide me with contact information for other stakeholders involved in the project? • Would it be ok if I used your name when contacting them?
Confirmation	• Would you like to receive the results of the thesis?
Show appreciation	• Thank you for your time and input • Can I contact you for any additional information? • I will send the requested material by ...